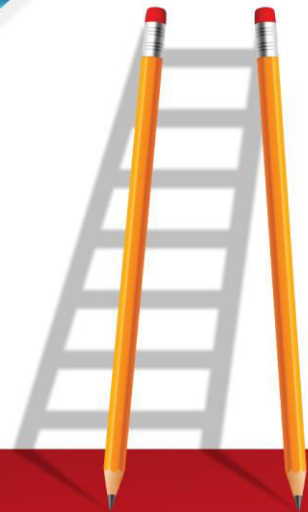


# BIOLOGY



## Worksheet-1



**STP**

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### Worksheet-1 (Homeostasis)

**Q.1** Animals cope with the temperature extremes by a homeostatic mechanism called:

- A) Evaporative cooling
- B) Shivering thermogenesis
- C) Non-shivering thermogenesis
- D) Thermoregulation

**Q.2** Each organism of a species has assumed, in evolutionary history a specific set up of \_\_\_\_\_ at various levels of organization suitable to its surrounding.

- A) Internal environment
- B) External environment
- C) Intracellular environment
- D) Intercellular environment

**Q.3** Weight of kidneys accounts for less than \_\_\_\_\_ % of the total body weight.

- A) 10
- B) 20
- C) 1
- D) 0.1

**Q.4** Kidneys receive \_\_\_\_\_ % of blood supplied with each cardiac beat.

- A) 1
- B) 10
- C) 5
- D) 20

**Q.5** Nephrons, in human kidneys are arranged along two distinct regions, i.e.:

- A) An inner cortex and outer medulla
- B) An outer cortex and an inner medulla
- C) An inner cortex and an inner medulla
- D) An outer cortex and a middle medulla

**Q.6** The structure which is specifically instrumental in the production of concentrated urine is:

- A) Cortical nephron
- B) Juxtamedullary nephron

- C) Counter current multiplier
- D) Restricted supply of water

**Q.7** The nephrons arranged along the cortex are called as:

- A) Cortical
- B) Juxtamedullary
- C) Juxtacortical nephron
- D) Medullary

**Q.8** In each nephron inner end forms a cup shaped swelling, called:

- A) Glomerulus
- B) Bowman's capsule
- C) Renal pyramid
- D) Renal hilus

**Q.9** In each nephron inner end forms a cup shaped swelling around a ball of capillaries called:

- A) Bowman's capsule
- B) Glomerulus
- C) Loop of Henle
- D) Renal pelvis

**Q.10** It circulates blood through a capsule in a nephron:

- A) Afferent arteriole
- B) Peritubular capillaries
- C) Efferent arteriole
- D) Glomerulus

**Q.11** Blood is specially filtered in glomerulus, because glomerular walls are porous, and the fraction of the \_\_\_\_\_ reaching here provides the filtration pressure.

- A) Osmotic pressure

- B) Blood pressure  
C) Interstitial pressure  
D) Diffusion pressure
- Q.12** After coming out of the capsule as efferent arteriole, the blood vessel subdivides again into another network of capillaries called:
- A) Vasa recta  
B) Afferent arteriole  
C) Peritubular capillaries  
D) Renal vein
- Q.13** Bowman's capsule continues as:
- A) Proximal tubule  
B) Distal tubule  
C) Loop of Henle  
D) Urine collecting duct
- Q.14** The collecting tubule receives wastes from:
- A) Renal pelvis  
B) Distal tubule  
C) Proximal tubule  
D) Loop of Henle
- Q.15** Blood passing through \_\_\_\_\_ is filtered into Bowman's capsule.
- A) Peritubular network  
B) Glomerulus  
C) Afferent arteriole  
D) Efferent arteriole
- Q.16** Blood is specially filtered in glomerulus, because glomerulus walls are porous and the fraction of the pressure reaching here provides the:
- A) Osmotic pressure  
B) Filtration pressure  
C) Diffusion pressure  
D) Osmotic pressure
- Q.17** Glomerular filtrate contains numerous useful substances such as:
- A) Glucose, amino acids, urea  
B) Glucose, uric acid, salts  
C) Glucose, amino acids, salts  
D) Urea, uric acid, ammonia
- Q.18** All useful constituents of the glomerular filtrate are reabsorbed in:
- A) Distal tubule      C) Proximal tubule  
B) Loop of Henle      D) Collecting tubule
- Q.19** The tubular epithelium also secretes substances into the lumen, which is mainly of:
- A) Hydrogen ions      C) Potassium ions  
B) Hydroxyl ions      D) Sodium ions
- Q.20** Conservation of water is the principal function of the body in:
- A) Surplus supply of water  
B) Restricted supply of water  
C) Sufficient supply of water  
D) Excess supply of water
- Q.21** In restricted supply of water concentration of the filtrate is done by the following except:
- A) Counter current  
B) Hormonal mechanism  
C) Antidiuretic Hormone  
D) Aldosterone
- Q.22** In sufficient or excess supply of water, reabsorption of water from filtrate is:
- A) Increased      C) Reduced  
B) Maintained      D) Stopped
- Q.23** Reabsorption of water from filtrate is reduced in:
- A) Surplus supply of water  
B) Sufficient supply of water

- C) Excess supply of water
- D) Restricted supply of water

**Q.24 Mammalian kidney including human is adapted to conserve water by \_\_\_\_\_ reabsorption of glomerular filtrate.**

- A) 99.0%                      C) 99.5%
- B) 99.1%                      D) Over 99.5%

**Q.25 The \_\_\_\_\_ of the kidney are gradually concentrated from cortical to medullary part of kidney.**

- A) Interstitial fluid
- B) Glomerular filtrate
- C) Blood
- D) Interstitial fluid as well as filtrate

**Q.26 Counter current multiplier causes gradual osmotic outflow of water from the filtrate back to kidney as it passes downward in the:**

- A) Proximal tubule
- B) Collecting tubule
- C) Descending loop of Henle
- D) Distal tubule

**Q.27 Ascending limb of loop of Henle does not allow \_\_\_\_\_ from its filtrate.**

- A) Outflow of sodium
- B) Outflow of water
- C) Outflow of salts
- D) Outflow of any material

**Q.28 Ascending loop of Henle actively transport \_\_\_\_\_ into kidney interstitium to sustain its high concentration.**

- A) Water                      C) Urea
- B) Na<sup>+</sup> ions                      D) H<sup>+</sup> ions

**Q.29 Various factors of pathological and chemical nature may progressively destroy the nephron which results in:**

- A) Increase in the plasma level of urea

- B) Decrease in other nitrogenous wastes
- C) Decrease in the plasma level of urea
- D) Decrease in the blood pressure

**Q.30 The function of the kidney is completely lost and it is unable to remove nitrogenous wastes, in:**

- A) Acute renal failure
- B) Chronic renal failure
- C) Partial renal failure
- D) Kidney stones

**Q.31 In case of uremia, to remove nitrogenous wastes, particularly the urea, the blood of the patient is treated through:**

- A) Centrifugation                      C) Transfusion
- B) Lithotripsy                      D) Dialysis

**Q.32 There are two types of dialysis i.e.:**

- A) Blood dialysis and peritoneal dialysis
- B) Plasma dialysis and peritoneal dialysis
- C) Hemodialysis and peritoneal dialysis
- D) Hemodialysis and permanent dialysis

**Q.33 Hemodialysis means:**

- A) Cleaning the blood
- B) Replacing the blood
- C) Washing the blood
- D) Centrifugation of the blood

**Q.34 The wastes and excess water pass during dialysis from blood through the membrane:**

- A) Into the body
- B) Out of the body
- C) Into the dialysis fluid
- D) Out of the dialysis fluid



**Q.35 Peritoneal cavity is filled with dialysis fluid that enters the body through a/an:**

- A) Artery                      C) Capillary  
B) Vein                        D) Catheter

**Q.36 It is the kidney machine that works on the same principle as the kidney for removal of wastes and excess water from the blood:**

- A) Catheter                      C) Dialyzer  
B) Peritoneum                  D) Epithelium

**Q.37 The surgical transplantation of a matching donor's kidney is the only option left for the permanent treatment of:**

- A) Kidney stones              C) Uremia  
B) Hypercalcemia            D) Hyperoxaluria

**Q.38 Homeostasis is the central requirement in the maintenance of an organism, which compels the \_\_\_\_\_ in constant changing conditions and contribute in evolutionary process.**

- A) Thermoregulation      C) Excretion  
B) Osmoregulation        D) Adaptations

**Q.39 Pick up the matching one:**

- A) Conservation of water-concentration of filtrate  
B) Conservation of water-diluted urine  
C) Restricted supply of water-diluted urine  
D) Sufficient supply of water-concentration of filtrate

**Q.40 Pick up the incorrect one:**

- A) Conservation of water results in concentration of filtrate  
B) Restricted supply of water cause conservation of water

C) Release of ADH is inhibited in the presence of hypo-osmotic body fluids

D) Reduction in reabsorption results in production of small volume of conc. urine

**Q.41 It is adapted to conserve water by over 99.5% reabsorption of glomerular filtrate:**

- A) Mammalian body including human  
B) Mammalian kidney including human  
C) Mammalian skin including human  
D) Mammalian liver including human

**Q.42 The active uptake of sodium from the ascending limb or thick loop of Henle is promoted by the action of:**

- A) ADH  
B) Aldosterone  
C) Concentration of filtrate  
D) Vasopressin

**Q.43 The production of varied concentration of urine depends upon the:**

- A) Availability of water  
B) Availability of sodium  
C) Production of aldosterone  
D) Counter current multiplier

**Q.44 Kidney stones are formed in:**

- A) Infectious diseases  
B) Metabolic diseases  
C) Genetic disease  
D) Congenital diseases

**Q.45 Calcium oxalate type stone is caused by:**

- A) Hyperoxaluria              C) Hyperuricemia

B) Hypercalcaemia D) Metabolic disease

**Q.46** The kidney stones caused by hypercalcaemia are \_\_\_\_\_ percent of the total kidney stones.

- A) 10% C) 70%  
B) 15% D) 5%

**Q.47** The kidney stones caused by hyperoxaluria are \_\_\_\_\_ percent of the all kidney stones.

- A) 10% C) 70%  
B) 15% D) 5%

**Q.48** The kidney stones caused by hyperuricemia are \_\_\_\_\_ percent of the all kidney stones.

- A) 10% C) 70%  
B) 15% D) 5%

**Q.49** Hypercalcaemia i.e. high level of circulating calcium in blood is because of:

- A) Stone of calcium phosphate  
B) Stone of calcium oxalate  
C) Stone of uric acid  
D) Other diseases

**Q.50** The salts are precipitated out during \_\_\_\_ and accumulate later to form stone.

- A) Urea formation C) Urine formation  
B) Urination D) Defecation

**Q.51** Lithotripsy is a technique used to break up stones formed in the:

- A) Kidney  
B) Gall bladder  
C) Ureter  
D) Kidney, Ureter and gall bladder

**Q.52** Extracorporeal, shock wave lithotripsy is:

- A) The only way to carry out lithotripsy  
B) One of the several ways to carry out lithotripsy  
C) The most common way to carry out lithotripsy  
D) A way likely to be used in future

**Q.53** Various factors of pathological and chemical nature may progressively destroy the nephron, particularly its:

- A) Glomerulus part  
B) Convoluted tubule  
C) Loop of Henle  
D) Bowman's capsule

**Q.54** A pair of Kidneys consists of \_\_\_\_\_ of functional units.

- A) Million C) Millions  
B) Billion D) Billions

**Q.55** Detection of change and signalling for effector's response to control system is a:

- A) Homeostasis  
B) Thermoregulation  
C) Excretion  
D) Feedback mechanism

**Q.56** Animals maintain their internal osmotic state through:

- A) Homeostasis C) Osmoregulation  
B) Thermoregulation D) Excretion

**Q.57** A specified set up of internal environment at various levels of organization suitable to its surroundings, have been assumed by each organism of a species in:

- A) Life history  
B) Life cycle

- C) Evolutionary history
- D) Homeostatic history

STEP ENTRY TEST 2020

**ANSWER KEY (Worksheet-1)**

1	D	18	C	35	D	52	B
2	A	19	A	36	C	53	A
3	C	20	B	37	C	54	C
4	D	21	D	38	D	55	D
5	B	22	C	39	A	56	C
6	B	23	C	40	D	57	C
7	A	24	D	41	B	58	
8	B	25	D	42	B	59	
9	B	26	C	43	A	60	
10	D	27	B	44	B	61	
11	B	28	B	45	A	62	
12	C	29	A	46	B	63	
13	A	30	B	47	C	64	
14	B	31	D	48	A	65	
15	B	32	C	49	D		
16	B	33	A	50	C		
17	C	34	C	51	D		

**EXPLANATION**

**Q.1** Answer is “Thermoregulation”

**Explanation:** The process mentioned in ‘A’, ‘B’ and ‘C’ are partially supportive in temperature maintenance, however thermoregulation is the homeostatic process used in this regard.

**Q.2** Answer is “Internal environment”

**Explanation:** Homeostatic arrangements in each organism have acquired perfection through evolution and now each species have its own arrangement.

**Q.3** Answer is “01”

**Explanation:** Kidneys contribute less than 1% of the total body weight but they receive 20% of the total blood of the body by each cardiac beat. This indicates their physiological importance.

**Q.4** Answer is “20”

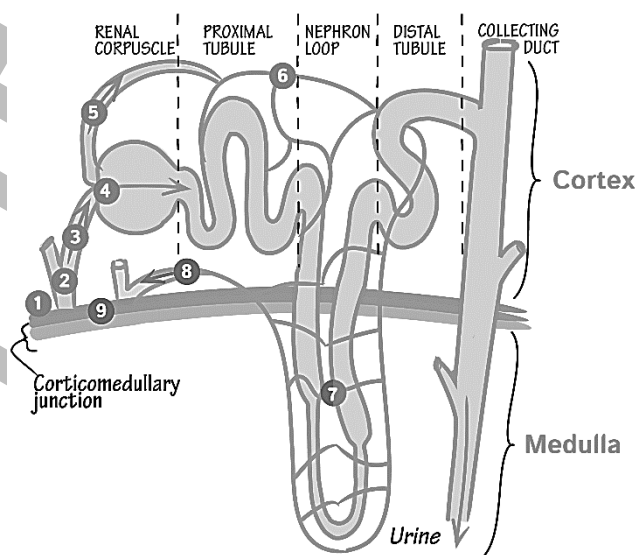
**Explanation:** Kidney contribute less than 1% of the total body weight but they receive 20% of the total blood of the body by each cardiac beat. This indicates their physiological importance.

**Q.5** Answer is “An outer cortex and an inner medulla”

**Explanation:** Cortex literally means outer layer and medulla literally means inner part. The outer and peripheral part is called renal cortex and inner or central part is called renal medulla.

**Q.6** Answer is “Juxtamedullary nephron”

**Explanation:** Though counter current multiplier and restricted supply of water are also associated with production of concentrated urine but they are not structures.



**Q.7** Answer is “Cortical”

**Explanation:** Cortex is the outer and peripheral part of kidneys whereas medulla is the inner or central part of kidney. The nephrons of cortical part are called cortical nephrons.

**Q.8** Answer is “Bowman’s capsule”

**Explanation:** Bowman’s capsule or the Bowman capsule or capsule glomeruli or glomerular capsule is a cup like sac at the beginning of the tubular component of a nephron in the mammalian kidneys.

**Q.9** Answer is “Glomerulus”

**Explanation:** The ball of capillaries is called glomerulus which is surrounded by a cup shaped structure called Bowman’s

capsule. Glomerulus circulates the blood in the cup shaped Bowman's capsule.

**Q.10 Answer is "Glomerulus"**

**Explanation:** The ball of capillaries is called glomerulus which is surrounded by a cup shaped structure called Bowman's capsule.

**Q.11 Answer is "Blood pressure"**

**Explanation:** The net filtration pressure (NFP) at the glomerulus is the difference between the net hydrostatic pressure and the blood colloid osmotic pressure acting across the glomerular capillaries. This is the average pressure forcing water and dissolved materials out of the glomerular capillaries into the capsular space.

**Q.12 Answer is "Peritubular capillaries"**

**Explanation:** Peritubular capillaries constitute a network of tiny blood vessels that travel alongside nephrons, allowing reabsorption and secretion between blood and the inner lumen of the nephron. Peritubular capillaries surround the proximal and distal tubules, as well as the loop of Henle where they are known as Vasa recta.

**Q.13 Answer is "Proximal tubules"**

**Explanation:** Proximal tubule receive filtrate from Bowman's capsule.

**Q.14 Answer is "Distal tubules"**

**Explanation:** Distal tube opens into collecting tubule.

**Q.15 Answer is "Glomerulus"**

**Explanation:** Glomerular membrane is used as initial filtering membrane.

**Q.16 Answer is "Filtration pressure"**

**Explanation:** Blood pressure provides the pressure required for pressure filtration.

**Q.17 Answer is "Glucose, amino acids, salts"**

**Explanation:** These useful substances are filtered out in aqueous solution along

with waste substances from glomerulus into the Bowman's capsule.

**Q.18 Answer is "Proximal tubule"**

**Explanation:** All useful constituents of the glomerular filtrate are reabsorbed in the proximal tubules and when filtrate leaves proximal tubules, it mostly contains nitrogenous wastes.

**Q.19 Answer is "Hydrogen ions"**

**Explanation:** Hydrogen ions make pH acidic to give the urine an antiseptic effect.

**Q.20 Answer is "Restricted supply of water"**

**Explanation:** When supply of water to the body is restricted the water inside the body is conserved to compensate it and vice versa. Thus volume of the urine is reduced and it becomes concentrated.

**Q.21 Answer is "Aldosterone"**

**Explanation:** Aldosterone is associated with active reabsorption of salts not of water. Whereas, rest of the choices are associated with concentration of urine and conservation of water.

**Q.22 Answer is "Reduced"**

**Explanation:** When sufficient or excess supply of water is available to our body, reabsorption from the glomerular filtrate will be reduced and more and more water will be allowed to leave the body in the form of urine.

**Q.23 Answer is "Excess supply of water"**

**Explanation:** When supply of water to the body is restricted the water inside the body is conserved to compensate it and vice versa.

**Q.24 Answer is "Over 99.5%"**

**Explanation:** More than 99.5% water from filtrate is reabsorbed in human and mammalian kidney.

**Q.25 Answer is "Interstitial fluid as well as filtrate"**

**Explanation:** The interstitial fluid of kidney becomes more and more



concentrated from cortex to inner medulla which exerts osmotic pressure on the filtrate moving inside the nephron thus making it more and more concentrated as well.

**Q.26 Answer is “Descending loop of Henle”**

**Explanation:** Water is passively reabsorbed from the filtrate back into blood stream while passing through the descending limb of loop of Henle.

**Q.27 Answer is “Outflow of water”**

**Explanation:** Sodium is actively reabsorbed from filtrate under the influence of aldosterone hormone while passing through the ascending limb of loop of Henle, not water.

**Q.28 Answer is “Na<sup>+</sup> ions”**

**Explanation:** Sodium is actively reabsorbed from filtrate under the influence of aldosterone hormone while passing through the ascending limb of loop of Henle.

**Q.29 Answer is “Increase in the plasma level of urea”**

**Explanation:** When nephrons suffers from any disorder, they remain unable to filter the urea from blood and as a result of plasma level of urea increases.

**Q.30 Answer is “Chronic renal failure”**

**Explanation:** In chronic renal failure the kidneys will not remove the nitrogenous wastes from the blood.

**Q.31 Answer is “Dialysis”**

**Explanation:** Dialysis is a temporary measure to clean the blood off nitrogenous wastes until the kidney transplant is managed.

**Q.32 Answer is “Hemodialysis and peritoneal dialysis”**

**Explanation:** Hemodialysis is a pure mechanical dialysis whereas in peritoneal dialysis a human membrane called peritoneum is used as filtering membrane

to isolate the nitrogenous wastes from blood.

**Q.33 Answer is “Cleaning the blood”**

**Explanation:** Hemodialysis literally means cleaning the blood.

**Q.34 Answer is “Into the dialysis fluid”**

**Explanation:** Wastes are collected in dialysis fluid during dialysis.

**Q.35 Answer is “Catheter”**

**Explanation:** A catheter is a thin tube made from medical grade materials, serving a broad range of functions along with filling and draining the dialysis fluid from peritoneal cavity.

**Q.36 Answer is “Dialyzer”**

**Explanation:** As the name indicates, it is a dialysis machine.

**Q.37 Answer is “Uremia”**

**Explanation:** Uremia is an end stage kidney failure and it can be treated with kidney transplant only.

**Q.38 Answer is “Adaptations”**

**Explanation:** Adaptations gradually accumulate and become a result of evolution in longtime.

**Q.39 Answer is “Conservation of water – concentration of filtrate”**

**Explanation:** When water is taken back from the filtrate it becomes concentrated.

**Q.40 Answer is “Reduction in reabsorption results in production of small volume of conc. urine”**

**Explanation:** When reabsorption from filtrate is reduced it results in production of massive volume of diluted urine.

**Q.41 Answer is “Mammalian kidney including humans”**

**Explanation:** More than 99.5% water from filtrate is reabsorbed in human and mammalian kidney.

**Q.42 Answer is “Aldosterone”**

**Explanation:** Aldosterone hormone is secreted from adrenal cortex and acts upon ascending limb of loop of Henle to promote reabsorption of sodium by active uptake. It is mineralocorticoid hormone.

**Q.43 Answer is “Availability of water”**

**Explanation:** When sufficient water is available diluted urine is produced and when water is deficient urine is concentrated.

**Q.44 Answer is “Metabolic diseases”**

**Explanation:** Metabolic diseases result in formation of kidney stones.

**Q.45 Answer is “Hyperoxaluria”**

**Explanation:** It is high level of oxalates in blood which cause calcium oxalate type stones.

**Q.46 Answer is “15%”**

**Explanation:** As per statistical data given in textbook.

**Q.47 Answer is “70%”**

**Explanation:** As per statistical data given in textbook.

**Q.48 Answer is “10%”**

**Explanation:** As per statistical data given in textbook.

**Q.49 Answer is “Other diseases”**

**Explanation:** Hypercalcemia is caused by some metabolic, dietary or hormonal disorder.

**Q.50 Answer is “Urine formation”**

**Explanation:** Stone formation occur during urine formation.

**Q.51 Answer is “Kidney, ureter and gall bladder”**

**Explanation:** Stones formed in kidney, ureter and gall bladder can be broken down by radiations.

**Q.52 Answer is “One of the several ways to carry out lithotripsy”**

**Explanation:** Others are intracorporeal shockwave lithotripsy, laser lithotripsy

electrohydraulic lithotripsy, mechanical lithotripsy and ultrasonic lithotripsy.

**Q.53 Answer is “Glomerulus part”**

**Explanation:** As glomerulus plays a vital role in filtration of wastes (particularly nitrogenous wastes).

**Q.54 Answer is “Millions”**

**Explanation:** Means many millions.

**Q.55 Answer is “Feedback mechanism”**

**Explanation:** In these processes there is an inverse effector's response to control the change.

**Q.56 Answer is “Osmoregulation”**

**Explanation:** Maintenance of inner osmotic state is the basic responsibility of osmoregulatory homeostasis, however excretory homeostasis also plays a role in it as a secondary function.

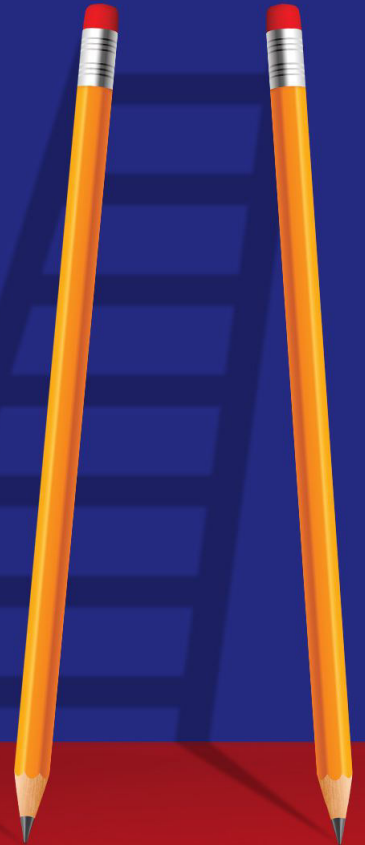
**Q.57 Answer is “Evolutionary history”**

**Explanation:** Homeostasis is the central requirement in the maintenance of an organism, which compels the adaptations in the constant changing conditions and contribute in evolutionary process. Thus homeostatic arrangements have been evolved along with the evolution of animal world. Highly evolved animals like mammals (including humans) have perfectly evolved homeostasis. Evolution of excretory homeostasis in animal world proceeded in following sequence.

Protonephridial system →  
metanephridial system → true  
nephridial system.

# STOP

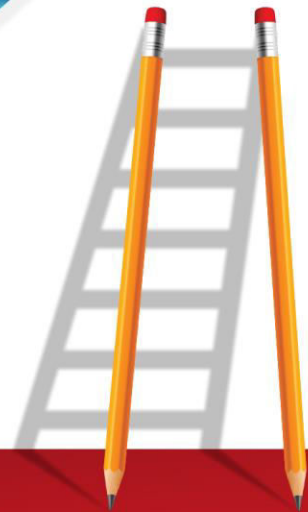
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# BIOLOGY



## Worksheet-2



**STP**

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**Worksheet-2****(Muscles and Movement)**

- Q.1** The muscles that are attached to the skeleton are:  
 A) Smooth muscles  
 B) Skeletal muscles  
 C) Cardiac muscles  
 D) Involuntary muscles
- Q.2** Generally, each end of the entire muscle is attached to bone by a bundle of collagen, non-elastic fibres known as:  
 A) Ligament  
 B) Capsule  
 C) Tendon  
 D) Connective tissue
- Q.3** It is a long cylindrical cell with multiple oval nuclei arranged just beneath its sarcolemma:  
 A) Muscle fibre  
 B) Muscle bundle  
 C) Myofibril  
 D) Myofilament
- Q.4** Sarcoplasm of muscle fibres differs from the cytoplasm of the other cells as it contains usually:  
 A) Large amount of stored starch  
 B) A unique oxygen binding protein, myoglobin  
 C) Hemoglobin that stores oxygen  
 D) Large amount of stored lipids
- Q.5** Myofibrils run in parallel fashion and extend entire length of the:  
 A) Muscle bundle  
 B) Muscle  
 C) Muscle fibre or muscle cell  
 D) Myofilament
- Q.6** Bundles of myofibrils are enclosed by the:  
 A) Muscle cell membrane  
 B) Nuclear membrane  
 C) Sarcolemma  
 D) Muscle cell membrane or sarcolemma
- Q.7** The light band of sarcomere is called:  
 A) H band  
 B) A band  
 C) I band  
 D) M band
- Q.8** Light and dark bands of muscles give the muscle cell as a whole its:  
 A) Strength  
 B) Nourishment  
 C) Striped appearance  
 D) Protection
- Q.9** A sarcomere is the region of a myofibril between two successive:  
 A) A-lines  
 B) H-lines  
 C) Z-lines  
 D) M-lines
- Q.10** Myofibrils contain:  
 A) Myofilaments  
 B) Thick filaments  
 C) Thin filaments  
 D) Muscle fibres
- Q.11** It is made up of thick and thin filament:  
 A) Myofibril  
 B) Muscle fibre  
 C) Muscle bundle  
 D) Myofilament
- Q.12** The diameter of thick filament is:  
 A) 16  $\mu\text{m}$   
 B) 7-8 nm  
 C) 1-2  $\mu\text{m}$   
 D) 16 nm
- Q.13** Each myosin molecule has a tail terminating in:  
 A) Two globular heads  
 B) Two linear heads  
 C) A globular head  
 D) A linear head
- Q.14** Globular heads of myosin filaments link the thick and the thin myofilaments together during contraction, that is why they are sometimes called:  
 A) Cross links  
 B) Cross bridges  
 C) Cross connection  
 D) Cross heads
- Q.15** Thin filaments have a diameter of:  
 A) 1-2  $\mu\text{m}$   
 B) 10-60  $\mu\text{m}$   
 C) 7-8 nm  
 D) 16 nm



**Q.16 Thin filaments are composed chiefly of:**

- A) Actin
- B) Troponin
- C) Tropomyosin
- D) Actin, tropomyosin and troponin

**Q.17 Out of three polypeptides of troponin one binds to actin chain, another binds to tropomyosin while third binds:**

- A) Myosin
- B) Collagen
- C) Sodium ions
- D) Calcium ions

**Q.18 The hypothesis to explain all events involved in muscle contraction was suggested by:**

- A) H. Huxley
- B) H. Huxley and A.F Huxley
- C) A.F. Huxley
- D) H. Huxley and A.F Huxley and their colleagues

**Q.19 During muscle contraction the cross bridges of thick filaments become attached to:**

- A) Myosin filament
- B) Binding sites of myosin filament
- C) Binding sites on actin filament
- D) Actin filament

**Q.20 Calcium ions bind with the troponin molecule and cause them to:**

- A) Extend
- B) Move slightly
- C) Contract
- D) Remain in the same position

**Q.21 Once the myosin head has become attached to the actin filament:**

- A) ATP is synthesized and the bridge goes to its cycle
- B) ATP is hydrolyzed and the bridge goes to its cycle

C) ATP is synthesized and the bridge becomes fixed

D) ATP is hydrolyzed and the bridge becomes fixed

**Q.22 All the fibres innervated by a single motor neuron contract:**

- A) One after other
- B) Simultaneously
- C) Separately
- D) Now or then simultaneously

**Q.23 T-system extends and encircles the myofibril at the level of:**

- A) Z-line
- B) A and I junction
- C) Z-line or A and I Junctions
- D) M-line or A and I Junctions

**Q.24 It causes muscle pH to drop when the muscle suffers from:**

- A) Accumulation of ATPs
- B) Aerobic breakdown of glucose
- C) Overactive metabolism
- D) Lactic acid accumulation

**Q.25 It increases the excitability of neurons and result in loss of sensation:**

- A) Cramp
- B) Muscle fatigue
- C) Tetany
- D) Tetanus

**Q.26 The vertebrates possess \_\_\_\_\_ kinds of muscles:**

- A) Two
- B) Four
- C) Three
- D) Six

**Q.27 It has regular stripes:**

- A) Cardiac muscles
- B) Skeletal muscles
- C) Voluntary muscles
- D) Involuntary muscles

**Q.28 It has many nuclei per cell:**

- A) Smooth muscles
- B) Cardiac muscles
- C) Skeletal muscles
- D) Involuntary muscles

**Q.29** Contraction of smooth muscles is caused by following causes:

- A) Spontaneous stimuli
- B) Nervous system & hormonal stimuli
- C) Stretch stimuli
- D) Spontaneous, stretch, nervous & hormones

**Q.30** The contraction of cardiac muscles is caused by:

- A) Spontaneous stimuli
- B) Nervous stimuli
- C) Stretch stimuli
- D) Hormonal stimuli

**Q.31** The function of cardiac muscles is to:

- A) To pump blood
- B) To move the skeleton
- C) To control movement of substances through hollow organs
- D) To pump the lymph

**Q.32** The function of skeletal muscles is to:

- A) To pump blood
- B) To move the skeleton
- C) To control movement of substances through hollow organs
- D) To pump the lymph

**Q.33** A smallest contractile unit of muscle contraction called sarcomere is the area between two:

- A) H- zone                      C) Z- Line
- B) M- Line                    D) A band

**Q.34** The thousands of T-tubules of each muscle cell are collectively called:

- A) Triad
- B) Sarco-tubules
- C) T-system
- D) Neuromuscular junction

**Q.35** If a cross section of a sarcomere is seen, each myosin is surrounded by how many actin molecules:

- A) 9                              C) 6
- B) 5                              D) 7

**Q.36** The protein filament which binds to the calcium:

- A) Actin                              C) Troponin
- B) Myosin                          D) Tropomyosin

**Q.37** Muscle fatigue is caused by:

- A) CO<sub>2</sub>
- B) Accumulation lactic acid
- C) Fumaric acid
- D) Ethyl alcohol

**Q.38** Twisting around the actin chains there are two strands of another protein:

- A) Myosin                              C) Troponin
- B) Tropomyosin                      D) Creatine

**Q.39** It remains fixed during muscle contraction:

- A) Origin                              C) Belly
- B) Insertion                          D) Bone

**Q.40** \_\_\_\_\_ can polarize visible light:

- A) M-line of sarcomere
- B) I-band of sarcomere
- C) H-band of sarcomere
- D) A-band of sarcomere

**Q.41** It length of myofibril from one Z-line to the next:

- A) Plasma membrane              C) Sarcoplasm
- B) Sarcomere                          D) Sarcolemma

**Q.42** Muscle cell is considered as:

- A) Muscle fiber
- B) Sarcomere
- C) Muscle bundle
- D) Myofibril

**Q.43** Smooth reticulum are similar in structure to:

- A) RER
- C) Golgi bodies

- B) Microfilaments
- D) Sarcoplasmic reticulum

**Q.44 Pickup the ranges of muscle fibre:**

- A) 5 – 10  $\mu\text{m}$                       C) 10 – 100  $\mu\text{m}$
- B) 1 – 2  $\mu\text{m}$                       D) 50 – 100 nm

**Q.45 The thin filaments extends across the I-band and partly in to:**

- A) Z-line                      C) A-band
- B) H-zone                      D) M-line

**Q.46 The \_\_\_\_\_ have mid-section called H zone:**

- A) H-zone                      C) Z-zone
- B) M-zone                      D) A-zone

**Q.47 Pick up a complex of three polypeptide chains protein:**

- A) Tropomyosin                      B) Actin
- C) Myosin                      D) Troponin

**Q.48 Each myosin filament is surrounded by \_\_\_\_\_ actin filaments on both ends:**

- A) 5                      B) 6
- C) 10                      D) 12

**Q.49 After death, the amount \_\_\_\_\_ in the body falls:**

- A) Water                      C) Oxygen
- B) Calcium                      D) ATP

**Q.50 Majority of muscles tissue in human body are \_\_\_\_\_ type:**

- A) Smooth                      C) Cardiac
- B) Circular                      D) Skeletal

**ANSWER KEY (Worksheet-2)**

1	B	21	B	41	B
2	C	22	B	42	A
3	A	23	C	43	D
4	B	24	D	44	C
5	C	25	C	45	C
6	D	26	C	46	A
7	C	27	B	47	D
8	C	28	C	48	D
9	C	29	D	49	D
10	A	30	B	50	D
11	D	31	A		
12	D	32	B		
13	A	33	C		
14	B	34	C		
15	C	35	C		
16	A	36	C		
17	D	37	B		
18	D	38	B		
19	C	39	A		
20	B	40	D		

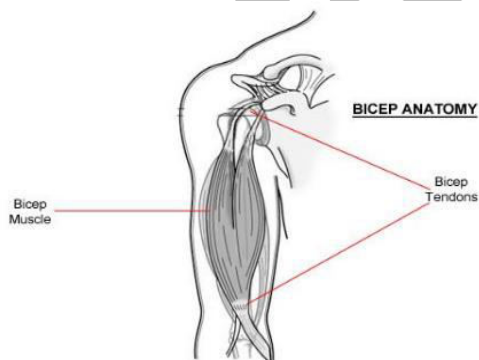
**EXPLANATION**

**Q.1** Answer is “Skeletal muscles”

*Explanation:* Skeletal muscles are called so because of their association on with skeleton.

**Q.2** Answer is “Tendon”

*Explanation:*



Tendon makes the ends of origin and ends of insertion of a skeletal muscles.

**Q.3** Answer is “Muscle fibre”

*Explanation:* A muscle cell or muscle fibre of skeletal muscle have such features.

**SKELETAL MUSCLE****LEG**

**Q.4** Answer is “A unique oxygen binding protein myoglobin”

*Explanation:* It is called muscle hemoglobin.

**Q.5** Answer is “Muscle fibre or muscle cell”

*Explanation:* Myofibrils have same length as held by muscle cell.

**Q.6** Answer is “Muscle cell membrane or sarcolemma”

*Explanation:* The plasma membrane of muscle cell is called sarcolemma.

**Q.7** Answer is “I-band”

*Explanation:* It consists of thin (actin) filaments only.

**Q.8** Answer is “Striped appearance”

*Explanation:* That is why they are called striped or striated muscles.

**Q.9** Answer is “Z-line”

*Explanation:* An area between two Z-lines or Z disc is called sarcomere.

**Q.10** Answer is “Myofilaments”

*Explanation:* Actin and myosin filaments.

**Q.11 Answer is “Myofilament”**

**Explanation:** Actin filament is thin while myosin filament is thick. They collectively (six thin myofilaments and one thick myofilament) give rise to a myofibril.

**Q.12 Answer is “16nm”**

**Explanation:** As per measurement.

**Q.13 Answer is “Two globular heads”**

**Explanation:** These are looping ends which make cross bridges with thin myofilament.

**Q.14 Answer is “Cross bridges”**

**Explanation:** Bond between myosin head and thin filament is called cross bridge.

**Q.15 Answer is “7-8 nm”**

**Explanation:** As per measurement.

**Q.16 Answer is “Actin”**

**Explanation:** Thin myofilaments consist of actin, tropomyosin and troponin, however the chief protein is actin. So thin myofilament is chiefly made up of actin.

**Q.17 Answer is “Calcium ions”**

**Explanation:** Calcium ions after making bond with troponin drag the tropomyosin away from the slot where myosin head makes bond.

**Q.18 Answer is “H. Huxley and A-F Huxley and their colleagues”**

**Explanation:** As per historical fact.

**Q.19 Answer is “Binding sites on actin filament”**

**Explanation:** Myosin heads bind to the binding sites on actin filaments to make cross bridges. These myosin heads bring the actin filaments towards the centre of the sarcomere by contracting.

**Q.20 Answer is “Move slightly”**

**Explanation:** When the muscle is required to contract, calcium ions bind with the troponin molecule and cause them to move slightly. This has the effect of displacing the tropomyosin and exposing the binding sites for the myosin head.

**Q.21 Answer is “ATP is hydrolyzed and bridge goes to its cycle”**

**Explanation:** Muscle contraction is highly active process and ATPs are consumed at each step i.e. making bond with actin filament, moving or bending and detaching from actin filament.

**Q.22 Answer is “Simultaneously”**

**Explanation:** the contraction of each muscle fibre is based on “All or none” principle i.e. all of its fibrils participate in contraction. The degree of contraction depends at once upon the number of fibres that participate in the contraction.

**Q.23 Answer is “Z-line or A and I junctions”**

**Explanation:** It is to ensure the transmission of impulse.

**Q.24 Answer is “Lactic acid accumulation”**

**Explanation:** It accumulates as a result of anaerobic respiration and accumulation of acid lowers the pH.

**Q.25 Answer is “Tetany”**

**Explanation:** As per symptoms of tetany.

**Q.26 Answer is “Three”**

**Explanation:** Skeletal, smooth and cardiac.

**Q.27 Answer is “Skeletal muscles”**

**Explanation:** Skeletal muscles have regular striations or strips converting the surface into alternating light and dark bands.

**Q.28 Answer is “Skeletal muscle”**



**Explanation:** Skeletal muscle cells are multinucleate.

**Q.29 Answer is “Spontaneous, stretch, nervous and hormones”**

**Explanation:** Causes of contraction of smooth muscles are diverse.

**Q.30 Answer is “Nervous stimuli”**

**Explanation:** It is autonomic nervous system, which send rythonic stimuli.

**Q.31 Answer is “To pump blood”**

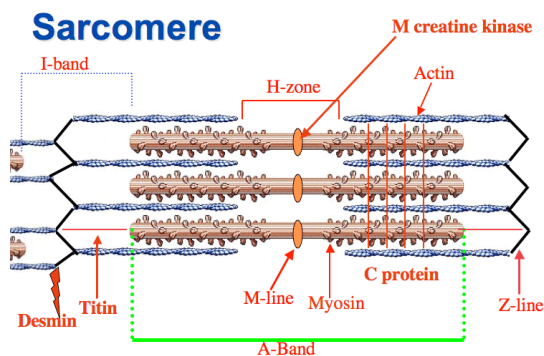
**Explanation:** As per function of the heart.

**Q.32 Answer is “To move the skeleton”**

**Explanation:** As per function of the skeletal muscles.

**Q.33 Answer is “Z- Line”**

**Explanation:**

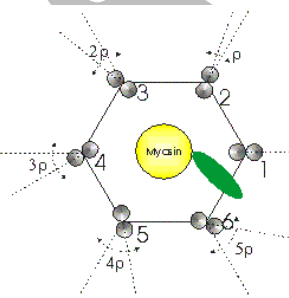


**Q.34 Answer is “T-system”**

**Explanation:** The thousands of T-tubules of each muscle cell are collectively called T-system.

**Q.35 Answer is “6”**

**Explanation:**



Each myosin filament is surrounded by 6 actin filaments on each end.

**Q.36 Answer is “Troponin”**

**Explanation:** The protein filament which binds to the calcium troponin.

**Q.37 Answer is “Accumulation lactic acid”**

**Explanation:** Muscle fatigue is caused by accumulation lactic acid.

**Q.38 Answer is “Tropomyosin”**

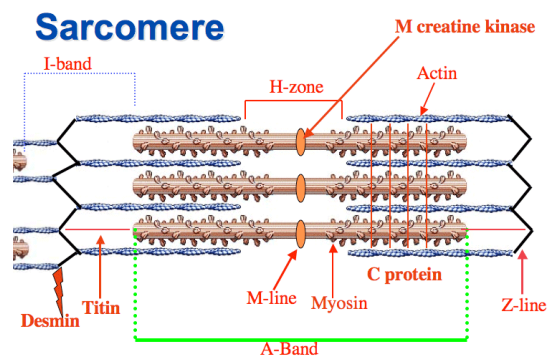
**Explanation:** Twisting around the actin chains there are two strands of another protein tropomyosin.

**Q.39 Answer is “Origin”**

**Explanation:** It remains fixed during muscle contraction origin.

**Q.40 Answer is “A-band of sarcomere”**

**Explanation:** I-band of sarcomere cannot polarize visible light.



**Q.41 Answer is “Sarcomere”**

**Explanation:** The length of myofibril from one Z-line to the next is known as sarcomere.

**Q.42 Answer is “Muscle fiber”**

**Explanation:** Each muscle consists of muscle bundles, which are further composed of muscle fibers of cells.

**Q.43 Answer is “Sarcoplasmic reticulum”**

**Explanation:** The nerve impulse is carried through the T-tubule to the adjacent sarcoplasmic reticulum (SR). the calcium gates of the ST open releasing calcium into the cytosol, thus binding calcium ion to troponin molecules of the thin filament.

**Q.44 Answer is “10 – 100  $\mu\text{m}$ ”**

**Explanation:** The diameter of skeletal muscle fibres is in ranges of 10 – 100  $\mu\text{m}$ .

**Q.45 Answer is “A-band”**

**Explanation:** The thin filaments extends across the I-band and partly in A-band.

**Q.46 Answer is “H zone”**

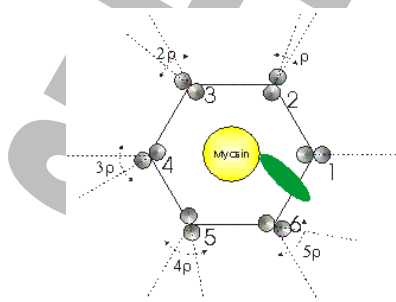
**Explanation:** Each A band has a lighter stripe in its mid-section called H-zone (H stands for “hele” mean bright). The H-zone is bisected by dark line called M - line. The I bands have mid line called Z-line (Z for zwishen means between).

**Q.47 Answer is “Troponin”**

**Explanation:** The protein that is complex of three polypeptide chains is called troponin.

**Q.48 Answer is “12”**

**Explanation:**



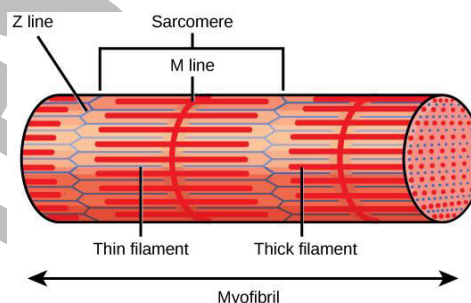
Each myosin filament is surrounded by 12 actin filaments on both ends.

**Q.49 Answer is “ATP”**

**Explanation:** After death, the amount of ATP in the body falls. Under these circumstances the bridges cannot be broken and so they remain firmly bound. This results in the body becoming stiff, a condition known as rigor mortis.

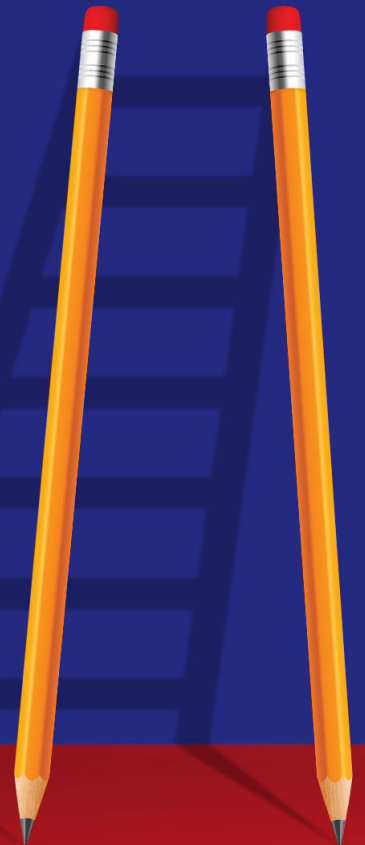
**Q.50 Answer is “Skeletal”**

**Explanation:** Majority of muscles tissue in your body are skeletal type.



# STOP

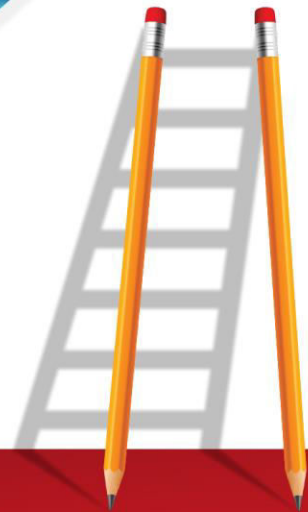
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# BIOLOGY



## Worksheet-3



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-3**  
**(Communication)**

- Q.1** Nervous coordination involves specialized cells or neurons linked together directly or via the central nervous system, to form network that connects the:
- A) Receptor and neurons
  - B) Receptors and Effectors
  - C) Receptors and CNS
  - D) CNS and effectors
- Q.2** The neurons has capacity to generate and conduct impulses which travel across the:
- A) Synapse and pass from the receptors to effectors
  - B) Effectors and pass from the synapse to receptors
  - C) Synapse and pass from the effectors to receptor
  - D) Receptors and pass from the synapse to effectors
- Q.3** The elements of nervous system which help in coordination are:
- A) Receptors, neurons and effectors
  - B) CNS and PNS
  - C) Motor, sensory and associative neurons
  - D) Brian and spinal cord
- Q.4** The receptors for smell, taste and blood composition are:
- A) Mechanoreceptors C) Nociceptors
  - B) Chemoreceptors D) Thermoreceptor
- Q.5** The example of chemoreceptors is:
- A) Eyes C) Stray ending

- B) Nose D) Rods and cones
- Q.6** All are the examples of mechanoreceptors EXCEPT:
- A) Free nerve endings
  - B) Stray endings
  - C) Expanded tip endings
  - D) Rods and cones
- Q.7** It is an example of mechanoreceptors:
- A) Hypothalamus
  - B) Expanded tip endings
  - C) Tongue
  - D) Rods and cones
- Q.8** These respond to stimuli of light:
- A) Mechanoreceptors
  - B) Chemoreceptors
  - C) Photoreceptors
  - D) Undifferentiated ending
- Q.9** The receptors that receive stimuli of light are:
- A) Free nerve ending
  - B) Rods and cones
  - C) Expanded tip endings
  - D) Stray nerve ending
- Q.10** All of the principal types of sensations that we can experience are called:
- A) Visceral sensations
  - B) Sensation of pain
  - C) Modalities of sensation
  - D) Sensation of body position
- Q.11** Despite the fact that we experience different modalities of sensation, nerve fibres transmit only:
- A) Responses C) Stimuli



- B) Impulses                      D) Few
- Q.12** The \_\_\_\_\_ is determined by the point in the CNS to which the nerve fibre leads.
- A) Type of sensation  
B) Strength of sensation  
C) Intensity of sensation  
D) Frequency of sensation
- Q.13** Touch stimulus is carried by nerve impulse in the:
- A) Visual cortex of brain  
B) Auditory centre of brain  
C) Taste centre of brain  
D) Touch area of brain
- Q.14** Each receptor organ is specialized to receive a particular type of stimulus and this is carried to the:
- A) Particular area of the PNS  
B) Particular area of the muscles  
C) Particular area of the glands  
D) Particular area of the brain
- Q.15** In skin the receptors are concerned with at least how many different senses:
- A) Two                              C) Four  
B) Three                            D) Five
- Q.16** Receptors found in the skin are associated with:
- A) Touch, pressure, hearing, cold & pain  
B) Touch, pressure, heat, cold & pain  
C) Touch, pressure, heat, cold & visual  
D) Touch, taste, heat, cold & pain
- Q.17** The detection of vibration of the ground by terrestrial vertebrates is probably achieved by receptors in the:
- A) Joints                            C) Ears  
B) Eyes                            D) Base of hairs
- Q.18** The relative abundance of various types of receptors:
- A) Remains same              C) Differs greatly  
B) Differ rarely                D) Remains uniform
- Q.19** Cold receptors are nearly \_\_\_\_\_ less abundant than pain receptors.
- A) 27 percent                    C) 27 times  
B) 10 percent                   D) 10 times
- Q.20** \_\_\_\_\_ receptors are nearly 27 times more abundant than cold receptors.
- A) Temperature                C) Pain  
B) Heat                            D) Touch
- Q.21** \_\_\_\_\_ receptors are nearly 27 times less abundant than pain receptors.
- A) Touch                            C) Temperature  
B) Heat                            D) Cold
- Q.22** The receptors are \_\_\_\_\_ over the entire surface of the body.
- A) Distributed evenly  
B) Not distributed evenly  
C) Not distributed unevenly  
D) Not distributed
- Q.23** \_\_\_\_\_ receptors are much more numerous in the finger tips than in the skin of the back.
- A) Touch                            C) Cold  
B) Pain                              D) Heat
- Q.24** The unequal distribution of touch receptor in finger tips as compared to the backside skin indicates the:
- A) Normal functions of those two parts of the body

- B) Location of those parts of the body  
C) Surface area of these parts of the body  
D) Size of those parts of the body
- Q.25** The stimulus received by the receptors in the skin which are the endings of sensory neurons is passed to the \_\_\_\_\_ via inter neurons:  
A) Interneurons                      C) Motor neurons  
B) Relay neurons                      D) Somatic neurons
- Q.26** Example of mechanoreceptors is/are:  
A) Eyes                                  C) Rods and cones  
B) Stretch receptors                  D) Hypothalamus
- Q.27** The stimulus received by the receptors in the skin is passed to the motor neurons via associative neurons which are present in the:  
A) Brain                                  C) Brain and spinal  
B) Spinal cord                          D) Fingertips
- Q.28** Impulse is sent by the motor neurons to the:  
A) Receptors                          C) Muscles  
B) Effectors                              D) Glands
- Q.29** The sensations of \_\_\_\_\_ are detected by modified sensory neurons having naked nerve endings.  
A) Heat and cold                      C) Touch and pain  
B) Pain and cold                      D) Pain and heat
- Q.30** The sensations of \_\_\_\_\_ are detected by modified sensory neurons.  
A) Touch, pressure, heat, cold and pain  
B) Hearing, taste, body position and smell  
C) Touch, pressure, hearing, taste and pain  
D) Pressure, pain, taste, touch and smell
- Q.31** Specialized cellular corpuscles detect the sensation of:  
A) Pressure, touch and pain  
B) Pressure, vision and hearing  
C) Pressure, heat and cold  
D) Pressure, taste and touch
- Q.32** The chief structural and functional units of nervous system are:  
A) Cell bodies  
B) Neurons  
C) Axons  
D) Receptors & Effectors
- Q.33** \_\_\_\_\_ play a vital role in the nutrition of neurons and their protection by myelin sheath.  
A) Soma                                  C) Neuroglia  
B) Cell body                              D) Dendrites
- Q.34** There are \_\_\_\_\_ functional types of neurons.  
A) Two                                      C) Four  
B) Three                                    D) Five
- Q.35** The \_\_\_\_\_ of certain brain cells branch profusely, giving cell a tree like appearance.  
A) Axons                                  C) Dendrites  
B) Cell bodies                            D) Soma
- Q.36** Many granules are present in the \_\_\_\_\_ of neuron:  
A) Axon ending  
B) Axons  
C) Dendrites  
D) Cell bodies or soma
- Q.37** Many sensory neurons have only one fiber, which branch:  
A) A long distance from the cell body  
B) A short distance from the cell body  
C) A long distance from the CNS

D) A short distance from the PNS

**Q.38** The neuron has \_\_\_\_\_ arising from its cell body.

- A) Dendrites
- B) Axons
- C) Dendron
- D) Protoplasmic processes

**Q.39** There are \_\_\_\_\_ main types of cytoplasmic processes or fibres in neurons.

- A) Two
- B) Three
- C) Four
- D) Five

**Q.40** It may be more than a meter long in some neurons:

- A) Axon ending
- B) Axon
- C) Dendrite
- D) Dendron

**Q.41** Nissl's granules which are groups of ribosomes associated with endoplasmic reticulum and Golgi apparatus are present in the:

- A) Dendrites
- B) Axon
- C) Cell body
- D) Axoplasm

**Q.42** Microtubules, neurofibrils, rough endoplasmic reticulum and mitochondria are present throughout the \_\_\_\_\_ of the neuron.

- A) Axon
- B) Dendron
- C) Cytoplasm of axon
- D) Dendrites

**Q.43** The \_\_\_\_\_ is the main nutritional part of the nerve cell and is concerned with the biosynthesis of materials necessary for the growth and maintenance of the neuron.

- A) Cell body or soma
- C) Dendron

- B) Dendrites
- D) Axon

**Q.44** If the \_\_\_\_\_ of the neuron remains intact, it can regenerate axonal and dendrite fibres, but neuron once mature, do not divide any further.

- A) Axon
- B) Dendron
- C) Cell body
- D) Dendrites

**Q.45** The structures which respond to the impulse coming via motor neurons are:

- A) Receptors
- B) Effectors
- C) Sense organs
- D) Pacinian corpuscles

**Q.46** The nervous pathways utilized for an immediate and involuntary action performed by our body is called:

- A) Spinal cord
- B) Brain
- C) Reflex arc
- D) CNS

**Q.47** Flow of impulse through the nervous system involving \_\_\_\_\_ will be clear if we study an example of reflex arc.

- A) Receptors, neurons & effectors
- B) Forebrain, Mid brain & Hind Brain
- C) Sensory, motor and associative neurons
- D) Brain, Spinal cord & PNS

**Q.48** Reflex arc is the pathway of passage of impulse during a:

- A) Voluntary action
- B) Nervous action
- C) Unconscious action
- D) Reflex action

**Q.49** The simple reflex circuit includes of the four elements of a neural pathway in following sequence:

- A) Sensory neuron, associative neuron, motor neuron and muscles
- B) Sensory neuron, motor neuron, associative neuron and glands
- C) Sensory neuron, motor neuron, associative neuron and muscles
- D) Associative neurons, sensory neurons, motor neurons and muscles

**Q.50** The sensory neurons have pain sensitive endings in the:

- A) Joints                      C) Skin
- B) Ears                        D) Nose

**Q.51** The sensory neurons have pain sensitive ending in the skin and \_\_\_\_\_ leading to the spinal cord:

- A) Short fibre                C) Thick fibre
- B) Long fibre                D) Thin fibre

**Q.52** The sensory neurons also make a synapse on associative neurons not involved in the reflex, that carry signals to the brain:

- A) Informing it of the danger
- B) Informing it of the situation
- C) Informing it of the tranquil position
- D) Informing it of the confusion

**Q.53** Nerve impulse is a wave of electrochemical change, which travels along the length of the neuron involving \_\_\_\_\_ across the cell.

- A) Chemical reactions and movement of elements
- B) Chemical reactions and movement of molecules
- C) Physical actions and movement of ions
- D) Chemical reactions and movement of ions

**Q.54** Human nervous system is a type of:

- A) Diffused nervous system
- B) Centralized nervous system
- C) Primitive nervous system
- D) Peripheral nervous system

**Q.55** It conducts signals to and from the brain and controls reflex activities:

- A) Brain                      C) CNS
- B) Spinal cord              D) PNS

**Q.56** It carries signals from the CNS that control the activities of muscles and glands:

- A) Sensory neurons
- B) Brain
- C) Associative neurons
- D) Motor neurons

**Q.57** It controls involuntary responses by influencing organs, glands and smooth muscles:

- A) Somatic nervous system
- B) Central nervous system
- C) Autonomic nervous system
- D) Peripheral nervous system

**Q.58** The CNS consists of brain and spinal cord, which are both protected in:

- A) Two ways                C) Four ways
- B) Three ways              D) Five ways

**Q.59** \_\_\_\_\_ which is a part of skull, protects the brain.

- A) Meninges
- B) CSF
- C) Cranium
- D) Vertebral columns



**Q.60** The brain and spinal cord are also protected by \_\_\_\_\_ layers of meninges.

- A) Single                      C) Triple  
B) Double                     D) Tetra

**Q.61** \_\_\_\_\_ bathes the neurons of brain and spinal cord and cushions against the bumps and jolts.

- A) Meninges  
B) Saliva  
C) Cerebrospinal fluid  
D) Amniotic fluid

**Q.62** The spinal cord has:

- A) Many cavities            C) Central canal  
B) Many ventricles        D) Many canals

**Q.63** Thalamus, limbic system and cerebrum are three functional parts of:

- A) Fore brain                C) Hind brain  
B) Mid brain                 D) Limbic system

**Q.64** The information that includes sensory input from auditory and visual pathways, from the skin and from within the body is carried by \_\_\_\_\_ to limbic system and cerebrum.

- A) Thalamus                 C) Cerebrum  
B) Hypothalamus          D) Limbic system

**Q.65** \_\_\_\_\_ works together to produce our most basic and primitive emotions, drives and behaviors.

- A) Cerebrum                C) Corpus callosum  
B) Thalamus                D) Limbic system

**Q.66** Fear, rage, tranquility, hunger, thirst, pleasure and sexual responses are the most \_\_\_\_\_ emotions.

- A) Basic and primitive  
B) Exceptional

- C) Developed and advanced  
D) Extraordinary

**Q.67** Limbic system consists of:

- A) Hypothalamus, amygdala & hippocampus  
B) Thalamus, Hypothalamus & Amygdala  
C) Hypothalamus, Pons & Hippocampus  
D) Amygdala, Hippocampus & thalamus

**Q.68** It acts as a major coordinating center controlling body temperature, hunger, the menstrual cycle, water balance, the sleep wake cycle etc.:

- A) Hypothalamus            C) Thalamus  
B) Hippocampus            D) Amygdala

**Q.69** It plays an important role in formation of long term memories:

- A) Hippocampus            C) Hypothalamus  
B) Amygdala                D) Cerebrum

**Q.70** It is the largest part of the brain:

- A) Cerebellum                C) Cerebrum  
B) Amygdala                D) Thalamus

**Q.71** Cerebrum consists of \_\_\_\_\_ of neurons.

- A) Ten billion                C) Tens of billions  
B) Ten million               D) Tens of millions

**Q.72** It directs the voluntary movements:

- A) Cerebral cortex  
B) Cerebral medulla  
C) Cerebral hemispheres  
D) Cerebellum

**Q.73** It contains primary sensory areas:

- A) Cerebral medulla  
B) Cerebral hemispheres  
C) Corpus callosum

D) Cerebral cortex

**Q.74 This area is involved in speech and also receives and interprets sensation of touch from all parts of the body:**

- A) Cerebral hemispheres
- B) Cerebral cortex
- C) Corpus callosum
- D) Cerebral medulla

**Q.75 The left cerebral hemisphere controls the:**

- A) Right side of the body
- B) Upper side of the body
- C) Left side of the body
- D) Lower side of the body

**Q.76 It is very important in screening the input information, before they reach higher brain center:**

- A) Corpus callosum
- B) Mid brain
- C) Reticular formation
- D) Cerebrum

**Q.77 Certain neurons in \_\_\_\_\_ located above the medulla, appear to influence transition between sleep and wakefulness, and the rate and pattern of breathing.**

- A) Medulla oblongata C) Pons
- B) Cerebellum D) Mid brain

**Q.78 It is also involved in learning and memory storage for behaviors:**

- A) Pons C) Limbic system
- B) Cerebellum D) Hippocampus

**Q.79 Medulla oblongata narrows down into an oval shaped hollow cylinder called:**

- A) Cerebellum C) Spinal cord
- B) Pons D) Vertebral column

**Q.80 It runs through the vertebral column:**

- A) Spinal cord
- B) Meninges
- C) Cerebrospinal fluid
- D) CSF

**Q.81 An inner butterfly shaped grey matter is found in:**

- A) Cerebrum
- B) Cerebellum
- C) Spinal cord
- D) Medulla oblongata

**Q.82 White matter of spinal cord is made up of:**

- A) Myelinated nerve fibres
- B) Non-myelinated nerve fibres
- C) Myelinated nerve tracts
- D) Myelinated nerve fibres or tracts

**Q.83 It is centre of great many reflexes and it serves as a pathway for conduction of impulses to and from different parts of the body and brain:**

- A) Spinal cord
- B) Medulla oblongata
- C) Cerebellum
- D) Brain

**Q.84 It acts as relay centre in brain:**

- A) Thalamus
- B) Mid brain
- C) Pons
- D) Thalamus and mid brain

**Q.85 PNS comprises of \_\_\_\_\_ and \_\_\_\_\_ which may form ganglia and the nerves.**

- A) Sensory neurons, associative neurons

- B) Associative neurons, sensory neurons
- C) Sensory neurons, motor neurons
- D) Somatic neurons, autonomic neurons

**Q.86** These are bundles of axons or dendrites bound by connective tissue:

- A) The nerves                      C) Grey matters
- B) The ganglia                  D) Spinal cord

**Q.87** It may be sensory, motor or mixed, depending upon the direction of impulse they conduct:

- A) Neuron                          C) Nerve
- B) Nerve cell                      D) Ganglia

**Q.88** The stimulus received by the receptors in the skin (which are the endings of sensory neurons) is passed to the motor neurons via \_\_\_\_\_ neurons.

- A) Inter or somatic
- B) Sympathetic & Parasympathetic
- C) Somatic or autonomic
- D) Inter or associative

**Q.89** Biochemical reactions are regulated by:

- A) Enzymes                          C) Hormones
- B) Coenzymes                      D) Cofactors

**Q.90** Long term changes in our body are regulated by:

- A) Enzyme                          C) CNS
- B) Neurons                          D) Hormone

**Q.91** Endocrine system provides for:

- A) Nervous coordination
- B) Chemical coordination
- C) Immediate coordination
- D) Skeletal coordination

**Q.92** Endocrine glands/tissues are lying in:

- A) Abdominal cavity
- B) CNS

- C) Thoracic cavity
- D) Different parts of the body

**Q.93** Hormones are:

- A) Poured into specific ducts
- B) Transported by specific ducts
- C) Poured directly into blood
- D) Poured directly into blood which carry them to respective target tissues.

**Q.94** Hormones control some long-term changes, such as:

- A) Rate of growth
- B) Rate of metabolic activities
- C) Sexual maturity
- D) Rate of growth and metabolic activities and Sexual maturity

**Q.95** Increased levels of vasopressin cause increased water reabsorption in:

- A) Distal parts of nephron
- B) Cortical part of kidney
- C) Proximal parts of nephron
- D) Medullary part of kidney

**Q.96** Diabetes insipidus is a consequence of deficiency of:

- A) ADH                                  C) STH
- B) MSH                                  D) TSH

**Q.97** The islets of Langerhans contain:

- A) A large number of  $\beta$ -cells associated with insulin production
- B) A small number of  $\beta$ -cells associated with insulin production
- C) A large number of  $\alpha$  cells associated with insulin production
- D) A small number of  $\alpha$  cells associated with insulin production

**Q.98** Following are different growth promoting hormones of plants, **EXCEPT:**

- A) Absciscic acid      C) Auxins
- B) Kinetin              D) Gibberellins

**Q.99** Higher concentration of auxins inhibits:

- A) Root elongation      C) Cell division
- B) Cell elongation      D) Stem elongation

**Q.100** When auxins are used along with cytokinins on shoots they:

- A) Promote bud initiation
- B) Promote bud dormancy
- C) Inhibit bud dormancy
- D) Inhibit apical dominance

**Q.101** Both auxins and Gibberellins cause delay in:

- A) Flowering              C) Leaf senescence
- B) Fruiting                D) Bud initiation

**ANSWER KEY (Worksheet-3)**

1	B	26	B	51	B	76	C
2	A	27	A	52	A	77	C
3	A	28	B	53	D	78	B
4	B	29	C	54	B	79	C
5	B	30	A	55	B	80	A
6	D	31	C	56	D	81	C
7	B	32	B	57	C	82	D
8	C	33	C	58	B	83	A
9	B	34	B	59	C	84	D
10	C	35	C	60	C	85	C
11	B	36	D	61	C	86	A
12	A	37	B	62	C	87	C
13	D	38	D	63	A	88	D
14	D	39	A	64	A	89	C
15	D	40	B	65	D	90	D
16	B	41	C	66	A	91	B
17	A	42	C	67	A	92	D
18	C	43	A	68	A	93	D
19	C	44	C	69	A	94	D
20	C	45	B	70	C	95	A
21	D	46	C	71	C	96	A
22	B	47	A	72	A	97	A
23	A	48	D	73	D	98	A
24	A	49	A	74	B	99	A
25	C	50	C	75	A	100	B
						101	C

**EXPLANATION**

**Q.1** Answer is “Receptors and Effectors”

**Explanation:** Receptors receive stimuli and effectors respond but the neurons or nerve cells connect them together.

**Q.2** Answer is “Synapse and pass from the receptors to effectors”

**Explanation:** Synapse is a cytoplasmic gap between axon endings of one neuron and dendrite endings of the next neuron. Impulse always travel from receptors to effectors via neurons. However at the end of each neuron and before the start of next neuron there is a protoplasmic gap called

synapse. Impulse have to pass through it with the help of neurotransmitter.

**Q.3** Answer is “Receptors, neurons and effectors”

**Explanation:** Receptors, neurons and effectors are three basic dementes of nervous system. Receptors receive the stimulus and pass on it in the form of impulse to neurons, which bring it to the CNS, where it is interpreted and then converted into subjective impressions. Then a direction is generated accordingly which is conveyed to the effectors for response by neurons.

**Q.4** Answer is “Chemoreceptors”

**Explanation:** Such receptors which received chemical stimuli and notice chemical changes in internal environment are called chemoreceptors.

**Q.5** Answer is “Nose”

**Explanation:** As smell is a chemical stimulus, nose as a chemoreceptor is associated with it.

**Q.6** Answer is “Rods and cones”

**Explanation:** Rods and cones are photoreceptors.

**Q.7** Answer is “Expanded tip endings”

**Explanation:** Expanded tip nerve endings receive stimuli of touch, pressure and texture.

**Q.8** Answer is “Photoreceptors”

**Explanation:** Rods and cones being photoreceptors respond to the stimulus of light.

**Q.9** Answer is “Rods and Cones”

**Explanation:** Rods and cones being photoreceptors respond to the stimulus of light.



**Q.10 Answer is “Modalities of sensation”**

**Explanation:** Each principle type of sensation that we experience, pain, touch, sight, sound and so forth is called modalities of sensation. We experience these different modalities while nerve fibers transmit only impulses. However the basic structural elements involved in perception and response of each sensation are similar i.e. receptors to sensory neurons to associative neuron to motor neurons to effectors make a model unit, involved in each sensation.

**Q.11 Answer is “Impulses”**

**Explanation:** Each sensation travels in the form of nerve impulse in nervous system.

**Q.12 Answer is “Type of sensation”**

**Explanation:** Type of sensation is determined by the sensory cells or organs receiving it and the part of CNS involved in its assessment.

**Q.13 Answer is “Touch area of brain”**

**Explanation:** Type of sensation is determined by the sensory cells or organs receiving it and the part of CNS involved in its response. A specific area in brain is called touch area that deals with the sensation of touch.

**Q.14 Answer is “Particular area of the brain”**

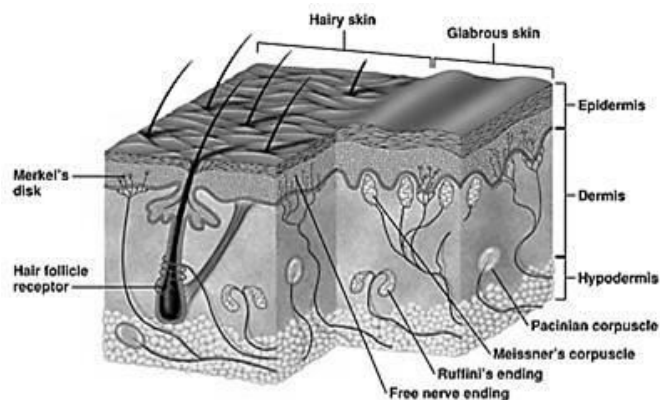
**Explanation:** Type of sensation is determined by the sensory cells or organs receiving it and the part of CNS involved in its response.

**Q.15 Answer is “Five”**

**Explanation:** These are touch, pressure, heat, cold and pain.

**Q.16 Answer is “Touch, pressure, heat, cold and pain”**

**Explanation:** These are touch, pressure, heat, cold and pain stimuli which are received by skin.

**Q.17 Answer is “Joints”**

**Explanation:** The mechanoreceptors associated with receipt of stimulus of vibration are located in joints.

**Q.18 Answer is “Differs greatly”**

**Explanation:** The relative abundance of receptors depends upon significance of sensation to which that particular type of receptor is associated.

**Q.19 Answer is “27 times”**

**Explanation:** The relative abundance of receptors depends upon significance of sensation to which that particular type of receptor is associated. Pain receptors are 27 times more than cold receptors

**Q.20 Answer is “Pain”**

**Explanation:** The relative abundance of receptors depends upon significance of sensation to which that particular type of receptor is associated. Pain receptors are 27 times more than cold receptors.

**Q.21 Answer is “Cold”**

**Explanation:** The relative abundance of receptors depends upon significance of

sensation to which that particular type of receptor is associated. Pain receptors are 27 times more abundant than cold receptors.

**Q.22 Answer is “Not distributed evenly”**

**Explanation:** The distribution of receptors is uneven and it depends upon the role of an organ with respect to that sensation e.g. fingers are usually used for touch so they have more abundant touch receptors.

**Q.23 Answer is “Touch”**

**Explanation:** The distribution of receptors is uneven and it depends upon the role of an organ with respect to that sensation.

**Q.24 Answer is “Normal functions of those two parts of the body”**

**Explanation:** Touch is mainly associated with finger tips, thus finger tips have maximum sensation for touch. Similarly being bilaterally symmetrical animals we always move in forward direction so our front body surface is more sensitive to touch as compared to backside of the body.

**Q.25 Answer is “Motor neurons”**

**Explanation:** Associative neurons prepare a direction and send it via motor neurons to effectors.

**Q.26 Answer is “Stretch receptors”**

**Explanation:** Stretch stimulus is a mechanical stimulus, so its receptors are mechanoreceptors.

**Q.27 Answer is “Brain”**

**Explanation:** CNS including brain is made up of associative neurons which interpret the stimulus and prepare direction to be sent to the effectors via motor neurons. Control centre for touch is located in cerebrum of brain.

**Q.28 Answer is “Effectors”**

**Explanation:** Effectors respond to the stimuli received by receptors.

**Q.29 Answer is “Touch and pain”**

**Explanation:** These are mechanoreceptors of skin which consist of modified sensory neurons having naked nerve endings.

Sensory receptors of the skin	
Modified sensory neurons having naked ends	Specialized cellular corpuscles
	Pressure
Touch	Hot
Pain	Cold

**Q.30 Answer is “Touch, pressure, heat, cold and pain”**

**Explanation:** The sensations of touch, pressure, heat, cold and pain are detected by modified sensory neurons having naked nerve endings (Touch and pain receptors or specialized cellular corpuscles, pressure, hot and cold receptors).

**Q.31 Answer is “Pressure, heat and cold”**

**Explanation:** Specialized cellular corpuscles detect the sensation of pressure, hot and cold.

**Q.32 Answer is “Neurons”**

**Explanation:** Though nervous tissue consists of neurons and neurological tissue. However, the neurons act as chief structural and functional units of nervous system.

**Q.33 Answer is “Neuroglia”**

**Explanation:** Neuroglia or glial cells e.g Schwann cells are associated with protection and nourishment of neurons or nerve cells.

**Q.34 Answer is “Three”**

**Explanation:** Sensory, associative and motor neurons.

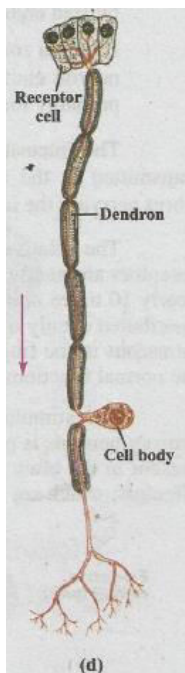
**Q.35 Answer is “Dendrites”**

**Explanation:** Dendrites are such cytoplasmic processes which bring nerve impulse towards the cell body.

**Q.36 Answer is “Cell bodies or soma”**

**Explanation:** Nissl’s granules which are groups of ribosomes associated with rough E.R and Golgi apparatus are present in cell bodies.

**Q.37 Answer is “A short distance from the cell body”**



**Explanation:** Usually the axon is considered the longest part of neurons or nerve cells, however in certain sensory neurons it is very short and their dendron is very long.

**Q.38 Answer is “Protoplasmic processes”**

**Explanation:** These are also called cytoplasmic processes and they consist of dendrites (dendron) and axons.

**Q.39 Answer is “Two”**

**Explanation:** Axons and dendrites or Dendron are two types of cytoplasmic processes of fibers.

**Q.40 Answer is “Axon”**

**Explanation:** These are axons of sciatic nerves which run from the base of the spinal cord to the big toe of each foot.

**Q.41 Answer is “Cell body”**

**Explanation:** Nissl’s granules are found in cell body or soma of neuron or nerve cell.

**Q.42 Answer is “Cytoplasm of the axon”**

**Explanation:** It is also called axoplasm.

**Q.43 Answer is “The cell body or soma”**

**Explanation:** Volumetrically dendrites and axons have very minute volume of cytoplasm as compared to cell body. It is the cell body which have a room to store some food and have a complete cellular machinery to synthesize something.

**Q.44 Answer is “Cell body”**

**Explanation:** Axons and dendrites can regenerate by the guidance and resource of nucleus containing cell body, however of cell body is removed there will be neither genetic material nor stored food to regenerate it.

**Q.45 Answer is “Effectors”**

**Explanation:** Effectors as muscles or glands respond to the directions which come through motor neurons to them.

**Q.46 Answer is “Reflex arc”**

**Explanation:** Reflex arc is a complete model unit to represent an action controlled by nervous system. It consists of receptor, three types of neurons and effectors. It is used to carry out reflex action.

**Q.47 Answer is “Receptors, neurons and effectors”**

**Explanation:** These are the components of a reflex arc.

**Q.48 Answer is “Reflex action”**

**Explanation:** An immediate and involuntary action of our body.

**Q.49 Answer is “Sensory neuron, associative neuron, motor neuron and muscles”**

**Explanation:** These are components of a reflex circuit in their functional sequence.

**Q.50 Answer is “Skin”**

**Explanation:** Pain sensitive nerve endings are located in the skin.

**Q.51 Answer is “Long fiber”**

**Explanation:** Pain sensitive sensory neurons have long fibers.

**Q.52 Answer is “Informing it of the danger”**

**Explanation:** These prepare the body for some dangerous situation.

**Q.53 Answer is “Chemical reactions and movement of ions”**

**Explanation:** Movement of ions is involved in the movement of nerve impulse.

**Q.54 Answer is “Centralized nervous system”**

**Explanation:** Having brain and spinal cord as central control centres of all human activities.

**Q.55 Answer is “Spinal cord”**

**Explanation:** Because all peripheral nerves pass through the spinal cord.

**Q.56 Answer is “Motor neurons”**

**Explanation:** Motor neurons receive the signals (directions) from CNS and deliver them to effectors.

**Q.57 Answer is “Autonomic nervous system”**

**Explanation:** It is involuntary control centre.

**Q.58 Answer is “Three ways”**

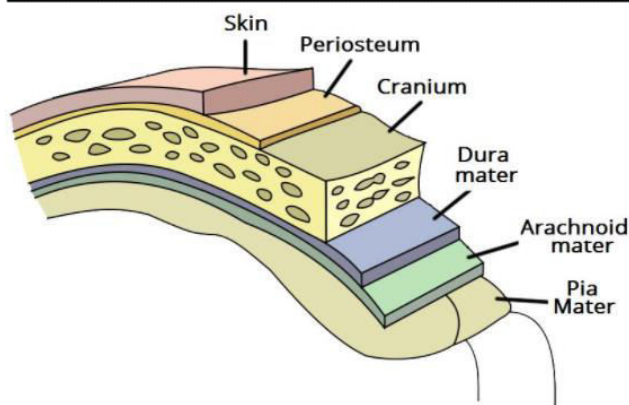
**Explanation:** Bony protection by cranium and vertebral column, membranous protection by triple layers of meninges and fluid protection by CSF.

**Q.59 Answer is “Cranium”**

**Explanation:** It is bony protection of brain i.e., brain case.

**Q.60 Answer is “Triple”**

**Explanation:** Meninges are three membranes that envelope the brain and spinal cord. In mammals the meninges are the dura mater, the arachnoid mater and the pia mater. Cerebrospinal fluid is located in the subarachnoid space between the arachnoid mater and pia mater.



**Q.61** Answer is “Cerebrospinal fluid”

**Explanation:** The cerebrospinal fluid (CSF), similar in composition to blood plasma bathes the neurons of brain and spinal cord and cushions against bumps and jolts.

**Q.62** Answer is “Central canal”

**Explanation:** That is why it is called dorsal hollow nervous system.

**Q.63** Answer is “Forebrain”

**Explanation:** Forebrain consists of Thalamus, limbic system and cerebrum. The limbic system is further sub-divided into hypothalamus, amygdala and hippocampus.

**Q.64** Answer is “Thalamus”

**Explanation:** Thalamus acts as relay centre between cerebrum and limbic system.

**Q.65** Answer is “Limbic system”

**Explanation:** Limbic system works together to produce our most basic and primitive emotions, drives and behavior, including fear, rage, tranquility, hunger, thirst, pleasure and sexual arousal.

**Q.66** Answer is “Basic and primitive”

**Explanation:** Because such emotions and behaviors are also found in primitive animals. Fear, rage, tranquility, hunger, thirst, pleasure and sexual arousal are considered most basic and primitive emotions and drives because these are held by primitive animals as well.

**Q.67** Answer is “Hypothalamus, amygdala and hippocampus”

**Explanation:**

Parts	Functions
Hypothalamus	Through its hormone production and neural connection acts as a major coordinating centre controlling body temperature, hunger the menstrual cycle, water balance, the sleep wake cycle etc.
Amygdala	Produces sensation of pleasure punishment and sexual arousal when stimulated. It is also involved in feeling of fear and rage
Hippocampus	Plays an important role in the formation of long term memory and thus is required for learning.

**Q.68** Answer is “Hypothalamus”

**Explanation:** Hypothalamus is considered major coordinating centre of our body as through its tropic hormones it regulates the



activities of other endocrine glands and controls body temperature by acting as thermostat. It also controls water cycle and sleep cycle.

**Q.69 Answer is “Hippocampus”**

**Explanation:** Hippocampus plays an important role in the formation of long term memory and thus is required for learning.

**Q.70 Answer is “Cerebrum”**

**Explanation:** In humans cerebrum is the largest part of brain which consists of two hemispheres and rest of the brain is located underneath it. With more recent estimates there are 21-26 billion neuron in the cerebral cortex alone.

**Q.71 Answer is “Tens of billions”**

**Explanation:** In humans cerebrum is the largest part of brain which consists of two hemispheres and rest of the brain is located underneath it. It consists of multiple of ten billion neurons.

**Q.72 Answer is “Cerebral cortex”**

**Explanation:** All voluntary control centers are located in cerebral cortex.

**Q.73 Answer is “Cerebral cortex”**

**Explanation:** Cerebral cortex contains sensory centres. Such as hearing centre, vision centre, taste centre, touch centre, smell centre etc.

**Q.74 Answer is “Cerebral cortex”**

**Explanation:** Sensory centres such as hearing centre, vision centre, taste centre, touch centre, smell centre etc are located in cerebral cortex.

**Q.75 Answer is “Right side of the body”**

**Explanation:** It is criss cross control i.e right hemisphere controls left half of the

body whereas left hemisphere controls right half of the body.

**Q.76 Answer is “Reticular formation”**

**Explanation:** Midbrain contains reticular formation, which is a relay centre connecting hindbrain with the forebrain. Reticular formation is very important in screening the input information before they reach higher brain centres.

**Q.77 Answer is “Pons”**

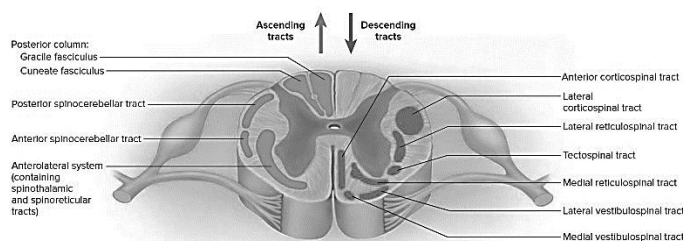
**Explanation:** Certain neurons in pons located above the medulla, appear to influence transitions between sleeps and wakefulness and the rate and pattern of breathing.

**Q.78 Answer is “Cerebellum”**

**Explanation:** Like hippocampus it is also involved in memory storage.

**Q.79 Answer is “Spinal cord”**

**Explanation:** On lower side medulla is attached to spinal cord which is an oval and hollow structure.



**Q.80 Answer is “Spinal cord”**

**Explanation:** Spinal cord runs inside the vertebral column as vertebral column provides bony protection to spinal cord.

**Q.81 Answer is “Spinal cord”**

**Explanation:** Inner grey matter of spinal cord is butterfly shaped or H shaped and it consists of cell bodies.

**Q.82 Answer is “Myelinated nerve fibres and tracts”**

**Explanation:** White color is due to myelin which is made up of fats.

**Q.83 Answer is “Spinal cord”**

**Explanation:** All reflex activities are controlled by spinal cord.

**Q.84 Answer is “Thalamus and midbrain”**

**Explanation:** Thalamus acts as a cerebrum between cerebrum and limbic system whereas midbrain acts as a relay centre between forebrain and hindbrain.

**Q.85 Answer is “Sensory neurons, motor neurons”**

**Explanation:** PNS consists of sensory and motor neurons only as associative neurons are part of CNS.

**Q.86 Answer is “The nerves”**

**Explanation:** Nerves are bundles of axons or dendrites.

**Q.87 Answer is “Nerve”**

**Explanation:** Nerves are categorized into three categories on the basis of their composition i.e. motor sensory and mixed.

**Q.88 Answer is “Inter or associative neuron”**

**Explanation:** Inter neurons, intermediate neurons associative neurons or relay neurons are part of CNS.

**Q.89 Answer is “Hormone”**

**Explanation:** As enzymes speed up the already proceeding chemical reactions, hormones regulate them i.e. speed up or slow down according to the need of the body.

**Q.90 Answer is “Hormones”**

**Explanation:** Hormones regulate long term changes like development as well.

**Q.91 Answer is “Chemical coordination”**

**Explanation:** Coordination through hormones is called chemical coordination. Endocrine glands secrete hormones.

**Q.92 Answer is “Different parts of the body”**

**Explanation:** See location of various endocrine glands in human body.

**Q.93 Answer is “Poured directly into blood which carry them to respective target tissues”**

**Explanation:** Hormones use blood stream as a source of transport.

**Q.94 Answer is “Rate of growth and metabolic activities and sexual maturity”**

**Explanation:** These are developmental changes which take long time to be accomplished.

**Q.95 Answer is “Distal parts of nephron”**

**Explanation:** Vasopressin (ADH) acts upon urine collecting duct to get water actively reabsorbed from filtrate.

**Q.96 Answer is “ADH”**

**Explanation:** Deficiency of ADH also called vasopressin will let the water go in urine and volume and frequency of urine will be increased. Thus diabetes insipidus occurs.

**Q.97 Answer is “A large number of  $\beta$ -cells associated with insulin production”**

**Explanation:** Because  $\beta$  cells occupy the periphery of islets whereas the remaining central area is occupied by  $\alpha$ -cells.

**Q.98 Answer is “Absciscic acid”**

**Explanation:**

Growth promoting hormones	Growth inhibiting hormones
Auxins	Abciscic acid
Gibberellins	Ethane (Ethylene)
Cytokinins (kinetin)	

**Q.99 Answer is “Root elongation”**

**Explanation:** Auxins promote cell enlargement in regions behind apex. Promote cell division in cambium. In

root, auxins promote growth at very low concentration, but inhibits growth at higher concentration.

**Q.100 Answer is “Promote bud dormancy”**

**Explanation:** Auxins promotes bud initiation in shoots but sometimes, antagonistic to cytokinins and is inhibitory.

**Q.101 Answer is “Leaf senescence”**

**Explanation:** Auxins and Gibberellins being growth promoting plant hormones cause delay in leaf senescence and inhibit leaf abscission.

# STOP

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# BIOLOGY



## Worksheet-4



**STP**

A PROJECT BY PUNJAB GROUP



**Worksheet-4****(Reproduction)**

**Q.1** Repeated division by the cells of the germinal epithelium produce spermatogonia in:

- A) Sperm duct
- B) Seminiferous tubules
- C) Ejaculatory duct
- D) Epididymis

**Q.2** Primary spermatocytes undergo meiotic division to form:

- A) Spermatids
- B) Secondary spermatocytes
- C) Sperms
- D) Spermatogonia

**Q.3** Secondary spermatocytes give rise to spermatids through:

- A) Meiosis-I
- B) Meiosis-II
- C) Mitosis
- D) Repeated division

**Q.4** Secondary spermatocytes originate from:

- A) Primary spermatocytes
- B) Sperms
- C) Spermatogonia
- D) Spermatids

**Q.5** During spermatogenesis each spermatocyte ultimately gives rise to:

- A) Four viable sperms
- B) Two viable sperms
- C) One viable sperm
- D) Three viable sperms

**Q.6** Germ cells in the ovary produce many oogonia which divide to give rise to primary oocytes by:

- A) Meiosis-I      C) Mitosis
- B) Meiosis-II     D) Differentiation

**Q.7** Primary oocytes originate mitotically from:

- A) Oogonia
- B) Primary oocytes
- C) Secondary oocytes
- D) Ova

**Q.8** Primary oocytes divide by \_\_\_\_\_ into haploid secondary oocytes and first polar body:

- A) Meiosis-I      C) Mitosis
- B) Meiosis-II     D) Differentiation

**Q.9** Haploid secondary oocytes and first polar body are formed meiotically from:

- A) Ova      C) Primary oocytes
- B) Oogonia     D) Follicle cells

**Q.10** The primary oocytes divide meiotically into the haploid:

- A) Secondary oocyte
- B) First polar body
- C) Second polar body
- D) Secondary oocyte and first polar body

**Q.11** The secondary oocyte divides meiotically into the haploid:

- A) Secondary oocyte and second polar body
- B) Ovum and secondary polar body
- C) Secondary oocytes and first polar body
- D) Germ cell and first polar body

**Q.12** A \_\_\_\_\_ is established between uterine and foetal tissue for the exchange of oxygen, carbon dioxide, wastes, nutrients and other material.

- A) Umbilical cord      C) Conception
- B) Placenta             D) Pregnancy

**Q.13** Gametes production is continuous in:

- A) Human male
- B) Human female
- C) Ovaries of females
- D) Uterus of females

**Q.14** It involves changes in the structure and function of the whole reproductive system:

- A) Menstrual cycle      C) Oogenesis
- B) Menstruation        D) Gametogenesis

**Q.15** Only one follicle continues to grow with its primary oocytes while the rest breakdown by:

- A) Ovulation
- B) Menstruation
- C) Follicle degeneration
- D) Follicle atresia

- Q.16 Estrogen stimulates:**  
 A) Secretion of FSH  
 B) Laying down of endometrium  
 C) Secretion of LH  
 D) Laying down of endometrium and secretion of LH
- Q.17 Decrease of FSH and increase of estrogen, causes the pituitary gland to secrete:**  
 A) Progesterone                      C) LTH  
 B) LH                                      D) Prolactin
- Q.18 Follicle cells, after release of the egg, are modified to form a special structure called:**  
 A) Placenta                              C) Follicle  
 B) Corpus luteum                      D) Endometrium
- Q.19 This hormone develops the endometrium and makes it receptive for the implantation of zygote:**  
 A) Estrogen                              C) FSH  
 B) Progesterone                      D) ICSH
- Q.20 Menstruation usually lasts for:**  
 A) 4-8 days                              C) 2-5 days  
 B) 3-7 days                              D) 5-9 days
- Q.21 The discharge of blood and cell debris from vagina at the end of reproductive cycle is called:**  
 A) Gestation                              C) Menstruation  
 B) After birth                              D) Implantation
- Q.22 The human menstrual cycle generally repeats every \_\_\_\_\_ days.**  
 A) 26                                      C) 28  
 B) 27                                      D) 29
- Q.23 The uterine cycle in humans involves the preparation of the uterine wall to receive the \_\_\_\_\_ if fertilization occurs.**  
 A) Ovum                                      C) Embryo  
 B) Egg                                      D) Zygote
- Q.24 The ovary under the stimulus of \_\_\_\_\_, also produce \_\_\_\_\_.**  
 A) FSH, LH  
 B) FSH, Estrogen  
 C) LH, FSH  
 D) Estrogen, Progesterone
- Q.25 During luteal phase of menstrual cycle, the hormone at its peak:**  
 A) Progesterone  
 B) Estrogen  
 C) LH  
 D) GnRH
- Q.26 On which date is a woman most likely to ovulate if the first day of menstrual cycle was first april?**  
 A) 5 april                                      C) 20 april  
 B) 14 april                                      D) 28 april
- Q.27 The shedding of portions of the endometrium during a uterine (menstrual) cycle is called:**  
 A) Menstruation                      C) Post ovulation  
 B) Proliferation                      D) Ovulation
- Q.28 Corpus luteum starts secreting a hormone called:**  
 A) Oestrogen                              C) Oxytocin  
 B) Progesterone                              D) Testosterone
- Q.29 In human female, the discharge of blood and cell debris is called:**  
 A) Ovulation                              C) Menstruation  
 B) Abortion                              D) Secretion
- Q.30 The duration of gestation period in human female is usually:**  
 A) 250 days                              C) 270 days  
 B) 260 days                              D) 280 days
- Q.31 In humans, \_\_\_\_\_ takes place in the seminiferous tubules:**  
 A) Oogenesis  
 B) Spermatogenesis  
 C) Fertilization  
 D) Development of embryo
- Q.32 Two primary spermatocytes, in the end gives rise to \_\_\_\_\_ sperms:**  
 A) Two                                      B) Four  
 C) Six                                      D) Eight
- Q.33 Each primary oocyte, in the end gives rise to \_\_\_\_\_ ovum/ ova:**  
 A) One                                      C) Three  
 B) Two                                      D) Four

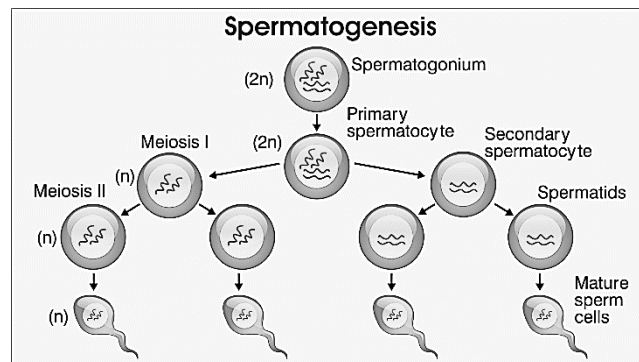
- Q.34 Pick up haploid cell:**  
 A) Spermatogonium  
 B) Primary spermatocyte  
 C) Primary oocyte  
 D) Spermatid
- Q.35 Its starts before birth in human females:**  
 A) Spermatogenesis C) Menstruation  
 B) Fertilization D) Oogenesis
- Q.36 How many sperms are formed from two secondary spermatocyte?**  
 A) 1 C) 3  
 B) 2 D) 4
- Q.37 They give rise to the primary spermatocytes by direct differentiation:**  
 A) Secondary spermatocytes  
 B) Spermatogonia  
 C) Spermatids  
 D) Spermatozoa
- Q.38 Primary oocyte divides meiotically to form:**  
 A) Secondary oocytes C) Ovum  
 B) Primary oocytes D) Egg
- Q.39 Which one of the following phase does not occur between 14 - 27 days of menstrual cycle?**  
 A) Luteal C) Proliferative  
 B) Secretory D) Ovulation
- Q.40 The follicle cells, after release of the egg, are modified to form a special structure called:**  
 A) Follicles  
 B) Corona radiata  
 C) corpus luteum  
 D) Zona pellucid
- Q.41 In human females, the periodic reproductive cycle is completed in approximately \_\_\_\_\_ days:**  
 A) 20 C) 30  
 B) 28 D) 40
- Q.42 This hormone develops the endometrium and make it receptive for the implantation of the zygote (placenta formation):**  
 A) Androgen C) LH  
 B) FSH D) Progesterone
- Q.43 Vascularization of endometrium is induced by:**  
 A) LH C) Estrogen  
 B) Progesterone D) Testosterone
- Q.44 Pick up the shortest phase of uterine cycle:**  
 A) Menstruation phase  
 C) Secretory phase  
 B) Proliferative phase  
 D) Ovulatory phase
- Q.45 The hormone which stimulates and vascularizes the endometrium:**  
 A) LH C) Progesterone  
 B) FSH D) Estrogen
- Q.46 The hormone, produced by the corpus luteum, that promotes the development of the uterine lining in females is called:**  
 A) LH C) Progesterone  
 B) FSH D) Estrogen
- Q.47 Pick up the inner lining of uterus:**  
 A) Ectometrium C) Endometrium  
 B) Myometrium D) Perimetrium
- Q.48 \_\_\_\_\_ cycle is a reproductive cycle found in all female mammals, EXCEPT human being:**  
 A) Menstrual C) Oestrous  
 B) Ovarian D) Uterine
- Q.49 The release of a \_\_\_\_\_ is timed to coincide with the thickening of the lining of the uterus:**  
 A) Polar body  
 C) Primary oocyte  
 B) Ovum  
 D) Secondary oocyte
- Q.50 The \_\_\_\_\_ cycle in humans involves the preparation of the uterine wall to receive the embryo if fertilization occurs:**  
 A) Menstrual C) Uterine  
 B) Ovarian D) Oestrous

**ANSWER KEY (Worksheet-4)**

1	B	19	B	37	C
2	B	20	B	38	A
3	B	21	C	39	C
4	A	22	C	40	C
5	A	23	C	41	B
6	C	24	B	42	D
7	A	25	A	43	C
8	A	26	B	44	A
9	C	27	A	45	D
10	D	28	B	46	C
11	B	29	C	47	C
12	B	30	D	48	C
13	A	31	B	49	D
14	A	32	D	50	C
15	D	33	A		
16	D	34	D		
17	B	35	D		
18	B	36	D		

**EXPLANATION**

- Q.1** Answer is "Seminiferous tubules"  
**Explanation:** Spermatogenesis occurs in seminiferous tubules.
- Q.2** Answer is "Secondary spermatocytes"  
**Explanation:** Primary spermatocyte undergoes first meiotic division to give rise to two secondary spermatocytes which undergo second meiotic division to give rise to four spermatids which differentiate into four sperms.
- Q.3** Answer is "Meiosis-II"  
**Explanation:** Spermatogonia differentiate into primary spermatocytes which undergo meiotic division to form secondary spermatocytes and spermatids, respectively.
- Q.4** Answer is "Primary spermatocytes"  
**Explanation:** Spermatogonia differentiate into primary spermatocytes which undergo meiotic division to form secondary spermatocytes and spermatids, respectively.



- Q.5** Answer is "Four viable sperms"  
**Explanation:** As all four meiotic products spermatogenesis survive.
- Q.6** Answer is "Mitosis"  
**Explanation:** Primary oocytes are formed from oogonia by mitosis.
- Q.7** Answer is "Oogonia"  
**Explanation:** Germ cells in the ovary produce many oogonia which divide mitotically to form primary oocytes. These are enclosed in groups of follicle cells. The primary oocyte divides meiotically into haploid secondary and first polar body. Second meiotic division in the oocyte proceeds as far as metaphase but is not completed until the oocyte is fertilized with sperm.
- Q.8** Answer is "Meiosis-I"  
**Explanation:** Primary oocyte undergoes meiosis-I to give rise to a secondary oocyte and a polar body. Which undergo meiosis-II to produce an ovum and three polar bodies.
- Q.9** Answer is "Primary oocytes"  
**Explanation:** Primary oocyte undergo meiosis-I to give rise to secondary oocyte and first polar body.
- Q.10** Answer is "Secondary oocyte and first polar body"  
**Explanation:** Secondary oocyte and first polar body are formed by Meiosis-I from primary oocyte.

**Q.11 Answer is “Ovum and secondary polar body”**

**Explanation:** Secondary oocyte and first polar body divide by meiosis-II to give rise to an ovum and three polar bodies in the end.

**Q.12 Answer is “Placenta”**

**Explanation:** Placenta is a physical connection between maternal uterine wall and foetal tissue. It is source of exchange of material between mother and foetus as well as endocrine role is also performed by it to maintain pregnancy.

**Q.13 Answer is “Human male”**

**Explanation:** That is why reproductive life of human male is unlimited.

**Q.14 Answer is “Menstrual cycle”**

**Explanation:** Changes in whole reproductive system indicate menstrual cycle i.e. changes in uterus as well as in ovary.

**Q.15 Answer is “Follicle atresia”**

**Explanation:** When one follicle starts development rest of the follicles degenerate this is called follicle atresia.

**Q.16 Answer is “Laying down of endometrium and secretion of LH”**

**Explanation:** Estrogen hormone initiate thickening of uterine wall and stimulates laying down of endometrium. Moreover it inhibits the secretion of FSH and stimulates the secretion of LH.

**Q.17 Answer is “LH”**

**Explanation:** It is luteinizing hormone which induces rupturing of mature follicle and formation of corpus luteum.

**Q.18 Answer is “Corpus luteum”**

**Explanation:** Corpus luteum is a yellow colored structure formed by the rupturing of follicle during ovulation. It secretes progesterone.

**Q.19 Answer is “Progesterone”**

**Explanation:** Progesterone induces conception and maintains pregnancy.

**Q.20 Answer is “3 – 7 days”**

**Explanation:** It is 3-7 day on average.

**Q.21 Answer is “Menstruation”**

**Explanation:** However discharge of debris from vagina after parturition is called “after birth”.

**Q.22 Answer is “28 days”**

**Explanation:** It is a biorhythm of 28 days.

**Q.23 Answer is “Embryo”**

**Explanation:** Progesterone develops the endometrium and makes it receptive for the implantation of the zygote.

**Q.24 Answer is “FSH, Estrogen”**

**Explanation:** Production of estrogen is induced by FSH.

**Q.25 Answer is “Progesterone”**

**Explanation:** Rising levels of progesterone from the corpus luteum act on endometrium, causing the arteries to elaborate and converting the functional layer to a glandular secretory layer.

**Q.26 Answer is “14<sup>th</sup> April”**

**Explanation:** Because secretory (Luteal/postovulatory) phase has fixed number of days (15-28). 14<sup>th</sup> day in a normal menstrual cycle of 28 days.

**Q.27 Answer is “Menstruation”**

**Explanation:** The shedding of portions of the endometrium during a uterine (menstrual) cycle is called menstruation.

**Q.28 Answer is “Progesterone”**

**Explanation:** Corpus luteum starts secreting a hormone called progesterone.

**Q.29 Answer is “Menstruation”**

**Explanation:** In human female, the discharge of blood and cell debris is called Menstruation.

**Q.30 Answer is “280 days”**

**Explanation:** The duration of gestation period in human female is usually 280 days (Nine months).

**Q.31 Answer is “Spermatogenesis”**

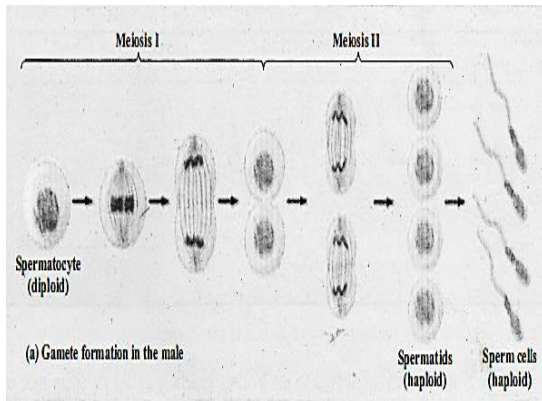
**Explanation:** In humans, spermatogenesis takes place in the seminiferous tubules, which are an intricate system of tubules in the testes where spermatogenesis takes place. The seminiferous tubules of an adult



human male can sometimes produce over 100 million sperm per day.

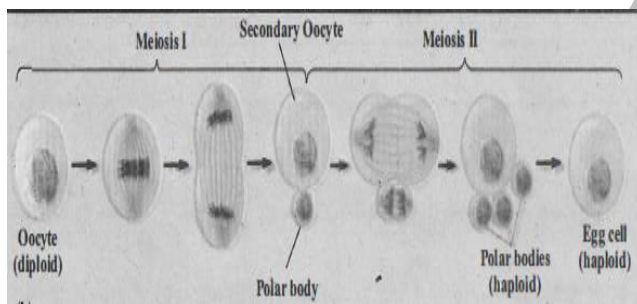
**Q.32 Answer is “Eight”**

**Explanation:**



**Q.33 Answer is “One”**

**Explanation:**



**Q.34 Answer is “Spermatid”**

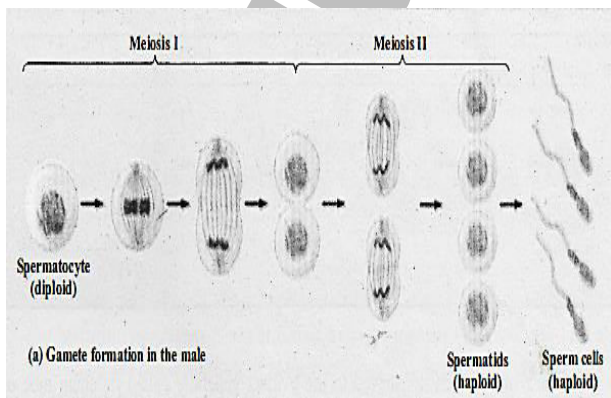
**Explanation:** Spermatid haploid cell.

**Q.35 Answer is “Oogenesis”**

**Explanation:** Oogenesis in human females start before birth.

**Q.36 Answer is “4”**

**Explanation:**

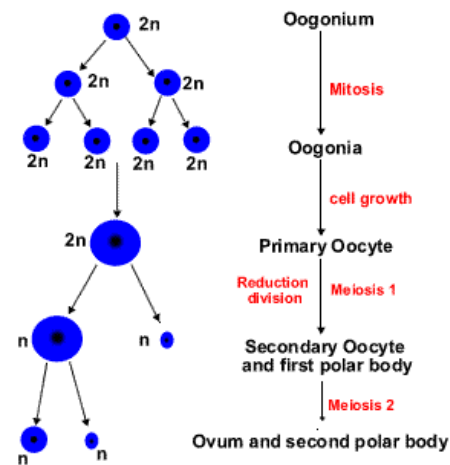


**Q.37 Answer is “Spermatids”**

**Explanation:** Each testis consists of a highly complex duct system called seminiferous tubules, in which repeated divisions by the cells of the germinal epithelium produce spermatogonia. These increase in size and differentiate into spermatocytes.

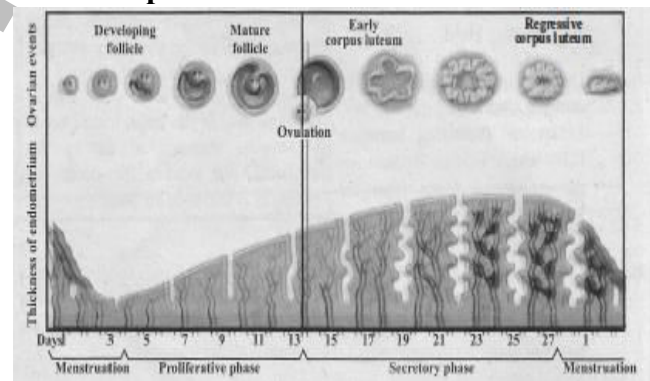
**Q.38 Answer is “Secondary oocytes”**

**Explanation:**



**Q.39 Answer is “Proliferative”**

**Explanation:**



**Q.40 Answer is “Corpus luteum”**

**Explanation:** The follicle cells, after release of the egg, are modified to form a special structure called corpus luteum. This yellowish glandular structure starts secreting hormone called progesterone. This hormone develops the endometrium and make it receptive for the implantation of the zygote (placenta formation).



**Q.41 Answer is “28”**

**Explanation:** In human females, the periodic reproductive cycle is completed in approximately 28 days and involves changes in the structure and function of the whole reproductive system.

**Q.42 Answer is “Progesterone”**

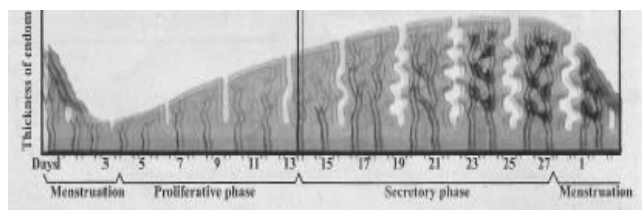
**Explanation:** Progesterone develops the endometrium and make it receptive for the implantation of the zygote (placenta formation).

**Q.43 Answer is “Estrogen”**

**Explanation:** Vascularization of endometrium is induced by estrogen hormone.

**Q.44 Answer is “Menstruation phase”**

**Explanation:** Menstruation phase is the shortest phase of uterine cycle.



**Q.45 Answer is “Estrogen”**

**Explanation:** Estrogen stimulates the endometrium and vascularizes.

**Q.46 Answer is “Progesterone”**

**Explanation:** Glossary page VIII book II.

**Q.47 Answer is “Endometrium”**

**Explanation:** Glossary page IV book II.

**Q.48 Answer is “Oestrous”**

**Explanation:** Oestrous cycle is a reproductive cycle found in all female mammals except human being.

**Q.49 Answer is “Secondary oocyte”**

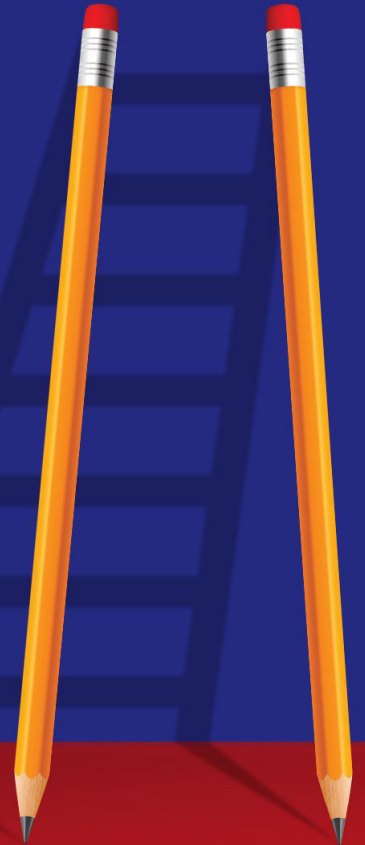
**Explanation:** The release of a secondary oocyte (ovulation) is timed to coincide with the thickening of the lining of the uterus.

**Q.50 Answer is “Uterine”**

**Explanation:** The uterine cycle in humans involves the preparation of the uterine wall to receive the embryo if fertilization occurs.

# STOP

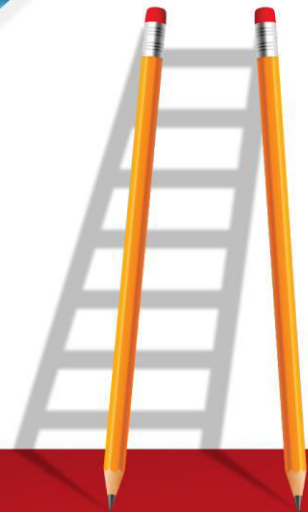
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# BIOLOGY



## Worksheet-5



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-5**  
**(The Cell)**

**Q.1** Contrary to the animal cell, in plant cell nucleus is located in periphery due to the large size of:

- A) Nucleus itself      C) Cell  
B) Vacuole              D) Plastids

**Q.2** The plant cells differ from animal cells in having:

- A) Chloroplast          C) Ribosome  
B) Mitochondria       D) Nucleus

**Q.3** Both animal and plant cells are included in:

- A) Prokaryotic category  
B) Unicellular category  
C) Eukaryotic category  
D) Coenocytic category

**Q.4** The biggest eukaryotic cell is:

- A) Ostrich's egg  
B) Tortoise's egg  
C) Human skin cell  
D) Turtle's egg

**Q.5** The differences between these two types of cells are mainly based upon the structure of their nuclei. The cells are:

- A) Animal and plant cells  
B) Bacterial and viral cells  
C) Prokaryotic and Eukaryotic cells  
D) Muscle and nerve cells

**Q.6** \_\_\_\_\_ cells generally lack many of the membrane bound structures found in \_\_\_\_\_ cells.

- A) Eukaryotic, Prokaryotic  
B) Prokaryotic, Algal  
C) Fungal, Algal  
D) Prokaryotic, Eukaryotic

**Q.7** \_\_\_\_\_ have small sized ribosomes 70S as, compared to \_\_\_\_\_ having 80S.

- A) Prokaryotes, eukaryotes  
B) Protists, eukaryotes  
C) Eukaryotes, prokaryotes  
D) Eukaryotes, protists

**Q.8** Pick up that feature of prokaryotic cells which is missing in eukaryotic cells:

- A) Presence of Extra chromosomal DNA  
B) Presence of cell wall  
C) Presence of ribosomes  
D) Chromosomes submerged in cytoplasm

**Q.9** Modern technology has revealed that lipid bilayer is:

- A) Sandwiched between two protein layers  
B) Embedded in two protein layers  
C) Not sandwiched between two protein layers  
D) Dispersed in two protein layers

**Q.10** As allowing only selective substances to pass through it, the plasma membrane is also called as:

- A) Cell membrane  
B) Differentially permeable membrane  
C) Cytoplasmic membrane  
D) Plasmalemma

**Q.11** The energy required for active transport of substances is provided by:

- A) Food                      C) Coenzymes  
B) Glucose                  D) ATP

**Q.12** In many animal cells, the cell membrane helps to take in material by infoldings in the form of vacuole. This type of intake is termed as:

- A) Pinocytosis              C) Exocytosis  
B) Phagocytosis          D) Endocytosis

**Q.13** Cell membrane transmits nerve impulse from one part of the body to the other in:

- A) Muscle cells      C) Nerve cells  
B) Bone cells      D) Epithelial cells

**Q.14** The outer most boundary of a plant cell is:

- A) Cell membrane      C) Pellicle  
B) Cell wall      D) Capsule

**Q.15** DNA content is comparatively low in:

- A) Prokaryotic cell      C) Plant cell  
B) Eukaryotic cell      D) Animal cell

**Q.16** In which one of the following DNA content is not halved during cell division:

- A) Eukaryotic cell      C) Animal cell  
B) Prokaryotic cell      D) Plant cell

**Q.17** In which one of the following cells, both transcription and translation occurs in cytoplasm:

- A) Fungal cells      C) Moneran cells  
B) Protist cells      D) Animal cells

**Q.18** Thylakoids lie freely in cytoplasm in:

- A) Animal cells      C) Plant cell  
B) Eukaryotic cells      D) Prokaryotic cells

**Q.19** Sap vacuoles are mostly absent in:

- A) Eukaryotic cells      C) Fungal cells  
B) Prokaryotic cells      D) Plant cells

**Q.20** There is no gametogenesis in:

- A) Protists      C) Prokaryotes  
B) Fungi      D) Eukaryotes

**Q.21** Microtubules and microfilaments are absent in:

- A) Bacterial cells      C) Plant cells

- B) Fungal cells      D) Animals cells

**Q.22** Chlorophyll is absent in:

- A) Animal cells      C) Protist cells  
B) Plant cells      D) Prokaryotic cells

**Q.23** Pick up the characteristic of a plant cell:

- A) Nucleus lies at centre  
B) Possesses many small vacuoles  
C) Mitochondria are fewer  
D) Mitochondria are numerous

**Q.24** Pick up a characteristic of plant cells:

- A) Anastral spindle  
B) Amphiasstral spindle  
C) Centrioles are present  
D) Plasmids are present

**Q.25** Cytokinesis occurs by cell plate method in:

- A) Animal cells      C) Plant cells  
B) Bacterial cells      D) Protist cells

**Q.26** Pick up a characteristic of animal cell:

- A) Tissue fluid bathes the cells  
B) Tissue fluid is absent  
C) Glyoxisomes are rarely present  
D) Lysosomes are rare

**Q.27** They do not burst when placed in hypotonic solution:

- A) Animal cells      C) Red blood cells  
B) Plant cells      D) Plant protoplasts

**Q.28** Phospholipid molecules of plasma membrane are found in:

- A) Parallel arrangement  
B) Alternate arrangement  
C) Scattered arrangement

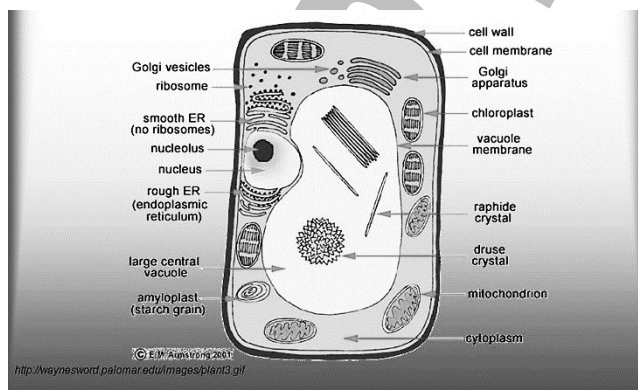
- D) Zigzag arrangement
- Q.29** Following functions are performed by cell membrane, EXCEPT:
- A) Cell drinking      C) Cell vomiting  
B) Cell eating      D) Autolysis
- Q.30** Infolds or invaginations in cell membrane are used for following functions, EXCEPT:
- A) Endocytosis  
B) Phagocytosis  
C) Microvilli formation  
D) Pinocytosis
- Q.31** Diffusion and osmosis are two types of:
- A) Active transport  
B) Passive transport  
C) Uphill movement  
D) Facilitated transport
- Q.32** Which of the following function is not performed by plasma membrane?
- A) Ingestion  
B) Secretion  
C) Locomotion  
D) Osmotic resistance
- Q.33** Give an example of passive transport across plasma membrane:
- A) Plasmolysis and deplasmolysis  
B) Endocytosis and exocytosis  
C) Reabsorption of  $\text{Na}^+$  from ascending limb of loop of Henle  
D) Reabsorption of water from urine collecting duct
- Q.34** A fluid droplet is ingested by plasma membrane through:
- A) Phagocytosis      C) Endocytosis  
B) Pinocytosis      D) Exocytosis
- Q.35** Which one of the following surfaces of plasma membrane is hydrophilic?
- A) Outer  
B) Inner  
C) Both outer and inner  
D) Neither outer nor inner
- Q.36** Human naked eye cannot differentiate the two points which have:
- A) Distance of 1.0 mm between them  
B) Distance of 2.0 mm between them  
C) Distance of 3.0 mm between them  
D) Distance of 2.0  $\mu\text{m}$  between them
- Q.37** Two points located at 2.0  $\mu\text{m}$  distance from each other can be differentiated:
- A) By means of naked eye  
B) By means of compound microscope  
C) By means of magnifying lens  
D) By means of dissecting microscope
- Q.38** Two points which are 2 – 4 Angstrom apart can be differentiated by:
- A) Human naked eye  
B) Compound microscope  
C) Electron microscope  
D) Dissecting microscope
- Q.39** Two points which are 2 – 4 Angstrom apart are illuminated for differentiation by:
- A) Torch light  
B) Beam of electrons  
C) Ordinary sunlight  
D) Red light
- Q.40** The object observed by electron microscope looks upto:
- A) 250000x greater than actual size  
B) 25000x greater than actual size  
C) 100000x greater than actual size  
D) 10000x greater than actual size
- Q.41** Electron microscope magnifies the object \_\_\_\_\_ greater than that of compound microscope:
- A) 500x      C) 125000x  
B) 2500x      D) 250000x



<b>ANSWER KEY (Worksheet-5)</b>			
1	B	21	A
2	A	22	A
3	C	23	C
4	A	24	A
5	C	25	C
6	D	26	A
7	A	27	B
8	D	28	A
9	C	29	D
10	B	30	C
11	D	31	B
12	D	32	D
13	C	33	A
14	B	34	B
15	A	35	C
16	B	36	D
17	C	37	B
18	D	38	C
19	B	39	B
20	C	40	A
		41	A

**EXPLANATION****Q.1 Answer is "Vacuole"**

**Explanation:** Plant cell have a central, single, larger vacuole, which occupies almost 70% of the area of cell, pushing the nucleus, cytoplasm and cytoplasmic organelles towards periphery.

**Q.2 Answer is "Chloroplast"**

**Explanation:** Chloroplast is a green plastid. It is associated with photosynthesis. Animal cells, being heterotroph lack it. It occurs in plant cells and algal cells. See the figure given above for chloroplast.

**Q.3 Answer is "Eukaryotic Category"**

**Explanation:** Kingdom Animalia, plantae and Protista are included in eukaryotes. They have a definite membrane bound nucleus and membrane bound organelles in their cells. However, bacteria and cyanobacteria are prokaryotic groups. Both animal and plants are multicellular. Aseptate fungi is coenocytic.

**Q.4 Answer is "Ostrich's egg"**

**Explanation:** It is obvious from these figures related to Ostrich's egg:

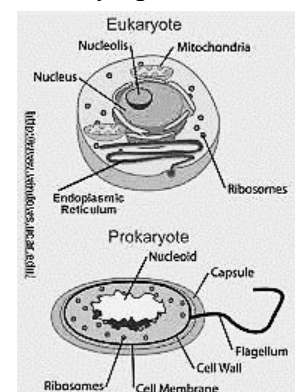
Length – 15 cm

Width – 13 cm

Weight – 1.4 kg

**Q.5 Answer is "Prokaryotic and Eukaryotic cells"**

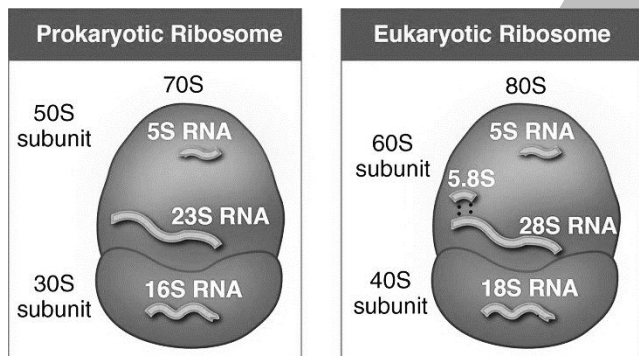
**Explanation:** Prokaryotic cell lacks a definite membrane bound nucleus, their non-discrete chromosome (DNA) is directly suspended in the cytoplasm. However, the eukaryotic cell have a definite membrane bound nucleus consisting up of a double nuclear membrane which separates its nucleoplasm, discrete chromosomes and nucleoli from cytoplasm.

**Q.6 Answer is "Prokaryotic, Eukaryotic"**

**Explanation:** Prokaryotic cells (e.g. bacteria), lack membrane bound organelles, like mitochondria, chloroplast, Golgi apparatus, lysosomes, endoplasmic reticulum etc; however, they contain non-membranous organelles like ribosomes. On the other hand, eukaryotic cells contain all types of organelles i.e. membraneless, single membrane bound and double membrane bound.

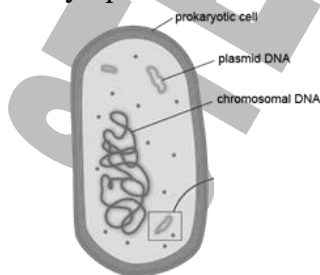
**Q.7 Answer is “Prokaryotic, Eukaryotic”**

**Explanation:** Prokaryotic ribosomes are smaller in size with 70s (rate of sedimentation). They come into being by fusion of two subunits i.e. a smaller subunit with 30s and a larger subunit with 50s. On the other hand eukaryotic ribosomes are larger in size with 80s, rate of sedimentation. They come into being by fusion of two subunits i.e. smaller subunit with 40s rate of sedimentation and larger subunit with 60s rate of sedimentation.



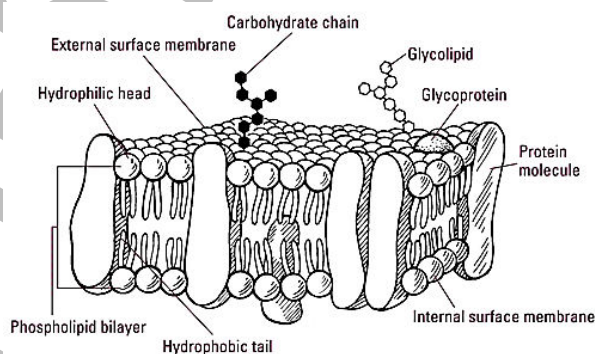
**Q.8 Answer is “Chromosomes submerged in cytoplasm”**

**Explanation:** As prokaryotic cell lacks nuclear membrane; thus, its chromosome/DNA is directly submerged into the cytoplasm.



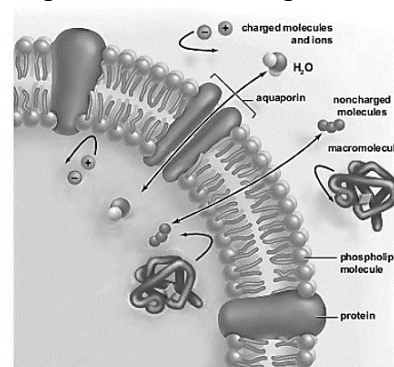
**Q.9 Answer is “Not sandwiched between two protein layers”**

**Explanation:** Modern technology, particularly electron microscope enabled us to improve our understanding about the ultrastructure of plasma membrane. It has led to the proposal of “Fluid Mosaic Model”. According to this model protein do not make any layer. There is a phospholipid bilayer in which protein molecules have been embedded in mosaic manner. So, protein molecules never form any layer to sandwich the phospholipid bilayer.



**Q.10 Answer is “Differentially permeable membrane”**

**Explanation:** As the plasma membrane behave differentially or selectively i.e. allowing the selective substance to cross it, it is called as selectively or differentially permeable membrane. In its selective or differential behavior, it allows the larger hydrocarbon molecules to pass through it but stops smaller ionic or polar substances.

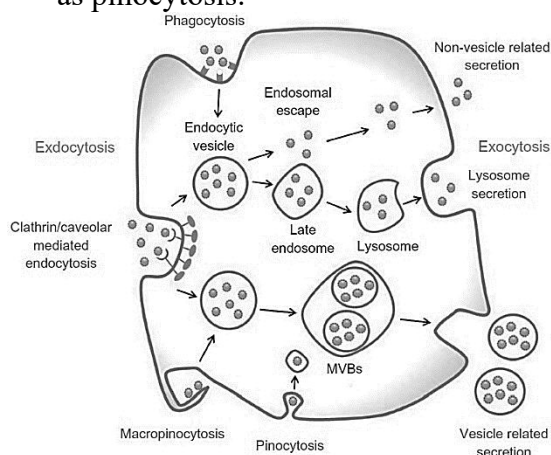


**Q.11 Answer is “ATP”**

**Explanation:** ATP (adenosine triphosphate) is an energy currency of the cell. Its second and third phosphate represents the so called “high energy bonds”.

**Q.12 Answer is “Endocytosis”**

**Explanation:** Endocytosis is a sort of active transport in which a cell transports molecules (food) into the cell by engulfing them. The food is wrapped into a part of cell membrane in the form of vacuole, then it is ingested. If food being ingested in this way is liquid the endocytosis will be called as pinocytosis.

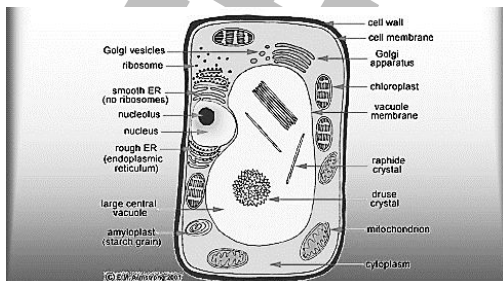


**Q.13 Answer is “Nerve cells”**

**Explanation:** Nerve impulse travels across the cell membrane of nerve cell as a wave of electrochemical change.

**Q.14 Answer is “Cell wall”**

**Explanation:** the outermost boundary of a plant cell is cell wall. Cell membrane comes next to the cell wall. However, in animal cells, cell membrane is the outermost boundary as there is no cell wall.



**Q.15 Answer is “Prokaryotic cell”**

**Explanation:** Prokaryotes typically have one chromosomes. These cells can also have smaller DNA structures called plasmids. The number of base pairs in prokaryotic chromosomes ranges from 160,000 to 12.2 million, depending upon the species. Eukaryotes frequently have multiple types of chromosomes with many more base pairs. For example humans have 23 pairs of chromosomes, containing about 2.9 billion base pairs in total.

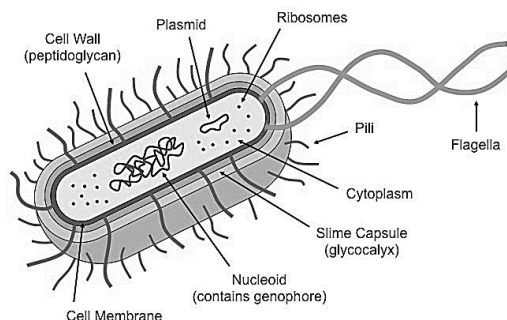
Chemical components		% total cell weight	
		Bacterial cell	Mammalian cell
1.	Water	70	70
2.	Proteins	15	18
3.	Carbohydrates	3	4
4.	Lipids	2	3
5.	DNA	1	0.25
6.	RNA	6	1.1
7.	Other organic molecules (Enzymes, hormones, metabolites)	2	2
8.	Inorganic ions (Na <sup>+</sup> , K <sup>+</sup> , Ca <sup>++</sup> , Mg <sup>++</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> etc)	1	1

**Q.16 Answer is “Prokaryotic cell”**

**Explanation:** Prokaryotes are unicellular organisms and lack mitotic cycle. However, in eukaryotes in ‘M’ phase of cell cycle amount of DNA is halved which is doubled again in ‘S’ phase of cell cycle.

**Q.17 Answer is “Moneran cell”**

**Explanation:** Moneran cells being prokaryotic lack nuclear membrane and DNA is directly submerged in cytoplasm so transcription also occurs in cytoplasm.



**Q.18 Answer is “Prokaryotic cells”**

**Explanation:** As there are no plastids (e.g. chloroplasts) so thylakoids are freely scattered in cytoplasm of cyanobacterial prokaryotic cells.

**Q.19 Answer is “Prokaryotic cells”**



**Explanation:** Most of the bacteria lack sap vacuole (a membrane bound organelle), except three genera of filamentous sulphur bacteria, the *Thioploca*, *Beggiatoa* and *Thiomargarita*. Gas vacuoles are present in some species of cyanobacteria

**Q.20 Answer is “Prokaryotes”**

**Explanation:** As prokaryotes lack traditional sexual reproduction, so there is no gametogenesis. However, they get the benefit of sexual reproduction (recombination) through conjugation, transduction and transformation.

**Q.21 Answer is “Bacterial cell”**

**Explanation:** Bacterial cell being prokaryotic have their own cytoskeletal fabric such as FtsZ, MreB, CreS etc. However they lack microtubules and microfilaments of eukaryotes.

**Q.22 Answer is “Animal cells”**

**Explanation:** Kingdom “Animalia” and “Fungi” being exclusively heterotrophic lack chlorophyll. However, the rest of the three kingdoms are either partly (Protista and Monera) or completely (Plantae) autotrophic and have chlorophyll for photosynthesis.

**Q.23 Answer is “Mitochondria are fewer”**

**Explanation:** As plant cells are comparatively less active than animal cells, they need less energy and afford fewer mitochondria.

**Q.24 Answer is “Anastral spindle”**

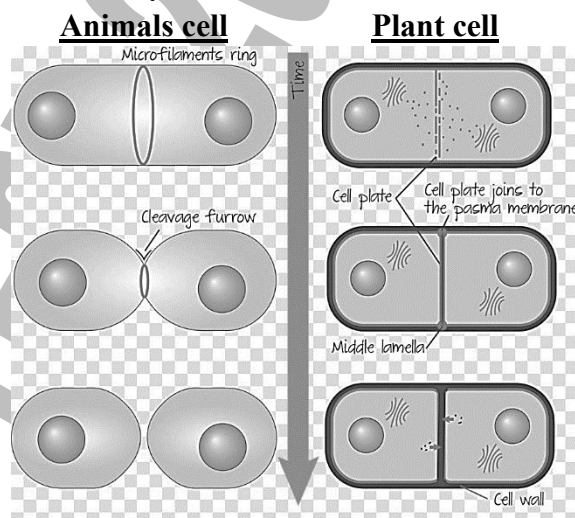
**Explanation:** Plant cells lack centrioles and make spindle without asters.



**Metaphase**

**Q.25 Answer is “Plant cell”**

**Explanation:** In plant cells, cytokinesis occurs in centrifugal way i.e. starts from the centre of the cell and is accomplished towards periphery. Microtubules of spindle are reorganized in the centre of the cell in the form of phragmoplast. In between phragmoplast cell plate formation starts by the fusion of golgi vesicles, which ultimately divides the cell into two halves.



**Q.26 Answer is “Tissue fluid bathes the cells”**

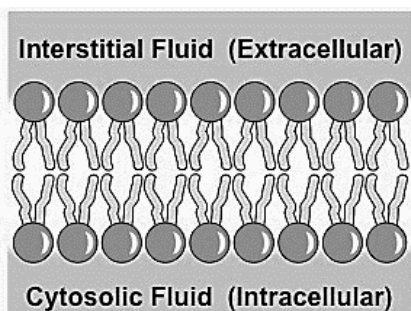
**Explanation:** Tissue fluid or lymph is a characteristic of animal cells. It is absent in plants. Rest of the three choices carry characteristics of animal cells.

**Q.27 Answer is “Plant cells”**

**Explanation:** Due to the presence of cell wall as an outer rigid boundary plant cells do not burst and resist osmotic pressure or turgor pressure

**Q.28 Answer is “Parallel arrangement”**

**Explanation:** Molecules of phospholipids are arranged in two parallel layers in all cellular membranes.

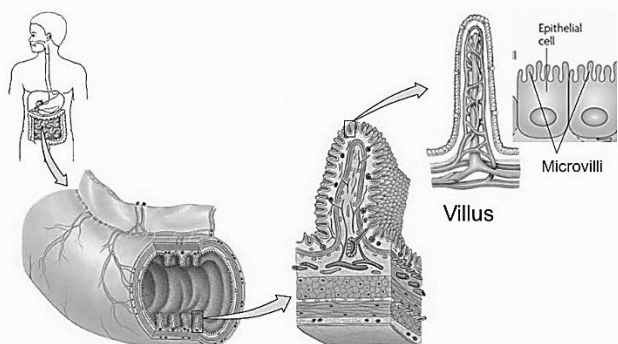


**Q.29** Answer is “Autolysis”

**Explanation:** Autolysis is performed by lysosomes, however cell drinking (pinocytosis), cell eating (phagocytosis) and cell vomiting (exocytosis) are performed by cell membrane.

**Q.30** Answer is “Microvilli formation”

**Explanation:** Microvilli are outfolds or outvaginations of epithelial cells of villi of ileum of small intestine. They enhance the absorptive surface area.



**Q.31** Answer is “Passive transport”

**Explanation:** Active transport or uphill movement is always against concentration gradient whereas facilitated transport may be active as well as passive. However diffusion and osmosis occurs according to concentration gradient. These are types of passive transport.

**Q.32** Answer is “Osmotic resistance”

**Explanation:** Osmotic resistance is the function of cell wall, however cell membrane is involved in locomotion through pseudopodia formation, ingestion (endocytosis) and secretion (exocytosis).

**Q.33** Answer is “Plasmolysis & deplasmolysis”

**Explanation:** Plasmolysis & deplasmolysis always occur according to concentration gradient i.e. passive transport.

**Q.34** Answer is “Pinocytosis”

**Explanation:** Ingestion of a liquid through cell membrane is called pinocytosis. It is also called as cell drinking.

**Q.35** Answer is “Both outer and inner”

**Explanation:** Because both outer and inner surfaces consist of heads of phospholipid molecules.

**Q.36** Answer is “Distance of 2.0  $\mu\text{m}$  between them”

**Explanation:**

Sr. #	Source of visualization	Resolution
1)	Human naked eye	1.0 mm
2)	Compound microscope	2.0 $\mu\text{m}$
3)	Electron microscope	2 – 4 Angstrom

**Q.37** Answer is “By means of compound microscope”

**Explanation:** See explanation of Q # 36.

**Q.38** Answer is “Electron microscope”

**Explanation:** See explanation of Q # 36.

**Q.39** Answer is “Beam of electrons”

**Explanation:**

	Compound microscope	Electron microscope
Source of illumination	Ordinary light	Beam of electrons
Cost	Millions of Rupees	Thousands of rupees
Size	Handy	Huge
Object	Falls in line of vision	Does not fall in line of vision
Magnification	10000 times	250,000

**Q.40** Answer is “250000x greater than actual size”

*Explanation:* See explanation of Q # 39.

**Q.41** Answer is “500x”

*Explanation:* See explanation of Q # 39.

STEP ENTRY TEST 2020



# STOP

A PROGRAM BY PUNJAB GROUP



# BIOLOGY



## Worksheet-6



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-6****(The Cell)**

**Q.1** Nucleus may be \_\_\_\_\_ or \_\_\_\_\_ in shape.

- A) Irregular, spherical
- B) Rectangular, spherical
- C) Elongated, spherical
- D) Ellipsoidal, square

**Q.2** The example of polynucleate cells is:

- A) Smooth muscle cells
- B) Striated muscle cells
- C) Striped muscle cells
- D) Skeletal muscle cells

**Q.3** In non-dividing phase nucleus contains \_\_\_\_\_ and soluble sap called \_\_\_\_\_ respectively.

- A) Chromatin network, nucleoplasm
- B) Chromosomes, nucleoplasm
- C) Nucleoplasm, chromatin network
- D) Chromatin network, cytoplasm

**Q.4** The hereditary material is in the form of chromosomes, which control:

- A) Reproductive activities of the cell
- B) Somatic activities of the cell
- C) All activities of the cell
- D) Physiological activities of the cell

**Q.5** The membrane that separates the nuclear material from the cytoplasm is:

- A) Plasmalemma
- B) Cytoplasmic membrane
- C) Plasma membrane
- D) Nuclear membrane

**Q.6** The outer and inner nuclear membranes are continuous at certain points, resulting in the formation of:

- A) Endoplasmic reticulum
- B) Nucleolus
- C) Nuclear pores
- D) Chromosomes

**Q.7** The exchange of material between the nucleus and the cytoplasm is carried out through:

- A) Endoplasmic reticulum
- B) Nuclear pores
- C) Vacuoles
- D) Nuclear envelope

**Q.8** The number of nuclear pores in the nuclei of differentiated cells such as erythrocytes is only:

- A) 1-2 nuclear pores/nucleus
- B) 2-3 nuclear pores/nucleus
- C) 3-4 nuclear pores/nucleus
- D) 5-6 nuclear pores/nucleus

**Q.9** The example of undifferentiated cells is that of:

- A) Leucocytes
- B) Erythrocytes
- C) Osteocytes
- D) Egg cells

**Q.10** Number of nucleoli may be:

- A) Many per nucleus
- B) One per nucleus
- C) One or more per nucleus
- D) Zero per nucleus

**Q.11** It is the \_\_\_\_\_ where ribosomes are assembled and then exported to the cytoplasm via nuclear pores.

- A) Nucleus
- B) Nucleoplasm
- C) Nuclear envelope
- D) Nucleolus

**Q.12** During cell division thread like material is converted into darkly stained structures known as:

- A) Nucleoli
- B) Nuclear membrane
- C) Nucleosomes
- D) Chromosomes

**Q.13** The place on chromosomes where spindle fibres are attached during cell division is called:

- A) Centromere
- B) Chromatid

- C) Secondary construction  
D) Nucleosome
- Q.14** Each chromosome consists of \_\_\_\_\_ at the beginning of cell division.  
A) Two non-sister centromeres  
B) Two sister chromatids  
C) Two non-sister chromatids  
D) Two sister centromeres
- Q.15** All the information needed to control the activities of the cell is located on the chromosomes in the form of:  
A) Centromeres C) Genes  
B) Kinetochores D) Genetic material
- Q.16** The number of chromosomes in \_\_\_\_\_ remains constant generation after generation.  
A) All individuals of same species  
B) All individuals of different species  
C) Few individuals of same species  
D) Few individuals of different species
- Q.17** In man each cell contains:  
A) 23 chromosomes C) 8 chromosomes  
B) 46 chromosomes D) 48 chromosomes
- Q.18** Number of chromosomes in each cell of fruit fly, *Drosophila melanogaster* is:  
A) 46 C) 48  
B) 26 D) 8
- Q.19** In each cell of Garden pea, the number of chromosomes is:  
A) 26 C) 08  
B) 16 D) 14
- Q.20** The number chromosomes in germ cells is:  
A) Tetraploid C) Haploid  
B) Triploid D) Diploid
- Q.21** Human sperms and eggs have:  
A) 23 chromosomes C) 4 chromosomes  
B) 46 chromosomes D) 13 chromosomes
- Q.22** Number of chromosomes in pollens of onion is:  
A) 14 C) 08  
B) 16 D) 07
- Q.23** Number chromosomes in the sperms of frog is:  
A) 26 C) 14  
B) 13 D) 16
- Q.24** The network of channels which is often continuous with plasma membrane and also appears to be in contact with the nuclear membrane is called as:  
A) Endoplasmic reticulum  
B) Chromatin network  
C) Reticular formation  
D) Microtubular network
- Q.25** Like intermediate filaments \_\_\_\_\_ also provides mechanical support to the cell so that its shape is maintained:  
A) Microfilaments  
B) Microtubules  
C) Golgi apparatus  
D) Endoplasmic reticulum
- Q.26** Two morphological forms of endoplasmic reticulum are:  
A) ER with the ribosome and ER without ribosome  
B) ER with cisternae and ER without cisternae  
C) ER with enzymes and ER without enzymes  
D) Rough endoplasmic reticulum and sarcoplasmic reticulum
- Q.27** The apparatus, which was found virtually in all eukaryotic cells and consists of stacks of flattened membrane bound sacs is called as:  
A) Golgi Apparatus

- B) Granum
- C) Endoplasmic reticulum
- D) Intergranum

**Q.28 Inner concave surface of Golgi apparatus is:**

- A) Maturation face      C) Forming face
- B) Cis face                D) Proximal face

**Q.29 The direction of flow of protein products synthesized on ribosomes is as under:**

- A) Ribosomes → RER → Transport Vesicles of ER → Golgi apparatus → Golgi vesicles → Plasma membrane
- B) Ribosomes → SER → Transport vesicles of ER → Golgi apparatus → Golgi vesicles → Plasma membrane
- C) Ribosomes → RER → Golgi vesicles → Golgi apparatus → Plasma membrane
- D) Ribosomes → RER → Golgi apparatus → Golgi vesicles → Plasma membrane

**Q.30 Blebs from tips of SER fuse with Golgi apparatus cisternae at:**

- A) Forming face      C) Trans face
- B) Inner face         D) Distal face

**Q.31 In mammals, the pancreas secretes granules containing enzymes. Such granules are formed by:**

- A) SER                    C) Golgi apparatus
- B) RER                   D) Lysosomes

**Q.32 The conjugation of proteins and lipids with carbohydrates is carried out in:**

- A) SER                    C) Golgi apparatus
- B) RER                   D) Mitochondria

**Q.33 Under electron microscope mitochondria appear to be:**

- A) Vesicles, rods or filaments

- B) Stellate, rods or filamentous
- C) Vesicles, star like or filamentous
- D) Round, rods or triangular

**Q.34 The number, shape and internal structure of mitochondria:**

- A) Vary rarely            C) Vary widely
- B) Do not vary          D) Do not resemble

**Q.35 The inner membrane of mitochondrion forms infoldings into the inner chamber called:**

- A) Mitochondrial cristae
- B) Mitochondrial matrix
- C) Mitochondrial stroma
- D) Mitochondrial sap

**Q.36 The inner surface of cristae in the mitochondrial matrix has small knob like structures known as:**

- A) F<sub>1</sub> particles            C) Matrix
- B) F<sub>0</sub> particles            D) F-ATPase

**Q.37 Mitochondrial matrix contains in it a large number of:**

- A) Enzymes and coenzymes
- B) Organic and inorganic salts
- C) Enzymes, coenzymes, organic and inorganic salts
- D) Enzymes, coenzymes, organic and inorganic salts and DNA with ribosomes

**Q.38 Mitochondria extract energy from different components of food and convert it in the form of:**

- A) Glucose                C) NADPH
- B) ATP                    D) ADP

**Q.39 Animal cells, and cells of some microorganisms and lower plants contain \_\_\_\_\_ located near the exterior surface of the nucleus.**

- A) One centriole



- B) Two centrioles
- C) Two pairs of centrioles
- D) Two mitochondria

**Q.40 Just before the cell divides:**

- A) Chromosomes duplicate
- B) Centrioles duplicate
- C) Ribosomes duplicate
- D) Nucleoli duplicate

**Q.41 Centrioles play important role in the:**

- A) Cytokinesis of plant cell
- B) Karyokinesis of plant cell
- C) Furrowing during cell division
- D) Formation of mitotic apparatus in plants

**Q.42 Cell contains many tiny granular structures known as:**

- A) Ribosomes
- C) Mitochondria
- B) Nuclei
- D) Golgi Apparatus

**Q.43 Ribonucleoprotein particles discovered by Palade in cell are:**

- A) Ribosomes
- C) Nucleosomes
- B) Lysosomes
- D) Golgi vesicles

**Q.44 Ribosomes exist in two forms in eukaryotic cells, i.e.:**

- A) Freely scattered in cytoplasm and attached with SER
- B) Freely scattered in cytoplasm and attached with RER
- C) Freely scattered in nucleoplasm and attached with RER
- D) Freely scattered in nucleoplasm and attached with SER

**Q.45 Each ribosome consists of:**

- A) Five subunits
- C) Three subunits
- B) Four subunits
- D) Two subunits

**Q.46 Pick up the choice which is true about subunits of eukaryotic ribosomes:**

- A) The larger subunits sediments at 60s, while smaller subunits sediments at 40s.
- B) The larger subunit sediments at 50s, while smaller subunit sediments at 30s.
- C) The larger subunit sediments at 60s, while smaller subunit sediments at 30s.
- D) The larger subunit sediments at 50s, while smaller subunit sediments at 40s.

**Q.47 Ribosomal subunits are attached to the mRNA string from:**

- A) 3' end
- C) 4' end
- B) 2' end
- D) 5' end

**Q.48 New ribosomes are assembled in the:**

- A) Nucleus
- C) Mitochondria
- B) Nucleolus
- D) Golgi apparatus

**Q.49 The factory of ribosomes is the \_\_\_\_\_, while that of protein synthesis is the \_\_\_\_\_.**

- A) Nucleolus, ribosomes
- B) Nucleus, ribosomes
- C) Ribosomes, nucleolus
- D) Nucleolus, mitochondria

**Q.50 Which one of the following is a single membrane enclosed organelle?**

- A) Mitochondria
- C) Nucleus
- B) Lysosome
- D) Chloroplast

**Q.51 Which one of the following is a congenital disease?**

- A) Uremia
- B) Glycogenosis
- C) Myocardial infarction



D) Cerebral infarction

**Q.52 Which one of the following is not true about Tay sach's disease?**

- A) Mental disorder
- B) Congenital disorder
- C) Lysosomal disorder
- D) Cardiovascular disorder

**Q.53 Tay sach's disease is due to deficiency of an enzyme associated with:**

- A) Metabolism
- B) Anabolism
- C) Catabolism
- D) Catalysis

**Q.54 Following organelles are derived from special assemblies of microtubules, EXCEPT:**

- A) Cilia
- B) Flagella
- C) Centrioles
- D) Microbodies

**Q.55 Cyclosis occurs due to the involvement of:**

- A) Microtubules
- B) Microfilaments
- C) Intermediate filaments
- D) Myofilaments

**Q.56 Intermediate filaments are called so, because they have intermediate:**

- A) Position in cell
- B) Composition
- C) Length
- D) Diameter

**Q.57 Absence of an enzyme that is involved in the catabolism of lipids may ultimately result in:**

- A) Glycogenosis
- B) Lysosomal disorder
- C) Mental retardation
- D) Storage disease

**Q.58 The most undesirable consequence of Tay Sach's disease is:**

- A) Accumulation of lipids in brain cells
- B) Mental retardation
- C) Death
- D) Absence of an enzyme involved in catabolism of lipids

**Q.59 Following events are associated with a lysosomal disorder called Tay Sach's disease. Arrange them in a specific sequence with respect to their occurrence:**

- i. Mental retardation
- ii. Inheritance of abnormal gene
- iii. Accumulation of lipids in brain cells
- iv. Lack of catabolism of lipids
- v. Absence of an enzyme

- A) i, ii, iii, iv, v
- B) v, iv, iii, ii, i
- C) ii, iv, i, iii, v
- D) ii, v, iv, iii, i

**Q.60 Events associated with lysosomal disorders are mentioned here below, arrange them in a sequence with respect to their occurrence:**

- i. Mutation
- ii. Storage diseases
- iii. Accumulation of substances within the cells
- iv. Deficiency of lysosomal enzymes
- v. Metabolic sluggishness

- A) i, ii, iii, iv, v
- B) i, iv, v, iii, ii
- C) v, iv, iii, ii, i
- D) ii, iii, iv, v, i

**Q.61 Autophagy in a cell is carried out by:**

- A) Lysosome
- B) Peroxisome
- C) Glyoxisome
- D) Mesosome

**Q.62 Autophagy is carried out by:**

- A) Lysosomes
- B) Autophagosomes
- C) Heterophagosomes
- D) Peroxisomes

**Q.63** The organelle that protects the cells from invading organisms or any other foreign object is:

- A) Lysosome
- B) Transport vesicle of endoplasmic reticulum
- C) Golgi vesicle
- D) Autophagosome

**Q.64** The proteins found in muscles are also found in:

- A) Cytoskeleton      C) Endoskeleton
- B) Exoskeleton      D) Cartilage

**Q.65** Cytoskeletal fabric consists of following structural components EXCEPT:

- A) Microtubules
- B) Cytosol
- C) Microfilament
- D) Intermediate filaments

**Q.66** Amoeboid movements are because of:

- A) Intermediate filaments
- B) Microtubules
- C) Microfilaments
- D) Cytoskeleton

**Q.67** Determination of cell shape and integration of cellular compartments is the role of:

- A) Microfilaments
- B) Cell membrane
- C) Intermediate filaments
- D) Cell wall

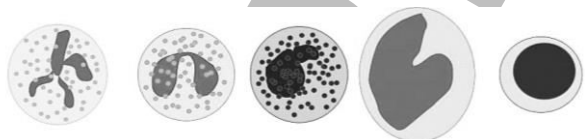
**ANSWER KEY (Worksheet-6)**

1	A	21	A	41	C	61	A
2	D	22	C	42	A	62	B
3	A	23	B	43	A	63	A
4	C	24	A	44	B	64	A
5	D	25	D	45	D	65	B
6	C	26	A	46	A	66	C
7	B	27	A	47	D	67	C
8	C	28	A	48	B		
9	D	29	A	49	A		
10	C	30	A	50	B		
11	D	31	C	51	B		
12	D	32	C	52	D		
13	A	33	A	53	C		
14	B	34	C	54	D		
15	C	35	B	55	B		
16	A	36	A	56	D		
17	B	37	D	57	C		
18	D	38	B	58	C		
19	D	39	B	59	D		
20	C	40	B	60	B		

**EXPLANATION**

**Q.1** Answer is “Irregular, Spherical”

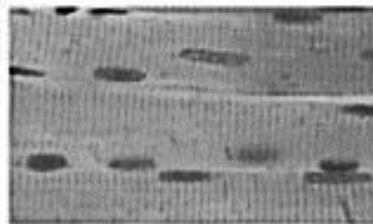
**Explanation:** Most of the nuclei are spherical in shape, however nuclei of certain cells (like various types of WBCs.) have irregular shapes e.g. the nucleus of neutrophils is two to five lobed and that of Eosinophil and Basophil is bilobed.



neutrophil eosinophil basophil monocyte lymphocyte

**Q.2** Answer is “Skeletal Muscle cell”

**Explanation:** Skeletal muscle cells are highly elongated and become unwieldy to be controlled by a single nucleus; thus contain many nuclei per cell.



**Q.3** Answer is “Chromatin network, nucleoplasm”

**Explanation:** In non-dividing cell (interphase) DNA of chromosomes have been decondensed and uncoiled. In this form it is called chromatin network. However, during cell division through recondensation and recoiling this chromatin network is converted into discrete structures called chromosomes. Chromatin network is suspended in a fluid substance called nucleoplasm.

**Q.4** Answer is “All activities of cell”

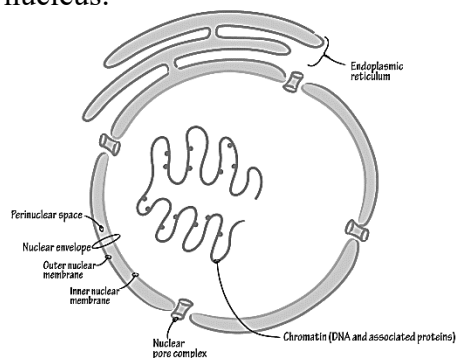
**Explanation:** All activities of a cell are controlled by its genetic material or DNA, through the genes; called units of inheritance. Genes are located on chromosomes.

**Q.5** Answer is “Nuclear membrane”

**Explanation:** In eukaryotic cells nuclear membrane or nuclear envelope separates the nuclear material from cytoplasm. It is double membrane having pores inside it.

**Q.6 Answer is “Nuclear pores”**

**Explanation:** Pores are formed by the fusion of outer and inner nuclear membranes at certain points which are source of communication between cytoplasm and nucleus.

**Q.7 Answer is “Nuclear Pores”**

**Explanation:** Nuclear pores are source of communication between nucleus and cytoplasm. Cytoplasm is the centre of metabolism for cell and each metabolic activity is controlled by genetic information located on chromosomes in the nucleus.

**Q.8 Answer is “3-4 nuclear pores / nucleus”**

**Explanation:** A differentiated cell which have been assigned a specific role and is not destined to divide further is less active metabolically and need less guidance from chromosomes and genes. Thus have less nuclear pores for communication with nucleus.

**Q.9 Answer is “Egg cells”**

**Explanation:** Egg cell is an undifferentiated cell which undergoes repeated mitoses after fertilization for development and remains highly active. That is why it needs much communication with nucleus and as a result much number of nuclear pores. i.e. upto 30,000 per nucleus.

**Q.10 Answer is “one or more per nucleus”**

**Explanation:** Number of nucleoli varies in different types of diploid cells, minimum being one and maximum may be in thousands. It depends upon the activeness of cell.

**Q.11 Answer is “Nucleolus”**

**Explanation:** Nucleoli are factories of ribosome synthesis whereas, ribosomes are factories of protein synthesis. Ribosomes are synthesized and assembled in nucleoli, then ribosomes synthesize proteins.

**Q.12 Answer is “Chromosomes”**

**Explanation:** Nucleus of a non-dividing cell contain chromatin material in form of network which have been obtained by uncoiling and decondensation of chromosomes. As the cell division starts the chromatin material is recoiled/recondensed to acquire the shape of chromosomes. Chromosomes appear as thread like structures in nucleus at that time under microscope.

**Q.13 Answer is “Centromere”**

**Explanation:** Centromere or primary constriction is that part of chromosome that links sister chromatids or a dyad. During mitosis, spindle fibers are attached to centromere via the kinetochore.

**Q.14 Answer is “Two sister chromatids”**

**Explanation:** Both chromatids of same chromosome are sister to each other whereas they are non-sister to the chromatids of other homologue. During gametogenesis both sister chromatids are separated and each goes to a separate gamete. However, in S phase of cell cycle each chromatid synthesizes its sister chromatid again.

**Q.15 Answer is “Genes”**

**Explanation:** Genes are physical units of heredity located on chromosomes.

**Q.16** Answer is “All Individuals of same species”

**Explanation:** The number of chromosomes is fixed for a species and any change in it leaves drastic impact on that individual. Such individuals are usually abnormal e.g. Down’s syndrome with 47 chromosomes and Turner’s syndrome with 45 chromosomes.

**Q.17** Answer is “46 chromosomes”

**Explanation:** It is normal diploid number of chromosomes in human being, however gametes or germ cells being haploid contain half (23) number of chromosomes.

**Q.18** Answer is “08”

**Explanation:** *Drosophila* have four pairs of chromosomes i.e. four homologous pairs of chromosomes in female *Drosophila* whereas three homologous pairs and one non homologous pair of chromosomes in male *Drosophila*.



Female

Male

**Q.19** Answer is “14”

**Explanation:** It is normal diploid number of chromosomes in garden pea.

**Q.20** Answer is “Haploid”

**Explanation:** As germ cells are products of meiosis.

**Q.21** Answer is “23 Chromosomes”

**Explanation:** This is haploid number of human chromosomes as eggs and sperms are meiotic products.

**Q.22** Answer is “08”

**Explanation:** Pollens or microspores are also haploid, formed by meiosis from a diploid microsporocyte or a pollen mother cell. The normal diploid number of chromosomes in onion is 16.

**Q.23** Answer is “13”

**Explanation:** Normal diploid number of chromosomes in frog is 26.

**Q.24** Answer is “Endoplasmic reticulum”

**Explanation:** Endoplasmic reticulum is a source of communication between nucleus of a cell and its external environment.

**Q.25** Answer is “Endoplasmic reticulum”

**Explanation:** Endoplasmic reticulum being a network present all around the nucleus upto cell membrane acts like spokes of a wheel to maintain the shape of the cell.

**Q.26** Answer is “ER with ribosomes and ER without ribosomes”

**Explanation:** ER with ribosomes are called rough endoplasmic reticulum (RER) whereas ER without ribosomes is called smooth endoplasmic reticulum (SER). Sarcoplasmic reticulum is the SER of muscle cells.

**Q.27** Answer is “Golgi Apparatus”

**Explanation:** A Golgi body is flattened membrane bound sac whereas a Golgi apparatus is a stack of Golgi bodies, whereas as Golgi complex is a Golgi apparatus along with transport vesicles of endoplasmic reticulum and Golgi vesicles.

**Q.28** Answer is “Maturation face”

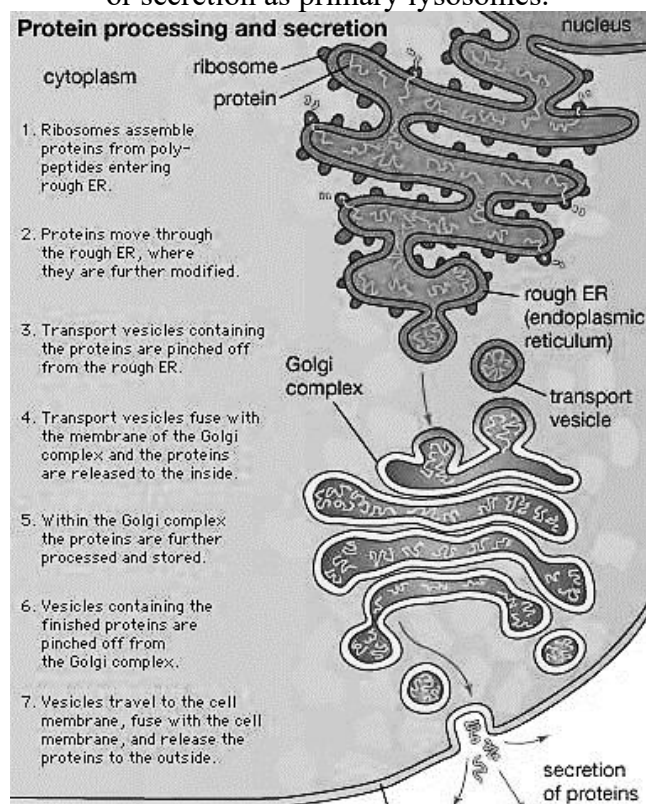
**Explanation:** It is also called trans face being away from the endoplasmic reticulum. From this face transport vesicles of Golgi bodies are pinched off having finished products inside them. That is why it is called maturation face.

**Q.29** Answer is “Ribosomes → RER → Transport Vesicles of ER → Golgi



apparatus → Golgi vesicles → Plasma membrane.”

**Explanation:** Raw proteins are synthesized by ribosomes on RER and then dumped into cisternae of RER. From RER these raw proteins are pinched off in transport vesicles of RER. These transport vesicles of RER are fused together at forming face of Golgi apparatus to form golgi bodies. During the movement of these golgi bodies from forming face to maturation face these raw proteins are converted into finished products (conjugated molecules). Then these are packed in golgi vesicles which are pinched off from maturation face. These vesicles move to the cell membrane for exocytosis or secretion as primary lysosomes.



**Q.30 Answer is “Forming Face”**

**Explanation:** Blebs from tips of SER are actually transport vesicles of endoplasmic reticulum which coalesce together to give rise to a golgi body at the forming face of golgi apparatus.

**Q.31 Answer is “Golgi Apparatus”**

**Explanation:** these granules are actually golgi vesicles containing digestive enzymes in inactive form, which are activated after being released into duodenum.

**Q.32 Answer is “Golgi Apparatus”**

**Explanation:** All finished products like conjugated molecules are synthesized in golgi apparatus after receiving their raw material from endoplasmic reticulum. That is why golgi apparatus is called finishing, packing and distribution section of the factory of cell. See the figure given at end of the explanation of question # 30.

**Q.33 Answer is “Vesicles, rods or filaments”**

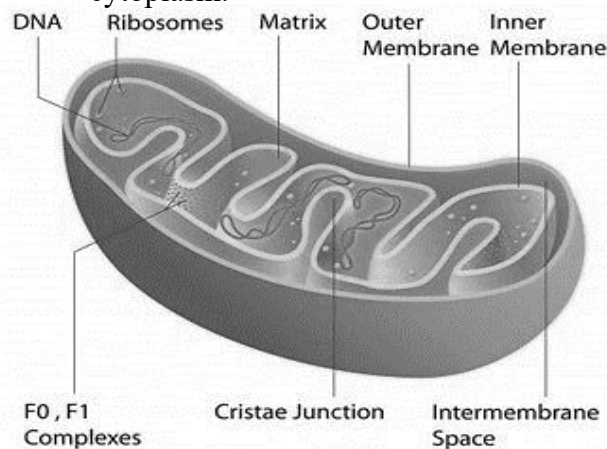
**Explanation:** Mitochondria may be of rod shape, vesicle shape or filamentous shape.

**Q.34 Answer is “Vary widely”**

**Explanation:** Number of mitochondria depends upon the activity of the cell. Similarly shape and internal structure may also be different in different organisms.

**Q.35 Answer is “Mitochondrial matrix”**

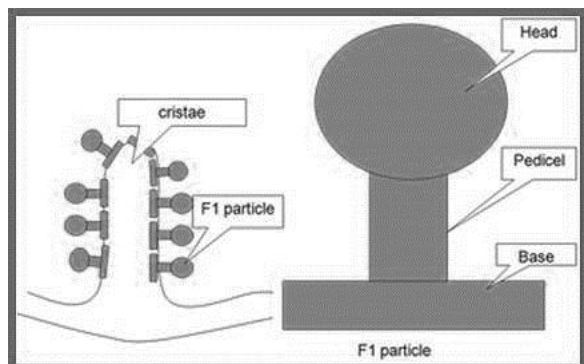
**Explanation:** The inner space of mitochondria within the inner membrane in which cristae lie is called matrix. The word matrix indicates that this space is viscous as compared to relatively aqueous cytoplasm.





**Q.36 Answer is “F<sub>1</sub> particles”**

**Explanation:** These are the knob like tips of ATP synthase (F<sub>1</sub> ATPase) embedded in the thylakoid membrane. The embedded part of ATP synthase is called F<sub>0</sub> particle.

**Q.37 Answer is “Enzymes, Co-enzymes, Organic and inorganic salts and DNA with ribosomes”**

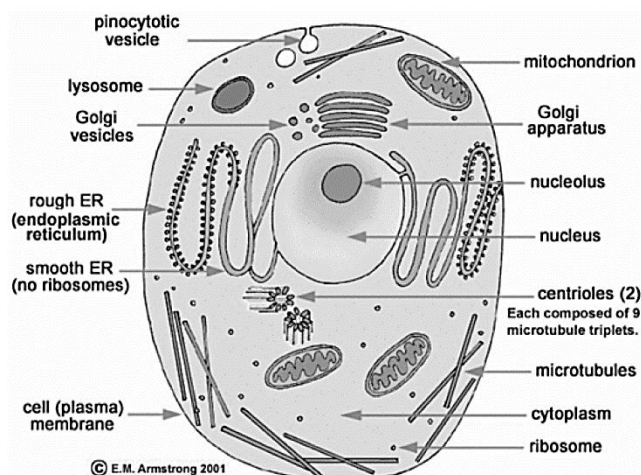
**Explanation:** Mitochondria are power houses of the cells where two important phases of aerobic respiration are accomplished i.e., Krebs cycle and respiratory electron transport chain. Thus all enzyme, coenzymes and other substances related to these pathways are present in mitochondria. ATPs are synthesized here. However, some extra chromosomal DNA along with ribosomes are also found in mitochondria.

**Q.38 Answer is “ATP”**

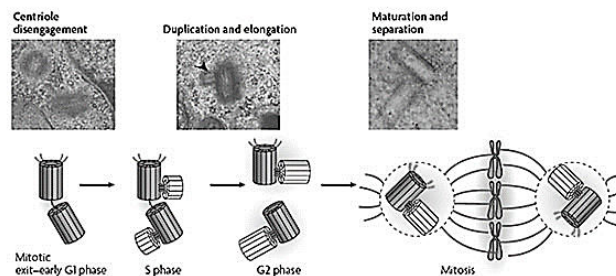
**Explanation:** Being power house of the cell mitochondria are involved in synthesis of most of the energy in the form of ATP through aerobic respiration i.e. through Krebs cycle and electron transport chain.

**Q.39 Answer is “Two centrioles”**

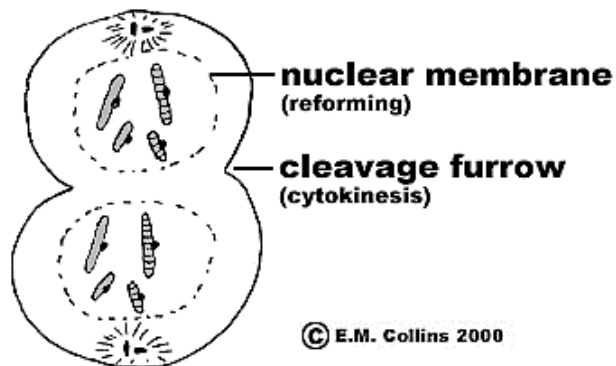
**Explanation:** Centrioles are located on the outer surface of nucleus making right angle with each other in a non-dividing cell.

**Q.40 Answer is “Centrioles duplicate”**

**Explanation:** Duplication of centrioles is the first indication of initiation of cell division in animal cells.

**Q.41 Answer is “Furrowing during cell division”**

**Explanation:** In animal cells cytokinesis occurs through furrowing and it starts at the central point between centriole pairs positioned on opposite poles of the dividing cell.



**Q.42 Answer is “Ribosomes”**

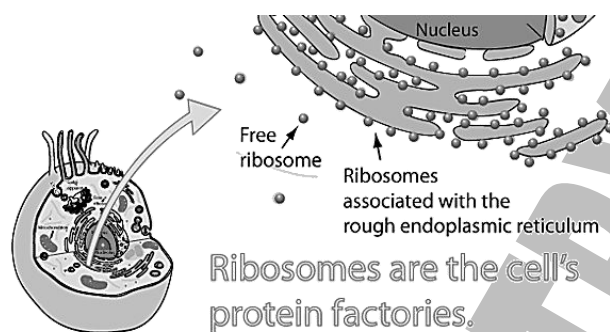
**Explanation:** Ribosomes are tiny membraneless granular structures of both prokaryotic and eukaryotic cells.

**Q.43 Answer is “Ribosomes”**

**Explanation:** Ribosomes are made up of RNA and proteins. Palade discovered the ribosomes.

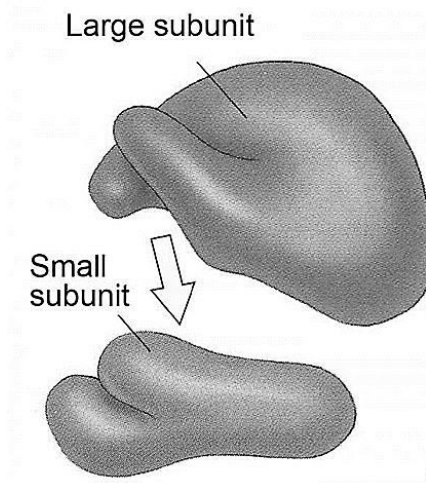
**Q.44 Answer is “Freely scattered in cytoplasm and attached with RER”**

**Explanation:** Ribosomes are of two types with respect to their spatial distribution in cell i.e., free and attached with membrane of endoplasmic reticulum. Such endoplasmic reticulum become rough surfaced (RER).



**Q.45 Answer is “Two subunits”**

**Explanation:** The larger subunit and smaller subunit.

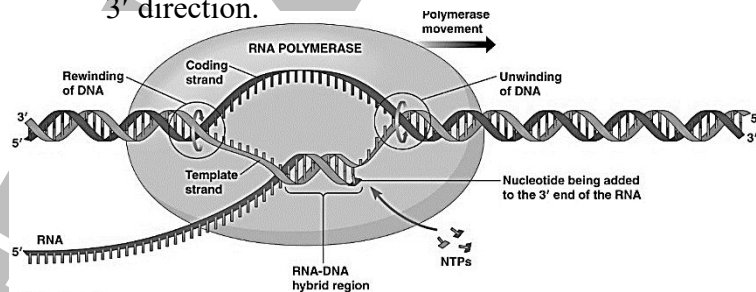


**Q.46 Answer is “the larger submit sediment at 60s, while smaller submits sediment at 40s”**

**Explanation:** The larger subunit (60S) have higher rate of sedimentation as compared to smaller one (40S), for eukaryotes.

**Q.47 Answer is “5 end”**

**Explanation:** The genetic message, transcribed on mRNA is translated in 5' to 3' direction.



**Q.48 Answer is “Nucleolus”**

**Explanation:** As nucleolus is the factory of ribosome synthesis.

**Q.49 Answer is “Nucleolus, Ribosomes”**

**Explanation:** Nucleoli synthesize the ribosomes and in turn ribosomes synthesize the proteins.

**Q.50 Answer is “Lysosomes”**

**Explanation:** Lysosomes have single membrane.

**Q.51 Answer is “Glycogenosis”**

**Explanation:** It is a lysosomal disorder which is inherited by birth as a genetic deficiency.

**Q.52 Answer is “Cardiovascular disorder”**

**Explanation:** Tay sach's diseases is a congenital disorder due to deficiency of a particular lysosome (enzyme) associated with catabolism of lipids. As a result, lipids accumulate in brain and a mental disorder appears which may lead to death.

**Q.53 Answer is “Catabolism”**

**Explanation:** Glyoxisomes contain such enzymes which are associated with conversion of stored fatty acids to carbohydrates in seedlings of oil yielding plants.

**Q.54 Answer is “Microbodies”**

**Explanation:** Microbodies are cell organelles like peroxisomes and glyoxisomes.

**Q.55 Answer is “Microfilaments”**

**Explanation:** Microfilaments made up of contractile actin proteins contract and relax rhythmically in a cell and generate a pumping pressure which forces the cytoplasm to carry out a mass movement or streaming movement in clockwise manner around the nucleus. It is called cyclosis.

**Q.56 Answer is “Diameter”**

**Explanation:** The diameter of intermediate filaments is in-between that of microtubules and microfilaments.

**Q.57 Answer is “Mental retardation”**

**Explanation:** Due to the deficiency of such enzymes lipids are accumulated in the brain cells which lead to mental retardation or even death. Disorder is called Tay Sach’s disease.

**Q.58 Answer is “Death”**

**Explanation:** The worst consequence of the accumulation of lipids in brain is death of human being. Even with the best care, children with infantile Tay Sach’s disease usually die at the age of 4.

**Q.59 Answer is “ii, v, iv, iii, i”**

**Explanation:** When someone inherits abnormal gene associated with the synthesis of that enzyme required for catabolism of lipids, the person will lack such enzymes. As a consequence there will be no catabolism of lipids and lipids will

get accumulated into the brain cells. It will result in mental retardation.

**Q.60 Answer is “i, iv, v, iii, ii”**

**Explanation:** When the gene associated with enzyme synthesis is mutated, the enzyme becomes deficient and as a result that metabolic process becomes sluggish and the substrate (substance) starts accumulation. This results in storage disease.

**Q.61 Answer is “Lysosome”**

**Explanation:** The lysosomes associated with autophagy or self-eating are called autophagosomes. Such lysosomes engulf some worn out parts of cell and digest it.

**Q.62 Answer is “Autophagosomes”**

**Explanation:** Lysosomes associated with self-eating (autophagy) are called autophagosomes.

**Q.63 Answer is “Lysosome”**

**Explanation:** Pathogen often hijack endocytic pathway such as pinocytosis in order to gain entry into the cell. The lysosome prevents easy entry into the cell by hydrolyzing the biomolecules of pathogen necessary for their replication strategies. Reduced lysosomal activity is an increase in viral infectivity.

**Q.64 Answer is “Cytoskeleton”**

**Explanation:** Actin, myosin and tropomyosin and other proteins which are part of muscles are also part of cytoskeleton.

**Q.65 Answer is “Cytosol”**

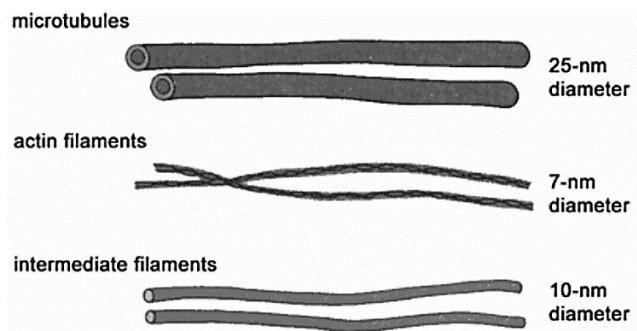
**Explanation:** Cytosol is the soluble or solution part of cytoplasm whereas cytoskeleton consists of three components i.e. microtubules, microfilaments and intermediate filaments.

**Q.66 Answer is “Microfilament”**

**Explanation:** Microfilaments are associated with streaming movement or mass movement of cytoplasm, called cyclosis. Any intracellular movement of cytoplasm is carried out by the rhythmic contraction of microfilaments and for pseudopodial movement intracellular movement of cytoplasm is required.

**Q.67** Answer is “Intermediate filament”

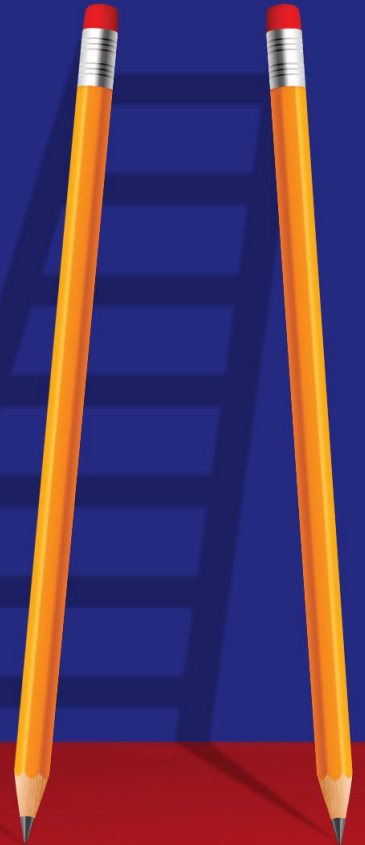
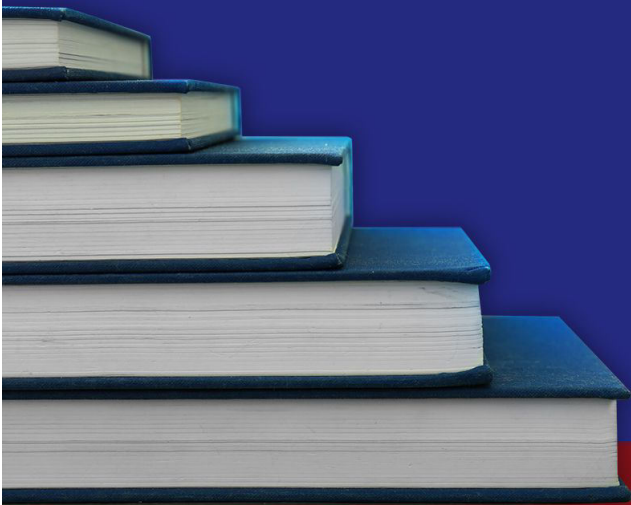
**Explanation:** intermediate filaments are aggregated on the inner surface of cell membrane as well as in the space between cell membrane and nucleus and provide support to the cell membrane to maintain its shape on one hand and other hand maintain the inner compartment of the cell.





# STOP

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# BIOLOGY



## Worksheet-7



**STP**

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**Worksheet-7**  
**(Biological Molecules)**

**Q.1** Cellulose of wood, cotton and paper is an example of:

- A) Carbohydrates      C) Nucleic acids  
B) Proteins              D) Lipids

**Q.2** The main constituents of cell walls in plants, algae, fungi and eukaryotic microorganisms are:

- A) Carbohydrates      C) Proteins  
B) Lipids                D) Nucleic acids

**Q.3** Carbohydrates are composed of:

- A) Carbon, nitrogen and oxygen  
B) Carbon, hydrogen, oxygen and phosphorus  
C) Carbon, hydrogen, oxygen and nitrogen  
D) Carbon, hydrogen and oxygen

**Q.4** In simple carbohydrates the ratio of hydrogen and oxygen is same as in:

- A) Lipids                C) Water  
B) Proteins              D) Nucleic acids

**Q.5** The general formula of carbohydrates is  $C_x(H_2O)_y$  where 'x' is the whole number:

- A) From three to many thousands  
B) From three to seven thousands  
C) From three to three thousands  
D) From seven to many thousands

**Q.6** Polyhydroxy aldehydes or polyhydroxy ketones are:

- A) Carbohydrates      C) Lipids  
B) Proteins              D) Nucleic acids

**Q.7** The example of polyhydroxy ketone is:

- A) Glucose              C) Dihydroxyacetone  
B) Glyceraldehyde    D) Ribose

**Q.8** "Complex substances which on hydrolysis yield polyhydroxy aldehyde or ketone subunits" are:

- A) Monosaccharides and oligosaccharides  
B) Glucose and fructose  
C) Monosaccharides and polysaccharides  
D) Oligosaccharides and polysaccharides

**Q.9** The sources of carbohydrates are:

- A) Bacteria              C) Protists  
B) Green plants        D) Protozoans

**Q.10** Carbohydrates in cell combine with \_\_\_\_\_ and \_\_\_\_\_ and the resulting compounds are called glycoproteins and glycolipids respectively.

- A) Lipids, Proteins  
B) Carbohydrates, Proteins  
C) Carbohydrates, Lipids  
D) Proteins, Lipids

**Q.11** Both glycoproteins and glycolipids are components of:

- A) Plant cell walls  
B) Algal cell walls  
C) Fungal cell wall  
D) Biological membrane

**Q.12** Carbohydrates are also called:

- A) Saccharides  
B) Polyhydroxy aldehydes  
C) Polyhydroxy ketone  
D) Condensation products

**Q.13 Carbohydrates are classified into:**

- A) Three groups
- B) Seven groups
- C) Three to seven groups
- D) More than seven groups

**Q.14 These are simple sugars:**

- A) Polysaccharides    C) Disaccharides
- B) Oligosaccharides    D) Monosaccharides

**Q.15 These are easily soluble in water:**

- A) Carbohydrates    C) Oligosaccharides
- B) Monosaccharides    D) Polysaccharides

**Q.16 All carbon atoms in a monosaccharide \_\_\_\_\_ have hydroxyl group.**

- A) Except one    C) Except two
- B) Without exception    D) Except last

**Q.17 Aldo-triose differs from keto-triose with respect to:**

- A) Number of carbon atoms
- B) Position of carbon atoms
- C) Position of hydrogen atoms
- D) Position of hydrogen and oxygen atoms

**Q.18 Pick up the triose:**

- A) Glyceraldehyde    C) Ribose
- B) Fructose    D) Glucose

**Q.19 Pick up the keto-triose:**

- A) DAP    C) G.6.P
- B) RuBP    D) G.3.P

**Q.20 In nature monosaccharides with \_\_\_\_\_ carbon atoms are found.**

- A) One to three    C) Three to seven
- B) One to seven    D) Three to thousands

**Q.21 The general formula of monosaccharides is:**

- A)  $(CH_2O)_n$     C)  $C_n(H_2O)_y$
- B)  $C_n(H_2O)_n$     D)  $C_y(H_2O)_n$

**Q.22 \_\_\_\_\_ and \_\_\_\_\_ are most common monosaccharides.**

- A) Trioses, tetroses
- B) Tetroses, pentoses
- C) Pentoses, hexoses
- D) Hexoses, heptoses

**Q.23 It is an aldo-hexose:**

- A) Fructose    C) Ribulose
- B) Glucose    D) Ribose

**Q.24 Most of the monosaccharides form a \_\_\_\_\_ when in solution.**

- A) Straight chain    C) Ring structure
- B) Branched chain    D) Folded structure

**Q.25 Ribose forms a \_\_\_\_\_ cornered ring:**

- A) Three    C) Six
- B) Four    D) Five

**Q.26 Glucose forms a six cornered ring called:**

- A) Glucopyranose
- B) Fructofuranose
- C) Ribofuranose
- D) Deoxyribofuranose

**Q.27 \_\_\_\_\_ corners of ribofuranose are occupied by carbon.**

- A) Three    C) Four
- B) Two    D) Five

**Q.28 \_\_\_\_\_ corners of Glucopyranose are occupied by carbon atoms.**

- A) Three    C) Five
- B) Four    D) Six

**Q.29 In free state, glucose is present in:**

- A) Grapes    C) Dates
- B) Figs    D) All fruits

**Q.30 In combined form glucose is found in:**

- A) Many disaccharides & polysaccharides
- B) All oligosaccharides & polysaccharides
- C) All disaccharides & polysaccharides
- D) All trisaccharides & polysaccharides

**Q.31** Starch, cellulose and glycogen yield \_\_\_\_\_ on complete hydrolysis:

- A) Fructose                      C) Glucose  
B) Mannose                      D) Galactose

**Q.32** Glucose is naturally produced in:

- A) Green plants                  C) Animals  
B) Protists                        D) Fungi

**Q.33** The chemical energy stored in 10 grams of glucose is:

- A) 7170.6 Kcal                  C) 717.6 Kcal  
B) 7017.6 Kcal                  D) 17107.6 Kcal

**Q.34** These are comparatively less sweet in taste and less soluble in water:

- A) Monosaccharides          C) Disaccharides  
B) Oligosaccharides          D) Polysaccharides

**Q.35** The ones yielding two monosaccharides on hydrolysis are:

- A) Trisaccharides              C) Pentasaccharides  
B) Tetrasaccharides          D) Disaccharides

**Q.36** The molecular formula of sucrose is:

- A)  $C_{12}H_{22}O_{11}$                   C)  $C_3H_6O_3$   
B)  $C_6H_{12}O_6$                     D)  $C_5H_{10}O_5$

**Q.37** Carbon number \_\_\_\_\_ of glucose and \_\_\_\_\_ of fructose respectively make a glycosidic bond to give rise to a sucrose.

- A) 4, 4                              C) 1, 4  
B) 1, 2                              D) 2, 1

**Q.38** How many carbons are kept outside the ring in glucose?

- A) 01                                C) 02  
B) 03                                D) 04

**Q.39** The most complex and the most abundant carbohydrates in nature are:

- A) Monosaccharides          C) Disaccharides  
B) Oligosaccharides          D) Polysaccharides

**Q.40** The carbohydrates which are only sparingly soluble in water are:

- A) Monosaccharides          C) Oligosaccharides  
B) Disaccharides                D) Polysaccharides

**Q.41** Starches are of \_\_\_\_\_ types.

- A) One                                C) Three  
B) Two                                D) Four

**Q.42** It consists of an unbranched chain of  $\alpha$  glucose monomers:

- A) Amylopectin                  C) Cellulose  
B) Glycogen                        D) Amylose

**Q.43** Amylopectin starches have \_\_\_\_\_ chains and are \_\_\_\_\_ in hot or cold water.

- A) Unbranched, soluble  
B) Unbranched, insoluble  
C) Branched, soluble  
D) Branched, insoluble

**Q.44** \_\_\_\_\_ gives blue color with iodine.

- A) Glycogen                        C) Dextrin  
B) Cellulose                        D) Starches

**Q.45** It is found abundantly in muscle and liver cells:

- A) Starch                            C) Glycogen  
B) Chitin                            D) Amylose

**Q.46** Cotton is a pure form of:

- A) Starch                            C) Cellulose  
B) Amylopectin                  D) Pectins

**Q.47** It is highly insoluble in water:

- A) Glycogen                        C) Cellulose  
B) Amylose                        D) Agar

**Q.48** Pick up the one which yields glucose molecules upon hydrolysis:

- A) Starch
- B) Glycogen
- C) Cellulose
- D) Starch, Glycogen and Cellulose

**Q.49** In the herbivores, cellulose is digested because of:

- A) Bacteria
- B) Yeasts
- C) Protozoa
- D) Bacteria, Yeasts and Protozoa

**Q.50** The bacteria, yeast and protozoans found in the digestive tract of herbivores secrete:

- A) Amylase
- B) Cellulase
- C) Lipase
- D) Ptyalin

**Q.51** It gives no color with iodine:

- A) Amylose
- B) Amylopectin
- C) Glycogen
- D) Cellulose

**Q.52** They are insoluble in water and soluble in organic solvents:

- A) Nucleic acids
- B) Carbohydrates
- C) Lipids
- D) Proteins

**Q.53** Lipids as hydrophobic compounds are component of:

- A) Genetic material
- B) Cell wall
- C) Cytoplasm
- D) Cellular membrane

**Q.54** Lipids store double amount of energy, as compared to the equal amount of carbohydrates, because of:

- A) Higher proportion of C-H bonds
- B) Higher proportion of C-N bonds
- C) Higher proportion of C-O bonds
- D) Lower proportion of C-O-P bonds

**Q.55** Some \_\_\_\_\_ provide insulation against atmospheric heat and cold.

- A) Lipids
- B) Carbohydrates
- C) Nucleic acids
- D) Proteins

**Q.56** Pick up the one which is not a lipid:

- A) Acylglycerols and waxes
- B) Phospholipids and sphingolipids
- C) Carotenoids and steroids
- D) Dextrins and pectins

**Q.57** Triacylglycerols are also called as:

- A) Saccharolipids or sphingolipids
- B) Glycerolipids or polyketides
- C) Triglycerides or neutral lipids
- D) Isoprene or neutral lipids

**Q.58** Chemically \_\_\_\_\_ can be defined as esters of fatty acids and alcohol.

- A) Phospholipids
- B) Waxes
- C) Acylglycerols
- D) Terpenoids

**Q.59** A compound produced as a result of a chemical reaction of an alcohol with an acid, where a water molecule is released, is called:

- A) Acylglycerol
- B) Ester
- C) Fatty acid
- D) Wax



**Q.60** For ester formation \_\_\_\_\_ is released from alcohol and \_\_\_\_\_ is released from acid, which combine to form a water molecule.

- A) H, OH                      C) OH, H  
B) H, H                      D) OH, OH

**Q.61** \_\_\_\_\_ is composed of one glycerol and three fatty acids.

- A) Acylglycerol              C) Monoglyceride  
B) Triglyceride              D) Diacylglycerol

**Q.62** The number of carbon atoms in fatty acids may be:

- A) 2-7                      C) 2-30  
B) 3-7                      D) 2-40

**Q.63** Fatty acids contain even number of carbon atoms in straight chain attached with \_\_\_\_\_ atoms and having \_\_\_\_\_.

- A) Hydrogen, an acidic group  
B) Oxygen, an alcohol  
C) Oxygen, an acid group  
D) Hydrogen, an alcohol

**Q.64** Pick up the character which does not belong to unsaturated fatty acids:

- A) No double bond  
B) One the six double bonds  
C) Low melting point  
D) Part of plant fats

**Q.65** In animals the fatty acids are \_\_\_\_\_ while in plants these may be \_\_\_\_\_ or \_\_\_\_\_.

- A) Unbranched, branched, ringed  
B) Branched, ringed, unbranched  
C) Ringed, branched, unbranched  
D) Ringed, unbranched, branched

**Q.66** Solubility of fatty acids in organic solvents and their melting points increase with increase in the:

- A) Number of carbon atoms in chain  
B) Number of oxygen atoms in chain  
C) Number of hydrogen atoms in chain  
D) Number of acid groups in chain

**Q.67** \_\_\_\_\_ is much more soluble in organic solvent than \_\_\_\_\_.

- A) Acetic acid, butyric acid  
B) Butyric acid, palmitic acid  
C) Palmitic acid, butyric acid  
D) Palmitic acid, oleic acid

**Q.68** Melting point of palmitic acid is:

- A) 61.3°C                      C) 80°C  
B) 63.1°C                      D) -8°C

**Q.69** Melting point of butyric acid is:

- A) 61.3°C                      C) 80°C  
B) 63.1°C                      D) -8°C

**Q.70** The smallest fatty acid is:

- A) Oleic acid                      C) Butyric acid  
B) Palmitic acid                      D) Acetic acid

**Q.71** A saturated fatty acid with four carbon atoms is:

- A) Oleic acid                      C) Butyric acid  
B) Palmitic acid                      D) Acetic acid

**Q.72** A saturated fatty acid with sixteen carbon atoms is:

- A) Acetic acid                      C) Palmitic acid  
B) Butyric acid                      D) Oleic acid

**Q.73** Fats containing \_\_\_\_\_ fatty acids are usually liquid at room temperature and are said to be oils.

- A) Saturated
- B) Straight chain
- C) Unsaturated
- D) Saturated unbranched

**Q.74** Fats containing \_\_\_\_\_ fatty acids are solid at room temperature.

- A) Unsaturated
- B) Branched
- C) Saturated
- D) Ringed

**Q.75** Fat containing unsaturated fatty acids are usually represented by:

- A) Oils
- B) Solid fats
- C) Butter
- D) Banaspati

**Q.76** \_\_\_\_\_ fats are solid at room temperature.

- A) Animal
- B) Plant
- C) All
- D) No

**Q.77** Fats and oils are:

- A) Lighter than water
- B) Havier than water
- C) Less viscous than water
- D) More denser than water

**Q.78** The specific gravity of fats and oils is:

- A) 0.08
- B) 0.8
- C) 0.008
- D) 8.0

**Q.79** They are non crystalline but some can be crystallized under specific conditions:

- A) Carbohydrates
- B) Monosaccharides
- C) Fats and oils
- D) Sucrose

**Q.80** Glycerol, fatty acids and phosphoric acid gives rise to:

- A) Phospholipid
- B) Phosphatidic acid
- C) Phosphatidyl choline
- D) Phosphatidylethnoline

**Q.81** Phosphatidic acid upon combining with a nitrogenous base gives rise to:

- A) Phosphatidic acid
- B) Phosphatidylcholine
- C) Phospholipid
- D) Lecithin

**Q.82** A phosphatidic acid upon combining with a choline gives rise to:

- A) Phosphatidic acid
- B) Phosphatidylcholine
- C) Phospholipids
- D) Phosphatidylserine

**Q.83** Condensation of a glycerol with two fatty acids and one phosphoric acid yields:

- A) One molecule of water
- B) Two molecules of water
- C) Three molecules of water
- D) Four molecules of water

**Q.84** The most widely spread acylglycerol is:

- A) Triacylglycerol
- B) Diacylglycerol
- C) Monoacyl glycerol
- D) Monoglyceride

- Q.85** Biological macromolecules are polymers that are formed when \_\_\_\_\_ are joined by a \_\_\_\_\_ reaction.
- A) Monomers, dehydration
  - B) Subunits, reduction
  - C) Multimers, dehydration
  - D) Monomers, hydrolysis
- Q.86** Which one of the following characteristics is not common among to carbohydrates, lipids and proteins?
- A) They are composed of a carbon backbone with functional group attached
  - B) Their polymers are broken apart by hydrolysis
  - C) Monomers of these molecules undergo dehydration synthesis to form polymers.
  - D) The molecules are held together by ionic bondings
- Q.87** The first phospholipid identified in biological tissue was:
- A) Phosphatidylcholine
  - B) Phosphatidylethanolamine
  - C) Phosphatidylserine
  - D) Phosphatidic acid
- Q.88** The polar region of a phospholipid molecule is:
- A) Hydrophobic head
  - B) Hydrophilic head
  - C) Hydrophilic tail
  - D) Hydrophobic tail
- Q.89** The non-polar region of a phospholipid molecule consists of:
- A) Glycerol
  - B) Alcohol
  - C) Phosphoric acid
  - D) Fatty acids
- Q.90** In phosphatidic acid fatty acids are attached to carbon no. \_\_\_\_\_ of glycerol.
- A) 01
  - B) 02
  - C) 01 and 02
  - D) 03
- Q.91** In phosphatidic acid, phosphoric acid is attached to carbon no. \_\_\_\_\_ of glycerol.
- A) 01
  - B) 02
  - C) 03
  - D) 04
- Q.92** For synthesis of a phospholipid, nitrogenous base is attached to \_\_\_\_\_ of phosphatidic acid.
- A) First fatty acid
  - B) Second fatty acid
  - C) Phosphoric acid
  - D) Glycerol
- Q.93** The organic biomolecules that store maximum amount of potential energy are:
- A) Carbohydrates
  - B) Proteins
  - C) Nucleic acids
  - D) Lipids
- Q.94** Lipids provide water barrier to:
- A) Birds
  - B) Fur containing animals
  - C) Insects
  - D) Birds and fur containing animals

**ANSWER KEY (Worksheet-7)**

1	A	25	D	49	D	73	C
2	A	26	A	50	B	74	C
3	D	27	C	51	D	75	A
4	C	28	C	52	C	76	A
5	A	29	D	53	D	77	A
6	A	30	A	54	A	78	B
7	C	31	C	55	A	79	C
8	D	32	A	56	D	80	B
9	B	33	C	57	C	81	C
10	D	34	B	58	C	82	B
11	D	35	D	59	B	83	C
12	A	36	A	60	C	84	A
13	A	37	B	61	B	85	A
14	D	38	A	62	C	86	D
15	B	39	D	63	A	87	A
16	A	40	D	64	A	88	B
17	C	41	B	65	A	89	D
18	A	42	D	66	A	90	C
19	A	43	D	67	C	91	C
20	C	44	D	68	B	92	C
21	A	45	C	69	D	93	D
22	C	46	C	70	D	94	D
23	B	47	C	71	C		
24	C	48	D	72	C		

**EXPLANATION**

**Q.1** Answer is “Carbohydrates”

**Explanation:** Wood, cotton and paper are made up of a polysaccharide called cellulose.

**Q.2** Answer is “Carbohydrates”

**Explanation:** Cellulose, hemicellulose and pectins are the main components of the cell wall of plants and algae, whereas chitin is the main component of the cell wall of fungi. All of them are polysaccharide carbohydrates.

**Q.3** Answer is “Carbon, Hydrogen and Oxygen”

**Explanation:** Carbohydrates are commonly called as hydrated carbons i.e., water (Hydrogen and Oxygen) and

carbons. It means they have three elements, carbon, oxygen and hydrogen.

**Q.4** Answer is “Water”

**Explanation:** By simple carbohydrates we mean monosaccharides with general formula of  $C_n(H_2O)_n$ . In each monosaccharide, there are two hydrogen atoms and one oxygen atom against each carbon atom.

**Q.5** Answer is “From three to many thousands”

**Explanation:** The smallest carbohydrate is a triose (monosaccharide) whereas the complex carbohydrates (Polysaccharides) may consist of hundreds or thousands of Monosaccharide units.

**Q.6** Answer is “Carbohydrates”

**Explanation:** Chemically carbohydrates are either polyhydroxy aldehydes or polyhydroxy ketones or their condensation products.

**Q.7** Answer is “Dihydroxyacetone”

**Explanation:** It is a keto triose.

**Q.8** Answer is “Oligosaccharides and polysaccharides”

**Explanation:** Because these are condensation products of polyhydroxyaldehydes or polyhydroxy ketone units, thus they yield same upon their hydrolysis.

**Q.9** Answer is “Green plants”

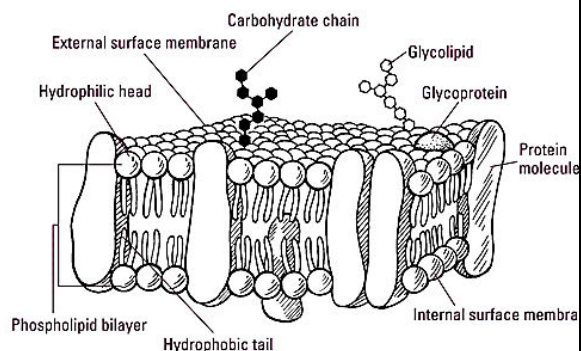
**Explanation:** Carbohydrates are the primary products of the living world synthesized by photosynthesis. Rest of the all organic biomolecules are derivatives of carbohydrates.

**Q.10** Answer is “Proteins and lipids”

**Explanation:** When carbohydrates are conjugated with proteins they yield glycoproteins and when conjugated with lipids they yield glycolipids. Both of them are part of biological membranes.

## Q.11 Answer is "Biological membranes"

**Explanation:** Basic framework of cellular membranes is provided by proteins and lipids, however carbohydrates are conjugated with them to synthesize glycoproteins and glycolipids which act as cell markers and tissue markers.



## Q.12 Answer is "Saccharides"

**Explanation:** It have been derived from a Greek word sackaron which means sugar.

## Q.13 Answer is "Three groups"

**Explanation:** Monosaccharides, Oligosaccharides and polysaccharides as per text book.

## Q.14 Answer is "Monosaccharides"

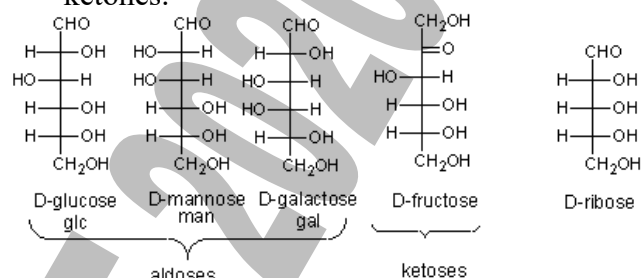
**Explanation:** Monosaccharides, also called simple sugars, are the simplest form of sugar and the most basic units of carbohydrates. They cannot be further hydrolyzed to simpler chemical compounds.

## Q.15 Answer is "Monosaccharides"

**Explanation:** Monosaccharides such as glucose and fructose are crystalline solids at room temperature, but they are quite soluble in water, each molecule having several OH groups that readily engage in hydrogen bonding.

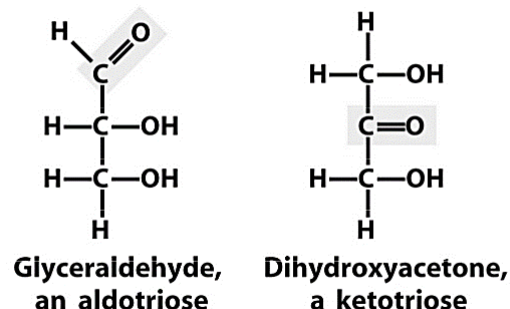
## Q.16 Answer is "Except one"

**Explanation:** That is why they are called polyhydroxy aldehydes or polyhydroxy ketones.



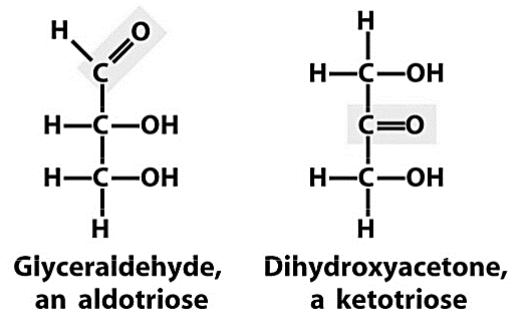
## Q.17 Answer is "Position of hydrogen atoms"

**Explanation:** If two hydrogen atoms from carbon number two of aldotriose are shifted to carbon number one it becomes Keto triose and *vice versa*.



## Q.18 Answer is "Glyceraldehyde"

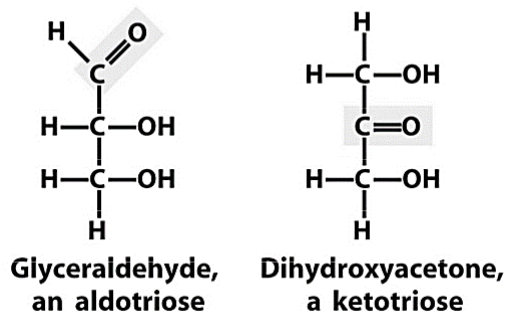
**Explanation:** It is an aldotriose i.e. a monosaccharide of three carbon atoms.





**Q.19** Answer is “DAP”

**Explanation:** Dihydroxyacetone phosphate is a ketotriose.



**Q.20** Answer is “Three to seven”

**Explanation:** Trioses to heptoses

**Q.21** Answer is “ $(\text{CH}_2\text{O})_n$ ”

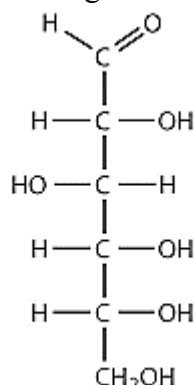
**Explanation:** These are hydrated carbons i.e. having a water molecule against each carbon.

**Q.22** Answer is “Pentoses and hexoses”

**Explanation:** Pentoses being part of nucleic acids and hexoses (glucose) being substrate for aerobic respiration are most common carbohydrates of nature.

**Q.23** Answer is “Glucose”

**Explanation:** Having aldehyde group and six carbon atoms glucose is an aldohexose.



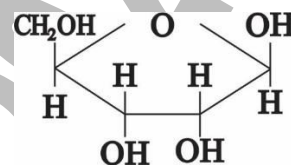
**Q.24** Answer is “Ring structure”

**Explanation:** In solution form non cyclic monosaccharides acquire cyclic form and

two types of ring structures are formed i.e. furan (5 cornered) and pyran (6 cornered).

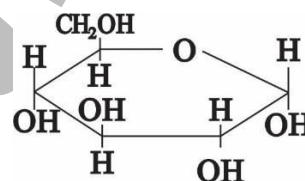
**Q.25** Answer is “Five”

**Explanation:** Ribofuranose is a five cornered ring.



**Q.26** Answer is “Glucopyranose”

**Explanation:** Six cornered ring of glucose is also called glucopyranose.

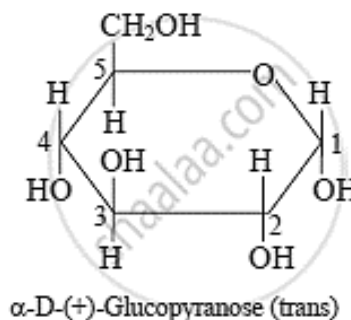


**Q.27** Answer is “Four”

**Explanation:** Out of five corners one is occupied by oxygen and rest of the four corners are occupied by carbon atoms whereas, and fifth carbon remains outside the ring.

**Q.28** Answer is “Five”

**Explanation:** One corner is occupied by oxygen and rest of the four by carbon atoms, whereas sixth carbon remaining outside the ring.



**Q.29** Answer is “All fruits”

**Explanation:** It is found in all fruits however it is abundant in grapes, dates and figs.

**Q.30** Answer is “Many disaccharides and poly saccharides”

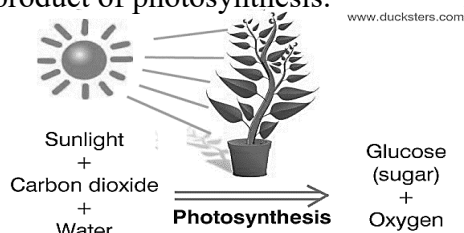
**Explanation:** Glucose is part of sucrose, maltose and fructose which are disaccharides. Similarly, cellulose starch and glycogen are polymers of glucose. However, some disaccharides and polysaccharides may have a monomer other than glucose.

**Q.31** Answer is “Glucose”

**Explanation:** Starch glycogen and cellulose are polymers of glucose monomers and they are synthesized by condensation of glucose monomers. Thus yield glucose monomers upon hydrolysis.

**Q.32** Answer is “Green plants”

**Explanation:** Green plants being chlorophyllous photosynthetic plants carry out photosynthesis and produce glucose as a product of photosynthesis.



**Q.33** Answer is “717.6 Kcal”

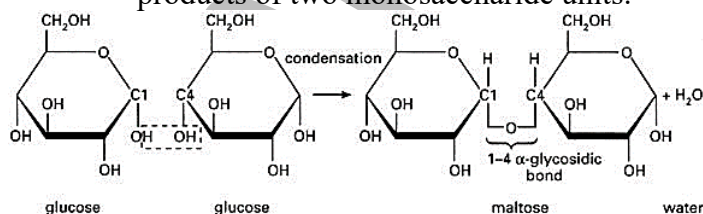
**Explanation:** As per figure given in the text book of biology part-I.

**Q.34** Answer is “Oligosaccharides”

**Explanation:** These are intermediate or moderate carbohydrates having properties in between monosaccharides and polysaccharides. However, disaccharides are soluble like monosaccharides.

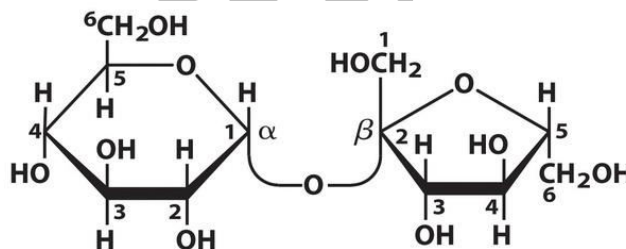
**Q.35** Answer is “Disaccharides”

**Explanation:** These are Condensation products of two monosaccharide units.



**Q.36** Answer is “ $C_{12}H_{22}O_{11}$ ”

**Explanation:** Condensation product of a glucose and a fructose monomers with removal of two hydrogen atoms and one oxygen ( $H_2O$ ). 1, 2 glycosidic bond is formed as a consequence.



**Sucrose**

$\alpha$ -D-glucopyranosyl  $\beta$ -D-fructofuranoside  
Glc( $\alpha 1 \leftrightarrow 2\beta$ )Fru

**Q.37** Answer is “1,2”

**Explanation:** It is condensation product of D-glycopyranose and L-fructofuranose. Thus carbon no.1 of glucose and carbon no.2 of fructose are involved. See the figure given in explanation of Q # 36.

**Q.38** Answer is “01”

**Explanation:** Only carbon no. 6 is kept outside the ring in case of glucose.

**Q.39** Answer is “Polysaccharides”

**Explanation:** cellulose being a part of algal cell wall and plant cell wall becomes the most abundant carbohydrate of nature. Moreover, the polysaccharides are the most complex carbohydrates as well because they are made up of thousands of monosaccharide units.

**Q.40** Answer is “Polysaccharides”

**Explanation:** Out of polysaccharides only amylose starch is soluble in hot water.

**Q.41** Answer is “Two”

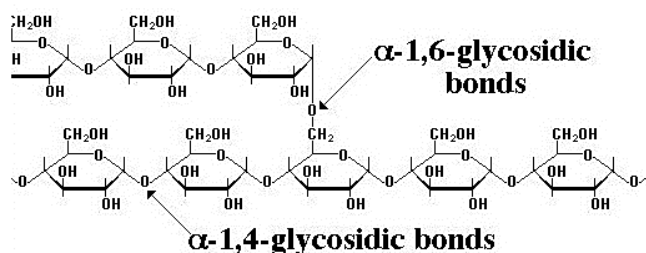
**Explanation:** Amylose and amylopectin

**Q.42 Answer is “Amylose”**

**Explanation:** Amylose is a helical polymer made of  $\alpha$ -D glucose units, bonded to each other through  $\alpha(1-4)$  glycosidic bonds.

**Q.43 Answer is “Branched, insoluble”**

**Explanation:** It consists of linear chains of glucose linked by  $\alpha$  1-4 glycosidic bonds and branches attached by  $\alpha$  1-6 glycosidic bonds occurring every 24 to 30 glucose units.

**Q.44 Answer is “Starches”**

**Explanation:** The iodine test is used to test the presence of starch. Starch turns its color to dark blue-black upon addition of aqueous solutions of the triiodide anion, due to the formation of an intermolecular charge-transfer complex.

**Q.45 Answer is “Glycogen”**

**Explanation:** In animals, surplus glucose is converted into insoluble glycogen and then it is stored in muscle and liver cells. This conversion is regulated by insulin.

**Q.46 Answer is “Cellulose”**

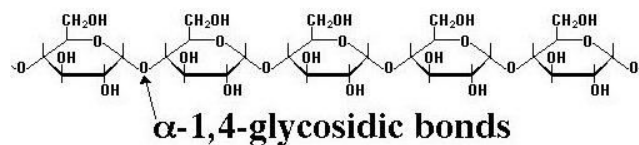
**Explanation:** Because cotton fiber is derived from the epidermis of cotton seeds as epidermal appendages i.e. the outgrowths of the outer cell walls of epidermal cells. And cell wall is made up of cellulose.

**Q.47 Answer is “Cellulose”**

**Explanation:** Because of its high molecular weight and crystalline structure, cellulose is soluble in water and has a poor ability to absorb water.

**Q.48 Answer is “Starch, Glycogen & celluloses”**

**Explanation:** All of them are polymers of glucose monomers and are synthesized by condensation of glucose monomers, thus yield glucose monomer upon hydrolysis.

**Q.49 Answer is “Bacteria, Yeast and protozoa”**

**Explanation:** Cellulase enzyme needed for the digestion of cellulose is not produced by the herbivores themselves. It is produced by symbiotic bacteria, yeast and protozoa found in their gut.

**Q.50 Answer is “Cellulase”**

**Explanation:** Cellulase is any of several enzymes produced chiefly by fungi, bacteria and protozoans that catalyze the cellulolysis, the decomposition of cellulose and of some related polysaccharides.

**Q.51 Answer is “Cellulose”**

**Explanation:** Due to straight chains of  $\beta$ , D-glucose and absence of spiral configuration it is difficult for iodine to combine with cellulose. However, amylose gives blue colour while amylopectin gives purple colour with iodine.

**Q.52 Answer is “Lipids”**

**Explanation:** Lipids having fatty acids are insoluble in water but readily soluble in organic solvents.

**Q.53 Answer is “Cellular membranes”**

**Explanation:** Basic framework of all cellular membranes is made up of phospholipid bilayers.

**Q.54 Answer is “Higher proportion of carbon hydrogen bonds”**

**Explanation:** Lipids have more hydrogen atoms than equal amount of carbohydrates and less oxygen atoms than equal amount of carbohydrates. Thus, number of C – H bonds is increased

**Q.55 Answer is “Lipids”**

**Explanation:** Lipids are poor conductor of heat and electric current that is why they are used as insulator.

**Q.56 Answer is “Dextrins and Pectins”**

**Explanation:** Dextrins and Pectins are polysaccharides.

**Q.57 Answer is “Triglycerides or neutral lipids”**

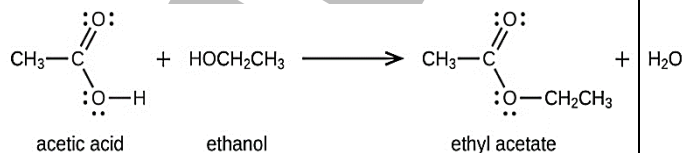
**Explanation:** Triglyceride is synonymous to triacylglycerol and having no charge they are also called neutral lipids. They are formed by triple esterification i.e. three fatty acids are esterified with one glycerol and three water molecules are produced.

**Q.58 Answer is “Acylglycerols”**

**Explanation:** Acylglycerols are condensation products of fatty acids (Acyl) and a Trihydroxy alcohol (glycerol). Three fatty acids make three ester bonds with three carbons of glycerol and three water molecules are removed.

**Q.59 Answer is “Ester”**

**Explanation:** Esters are formed by condensation of acid and alcohol, water molecule is removed and both acid and alcohol are bonded together by an ester bond.



**Q.60 Answer is “OH, H”**

**Explanation:** It is actually a dehydration synthesis and water is formed by taking OH from glycerol and H from fatty acid.

**Q.61 Answer is “Triglyceride”**

**Explanation:** Tri-means three fatty acids (Acyls) glyceride means – glycerol.

**Q.62 Answer is “2-30”**

**Explanation:** Fatty acids have carbon atoms in even number from two to thirty.

**Q.63 Answer is “Hydrogen, an acidic group”**

**Explanation:** Each fatty acid is a hydrocarbon chain attached with a carboxylic acid.

**Q.64 Answer is “no double bond”**

**Explanation:** Unsaturated fatty acids always have lesser hydrogen atoms than their fullest capacity, thus the valency of carbon is satisfied by double bond. So having no double bond is not true with respect to them.

**Q.65 Answer is “Unbranched, Branched, ringed”**

**Explanation:** The fatty acids of animals are saturated and unbranched, having higher melting points. That is why these are not advised to be taken in diet. Whereas, the fatty acids of plants are unsaturated branched or ringed, having lower melting points and are advised to be taken in diet.

**Q.66 Answer is “Number of carbon atoms in chain”**

**Explanation:** By increasing the number of carbon atoms in a fatty acid its solubility in organic solvents and its melting point increases and vice versa. e.g. melting point of palmitic acid (C-16) is 63.1 °C and that of butyric acid (C-4) is -8°C.



**Q.67 Answer is “Palmitic acid, butyric acid”**

**Explanation:** By increasing the number of carbon atoms in a fatty acid its solubility in organic solvents and its melting point increases and vice versa. e.g. melting point of palmitic acid (C-16) is  $63.1^{\circ}\text{C}$  and that of butyric acid (C-4) is  $-8^{\circ}\text{C}$ .

**Q.68 Answer is “ $63.1^{\circ}\text{C}$ ”**

**Explanation:** Melting point of palmitic acid is high that that is why doctors discourage it to be taken diet as it may cause some cardiovascular disorder.

**Q.69 Answer is “ $-8^{\circ}\text{C}$ ”**

**Explanation:** Having less number of carbon atoms (4) the butyric acid have low melting point.

**Q.70 Answer is “Acetic acid”**

**Explanation:** It has two carbon atoms

**Q.71 Answer is “Butyric acid”**

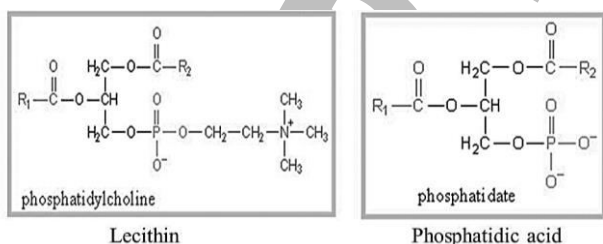
**Explanation:** Butyric acid have four carbon atoms and no double bond.

**Q.72 Answer is “Palmitic acid”**

**Explanation:** It have sixteen carbon atoms with no double bond.

**Q.73 Answer is “unsaturated”**

**Explanation:** Unsaturated fatty acids have low melting points and they usually occur in plant fats.



**Q.74 Answer is “saturated”**

**Explanation:** Saturated fatty acids have higher melting points and they are part of animal fats.

**Q.75 Answer is “Oils”**

**Explanation:** Such fatty acids which are liquid at room temperature are called oils.

**Q.76 Answer is “Animal”**

**Explanation:** Animal fats being saturated have high melting points.

**Q.77 Answer is “Lighter than water”**

**Explanation:** Fats and oils have a specific gravity of about 0.8. That is why they are lighter than water

**Q.78 Answer is “0.8”**

**Explanation:** Fats are lighter than water specific gravity less than 1.0 i.e. 0.8.

**Q.79 Answer is “fats and Oils”**

**Explanation:** Having no definite geometry and no sharp melting points, they are so.

**Q.80 Answer is “Phosphatidic acid”**

**Explanation:** A glycerol is condensed with two fatty acids on its first two carbons and with phosphoric acid at its third carbon to get phosphatidic acid and three molecules of water are released.

**Q.81 Answer is “Phospholipids”**

**Explanation:** Phospholipids are derivatives of phosphatidic acid and nitrogenous base like choline, serine and ethanolamine.

**Q.82 Answer is “Phosphatidylcholine”**

**Explanation:** It is most common phospholipid of nature. It consists of a glycerol, two fatty acids, a phosphoric acid and a choline.

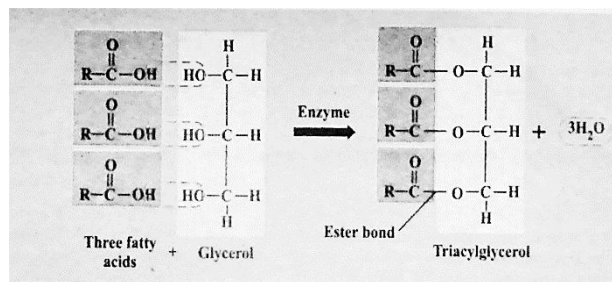
**Q.83 Answer is “Three molecules of water”**

**Explanation:** It involves triple esterification thus three molecules of water are produced.



**Q.84 Answer is “Triacylglycerol”**

**Explanation:** Common fats and oils.



**Q.85 Answer is “Monomers, dehydration”**

**Explanation:** Biological macromolecules are polymers that are formed when monomers are joined by a dehydration reaction.

**Q.86 Answer is “The molecules are held together by ionic bondings”**

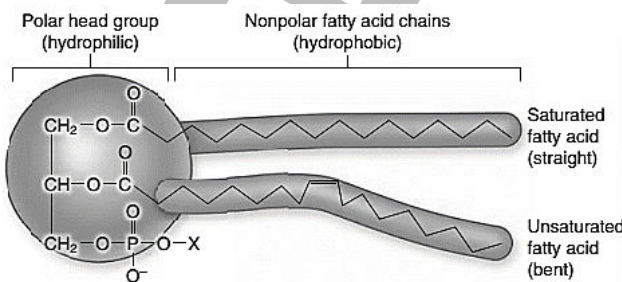
**Explanation:** The molecules are held together by covalent bonds.

**Q.87 Answer is “Phosphatidylcholine”**

**Explanation:** The first phospholipid identified in 1847 as such in biological tissues was lecithin or phosphatidylcholine, in egg yolk of chickens by French Chemist and pharmacist, Theodore Nicolas Gobley.

**Q.88 Answer is “Hydrophilic head”**

**Explanation:** The head of a phospholipid molecule which consists of glycerol phosphoric acid and nitrogenous base is polar and hydrophilic whereas tails which consist of fatty acids are non-polar and hydrophobic. That is why heads are kept on surface.



**Q.89 Answer is “Fatty acids”**

**Explanation:** Tails of phospholipids consist of fatty acids and we know that fatty acids are hydrophobic and non-polar.

**Q.90 Answer is “01 and 02”**

**Explanation:** Two fatty acids are attached to carbon number 1 and 2 of glycerol whereas phosphoric acid is attached to carbon number 3 of glycerol. As a consequence phosphatidic acid is formed. Then choline base is condensed with phosphoric acid to complete a phosphatidylcholine or Lecithin molecule.

**Q.91 Answer is “03”**

**Explanation:** Phosphoric acid is attached to carbon no.3 of glycerol, first two carbons are condensed with fatty acids.

**Q.92 Answer is “Phosphoric acid”**

**Explanation:** Nitrogenous bases (Choline, serine or ethanolamine) are attached to the phosphoric acids which have been already condensed with carbon no. 3 of glycerol. In this way a phospholipid is formed.

**Q.93 Answer is “Lipids”**

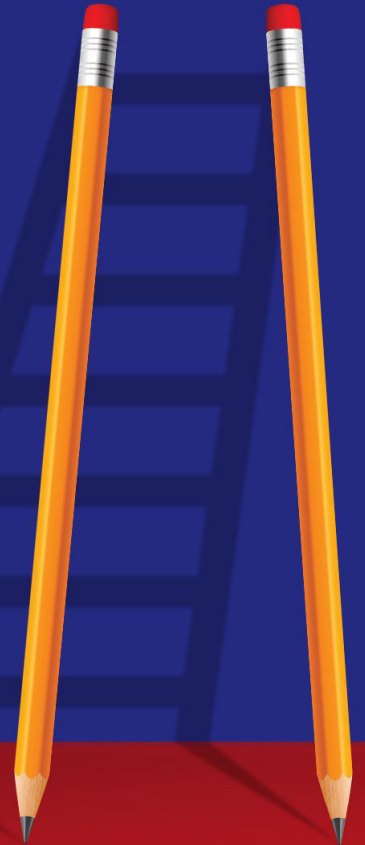
**Explanation:** Lipids having maximum number of C – H bonds are capable to store maximum potential energy as compared to equal amount of carbohydrates and proteins.

**Q.94 Answer is “Birds and Fur containing animals”**

**Explanation:** A thin coating of fats on the fur of animals and feathers of birds save them from absorbing rainwater and enable them to thermoregulate in winter.

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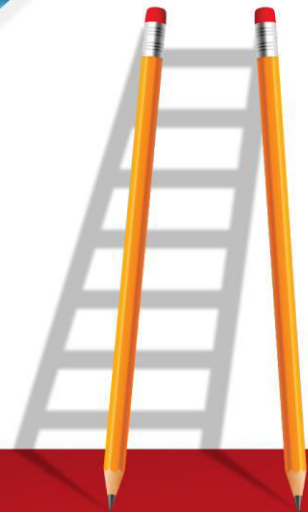
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# BIOLOGY



## Worksheet-8



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-8**  
**(Biological Molecules)**

**Q.1 The most abundant organic compounds to be found in the cells are:**

- A) Proteins                      C) Nucleic acids  
B) Lipids                        D) Carbohydrates

**Q.2 All \_\_\_\_\_ are proteins and in this way they control the whole metabolism of the cell.**

- A) Hormones  
B) Antibodies  
C) Enzymes  
D) Immunoglobulins

**Q.3 The organic biomolecules that exhibit maximum physiological diversity in living being are:**

- A) Lipids                        C) Nucleic acids  
B) Proteins                      D) Carbohydrates

**Q.4 Some proteins work as carriers and transport specific substances for example:**

- A) Immunoglobulins    C) Albumins  
B) Enzymes                D) Hemoglobin

**Q.5 The protein that prevent the loss of blood from the body after injury is:**

- A) Albumin                    C) Globulin  
B) Fibrin                        D) Keratin

**Q.6 These are polymers of amino acids:**

- A) Hormones                C) Hemoglobin  
B) Enzymes                 D) Proteins

**Q.7 Amino acids mostly contain following elements:**

- A) Carbon, nitrogen, oxygen, hydrogen  
B) Carbon, nitrogen, sulphur, oxygen, hydrogen  
C) Carbon, sulphur, oxygen, hydrogen  
D) Carbon, nitrogen, sulphur, oxygen

**Q.8 All the amino acids invariably have following components, EXCEPT:**

- A)  $\text{NH}_2$                       C)  $\text{COOH}$   
B) H                            D)  $\text{CH}_3$

**Q.9 All the amino acids have an amino group and a carboxyl group attached to the same carbon atom, also known as:**

- A) Central carbon    C) Alpha carbon  
B) Major carbon      D) Beta carbon

**Q.10 Amino acids mainly differ due to the type or nature of:**

- A) Carboxyl group    C) Amino group  
B) R-group             D) Methyl group

**Q.11 The \_\_\_\_\_ group of one amino acid may react with the \_\_\_\_\_ group of another releasing a molecule of water to form a dipeptide.**

- A) Functional, Amino  
B) Amino, Amino  
C) Carboxyl, Carboxyl  
D) Carboxyl, Amino

**Q.12 If R-group is a hydrogen atom, the amino acid will be:**

- A) Alanine                    C) Leucine  
B) Glycine                    D) Tyrosine

**Q.13 Peptide bond is a:**

- A) C-O bond                C) C-C bond  
B) C-N bond                D) C-O-P bond

**Q.14 A dipeptide have an/a \_\_\_\_\_ group at one end and a \_\_\_\_\_ group at the other end of molecule.**

- A) Amino, Carboxyl  
B) Amino, Functional  
C) Functional, Carboxyl  
D) Amino, Amino

**Q.15 A dipeptide glycylalanine consists of:**

- A) Glycine and glycine
- B) Glycine and alanine
- C) Alanine and alanine
- D) Glycine and valine

**Q.16 Each protein has specific properties which are determined by the:**

- A) Number of amino acids
- B) Specific sequence of the amino acids
- C) Shape of the amino acids
- D) Number and specific sequence of amino acids

**Q.17 Proteins have \_\_\_\_\_ levels of organization.**

- A) Two
- B) Three
- C) Four
- D) Five

**Q.18 F. Sanger was the first scientist who determined the \_\_\_\_\_ structure of a protein molecule.**

- A) Primary
- B) Secondary
- C) Tertiary
- D) Quaternary

**Q.19 One chain of insulin consists of \_\_\_\_\_ amino acids and the other has \_\_\_\_\_ amino acids.**

- A) 21, 30
- B) 20, 31
- C) 31, 20
- D) 22, 29

**Q.20 Both chains of insulin are held together by:**

- A) Peptide bonds
- B) Hydrogen bonds
- C) Disulphide bonds
- D) Glycosidic bonds

**Q.21 The primary structure of proteins is stabilized by:**

- A) Disulphide bonds
- B) Hydrogen bonds
- C) Hydrophobic interaction
- D) Peptide bonds

**Q.22 Hemoglobin is composed of:**

- A) Two alpha chains
- B) Two beta chains
- C) Two alpha and two beta chains
- D) Four alpha chains

**Q.23 Each alpha chain of hemoglobin consists of:**

- A) 151 amino acids
- B) 146 amino acids
- C) 141 amino acids
- D) 156 amino acids

**Q.24 Each beta chain of hemoglobin consists of:**

- A) 146 amino acids
- B) 156 amino acids
- C) 141 amino acids
- D) 151 amino acids

**Q.25 Number of amino acids incorporated in beta chains of a molecule of hemoglobin is:**

- A) 280
- B) 282
- C) 292
- D) 290

**Q.26 Number of peptide bonds involved in stabilization of primary structure of a molecule of hemoglobin is:**

- A) 574
- B) 570
- C) 572
- D) 573

**Q.27 Number of peptide bonds involved in maintenance of primary structure of shorter chain of insulin is:**

- A) 30
- B) 21
- C) 20
- D) 19

**Q.28 The size of a protein molecule at primary level is determined by:**

- A) Number of amino acids
- B) Type of amino acids
- C) Number and type of amino acids
- D) Number and sequence of amino acids



- Q.29** Proteins in the human body are composed of unique and specific arrangement of:
- A) 25 types of amino acids
  - B) 20 types of amino acids
  - C) Over 20 types of amino acids
  - D) Less than 20 types of amino acids
- Q.30** Due to unique and specific arrangement of same amino acids more than \_\_\_\_\_ different proteins are found in human body:
- A) 10,000
  - B) 1000
  - C) 10,0000
  - D) 100
- Q.31** For proper functioning, a protein should have its amino acids in:
- A) A random arrangement
  - B) A specific medium
  - C) A specific arrangement
  - D) Ascending order
- Q.32** The example of physiological ill effect of changing the amino acid sequence of a protein is:
- A) Uremia
  - B) Hypoglycemia
  - C) Goiter
  - D) Sickle cell anemia
- Q.33** If one amino acid out of 574 amino acids is replaced by another in a hemoglobin molecule it will lose following properties, EXCEPT:
- A) Shape
  - B) Functional capacity
  - C) Oxygen carrying capacity
  - D) Quaternary level
- Q.34** Hypoxia which may lead to death is the ultimate consequence of a change occurred initially at \_\_\_\_\_ level of hemoglobin structure:
- A) Quaternary
  - B) Tertiary
  - C) Secondary
  - D) Primary
- Q.35** The polypeptide chains in a protein molecule usually do not \_\_\_\_\_.  
 A) Remain stable      C) Acquire coiling  
 B) Lie flat      D) Acquire folding
- Q.36** The example of structural protein is:  
 A) Hemoglobin      C) Antibodies  
 B) Albumin      D) Collagen
- Q.37** One of the common secondary structure of protein is:  
 A)  $\alpha$ -helix      C)  $\gamma$  helix  
 B)  $\beta$ -helix      D)  $P_i$  helix
- Q.38** It is a very uniform geometric structure with 3.6 amino acids in each turn of the helix:  
 A)  $\alpha$ -helix      C)  $\alpha$ -pleated sheet  
 B)  $\beta$ -helix      D)  $\beta$ -pleated sheet
- Q.39** The helical structure of secondary protein is kept by the formation of \_\_\_\_\_ among amino acid molecules in successive turns of the spiral:  
 A) Ionic bond      C) Hydrogen bond  
 B) Peptide bond      D) Disulphide bond
- Q.40** It is formed by folding back of the polypeptide chain:  
 A)  $\alpha$ -helix      C)  $\alpha$ -pleated sheet  
 B)  $\beta$ -helix      D)  $\beta$ -pleated sheet
- Q.41** Usually a polypeptide chain bends and folds upon itself forming globular shape to acquire:  
 A) Primary configuration  
 B) Secondary configuration  
 C) Tertiary configuration  
 D) Quaternary configuration
- Q.42** This structural level of proteins is maintained by ionic, hydrogen and disulphide bonds:  
 A) Primary structure  
 B) Secondary structure

- C) Tertiary structure  
D) Quaternary structure
- Q.43 Stabilization of tertiary structure of proteins involve \_\_\_\_\_ chemical bonds.**  
A) One C) Three  
B) Two D) Four
- Q.44 The most stable tertiary configuration is due to:**  
A) Ionic bonds  
B) Hydrogen bonds  
C) Disulphide bonds  
D) Hydrophobic interaction
- Q.45 Pick up the highly complex protein:**  
A) Primary protein  
B) Secondary protein  
C) Tertiary protein  
D) Quaternary protein
- Q.46 Polypeptide tertiary chains are aggregated and held together to give rise to:**  
A) Primary structure  
B) Secondary structure  
C) Tertiary structure  
D) Quaternary structure
- Q.47 Quaternary structure is maintained by:**  
A) Ionic bonds  
B) Hydrophobic interaction  
C) Hydrogen bonds  
D) Ionic bonds, Hydrogen bonds and Hydrophobic interaction
- Q.48 Hemoglobin, the oxygen carrying protein of red blood cells exhibits:**  
A) Primary structure  
B) Secondary structure  
C) Tertiary structure  
D) Quaternary structure
- Q.49 It involves all the four structural levels of proteins:**  
A) Insulin  
B)  $\alpha$ -helix  
C) Alpha chain of hemoglobin  
D) Hemoglobin molecule
- Q.50 Pick up the fibrous protein:**  
A) Keratin C) Enzyme  
B) Hemoglobin D) Antibodies
- Q.51 Pick up the globular protein:**  
A) Keratin C) Collagen  
B) Fibrin D) Hemoglobin
- Q.52 Pick up the globular protein:**  
A) Actin  
B) Myosin  
C) Hormonal proteins  
D) Collagen
- Q.53 In a DNA duplex, ten base pairs cover the length of  $34\text{\AA}$ , what will be distance in between two consecutive base pairs:**  
A)  $3.4\text{\AA}$  C)  $0.34\text{\AA}$   
B)  $34\text{\AA}$  D)  $340\text{\AA}$
- Q.54 The amount of DNA is fixed for a particular species, as it depends upon the:**  
A) Number of individuals  
B) Number of chromosomes  
C) Number of cells  
D) Number of genes
- Q.55 The amount of DNA in \_\_\_\_\_ is one half to that of \_\_\_\_\_:**  
A) Somatic cells, germ cells  
B) Gametocytes, Somatic cells  
C) Germ cells, Somatic cells  
D) Somatic cells, Gametocytes

- Q.56** If kidney cells of carp fish have 3.3 picograms DNA per nucleus, the amount of DNA in sperm cell of carp fish will be:  
A) 1.3 picograms      C) 1.6 picograms  
B) 2.3 picograms      D) 2.4 picograms
- Q.57** In the chromosomes of the bacterium *E. coli*, each of the paired strand of DNA contains about:  
A) 5 million bases      C) 0.5 million bases  
B) 5 billion bases      D) 50 million bases
- Q.58** The *E. coli* genome consists of base pairs:  
A) 4,639,221      C) 4,629,221  
B) 4,639,222      D) 4,638,221
- Q.59** Like DNA \_\_\_\_\_ is a polymer of ribonucleotides.  
A) ATP      C) FAD  
B) NAD      D) RNA
- Q.60** \_\_\_\_\_ is synthesized by \_\_\_\_\_ in a process known as transcription.  
A) RNA, DNA      C) DNA, DNA  
B) RNA, RNA      D) DNA, RNA
- Q.61** RNAs are synthesized in the \_\_\_\_\_ and then are moved out in the \_\_\_\_\_ to perform their specific functions.  
A) Cytoplasm, Nucleus  
B) Nucleus, Cytoplasm  
C) Nucleus, Nucleus  
D) Cytoplasm, Cytoplasm
- Q.62** As the name indicates, it takes the genetic message from the nucleus to the ribosomes, in the cytoplasm to form the particular proteins:  
A) Ribosomal RNA      C) Transfer RNA  
B) Messenger RNA      D) DNA
- Q.63** Transfer RNA comprises about \_\_\_\_\_ % of the cellular RNA.  
A) 3 to 4      C) 80  
B) 5 to 6      D) 10 to 20
- Q.64** It transfers amino acid molecules to the site where peptide chains are being synthesized:  
A) tRNA      C) rRNA  
B) mRNA      D) ScRNA
- Q.65** It may be upto 80% of the total RNA:  
A) tRNA      C) rRNA  
B) mRNA      D) snRNA
- Q.66** It acts as a machinery for synthesis of proteins:  
A) Golgi Apparatus      C) Mitochondria  
B) Ribosomal RNA      D) DNA of a gene
- Q.67** DNA was discovered by:  
A) A French chemist  
B) A German chemist  
C) An English chemist  
D) A Spanish chemist
- Q.68** Who discovered DNA?  
A) Frederick Miescher  
C) Frederick Sanger  
B) Frederick Griffith  
D) Frederick Aldrich
- Q.69** Nucleic acids were first isolated from:  
A) Human pus cells  
B) Fish sperm cells  
C) Human pus cells and fish sperm cells  
D) Human sperm cells and fish pus cells

**Q.70 Nucleic acids were named so due to:**

- A) Their isolation from nuclei
- B) Their isolation from pus cells
- C) Their acidic nature
- D) Their isolation from nucleus and acidic nature

**Q.71 Mostly occurs in the nuclei of the cells but in lesser amount outside the nucleus as well:**

- A) RNA
- B) Proteins
- C) Nucleic acids
- D) DNA

**Q.72 It is mostly present in the nucleolus, in the ribosomes in the cytosol and in smaller amounts in other parts of the cell as well:**

- A) DNA
- B) RNA
- C) Proteins
- D) Nucleic acids

**Q.73 They are polymers of units called nucleotides:**

- A) Amino acids
- B) Nucleosides
- C) Fatty acids
- D) Nucleic acids

**Q.74 Each nucleotide is made up of:**

- A) One sub unit
- B) Two sub units
- C) Three sub units
- D) Four sub units

**Q.75 The pentose of DNA is:**

- A) Ribose
- B) Ribulose
- C) Deoxyribulose
- D) Deoxyribose

**Q.76 The pentose of RNA is:**

- A) Ribose
- B) Ribulose
- C) Deoxyribulose
- D) Deoxyribose

**Q.77 Single ringed nitrogenous bases are:**

- A) Purine
- B) Pyrimides
- C) Adenine
- D) Guanine

**Q.78 Pick up the smaller nitrogenous base:**

- A) Purines
- B) Adenine
- C) Cytosine
- D) Guanine

**Q.79 Purines include:**

- A) Adenine and cytosine
- B) Adenine and thymine
- C) Adenine and guanine
- D) Adenine and uracil

**Q.80 Pyrimidines found in RNA are:**

- A) Cytosine and thymine
- B) Cytosine and uracil
- C) Cytosine and adenine
- D) Cytosine and guanine

**Q.81 In a typical nucleotide the nitrogenous base is attached to carbon at:**

- A) Position 01 of pentose sugar
- B) Position 05 of pentose sugar
- C) Position 03 of pentose sugar
- D) Position 02 of pentose sugar

**Q.82 The compound formed by combination of a base and a pentose sugar is called:**

- A) Nucleoside
- B) Nucleotide
- C) Nucleic acid
- D) Nuclein

**Q.83 It is an important nucleotide used as an energy currency by the cell:**

- A) FAD
- B) NAD
- C) ATP
- D) AMP

**Q.84 It controls the properties and potential activities of the cell:**

- A) DNA
- B) RNA
- C) ATP
- D) AMP

**Q.85 It is the heredity material:**

- A) RNA
- B) DNA
- C) Proteins
- D) ATP

**Q.86** DNA is made up of \_\_\_\_\_ different types of nucleotides.

- A) Three                      C) Five
- B) Four                      D) Six

**Q.87** Pick up the example of a dinucleotide:

- A) ATP                      C) GTP
- B) ADP                      D) NAD

**Q.88** Ribose plus nitrogenous base plus phosphoric acid is equal to:

- A) Deoxyribonucleotide
- B) Deoxyribonucleoside
- C) Ribonucleotide
- D) Ribonucleoside

**Q.89** Pick up the set of nucleotides not included in the list of deoxyribonucleotide:

- A) AMP, ADP, ATP
- B) UMP, UDP, UTP
- C) CMP, CDP, CTP
- D) TMP, TDP, TTP

**Q.90** Pick up the list carrying four nucleosides of DNA:

- A) Adenosine, Guanosine, Cytidine, Thymidine
- B) Adenosine, Guanosine, Thymidine, uridine
- C) Adenosine, Uridine, Thymidine, Cytidine
- D) Uridine, Guanosine, Thymidine, Cytidine

**Q.91** Data about ratios of different bases present in DNA molecules was provided by:

- A) Maurice Wilkins
- B) Erwin Chargaff
- C) Watson and Crick
- D) Rosalind and Franklin

**Q.92** The data presented by Erwin Chargaff suggested that:

- A) Adenine and guanine are equal
- B) Guanine and thymine are equal
- C) Adenine and cytosine are equal
- D) Adenine and thymine are equal and so are cytosine and guanine

**Q.93** They built a scale model of DNA:

- A) James D. Watson and Francis Crick
- B) Maurice Wilkins and Rosalind Franklin
- C) Maurice Wilkins and Rosalind Franklin
- D) P.A Leneve and T.H Morgan



**ANSWER KEY (Worksheet-8)**

1	A	26	B	51	D	76	A
2	C	27	C	52	C	77	B
3	B	28	C	53	A	78	C
4	D	29	B	54	B	79	C
5	B	30	A	55	A	80	B
6	D	31	C	56	C	81	A
7	A	32	D	57	A	82	A
8	D	33	D	58	A	83	C
9	C	34	D	59	D	84	A
10	B	35	B	60	A	85	B
11	D	36	D	61	B	86	B
12	B	37	A	62	B	87	D
13	B	38	A	63	D	88	C
14	A	39	C	64	A	89	B
15	B	40	D	65	C	90	A
16	B	41	C	66	B	91	B
17	C	42	C	67	B	92	D
18	A	43	C	68	A	93	A
19	A	44	D	69	C		
20	C	45	D	70	D		
21	D	46	D	71	D		
22	C	47	D	72	B		
23	C	48	D	73	D		
24	A	49	D	74	C		
25	C	50	A	75	D		

**EXPLANATION****Q.1 Answer is "Proteins"**

**Explanation:** Proteins being a major structural organic biomolecule at any level of biological organization constitutes more than 50% of the dry weight of organic biomass and maintain the basic fabric of the structure of cells, tissues and organs. Moreover, there are numerous functional proteins as well.

**Q.2 Answer is "Enzymes"**

**Explanation:** Enzymes being biological catalysts catalyze the metabolic processes in living beings. Without enzymes

metabolism will proceed so slowly that life will cease.

**Q.3 Answer is "Proteins"**

**Explanation:** Proteins perform variety of functions in living being. No other biomolecule perform such diverse roles as played by proteins.

**Q.4 Answer is "Hemoglobin"**

**Explanation:** Hemoglobin is a carrier or transport protein which carries the respiratory gases i.e. O<sub>2</sub> and CO<sub>2</sub>.

**Q.5 Answer is "Fibrin"**

**Explanation:** Fibrin is an insoluble plasma protein which seals the ruptured blood vessels after injury and prevents the loss of blood.

**Q.6 Answer is "Proteins"**

**Explanation:** Proteins are synthesized by condensation of amino acid monomers in variable sequence and variable number. Thus amino acid are monomers of proteins and proteins are polymers of amino acids.

**Q.7 Answer is "Carbon, Nitrogen, Oxygen and Hydrogen"**

**Explanation:** Most of the proteins are polymer of twenty amino acids. Out of these twenty amino acids only cysteine and methionine contain sulphur along with carbon, nitrogen, oxygen and hydrogen.

**Q.8 Answer is "CH<sub>3</sub>"**

**Explanation:** Amino acids differ from each other with respect to R group only, rest of the components are constant. CH<sub>3</sub> represents R group for alanine.

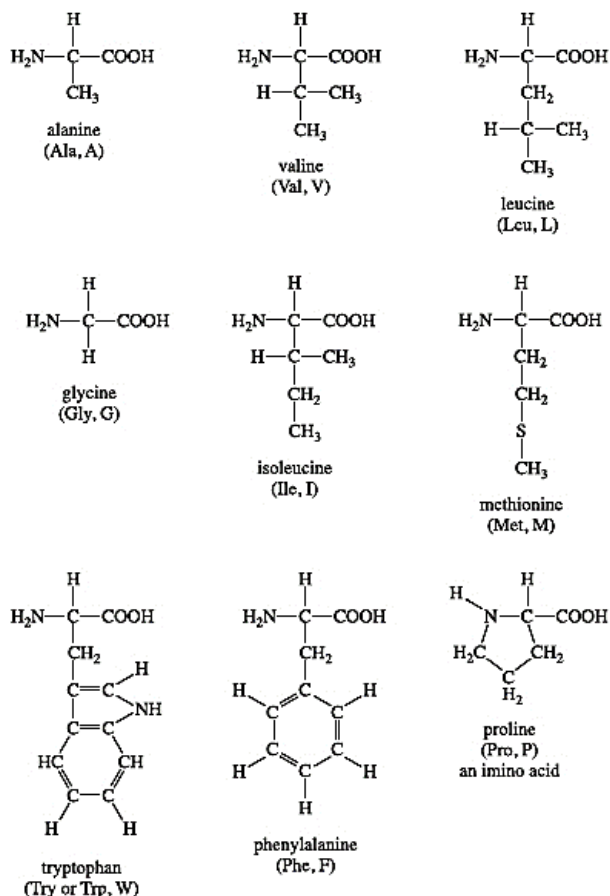
**Q.9 Answer is "Alpha carbon"**

**Explanation:** It is called alpha carbon due to the attachment of functional group to it.

**Q.10 Answer is "R group"**

**Explanation:** Amino acids differ from each other on the basis of R group or side

chain, rest of the components are constant  
e.g. when 'R' is hydrogen it will be glycine  
and if 'R' is methyl it will be alanine.



**Q.11 Answer is "Carboxyl, Amino"**

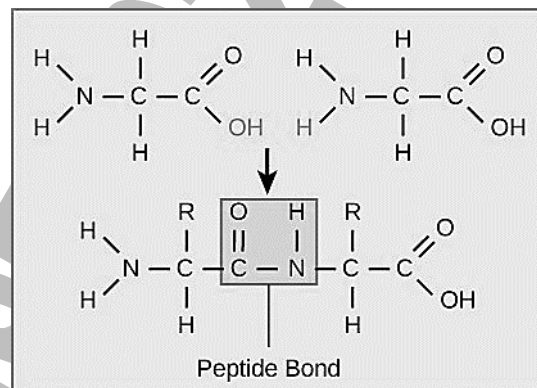
**Explanation:** The hydroxyl (OH) of carboxylic acid of one amino acid combines with the hydrogen (H) of amino group of second amino acid to produce a water molecule. As a result the carbon atom of carboxylic acid of first amino acid makes a bond with the nitrogen atom of amino group of next amino acid. This C – N bond is peptide bond.

**Q.12 Answer is "Glycine"**

**Explanation:** Glycine being the simplest amino acid of nature have hydrogen as 'R' group.

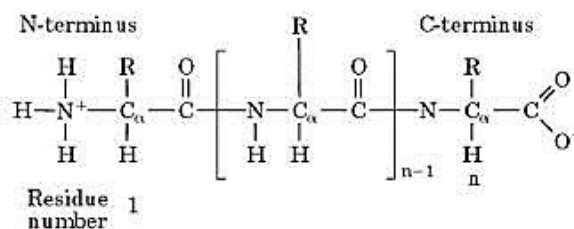
**Q.13 Answer is "C – N bond"**

**Explanation:** Peptide bond is a bond between the carbon atom of carboxyl group of one amino acid and nitrogen of amino group of second amino acid.



**Q.14 Answer is "Amino, Carboxyl"**

**Explanation:** No matter, how long the peptide chain is, it will have two reactive ends i.e amino (-NH) at one end and carboxylic acid (-COOH) at other end.



**Q.15 Answer is "Glycine and alanine"**

**Explanation:** As the name glycylalanine indicates, it is formed by condensation of glycine and alanine amino acids by removal of a water molecule.

**Q.16 Answer is "Number and specific sequence of amino acids"**

**Explanation:** At primary structural level any change in the number and sequence of amino acids changes shape and properties of protein as well. Sickle cell hemoglobin is its best example where only glutamic acid have been replaced by valine and as a

consequence its O<sub>2</sub> carrying capacity is affected.

**Q.17 Answer is “Four”**

**Explanation:** Primary, secondary, tertiary and quaternary proteins are four different structural levels of proteins.

**Q.18 Answer is “Primary”**

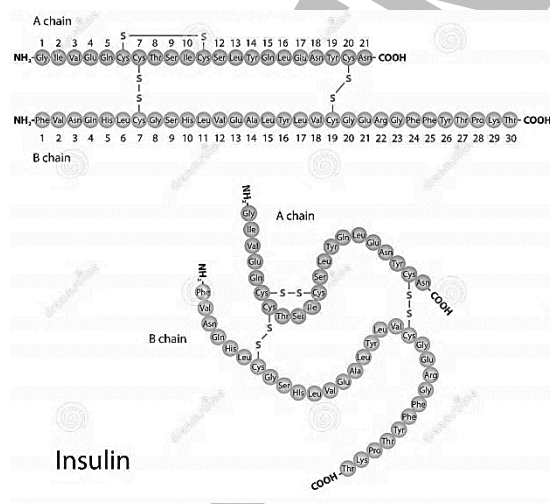
**Explanation:** F. Sanger told us that insulin protein consists of 51 amino acids in two chains i.e. a chain of 21 amino acids attached by means of disulphide bonds with a chain of 30 amino acids. Such straight chains of amino acids represent the primary structure of insulin protein. It was the first ever instance of the determination of number and sequence of amino acids in a protein. However a finished molecule of insulin stands at quaternary level.

**Q.19 Answer is “21, 30”**

**Explanation:** Short chain of insulin consists of 21 amino acids whereas long chain consists of 30 amino acids.

**Q.20 Answer is “Disulphide bonds”**

**Explanation:** Disulphide bonds hold together the two chains of amino acids.



**Q.21 Answer is “Peptide bonds”**

**Explanation:** Primary protein is formed by a linear arrangement of amino acids held together by peptide bonds. Thus the number and sequence of amino acids will matter for a particular type of primary protein.

**Q.22 Answer is “Two alpha and two beta chains”**

**Explanation:** Hemoglobin a carrier protein of our blood is made up of 574 amino acids in four chains of tertiary proteins. Two alpha chains consist of 141 amino acids each, whereas two beta chains consist of 146 amino acids each. A hemoglobin molecule ultimately stands at quaternary level of protein structure, involving primary, secondary and tertiary levels in it.

**Q.23 Answer is “141 amino acids”**

**Explanation:** Each alpha chain of hemoglobin consists of 141 amino acids.

**Q.24 Answer is “146”**

**Explanation:** Each alpha chain of hemoglobin consists of 146 amino acids.

**Q.25 Answer is “292”**

**Explanation:** It is  $146 \times 2 = 292$  amino acids.

**Q.26 Answer is “570”**

**Explanation:** Number of peptide bond in a polypeptide chain is always one less than the total number of amino acids in that chain. In this way each alpha chain will be stabilized by 140 peptide bonds and each beta chain by 145 peptide bonds. Doubling the both numbers ( $140 \times 2 = 280$ ,  $145 \times 2 = 290$ ) and adding them up ( $280 + 290 = 570$ ), we get 570.

**Q.27** Answer is “20”

**Explanation:** Shorter chain of insulin consists of 21 amino acids, thus having 20 peptide bonds.

**Q.28** Answer is “Number and type of amino acids”

**Explanation:** Number of monomers always decides the size of polymer. As the various amino acids have different size that is why the type of amino acid will also contribute in determining the size of primary protein.

**Q.29** Answer is “20 types of amino acids”

**Explanation:** Human proteins which are more than 10,000 types are synthesized by same 20 amino acids by changing their number and sequence.

**Q.30** Answer is “10,000”

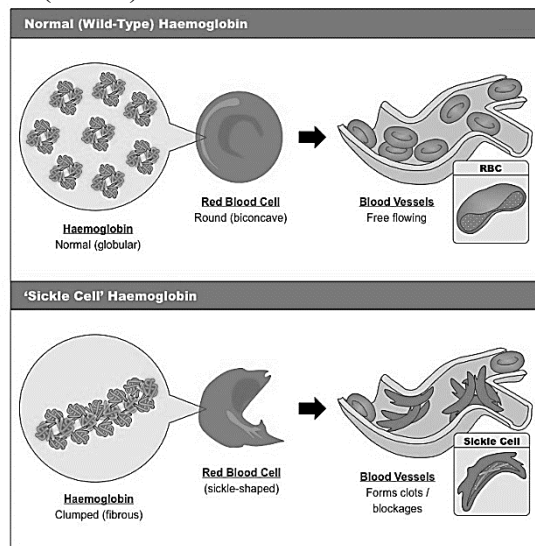
**Explanation:** In human body all the proteins are synthesized from same twenty amino acids however their diversity depends upon number and sequence of amino acids in each protein. More than 10,000 types of proteins have been discovered from human bodies so far.

**Q.31** Answer is “A specific arrangement”

**Explanation:** At primary level a protein retains its specific configuration and function by specific arrangement of its amino acids. Sickle cell hemoglobin is best example in this regard.

**Q.32** Answer is “Sickle cell anemia”

**Explanation:** Hemoglobin stops carrying oxygen if one amino acid (glutamic acids) in beta chain is replaced by the other (valine).



**Q.33** Answer is “Quaternary level”

**Explanation:** By changing sequence of amino acids in a quaternary protein the structure and function of proteins is changed but it will remain a new protein of quaternary level.

**Q.34** Answer is “Primary”

**Explanation:** Any change in hemoglobin at primary level changes the overall configuration of hemoglobin and as a result it stops functioning properly.

**Q.35** Answer is “Lie flat”

**Explanation:** Most of the primary proteins are folded, refolded and aggregated to acquire secondary, tertiary and quaternary structural levels, respectively.

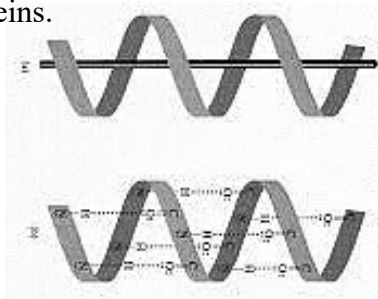
**Q.36** Answer is “Collagen”

**Explanation:** Collagen makes the basic framework of bones and cartilage. Thus it is a structural protein. Rest of the three proteins are functional.



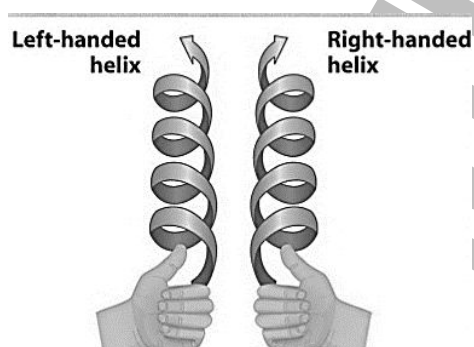
**Q.37** Answer is “ $\alpha$  – helix”

**Explanation:** The most common secondary structures in proteins are alpha helices and beta pleated sheets. Particularly the  $\alpha$ -helix is part of many important structural and functional proteins.



**Q.38** Answer is “ $\alpha$  – helix”

**Explanation:** Alpha helix is also called a classic Pauling–Corey–Branson  $\alpha$ -helix. The 3.6<sub>13</sub> is also used for this type of helix denoting the average number of residues per helical turn, with 13 atoms being involved in the ring formed by the hydrogen bond.

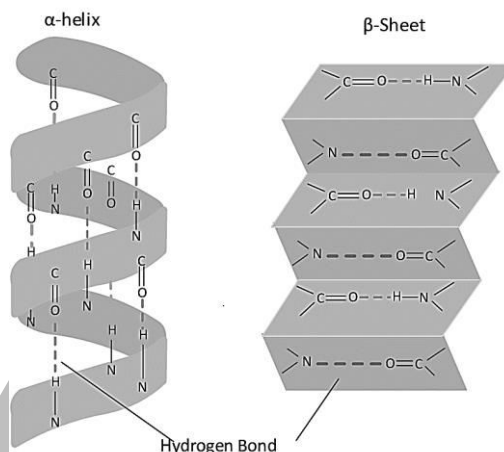


**Q.39** Answer is “Hydrogen bonds”

**Explanation:** The coils and folds of secondary structure are stabilized by hydrogen bonds between consecutive folds or turns /coils.

**Q.40** Answer is “ $\beta$  – pleated sheet”

**Explanation:** The example of folded secondary protein is  $\beta$  – pleated sheet which is formed by folding back of polypeptide chain.



**Q.41** Answer is “Tertiary configuration”

**Explanation:** A globular three-dimensional structure formed by a single polypeptide chain will be a tertiary protein, because quaternary protein is also globular but it requires more than one polypeptide chains.

**Q.42** Answer is “Tertiary structure”

**Explanation:** Ionic, hydrogen and disulphide bonds are involved in stabilization of tertiary structure of proteins.

Structural level	Bond/s involved in stabilization
Primary structure	Peptide bond
Secondary structure	Hydrogen bond
Tertiary structure	Ionic, hydrogen and disulphide bond
Quaternary structure	Hydrogen interaction, hydrogen and ionic bonds

**Q.43** Answer is “Three”

**Explanation:** Tertiary structure of proteins is maintained by ionic, hydrogen and disulphide bonds.



**Q.44 Answer is “Hydrophobic interaction”**

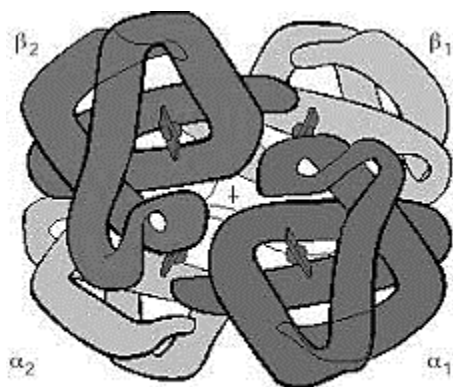
**Explanation:** Hydrophobic amino acids are buried inside while the hydrophilic amino acids are on the surface of the molecule until the aqueous medium remains intact.

**Q.45 Answer is “Quaternary Protein”**

**Explanation:** Because it involves primary secondary and tertiary levels as well.

**Q.46 Answer is “Quaternary structure”**

**Explanation:** More than one molecules of tertiary proteins are bonded to acquire a stable aggregated configuration called quaternary configuration e.g. hemoglobin.



Quaternary structure of Protein

**Q.47 Answer is “Ionic bond, Hydrogen bond and hydrophobic interaction”**

**Explanation:** These bonds are involved in stabilization of quaternary structure, as per textbook.

**Q.48 Answer is “Quaternary structure”**

**Explanation:** A hemoglobin molecule stands at quaternary level of proteins. It involves four chain of tertiary level i.e. two alpha chains and two beta chains.

**Q.49 Answer is “Hemoglobin molecule”**

**Explanation:** Hemoglobin involves all the four structural levels of proteins i.e. primary, secondary, tertiary and quaternary. Actually four chains of tertiary level are aggregated together to give rise to a hemoglobin molecule acquiring quaternary level.

**Q.50 Answer is “Keratin”**

**Explanation:** Keratin is that structural protein which is used to make our hair and nails and all structural proteins including keratin are included in fibrous category of proteins.

**Q.51 Answer is “Hemoglobin”**

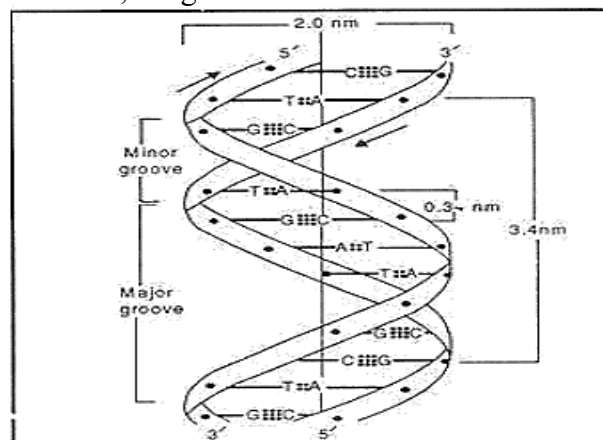
**Explanation:** All functional proteins are globular proteins including hemoglobin.

**Q.52 Answer is “Hormonal proteins”**

**Explanation:** Hormonal proteins being functional are globular proteins.

**Q.53 Answer is “3.4 Å”**

**Explanation:** Dividing 34 Å (3.4 nm) by 10, we get 3.4 Å or 0.34 nm.



**Q.54 Answer is “Number of chromosomes”**

**Explanation:** Major amount of DNA is located in chromosomes and number of chromosomes varies from species to

species, thus amount of DNA will also be different from species to species. But in same species it will be same.

**Q.55 Answer is “Germ cells, somatic cells”**

**Explanation:** Germ cells (sperms and ova) are meiotic products, thus contain haploid number of chromosomes, whereas rest of the body cells are mitotic products.

**Q.56 Answer is “1.6 picogram”**

**Explanation:** As kidney cells are diploid (2n) as compared to haploid (n) sperm cells.

**Q.57 Answer is “5 million bases”**

**Explanation:** These are 5 million bases arranged in a particular linear order.

**Q.58 Answer is “4,639,221”**

**Explanation:** The E.coli genome consists of 4,639,221 base pairs which code for at least 4288 proteins.

**Q.59 Answer is “RNA”**

**Explanation:** Ribonucleic acid is a polymer of ribonucleotides.

**Q.60 Answer is “RNA, DNA”**

**Explanation:** RNA is synthesized through the process of transcription by using DNA as a template.

**Q.61 Answer is “Nucleus, cytoplasm”**

**Explanation:** Transcription occurs in nucleus by using chromosomal DNA as template, then mRNA transcript is moved on through nuclear pores to the cytoplasm where transcribed message is translated into appropriate polypeptide proteins by using all three types of RNAs.

**Q.62 Answer is “Messenger RNA”**

**Explanation:** It takes the message encoded on genes to the ribosomes in cytoplasm where it is translated into proteins.

**Q.63 Answer is “10 to 20”**

**Explanation:** It is intermediate in quantity among three types of RNAs.

**Q.64 Answer is “tRNA”**

**Explanation:** It transfers appropriate amino acids to growing polypeptide chain.

**Q.65 Answer is “rRNA”**

**Explanation:** Quantitatively rRNA is the major form of RNA in cell.

**Q.66 Answer is “Ribosomal RNA”**

**Explanation:** It is used to make peptide bonds between amino acids and as a result polypeptide chain is synthesized.

**Q.67 Answer is “A German chemist”**

**Explanation:** It was Frederick Miescher.

**Q.68 Answer is “Frederick Miescher”**

**Explanation:** A German chemist Fredrick Miescher isolated a white substance from the nucleus of human pus cell and fish sperm cell and called it as nucleic. Due to its acidic pH it was renamed as nucleic acid later on.

**Q.69 Answer is “Human pus cells and fish sperm cells”**

**Explanation:** Frederick Miescher isolated a whitish substance from the nuclei of human pus cells and fish sperm cells and called it nuclien.

**Q.70 Answer is “Their isolation from nucleus and acidic nature”**

**Explanation:** Nucleic means isolated from nucleus and acid means having acidic pH.

**Q.71 Answer is “DNA”**

**Explanation:** Being genetic material DNA constitutes chromosomes and genes but small amount of extra chromosomal DNA exists in cytoplasm inside the chloroplast and mitochondria.

**Q.72 Answer is "RNA"**

**Explanation:** RNA being associated with protein synthesis mostly occurs in cytoplasm however it is synthesized inside the nucleus from DNA that is why it always occurs in nucleus as well.

**Q.73 Answer is "Nucleic acid"**

**Explanation:** Nucleotides are condensed to give rise to nucleic acids i.e. polymer of nucleotides.

**Q.74 Answer is "Three sub units"**

**Explanation:** Nucleotide consists of pentose sugar, nitrogenous base and phosphoric acid.

**Q.75 Answer is "Deoxyribose"**

**Explanation:** Because DNA is a polymer of deoxyribonucleotides.

**Q.76 Answer is "Ribose"**

**Explanation:** As RNA is polymer of ribonucleotides.

**Q.77 Answer is "Pyrimidines"**

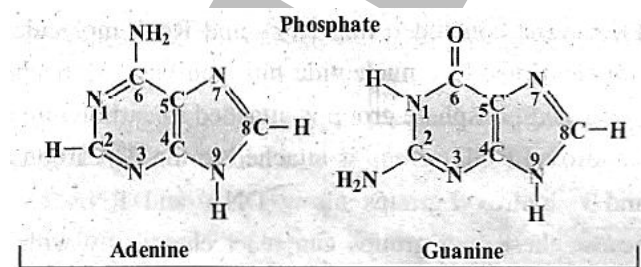
**Explanation:** These are smaller nitrogenous bases and have a single ring.

**Q.78 Answer is "Cytosine"**

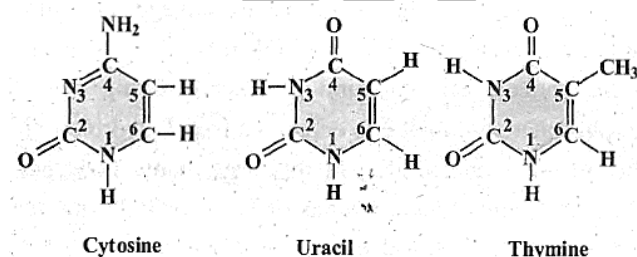
**Explanation:** Pyrimidines being a group smaller nitrogenous bases includes cytosine, thymine and uracil. But here we have been asked about the smallest base, not group.

**Q.79 Answer is "Adenine and guanine"**

**Explanation:** These are larger nitrogenous bases.

**Q.80 Answer is "Cytosine and Uracil"**

**Explanation:** As thymine is replaced by uracil in RNA.

**Q.81 Answer is "Position 01 of pentose sugar"**

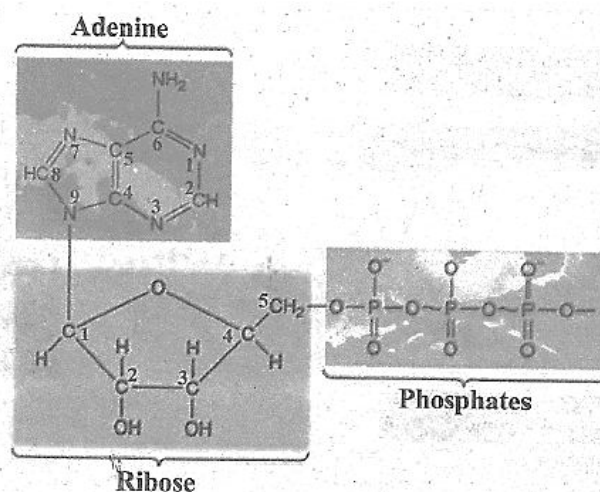
**Explanation:** Position of nitrogenous base is fixed in nucleotides and it is always carbon no.1 of pentose.

**Q.82 Answer is "Nucleoside"**

**Explanation:** Nucleotide minus phosphoric acid is equal to nucleoside and nucleoside plus phosphoric acid is equal to nucleotide.

**Q.83 Answer is "ATP"**

**Explanation:** Adenosine triphosphate is a nucleotide and it is used as energy currency of the cell having energy rich bonds of phosphate with phosphate.

**Q.84 Answer is "DNA"**

**Explanation:** DNA as a hereditary material controls all activities of a cell.

**Q.85 Answer is “DNA”**

*Explanation:* DNA is hereditary material.

**Q.86 Answer is “Four”**

*Explanation:* The types of nucleotides are decided by the types of nitrogenous bases used in DNA synthesis.

**Q.87 Answer is “NAD”**

*Explanation:* Nicotinamide adenine dinucleotide.

**Q.88 Answer is “Ribonucleotide”**

*Explanation:* Ribose sugar is part of ribonucleotide.

**Q.89 Answer is “UMP, UDP, UTP”**

*Explanation:* Uracil is not part of DNA.

**Q.90 Answer is “Adenosine, Guanosine, Cytidine and Thymidine”**

*Explanation:* Four nucleosides on the basis of four nitrogenous bases which are part of DNA.

**Q.91 Answer is “Erwin Chargaff”**

*Explanation:* He provided this data.

**Q.92 Answer is “Adenine and thymine are equal and so are the cytosine and guanine”**

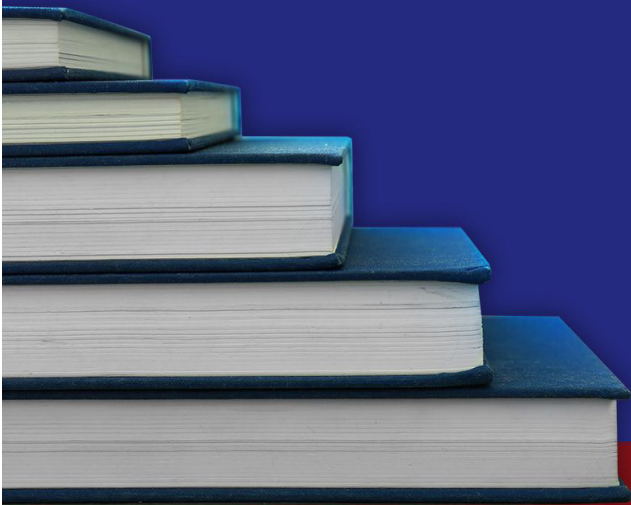
*Explanation:* As adenine makes a base pair with thymine and vice versa, whereas cytosine makes a base pair with guanine and vice versa.

**Q.93 Answer is “James D. Watson and Francis crick”**

*Explanation:* Scale model of DNA was built by these two scientists after X-Ray photographs of DNA made by Franklin.

# STOP

A PROGRAM BY PUNJAB GROUP





**Worksheet-9**  
**(Biological Molecules)**

**Q.1 It forms a fluid cushion around organs that helps to protect them from trauma:**

- A) Protein                      C) Vitamin  
B) Lipid                        D) Water

**Q.2 Biological importance of water is/are:**

- A) Polarity  
B) Universal solvent  
C) High specific heat and high heat of vaporization  
D) Polarity, Universal solvent and high specific heat and High heat of vaporization

**Q.3 The heat required to convert one gram of liquid water into vapors at its boiling point is called:**

- A) Heat of condensation  
B) Heat of neutralization  
C) Specific heat  
D) Heat of vaporization

**Q.4 Protoplasm of living cell can survive, if its water contents upto:**

- A) 20%                      C) 70%  
B) 10%                     D) 50%

**Q.5 All are biological importance of water, EXCEPT:**

- A) Polar molecule  
B) Universal solvent  
C) High specific heat and high heat of vaporization  
D) Water expands at high temperature

**Q.6 The amount of heat energy required to raise the temperature of one gram of water by one-degree celsius:**

- A) Heat of neutralization of water  
B) Heat of condensation of water

- C) Heat of vaporization of water  
D) Specific heat of water

**Q.7 It is a process in which large organic molecules are synthesized and water molecule is removed:**

- A) Hydrolysis                C) Hydrogenation  
B) Condensation            D) Decarboxylation

**Q.8 Which one of the following is not correct about water?**

- A) Water has high specific heat  
B) Water has high heat of vaporization  
C) Water is not universal solvent  
D) Water exhibits strong cohesion tension

**Q.9 Ice floats because:**

- A) It is less dense than water  
B) It is more dense than water  
C) It occupies less space than water  
D) It occupies more space than water

**Q.10 Which one of the following is not a property of water?**

- A) Hydrophobic properties  
B) Hydrophilic properties  
C) Very good solvent  
D) Strong surface tension

**Q.11 After taking a shower, you notice that some water droplets are clinging to the shower curtain. This is an example of:**

- A) Adhesion                C) Ionic bonding  
B) Cohesion                D) Surface tension

**Q.12 The formation of a large molecule from two small molecules with the removal of water is called:**

- A) Condensation  
B) Hydrolysis  
C) Dehydration synthesis

D) Sublimation

**Q.13 Water:**

- A) Is a good solute
- B) Serves as enzyme
- C) Is a universal solvent
- D) Serve as energy currency

**Q.14 Which one of the following is called biological catalysts?**

- A) Clotting factor      C) Enzyme
- B) Osmotic protein    D) Vitamin

**Q.15 The active site of enzymes consists of:**

- A) Only few amino acids
- B) Only a few amino acids
- C) Bulk of amino acids
- D) One or two amino acids

**Q.16 \_\_\_\_\_ maintains the globular structure of the enzyme.**

- A) Few amino acids
- B) A few amino acids
- C) Many amino acids
- D) Bulk of the amino acids

**Q.17 Often it contributes directly to the chemical reactions which bring about catalysis:**

- A) Prosthetic group    C) Co-enzymes
- B) Co-factor            D) Activator

**Q.18 If non-protein part of enzyme is covalently bonded to the protein part, it is called:**

- A) Holoenzyme          C) Prosthetic group
- B) Co-enzyme          D) Apo-enzyme

**Q.19 An activated enzyme consisting of polypeptide chain and a cofactor is known as:**

- A) Apoenzyme          C) Co-enzyme
- B) Holoenzyme        D) Pseudo enzyme

**Q.20 Enzymes are sensitive to even a minor change in:**

- A) pH
- B) Temperature
- C) Substrate conc.
- D) pH, temperature and substrate conc.

**Q.21 \_\_\_\_\_ is a powerful protein digesting enzyme and is capable of destroying cell's internal structure and thus produced in inactive \_\_\_\_\_ form by the cell.**

- A) Pepsin, Pepsinogen
- B) Pepsinogen, Pepsin
- C) Pepsin, Trypsin
- D) Trypsin, Pepsin

**Q.22 After the formation of products, it is released unaltered and thus can be used again:**

- A) Substrate            C) Inhibitor
- B) Enzyme              D) Hormone

**Q.23  $E + S \rightleftharpoons$  \_\_\_\_\_:**

- A)  $E + P$                 C)  $E + S$
- B)  $ES$                     D)  $EI$

**Q.24 Enzymes involved in some metabolic pathways are normally present together:**

- A) Randomly
- B) In descending order
- C) In reverse order
- D) In precise order

**Q.25 The charge and shape of the active site of the enzyme is formed by \_\_\_\_\_ in the polypeptide chain of the active site of the enzyme.**

- A) Some amino acids
- B) Many amino acids
- C) Bulk of amino acids
- D) One amino acids

**Q.26** The reaction between \_\_\_\_\_ activates the catalytic site of enzyme.

- A) Enzyme and substrate
- B) Active site of enzyme and substrate
- C) Substrate and binding site of enzyme
- D) Enzyme and binding site of enzyme

**Q.27** According to this model enzyme is a rigid structure:

- A) Lock and key model
- B) Induced fit model
- C) Allosteric model
- D) Isoenzyme model

**Q.28** According to \_\_\_\_\_ the active site of enzyme is not a rigid structure.

- A) Lock and key model
- B) Emil Fischer's model
- C) Induced fit model
- D) Allosteric model

**Q.29** The functional specificity of every enzyme is the consequence of its:

- A) Specific chemistry
- B) Specific configuration
- C) Variable chemistry and configuration
- D) Specific chemistry and configuration

**Q.30** The rate of reaction depends directly on the amount of enzyme provided the substrate concentration is:

- A) Unlimited      C) Limited
- B) Low              D) Fixed

**Q.31** By increasing the enzyme molecules \_\_\_\_\_ will convert the substrate molecules into products, in the given period of time.

- A) Less active sites

B) More active sites

- C) The same number of active site
- D) No active site

**Q.32** If the enzyme conc. is kept constant, by increasing the substrate concentration the rate of enzyme action is:

- A) Never increased
- B) Decreased
- C) Increased forever
- D) Increased for specific time

**Q.33** The rate of enzyme-controlled reactions may increase with increase in:

- A) Temperature upto minimum level
- B) Temperature upto maximum level
- C) Temperature upto optimum level
- D) Temperature upto infinite level

**Q.34** Chemical reactions are accelerated at high temperature because:

- A) Heat provides activation energy
- B) Heat lowers the activation energy
- C) Heat lowers the kinetic energy
- D) Heat makes the reactants remain static

**Q.35** When reactants move more quickly and chances of their collision with each other are increased as a result the rate of enzyme-controlled reactions will?

- A) Decrease initially    C) Increase for ever
- B) Increase initially    D) Decrease for ever

**Q.36** Inhibitors can be divided into:

- A) Two basic types    C) Four basic types
- B) Three basic types    D) Five basic types

**Q.37** They alter the structure of the enzyme in such a way that even if genuine substrate binds the active site, catalysis fails to take place temporarily:

- A) Irreversible inhibitors

- B) Reversible inhibitors
- C) Competitive inhibitors
- D) Non-competitive inhibitors

**Q.38 Pick up the product:**

- A) Succinic acid      C) Fumaric acid
- B) Malonic acid      D) Dehydrogenase

**Q.39 Succinic acid dehydrogenase + malonic acid  $\longrightarrow$ ?**

- A) No reaction possible
- B) Fumaric acid
- C) Enzyme is blocked
- D) No reaction possible, Enzyme is blocked

**Q.40 Which one of the following is reused?**

- A) Substrate
- B) Enzyme
- C) Coenzyme
- D) Enzyme and Co-enzyme

**Q.41 Some enzymes are potentially damaging if they are manufactured in their active form e.g.:**

- A) Amylose      C) Pepsinogen
- B) Pepsin      D) Lipase

**Q.42 Which one of the following products will control this pathway through feedback activation?**



- A) B      C) D
- B) C      D) E

**Q.43 A  $\longrightarrow$  B  $\longrightarrow$  C  $\longrightarrow$  D  $\longrightarrow$  E**

**Accumulation of "E" will control the above pathway through:**

- A) Feedback mechanism

- B) Feedback activation
- C) Positive feedback
- D) Feedback inhibition

**Q.44 A  $\longrightarrow$  B  $\longrightarrow$  C  $\longrightarrow$  D  $\longrightarrow$  E**

**Deficiency of "E" will control the above pathway through:**

- A) Feedback mechanism
- B) Feedback activation
- C) Negative feedback
- D) Feedback inhibition

**Q.45 Induce fit model was proposed by:**

- A) Watson      C) Emil Fischer
- B) Koshland      D) F. Miescher

**Q.46 Salivary amylase works best at pH:**

- A) 2.00      C) 6.80
- B) 7.20      D) 8.50

**Q.47 Optimum pH for the action of pancreatic lipase is:**

- A) 2.00      C) 5.00
- B) 7.00      D) 9.00

**Q.48 Malonic acid is competitive inhibitor of:**

- A) Succinic acid
- B) Fumaric acid
- C) Succinic dehydrogenase
- D) Citric acid

**Q.49 It causes denaturation of globular structure of enzyme:**

- A) Slight change in pH
- B) Extreme pH change
- C) Competitive inhibitor
- D) Slight pH change

**Q.50** Any molecule that increases the rate of a chemical reaction without being used up during that reaction is called:

- A) Coenzyme                      C) Apoenzyme
- B) Activator                     D) Catalyst

STEP ENTRY TEST 2020



ANSWER KEY (Worksheet-9)					
1	D	23	B	45	B
2	D	24	D	46	C
3	D	25	A	47	D
4	B	26	C	48	C
5	D	27	A	49	B
6	D	28	C	50	D
7	B	29	D		
8	C	30	A		
9	A	31	B		
10	A	32	D		
11	A	33	C		
12	C	34	A		
13	C	35	B		
14	C	36	A		
15	B	37	D		
16	D	38	C		
17	B	39	D		
18	C	40	D		
19	B	41	B		
20	D	42	D		
21	A	43	D		
22	B	44	B		

### EXPLANATION

**Q.1** Answer is “Water”

**Explanation:** Water is effective lubricant that provides protection against damage resulting from friction. For example, tears protect the surface of eye from the rubbing of eyelids, water also forms a fluid cushion around organs that helps to protect them from trauma.

**Q.2** Answer is “Polarity, Universal solvent and High specific heat and high heat of vaporization”

**Explanation:** Biological importance of water is essential for life. There is no existence of life without water. All the almighty has created all living organisms from water. Polarity, universal solvent and high specific heat and high heat of

vaporization all are the biological importance of water.

**Q.3** Answer is “Heat of vapourization”

**Explanation:** The heat required to convert one gram of liquid water into vapors at its boiling point is called heat of vapourization.

**Q.4** Answer is “10%”

**Explanation:** It is essential for existence of protoplasm because protoplasm cannot survive if its water content is reduced as low as 10 percent.

**Q.5** Answer is “Water expands at high temperature”

**Explanation:** Water has a unique property, as it expands when temperature falls below 4°C. Water is most heavy at 4°C. therefore ice (solid water) is less dense than liquid water and this is the reason that ice floats in liquid water. Water body freezes on the surface at low temperature. Water has a high surface tension. In living cells this feature of surface tension allows a thin film of water to cover membranes and to keep them moist.

**Q.6** Answer is “Specific heat of water”

**Explanation:** Water has high specific heat. Specific heat is the amount of heat energy required to rise the temperature of one gram of water by one degree celsius.

**Q.7** Answer is “Condensation”

**Explanation:** Condensation is a process in which large organic molecules are synthesized and water molecule is removed.

**Q.8** Answer is “Water is not universal solvent”

**Explanation:** Water is a universal solvent because it can dissolve all polar and ionic substances.

**Q.9** Answer is “It is less than water”

**Explanation:** Water has a unique property, as it expands when temperature falls below 4°C. Water is most heavy at 4°C. Therefore ice (solid water) is less dense than liquid water and this is that ice float is liquid water.

**Q.10** Answer is “Hydrophobic properties”

**Explanation:** Water is polar molecule due to polar nature of water it dissolves almost all type of polar substances.

**Q.11** Answer is “Adhesion”

**Explanation:** Adhesion refers to the tendency of water molecules to be attracted, or “stick”, to other substances. This is a result of the covalent bond between the two hydrogen atoms and the one oxygen atom in the water molecule. Just like a magnet, the poles of water molecule allow it to stick to other polar substances.

**Q.12** Answer is “Dehydration synthesis”

**Explanation:** Because dehydration synthesis is the combination of smaller molecules into the larger molecule with the removal of water.

**Q.13** Answer is “Is a universal solvent”

**Explanation:** Water is a universal solvent. Due to polar nature of water it dissolves almost all type of polar substances and therefore regarded as universal solvent.

**Q.14** Answer is “Enzyme”

**Explanation:** Enzymes being biological catalysts are involved in metabolism going on, in each cell all the time.

**Q.15** Answer is “Only a few amino acids”

**Explanation:** Active site is usually a groove or pocket not a solid compact structure as the rest of the enzyme is, that is why it is made up of only a few amino acids which means some amino acids.

**Q.16** Answer is “Bulk of amino acids”

**Explanation:** Few means “very few” or none at all, however a few is used to indicate “not a large number”. Many amino acids are also not enough to make a three-dimensional globular compact part of enzyme. Thus bulk is true word for it.

**Q.17** Answer is “Co-factor”

**Explanation:** Co-factor which is further sub-categorized into activator, prosthetic group and coenzyme, often contribute directly in enzyme catalysis sometimes it provides a source of chemical energy, helping to drive reactions which would otherwise be difficult or impossible and usually it acts as a bridge between the enzyme and its substrate.

**Q.18** Answer is “Prosthetic group”

**Explanation:** It is organic cofactor which is non-detachable (covalently bonded).

Sr . #	Cofactor	Nature of Bonding	Chemical Composition
1.	Activator	Detachable	Inorganic metallic ions
2.	Prosthetic group	Undetachable/covalent bonded	Organic
3.	Coenzyme	Detachable	Organic derived from vitamins

**Q.19** Answer is “Holoenzyme”

**Explanation:**

Holoenzyme = Apo enzyme + cofactor

Apoenzyme = Holoenzyme – cofactor

Cofactor = Holoenzyme – apoenzyme

**Q.20 Answer is “pH temperature and substrate conc.”**

**Explanation:** Both temperature and pH can change the enzyme configuration, thus changing its action, whereas substrate is that substance which is changed into products with the help of enzyme.

**Q.21 Answer is “Pepsin, Pepsinogen”**

**Explanation:** Pepsin being a proteolytic enzyme is considered among potentially damaging enzymes. Thus it is produced in inactive form called pepsinogen and is activated inside the lumen of stomach and wall of stomach is protected by mucus.

**Q.22 Answer is “Enzyme”**

**Explanation:** Enzyme being biocatalyst speeds up the biochemical reaction but it itself is not consumed in the reaction. Thus, at the end of biochemical reaction enzyme is obtained unaltered, to be used again.

**Q.23 Answer is “ES”**

**Explanation:** When an appropriate enzyme comes together with an appropriate substrate molecule in the same aqueous medium, enzyme substrate complex (ES) is formed.

**Q.24 Answer is “In precise order”**

**Explanation:** In a biochemical pathway specific enzymes catalyze the specific steps, thus they should be at specific position, otherwise pathway will not be accomplished.

**Q.25 Answer is “Some amino acids”**

**Explanation:** In biology, the active site is the region of an enzyme where substrate molecules bind and undergo a chemical reaction. The active site consists of residues that form temporary bonds with the substrate. The active site is usually a

groove or pocket of the enzyme which can be located in a deep funnel within the enzyme or between the interfaces of multimeric enzymes. Being hollow it consists of some amino acids.

**Q.26 Answer is “Substrate and binding site of enzyme”**

**Explanation:** Catalytic site of enzyme is activated when a suitable substrate molecule have been chemically bonded with the binding site of an enzyme.

**Q.27 Answer is “Lock and key model”**

**Explanation:** According to “Lock and Key Model” the active site of an enzyme is a rigid structure. There is no modification or flexibility in the active site, before, during or after the enzyme action and it is used only as a template.

**Q.28 Answer is “Induced Fit Model”**

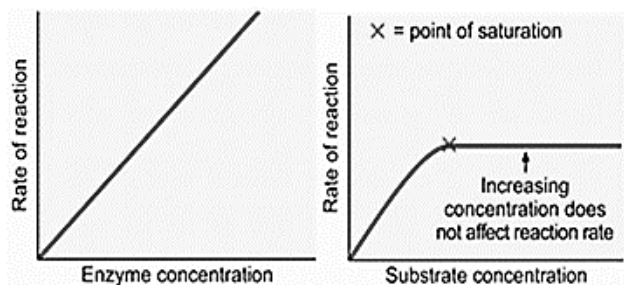
**Explanation:** Koshland’s Induced Fit model recognizes the flexibility in enzyme structure and in this way an appropriate substrate on coming closer to the enzyme may induce certain changes in the active site of that enzyme to become fit with substrate.

**Q.29 Answer is “Specific chemistry and configuration”**

**Explanation:** Any change in chemistry and configuration will change the shape of active site of enzyme and it will become misfit for its substrate.

**Q.30 Answer is “Unlimited”**

**Explanation:** Because substrate is that substance which is transformed into product(s) by the action of enzyme.



**Q.31 Answer is “More active site”**

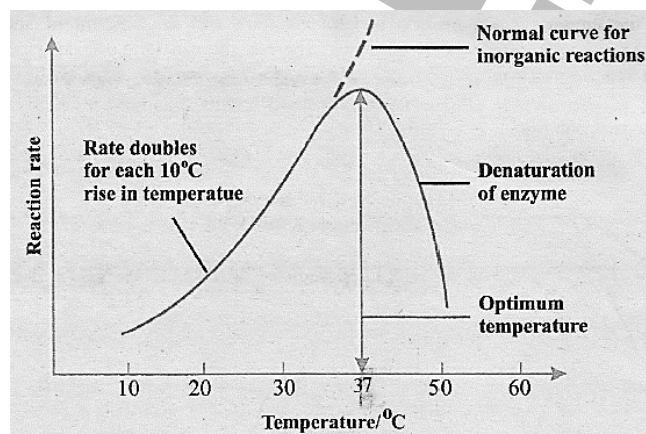
**Explanation:** Active sites are the active parts of enzyme which act upon a substrate. Thus by increasing the number of enzyme molecules more active sites will be available to act upon substrate molecules.

**Q.32 Answer is “Increase for a specific time”**

**Explanation:** Initially the rate will increase as more and more enzyme molecules will be involved in catalysis but soon a saturation stage will come when all the active sites will be occupied. Thus finally the increase in substrate concentration will be of no use without increasing the concentration of enzyme. Please see the graph given in the explanation of question # 23.

**Q.33 Answer is “Temperature upto optimum level”**

**Explanation:** Further increase in temperature beyond optimum temperature will start the denaturation of enzyme molecules and as a result the enzyme action will be slowed down.

**Q.34 Answer is “Heat provides activation energy”**

**Explanation:** Heat increases the kinetic energy of substrate and enzyme molecules which results in an increase in activation energy and as a result rate of enzyme action increases. Please see the graph given in the explanation of question # 26.

**Q.35 Answer is “Increase initially”**

**Explanation:** Initially when temperature is increased from any lower point, the kinetic energy of molecules is increased and as a result the rate of enzyme catalysis also increases. Later on when temperature moves beyond maximum range the movement of molecules will become so violent that they start coming out of the enzyme structure and enzyme denaturation starts consequently.

**Q.36 Answer is “Two basic types”**

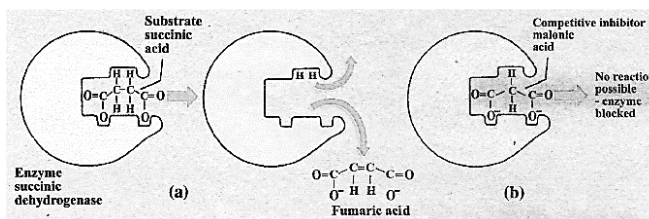
**Explanation:** Reversible and irreversible inhibitors.

**Q.37 Answer is “Non-competitive inhibitors”**

**Explanation:** When change is temporary it is reversible inhibitor and if the inhibitor is changing the enzyme structure as well it cannot compete with substrate for same active site, it is non-competitive inhibitor.

**Q.38 Answer is “Fumaric acid”**

**Explanation:** Fumaric acid is a product which is obtained by removing two hydrogen atoms from succinic acid. The reaction is catalyzed by succinic acid dehydrogenase enzyme.

**Q.39 Answer is “No reaction possible, Enzyme is blocked”**

**Explanation:** Malonic acid is a competitive reversible inhibitor of succinic acid



substrate and it blocks the succinic acid dehydrogenase enzyme.

**Q.40** Answer is “Enzyme and Co-enzyme”

**Explanation:** Both enzyme and co-enzyme are obtained unaltered at the end of reaction and remain available again for use.

**Q.41** Answer is “Pepsin”

**Explanation:** Pepsin being proteolytic enzyme is a potentially damaging enzyme having capability to digest the gut wall as well as to the that cell which is secreting it. Thus it is secreted in inactive form.

**Q.42** Answer is “E”

**Explanation:** The end product of last reaction in a chain of biochemical reactions controls the entire pathway either positively (by feedback activation) or negatively (by feedback inhibition)

**Q.43** Answer is “Feedback inhibition”

**Explanation:** Cell have limited space thus product should be produced according to need. The excess cause storage disorders. Thus upon accumulation of end products, the pathway is inhibited from first step and this is called feedback inhibition and vice versa.

**Q.44** Answer is “Feedback activation”

**Explanation:** In a chain of biochemical reaction, if the end product of last reaction is deficient, the first step in the pathway is activated.

**Q.45** Answer is “Koshland”

**Explanation:** On the basis of new evidences Koshland (1959) proposed its modified form.

**Q.46** Answer is “6.80”

**Explanation:**

Enzyme	Optimum pH
Pepsin	2.00
Sucrase	4.50
Enterokinase	5.50
Salivary amylase	6.80
Catalase	7.60
Chymotrypsin	7.00-8.00
Pancreatic lipase	9.00
Arginase	9.70

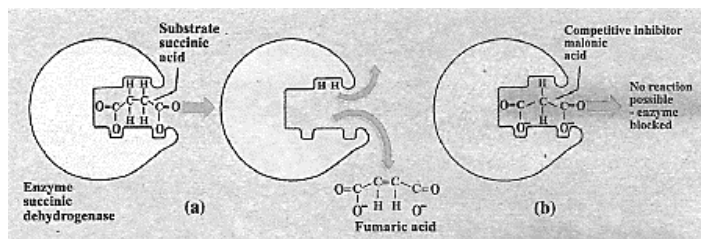
**Q.47** Answer is “9.00”

**Explanation:**

Enzyme	Optimum pH
Pepsin	2.00
Sucrase	4.50
Enterokinase	5.50
Salivary amylase	6.80
Catalase	7.60
Chymotrypsin	7.00-8.00
Pancreatic lipase	9.00
Arginase	9.70

**Q.48** Answer is “Succinic dehydrogenase”

**Explanation:**



**Q.49** Answer is “Extreme pH change”

**Explanation:** Extreme changes in pH cause the bonds in the enzymes to break, resulting in the enzyme denaturation.

**Q.50** Answer is “Catalyst”

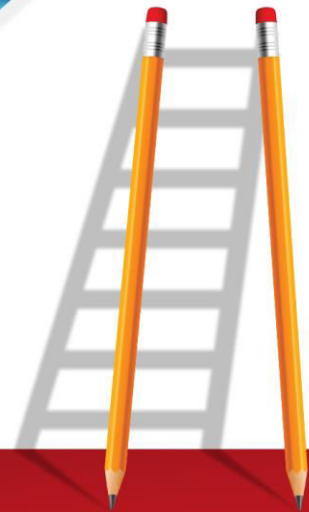
**Explanation:** Glossary Page # IV, Book – I.



# BIOLOGY



## Worksheet-10



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-10****(Chromosomes and DNA)**

- Q.1** At the beginning of translation, a tRNA molecule carrying a chemically modified \_\_\_\_\_ binds to the \_\_\_\_\_.  
 A) Methionine, Small ribosomal subunit  
 B) Methionine, Large ribosomal subunit  
 C) Tyrosine, Large ribosomal subunit  
 D) Tyrosine, Small ribosomal subunit
- Q.2** The site of ribosome where peptide bond is formed is called:  
 A) Aminoacyl site      C) Peptidyl site  
 B) Exit site              D) E site
- Q.3** A site of ribosome where empty tRNAs will leave the ribosome is called:  
 A) Aminoacyl site      C) Peptidyl site  
 B) Exit site              D) A-site
- Q.4** In translation, the initiation complex guided by another \_\_\_\_\_ binds to AUG on the RNA.  
 A) Elongation factor      C) Initiation factor  
 B) Release factor        D) tRNA synthetase
- Q.5** After initiation complex has formed, the larger ribosomal subunit binds \_\_\_\_\_ molecule with the appropriate \_\_\_\_\_.  
 A) mRNA, anticodon      C) tRNA, anticodon  
 B) mRNA, codon        D) tRNA, codon
- Q.6** The protein called elongation factor assists the tRNA in binding to the exposed \_\_\_\_\_ at the \_\_\_\_\_.  
 A) mRNA codon, A-site  
 B) mRNA codon, P-site  
 C) rRNA, A-site  
 D) rRNA, P-Site
- Q.7** In translation, methionine is released from its tRNA and is attached instead by a peptide bond to the second amino acid. This is catalyzed by:  
 A) Small ribosomal subunit  
 B) Initiation factor  
 C) Elongation factor  
 D) Large ribosomal subunit
- Q.8** The movement of ribosome on mRNA translocates the initial tRNA to the \_\_\_\_\_ site and ejects it from the ribosome.  
 A) A                              C) U  
 B) P                              D) E
- Q.9** \_\_\_\_\_ codons do not bind to tRNA, but they are recognized by release factors.  
 A) Initiation                      C) Non sense  
 B) Start                            D) Anti sense
- Q.10** According to the principle of semi conservative replication the sequence of the original \_\_\_\_\_ is conserved after one round of replication, the \_\_\_\_\_ itself is not.  
 A) Duplex, Helix              C) Duplex, Duplex  
 B) Helix, Duplex              D) Helix, Helix
- Q.11** In semi conservative replication, the two strands of duplex separate out, each acting as a \_\_\_\_\_ or \_\_\_\_\_ along which nucleotides are arranged thus giving rise to two new duplexes.  
 A) Copy or mould              C) Model, mould  
 B) Cast or mould              D) Model, Copy
- Q.12** In the process of semi-conservative replication:  
 A) Primary structure is conserved  
 B) Secondary structure is conserved  
 C) Primary structure is changed  
 D) Primary structure is disrupted
- Q.13** The conservative model of DNA replication stated that the parental double helix would \_\_\_\_\_ and \_\_\_\_\_

generate DNA copies consisting of entirely new molecules.

- A) Be disrupted
- B) Remain intact
- C) Be opened
- D) Remain partially intact

**Q.14** In this model of DNA replication parental DNA would become completely dispersed and each strand of all the daughter molecules would be a mixture of old and new DNA:

- A) Conservative C) Dispersive
- B) Semi conservative D) Semi-dispersive

**Q.15** The density of DNA containing \_\_\_\_\_ was exactly intermediate to that of the DNA containing \_\_\_\_\_ and \_\_\_\_\_ respectively.

- A)  $N^{15}/N^{14}$ ,  $N^{14}/N^{14}$  and  $N^{15}/N^{15}$
- B)  $N^{14}/N^{14}$ ,  $N^{15}/N^{14}$  and  $N^{15}/N^{15}$
- C)  $N^{15}/N^{15}$ ,  $N^{15}/N^{14}$  and  $N^{14}/N^{14}$
- D)  $N^{15}/N^{14}$ ,  $N^{15}/N^{14}$  and  $N^{14}/N^{14}$

**Q.16** Meselson and Stahl interpreted that after the first round of replication, each daughter DNA duplex was hybrid possessing one of the \_\_\_\_\_ strands of parent molecule and one \_\_\_\_\_ strand.

- A) Heavy, Heavy C) Heavy, Light
- B) Light, Light D) Light, Heavy

**Q.17** In Meselson and Stahl experiments in  $F_1$  generation DNA was:

- A) Heavy
- B) Light
- C) Hybrid
- D) Neither light nor heavy

**Q.18** There are \_\_\_\_\_ DNA polymerases in bacteria.

- A) Two C) Four
- B) Three D) Five

**Q.19** In bacteria, polymerases involved in DNA replication is/are:

- A) I C) III
- B) II D) III and I

**Q.20** The true *E. coli* replicating enzyme is:

- A) DNA poly – I C) DNA poly - III
- B) DNA poly – II D) DNA poly - IV

**Q.21** This enzyme is a dimer and catalyzes replication of one DNA strand:

- A) DNA poly – I C) DNA poly - III
- B) DNA poly – II D) DNA poly - IV

**Q.22** DNA polymerase cannot:

- A) Carry out DNA replication
- B) Carry out DNA synthesis
- C) Initiate DNA replication
- D) Add nucleotides to a nucleotide chain

**Q.23** Pick up the choice that is incorrect about RNA primer:

- A) Constructed by Primase
- B) A sequence of about 10 RNA nucleotides
- C) Complementary to the parent DNA template
- D) Constructed by RNA polymerase

**Q.24** DNA polymerase III recognizes the \_\_\_\_\_ and adds DNA nucleotides to it to construct DNA strands.

- A) DNA template C) Primase
- B) Primer D) Parental strand

**Q.25** In DNA replication the replacement of RNA nucleotides of primer is catalyzed by:

- A) DNA poly – I C) DNA poly – III
- B) DNA poly – II D) RNA poly

**Q.26** Replication always proceeds in:

- A)  $5' \rightarrow 3'$  direction C)  $3' \rightarrow 3'$  direction
- B)  $3' \rightarrow 5'$  direction D)  $5' \rightarrow 5'$  direction

**Q.27** Because the two parental strands of a DNA are \_\_\_\_\_, the new strands are oriented in \_\_\_\_\_ direction.

- A) Parallel, Parallel
- B) Parallel, Opposite
- C) Antiparallel, Same
- D) Antiparallel, Opposite

**Q.28 Pick up the choice that is not true with respect to DNA replication:**

- A) New strands grow in different directions
- B) Leading strand grows towards replication fork
- C) Leading strand grows continuously
- D) Lagging strand grows continuously

**Q.29 The lagging strand of DNA elongates:**

- A) Towards replications fork
- B) Away from replications fork
- C) Continuously
- D) Discontinuously away from replication fork

**Q.30 The length of Okazaki fragments in eukaryotes is:**

- A) 1000 – 2000 nucleotides
- B) 100 – 200 nucleotides
- C) 10 – 20 nucleotides
- D) 10,000 – 20,000 nucleotides

**Q.31 Vernon Ingram discovered Sickle cell anemia by working at:**

- A) Oxford University
- B) Cambridge University
- C) Tübingen University
- D) California University

**Q.32 Sickle cell hemoglobin occurs due to the immediate replacement of:**

- A) Valine by Glutamic acid
- B) Glutamic acid by valine
- C) Thymine by adenine
- D) Adenine by thymine

**Q.33 The critical changes leading to sickle cell disease is a mutation that replaces a single:**

- A) Adenine with thymine
- B) Thymine with adenine
- C) Guanine with cytosine
- D) Cytosine with guanine

**Q.34 The sequence of nucleotides that determines the amino acid sequence of a protein is called:**

- A) Gene
- B) Allele
- C) Chromosome
- D) Primer

**Q.35 Pick up the  $\beta$  chain of normal hemoglobin:**

- A) Valine – Histidine – Leucine – Threonine – Proline – Glutamic acid
- B) Valine – Glutamic acid – Leucine – Threonine – Proline – Glutamic acid
- C) Valine – Histidine – Leucine – Threonine – Proline – Glutamic acid – Valine
- D) Valine – Histidine – Leucine – Threonine – Proline – Valine – Glutamic acid

**Q.36 Pick up the  $\beta$  chain for sickle cell hemoglobin:**

- A) Valine – Histidine – Leucine – Threonine – Proline – Glutamic
- B) Valine – Glutamic acid – Leucine – Threonine – Proline – Glutamic acid
- C) Valine – Histidine – Leucine – Threonine – Proline – Glutamic acid – Valine
- D) Valine – Histidine – Leucine – Threonine – Proline – Valine – Glutamic acid

**Q.37 The first step of central dogma is the transfer of information from:**

- A) RNA to DNA
- B) DNA to RNA
- C) RNA to proteins
- D) Proteins to RNA

**Q.38 \_\_\_\_\_ is initiated when the enzyme RNA polymerase binds to a particular binding site called a promoter located upstream of a gene.**

- A) Translation
- B) Transcription
- C) Replication
- D) Central Dogma

**Q.39 The second step of the central dogma is the transfer of information from:**

- A) Protein to RNA
- B) RNA to Proteins
- C) Proteins to DNA
- D) DNA to RNA

- Q.40** The nucleotide sequence of the mRNA is translated into an amino acid sequence during:
- A) Transcription      C) Replication  
B) Translation      D) Mutation
- Q.41** Two steps of central dogma provide means of:
- A) Translation      C) Gene expression  
B) Transcription      D) Mutation
- Q.42** \_\_\_\_\_ are long strands of RNA that are transcribed from \_\_\_\_\_ and that travel to the ribosomes to direct precisely which amino acids are assembled into polypeptides.
- A) mRNA, tRNA      C) mRNA, DNA  
B) mRNA, rRNA      D) mRNA, snRNA
- Q.43** Only one of the two strands of DNA is:
- A) Replicated      C) Transcribed  
B) Uncoiled      D) Meaningful
- Q.44** The strand of DNA which is not transcribed is called:
- A) Coding or template strand  
B) Coding or sense strand  
C) Template or antisense strand  
D) Template or sense strand
- Q.45** The RNA polymerase enzyme synthesizes RNA in:
- A) 5' → 5' direction  
B) 5' → 3' direction  
C) 3' → 3' direction  
D) 3' → 5' direction
- Q.46** Transcription starts at the \_\_\_\_\_ on DNA template strand.
- A) RNA polymerase binding site  
B) Promotor site  
C) RNA polymerase binding site called promoter  
D) DNA polymerase binding site
- Q.47** Pick up the binding sites within promoter of Prokaryotes:
- A) -35 and -75      C) -35 and -25  
B) -35 and -10      D) -75 and -25
- Q.48** The -10 sequence of prokaryotes reads as:
- A) TATAAT      C) TAGACA  
B) TTGACA      D) GACAAT
- Q.49** In transcription the parental DNA duplex opens up to give rise to:
- A) Transcription fork  
B) Replication fork  
C) Transcription bubble  
D) Replication bubble
- Q.50** The stop sequence at the end of the gene terminates the synthesis of:
- A) mRNA      C) tRNA  
B) DNA      D) rRNA
- Q.51** The newly synthesized mRNA has to travel long distance from inside the nucleus to ribosomes in:
- A) Bacteria      C) Cyanobacteria  
B) Prokaryotes      D) Eukaryotes
- Q.52** To mRNA of eukaryotes \_\_\_\_\_ and \_\_\_\_\_ is added so that the molecule may remain stable during long journey to ribosomes.
- A) Cap, Tail  
B) Initiation codon, termination codon  
C) Start codon, Stop codon  
D) GC hair pins, 7 methyl GTP
- Q.53** The tail of mRNA transcript is in the form of \_\_\_\_\_ linked to \_\_\_\_\_.
- A) Poly A, 3' end of RNA  
B) 7 methyl GTP, 3' end of RNA  
C) 7 methyl GTP, 5' end of RNA  
D) Poly A, 5' end of RNA



**Q.54** UAA, UGA and UAG respectively code for:

- A) Leucine, Alanine, Serine
- B) Leucine, Serine, Alanine
- C) Leucine, Glycine, Alanine
- D) No amino acid, No amino acid, No amino acid

**Q.55** UAA is a \_\_\_\_\_ codon.

- A) Stop
- B) Non sense
- C) Termination
- D) Stop, Non sense or Termination

**Q.56** Every gene starts with:

- A) Initiation codon
- B) Start codon
- C) AUG
- D) Initiation, Start or AUG codon

**Q.57** Transfer of genes from one organism to other and its successful transcription and translation in new host is possible because:

- A) Genetic language is universal
- B) Entire living world follows the central dogma
- C) Mechanism of gene expression is universal
- D) All organisms have similar genes

**Q.58** The most applicable statement about genetic code is that:

- A) It is universal
- B) It is not that universal
- C) It is not quite universal
- D) It is not universal

**Q.59** The mRNA lies on the ribosome in such a way that only \_\_\_\_\_ of its

codons is exposed at the polypeptide site at any time.

- A) 01
- B) 02
- C) 03
- D) 04

**Q.60** A tRNA molecule possessing the complementary three nucleotide sequence of \_\_\_\_\_, binds to the exposed \_\_\_\_\_ in mRNA.

- A) Codon, Codon
- B) Codon, Anticodon
- C) Anticodon, Anticodon
- D) Anticodon, Codon

**Q.61** N-formyl methionine is a:

- A) Chemically modified methionine
- B) Photo reactive methionine
- C) Deaminated methionine
- D) Acetylated of methionine

**Q.62** Genetic code is a combination of:

- A) Two nucleotides
- B) Three nucleotides
- C) Four nucleotides
- D) Five nucleotides

**Q.63** Genetic code is a \_\_\_\_\_ code:

- A) Twin
- B) Quadruplet
- C) Duplet
- D) Triplet

**Q.64** Thread like structures that appear inside the nucleus at the time of cell division are called:

- A) Chromatin fibers
- B) Chromosomes
- C) Spindle fibers
- D) Microtubules

**Q.65** Chromosomes were first observed by:

- A) T. H. Morgan
- B) Carl Correns
- C) W.S. Sutton
- D) Walther Fleming

**Q.66** \_\_\_\_\_ have been found in all eukaryotic cells:

- A) Centrosomes
- C) Mesosomes

- B) Centrioles                      D) Chromosomes
- Q.67** The genes are transported to the daughter cells through vehicles called:
- A) Nuclei                      C) Chromosomes  
B) Centrioles                      D) Spindle fibers
- Q.68** Missing of a part of or whole of chromosomes leads to:
- A) Variation                      C) Evolution  
B) Diversification                      D) Mutation
- Q.69** Following are the components of a chromosome, EXCEPT:
- A) Centromere  
B) Chromatids  
C) Centrosome  
D) Primary constriction
- Q.70** Chromosomes may widely differ in:
- A) Roles                      C) Behavior  
B) Composition                      D) Appearance
- Q.71** Chromosomes vary in following features, EXCEPT:
- A) Size  
B) Arm length  
C) Chemical composition  
D) Centromeric position
- Q.72** Karyotype include following features, EXCEPT:
- A) Position of constricted regions on chromosome  
B) The relative lengths of two arms  
C) Staining properties  
D) Role performed in cell
- Q.73** The chromosomes with arm length ratio of 1:1 are called:
- A) Acrocentric                      C) Sub-metacentric  
B) Telocentric                      D) Metacentric
- Q.74** One extremely longer and one extremely shorter arms are found in:
- A) Telocentric chromosomes  
B) Acrocentric chromosomes  
C) Sub-metacentric chromosomes  
D) Metacentric chromosomes
- Q.75** The chromosomes with single arms are called:
- A) Acrocentric                      C) Sub-metacentric  
B) Telocentric                      D) Metacentric
- Q.76** Which one of the following chromosomes acquires the shape of English letter 'L' during anaphase of mitosis?
- A) Acrocentric                      C) Sub-metacentric  
B) Telocentric                      D) Metacentric
- Q.77** Major quantitative chemical component of chromosome is:
- A) Protein                      C) RNA  
B) DNA                      D) Lipid
- Q.78** Major functional component of chromosome is:
- A) DNA                      C) RNA  
B) Proteins                      D) Nucleic acid
- Q.79** If we gently disrupt a eukaryotic nucleus and examine the DNA with an electron microscope, we find that it resembles a:
- A) Chromosome                      C) String of beads  
B) Chromatid                      D) Coiled rope
- Q.80** In structural organization of eukaryotic chromosomes supercoils are made up of:
- A) Coils                      C) Beaded string  
B) Chromatin fiber                      D) Chromatids

**ANSWER KEY (Worksheet-10)**

1	A	21	C	41	C	61	A
2	C	22	C	42	C	62	B
3	B	23	D	43	C	63	D
4	C	24	B	44	B	64	B
5	C	25	A	45	B	65	D
6	A	26	A	46	C	66	D
7	D	27	D	47	B	67	C
8	D	28	D	48	A	68	D
9	C	29	D	49	C	69	C
10	C	30	B	50	A	70	D
11	C	31	B	51	D	71	C
12	A	32	B	52	A	72	D
13	B	33	B	53	A	73	D
14	C	34	A	54	D	74	B
15	A	35	A	55	D	75	B
16	C	36	D	56	D	76	C
17	C	37	B	57	A	77	A
18	B	38	B	58	A	78	A
19	D	39	B	59	A	79	C
20	C	40	B	60	D	80	A

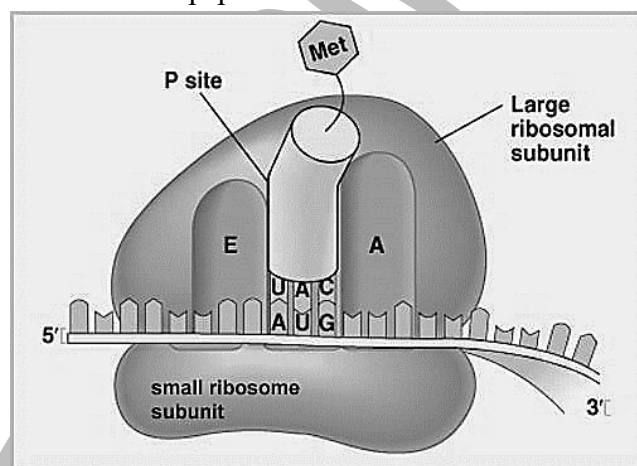
**EXPLANATION**

**Q.1** Answer is “Methionine, small ribosomal subunit”

**Explanation:** In prokaryotes polypeptide synthesis begins with the formation of initiation complex. First the tRNA molecule carrying a chemically modified methionine (called N-formyl methionine) binds to the small ribosomal subunit. Protein called initiation factor positions the tRNA on ribosomal surface at the P site where peptide bond is formed.

**Q.2** Answer is “Peptidyl site”

**Explanation:** ‘P’ site on ribosome is that site where peptide bond is formed.



**Q.3** Answer is “Exit site”

**Explanation:** ‘E’ site is exit site where empty tRNAs will exit the ribosome.

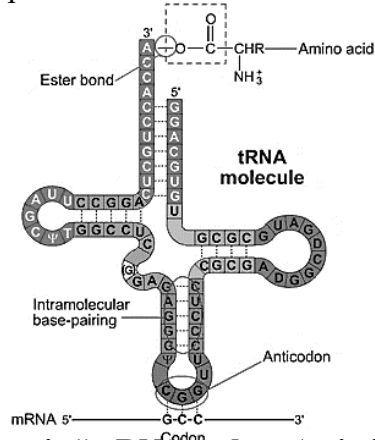
**Q.4** Answer is “Initiation factor”

**Explanation:** Initiation factors are proteins that bind to the small subunit of the ribosome during the initiation of translation, a part of protein synthesis. They are divided into three major groups.

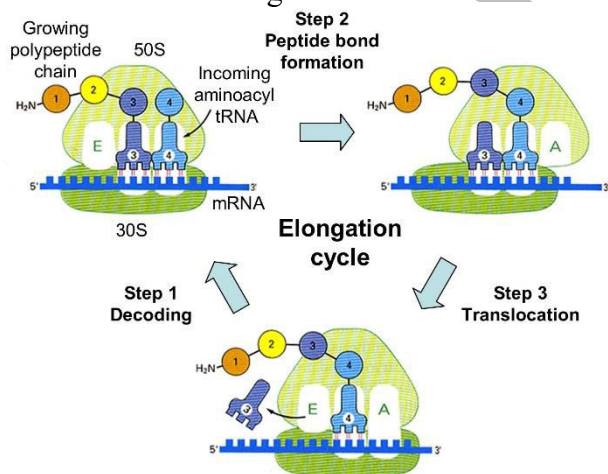
- Prokaryotic initiation factor
- Archael initiation factor
- Eukaryotic initiation factor

**Q.5 Answer is “tRNA, anticodon”**

**Explanation:** After the formation of initiation complex, the large ribosomal subunit binds tRNA molecule with the appropriate anticodon, protein called elongation factors assists in binding it to the exposed mRNA codon at the ‘A’ site.

**Q.6 Answer is “mRNA codon, A-site”**

**Explanation:** Elongation factors are sets of proteins that are used in protein synthesis in the process of cell cycle and elongation in some cells. In the ribosome, they facilitate translational elongation, from the formation of the first peptide bond to the formation of last one. Each time tRNA is guided to enter on site A.

**Q.7 Answer is “Large ribosomal subunit”**

**Explanation:** The two amino acids which lie adjacent to each other undergo a chemical reaction, catalyzed by the large ribosomal subunit, which releases the

initial amino acid from its tRNA and attaches it instead by a peptide bond to the second amino acid.

**Q.8 Answer is “E”**

**Explanation:** The movement of ribosomes along the mRNA molecule in the 5' → 3' direction, translocates the initial tRNA to the E site and ejects it from the ribosome.

**Q.9 Answer is “Non-sense”**

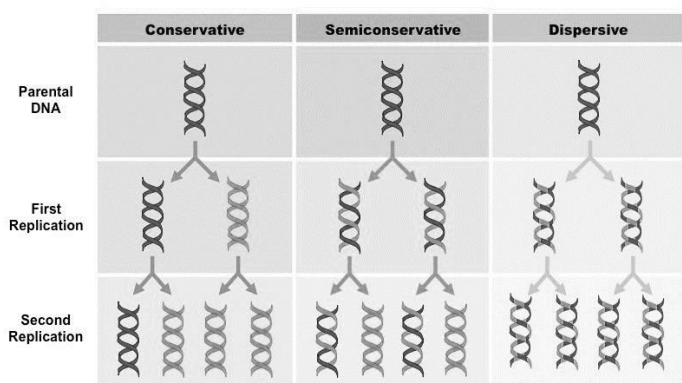
**Explanation:** The non-sense codon also called stop or termination codons, do not encode any genetic information (amino acid), thus they are not recognized by the anticodon of any tRNA. However, they are recognized by the release factor. A release factor is a protein that allows for the termination of translation by recognizing the termination codon or stop codon in an mRNA sequence. UAA, UAG and UGA are stop codons.

**Q.10 Answer is “Duplex , Duplex”**

**Explanation:** The sequence of original duplex is conserved due to semi-conservative replication i.e. both parental strand get separated and start acting as template and two new complementary strands are formed. Thus two new duplexes result in each with same sequence of nucleotides as was held by parental duplex.

**Q.11 Answer is “Model, mould”**

**Explanation:** In semi conservative replication each strand of parental DNA duplex is conserved and it acts as a template for newly formed strand.



**Q.12** Answer is “Primary structure is conserved”

**Explanation:** The nucleotide sequence in each strand of DNA duplex represents the primary structure of DNA which is not affected in semi conservative replication, however the duplex (double helical structure) which represents the secondary structure of DNA duplex is demolished.

**Q.13** Answer is “Remain intact”

**Explanation:** According to conservative replication the entire parental DNA duplex is conserved and a completely new duplex is formed.

**Q.14** Answer is “Dispersive”

**Explanation:** That is why it is called dispersive model of replication as the original DNA is completely broken up into its nucleotides, then new nucleotides are mixed with them to synthesize two duplexes.

**Q.15** Answer is “ $N^{15}/N^{14}$ ,  $N^{14}/N^{14}$  and  $N^{15}/N^{15}$ ”

**Explanation:**  $N^{15}/N^{14}$  being hybrid DNA duplex have density lesser than  $N^{15}/N^{15}$  and more than  $N^{14}/N^{14}$  i.e. it has intermediate density. Thus, it settles in between the pure  $N^{14}/N^{14}$  and pure  $N^{15}/N^{15}$  duplexes.

**Q.16** Answer is “Heavy, light”

**Explanation:** Original DNA was completely heavy  $N^{15}/N^{15}$ , so after semi-conservative replication it should be hybrid, as a single light strand is formed.

**Q.17** Answer is “Hybrid”

**Explanation:** In  $F_1$  generation reused by Meselson and Stahl DNA was hybrid i.e. one strand (parental) was heavy whereas other strand was light.

**Q.18** Answer is “Three”

**Explanation:** There are three DNA polymerase namely I, II and III in bacteria. DNA polymerase I is relatively small enzyme that plays a supporting role in DNA replication. True E.coli replicating enzyme is DNA polymerase III which is 10 times larger and far more complex in structure. The enzyme is a dimer and catalyzes replication of one DNA strand. Polymerase III progressively threads the DNA through the enzyme complex, moving at a rapid rate, some 100 nucleotides per second.

**Q.19** Answer is “III and I”

**Explanation:** DNA poly-II is a DNA repairing enzyme which keeps on carrying out surveillance on DNA and repairs it immediately wherever it is needed.

Type DNA polymerase	Function
DNA poly-I	Converts RNA primer into DNA.
DNA poly-II	It is a DNA repairing enzyme.
DNA poly-III	It is actual polymerase related with replication of DNA.

**Q.20** Answer is “DNA poly-III”

**Explanation:** The actual DNA replication enzyme is DNA polymerase-III DNA poly-I only transforms the RNA primer into DNA fragments.

**Q.21** Answer is “DNA polymerase-III”

**Explanation:** DNA polymerase III is a dimer and catalyzes replication of one DNA strand at a time.

**Q.22** Answer is “Initiate DNA replication”



**Explanation:** It can only elongate the already existing polynucleotide chain. That is why primer is used.

**Q.23 Answer is “Constructed by RNA polymerase”**

**Explanation:** Primase constructs the primer which is a specific type of RNA polymerase that is why it is preferable over mere RNA polymerase.

**Q.24 Answer is “Primer”**

**Explanation:** Primer is a launching pad for DNA polymerase enzyme.

**Q.25 Answer is “DNA poly-I”**

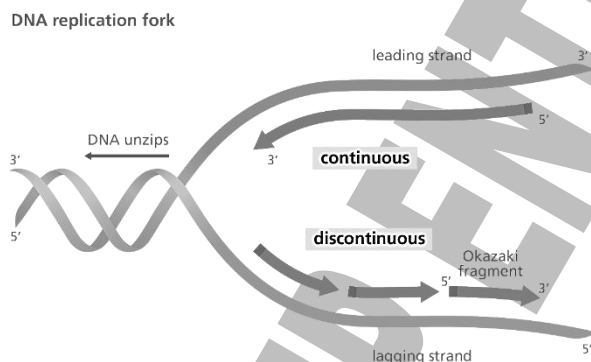
**Explanation:** DNA polymerase-I converts the RNA primer into DNA.

**Q.26 Answer is “5 to 3 direction”**

**Explanation:** As DNA polymerase-III adds new nucleotides at position 3 of polynucleotide chain.

**Q.27 Answer is “Antiparallel, Opposite”**

**Explanation:** As parental DNA strands are antiparallel, thus, construction of new DNA strand against each template strand will also be antiparallel or opposite.



**Q.28 Answer is “Lagging strand grows continuously”**

**Explanation:** Lagging strand grows away from replication fork, thus it is synthesized in fragments called Okazaki fragments and its replication is always discontinuous.

**Q.29 Answer is “Discontinuously away from replication fork”**

**Explanation:** Lagging strand grows away from replication fork, thus it is synthesized

in fragments called Okazaki fragments and its replication is always discontinuous.

**Q.30 Answer is “100 – 200 nucleotides”**

**Explanation:** It is 100 – 200 nucleotides in eukaryotes whereas 1000 – 2000 nucleotides in prokaryotes.

**Q.31 Answer is “Cambridge university”**

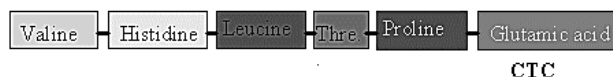
**Explanation:** Following Sanger's pioneer work Veron Ingram in 1956 discovered the molecular basis of sickle cell anemia, a protein defect inherited as a Mendelian disorder.

**Q.32 Answer is “Glutamic acid by valine”**

**Explanation:** Its genetic basis or root cause is a mutation involving replacement of a thymine with an adenine, however an immediate cause is replacement of amino acids.

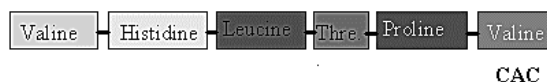
Normal Hemoglobin Beta Chain

First six amino acids



Hemoglobin S Beta Chain

First six amino acids



One nucleotide has changed

**Q.33 Answer is “Thymine with adenine”**

**Explanation:** At DNA level a thymine nucleotide is replaced by adenine nucleotide and as result the triplet code encoding glutamic acid is replaced by a triplet code encoding valine. Consequently valine replaces glutamic acid. As amino acid sequence is very important for specific protein. Thus by this change normal hemoglobin protein is transformed into sickle cell hemoglobin and the person suffers from anemia because modified hemoglobin stops carrying gases ( $O_2$  and  $CO_2$ ).

**Q.34 Answer is “Gene”**

**Explanation:** Gene is basically a nucleotide sequence which specifies the amino acid sequence in a specific protein.

**Q.35 Answer is “Valine – Histidine – Leucine – Threonine – Proline – Glutamic acid”**

**Explanation:** In  $\beta$  chain of sickle cell hemoglobin glutamic acid at position six is replaced by valine.

**Q.36 Answer is “Valine – Histidine – Leucine – Threonine – Proline – Valine – Glutamic acid”**

**Explanation:** In  $\beta$  chain of sickle cell hemoglobin glutamic acid at position seven have been replaced by valine.

**Q.37 Answer is “DNA to RNA”**

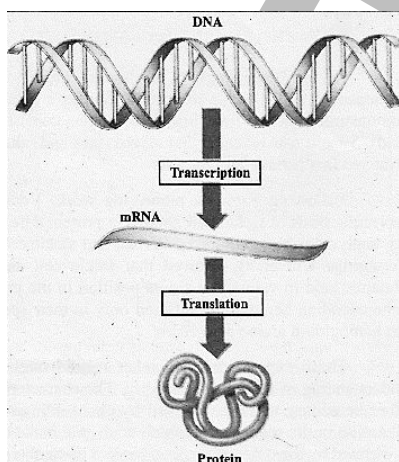
**Explanation:** In central dogma first the DNA is converted into RNA (transcription) and it is in turn converted (translated) into polypeptide proteins.

**Q.38 Answer is “Transcription”**

**Explanation:** RNA polymerase is involved in the formation transcription and starts transcription just behind the RNA primer.

**Q.39 Answer is “RNA to proteins”**

**Explanation:** In translation the RNA transcript is converted into a polypeptide protein.



**Q.40 Answer is “Translation”**

**Explanation:** During translation the transcribed information of mRNA is

translocated into a specific polypeptide protein.

**Q.41 Answer is “Gene expression”**

**Explanation:** As gene encodes information of a particular protein and synthesis of that protein is considered as expression of that encoded information.

**Q.42 Answer is “mRNA, DNA”**

**Explanation:** mRNA is a long chain of nucleotides which is synthesized from DNA template by the process of transcription.

**Q.43 Answer is “Transcribed”**

**Explanation:** It is template strand or antisense strand whereas the other strand not used in transcription is called coding strand or sense strand.

**Q.44 Answer is “Coding or sense strand”**

**Explanation:** It is called so because it is exact replica of mRNA except uracil have been replaced thymine.

**Q.45 Answer is “5 to 3 direction”**

**Explanation:** Just like DNA polymerase, RNA polymerase also adds new nucleotides to position 3 of nucleotide chain.

**Q.46 Answer is “RNA polymerase binding site called promotor”**

**Explanation:** Transcription always starts at promotor site.

**Q.47 Answer is “-35 and -10”**

**Explanation:** -35 means 35 nucleotides down the order and 10 means ten nucleotides down the order.

**Q.48 Answer is “TATAAT”**

**Explanation:** TATAAT is -10 promotor site of prokaryotic cells.

**Q.49 Answer is “Transcription bubble”**

**Explanation:** As genes are mostly located at intercalary positions and DNA is opened in-between the ends so bubble is

formed instead of fork which is formed in replication.

**Q.50 Answer is “mRNA”**

**Explanation:** As stop sequence is an indication for termination of transcription.

**Q.51 Answer is “Eukaryotes”**

**Explanation:** Prokaryotes lack nuclear membrane and their chromosome is directly submerged in cytoplasm, so mRNA after being formed from DNA of chromosome starts being translated. However, in eukaryotes chromosomes are located inside the nucleus where site of translation is cytoplasm, so mRNA have to travel that distance.

**Q.52 Answer is “Cap, tail”**

**Explanation:** As it has to travel a long distance through a hostile environment loaded with nucleases and acid phosphatases.

**Q.53 Answer is “Poly A, 3 end of RNA”**

**Explanation:** Making addition of further nucleotide impossible and inhibiting entrance of any enzyme as well, both tail and head of mRNA transcript are covered in eukaryotes.

**Q.54 Answer is “No amino acid, No amino acid, No amino acid”**

**Explanation:** These are stop, termination or non-sense codons.

**Q.55 Answer is “Stop, non-sense or termination codon”**

**Explanation:** Stop codon is also called termination codon or non-sense codon because it does not encode any amino acid and polypeptide chain is terminated at it.

**Q.56 Answer is “Initiation, start or AUG codon”**

**Explanation:** Initiation codon or start codon is specified to start the polypeptide chain by methionine amino acid.

**Q.57 Answer is “Genetic language is universal”**

**Explanation:** Same genetic code transcribes or encodes same amino acid in chromosomal DNA of any organism.

**Q.58 Answer is “It is universal”**

**Explanation:** As in most of the cases it is same. The only exception is extrachromosomal DNA.

**Q.59 Answer is “01”**

**Explanation:** Three nucleotides or triplet code is exposed at A site of ribosome after initiation.

**Q.60 Answer is “Anticodon, codon”**

**Explanation:** Coded language of mRNA which have been encoded in form of triplet codes is read by anticodons of tRNA and accordingly amino acids are delivered.

**Q.61 Answer is “Chemically modified methionine”**

**Explanation:** N-formyl methionine is a derivative of the amino acid Methionine in which formyl group has been added to amino group. It is specifically used for initiation of protein synthesis in bacterial and organellar genes.

**Q.62 Answer is “Three nucleotides”**

**Explanation:** As it is a triplet code.

**Q.63 Answer is “Triplet”**

**Explanation:** Triplet code means each codon consists of set of three nucleotides.

**Q.64 Answer is “Chromosomes”**

**Explanation:** Chromatin networks which is visible in the nucleus of a non-dividing cell, is transformed into discrete structures called chromosomes by means of coiling and condensation as the nuclear division (karyokinesis) starts.

**Q.65 Answer is “Walther Fleming”**

**Explanation:**

Sr. #	Name of scientist	Contribution
1)	T.H Morgan	Worked on sex determination and sex linkage in <i>Drosophila</i> and got Nobel prize in 1911.
2)	Carl Correns	German geneticist who suggested the role of chromosome in heredity in her papers named "Rediscovery of Mendel's work"
3)	W.S Sutton	Walter Stan Join borough Sutton, An American geneticist formulated chromosomal theory of inheritance.
4)	Walther Fleming	German biologist and founder of cytogenetic observed rapidly dividing cells of a salamander larvae and first observed the chromosomes.

**Q.66 Answer is "Chromosomes"**

**Explanation:** Discrete chromosomes are found in all eukaryotic cells in variable number, however centrosome, along with centrioles are absent in plant cells and mesosomes are found only in prokaryotic/bacterial cells.

**Q.67 Answer is "Chromosomes"**

**Explanation:** Chromosomes are carriers of genes. Each of them contains hundreds or thousands of genes that play important roles in determining how persons body develops and functions. That is why the possession of all chromosomes is essential for survival. The sites of chromosome where genes are located are called loci (pl.), locus (sing.).

**Q.68 Answer is "Mutation"**

**Explanation:** Recombination, crossing over and reshuffling of genetic material during sexual reproduction are sources of variation, diversification and evolution. However, loss of part or whole chromosome is called chromosomal aberration of number which is a type of mutation and have serious consequences in form of physical or physiological retardation and usually becomes lethal as well.

**Q.69 Answer is "Centrosome"**

**Explanation:** Typically a chromosome is made of chromatids, centromere (also called primary constriction) and secondary constriction. However, centrosome is an organelle found in animal cells containing a pair of centrioles located at right angle to each other. Centrosome is located on the exterior surface of nucleus.

**Q.70 Answer is "Appearance"**

**Explanation:** All eukaryotic chromosomes are carriers of genes having same role in heredity. Their behavior in various stages of cell cycle is also same. However, their appearance and morphology differs with changing position of centromere, relative length, thickness and staining behavior.

**Q.71 Answer is "Chemical composition"**

**Explanation:** Chromosomes vary in size, staining properties, the location of centromere, the relative lengths of the two arms on either side of centromere and position of constricted regions along the arms. However, their chemical composition is same i.e. nucleoproteins. Similarly, all chromosomes carry genes and have same role in inheritance.

**Q.72 Answer is "Role performed in cell"**

**Explanation:** Chromosomes vary in size, staining properties, the location of



centromere, the relative lengths of the two arms on either side of centromere and position of constricted regions along the arms. However, their chemical composition is same i.e. nucleoproteins. Similarly, all chromosomes carry genes and have same role in inheritance.

**Q.73 Answer is “Metacentric”**

*Explanation:*

Sr. #	Type of chromosome	Description
1)	Telocentric	Chromosomes having centromere at one end. There will be only one arm. It acquires the shape of English letter ‘i’ during anaphase of mitosis.
2)	Acrocentric	Chromosomes having centromere located slightly below one end, with extremely shorter arm. The arm ratio is like 2 : 10. It acquires the shape of English letter ‘j’ during anaphase of mitosis.
3)	Sub-metacentric	Chromosomes having centromere located slightly away from the centre with a slightly longer and slightly shorter arm. The arm ratio will be like 6 : 8. It acquires the shape of English letter ‘L’ during anaphase of mitosis.
4)	Metacentric	Such chromosomes have centromere exactly in the centre with equal arm length on both side. The arm ratio will be like 5 : 5. It acquires the shape of English letter ‘v’ during anaphase of mitosis

**Q.74 Answer is “Acrocentric chromosomes”**

*Explanation:* See explanation of Q # 73.

**Q.75 Answer is “Telocentric”**

*Explanation:* See explanation of Q # 73.

**Q.76 Answer is “Sub-metacentric”**

*Explanation:* See explanation of Q # 73.

**Q.77 Answer is “Protein”**

*Explanation:*

Protein : 60%

DNA : 40%

**Q.78 Answer is “DNA”**

*Explanation:* Function of chromosomes is to carry genes which are physical units of heredity and genes are made up of DNA having coded information in form of nucleotide sequence. Through chromosomes have 60% proteins but proteins have no direct link with inheritance.

**Q.79 Answer is “String of beads”**

*Explanation:* When DNA of a non-dividing cell (a cell with intact nucleus) is observed under electron microscope it look like beaded string because histone octamers are wrapped in DNA ribbon to form nucleosomes and nucleosomes are linked together by ribbon of linker DNA.

**Q.80 Answer is “Coils”**

*Explanation:* DNA ribbon wraps the histone octamers to form a beaded string which coils and condenses to give rise to the chromatin fiber and chromatin fiber gives rise to coils, coils form supercoils which form chromatids and chromatids form chromosomes.



# STOP

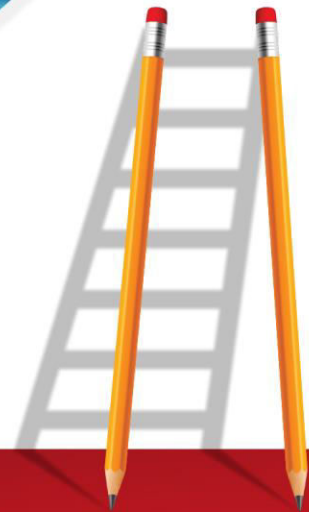
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# BIOLOGY



## Worksheet-11



**STP**

A PROJECT BY PUNJAB GROUP

### Worksheet-11 (Cell Division)

**Q.1** The cell undergoes a sequence of changes which involves all of the following, EXCEPT:

- A) Period of growth
- B) Replication of DNA
- C) Followed by cell division
- D) Followed by nuclear mitosis

**Q.2** Pick up the phase of cell cycle with non-apparent division \_\_\_\_\_ phase:

- A) Inter
- B) Mitotic
- C) Meiotic
- D) Post mitotic

**Q.3** The phase of cell cycle with period of division is called:

- A) Interphase
- B) Mitotic phase
- C) Meiotic phase
- D) Post mitotic phase

**Q.4** \_\_\_\_\_ is the period of extensive metabolic activity:

- A) G<sub>1</sub>
- B) G<sub>2</sub>
- C) S
- D) G<sub>0</sub>

**Q.5** Which one of the following is misleadingly called resting phase?

- A) Interphase
- B) Mitotic phase
- C) G<sub>1</sub> phase
- D) S phase

**Q.6** The phase of cell cycle in which specific enzymes are synthesized and DNA base units are accumulated for the DNA synthesis:

- A) G<sub>1</sub> phase
- B) G<sub>2</sub> phase
- C) G<sub>0</sub> phase
- D) S phase

**Q.7** The phase of cell cycle during which the DNA is synthesized is called:

- A) G<sub>1</sub>
- B) S
- C) G<sub>2</sub>
- D) G<sub>0</sub>

**Q.8** Length of cell cycle in case of human is about:

- A) 24 hours
- B) 1.5 hours
- C) 12 hours
- D) 5 hours

**Q.9** Length of cell cycle in yeast cell is about of \_\_\_\_\_ minutes:

- A) 30
- B) 60
- C) 90
- D) 150

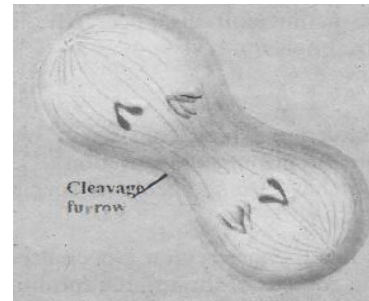
**Q.10** Spindle fibers attach on to:

- A) Centromere of the chromosome
- B) Kinetochore of the chromosome
- C) Telomere of the chromosome
- D) Tip of the chromosome

**Q.11** During meiosis I, the chromosomes start pairing in:

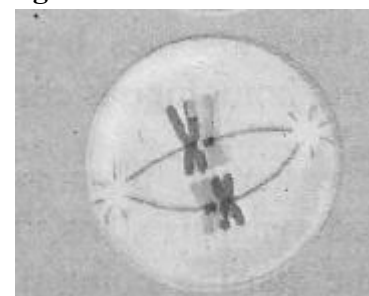
- A) Zygotene
- B) Diplotene
- C) Pachytene
- D) Leptotene

**Q.12** Identify the stage of mitosis in the given below figure:



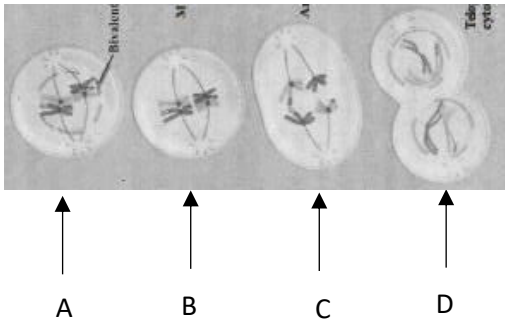
- A) Late prophase
- B) Metaphase
- C) Anaphase
- D) Telophase

**Q.13** Identify the stage of meiosis in the given below figure:



- A) Prophase
- B) Metaphase
- C) Anaphase
- D) Telophase

**Q.14 Identify the anaphase I of meiosis I:**



**Q.15 Microtubules are composed of a protein \_\_\_\_\_ and traces of \_\_\_\_\_:**

- A) Tubulin, RNA      C) Myosin, RNA  
B) Actin, RNA      D) Tubulin, DNA

**Q.16 The centromere has special area, the \_\_\_\_\_:**

- A) Telomere  
B) Kinetochore  
C) Primary constriction  
D) Secondary constriction

**Q.17 Which one of the following is the most critical phase of mitosis?**

- A) Prophase      C) Anaphase  
B) Metaphase      D) Telophase

**Q.18 The phase of mitosis which ensures the equal distribution of chromatids in the daughter cells:**

- A) Prophase      C) Anaphase  
B) Metaphase      D) Telophase

**Q.19 Reaching of the chromosomes at opposite poles terminates \_\_\_\_\_ and start \_\_\_\_\_:**

- A) Prophase, Metaphase  
B) Anaphase, Telophase  
C) Metaphase, Anaphase  
D) Prophase, Telophase

**Q.20 Tissue culture and cloning seek help through:**

- A) Crossing over      C) Meiosis  
B) Mitosis      D) Binary fission

**Q.21 Regeneration, healing of wounds and replacement of older cells all are the gifts of:**

- A) Crossing over      C) Meiosis  
B) Mitosis      D) Binary fission

**Q.22 An exchange of segments between non-sister chromatids of homologous chromosomes during meiosis is called:**

- A) Chiasmata      C) Crossing over  
B) Recombination      D) Mutation

**Q.23 Disc-shaped protein structure within the centromere to which the spindle fibres attached during mitosis or meiosis called:**

- A) Telomere  
B) Kinetochore  
C) Primary constriction  
D) Secondary constriction

**Q.24 Homologous chromosomes, each having sister chromatids, that are joined by a nucleoprotein lattice during meiosis called:**

- A) Monovalent      C) Tetravalent  
B) Bivalent      D) Pentavalent

**Q.25 During which phase of meiosis, the kinetochore fibers contract and the spindle or pole fibers elongate:**

- A) Prophase I      C) Anaphase I  
B) Metaphase I      D) Telophase I

**Q.26 Meiosis usual takes place in all of the following, EXCEPT:**

- A) Spore formation in plants  
B) Sex cell formation  
C) Healing of wounds  
D) Gametes

**Q.27 The four chromatids in each cluster during synapsis; formed by the two sister chromatids in each of the two homologous chromosomes called:**

- A) Recombinant      C) Tetrad  
B) Non homologous      D) Bivalent

**Q.28** During meiosis I, the chromosomes start pairing at:

- A) Zygotene C) Pachytene  
B) Diplotene D) Leptotene

**Q.29** During the metaphase stage of mitosis, spindle fibres attach to chromosomes at:

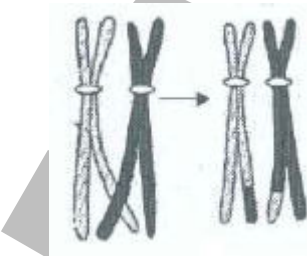
- A) Kinetochore  
B) Both centromere and kinetochore  
C) Centromere, kinetochore and areas adjoining centromere  
D) Centromere

**Q.30** A stage of mitosis is shown in the diagram. Pickup the stage along with its characteristics:



- A) Metaphase –centromeres split and chromatids separate  
B) Metaphase – Chromosomes moved to spindle equator  
C) Anaphase – Centromeres split and chromatids separate and start moving away  
D) Telophase – Chromosomes move to spindle equator

**Q.31** The given diagram is the representation of a particular stage of a type of cell division. Identify this stage?



- A) Prophase I during meiosis  
B) Prophase II during meiosis  
C) Prophase of mitosis  
D) Telophase of mitosis

**Q.32** At metaphase, chromosomes are attached to the spindle fibres by their:

- A) Primary constrictions  
B) Secondary constrictions  
C) Kinetochore  
D) Centromeres

**Q.33** Spindle fibre unit with which structure of chromosomes?

- A) Chromocentre C) Kinetochore  
B) Chromomere D) Centriole

**Q.34** Microtubule is involved in which of the following?

- A) Muscle contraction  
B) Membrane architecture  
C) Cell division  
D) DNA recognition

**Q.35** Number of mitotic divisions are required to make 128 cells?

- A) 28 C) 7  
B) 32 D) 14

**Q.36** When paternal and maternal chromosomes changes their materials with each other in cell division this event is called:

- A) Bivalent forming C) Synapsis  
B) Tetard D) Crossing over

**Q.37** Meiosis II performs:

- A) Separation of sex chromosomes  
B) Synthesis of DNA and centromere  
C) Separation of homologous chromosomes  
D) Separation of chromatids

**Q.38** Each kinetochore gets \_\_\_\_\_ fibers in mitosis:

- A) 2 C) 4  
B) 3 D) 6

**Q.39** Pick up the most critical phase of mitosis:

- A) Prophase C) Anaphase  
B) Metaphase D) Telophase

**Q.40** Which one of the following is reverse of prophase?

- A) Interphase C) Metaphase  
B) Anaphase D) Telophase

**Q.41** Spread of tumor cells and establishment of secondary areas of growth is called:

- A) Benign tumors C) Cancer  
B) Metastasis D) Apoptosis



- Q.42 Pick up the longest phase of meiosis I:**  
A) Metaphase I                      C) Anaphase II  
B) Prophase I                      D) Telophase I
- Q.43 Morphology of chromosomes is best studied during:**  
A) Telophase                      C) Metaphase  
B) Prophase                      D) Anaphase
- Q.44 Cytokinesis refers to division of:**  
A) Nucleus                      C) Cytoplasm  
B) Cell                      D) Mitochondria
- Q.45 S-phase in case of human cell cycle is:**  
A) 30 minutes                      C) 9 hours  
B) 10 hours                      D) 4.5 hours
- Q.46 Which one of the following is absent in animal cell?**  
A) Spindle                      C) Centriole  
B) Chromatids                      D) Phragmoplast
- Q.47 The spindle fibers are composed of RNA and protein called:**  
A) Myoglobin                      C) Tubulin  
B) Actin                      D) Myosin
- Q.48 The condensation of chromosomes reaches to its maximum at:**  
A) Leptotene                      C) Zygotene  
B) Pachytene                      D) Diakinesis
- Q.49 Separation of homologous chromosomes occurs during:**  
A) Prophase                      C) Metaphase  
B) Anaphase                      D) Telophase
- Q.50 The stage of mitosis or meiosis during which the microtubules become organized into a spindle and the chromosomes come to lie in the spindles equatorial plane is called:**  
A) Prophase                      C) Anaphase  
B) Metaphase                      D) Telophase

**ANSWER KEY (Worksheet-11)**

1	D	21	B	41	B
2	A	22	C	42	B
3	C	23	B	43	C
4	A	24	B	44	C
5	A	25	C	45	B
6	A	26	D	46	D
7	B	27	C	47	C
8	A	28	A	48	D
9	C	29	A	49	B
10	B	30	B	50	B
11	A	31	A		
12	C	32	C		
13	B	33	C		
14	C	34	C		
15	A	35	C		
16	B	36	D		
17	C	37	D		
18	C	38	A		
19	B	39	C		
20	B	40	D		

**EXPLANATION**

**Q.1** Answer is “Followed by nuclear mitosis”

**Explanation:** The cell undergoes a sequence of changes, which involves period of growth, replication of DNA, followed by cell division. This sequence of changes is called cell cycle.

**Q.2** Answer is “Inter”

**Explanation:** It comprises two phases viz., interphase which is the period of non-apparent division and the period of division also known as mitotic phase. Each phase is further subdivided into different sub-phases.

**Q.3** Answer is “Meiotic phase”

**Explanation:** The period of division also known as mitotic phase. Each phase is further subdivided into different sub-phases.

**Q.4** Answer is “G<sub>1</sub>”

**Explanation:** G<sub>1</sub> (Gap 1) is the period of extensive metabolic activity, in which cell normally grows in size, specific enzymes, are synthesized and DNA base units are accumulated for the DNA synthesis.

**Q.5** Answer is “Interphase”

**Explanation:** The period of life cycle of cell (cell cycle) between two consecutive division is termed as the interphase or misleadingly called resting phase.

**Q.6** Answer is “G<sub>1</sub> phase”

**Explanation:** G<sub>1</sub> (Gap 1) is the period of extensive metabolic activity, in which cell normally grows in size, specific enzymes, are synthesized and DNA base units are accumulated for the DNA synthesis.

**Q.7** Answer is “S”

**Explanation:** The phase of cell cycle during which the DNA is synthesized is called synthesizes phase.

**Q.8** Answer is “24 hours”

**Explanation:** Length of each phase is variable. In the case of human cell, average cell cycle is about 24 hours, mitosis takes 30 minutes.

**Q.9** Answer is “90”

**Explanation:** Whereas full cycle in yeast cells is only 90 minutes.

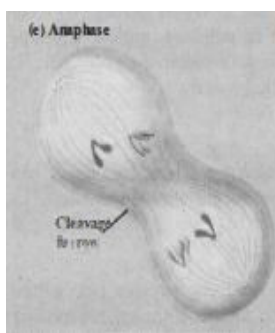
**Q.10** Answer is “Kinetochore of the chromosome”

**Explanation:** Spindle fibers attach on to kinetochore of the chromosome.

**Q.11** Answer is “Zygote”

**Explanation:** First essential phenomenon of meiosis i.e. pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed but with no definite starting points. Each paired but not fused, complex structure is called bivalent or tetrad.

**Q.12** Answer is “Anaphase”



**Q.13** Answer is “Metaphase”



**Q.14** Answer is “C”



**Q.15** Answer is “Tubulin, RNA”

**Explanation:** Microtubules are composed of a protein tubulin and traces of RNA.

**Q.16** Answer is “Kinetochore”

**Explanation:** The centromere has special area known as kinetochore which is formed a special protein.

**Q.17** Answer is “Anaphase”

**Explanation:** Anaphase is the most critical phase of mitosis.

**Q.18** Answer is “Anaphase”

**Explanation:** The phase of mitosis which ensures the equal distribution of chromatids in the daughter cells is called anaphase.

**Q.19** Answer is “Anaphase, Telophase”

**Explanation:** Reaching of the chromosomes at opposite poles terminates anaphase and start telophase.

**Q.20** Answer is “Mitosis”

**Explanation:** Tissue culture and cloning seek help through mitosis.

**Q.21** Answer is “Mitosis”

**Explanation:** Regeneration, healing of wounds and replacement of older cells all are the gifts of mitosis.

**Q.22** Answer is “Crossing over”

**Explanation:** An exchange of segments between non-sister chromatids of homologous chromosomes during meiosis is called crossing over.

**Q.23** Answer is “Kinetochore”

**Explanation:** Disc-shaped protein structure within the centromere to which the spindle fibres attached during mitosis or meiosis called kinetochore.

**Q.24** Answer is “Bivalent”

**Explanation:** First essential phenomenon of meiosis i.e. pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed but with no definite starting points. Each paired but not fused, complex structure is called bivalent or tetrad.

**Q.25** Answer is “Anaphase I”

**Explanation:** The kinetochore fibers contract and the spindle or pole fibers elongate, which pull the individual chromosome (each having two chromatids) towards their respective poles.

**Q.26** Answer is “Gametes”

**Explanation:** It takes place in diploid cells only, in animals at the time of gamete formation, while in plants when spores are produced.

**Q.27** Answer is “Tetrad”

**Explanation:** First essential phenomenon of meiosis i.e. pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed but with no definite starting points. Each paired but not fused, complex structure is called bivalent or tetrad.

**Q.28 Answer is “Zygotene”**

**Explanation:**

During zygotene or zygonema of meiotic prophase I the chromosomes become shorter and thicker. homologous chromosomes come to lie side-by-side in pairs. This pairing of homologous chromosomes is known as synapsis, or syndesis. A pair of homologous chromosomes lying together is called a bivalent.

**Q.29 Answer is “Kinetochore”**

**Explanation:**

In metaphase, chromosomes consisting of two sister chromatids get arranged at equator. Discontinuous fibres radiate out from two spindle poles and get connected to the disc shaped structure at the surface of the centromere called kinetochores. These are known as chromosome fibres or tractile fibrils. A kinetochore is a complex protein structure that is analogous to a ring for the microtubule hook; it is the point where microtubules attach themselves to the chromosome.

**Q.30 Answer is “Metaphase – Chromosomes moved to spindle equator”**

**Explanation:**



**Q.31 Answer is “Prophase I during meiosis”**

**Explanation:** The given figure shows crossing over i.e., exchange of segments between two homologous chromosomes. Crossing over is characteristic of meiosis and occurs during pachytene stage of prophase I.

**Q.32 Answer is “Kinetochores”**

**Explanation:**

The key feature of metaphase is the attachment of spindle fibres to kinetochores of chromosomes. Kinetochores are disc-shaped structures at the surface of the centromeres. These structures serve as the sites of attachment of spindle fibres to the chromosomes that are moved into position.

**Q.33 Answer is “Kinetochore”**

**Explanation:**

Spindle is microtubular apparatus that appears in many eukaryotic cells at the beginning of nuclear division and is responsible for the ordered separation of the chromosomes, chromosomes being attached to the spindle fibres by their centromeres. Two types of spindle fibres can be distinguished as the interpolar fibre, which stretches continuously from pole to pole of the spindle; the kinetochore fibre, which stretches from the pole to the centromere (kinetochore) of an individual chromosome. The mechanism by which the chromosomes move and the spindle fibres contract remains unclear. Cells of animals and lower plants possess centrioles, which act as organizer regions for spindle microtubule formation, but centrioles are absent from the cells of higher plants.

**Q.34 Answer is “Cell division”**

**Explanation:**

Microtubules are unbranched hollow submicroscopic tubules of protein tubulin which develop on specific nucleating regions and can undergo quick growth or dissolution at their ends by assembly or disassembly of monomers. Microtubules form spindle during cell division. Centrioles help in cell division by forming spindle poles or microtubules. In animal cells, microfilament collect in the middle region of the cell below the cell

membrane. They induce the cell membrane to invaginate.

In plant cells, cell plate is formed to separate the two daughter cells. Some of the spindle fibres called interzonal microtubules are deposited around phragmoplast. Vesicles from Golgi apparatus are deposited and coalesce on the phragmoplast to form a cell plate.

**Q.35 Answer is “7”**

**Explanation:** Mitosis is an equational division where after division each cell produces two daughter cells, therefore after 7 divisions one cell will give 128 cells in case of mitosis.

$$1 \xrightarrow{1} 2 \xrightarrow{2} 4 \xrightarrow{3} 8 \xrightarrow{4} 16 \xrightarrow{5} 32 \xrightarrow{6} 64 \xrightarrow{7} 128$$

**Q.36 Answer is “Crossing over”**

**Explanation:** Crossing over is responsible for inducing variability. It involves an exchange of equal segments of non-sister chromatids belonging to two different but homologous chromosomes. Crossing over takes place at four stranded stage. Only two of the four chromatids take part in crossing over. The other two are called non crossovers. Zygotene is characterized by pairing of homologous chromosomes which is called synapsis. The first meiotic division which is completed at first telophase may be followed by cytokinesis giving rise to a dyad.

**Q.37 Answer is “Separation of chromatids”**

**Explanation:** Meiosis II is shorter than the typical mitotic division because of the shortening of prophase of this division. The division maintains the number of chromosomes produce at the end of reduction division. Hence, it is called homotypic or equational division, though it is similar to mitosis. The main function of homotypic division or meiosis II is to separate the chromatids of univalent chromosomes which differ from each

other in their linkage groups due to crossing over.

**Q.38 Answer is “2”**

**Explanation:**

Each kinetochore gets 2 fibers in mitosis.

**Q.39 Answer is “Anaphase”**

**Explanation:** It is the most critical phase of the mitosis, which ensures equal distribution of chromatids in the daughter cells.

**Q.40 Answer is “Telophase”**

**Explanation:** Telophase is reverse of prophase.

**Q.41 Answer is “Metastasis”**

**Explanation:** Spread of tumor cells and establishment of secondary areas of growth is called metastasis.

**Q.42 Answer is “Prophase I”**

**Explanation:** This is very prolonged phase, and differs from the prophase of mitosis, because in this chromosomes behave as homologous pairs.

**Q.43 Answer is “Metaphase”**

**Explanation:** Morphology of chromosomes is best studied during metaphase.

**Q.44 Answer is “Cytoplasm”**

**Explanation:** Cytokinesis refers to division of cytoplasm.

**Q.45 Answer is “10 hours”**

**Explanation:** In the case of human cell, average cell cycle is about 24 hours, mitosis takes 30 minutes, G<sub>1</sub> 9 hours, the S-phase 10 hours, and G<sub>2</sub> 4.5 hours, where full cycle in yeast cells is only 90 minutes.

**Q.46 Answer is “Phragmoplast”**

**Explanation:** Phragmoplast is absent in animal cell and present in plant cell.

**Q.47 Answer is “Tubulin”**

**Explanation:** The spindle fibers are composed of RNA and protein called Tubulin.



**Q.48 Answer is “Diakinesis”**

**Explanation:** During this phase the condensation of chromosomes reaches to its maximum. At the same time separation of the homologous chromosomes (started during diplotene) is completed, but still they are united at one point, more often at ends, Nucleoli disappear.

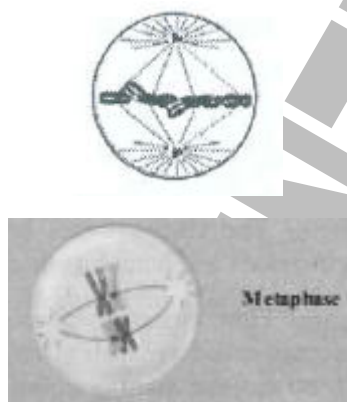
**Q.49 Answer is “Anaphase”**

**Explanation:** Separation of homologous chromosomes occurs during anaphase.



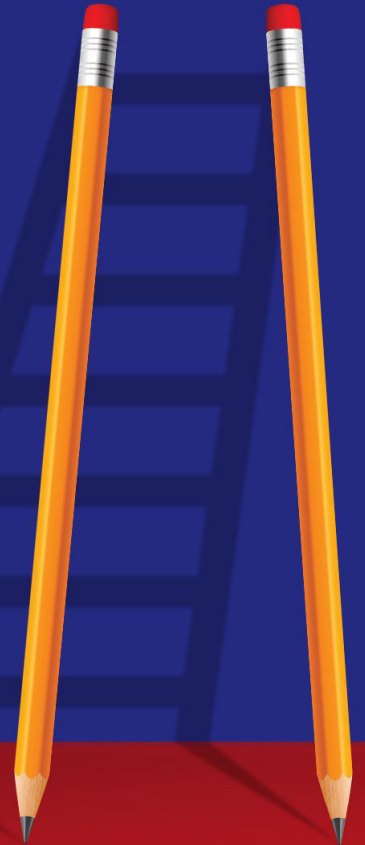
**Q.50 Answer is “Metaphase”**

**Explanation:** The stage of mitosis or meiosis during which the microtubules become organized into a spindle and the chromosomes come to lie in the spindle's equatorial plane is called metaphase.



# STOP

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# BIOLOGY



## Worksheet-12



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-12****(Variety of Life)****Q.1 Reverse transcriptase can convert:**

- A) Single stranded RNA genome into single stranded DNA
- B) Single stranded RNA genome into double stranded DNA
- C) Double stranded DNA genome into single stranded RNA
- D) Double stranded DNA genome into double stranded RNA

**Q.2 In case of HIV, only \_\_\_\_\_ can infect host cells.**

- A) Single stranded RNA
- B) Double stranded DNA
- C) Double stranded RNA
- D) Single stranded DNA

**Q.3 The double stranded viral DNA can be incorporated into host T<sub>4</sub> genome as a:**

- A) Prophage
- B) Provirus
- C) Bacteriophage
- D) Phage virus

**Q.4 Some retroviruses can convert:**

- A) Cancer cells into normal cells
- B) Cancer cells into germ line cells
- C) Cancer cells into degenerated cells
- D) Normal cells into cancer cells

**Q.5 The AIDS was reported by some physicians in early 1980's in young homosexual males. They showed following symptoms, EXCEPT:**

- A) Severe pneumonia and a rare vascular cancer
- B) Rare pneumonia and a severe vascular cancer
- C) Sudden weight loss and swollen lymph nodes

D) Swollen lymph nodes and general loss of immune functions

**Q.6 Soon after the initial victims of AIDS, the disease was discovered in \_\_\_\_\_ patients, who were given blood products.**

- A) Homosexuals
- B) Females
- C) Non-homosexuals
- D) Transsexuals

**Q.7 The agent causing the AIDS was identified by research teams from:**

- A) Pasteur institute in USA
- B) National institute of health in France
- C) Pasteur Institute in USA and National Institute of health in France
- D) Pasteur Institute in France and National Institute of health in USA

**Q.8 Human immunodeficiency virus causes:**

- A) Severe combined immunodeficiency syndrome
- B) Acquired immunodeficiency syndrome
- C) Non-Hodgkin's lymphoma
- D) Bubble boy disease

**Q.9 Recent studies on HIV reveal that the virus infects and multiplies in \_\_\_\_\_ but does not cause disease in them.**

- A) Heterosexual males
- B) Young homosexual males
- C) Monkeys
- D) Young homosexual females

**Q.10 Following are the means of transmission of AIDS, EXCEPT:**

- A) Intimate sexual contact and breast feeding
- B) Use of common syringes and surgical instruments
- C) Blood transfusion without screening
- D) Human immunodeficiency virus

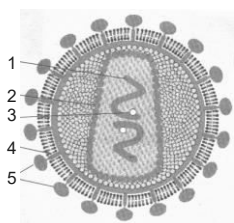
**Q.11** The most important measure to prevent AIDS and HIV is:

- A) Avoiding intravenous drugs
- B) Avoiding intracellular drugs
- C) Avoiding use of syringes
- D) Avoiding the direct contact with HIV

**Q.12** Now vaccine against \_\_\_\_\_ have been synthesized and its experimental administration in humans started in South Africa.

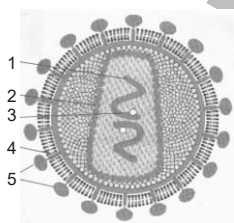
- A) Hepatitis – C
- B) HIV
- C) Hepatitis – A
- D) Hepatitis – B

**Q.13** Which of the following are of viral origin?



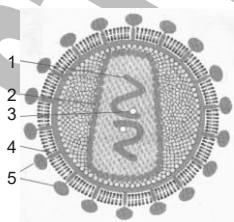
- A) 1,2,3,4
- B) 1,2,3,5
- C) 2,3,4,5
- D) 1,2,4,5

**Q.14** Which one of the following is not of viral origin?



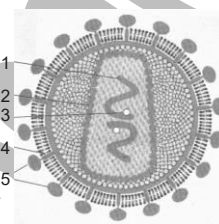
- A) 2
- B) 3
- C) 4
- D) 5

**Q.15** Which of the following is viral envelope?



- A) 2
- B) 3
- C) 4
- D) 5

**Q.16** Pick up the reverse transcriptase:



- A) 2
- B) 3
- C) 4
- D) 5

**Q.17** HIV is uncoated:

- A) Outside the cytoplasm
- B) At the surface of the host cell
- C) Inside the cytoplasm
- D) Inside the nucleus of the host cell

**Q.18** How many molecules of RNA are found in HIV:

- A) 2
- B) 3
- C) 4
- D) 5

**Q.19** How many molecules of reverse transcriptase are found in HIV:

- A) 2
- B) 3
- C) 4
- D) 5

**Q.20** In infection cycle of HIV RNA is converted into DNA duplex by:

- A) Replication
- B) Transcription
- C) Reverse transcription
- D) Translation

**Q.21** In infection cycle of HIV after attachment there comes:

- A) Entry
- B) Uncoiling
- C) Reverse transcription
- D) Integration



**Q.22** Cd<sub>4</sub> receptor bearing T Lymphocyte is infected by:

- A) HIV C) HCV  
B) HBV D) HAV

**Q.23** T<sub>4</sub> phage consists of:

- A) Head C) Nucleocapsid  
B) Tail D) Head and tail

**Q.24** Following are true about head of T<sub>4</sub> phage EXCEPT:

- A) Hexagonal structure  
B) Pyramidal structure  
C) Prism shaped structure  
D) An oval structure

**Q.25** "Two triangular structures with common base" is the description of the structure of \_\_\_\_\_ of T<sub>4</sub> phage.

- A) Tail C) Head  
B) Collar D) Base plate

**Q.26** Within the head of T<sub>4</sub> phage \_\_\_\_\_ molecule is present.

- A) Single Stranded DNA  
B) Double stranded DNA  
C) Single Stranded RNA  
D) Double stranded RNA

**Q.27** The structure of phage \_\_\_\_\_ is more complex than \_\_\_\_\_.

- A) Head, Tail  
B) Tail, Head  
C) Collar, Base plate  
D) Head, Base plate

**Q.28** About tail of T<sub>4</sub> phage which one is not true:

- A) Core or tube is made up of distinct protein  
B) Core or tube is enclosed in sheath

C) Core and sheath are made of same type of protein

D) Sheath is made of another type of protein

**Q.29** The volume of T<sub>4</sub> phage is about \_\_\_\_\_ times shorter than that of host:

- A) 01 C) 100  
B) 10 D) 1000

**Q.30** The bacteriophage is adsorbed to host cell at \_\_\_\_\_ of bacterium.

- A) Receptor site C) Cell membrane  
B) Cell wall D) Capsule

**Q.31** A bacteriophage is attached to the receptor site on the host cells:

- A) Slime C) Cell membrane  
B) Cell wall D) Envelope

**Q.32** In Rhizopus zygote is formed by fusion of hyphae of:

- A) Minus mating strains  
B) Minus mating and plus mating strain  
C) Plus mating strain  
D) Same fungus

**Q.33** In life cycle of Rhizopus, the hyphal tips after coming in contact with each are transformed into:

- A) Sporangia C) Sporangiohores  
B) Conidiophores D) Gametangia

**Q.34** In life cycle of Black bread mold, gametangia after plasmogamy and karyogamy give rise to:

- A) Zygospor C) Basidiospores  
B) Ascospores D) Conidiophore

**Q.35** In the life cycle of Rhizopus diploid spores are produced in:

- A) Asexual reproduction only  
B) Sexual reproduction only  
C) Both in sexual and asexual reproduction

D) Both in fragmentation and budding

**Q.36 Pick up the true choice with respect to the life cycle of Rhizopus:**

A) Haploid Zygosporangia  $\xrightarrow{\text{mitosis}}$  Haploid spores

B) Diploid Zygosporangia  $\xrightarrow{\text{mitosis}}$  Diploid spores

C) Diploid Zygosporangia  $\xrightarrow{\text{meiosis}}$  Haploid spores

D) Diploid Zygosporangia  $\xrightarrow{\text{meiosis}}$  Diploid spores

**Q.37 Which one of the following phases of life cycle of Rhizopus is delayed?**

A) Dikaryotic C) Diploid

B) Heterokaryotic D) Meiosis

**Q.38 Without the activity of \_\_\_\_\_ along with \_\_\_\_\_ all the essential nutrients would soon become locked up in the mounds of dead animals and plants:**

A) Fungi, Saprobic bacteria

B) Algae, Saprobic bacteria

C) Fungi, Parasitic bacteria

D) Algae, Parasitic bacteria

**Q.39 Mycorrhizal fungi improves the growth of \_\_\_\_\_ of all kinds of vascular plants through its association:**

A) 95%

C) 85%

B) 90%

D) 80%

**Q.40 \_\_\_\_\_ growing on rocks breaks them, setting stage for other organisms during the course of ecological succession.**

A) Ectomycorrhizae C) Bacteria

B) Endomycorrhizae D) Lichen

**Q.41 \_\_\_\_\_ are very good bioindicators of air quality as they are very sensitive to pollution.**

A) Lichens C) Rhizopus

B) Mycorrhizae D) Penicillium

**Q.42 Some fungi are also used for:**

A) Bioabsorption

B) Environmental degradation

C) Bioremediation

D) Biological control

**Q.43 Bioremediation means:**

A) Degrading pollutants

B) Removing pollutants

C) Degrading or removing environmental poisons

D) Degrading or removing environmental poisons or pollutants by organisms

**Q.44 Give example of edible fungi:**

A) *Agaricus sp.*

B) *Tuber sp.*

C) *Morchella esculenta*

D) *Agaricus sp.*, *Morchella esculenta* and *Tuber sp.*

**Q.45 Give example of poisonous mushrooms:**

A) Death cap/death angel

B) *Saccharomyces cerevisiae*

C) Jack – O Lantern

D) Death cap/death angel and Jack – O Lantern

**Q.46 Reindeers moss is used as food for reindeers and some other large animals in:**

A) Arctic regions

B) Boreal regions

C) Sub-arctic regions

D) Arctic, Sub-arctic and boreal regions

**Q.47 Because of its fermenting ability it is used in the production of bread and liquor:**

A) *Saccharomyces cerevisiae*

B) *Neurospora*

C) *Penicillium notatum*

D) *Asperillus fumigatus*

**Q.48 Yeasts are heavily used in genetic/molecular biological research, because of the:**

A) Rapid generation

- B) Rapid increasing pool of genetic information  
 C) Rapidly increasing pool of biochemical information  
 D) Rapid generation and rapidly increasing pool of genetic and biochemical information

**Q.49** Some species of \_\_\_\_\_ are used for producing soya sauce and soya paste from soya beans.

- A) *Penicillium*                      C) *Yeast*  
 B) *Aspergillus*                      D) *Neurospora*

**Q.50** *Penicillin* is dominated from:

- A) *Saccharomyces cerevisiae*  
 B) *Penicillium griseofulvum*  
 C) *Penicillium notatum*  
 D) *Neurospora crassa*

**Q.51** It is used in organ transplantation in preventing transplant rejection:

- A) Lovastatin                      C) *Penicillium*  
 B) Cyclosporine                      D) Griseofulvin

**Q.52** Lovastatin is used for:

- A) Lowering blood cholesterol  
 B) Relief in migraine  
 C) Preventing transplant rejection  
 D) Inhibiting fungal growth

**Q.53** Griseofulvin is used for:

- A) Lowering blood cholesterol  
 B) Relief in migraine  
 C) Preventing transplant rejection  
 D) Inhibiting fungal growth

**Q.54** It is used to relieve one kind of headache called migraine:

- A) Lovastatin                      C) Ergotine  
 B) Cyclosporine                      D) Griseofulvin

**Q.55** Antibiotics are synthesized by:

- A) Actinomycetes  
 B) Fungi  
 C) Bacteria  
 D) Actinomycetes, Bacteria and Fungi

**Q.56** Some antibiotics are synthesized in:

- A) Bacteria                      C) Fungi  
 B) Actinomycetes                      D) Laboratory

**Q.57** Massive quantities of antibiotics are being prepared and used, which are followed by the widespread problems of:

- A) Drug resistance in microorganisms  
 B) Drug addiction in microorganisms  
 C) Drug sensitivity in microorganisms  
 D) Intoxication in human being

**Q.58** These are the first eukaryotes to be used by genetic engineers:

- A) Lichen                      C) Mycorrhizae  
 B) Yeast                      D) Rhizopus

**Q.59** A functional artificial chromosome was made in:

- A) *Aspergillus fumigatus*  
 B) *Saccharomyces cerevisiae*  
 C) *Penicillium notatum*  
 D) *Penicillium griseofulvum*

**Q.60** \_\_\_\_\_ has also been used for genetic research.

- A) Pink bread mold  
 B) Blue bread mold  
 C) Black bread mold  
 D) Pink bread mold called *Neurospora*

**Q.61** Fungi are responsible for many serious plant diseases because they produce several enzymes that can break down the following substances, EXCEPT:

- A) Cellulose                      C) Lignin  
 B) Cutin                      D) Chitin

**Q.62** Extensive damage due to \_\_\_\_\_ and \_\_\_\_\_ diseases of wheat, corn and \_\_\_\_\_

rice prompted mass displacement and starvation to death many people.

- A) Rusts, Smuts
- B) Ergot of eye, red rot of sugarcane
- C) Brown rot of plums and apricots
- D) Cotton seed rot and apple scab

**Q.63 Rust and smut cause extensive damage to following crops:**

- A) Wheat, corn, rice
- B) Peaches, Plums, Apricots
- C) Sugarcane, Potato, Cotton
- D) Cotton, Apple, Rye

**Q.64 Fungus causes:**

- A) Root rot in cotton
- B) Scab in cotton
- C) Brown rot in cotton
- D) Ergot in cotton

**Q.65 Fungus causes:**

- A) Ergot in potato      C) Scab in potato
- B) Wilts in potato      D) Brown rot in apple

**Q.66 Ringworm and athlete's foot are superficial fungal infections caused by certain:**

- A) Club fungi
- B) Sac fungi
- C) Conjugating fungi
- D) Imperfect fungi

**Q.67 *Candida albicans* cause:**

- A) Oral thrush
- B) Vaginal thrush
- C) Oral and vaginal thrush
- D) Ringworm

**Q.68 Histoplasmosis becomes fatal:**

- A) Usually
- B) Always

C) Never

D) Very occasionally

**Q.69 Aspergillosis is caused by:**

- A) *Aspergillus fumigatus*
- B) *Aspergillus albicans*
- C) *Aspergillus notatum*
- D) *Penicillium notatum*

**Q.70 Histoplasmosis can be serious and fatal if it spreads in:**

- A) Blood stream
- B) Nervous system
- C) Organs other than lungs
- D) Blood stream and then to other organs

**Q.71 Pick up the correct sequence:**

- A) Aspergillus → Aspergillosis  
→ AIDS → Death
- B) Aspergillosis → Aspergillus  
→ AIDS → Death
- C) AIDS → Aspergillosis →  
Aspergillus → Death
- D) AIDS → Aspergillus →  
Aspergillosis → Death

**Q.72 Improperly stored grains such as peanuts and corn etc. are contaminated by:**

- A) *Aspergillus*      C) *Neurospora*
- B) *Candida*      D) *Agaricus*

**Q.73 It is caused by eating bread made from purple ergot contaminated rye flour:**

- A) Histoplasmosis      C) Ringworm
- B) Ergotism      D) Aspergillosis

**Q.74 Which one of the following is wood rotting fungi:**

- A) Bracket fungi or shelf fungi
- B) Truffles or morels
- C) Mushrooms or truffles
- D) Black bread mold or pink bread mold

**Q.75 Viruses that infect bacteria are called:**

- A) Prophage      C) Bacteriophage

- B) Provirus                      D) Virions
- Q.76 Who used the term bacteriophage for the first time?**  
 A) Twort  
 B) D'Herelle  
 C) Louis Pasteur  
 D) Charles chamberland
- Q.77 In Charles Chamberland's experiment which one of the following represented filterable viruses:**  
 A) Bacteria                      C) TMV  
 B) Rabies virus                D) HIV
- Q.78 The virus that was first ever obtained in purified form was:**  
 A) TMV                          C) Pox virus  
 B) Rabies virus                D) Polio virus
- Q.79 The transmittable nature of TMV was first observed by:**  
 A) W.M Stanley                C) Chamberland  
 B) Ivanowsky                  D) Twort
- Q.80 The size of the largest virus is:**  
 A) 250 nm                      C) 150 nm  
 B) 20 nm                        D) 200 nm
- Q.81 What gives definite shape to a virion?**  
 A) Tail                          C) Capsid  
 B) Base plate                  D) Genome
- Q.82 Pick up the one which is absent in viruses:**  
 A) DNA  
 B) RNA  
 C) Enzymes  
 D) Metabolic machinery
- Q.83 The protein subunits which make the protein coat of viruses are called:**  
 A) Capsids                      C) Monomers  
 B) Capsomeres                D) Amino acids
- Q.84 The capsid of herpes virus and that of adenovirus differ from each other with respect to:**  
 A) Chemical nature  
 B) Type of subunits  
 C) Number of subunits  
 D) Role in life cycle
- Q.85 How many additional capsomeres are found in adenovirus, as compared to those in herpes virus:**  
 A) 70                              C) 90  
 B) 80                              D) 100
- Q.86 Which one of the following characters, does not belong to fungi?**  
 A) Absorptive heterotrophic mode  
 B) Eukaryotic organization  
 C) Centrioles present  
 D) Nuclear mitosis
- Q.87 The body of a fungus is called:**  
 A) Hypha                        C) Mycelium  
 B) Fruiting body                D) Coenocyte
- Q.88 Non-hyphal unicellular fungi are called:**  
 A) Yeast                        C) Toadstools  
 B) Mushrooms                D) Fruiting bodies
- Q.89 The only exception with respect to sexual reproduction in fungi is that of:**  
 A) Conjugation fungi    C) Sac fungi  
 B) Imperfect fungi        D) Club fungi
- Q.90 Conidia are also called as:**  
 A) Naked spores                C) Zoospores  
 B) Zygosporangia              D) sexual spores
- Q.91 Heterokaryotic hyphae/cell contains:**



- A) Two nuclei of same types  
B) Two nuclei of different types  
C) Many nuclei of same types  
D) Many nuclei of different types
- Q.92 The word virus was generally referred to as a poison associated with disease and death at the time of:**  
A) Louis Pasteur and Charles Chamberland  
B) Louis Pasteur and Ivanowski  
C) Louis Pasteur and W. M Stanley  
D) Louis Pasteur and Robert Koch
- Q.93 A particle of nucleic acid wrapped in a protein coat is recognized as a:**  
A) Cell C) Virus  
B) Bacterium D) Prion
- Q.94 Study of nucleocapsids is carried out in:**  
A) Microbiology C) Virology  
B) Mycology D) Cell biology
- Q.95 For the synthesis of their proteins, a virus uses:**  
A) Its own metabolism  
B) Metabolism of its host organism  
C) Metabolism of its host cell  
D) Metabolism of its host cell
- Q.96 Which one of the following organisms can pass through the porcelain filter?**  
A) Virus C) Fungi  
B) Bacteria D) Protozoans
- Q.97 Who determined that, viruses are smaller than bacteria?**  
A) Ivanovsky  
B) Edward Jenner  
C) Charles Chamberland  
D) W. M. Stanley
- Q.98 Pick up the notorious fungus:**  
A) Mushrooms C) Smuts  
B) Morels D) Truffles
- Q.99 Taxonomically fungi was a:**  
A) Kingdom  
B) Group of plant kingdom  
C) Group of animal kingdom  
D) Group of protist kingdom
- Q.100 Unlike plants and like animals, fungi lack:**  
A) Cell wall C) Chitin  
B) Cellulose D) Definite nucleus
- Q.101 Fungi resembles to the arthropods unlike to the rest of the animals with respect to:**  
A) Heterotrophic mode of nutrition  
B) Absence of chloroplast  
C) Presence of exoskeleton  
D) The chemical found in external covering of the body
- Q.102 It have been estimated by mycologists that fungi and animals probably arose from:**  
A) Different ancestors  
B) Common ancestors  
C) Ingestive heterotrophs  
D) Absorptive heterotrophs
- Q.103 Fungi have been assigned to a separate kingdom because they are distinct from:**  
A) Plants  
B) Animals  
C) Protists  
D) Rest of the eukaryotes
- Q.104 Mention some unique characteristic of the fungi:**  
A) Absorptive heterotrophic mode of nutrition  
B) Occurrence of chitin  
C) Capability of reproduction  
D) Nuclear mitosis
- Q.105 The body of fungus consists of:**  
A) Mycelium  
B) Hyphae

- C) Fruiting body  
D) Rhizoids
- Q.106 It is more resistant to decay than cellulose and lignin:**  
A) Glycogen C) Chitin  
B) Amylose D) Amylopectin
- Q.107 Which one of the following statement about spores of fungi is wrong?**  
A) These are produced by sexual process  
B) These are produced by asexual process  
C) These are haploid  
D) These are motile and flagellate
- Q.108 Resting spore of fungi is called:**  
A) Ascospore C) Conidium  
B) Basidiospore D) Zygospor
- Q.109 Non-motile asexual spores produced uncovered on hyphal tips are called:**  
A) Teliospores C) Zygozozores  
B) Basidiospores D) Conidia
- Q.110 Appearance of mold on Jams and jellies indicate the fungal resistance against:**  
A) Extreme pH  
B) Immense osmotic pressure  
C) Decomposition  
D) Desiccation
- Q.111 The fruiting body of mushroom is called:**  
A) Ascocarp C) Mycelium  
B) Basidiocarp D) Thalamus
- Q.112 Formation of ascospores or basidiospores is the consequence of:**  
A) Karyogamy C) Diploidization  
B) Dikaryotization D) Meiosis
- Q.113 Formation of a resistant structure in Rhizopus is consequence of:**  
A) Plasmogammy  
B) Karyogammy  
C) Heterokaryotization  
D) Dikaryotization
- Q.114 \_\_\_\_\_ species of animals are known:**  
A) One million  
B) Over one million  
C) One and a half million  
D) Over one and a half million
- Q.115 \_\_\_\_\_ species of plants are known:**  
A) One million  
B) Half million  
C) Over one million  
D) Over a half million
- Q.116 The smallest taxon in plant nomenclature is:**  
A) Order C) Phylum  
B) Species D) Class
- Q.117 Two individuals organisms belong to same species if they can:**  
A) Interbreed  
B) Reproduce  
C) Produce sterile offspring  
D) Produce fertile offspring
- Q.118 Each kingdom divided into smaller taxon, called:**  
A) Phylum C) Family  
B) Classes D) Order
- Q.119 Classes are further sub-divided into:**  
A) Families C) Genera  
B) Orders D) Species
- Q.120 The family of corn is:**  
A) Poales C) Poaceae  
B) Plantae D) Angiospermae
- Q.121 Following names are used for onion in different regions of Pakistan, EXCEPT:**  
A) Bassal C) Ganda  
B) Argavad D) Piyaz
- Q.122 Pick up the odd one:**  
A) Golden shower C) Purging cassia  
B) Brinjal D) Gurmala
- Q.123 To biologist a fish is a:**  
A) Cray fish C) Jelly fish  
B) Vertebrate D) Starfish
- Q.124 Different classification systems recognize:**  
A) Two to six kingdoms  
B) Two to five kingdoms  
C) Two to three kingdoms  
D) Two to four kingdoms

**Q.125** Which one of the following organisms have both plant like and animal like characters?

- A) Yeast                      C) Paramecium  
B) Trichonympha          D) Euglena

**Q.126** Five kingdom classification system was modified by:

- A) Robert Whittaker  
B) Margulis and Schwartz  
C) Carlous Linnaeus  
D) Ernst Haeckel

STEP ENTRY TEST 2020

**ANSWER KEY (Worksheet-12)**

1	B	21	A	41	A	61	D	81	C	101	D
2	B	22	A	42	C	62	A	82	D	102	B
3	B	23	D	43	D	63	A	83	B	103	D
4	D	24	D	44	D	64	A	84	C	104	D
5	B	25	C	45	D	65	B	85	C	105	B
6	C	26	B	46	D	66	D	86	C	106	C
7	D	27	B	47	A	67	C	87	C	107	D
8	B	28	C	48	D	68	D	88	A	108	D
9	C	29	D	49	B	69	A	89	B	109	D
10	D	30	A	50	C	70	D	90	A	110	B
11	D	31	B	51	B	71	D	91	B	111	B
12	B	32	B	52	A	72	A	92	D	112	D
13	B	33	D	53	D	73	B	93	C	113	B
14	C	34	A	54	C	74	A	94	C	114	C
15	C	35	B	55	D	75	C	95	C	115	B
16	B	36	C	56	D	76	B	96	A	116	B
17	C	37	D	57	A	77	B	97	C	117	D
18	A	38	A	58	B	78	A	98	C	118	A
19	A	39	A	59	B	79	B	99	B	119	B
20	C	40	D	60	D	80	A	100	B	120	C
										121	B
										122	B
										123	B
										124	A
										125	D
										126	B

**EXPLANATION**

**Q.1** Answer is "A single stranded RNA genome into a double stranded DNA"

**Explanation:** Reverse transcription is a process in which an RNA acts as a template for synthesis of RNA-DNA hybrid. Then that DNA is replicated to get double stranded DNA. The enzyme involved in this process is called reverse transcriptase because this process is reverse of transcription.

**Q.2** Answer is "Double stranded DNA"

**Explanation:** The host of HIV is a lymphocyte T4 containing DNA as a

genetic material that is why the viral genome should also be converted into DNA by reverse transcription.

**Q.3** Answer is "Provirus"

**Explanation:** A viral DNA incorporated into the DNA of host animal cell is called provirus which means before becoming virus.

**Q.4** Answer is "Normal cells into cancer cells"

**Explanation:** Such retroviruses are called oncoviruses (cancer causing viruses).

**Q.5** Answer is "Rare pneumonia and a severe vascular cancer"

**Explanation:** Actually it is severe pneumonia and a rare vascular cancer.

**Q.6** Answer is "Non-homosexuals"

**Explanation:** As the infection was initially discovered in homosexuals but later on it was transmitted to heterosexuals from infected homosexuals.

**Q.7** Answer is "Pasture institute in France and National institute of Health in USA"

**Explanation:** HIV, the agent causing the AIDS was discovered at Pasteur Institute of France and National institute of Health in USA in 1984.

**Q.8** Answer is "Acquired immunodeficiency syndrome"

**Explanation:** It is abbreviated as AIDS.

**Q.9** Answer is "Monkeys"

**Explanation:** Recent studies of HIV reveal that the virus infects and multiplies in monkey but does not cause disease in them which means that HIV is host specific.

**Q.10** Answer is "Human immunodeficiency virus"

**Explanation:** Human Immunodeficiency Virus (HIV) is the causal agent not vector or transmitter.

**Q.11** Answer is “Avoiding the direct contact with HIV”

**Explanation:** All sources of transmission become effective by contact with HIV, which should be avoided for the prevention of AIDS. Actually the body fluids of the HIV positive person should not come in contact with the body fluids of any healthy person.

**Q.12** Answer is “HIV”

**Explanation:** It has been claimed in 2001 that a vaccine against HIV has been developed and after successful trials it will be in the market for consumers.

**Q.13** Answer is “1,2,3,5”

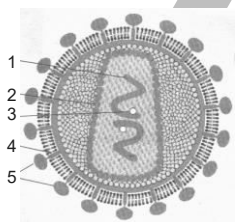
**Explanation:** Other than envelope which has been derived from the cell membrane of host cell, rest of the all parts of virus are genetically encoded on viral (HIV) genome.

**Q.14** Answer is “4”

**Explanation:** Envelope has been labeled by 4. It is part of the plasma membrane of host cell and its genetic information is not located on the viral genome.

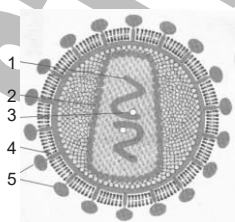
**Q.15** Answer is “4”

**Explanation:**



**Q.16** Answer is “03”

**Explanation:**



**Q.17** Answer is “Inside the cytoplasm”

**Explanation:** HIV is uncoated inside the cytoplasm of host cell.

**Q.18** Answer is “2”

**Explanation:** There are two molecules of reverse transcriptase i.e. one molecule is associated with each RNA.

**Q.19** Answer is “2”

**Explanation:** HIV has two identical strands of RNA, each having its own reverse transcriptase molecule.

**Q.20** Answer is “Reverse Transcription”

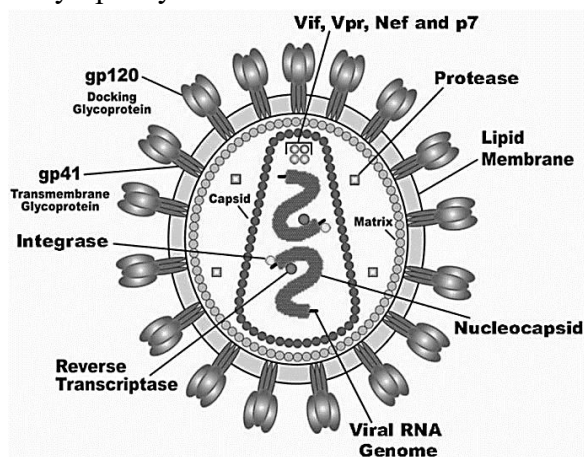
**Explanation:** RNA is converted into DNA by a process called reverse transcription. It is controlled by reverse transcriptase enzyme.

**Q.21** Answer is “Entry”

**Explanation:** In infection cycle of HIV after attachment of virus to host cell, there comes entry which is followed by uncoiling.

**Q.22** Answer is “HIV”

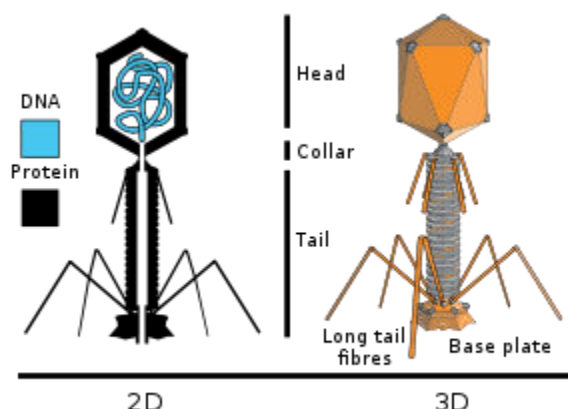
**Explanation:** Viruses are intracellular obligate parasites and they require a specific receptor site for their adsorption. The receptor site required by HIV is called Cd4 receptor site (cluster of differentiation 4). It is a cluster of specific glycoproteins which develops on the surface of T4 lymphocyte.





**Q.23 Answer is “Head and tail”**

**Explanation:** It is tadpole shaped with a head consisting up of nucleocapsid and a tail attached with head.

**Q.24 Answer is “An oval structure”**

**Explanation:** The head of bacteriophage is an elongated, pyramidal, hexagonal, prism shaped structure, to which straight tail is attached.

**Q.25 Answer is “Head”**

**Explanation:** Head of T<sub>4</sub> phage Pyramidal

**Q.26 Answer is “Double stranded DNA molecule”**

**Explanation:** T<sub>4</sub> phage have double stranded DNA molecules.

**Q.27 Answer is “Tail, Head”**

**Explanation:** Tail contains two types of proteins whereas head contains only one type of protein.

**Q.28 Answer is “Core and sheath are made of same type of protein”**

**Explanation:** Core of tail is made up of a rigid and inflexible protein whereas sheath is made up of flexible and contractile protein.

**Q.29 Answer is “1000”**

**Explanation:** The volume of the phage is about 1/1000<sup>th</sup> of the host.

**Q.30 Answer is “Receptor site”**

**Explanation:** Being obligate parasite viruses require receptor site on host surface for attachment.

**Q.31 Answer is “Cell Wall”**

**Explanation:** The receptor site develops on cell wall of host bacterium.

**Q.32 Answer is “Minus Mating strain and plus mating strain”**

**Explanation:** In fungi due to homothallic body the terms of male and female cannot be used.

**Q.33 Answer is “Gametangia”**

**Explanation:** Means bodies containing gametes.

**Q.34 Answer is “Zygospore”**

**Explanation:** It is a diploid resistant body which comes into being by fusion of two haploid nuclei of different strains.

**Q.35 Answer is “Sexual reproduction only”**

**Explanation:** Somatic body of fungus is haploid and it divides by mitosis to produce asexual spores.

**Q.36 Answer is “Diploid zygospore → Haploid spores”**

**Explanation:** Diploid zygospore undergoes meiosis to produce four haploid spores, two of plus strain and two of minus strain.

**Q.37 Answer is “Meiosis”**

**Explanation:** Zygospore is a resistant dormant body which waits for arrival of favorable conditions and meiosis is delayed.

**Q.38 Answer is “Fungi, saprobic bacteria”**

**Explanation:** Both of them are decomposers and recycler of nature.

**Q.39 Answer is “95%”**

**Explanation:** Symbiotic association is common in vascular plants.

**Q.40 Answer is “Lichen”**

**Explanation:** Lichens are hardy invaders which act as pioneers in xeroseres.

**Q.41 Answer is “Lichens”**

**Explanation:** They are sensitive to air pollution particularly to SO<sub>2</sub> and start dieing immediately if air becomes polluted.

**Q.42 Answer is “Bioremediation”**

**Explanation:** They eradicate the pollutant from nature.

**Q.43 Answer is “Degrading or removing environmental poisons/pollutants by organisms”**

**Explanation:** Degrading or removing environmental poisons/pollutants by organisms is called bioremediation.

**Q.44 Answer is “*Agaricus sp.*, *Morchella esculenta* and *Tuber sp.*”**

**Explanation:** All of them are edible.

**Q.45 Answer is “Death cap / death angel and Jack O Lantern”**

**Explanation:** These are poisonous fungi having strong neurotoxins.

**Q.46 Answer is “Arctic, subarctic and boreal regions”**

**Explanation:** Reindeers are found in these areas and consume the fruticose lichen (*Cladonia rangiferina*) as fodder.

**Q.47 Answer is “*Saccharomyces cerevisiae*”**

**Explanation:** It is the scientific name of baker’s or brewer’s yeast which acts as fermenting agent in bakeries and breweries.

**Q.48 Answer is “Rapid generation and rapidly increasing pool of genetic and biochemical information”**

**Explanation:** It has short generation time and budding enables it to multiply rapidly.

**Q.49 Answer is “*Aspergillus*”**

**Explanation:** It produces some highly proteolytic enzymes which breakdown the grain proteins.

**Q.50 Answer is “*Penicillium notatum*”**

**Explanation:** Historically it happened so.

**Q.51 Answer is “Cyclosporine”**

**Explanation:** It is an immunosuppressant.

**Q.52 Answer is “Lowering blood cholesterol”**

**Explanation:** It is an inhibitor of that enzyme which is associated with cholesterol anabolism.

**Q.53 Answer is “Inhibiting fungal growth”**

**Explanation:** It makes the cells resistant to fungal infections.

**Q.54 Answer is “Ergotine”**

**Explanation:** It is also called ergotamine. It have structural similarity with neurotransmitters such as serotonin, dopamine and epinephrine. It induces the constriction of the intracranial extra cerebral blood vessels to relieve migraine.

**Q.55 Answer is “Actinomycetes, bacteria and fungi”**

**Explanation:** Biological antibiotics are produced by certain fungi actinomycetes and bacteria, whereas synthetic antibiotics are usually derived from dyes.

**Q.56 Answer is “Laboratory”**

**Explanation:** Synthetic antibiotics.

**Q.57 Answer is “Drug resistance in microorganisms”**

**Explanation:** Widespread use of antibiotics and easy availability are causes of increased microbial resistance against antibiotics.

**Q.58 Answer is “Yeast”**

**Explanation:** Various yeast species have been genetically engineered to produce various drugs; *Saccharomyces cerevisiae* is a simple eukaryotic cell, serving as a model for all eukaryotes. It is easy to genetically engineer. Its physiology, metabolism and genetics are amenable for use in harsh industrial conditions. A wide variety of chemicals of different

classes can be produced by engineered yeast, including phenolics, isoprenoids, alkaloids and polyketides. About 20% biopharmaceuticals are produced by *Saccharomyces cerevisiae*, including insulin, vaccine for hepatitis and human serum albumin.

**Q.59 Answer is “Saccharomyces cerevisiae”**

**Explanation:** Yeast artificial chromosomes (YACs) are genetically engineered chromosomes derived from the DNA of the yeast *Saccharomyces cerevisiae*, which is then ligated into a bacterial plasmid.

**Q.60 Answer is “Pink bread mold called Neurospora”**

**Explanation:** *Neurospora Crassa* is a model organism because it is easy to grow and have haploid life cycle that makes genetic analysis simple since recessive traits will be shown in the offspring. For example, it was used by Beadle and Tatum in their experiments

**Q.61 Answer is “Chitin”**

**Explanation:** Fungi have battery of enzymes to decompose cellulose, lignin and cutin but chitin cannot be broken down by it.

**Q.62 Answer is “Rusts, Smuts”**

**Explanation:** The most devastating parasitic fungi for cereal crops.

**Q.63 Answer is “Wheat, Corn, Rice”**

**Explanation:** These are obligate parasites of cereal crops i.e. members of family poaceae.

**Q.64 Answer is “Root rot in cotton”**

**Explanation:**

Fungal Diseases	Affected Plants
Root rot	Cotton
Brown rot	Peaches, Plums Apricots and Cherries
Scab	Apple
Ergot	Rye

Red rot	Sugar cane
Rust, smut	Wheat, Corn, Barley, Rice, Oat, Sugar cane etc.
Powdery mildews	Grapes, Rose, Wheat, etc
Wilts	Potato

**Q.65 Answer is “Wilts in potato”**

**Explanation:**

Fungal Diseases	Affected Plants
Root rot	Cotton
Brown rot	Peaches, Plums Apricots and Cherries
Scab	Apple
Ergot	Rye
Red rot	Sugar cane
Rust, smut	Wheat, Corn, Barley, Rice, Oat, Sugar cane etc.
Powdery mildews	Grapes, Rose, Wheat, etc
Wilts	Potato

**Q.66 Answer is “Imperfect Fungi”**

**Explanation:**

Fungal Diseases	Causal Agent
Ringworm	Imperfect fungi (Deuteromycota)
Athlete's foot	Imperfect fungi (Deuteromycota)
Vaginal thrush (Candidiasis)	<i>Candida albicans</i>
Histoplasmosis	<i>Histoplasma capsulatum</i> (grows)
Aspergillosis	<i>Aspergillus fumigatus</i>
Cancer	<i>Aspergillus sp.</i>

**Q.67 Answer is “Oral or vaginal thrush”**

**Explanation:** *Candida albicans*, a yeast causes oral and vaginal thrush commonly called candidacies or candidiasis.

**Q.68 Answer is “Very occasionally”**

**Explanation:** If person's immune system is weak, then it becomes fatal.

**Q.69 Answer is “Aspergillus fumigatus”**

**Explanation:** As the name indicates

**Q.70 Answer is “Blood stream and then to other organs”**

**Explanation:** Because systemic fungus is difficult to be controlled and eradicated.

**Q.71 Answer is “AIDS – Aspergillus – Aspergillosis – Death”**

**Explanation:** Aspergillosis occurs in those persons who suffers from any type of immune deficiency e.g. AIDS

**Q.72 Answer is “Aspergillus”**

**Explanation:** It is decomposer and saprobic fungus.

**Q.73 Answer is “Ergotism”**

**Explanation:** Ergot fungi refers to a group of fungi of genus *Claviceps*. The most prominent member in *Claviceps purpurea*. This fungus grows on rye and related plants and produces alkaloids that can cause ergotism in humans and other mammals who consume grains contaminated with its fruiting structure called ergot sclerotium.

**Q.74 Answer is “Bracket fungi or shelf fungi”**

**Explanation:** Wood rotting fungi destroy not only living trees but also structural timber. Bracket fungi/shelf fungi cause lot of damage to stored cut lumber as well as stands of timber of living trees.

**Q.75 Answer is “Bacteriophages”**

**Explanation:** A virus that attacks on bacteria are called bacterial viruses, bacteriophages or phage viruses.

**Q.76 Answer is “D’ Herelle”**

**Explanation:** As far as discovery is concerned, Twort discovered the bacterial viruses earlier than D’Herelle, however the term bacteriophage was used by D’Herelle for the first time. Bacteriophage means bacteria eater.

**Q.77 Answer is “Rabies virus”**

**Explanation:** Those days word virus was generally used for any poisonous fluid which caused any disease or death. That is why Chamberland used the term filterable

viruses for rabies causing agents as they passed through the filter.

**Q.78 Answer is “TMV”**

**Explanation:** TMV was crystallized by W. M Stanley.

**Q.79 Answer is “Ivanowsky”**

**Explanation:** Ivanowsky took bacteria free extract from infected tobacco leaves and sprinkled it over healthy plants which suffered from TMV later on.

**Q.80 Answer is “250nm”**

**Explanation:** Pox virus is the largest virus with 250 nm size.

**Q.81 Answer is “Capsid”**

**Explanation:** Capsid gives definite shape to the virions.

**Q.82 Answer is “Metabolic machinery”**

**Explanation:** Viruses are acellular entities and lack biosynthetic machinery for their replication.

**Q.83 Answer is “Capsomeres”**

**Explanation:** Capsomeres are those protein subunits whereas capsid is entire protein coat.

**Q.84 Answer is “Number of subunits”**

**Explanation:** Herpes virus have 162 capsomeres, whereas adenovirus have 252 capsomeres. Net difference is that of 90 capsomeres.

**Q.85 Answer is “90”**

**Explanation:** Herpes virus have 162 capsomeres, whereas adenovirus have 252 capsomeres. Net difference is that of 90 capsomeres

**Q.86 Answer is “Centriole present”**

**Explanation:** Fungi like plants lack centrioles.

**Q.87 Answer is “Mycelium”**

**Explanation:** The body of fungus, called mycelium, consists of long, slender, branched tubular thread like filaments called the hyphae.



**Q.88 Answer is “Yeast”**

**Explanation:** Yeast are non-hyphal unicellular fungi.

**Q.89 Answer is “Imperfect fungi”**

**Explanation:** Perfect stage is sexual stage which is absent in Deuteromycota. That is why it is called imperfect fungi or fungi imperfecti.

**Q.90 Answer is “Naked spores”**

**Explanation:** Conidia being produced on conidrophore, without any covering like sporangial wall are called naked spores. These are haploid and asexual spores.

**Q.91 Answer is “Two nuclei of different types”**

**Explanation:** Heterokaryotic hyphae/cells also called dikaryotic hyphae/cells contain two nuclei of different genetic types or mating types.

**Q.92 Answer is “Louis Pasteur and Robert Koch”**

**Explanation:** as microscopic techniques were not well developed at the time of Louis Pasteur and Robert Koch, the study about virus was very limited and the only thing that is known about it was that it is a poison associated with disease and death.

**Q.93 Answer is “Virus”**

**Explanation:** Viruses are actually particles of nucleoproteins i.e. a nucleic acid core (DNA or RNA) have been coated in a protein coat called capsid.

**Q.94 Answer is “Virology”**

**Explanation:** That branch of biology which deals with the study of viruses is called virology and as structurally viruses are nucleocapsids so it may be study of nucleocapsids as well.

**Q.95 Answer is “Metabolism of its host cell”**

**Explanation:** Viruses are acellular entities having no cellular/metabolic machinery. Thus they have to rely upon the

biosynthetic machinery of host for this purpose.

**Q.96 Answer is “Virus”**

**Explanation:** Viruses having smaller size as compared to bacteria can pass through the porcelain filter and it was first proved by Charles Chamberland by filtering rabies virus through porcelain filter.

**Q.97 Answer is “Charles Chamberland”**

**Explanation:** Charles Chamberlandt called the filtrate as filterable viruses and residue as non-filterable viruses.

**Q.98 Answer is “Smuts”**

**Explanation:** Smuts are such fungi which are pathogenic to cereal crops particularly to wheat, barley, oat, maize etc.

**Q.99 Answer is “Group of plant kingdom”**

**Explanation:** Fungi was included in Kingdom plantae due to the presence of cell wall and absence of centrioles. However, later on due to its heterotrophic mode of nutrition it was excluded from plants and given the status of an independent kingdom.

**Q.100 Answer is “Cellulose”**

**Explanation:** Cellulose is found in the cell wall of plants and algae, fungi have chitinous cell wall. Animals cell lack cellulose as a structure component

**Q.101 Answer is “The chemical found in external covering of the body”**

**Explanation:** Fungi have chitinous cell wall as external covering and insects have chitinous exoskeleton as external covering.

**Q.102 Answer is “Common ancestors”**

**Explanation:** As both animals and fungi are heterotrophs and both have chitin as a structural component.

**Q.103 Answer is “Rest of the eukaryotes”**



**Explanation:** With respect to nuclear mitosis and molecular data fungi resemble none of the other eukaryote.

**Q.104 Answer is “Nuclear mitosis”**

**Explanation:** Nuclear mitosis is a unique feature of fungi as no other group of organisms carries out nuclear mitosis.

**Q.105 Answer is “Hyphae”**

**Explanation:** Hyphae are the structural units of fungi except yeast.

**Q.106 Answer is “Chitin”**

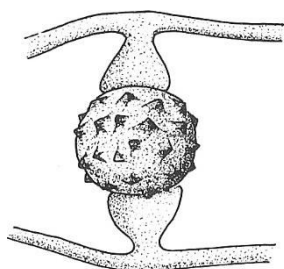
**Explanation:** Chitin is more resistant to decay than cellulose and lignin.

**Q.107 Answer is “These are motile and flagellate”**

**Explanation:** Fungi produces non-motile spores which lack flagella.

**Q.108 Answer is “Zygospore”**

**Explanation:** Zygospore formed in zygomycota is a resistant body which can withstand the unfavorable conditions and upon arrival of favorable conditions starts germination.



**Q.109 Answer is “Conidia”**

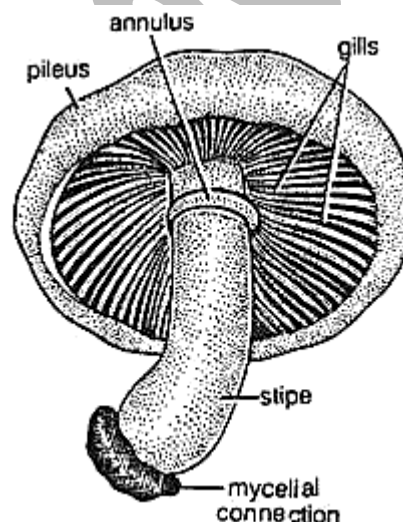
**Explanation:** Conidia are also called naked spores as they lack any sporangial cover.

**Q.110 Answer is “Immense osmotic pressure”**

**Explanation:** Jams and jellies are hyperosmotic media with saturation level of sugar and to grow in such medium requires immense osmotic resistance.

**Q.111 Answer is “Basidiocarp”**

**Explanation:** As mushroom (Agaricus) belongs to basidiomycota its fruiting body is called basidiocarp which bears basidia and basidiospores.



**Q.112 Answer is “Meiosis”**

**Explanation:** Both basidiospores and ascospores are haploid spores formed from diploid nucleus by reduction division or meiosis.

**Q.113 Answer is “Karyogamy”**

**Explanation:** After karyogamy or diploidization, the diploid nucleus produces a resistant cyst around it and becomes resistant zygospore.


**Q.114 Answer is “Over one million”**

**Explanation:** According to the verified figures of biodiversity, over one and half million species of animals and over a half million species of plants are known.

**Q.115 Answer is “Over a half million”**

**Explanation:** According to the verified figures of biodiversity, over one and half million species of animals and over a half million species of plants are known.

**Q.116 Answer is “Species”****Explanation:**

1	Kingdom	As we move from species to kingdom the number of individuals per taxon increases but similarity among individuals decreases
2	Division	
3	Class	
4	Order	
5	Family	
6	Genus	
7	Species	As we move from kingdom to species the number of individuals per taxon decreases but similarity among individuals increases

**Q.117 Answer is “Species”**

**Explanation:** A species is a group of natural population which can interbreed freely among themselves and produce fertile offspring, but are reproductively isolated from all other such groups in nature. So mere interbreeding and reproduction is not enough to be a species as occurs in horse and donkey, both belong to different species but they can interbreed and produce mule.

**Q.118 Answer is “Phyla”**

**Explanation:** See explanation of Q # 116.

**Q.119 Answer is “Orders”**

**Explanation:** See explanation of Q # 116.

**Q.120 Answer is “Poaceae”**

**Explanation:** Botanical classification of corn, Zea mays.

Kingdom	Plantae
Division (Phylum)	Anthophyta (Tracheophyta)
Class	Angiospermae
Order	Poales
Family	Poaceae
Genus	<i>Zea</i>
Species	<i>Mays</i>

**Q.121 Answer is “Argavad”****Explanation:**

Sr. #	Plant	Common names
1)	Onion	Bassal, Vassal, Ganda, Piyaz
2)	Cassia	Amaltas, Argavad, Golden shower, Purging Cassia

**Q.122 Answer is “Brinjal”**

**Explanation:** See explanation of Q # 121.

**Q.123 Answer is “Vertebrate”**

**Explanation:** A silver fish (*Lepisma saccharina*) is small primitive wingless insect. Crayfish are fresh water crustaceans resembling small lobsters. Starfish is an echinoderm. However, dogfish (*Squalis acanthias*) belongs to squalidae family of sharks.

**Q.124 Answer is “Two to six kingdoms”**

**Explanation:** Earliest classification was two Kingdom (Animals and plants) classification. However not due to the contribution of Ernst Haeckel, E. Chatton, Robert Whittaker, Lynn Margulis and Schwartz it have been extended upto 5 kingdoms.

**Q.125 Answer is “Euglena”**

**Explanation:** Euglenoids have at various times been classified in the plant kingdom (with algae) and in animal kingdom (in protozoa).

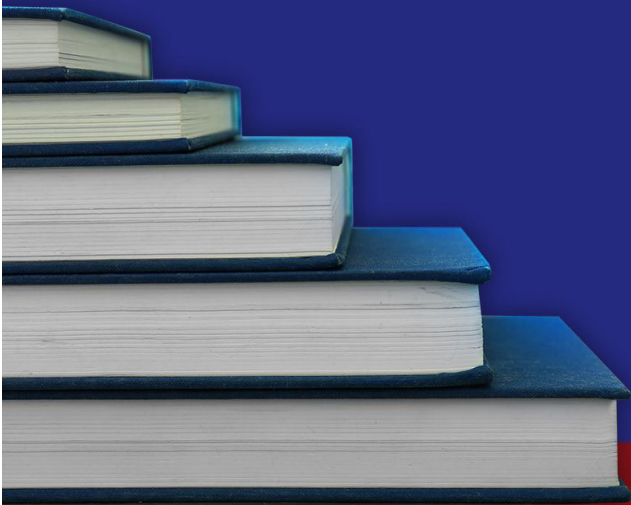
**Q.126** Answer is “Margulis and Schwartz”

**Explanation:** Five kingdom system was presented by Robert Whittaker but later on it was modified by Lynn Margulis and Carlene Schwartz.

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# STOP

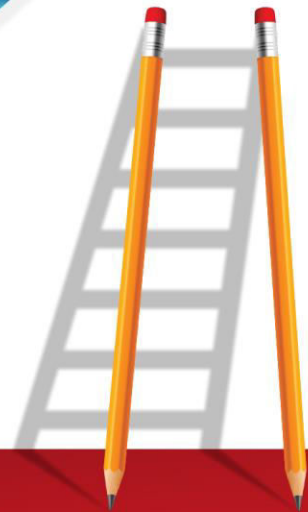
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# BIOLOGY



## Worksheet-13



**STP**

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**Worksheet-13(i)****(Bioenergetics)**

**Q.1** Inside the stroma of chloroplast there is a suspended:

- A) Membrane system
- B) Set of enzymes
- C) Membrane system and set of enzymes
- D) Chlorophyll

**Q.2** Chlorophyll molecules are found embedded in:

- A) Thylakoid membranes
- B) Outer chloroplast membrane
- C) Lamellar membranes
- D) Inner chloroplast membrane

**Q.3** Electron acceptors of photosynthetic electron transport chain are parts of:

- A) Thylakoid membranes
- B) Outer chloroplast membrane
- C) Lamellar membranes
- D) Inner chloroplast membrane

**Q.4** Chlorophyll and other pigments absorb light energy which is converted into chemical energy of:

- A) NADH and NADPH
- B) ATP and NADPH
- C) ATP and NADH
- D) FADH and NADPH

**Q.5** The substances that absorb visible light are called:

- A) Radioactive substances
- B) Bioluminescent substances
- C) Pigments
- D) Fluorescent substances

**Q.6** Different pigments absorb light of:

- A) Same wavelength
- B) 380 – 750 nm wavelengths
- C) Different wavelengths
- D) 280 – 750 nm wavelengths

**Q.7** An instrument used to measure relative abilities of different pigments to absorb different wavelengths of light is called:

- A) Photometer
- B) Light meter
- C) Spectrometer
- D) Spectrophotometer

**Q.8** Thylakoid membranes contain:

- A) Several kinds of pigments
- B) Only chlorophylls
- C) Only carotenoids
- D) Only xanthophylls

**Q.9** Carotenes are mostly:

- A) Red to orange
- B) Yellow and red to orange
- C) Yellow to orange
- D) Orange and red to yellow

**Q.10** These broaden the absorption and utilization of light:

- A) Yellow pigments
- B) Orange pigments
- C) Red pigments
- D) Yellow and red to orange pigments

**Q.11** Chlorophylls found in photosynthetic bacteria are called:

- A) Chlorophyll a and b
- B) Chlorophyll c and d
- C) Chlorophyll b and c
- D) Bacteriochlorophylls

**Q.12** Green, yellow and indigo wavelengths of light are least absorbed by:

- A) Carotenes
- B) Xanthophylls
- C) Chlorophylls
- D) Carotenoids

**Q.13 Plants appear green, because:**

- A) Green wavelength is reflected
- B) Green wavelength is transmitted
- C) Darker green color masks over the yellow color
- D) Green wavelength is reflected and transmitted

**Q.14 The light absorbing hydrophilic part of chlorophyll is:**

- A) Flat
- B) Long and anchoring
- C) Square shaped
- D) Flat and square shaped

**Q.15 Porphyrin ring represents the:**

- A) Hydrophobic head of chlorophyll
- B) Hydrophilic tail of chlorophyll
- C) Hydrophobic tail of chlorophyll
- D) Hydrophilic head of chlorophyll

**Q.16 Chlorophyll head is made up of:**

- A) Four joined porphyrin rings
- B) Four Joined tetrapyrrole rings
- C) Four joined pyrrole rings
- D) Two joined pyrrole rings

**Q.17 In chlorophyll head an atom of magnesium is coordinated with the:**

- A) Carbon of each pyrrole ring
- B) Hydrogen of each pyrrole ring
- C) Nitrogen of each pyrrole ring
- D) Methyl of each pyrrole ring

**Q.18 \_\_\_\_\_ of haemoglobin is also a porphyrin ring.**

- A)  $\alpha$  – chain
- B)  $\beta$  – chain
- C) Haem group
- D) Protein

**Q.19 Haem group of hemoglobin differs from porphyrin of chlorophyll in having:**

- A) Iron as central atom
- B) Magnesium as central atom
- C) Four pyrrole rings
- D) Central atom coordinated with nitrogen of each pyrrole ring

**Q.20 Long tail of chlorophyll which is attached to one of the pyrrole is:**

- A) Hydrocarbon tail
- B) Phytol
- C) Phytol or hydrocarbon tail
- D) Hydrophilic tail

**Q.21 The chlorophyll molecule is embedded in the hydrophobic core of:**

- A) Thylakoid membrane by its head
- B) Lamellar membrane by its head
- C) Thylakoid membrane by its tail
- D) Lamellar membrane by its tail

**Q.22 Chlorophyll a and Chlorophyll b differ from each other in only one of the:**

- A) Atoms
- B) Elements
- C) Functional groups
- D) Carbon atoms

**Q.23 Chlorophyll a and chlorophyll b differ from each other with respect to the number of:**

- A) Carbon atoms
- B) Oxygen atoms
- C) Hydrogen atoms
- D) Hydrogen and oxygen atoms

**Q.24 As compared to chlorophyll a, chlorophyll b have:**

- A) Two more hydrogen atoms
- B) One less oxygen atom
- C) Two less hydrogen atoms and one more oxygen atom
- D) Two more hydrogen atom and one less oxygen atom

**Q.25** As compared to chlorophyll b, chlorophyll a have:

- A) Two more hydrogen atoms
- B) One less oxygen atom
- C) Two less hydrogen atoms
- D) Two more hydrogen atom and one less oxygen atom

**Q.26** Chlorophyll a can be converted into chlorophyll b by replacing:

- A) Carbonyl group with methyl group
- B) Magnesium with ferrous
- C) Methyl group with carbonyl group
- D) Ferrous with magnesium

**Q.27** Chlorophyll b can be converted into chlorophyll a by replacing:

- A) Carbonyl group with methyl group
- B) Magnesium with ferrous
- C) Methyl group with carbonyl group
- D) Ferrous with magnesium

**Q.28** Some wavelengths \_\_\_\_\_ by chlorophyll a are \_\_\_\_\_ by chlorophyll b.

- A) Absorbed, absorbed
- B) Not absorbed, weakly absorbed
- C) Not absorbed, not absorbed
- D) Not absorbed, very effectively absorbed

**Q.29** Due to slight difference in their \_\_\_\_\_, the chlorophyll a and chlorophyll b show slightly different \_\_\_\_\_.

- A) Structure, absorption spectra
- B) Structure, molecular formula
- C) Absorption spectra, structure
- D) Absorption spectra, molecular formula

**Q.30** Difference in structure of different pigments:

- A) Increase the range of light wavelengths being absorbed
- B) Decrease the range of light wavelengths being absorbed
- C) Have no effect on range of light wavelengths being absorbed
- D) Have no effects on the color of pigment

**Q.31** Chlorophyll a is:

- A) Yellow – Green
- B) Blue – Green
- C) Blue – Yellow
- D) Yellow – Blue

**Q.32** Chlorophyll b is:

- A) Yellow – Green
- B) Blue – Green
- C) Blue – Yellow
- D) Yellow – Blue

**Q.33** The most important photosynthetic pigment is:

- A) Chlorophyll – b
- B) Chlorophyll - a
- C) Bacteriochlorophyll
- D) Carotenoids

**Q.34** It takes part directly in the light dependent reactions:

- A) Chlorophyll – b
- B) Chlorophyll – a
- C) Bacteriochlorophyll
- D) Carotenoids

**Q.35** The conversion of solar energy into chemical energy is carried out directly in:

- A) Chlorophyll – b
- B) Chlorophyll – a
- C) Bacteriochlorophyll
- D) Carotenoids

**Q.36** Chlorophyll a itself exists in:

- A) Two forms
- B) One forms
- C) Several forms
- D) Three forms

**Q.37 Chlorophyll b is found along with chlorophyll a in:**

- A) Few green plants and all algae
- B) All green plants and all algae
- C) All green plants and few algae
- D) Few green plants and green algae

**Q.38 Chlorophylls are soluble in:**

- A) Carbon tetrachloride
- B) Alcohol
- C) Carbon tetrachloride and alcohol
- D) Water

**Q.39 Pick up the one(s) called as accessory pigments:**

- A) Carotenes
- B) Chlorophylls
- C) Xanthophylls
- D) Carotenoids and xanthophylls

**Q.40 They absorb light and transfer the energy to chlorophyll a via chlorophyll b:**

- A) Chlorophylls – a    C) Carotenoids
- B) Chlorophylls – b    D) Xanthophylls

**Q.41 The order of transfer of energy is:**

- A) Carotenoids → chlorophyll a → chlorophyll b
- B) Chlorophyll b → chlorophyll a → carotenoids
- C) Carotenoids → Chlorophyll b → Chlorophyll a
- D) Chlorophyll a → Chlorophyll b → Carotenoids

**Q.42 Some carotenoids protect chlorophyll from intense light by:**

- A) Absorbing excessive light energy
- B) Dissipating excessive light energy
- C) Transferring excessive light energy to chlorophyll a

D) Absorbing and dissipating excessive light energy

**Q.43 Protection against intense light is provided by carotenoids to:**

- A) Chlorophyll – a
- B) Human eyes
- C) Chlorophyll – b
- D) Chlorophyll a and human eyes

**Q.44 Absorption spectrum for chlorophyll indicates that absorption is maximum in:**

- A) Blue part of spectrum
- B) Blue and Red parts of spectrum
- C) Red part of spectrum
- D) Violet – blue and orange – red part of spectrum

**Q.45 An absorption spectrum of chlorophylls have:**

- A) Two peaks
- B) Two peaks, one valley
- C) Two valleys
- D) One peaks, two valleys

**Q.46 Pick up the one having broadest valley:**

- A) Absorption spectrum of chlorophyll a
- B) Absorption spectrum of carotenoids
- C) Absorption spectrum of chlorophyll b
- D) Action spectrum of chlorophyll a

**Q.47 The absorptive peaks in the absorption spectrum of chlorophyll b are at the wave length of:**

- A) 430 – 670 nm    C) 440 – 480 nm
- B) 460 – 640 nm    D) 420 – 610 nm

**Q.48 Photosynthesis is a process in which:**

- A) Oxidation of CO<sub>2</sub> occurs
- B) Oxidation of H<sub>2</sub>O occurs
- C) Reduction of CO<sub>2</sub> occurs
- D) Reduction of CO<sub>2</sub> and oxidation of H<sub>2</sub>O occurs

**Q.49 The reactions of photosynthesis consists of:**

- A) Two phases                      C) Four phases  
B) Three phases                  D) Many phases

**Q.50 In photosynthesis reducing power and assimilatory power is synthesized during:**

- A) Dark reaction  
B) Light reaction  
C) Calvin cycle  
D) Oxidation phosphorylation

**Q.51 For synthesis of sugar by reducing CO<sub>2</sub>, NADPH<sub>2</sub> provides:**

- A) Chemical energy  
B) Co-enzymes  
C) Energized electrons  
D) Enzymes

**Q.52 The phase of photosynthesis in which sugar is synthesized by reducing CO<sub>2</sub> is also called as dark reaction because:**

- A) It requires darkness  
B) It does not require light  
C) It requires night period  
D) It cannot proceed in light

**Q.53 Photosynthetic pigments are organized into clusters called:**

- A) Antenna pigments  
B) Reaction centre  
C) Photosynthetic system  
D) Photosystems

**Q.54 Each photosystem consists of a light gathering:**

- A) Antenna complex  
B) Reaction complex  
C) Antenna complex and a reaction centre  
D) Primary electron acceptor

**Q.55 The reaction centre of photosystem have:**

- A) One molecule of chlorophyll a and primary electron acceptor  
B) Many molecule of chlorophyll a and primary electron acceptor

C) One or more molecules of chlorophyll a and primary electron acceptor

D) Chlorophyll a, chlorophyll b and primary electron acceptor

**Q.56 There are two photosystems associated with photosynthesis which have been named in order of their discovery as:**

- A) P680 and P700                  C) PS-I and PS-II  
B) PS-II and PS-I                  D) P700 and P680

**Q.57 Photosystem – I has a form of chlorophyll a which absorbs best the light of:**

- A) 700 nm                              C) 730 nm  
B) 680 nm                              D) 660 nm

**Q.58 Associated nearby each reaction centre of a photosystem, there is a specialized molecule called:**

- A) Primary electron acceptor  
B) Chlorophyll b  
C) Accessory pigments  
D) Carotenoids

**Q.59 Pick up the photosynthetic electron transport which is predominant:**

- A) Non – cyclic electron flow  
B) Z – scheme  
C) Cyclic electron flow  
D) Non-cyclic electron flow or Z – scheme

**Q.60 The photosynthetic electron transport which involved only photosystem – I is called:**

- A) Non-cyclic electron flow  
B) Z – scheme  
C) Cyclic electron flow  
D) Non-cyclic electron flow or Z – scheme

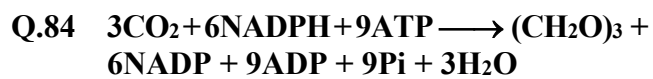
**Q.61 The formation of ATP during non-cyclic electron flow is called:**

- A) Z – scheme  
B) Light reaction  
C) Non-cyclic phosphorylation  
D) Synthesis of ATP and NADPH<sub>2</sub>



- Q.62** Formation of ATP during cyclic electron flow is called:  
A) Cyclic phosphorylation  
B) Photophosphorylation  
C) Oxidative phosphorylation  
D) Z – scheme
- Q.63** The splitting up of water molecule into two hydrogen ions and an oxygen atom, by light is called:  
A) Electrolysis of water  
B) Ionization of water  
C) Photolysis of water  
D) Autolysis of water
- Q.64** The correct sequence of electron carriers which receive the electrons from primary electron acceptor of PS-II and pass it to PS-I:  
A) PS → Cytochrome complex → PQ  
B) PQ → PC → Cytochrome complex  
C) Cytochrome complex → PQ → PC  
D) PQ → Cytochrome complex → PC
- Q.65** Pick up the one not involved in cyclic electron flow of light reaction of photosynthesis:  
A) PQ  
B) PC  
C) Cytochrome complex  
D) Fd
- Q.66** As electrons move down the photosynthetic electron transport chain their energy goes on decreasing and is used by thylakoid membrane to produce:  
A) ATP  
B) Oxygen  
C) Water  
D) NADH<sub>2</sub>
- Q.67** The chemical energy for the synthesis of sugar during the Calvin cycle, is provided by the:  
A) ATPs generated by light reactions  
B) NADH<sub>2</sub> generated by light reactions  
C) FADH<sub>2</sub> generated by light reactions  
D) Oxygen generated by light reactions
- Q.68** Pick up the correct flow of electrons in second electron transport chain of non-cyclic photophosphorylation:  
A) NADP → Primary electron acceptor of PS-I → NADP → PS-I  
B) PS-I → Fd → Primary acceptor of PS-I → NADP  
C) PS-I → Primary acceptor of PS-I → NADP → Fd  
D) PS-I → Primary acceptor of PS-I → Fd → NADP
- Q.69** This pathway uses the photosystem-I, but not photosystem-II:  
A) Non-cyclic photophosphorylation  
B) Cyclic electron flow  
C) Z-scheme  
D) Non-cyclic electron flow
- Q.70** During cyclic photophosphorylation ATP is generated by the:  
A) Coupling of ETC by chemiosmosis  
B) Involvement of chemiosmosis  
C) Involvement of ETC  
D) Oxidative phosphorylation
- Q.71** The mechanism for ATP synthesis is chemiosmosis in:  
A) Cyclic photophosphorylation  
B) Non-cyclic photophosphorylation  
C) Both cyclic and non-cyclic photophosphorylation  
D) Z-scheme

- Q.72** The details of path of carbon in dark reaction of photosynthesis were discovered by Melvin, Calvin and his colleagues at:
- A) Oxford university
  - B) University of California
  - C) Cambridge university
  - D) Tübingen university
- Q.73** The cyclic series of reactions, by which the carbon is fixed and reduced resulting in the synthesis of sugar is called:
- A) Cyclic phosphorylation
  - B) Calvin cycle
  - C) Non-cyclic phosphorylation
  - D) Z-scheme
- Q.74** First phase of Calvin cycle is:
- A) Reduction of  $\text{CO}_2$
  - B) Regeneration of  $\text{CO}_2$  acceptor
  - C) Fixation of  $\text{CO}_2$
  - D) Regeneration of RuBP
- Q.75** The Calvin cycle begins when a molecule of  $\text{CO}_2$  reacts with a highly reactive phosphorylated five carbon sugar named:
- A) Ribulose biphosphate
  - B) Ribulose diphosphate
  - C) Ribulose biphosphate
  - D) Ribose biphosphate
- Q.76** During the first step of reduction phase of Calvin cycle following change occurs:
- A)  $3\text{PGA} \xrightarrow{\text{ATP} \rightarrow \text{ADP}} 1, 3 \text{ BPGA}$
  - B)  $\text{G.3.P} \longrightarrow \text{RuBP}$
  - C)  $1, 3 \text{ BPGA} \xrightarrow{\text{NAD} \longrightarrow \text{NADH}} \text{G.3.P}$
  - D)  $\text{G.3.P} \longrightarrow \text{Starch}$
- Q.77** The assimilatory and reducing powers synthesized in light reaction of photosynthesis are utilized in:
- A) Fixation phase of Calvin cycle
  - B) Regeneration phase of Calvin cycle
  - C) Reduction phase of Calvin cycle
  - D) Condensation phase of Calvin cycle
- Q.78** The phase of Calvin cycle in which less ATPs of light reaction are used is:
- A) Fixation
  - B) Regeneration
  - C) Reduction
  - D) Reduction and Regeneration
- Q.79** The number of  $\text{CO}_2$ , NADPH and ATP molecules respectively required for one Calvin cycle are:
- A) 3, 6, 9
  - B) 6, 12, 18
  - C) 12, 24, 36
  - D) 24, 48, 72
- Q.80** The number of  $\text{CO}_2$ , NADPH<sub>2</sub> and ATP molecules required to synthesize one maltose molecule from the output of Calvin cycle is respectively:
- A) 3, 6, 9
  - B) 6, 12, 18
  - C) 12, 24, 36
  - D) 24, 48, 72
- Q.81** The ratio of  $\text{CO}_2$ , NADPH<sub>2</sub> and ATP molecules required to synthesize one glucose molecule from the output of  $\text{C}_3$  pathway is respectively:
- A) 1, 2, 3
  - B) 3, 6, 9
  - C) 6, 12, 18
  - D) 12, 24, 36
- Q.82** The ratio of  $\text{CO}_2$ , NADPH<sub>2</sub> and ATP molecules required for one calvin cycle is:
- A) 1, 2, 3
  - B) 3, 6, 9
  - C) 6, 12, 18
  - D) 12, 24, 36
- Q.83** The ratio of  $\text{CO}_2$ , NADPH<sub>2</sub> and ATP molecules required to synthesize starch from the output of Calvin cycle is:
- A) 1, 2, 3
  - B) 3, 6, 9
  - C) 6, 12, 18
  - D) 12, 24, 36



It is summary equation of:

- A) Light reactions of photosynthesis
- B) Photosynthesis
- C) Dark reactions of photosynthesis
- D) Respiration

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**ANSWER KEY (Worksheet-13(i))**

1	C	23	D	45	B	67	A
2	A	24	C	46	A	68	D
3	A	25	D	47	B	69	B
4	B	26	C	48	D	70	A
5	C	27	A	49	A	71	C
6	C	28	D	50	B	72	B
7	D	29	A	51	C	73	B
8	A	30	A	52	B	74	C
9	A	31	B	53	D	75	A
10	D	32	A	54	C	76	A
11	D	33	B	55	C	77	C
12	C	34	B	56	C	78	B
13	C	35	B	57	A	79	A
14	D	36	C	58	A	80	C
15	D	37	C	59	D	81	A
16	C	38	C	60	C	82	A
17	C	39	D	61	C	83	A
18	C	40	C	62	A	84	C
19	A	41	C	63	C		
20	C	42	D	64	D		
21	C	43	D	65	A		
22	C	44	B	66	A		

**EXPLANATION**

**Q.1** Answer is “Membrane system and set of enzymes”

**Explanation:** Thylakoid membranes making grana and enzymes associated with photosynthesis, attached to these membranes, are suspended in stroma of chloroplast.

**Q.2** Answer is “Thylakoid membranes”

**Explanation:** Each chlorophyll molecule is anchored in thylakoid membrane by means of its tail and head lies inside the lumen of thylakoids.

**Q.3** Answer is “Thylakoid membranes”

**Explanation:** Thylakoid membranes sites for cyclic and non-cyclic photophosphorylation.

**Q.4** Answer is “ATP and NADPH”

**Explanation:** It is assimilatory power (ATP) and reducing power (NADPH) respectively required for dark reaction.

**Q.5** Answer is “Pigments”

**Explanation:** Pigments are such colored substances which absorb light.

**Q.6** Answer is “Different wavelengths”

**Explanation:** As absorption spectra of pigments vary, they absorb light of different wavelengths.

**Q.7** Answer is “Spectrophotometer”

**Explanation:** A spectrophotometer is used to measure relative abilities of different pigments to absorb different wavelengths of light.

**Q.8** Answer is “Several kinds of pigments”

**Explanation:** Chlorophyll and other photosynthetic pigments like carotenes, xanthophylls, phycobilins are found embedded in the thylakoid membranes.

**Q.9** Answer is “Red to orange”

**Explanation:** According to their absorption spectra carotenes are red to orange pigments.

**Q.10** Answer is “Yellow and red to orange pigments”

**Explanation:** These are carotenoids i.e. carotenes and xanthophylls and they work as accessory pigments or antenna pigments to broaden the absorption and utilization of light by plants.

**Q.11** Answer is “Bacteriochlorophyll”

**Explanation:** It is different from that of eukaryotic and even cyanobacterial chlorophyll.

**Q.12** Answer is “Chlorophylls”

**Explanation:** Chlorophyll absorb blue and red wave lengths of light only.

**Q.13** Answer is “Darker green color masks over the yellow color”

**Explanation:** Carotenoids are yellow and red to orange pigments which are masked over by green colored chlorophylls.

**Q.14** Answer is “Flat and square shaped”

**Explanation:** It is porphyrin head made up of tetrapyrrole rings.

**Q.15** Answer is “Hydrophilic head of chlorophyll”

**Explanation:** The head of chlorophyll is hydrophilic but tail of chlorophyll is hydrophobic. Head consists of four pyrrole rings.

**Q.16** Answer is “Four joined pyrrole rings”

**Explanation:** It is tetrapyrrole means four pyrrole rings, however collectively four pyrrole rings constitute a porphyrin.

**Q.17** Answer is “Nitrogen of each pyrrole ring”

**Explanation:** An atom of magnesium is present in the centre of porphyrin ring and is coordinated with the nitrogen of each pyrrole ring.

**Q.18** Answer is “Haem group”

**Explanation:** This is homology between hemoglobin and chlorophyll.

**Q.19** Answer is “Iron as central atom”

**Explanation:** Haem have iron as central atom whereas porphyrin of chlorophyll have magnesium as central atom.

**Q.20** Answer is “Phytol or hydrocarbon tail”

**Explanation:** It is a hydrocarbon tail also called phytol.

**Q.21** Answer is “Thylakoid membrane by its tail”

**Explanation:** The chlorophyll molecule is embedded in hydrophobic core of thylakoid membrane, by its tail.

**Q.22** Answer is “Functional group”

**Explanation:** It is methyl ( $\text{CH}_3$ ) for chl. a and carbonyl ( $\text{CHO}$ ) for chl. b.

**Q.23** Answer is “Hydrogen and oxygen atoms”

**Explanation:** Chl. a have two additional hydrogen atoms but one oxygen less, whereas chl. b have one additional oxygen atom but two hydrogen atoms less.

**Q.24** Answer is “Two less hydrogen atoms and one more  $\text{O}_2$  atom”

**Explanation:** Chlorophyll a and chlorophyll b differ from each other in only one of the functional groups bonded to the porphyrin; the methyl group ( $-\text{CH}_3$ ) in chlorophyll a is replaced by a terminal carbonyl group ( $-\text{CHO}$ ) in chlorophyll b.

**Q.25** Answer is “Two more hydrogen atoms and one less oxygen atom”

**Explanation:** Chlorophyll a have methyl group ( $-\text{CH}_3$ ) whereas chlorophyll b have carbonyl group ( $-\text{CHO}$ ). Thus, chlorophyll a have two more hydrogen atoms and one less oxygen atom.

**Q.26** Answer is “Methyl group with carbonyl group”

**Explanation:** Chlorophyll a have methyl group ( $-\text{CH}_3$ ) whereas chlorophyll b have carbonyl group ( $-\text{CHO}$ ). Thus chlorophyll a have two more hydrogen atoms and one less oxygen atom.

**Q.27** Answer is “Carbonyl group with methyl group”

**Explanation:** Chlorophyll a have methyl group ( $-\text{CH}_3$ ) whereas chlorophyll b have carbonyl group ( $-\text{CHO}$ ). Thus both can be converted into each other by changing functional groups.



**Q.28** Answer is “Not absorbed, very effectively absorbed”

**Explanation:** Due to slight difference in their structure, the two chlorophylls shows slightly different colors. Some wavelengths not absorbed by chlorophyll a are very effectively absorbed by chlorophyll b and vice versa.

**Q.29** Answer is “Structure, absorption spectra”

**Explanation:** Due to slight difference in their structure, the two chlorophylls show slightly different colors. Some wavelengths not absorbed by chlorophyll a are very effectively absorbed by chlorophyll b and vice versa.

**Q.30** Answer is “Increase the range of wavelength being absorbed”

**Explanation:** Structural change changes the absorption spectrum.

**Q.31** Answer is “Blue green”

**Explanation:** It is dark green.

**Q.32** Answer is “Yellow – green”

**Explanation:** It is light green.

**Q.33** Answer is “Chlorophyll – a”

**Explanation:** As reaction centre for light reaction of photosynthesis lies in it.

**Q.34** Answer is “Chlorophyll – a”

**Explanation:** Chlorophyll a having primary reaction centre of light reaction of photosynthesis is directly involved in light reaction.

**Q.35** Answer is “Chlorophyll – a”

**Explanation:** As the reaction centre of light reaction lies in chlorophyll a, so it is involved in conversion of solar energy into chemical energy.

**Q.36** Answer is “Several forms”

**Explanation:** With respect to red absorbing peaks it may be at 670,680,690 and 700 nm.

**Q.37** Answer is “All green plants and few algae”

**Explanation:** Chlorophyll b occurs in all green plants right from bryophytes to angiosperms but it is found only in euglenoids and chlorophyta as far as algae is concerned, however chlorophyll a is present in all photoautotrophs except bacteria.

**Q.38** Answer is “Carbon tetrachloride and alcohol”

**Explanation:** As they are soluble in organic solvents.

**Q.39** Answer is “Carotenoids & xanthophyll”

**Explanation:** As they absorb lights of different wavelengths other than that absorbed by chlorophyll – a and finally transfer it to chlorophyll a by bringing that into its absorptive range.

**Q.40** Answer is “Carotenoids”

**Explanation:** It is as under;  
Carotenoids → Chl. b → Chl. a

**Q.41** Answer is “Carotenoids → Chlorophyll-b → Chlorophyll – a”

**Explanation:** Carotenoids and chlorophyll-b being antenna pigments transfer the light energy to chlorophyll-a where reaction centre lies.

**Q.42** Answer is “Absorbing and dissipating excessive light energy”

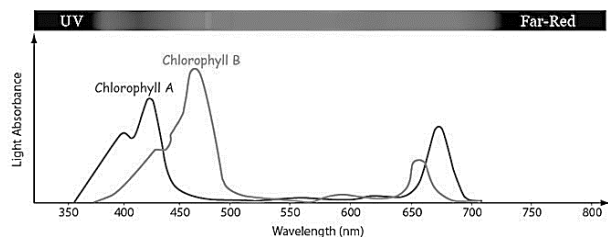
**Explanation:** This protection is provided to human eyes as well.

**Q.43** Answer is “Chlorophyll a and human eyes”

**Explanation:** Carotenoids provide protection against intense light to chlorophyll-a and human eyes.

**Q.44** Answer is “Blue and red parts of spectrum”

**Explanation:** Chlorophyll absorbs in these ranges maximum.



**Q.45 Answer is “Two peaks one valley”**

**Explanation:** One peak at blue and other at red wavelengths.

**Q.46 Answer is “Absorption spectrum of chlorophyll a”**

**Explanation:** One peak is near 430nm whereas other peak is near 670nm.

**Q.47 Answer is “460-640”**

**Explanation:** It is visible in the absorption spectrum of chlorophyll given in textbook of biology at page 212.

**Q.48 Answer is “reduction of CO<sub>2</sub> and oxidation of water occurs”**

**Explanation:** CO<sub>2</sub> is reduced to synthesize carbohydrate and hydrogen is removed from water which is used in reduction of CO<sub>2</sub>.

**Q.49 Answer is “Two phases”**

**Explanation:** Light reaction and dark reaction.

**Q.50 Answer is “Light reaction”**

**Explanation:** It is ATP and NADPH respectively. ATP is assimilatory power and NADPH is reducing power.

**Q.51 Answer is “Energized electrons”**

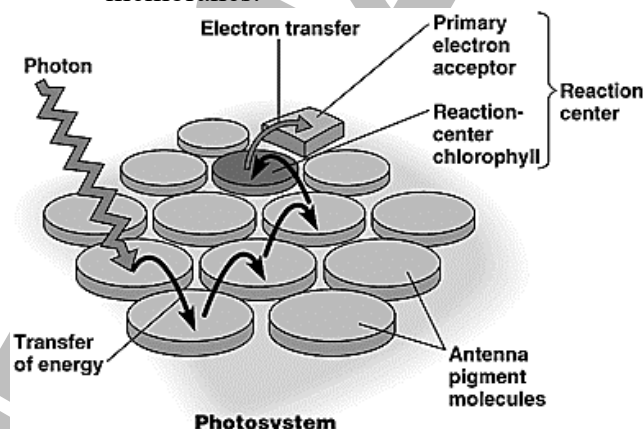
**Explanation:** These energized electrons are used as a source of energy in synthesis of sugar.

**Q.52 Answer is “It does not requires light”**

**Explanation:** It is dark reaction which uses the assimilatory power and reducing power synthesized in light reaction in reducing CO<sub>2</sub> to synthesize carbohydrates. It may occur in light as well as in dark.

**Q.53 Answer is “Photosystems”**

**Explanation:** Photosynthetic pigments are organized into clusters, called photosystems, for efficient absorption and utilization of solar energy in thylakoid membranes.



**Q.54 Answer is “Antenna complex and a reaction centre”**

**Explanation:** Each photosystem consists of a light gathering antenna complex and a reaction center. The antenna complex has many molecules of chlorophyll-a, chlorophyll-b and carotenoids, most of them channeling the energy to reaction center.

**Q.55 Answer is “One or more molecules of chlorophyll a and primary electron acceptor”**

**Explanation:** Reaction center of photosynthesis lies in chlorophyll a. It consists of one or more molecules of chlorophyll a along with a primary electron acceptor and associated electron carrier of electron transport system. Chlorophyll a molecules of reaction center and associated proteins are closely linked to the nearby electron transport system.

**Q.56 Answer is “Answer PS-I and PS-II”**

**Explanation:** PS-I was discovered earlier than PS-II.

**Q.57** Answer is “700nm”

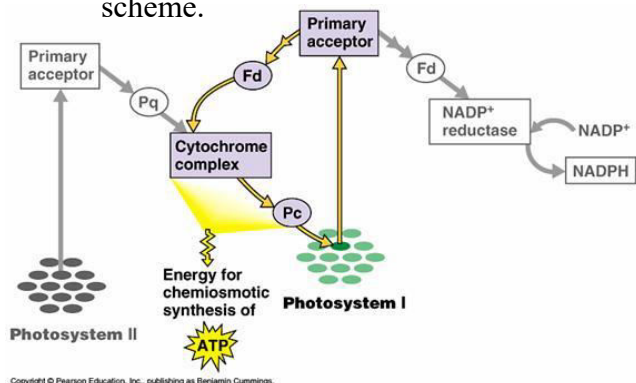
**Explanation:** This is absorptive range photosystem-I.

**Q.58** Answer is “Primary electron acceptor”

**Explanation:** Chlorophyll a molecules of reaction center and associated proteins are closely linked to the nearby electron transport system.

**Q.59** Answer is “Non-cyclic electron flow or Z-scheme”

**Explanation:** It is non-cyclic photophosphorylation also called Z-scheme.



**Q.60** Answer is “Cyclic electron flow”

**Explanation:** It yields only ATPs

**Q.61** Answer is “Non-cyclic phosphorylation”

**Explanation:** As same electrons are not cycled back again and again.

**Q.62** Answer is “Cyclic phosphorylation”

**Explanation:** Same electrons are again and again cycled back and each time yield one ATP.

**Q.63** Answer is “Photolysis of water”

**Explanation:** Photo means light and lysis means splitting up. So splitting up of water by light is called photolysis of water.

**Q.64** Answer is “PQ → Cytochrome complex → PC”

**Explanation:** It is photosynthetic electron transport chain involved in non-cyclic phosphorylation.

**Q.65** Answer is “PQ”

**Explanation:** Cyclic phosphorylation involves PS-I, primary electron acceptor of PS-I, Fd, cytochrome complex and PC.

**Q.66** Answer is “ATP”

**Explanation:** It occurs through chemiosmosis in cytochrome complex.

**Q.67** Answer is “ATPs generated by light reactions”

**Explanation:** ATP (assimilatory power) is synthesized in light reaction which is used later on in dark reaction to synthesize sugar.

**Q.68** Answer is “PS-I → Primary acceptor of PS-I → Fd → NADP”

**Explanation:** It starts from PS-I and ends at formation of reducing power.

**Q.69** Answer is “Cyclic electron flow”

**Explanation:** In cyclic phosphorylation only PS-I is involved.

**Q.70** Answer is “Coupling of ETC by chemiosmosis”

**Explanation:** In both cyclic and non-cyclic photophosphorylation, the mechanism for ATP synthesis is chemiosmosis, the process that uses membranes to couple redox reactions to ATP production.

**Q.71** Answer is “Both cyclic and non-cyclic photophosphorylation”

**Explanation:** Chemiosmosis is involved in both types of photophosphorylation.

**Q.72** Answer is “University of California”

**Explanation:** Melvin Calvin and his colleagues at The University of California discovered the details of path of carbon in these reactions. He was awarded Nobel prize in 1961.

**Q.73** Answer is “Calvin cycle”

**Explanation:** As discovered by Melvin Calvin. So it is called Calvin cycle

**Q.74** Answer is “Fixation of CO<sub>2</sub>”

**Explanation:** In first phase CO<sub>2</sub> is condensed with RuBP in presence of Rubisco. It is called fixation of CO<sub>2</sub>.

**Q.75** Answer is “Ribulose Bisphosphate”

**Explanation:** It is Ribulose 1, 5 bisphosphate.

**Q.76** Answer is 3PGA  $\xrightarrow[\text{ADP}]{\text{ATP}}$  1, 3 BPGA”

**Explanation:** In first stage of reduction phase assimilatory power is utilized and 3PGA is converted into 1,3 BPGA.

**Q.77** Answer is “Reduction phase of Calvin cycle”

**Explanation:** However additional assimilatory power (ATPs) are also used in regeneration phase.

**Q.78** Answer is “Regeneration”

**Explanation:** Only 3ATPs are used to regenerate 3RuBP from 5 G.3.P.

**Q.79** Answer is “3,6,9”

**Explanation:** Observe the Calvin cycle.

**Q.80** Answer is “12,24,36”

**Explanation:** As synthesis of glucose requires 6, 12, 18 molecules of CO<sub>2</sub>, NADPH and ATPs respectively, maltose consists of two glucose molecules.

**Q.81** Answer is “1,2,3”

**Explanation:** Ratio remains same.

**Q.82** Answer is “1,2,3”

**Explanation:** It is 3:6:9 actually.

**Q.83** Answer is “1,2,3”

**Explanation:** Ratio of input of Calvin Cycle will remain same.

**Q.84** Answer is “Dark reaction of photosynthesis”

**Explanation:** Evident from inputs and outputs.

**Worksheet-13(ii)**  
**(Bioenergetics)**

- Q.1**  $C_6H_{12}O_6 \longrightarrow 2C_3H_4O_3 + \text{Energy}$ . The given equation represents the:  
A) Oxidation of pyruvate  
B) Glycolysis  
C) Krebs's cycle  
D) TCA cycle
- Q.2** Biologists believe that in the first cell that was organized on earth, a reaction may have occurred which was identical to:  
A) Oxidation of pyruvate  
B) Glycolysis  
C) Krebs's cycle  
D) TCA cycle
- Q.3** Cellular respiration depending upon the type of the cell and prevailing conditions varies from the step after:  
A) Oxidation of pyruvate  
B) Citric acid cycle  
C) Glycolysis  
D) Oxidative phosphorylation
- Q.4** Pyruvate, the end product of glycolysis, follows different catabolic pathways depending on the:  
A) Organism  
B) Metabolic conditions  
C) Size of organism  
D) Organism and metabolic conditions
- Q.5** Alcoholic fermentation, lactic acid fermentation and aerobic respiration are the three ways for the processing of:  
A) Pyruvate in the cell  
B) Glucose in the cell  
C) Acetate in the cell  
D) Organic food in cell
- Q.6** What occurs in the absence of oxygen:  
A) Alcoholic fermentation  
B) Respiratory electron transport chain  
C) Lactic acid fermentation  
D) Alcoholic and lactic acid fermentation
- Q.7** Pick up the one which is anaerobic:  
A) Fermentation  
B) Oxidative phosphorylation  
C) Respiratory chain  
D) Krebs cycle
- Q.8** Glucose is completely broken down only in the:  
A) Aerobic respiration  
B) Cellular respiration  
C) Internal respiration  
D) External respiration
- Q.9** During aerobic respiration glucose is oxidized to:  
A)  $CO_2$   
B)  $H_2O$   
C)  $CO_2$  and water  
D)  $CO_2$  and energy
- Q.10** During aerobic respiration glucose is oxidized to carbon dioxide and water and:  
A) Energy is consumed  
B) Light is consumed  
C) Energy is released  
D) Light is produced
- Q.11** This form of anaerobic respiration occurs in muscle cells of humans and other animals during extreme physical activities, such as sprinting:  
A) Alcoholic fermentation  
B) Aerobic respiration  
C) Anaerobic respiration  
D) Lactic acid fermentation



**Q.12 Cristae are part of:**

- A) Chloroplast
- B) Endoplasmic reticulum
- C) Mitochondrion
- D) Golgi apparatus

**Q.13 A large “battery” of \_\_\_\_\_ slowly release energy from the glucose molecules.**

- A) Organelles
- B) Coenzymes
- C) Enzymes
- D) Enzyme and coenzymes

**Q.14 A compound found in every living cell and is one of the essential chemicals of life. It plays a key role in most biological energy transformations. It is:**

- A) NADH
- B) FADH
- C) ATP
- D) Glucose

**Q.15 Conventionally, ‘P’ stands for the:**

- A) Phosphorus atom
- B) Entire phosphate group
- C) Phosphorus element
- D) Phosphorus acid

**Q.16 A far more free energy is released when bond of \_\_\_\_\_ phosphate of ATP is broken by hydrolysis:**

- A) First
- B) Second
- C) Third
- D) Second and third

**Q.17 What enables the cell to accumulate a great quantity of energy in very small space and keeps it ready for use as soon as it is needed:**

- A) High energy ‘P’ bond
- B) High energy bonds of organic food
- C) High energy bonds of glucose
- D) High energy bonds of lipids

**Q.18 The maintenance of a living system requires a:**

- A) Continuous supply of free energy
- B) Continual supply of free energy
- C) Continuously increasing supply of free energy
- D) Continuously decreasing supply of free energy

**Q.19 Cellular respiration is essentially:**

- A) Oxidation process
- B) Redox process
- C) A reduction process
- D) Decarboxylation process

**Q.20 Cellular respiration is also called as:**

- A) Internal respiration
- B) Biological oxidation
- C) Organismic respiration
- D) Internal respiration and biological oxidation

**Q.21 The breakdown of glucose in cell yields pyruvate in the:**

- A) Presence of oxygen
- B) Absence of oxygen
- C) Presence or absence of oxygen
- D) High Conc. of oxygen

**Q.22 Following are the requirements for glycolysis to occur in the cytoplasm EXCEPT:**

- A) Glucose
- B) ATP
- C) Enzymes and Coenzymes
- D) FAD

**Q.23 The first step of glycolysis is the transfer of a phosphate group from:**

- A) ATP to glucose
- B) ATP to fructose
- C) G.3.P to ATP
- D) ATP to G.3.P

**Q.24 The product of second step of glycolysis:**

- A) Glucose 6-phosphate

- B) Fructose 1, 6 Bisphosphate  
C) Fructose 6-phosphate  
D) Glucose
- Q.25** The second ATP is consumed in \_\_\_\_\_ step of glycolysis.  
A) First C) Third  
B) Second D) Fourth
- Q.26** The product of third step of glycolysis is:  
A) Glucose  
B) Fructose 6-phosphate  
C) Glucose 6-phosphate  
D) Fructose 1, 6-biphosphate
- Q.27** The product(s) of fourth step of glycolysis is:  
A) G.3.P  
B) 3PGAL  
C) Dihydroxyacetone phosphate  
D) G.3.P/3PGAL and Dihydroxyacetone phosphate
- Q.28** Pick up the energy yielding process of glycolysis:  
A) Oxidation of PGAL  
B) Reduction of PGAL  
C) Phosphorylation of PGAL  
D) Reduction of 3-PG
- Q.29** The step of glycolysis in which removal of a water molecule is carried out is:  
A)  $3PG \rightarrow 2PG$  C)  $PEP \rightarrow \text{Pyruvate}$   
B)  $2PG \rightarrow PEP$  D)  $1,3 \text{ BPG} \rightarrow 3PG$
- Q.30** What is equivalent to half glucose molecule that has been oxidized to the extent of losing two electrons as hydrogen atoms:  
A) G.3.P C) 3PGAL  
B) 3-PG D) Pyruvate
- Q.31** During aerobic respiration, the chemical substance that enters the mitochondrion to start Krebs cycle is:  
A) Pyruvic acid C) Acetic acid  
B) Acetyl CO-A D) Citric acid
- Q.32** Before start of Krebs cycle, following changes occur, EXCEPT:  
A) Formation of acetyl-Co-A  
B) Oxidation of acetate  
C) Reduction of NAD  
D) Decarboxylation of pyruvate
- Q.33** Krebs cycle is a cyclic series of chemical reactions during which:  
A) Oxidation process is completed  
B) Decarboxylation process is completed  
C) Reduction process is completed  
D) Energy consuming process is completed
- Q.34** In first step of Krebs cycle following changes occur, EXCEPT:  
A) Formation of citrate  
B) Condensation of oxaloacetate and acetyl Co-A  
C) Hydration and decondensation of Co-A  
D) Decarboxylation and condensation of Co-A
- Q.35** In Kreb's cycle, for formation of  $\alpha$ -ketoglutarate, following changes occur, EXCEPT:  
A) NAD – mediated oxidation  
B) Formation of NADH  
C) Decarboxylation  
D) Hydration
- Q.36** FAD is reduced to get  $\text{FADH}_2$  in a step of Krebs cycle which involves conversion of:  
A) Succinate to fumarate  
B) Malate to oxaloacetate  
C) Fumarate to malate  
D)  $\alpha$ -ketoglutarate to succinate

- Q.37** Succinate is converted into fumarate by removal of:
- A hydrogen atom
  - A CO<sub>2</sub> atom
  - Two hydrogen atoms
  - A water molecule
- Q.38** Rearrangement followed by a second ATP phosphorylation involves step no. \_\_\_\_\_ of glycolysis.
- 1
  - 2
  - 3
  - 2, 3
- Q.39** In glycolysis, the six-carbon molecule is split into G-3-P and DAP, then DAP is also converted into G-3-P in step no. \_\_\_\_\_.
- 2 & 3
  - 3 & 4
  - 4 & 5
  - 5 & 6
- Q.40** In glycolysis, oxidation followed by phosphorylation produces two NADH molecules and two molecules of BPG, in step no.
- 4
  - 5
  - 6
  - 7
- Q.41** The step of glycolysis that involves removal of high energy phosphate by two ADP molecules to get two ATP molecules and two 3PGA molecules is:
- Step – 4
  - Step – 5
  - Step – 6
  - Step – 7
- Q.42** Removal of high energy phosphate by two ADP molecules produces two ATP molecules and two pyruvate molecules in step no. \_\_\_\_\_ of glycolysis.
- 7
  - 8
  - 9
  - 10
- Q.43** The oxidation – reduction substances which take part in respiratory chain are following EXCEPT:
- Coenzyme Q
  - Molecular oxygen
  - Cytochromes b, c, a and a<sub>3</sub>
  - Cytochrome f
- Q.44** In respiratory electron transport chain the first ATP is formed from ADP and inorganic phosphate, utilizing the free energy obtained by oxidation of :
- NADH
  - FADH
  - Coenzyme Q
  - Cytochrome C
- Q.45** In respiratory electron transport chain coenzyme – Q is reduced by:
- NADH
  - FADH
  - Cytochrome - C
  - Cytochrome - a
- Q.46** In respiratory electron transport chain cytochrome – b is reduced by:
- NADH
  - FADH
  - Cytochrome - C
  - Coenzyme - Q
- Q.47** In respiratory electron transport chain cytochrome – a is reduced by oxidation of:
- NADH
  - FADH
  - Cytochrome - C
  - Coenzyme - Q
- Q.48** In respiratory electron transport chain the third ATP is produced by the oxidation of:
- NADH
  - Cytochrome - b
  - Cytochrome - c
  - Cytochrome - a<sub>3</sub>
- Q.49** Normally oxidative phosphorylation is coupled with the:
- Photosynthetic electron transport chain
  - Non-cyclic electron transport chain
  - Respiratory electron transport chain
  - Cyclic electron transport chain

- Q.50**  $\text{NADH} + \text{H}^+ + 3\text{ADP} + 3\text{Pi} + \frac{1}{2} \text{O}_2 \longrightarrow 3\text{NAD}^+ + \text{H}_2\text{O} + 3\text{ATP}$ . The equation has summarized:
- A) Glycolysis
  - B) Respiratory chain
  - C) Kreb's cycle
  - D) Photosynthetic electron transport chain
- Q.51** Pumping of protons ( $\text{H}^+$ ) across the inner membrane of mitochondrion folded into cristae, between matrix of mitochondrion and mitochondrion's intermembrane space occur for chemiosmosis of:
- A) Oxidative phosphorylation
  - B) Cyclic phosphorylation
  - C) Photophosphorylation
  - D) Non-cyclic phosphorylation
- Q.52** Accumulation of NADH inhibits the Krebs cycle by inhibiting:
- A) Phosphoglucokinase
  - B) Pyruvate decarboxylase
  - C) Phosphofructokinase
  - D) Pyruvate dehydrogenase
- Q.53** Glycolysis is inhibited by inhibition of phosphofructokinase through feedback mechanism by accumulation of \_\_\_\_\_ in mitochondrion.
- A) Citrate
  - B) Oxaloacetate
  - C) Succinate
  - D) Adenosine triphosphate
- Q.54** The final phase of cellular respiration in which the compounds NADH and  $\text{FADH}_2$  are oxidized and their electrons pass along a chain of oxidation reduction steps is called:
- A) Electron transport chain
  - B) Non-cyclic photophosphorylation
  - C) Cyclic photophosphorylation
  - D) Z – scheme
- Q.55** The first of the two distinctive sets of reactions in photosynthesis in which light energy is required to oxidize water and  $\text{O}_2$  is released, is called:
- A) Light independent reaction
  - B) Light reaction
  - C) Calvin cycle
  - D) Dark reaction
- Q.56** The second stage of photosynthesis, in which carbon dioxide is reduced to carbohydrate and which occurs whether light is present or not, is called:
- A) Light reaction
  - B) Light dependent reaction
  - C) Light independent reaction
  - D) Synthesis of ATP and  $\text{NADPH}_2$
- Q.57** The removal of electrons from an atom or compound is called:
- A) Reduction
  - B) Oxidative phosphorylation
  - C) Oxidation
  - D) Oxidation-reduction reaction
- Q.58** The condition in which reduced metabolic products comprising the “debt” accumulate due to inability of oxidative metabolism to function rapidly enough. The “debt” is payed off when the metabolism that produces reduced products slows. This is called:
- A) Electron debt
  - B) Oxygen debt
  - C) Hydrogen debt
  - D) Carbon debt
- Q.59** The two basic molecular systems for converting light to chemical energy during photosynthesis are called:
- A) Photosystem I and II
  - B) Light systems

- C) Pigment systems
- D) PS 660 and PS 730

**Q.60** The hydrogen ions move down their gradient from thylakoid space to outside through special complexes found in thylakoid membrane called:

- A) Ferredoxine
- B) ATP synthase
- C) Cytochrome complex
- D) Plastoquinone

**Q.61** A process of CO<sub>2</sub> fixation in photosynthesis by which the first product is the four-carbon oxaloacetate molecule is called:

- A) C<sub>3</sub> photosynthesis
- B) C<sub>4</sub> photosynthesis
- C) Light reaction
- D) Cyclic electron flow



**ANSWER KEY**  
**(Worksheet-13(ii))**

1	B	23	A	45	A
2	B	24	C	46	D
3	C	25	C	47	C
4	D	26	D	48	D
5	A	27	D	49	C
6	D	28	A	50	B
7	A	29	B	51	A
8	A	30	D	52	B
9	C	31	C	53	A
10	C	32	B	54	A
11	D	33	A	55	B
12	C	34	D	56	C
13	D	35	D	57	C
14	C	36	A	58	B
15	B	37	C	59	A
16	D	38	D	60	B
17	A	39	C	61	B
18	B	40	C		
19	A	41	D		
20	D	42	D		
21	C	43	D		
22	D	44	A		

**EXPLANATION**

**Q.1** Answer is “Glycolysis”

**Explanation:** It indicates formation of two molecules of pyruvate from one molecule of glucose.

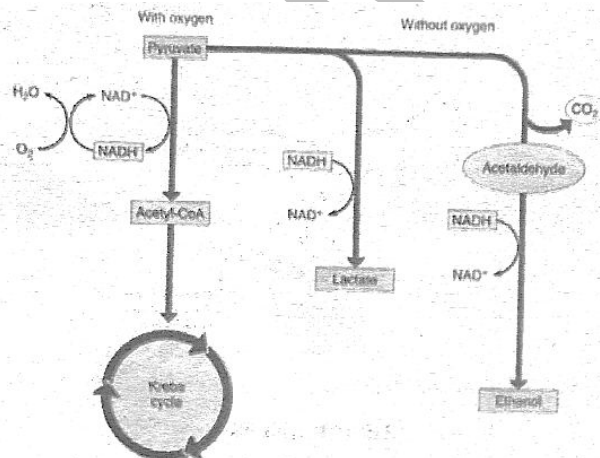
**Q.2** Answer is “Glycolysis”

**Explanation:** Glycolysis is such a process which is found in both prokaryotes and eukaryotes. It occurs in cytoplasm. Without glycolysis there is no other option for provision of energy to the cell.

**Q.3** Answer is “Glycolysis”

**Explanation:** If aerobic conditions prevail after glycolysis it will follow the path of oxidation of pyruvate and Krebs cycle

otherwise it will follow the path of lactic acid fermentation or alcoholic fermentation.



**Q.4** Answer is “Organism and metabolic condition”

**Explanation:** In prokaryotes, membranous organelles like mitochondria are absent. Thus, they follow the path of anaerobic respiration after completion of glycolysis. However, eukaryotes having membranous organelles like mitochondria carry out aerobic respiration. Similarly, in aerobic conditions aerobic respiration is possible but in anaerobic conditions, after glycolysis there is only option of anaerobic respiration.

**Q.5** Answer is “Pyruvate in cell”

**Explanation:** After glycolysis cell gets two molecules of pyruvate. After formation of pyruvate there comes oxidation of pyruvate and Krebs cycle, if oxygen is present and fermentation (Alcoholic or lactic acid fermentation) occurs, if oxygen is absent.

**Q.6** Answer is “Alcoholic and lactic acid fermentation”

**Explanation:** Both alcoholic fermentation and lactic acid fermentation occur in absence of oxygen. It is also called anaerobic respiration.

**Q.7 Answer is “Fermentation”**

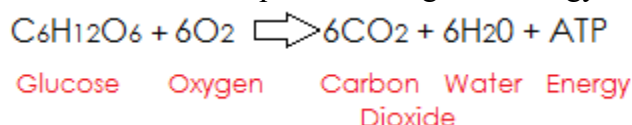
**Explanation:** Fermentation is an anaerobic process which is also called as anaerobic respiration.

**Q.8 Answer is “Aerobic respiration”**

**Explanation:** Anaerobic respiration is a sheer wastage of resources and is opted as necessary evil. It yields only 2% of the total potential energy. However, aerobic respiration yield maximum energy.

**Q.9 Answer is “CO<sub>2</sub> and water”**

**Explanation:** These are the end products of aerobic respiration along with energy.

**Q.10 Answer is “Energy is released”**

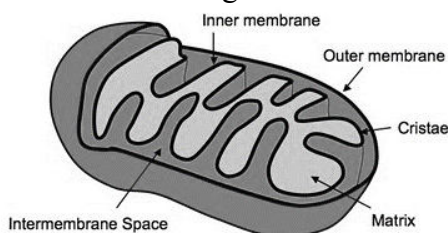
**Explanation:** During aerobic respiration glucose is broken down in the presence of oxygen into carbon dioxide and water and energy is produced. See the explanation of Q No. 9.

**Q.11 Answer is “Lactic acid fermentation”**

**Explanation:** As oxygen cannot be provided according to the demand in such situations and due to this deficit in demand and supply of oxygen muscles have to start anaerobic respiration to supplement the energy.

**Q.12 Answer is “Mitochondria”**

**Explanation:** Each mitochondrion is constructed of an outer enclosing membrane and an inner membrane with elaborate folds or cristae that extend into the interior of the organelle.

**Q.13 Answer is “Enzymes and coenzymes”**

**Explanation:** Aerobic respiration being a long pathway involves many enzymes and coenzymes.

**Q.14 Answer is “ATP”**

**Explanation:** That is why it is called energy currency of the cell.

**Q.15 Answer is “Entire phosphate group”**

**Explanation:** Conventionally, “P” stands for the entire phosphate group. The second and third phosphate represent the so called “high energy” bonds. If these are broken by hydrolysis far more free energy is released as compared to the other bond in the ATP molecule.

**Q.16 Answer is “Second and third”**

**Explanation:** The second and third phosphate represent the so called “high energy” bonds.

**Q.17 Answer is “High energy ‘p’ bond”**

**Explanation:** The energy of organic food is extracted from its bonds through aerobic respiration and is called ATP (in high energy ‘p’ bond).

**Q.18 Answer is “Continual supply of free energy”**

**Explanation:** Continual supply means rhythmic supply after equal time intervals but does not mean persistent supply or unabated supply.

**Q.19 Answer is “Oxidation process”**

**Explanation:** It is stepwise oxidative breakdown of organic food to get energy.

**Q.20 Answer is “Internal respiration or biological oxidation”**

**Explanation:** Cellular respiration is called internal respiration and biological oxidation of glucose to get energy.

**Q.21** Answer is “Presence or absence of oxygen”

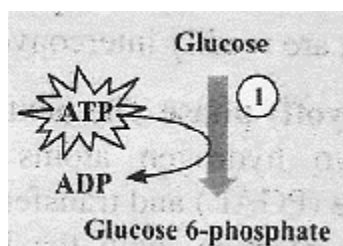
**Explanation:** As glycolysis does not need oxygen.

**Q.22** Answer is “FAD”

**Explanation:** FAD (Flavin adenine dinucleotide) have nothing to do with glycolysis.

**Q.23** Answer is “ATP to glucose”

**Explanation:** As a result Glucose 6-phosphate is formed.

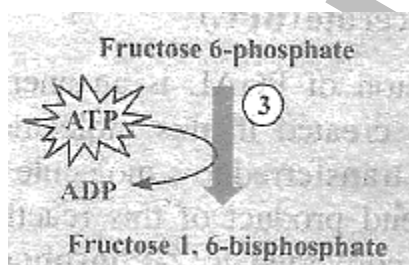


**Q.24** Answer is “Fructose 6-phosphate”

**Explanation:** Aldohexose (glucose 6 phosphate) is transformed into ketohexose (fructose 6 phosphate).

**Q.25** Answer is “Third”

**Explanation:** It is formation of fructose 1, 6 bisphosphate from fructose 6 phosphate.

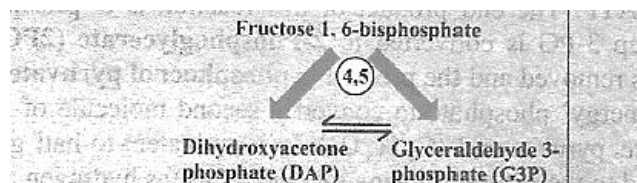


**Q.26** Answer is “Fructose 1,6 bisphosphate”

**Explanation:** As one ATP is again consumed.

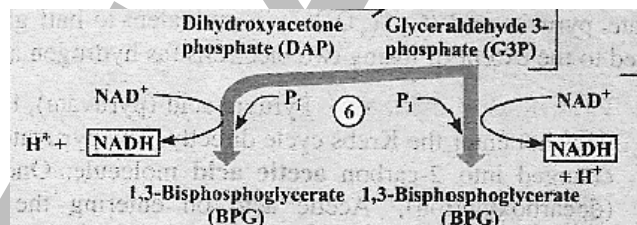
**Q.27** Answer is “G.3.P/3PGAL and dihydroxyacetone phosphate”

**Explanation:** As fructose 1, 6 bisphosphate is cleaved to yield two trioses i.e. Glyceraldehyde 3 phosphate and dihydroxyacetone phosphate.



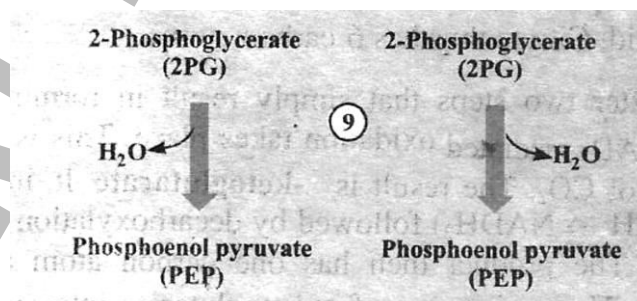
**Q.28** Answer is “Oxidation of PGAL”

**Explanation:** NAD is reduced by oxidation of PGAL and  $\text{NADH}^+$  is formed.



**Q.29** Answer is “2PG → PEP”

**Explanation:** Dehydration occurs during the formation of phosphoenol pyruvate from 2 phosphoglycerate.



**Q.30** Answer is “Pyruvate”

**Explanation:** It occurs during oxidation of pyruvate. Pyruvic acid (pyruvate) the end product of glycolysis does not enter the Krebs cycle directly. The pyruvate (3-carbon molecule) is first changed into 2-carbon acetic acid molecule. One carbon is released as  $\text{CO}_2$  coenzyme-A (CoA) to form acetyl CoA (Active acetate). In addition, more hydrogen atoms are transferred to NAD.

**Q.31** Answer is “Acetic acid”

**Explanation:** Acetic acid on entering the mitochondrion unites with Coenzyme A to form acetyl Co-A.



**Q.32 Answer is “Oxidation of acetate”**

**Explanation:** Oxidation of pyruvate takes places not that of acetate.

**Q.33 Answer is “Oxidation process is completed”**

**Explanation:** Oxidative breakdown of organic food is completed.

**Q.34 Answer is “Decarboxylation and condensation of Co-A”**

**Explanation:** Other three changes given in A), B) and C) occur in first step of Krebs cycle except decarboxylation and condensation of Co-A.

**Q.35 Answer is “Hydration”**

**Explanation:** No hydration occurs in this step.

**Q.36 Answer is “Succinate to fumarate”**

**Explanation:** The succinate is oxidized to get fumarate in presence of succinic acid dehydrogenase enzyme.

**Q.37 Answer is “Two hydrogen atoms”**

**Explanation:** Succinate is converted into fumarate and two hydrogen atoms are removed. The process is catalyzed by succinic acid dehydrogenase.

**Q.38 Answer is “2, 3”**

**Explanation:** Step 2 involves rearrangement i.e. formation of Fructose 6-phosphate from glucose 6-phosphate; and 3 involves ATP phosphorylation.

**Q.39 Answer is “4-5”**

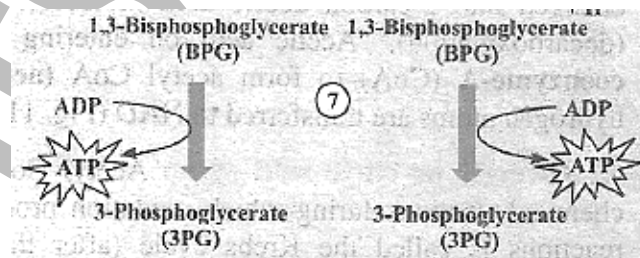
**Explanation:** Fructose 1, 6 bisphosphate splits up into glyceraldehyde 3-phosphate and dihydroxyacetone phosphate during step no.4 of glycolysis which is followed by step no.5 in which dihydroxyacetone phosphate is also converted into glyceraldehyde three phosphate (G.3.P). See explanation of question # 27

**Q.40 Answer is “6”**

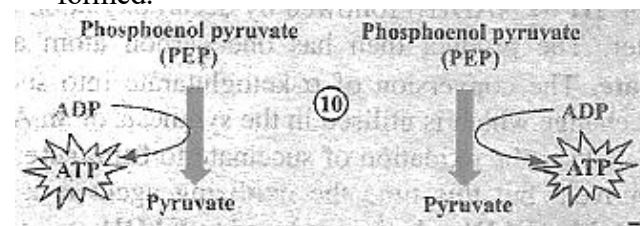
**Explanation:** In step no. 6 of glycolysis two molecules of G3P are oxidized and two molecules of NAD are reduced (NADH) and as a result two molecules of 1, 3 bisphosphoglycerate are formed. See the explanation of question # 28.

**Q.41 Answer is “Step 7”**

**Explanation:** In step no. 7 of glycolysis, two molecules of 1, 3 bisphosphoglycerate are dephosphorylated, two molecules of ADP are phosphorylated to get two ATPs and as a result two molecules of 3PGA are formed.

**Q.42 Answer is “10”**

**Explanation:** In step no. 10 of glycolysis two molecules of phosphoenol pyruvate (PEP) are converted into two molecules of pyruvate and two molecules of ATP are formed.

**Q.43 Answer is “Cytochrome f”**

**Explanation:** Cytochrome b6f, commonly called as cytochrome f is involved in photosynthesis to mediate the transfer of electron between the two photosynthetic reaction center complexes, from photosystem II to photosystem I, while transferring protons from the chloroplast stroma across the thylakoid membrane into the lumen.

**Q.44 Answer is “NADH”**

**Explanation:** It is first step of respiratory electron transport chain in which NADH is oxidized by coenzyme Q. This oxidation yields enough free energy to permit the synthesis of a molecule of ATP from ADP from ADP and inorganic phosphate.

**Q.45 Answer is “NADH”**

**Explanation:** As NADH stands at higher energy level and electron move from higher to lower energy level, thus NADH is oxidized and coenzymes Q is reduced.

**Q.46 Answer is “Coenzyme – Q”**

**Explanation:** Cytochrome-b is reduced by electrons which are released by the oxidation of coenzyme Q.

**Q.47 Answer is “Cytochrome – C”**

**Explanation:** Cytochrome-a is reduced by cytochrome c which is oxidized and electrons are used to reduced cytochrome a.

**Q.48 Answer is “Cytochrome a<sub>3</sub>”**

**Explanation:** When cytochrome a<sub>3</sub> is oxidized and O<sub>2</sub> is reduced to form water, electrons release some free energy to come to the lower energy state and as a result ADP is phosphorylated into ATP by inorganic phosphate using that free energy.

**Q.49 Answer is “Respiratory electron transport chain”**

**Explanation:** There are three different sites where oxidative phosphorylation occurs to yield three ATP molecules during respiratory electron transport chain.

**Q.50 Answer is “Respiratory chain”**

**Explanation:** This is summary equation of respiratory electron transport chain.

**Q.51 Answer is “Oxidative phosphorylation”**

**Explanation:** The organelle (mitochondrion) clearly indicates it.

**Q.52 Answer is “Pyruvate decarboxylase”**

**Explanation:** If pyruvate decarboxylase is inhibited acetate formation and subsequently Acetyl Co. A formation will be stopped. As a result Kreb's cycle will be stopped from the beginning. It is called negative feedback or feedback inhibition.

**Q.53 Answer is “Citrate”**

**Explanation:** See Book-I page # 299 fig. 11.15.

**Q.54 Answer is “Electron transport chain”**

**Explanation:** It is respiratory electron transport chain also called oxidative phosphorylation.

**Q.55 Answer is “Light reaction”**

**Explanation:** It is light reaction or photophosphorylation which uses light energy for photolysis of water in which oxygen is released.

**Q.56 Answer is “Light independent reaction”**

**Explanation:** Light independent phase also called as dark reaction or Calvin cycle is that phase which uses the reducing power and assimilatory powers (made in light reaction) to reduce CO<sub>2</sub> and to synthesized glucose.

**Q.57 Answer is “Oxidation”**

**Explanation:** Removal of electrons is oxidation while addition of electrons is reduction.

**Q.58 Answer is “Oxygen debt”**

**Explanation:** It have been taken from glossary of text book of biology book-I. It is definition of oxygen debt.

**Q.59 Answer is “Photosystem-I and photosystem-II”**

**Explanation:** Photosystems convert light energy into chemical energy.



**Q.60** Answer is “ATP synthase”

**Explanation:** ATP synthase is an important enzyme that creates the energy storage molecules adenosine triphosphate (ATP). ATP is the most commonly used “energy currency” of cells from most organisms.

**Q.61** Answer is “C<sub>4</sub> photosynthesis”

**Explanation:** A photosynthetic process which proceeds in the mesophyll and bundle sheath cells of C<sub>4</sub> plants.

STEP ENTRY TEST 2020

# STOP

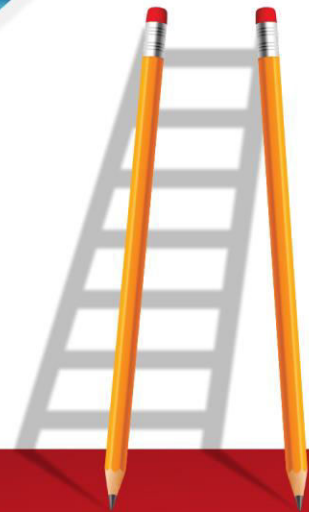
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# BIOLOGY



## Worksheet-14



**STP**

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**Worksheet-14 (i)**  
**(Gas Exchange)**

**Q.1** Air passageways of human being consist of following parts EXCEPT:

- A) Nostrils and nasal cavities
- B) Bronchi, bronchioles and alveolar ducts
- C) Pharynx, larynx and trachea
- D) Air sacs and alveoli

**Q.2** Both nasal cavities are collectively sub divided into:

- A) Three passageways
- B) Five passageways
- C) Four passageways
- D) Six passageways

**Q.3** Each nasal cavity is sub divided into three passageways by the projection of bones from the walls of the:

- A) External nose      C) Middle nose
- B) Internal nose      D) Posterior nose

**Q.4** The nasal cavity leads into the throat or pharynx by:

- A) Three internal openings
- B) Two internal openings
- C) Four internal openings
- D) Five internal openings

**Q.5** The larynx or voice box is a complex cartilaginous structure surrounding the:

- A) Upper end of trachea
- B) Upper end of pharynx
- C) Lower end of trachea
- D) Upper end of bronchi

**Q.6** One of the cartilage has a muscularly controlled hinge like action and serves as a lid which automatically covers the opening of the larynx and is called:

- A) Glottis      C) Voice box

- B) Epiglottis      D) Vocal cord

**Q.7** Glottis is the opening of:

- A) Larynx      C) Trachea
- B) Pharynx      D) Windpipe

**Q.8** In the glottis the mucous membrane is stretched across into two thin edged fibrous bands called:

- A) Vocal cords      C) Nerve cords
- B) Epiglottis      D) Notochord

**Q.9** The commonly held belief that the epiglottis closes downward upon the larynx when food is swallowed is:

- A) Quite true      C) Not quite true
- B) Quite wrong      D) Quite baseless

**Q.10** The degree of closure of larynx is determined partly by:

- A) Backward movement of the tongue
- B) Upward movement of the larynx
- C) Backward movement of the tongue and upward movement of the larynx
- D) Backward movement of the larynx and upward movement of the tongue

**Q.11** What forces the epiglottis into more or less horizontal position:

- A) Forward movement of the tongue
- B) Upward movement of the larynx
- C) Backward movement of the tongue
- D) Downward movement of the larynx

**Q.12** Food does not enter the partly open larynx and obstruct breathing primarily because the:

- A) Epiglottis diverts the food mass to one side of the opening
- B) Esophageal sphincter is contracted
- C) Esophageal sphincter is relaxed

- D) Glottis is so narrow to receive the food
- Q.13 Trachea upon entering into the thorax divides into:**
- A) Right and left bronchi  
B) Upper and lower bronchi  
C) Dorsal and ventral bronchi  
D) Smaller and larger bronchi
- Q.14 These are mainly made up of circular smooth muscles:**
- A) Larynx C) Bronchi  
B) Trachea D) Bronchioles
- Q.15 These continue to divide and sub divide deep into the lungs and finally open into a large number of air sacs:**
- A) Larynx C) Bronchi  
B) Trachea D) Bronchioles
- Q.16 Pleural membranes line the part of the thoracic cavity containing the lungs, so the lungs are in the:**
- A) Pleural cavity C) Thoracic cage  
B) Rib cage D) Diaphragm
- Q.17 Air enters the lungs from the oral cavity or nasal passages via trachea and bronchi and eventually reaches the:**
- A) Air sacs C) Bronchioles  
B) Alveoli D) Thoracic cavity
- Q.18 These are the organs placed in the chest cavity:**
- A) Air sacs C) Thorax  
B) Alveoli D) The lungs
- Q.19 Chest cavity is bound on sides by:**
- A) Ribs C) Ribs and Muscles  
B) Muscles D) Diaphragm
- Q.20 C shaped cartilaginous rings present in the wall of trachea prevent it from:**
- A) Bending  
B) Collapsing  
C) Opening  
D) Changing its diameter
- Q.21 Lungs are covered with double layered thin membranous sac called:**
- A) Air sacs C) Pleura  
B) Alveoli D) Rib cage
- Q.22 An uninterrupted supply of energy is required for activities at:**
- A) Cell level  
B) Organs level  
C) Tissue level  
D) Cell, Organs and Tissue levels
- Q.23 It is the process by which cell utilizes oxygen, produces carbon dioxide, extracts and conserves the energy:**
- A) Organismic respiration  
B) Breathing  
C) External Respiration  
D) Cellular respiration
- Q.24 In human being respiratory pigment is:**
- A) Myoglobin C) Hemocyanin  
B) Hemoglobin D) Oxyhaemoglobin
- Q.25 It is contained in the red blood cells:**
- A) Myoglobin C) Hemocyanin  
B) Hemoglobin D) Phycoerythrin
- Q.26 Oxyhemoglobin is unstable and splits into the normal purple red colored hemoglobin and oxygen in the condition of:**
- A) Low oxygen concentration and less pressure  
B) Low oxygen concentration and more pressure  
C) High oxygen concentration and more pressure



- D) High oxygen concentration and low pressure
- Q.27 Carbonic anhydrase enzyme present in R.B.C facilitates:**
- A) Splitting up of oxyhemoglobin
  - B) Splitting up of carboxyhemoglobin
  - C) Formation of hemoglobin
  - D) Formation of carboxyhemoglobin
- Q.28 The maximum amount of oxygen which normal human blood absorbs and carries at sea level is about:**
- A) 19.6 ml/100 ml of blood
  - B) 20 ml/98 ml of blood
  - C) 20 ml/100 ml of blood
  - D) 19.6 ml/98 ml of blood
- Q.29 Under normal conditions, blood of alveoli of the lungs is:**
- A) Completely oxygenated
  - B) Not oxygenated at all
  - C) Not completely oxygenated
  - D) Over oxygenated
- Q.30 At oxygen tension of 115 mm mercury the hemoglobin will carry oxygen as given below:**
- A) 20 ml / 100 ml of blood
  - B) 21 ml / 100 ml of blood
  - C) 19.6 ml / 100 ml of blood
  - D) 22 ml / 100 ml of blood
- Q.31 When oxygen pressure falls below 60 mm mercury in any cell and tissue, the oxygen saturation of hemoglobin:**
- A) Increases very sharply
  - B) Increases slowly
  - C) Decreases very sharply
  - D) Decreases slowly
- Q.32 For a scuba diver to breathe, the oxygen pressure should be:**
- A) Same as at sea level
  - B) Lesser than that at sea level
  - C) Greater than that at sea level
  - D) Inversely proportional to the depth
- Q.33 The oxygen carrying capacity of hemoglobin is decreased by:**
- A) Decreasing carbon dioxide pressure
  - B) Decreasing temperature of the blood
  - C) Decreasing pH of the blood
  - D) Increasing pH of the blood
- Q.34 The oxygen carrying capacity of hemoglobin is increased by:**
- A) Increasing carbon dioxide pressure
  - B) Increasing temperature of the blood
  - C) Increasing pH of the blood
  - D) Decreasing pH of the blood
- Q.35 The capacity of hemoglobin to hold oxygen becomes less by:**
- A) Increasing oxygen tension
  - B) Increasing pH of the blood
  - C) Decreasing temperature of the blood
  - D) Increasing carbon dioxide pressure
- Q.36 Increased carbon dioxide tension favors the:**
- A) Greater liberation of oxygen from the tissue to the blood
  - B) Greater liberation of oxygen from the blood to the tissues
  - C) Lesser liberation of oxygen from the blood to the tissues
  - D) Greater liberation of carbon dioxide from the blood of the tissues
- Q.37 What results in a decreased ability of hemoglobin to bind oxygen:**
- A) Decreased pH
  - B) Increased hydrogen ion concentration

C) Combination of hydrogen ions with protein part of hemoglobin

D) Low temperature

**Q.38 As regulator of alveolar ventilation carbon dioxide is much important in:**

A) Conditions of shock

B) Conditions of emergency

C) Conditions of shock and emergency

D) Normal conditions

**Q.39 The carbon dioxide carried as carboxyhemoglobin is \_\_\_\_\_ of the total carried by blood.**

A) 5%

C) 20%

B) 70%

D) 5%

**Q.40 The carbon dioxide carried by other plasma proteins is:**

A) 5%

C) 20%

B) 70%

D) 5%

**Q.41 The maximum amount of CO<sub>2</sub> is carried by blood as:**

A) Carboxyhemoglobin

B) Dissolved in plasma

C) Bicarbonate ion

D) Combined with potassium

**Q.42 The carbon dioxide carried as bicarbonate ions is combined with:**

A) Potassium

C) Sodium

B) Calcium

D) Magnesium

**Q.43 Pick up the chemical change promoted by carbonic anhydrase enzyme:**

A)  $HbO \longrightarrow Hb + O_2$

B)  $H^+ + HCO_3^- \longrightarrow H_2CO_3$

C)  $H_2CO_3 \longrightarrow H^+ + HCO_3^-$

D)  $H_2CO_3 \longrightarrow CO_2 + H_2O$

**Q.44 What occurs finally in blood capillaries of tissues:**

A)  $HCO^- + H^+ \longrightarrow H_2CO_3$

B)  $H_2CO_3 \longrightarrow CO_2 + H_2O$

C)  $CO_2 + H_2O \longrightarrow H_2CO_3$

D)  $Hb + O_2 \longrightarrow HbO_2$

**Q.45 What occurs in blood capillaries surrounding the alveoli:**

A)  $CO_2 + H_2O \longrightarrow H_2CO_3$

B)  $Hb + O_2 \longrightarrow HbO_2$

C)  $H_2CO_3 \longrightarrow CO_2 + H_2O$

D)  $HCO_3 + H^+ \longrightarrow H_2CO_3$

**Q.46 It diffuses out from the capillaries of the lungs into space of alveolar sac:**

A) Oxygen

B) Carbon dioxide

C) Carboxyhemoglobin

D) Oxyhemoglobin

**Q.47 It diffuses out from the alveolar sac into the capillaries of the lungs:**

A) Oxygen

B) Carbon dioxide

C) Carboxyhemoglobin

D) Oxyhemoglobin

**Q.48 Small amount of carbon dioxide is also carried by corpuscles by combining with:**

A) Sodium

C) Calcium

B) Potassium

D) Magnesium

**Q.49 How much amount of CO<sub>2</sub> is given off by blood while passing through the lungs per 100 ml of blood:**

A) 20ml

C) 54ml

B) 50ml

D) 4ml

**Q.50 It is a process in which fresh air containing more oxygen is pumped into lungs:**

A) Internal respiration C) Breathing

B) Cellular respiration D) Assimilation

**Q.51 A mechanical process consisting of two phases is:**

- A) Internal respiration C) Breathing
- B) Cellular respiration D) Assimilation

**Q.52 Breathing is a mechanical process consisting of:**

- A) Two phases C) Four phases
- B) Three phases D) Five phases

**Q.53 A phase in which fresh air moves into the lungs is called:**

- A) Expiration
- B) Ventilation
- C) Inspiration
- D) External respiration

**Q.54 A phase in which air with low O<sub>2</sub> and high CO<sub>2</sub> content moves out of the lungs is called:**

- A) Expiration
- B) Ventilation
- C) Inspiration
- D) External respiration

**Q.55 To understand the mechanism of breathing, we should keep in mind \_\_\_\_\_ aspects related to lungs and associated structures.**

- A) Three C) Five
- B) Four D) Six

**Q.56 Pick up the correct statement about lungs:**

- A) During inspiration active expansion takes place
- B) During expiration active contraction takes place
- C) During inspiration passive contraction takes place
- D) During expiration passive contraction takes place

**Q.57 The shape of diaphragm is more dome like:**

- A) At day time
- B) When its muscles relaxed
- C) When its muscle contract
- D) At night time

**Q.58 The shape of diaphragm becomes less dome like:**

- A) At day time
- B) When its muscles are relaxed
- C) When its muscle contract
- D) At night time

**Q.59 Walls of chest cavity are composed of:**

- A) Ribs
- B) Diaphragm
- C) Intercostal muscles
- D) Ribs and intercostal muscles

**Q.60 Ribs are elevated, when:**

- A) Muscles between the ribs contract
- B) Muscles of the lungs contract
- C) Muscles between the ribs are relaxed
- D) Muscles of the diaphragm are relaxed

**Q.61 During inspiration the space inside the chest cavity is increased in:**

- A) Two ways C) Four ways
- B) Three ways D) Five ways

**Q.62 During inspiration; the muscles of the ribs contract and this:**

- A) Elevates the ribs upwards and outwards
- B) Settles down the ribs downwards and backwards
- C) Elevates the ribs upwards and backwards
- D) Settles down the ribs downwards and forwards

**Q.63 During inspiration, the muscles of the diaphragm:**

- A) Relax and diaphragm becomes more dome like

- B) Contract and diaphragm becomes less dome like  
C) Relax and diaphragm becomes less dome like  
D) Contract and diaphragm becomes more dome like
- Q.64** The space in chest cavity is increased due to the movement of:  
A) Diaphragm upwards  
B) Ribs downwards  
C) Ribs upwards  
D) Diaphragm downwards and ribs upwards
- Q.65** With the expansion of lungs vacuum is created inside the lungs in which the air rushes from outside due to higher atmospheric pressure, this is called:  
A) Respiration                      C) Ventilation  
B) Inspiration                      D) Breathing
- Q.66** Pick up the event which is not fit among the rest of the three events:  
A) Ribs move downwards and inwards  
B) Diaphragm becomes less dome like  
C) Muscles of the ribs are relaxed  
D) The space in chest cavity becomes less
- Q.67** The immediate cause of the contraction of lungs during expiration is:  
A) Muscles of diaphragm relax  
B) Reduction in the space of chest cavity  
C) Diaphragm becoming more dome like  
D) Ribs moves downwards and inwards
- Q.68** The chest cavity is reduced from the floor by:  
A) Contraction of the muscles of diaphragm  
B) Contraction of the muscles of the ribs  
C) Relaxation of the muscles of diaphragm  
D) Relaxation of the muscles of the ribs
- Q.69** In premature infants, respiratory distress syndrome is common, especially for infants with a gestation age:  
A) Less than 7 months  
B) Less than 8 months  
C) More than 7 months  
D) More than 8 months
- Q.70** The deficiency which becomes ultimate cause of respiratory distress syndrome is that of:  
A) Gestation age  
B) Number of alveoli  
C) Surfactant  
D) Atmospheric pressure
- Q.71** The most important protein present in many animals including man is:  
A) Myoglobin                      C) Albumin  
B) Hemoglobin                      D) Fibrin
- Q.72** It serves as an intermediate compound for the transfer of oxygen from hemoglobin to aerobic metabolic process of the muscle cells:  
A) Blood plasma                      C) Myoglobin  
B) RBCs                      D) Hemoglobin
- Q.73** Which one of the following is a contagious disease?  
A) Tuberculosis                      C) Emphysema  
B) Asthma                      D) Obesity
- Q.74** The chances of lung cancer are \_\_\_\_\_ times less in those persons who do not smoke:  
A) 30                      C) 10  
B) 20                      D) 5
- Q.75** Alveolar walls degenerate and small alveoli combine to form larger alveoli in patients with:  
A) Lung cancer                      C) Tuberculosis  
B) Asthma                      D) Emphysema

<b>ANSWER KEY</b> <b>(Worksheet-14 (i))</b>					
1	D	26	A	51	C
2	D	27	A	52	A
3	B	28	C	53	C
4	B	29	C	54	A
5	A	30	C	55	A
6	B	31	C	56	D
7	A	32	C	57	B
8	A	33	C	58	C
9	C	34	C	59	D
10	C	35	D	60	A
11	C	36	B	61	A
12	A	37	C	62	A
13	A	38	D	63	B
14	D	39	C	64	D
15	D	40	A	65	B
16	A	41	C	66	B
17	B	42	C	67	B
18	D	43	A	68	C
19	C	44	A	69	A
20	B	45	C	70	C
21	C	46	B	71	B
22	D	47	A	72	C
23	D	48	B	73	A
24	B	49	D	74	C
25	B	50	C	75	D

**EXPLANATION**

**Q.1** Answer is “Air sacs and Alveoli”

**Explanation:** Air passageways start from nostrils and end up at alveolar ducts. Alveoli are the sites of exchange of gases which are located inside the air sacs.

**Q.2** Answer is “Six passageways”

**Explanation:** Because each nasal cavity is subdivided into three passageways by the projection of two bones from the walls of the internal nose. These bones are inferior nasal concha and middle nasal concha.

**Q.3** Answer is “Internal nose”

**Explanation:** Each nasal cavity is subdivided into three passageways by the projection of bones from the walls on internal nose.

**Q.4** Answer is “Two internal openings”

**Explanation:** These are internal nostrils or internal nares.

**Q.5** Answer is “Upper end of trachea”

**Explanation:** The larynx or voice box is a complex cartilaginous structure surrounding the upper end of trachea.

**Q.6** Answer is “Epiglottis”

**Explanation:** It is lid of glottis.

**Q.7** Answer is “Larynx”

**Explanation:** The opening of larynx is called glottis and epiglottis is its lid.

**Q.8** Answer is “Vocal cords”

**Explanation:** In the glottis the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in voice production, when vibrated by air.

**Q.9** Answer is “Not quite true”

**Explanation:** Glottis is never closed completely, so it is not quite true. However, glottis is partially closed by epiglottis during swallowing, thus it is baseless or quite wrong concept.

**Q.10** Answer is “Backward movement of the tongue and upward movement of the larynx”

**Explanation:** By both of these movements glottis is partly closed and food is directed towards food pipe.

**Q.11** Answer is “Backward movement of tongue”

**Explanation:** The closure of glottis is never complete; the degree of closure is determined partly by the backward movement of the tongue during



swallowing which forces the epiglottis into more or less horizontal position.

**Q.12 Answer is “Epiglottis diverts the food mass to one side of the opening”**

**Explanation:** Food does not enter the partly open larynx and obstruct breathing primarily because the epiglottis diverts the food mass to one side of the opening safely down the esophagus.

**Q.13 Answer is “Right and left bronchi”**

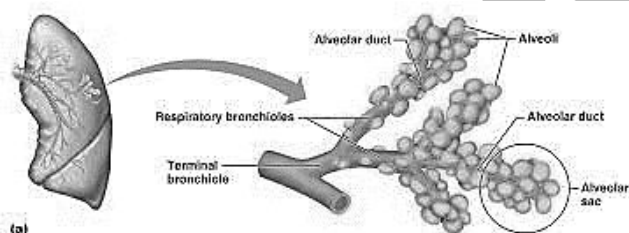
**Explanation:** Trachea sub-divides into light right and left bronchi. Each bronchus enters into a kidney.

**Q.14 Answer is “Bronchioles”**

**Explanation:** Trachea or wind pipe is a tubular structure lying ventral to the oesophagus and extends to the chest cavity or thorax where it is divided into right and left bronchi.

**Q.15 Answer is “Bronchioles”**

**Explanation:** Air sacs are functional units of lungs and receive air from bronchioles.



**Q.16 Answer is “Pleural cavity”**

**Explanation:** Pleural cavity provides protection to the lungs from over extension and also contains the pleural fluid.

**Q.17 Answer is “Alveoli”**

**Explanation:** Alveoli are structural units of lungs having thin membrane through which gases are exchanged with blood.

**Q.18 Answer is “The lungs”**

**Explanation:** Lungs are located in chest cavity also called as thoracic cavity.

**Q.19 Answer is “Ribs and Muscles”**

**Explanation:** Ribs provide bony protection to lungs against external physical trauma, whereas muscles are used in breathing.

**Q.20 Answer is “Collapsing”**

**Explanation:** Otherwise the walls will not be stronger enough to keep the lumen open.

**Q.21 Answer is “Pleura”**

**Explanation:** The pulmonary pleurae are the two pleurae of the invaginated sac surrounding lungs and attaching to the thoracic cavity.

**Q.22 Answer is “Cell organs and tissue levels”**

**Explanation:** Energy is basic need for any activity taking place at any level in an organism.

**Q.23 Answer is “Cellular respiration”**

**Explanation:** Cellular respiration is the process that utilizes oxygen, produces carbon dioxide and produces energy.

**Q.24 Answer is “Hemoglobin”**

**Explanation:** Main respiratory pigment in human body is hemoglobin, however in muscle cells myoglobin acts as a secondary respiratory pigment.

**Q.25 Answer is “Hemoglobin”**

**Explanation:** About 95% of the cytoplasm of red blood cells is occupied by hemoglobin and nucleus is also sacrificed to accommodate it.

**Q.26 Answer is “Low oxygen concentration and less pressure”**

**Explanation:** Oxyhaemoglobin is unstable and splits into the normal purple-red colored hemoglobin and oxygen in the condition of low oxygen concentration and less pressure. Carbonic anhydrase

enzyme present in R.B.C facilitates this activity

**Q.27 Answer is “Splitting up of oxyhemoglobin”**

**Explanation:** Carbonic anhydrase catalyses both formation and splitting up of oxyhemoglobin.

**Q.28 Answer is “20 ml / 100 ml of blood”**

**Explanation:** It is maximum oxygen carrying capacity of blood.

**Q.29 Answer is “Not completely oxygenated”**

**Explanation:** Because complete oxygenation requires optimum conditions and normal optimum conditions do not prevail.

**Q.30 Answer is “19.6ml / 100 ml of blood”**

**Explanation:** When oxygen tension is 115mm mercury, hemoglobin is 98 percent saturated and therefore, contains 19.6 ml of oxygen per 100ml of blood.

**Q.31 Answer is “Decreases very sharply”**

**Explanation:** Oxygen saturation level can be achieved under high pressure of  $O_2$  only. When oxygen pressure falls, oxygenation level also falls.

**Q.32 Answer is “Greater than that at sea level”**

**Explanation:** Otherwise inhalation will not occur as air always moves from higher pressure to lower one.

**Q.33 Answer is “Decreasing pH of the blood”**

**Explanation:** As pH is decreased by increase in  $H^+$  ion concentration and  $H^+$  have antagonistic relation with  $O_2$  for hemoglobin.

**Q.34 Answer is “Increasing pH of the blood”**

**Explanation:** By increasing pH concentration of hydroxyl ( $OH^-$ ) ions is increased and concentration of ( $H^+$ ) ions is decreased. As  $H^+$  ions antagonize with  $O_2$  for combining with hemoglobin, the low concentration of  $H^+$  ions will favour the oxygen to combine with hemoglobin.

**Q.35 Answer is “Increasing  $CO_2$  pressure”**

**Explanation:**  $CO_2$  and  $O_2$  also have antagonistic relation with hemoglobin.

**Q.36 Answer is “Greater liberation of oxygen form the blood to the tissues.”**

**Explanation:** As  $O_2$  and  $CO_2$  both have bonding affinity with hemoglobin, so both compete with each other for it and if one is low in concentration the other will face lesser opposition in binding with hemoglobin and vice versa.

**Q.37 Answer is “Combination of hydrogen ions with protein of hemoglobin”**

**Explanation:** When pH is decreased, by increase in hydrogen ion concentration, the hydrogen ions get a chance to combine with the protein part of hemoglobin instead of oxygen and ability of oxygen to combine with hemoglobin decreases. Thus ultimate cause is combination of hydrogen ions with protein part of hemoglobin.

**Q.38 Answer is “Normal conditions”**

**Explanation:** Because the chemoreceptors of the body are more sensitive to  $CO_2$  as compared to oxygen. That is why  $CO_2$  acquires regulatory role.

**Q.39 Answer is “20%”**

**Explanation:** Some carbon dioxide (about 20%) is carried as carboxyhemoglobin. Carboxyhemoglobin is formed when carbon dioxide combines with amino group of hemoglobin

**Q.40 Answer is “5%”**

**Explanation:** Other plasma proteins also carry about 5% carbon dioxide from the body fluids to the capillaries of the lungs.

**Q.41 Answer is “Bicarbonate ion”**

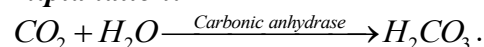
**Explanation:** About 70% carbon dioxide is carried as bicarbonate ions combined with sodium in the plasma.

**Q.42 Answer is “Sodium”**

**Explanation:** About 70% carbon dioxide is carried as bicarbonate ions combined with sodium in the plasma.

**Q.43 Answer is “ $HbO \rightarrow Hbo + O_2$ ”**

**Explanation:**



**Q.44 Answer is “ $HCO^- + H^+ \rightarrow H_2CO_3$ ”**

**Explanation:** As  $CO_2$  is being moved and carried towards heart and finally to the lungs.

**Q.45 Answer is “ $H_2CO_3 \rightarrow CO_2 + H_2O$ ”**

**Explanation:** As  $CO_2$  is required to be released from blood for exhalation.

**Q.46 Answer is “Carbon dioxide”**

**Explanation:** As  $CO_2$  is going to be exhaled or removed from the body and lungs, through are passageways.

**Q.47 Answer is “Oxygen”**

**Explanation:** Because it is required to be carried to the tissues and cells of the body.

**Q.48 Answer is “Potassium”**

**Explanation:** Small amount of carbon dioxide is also carried by corpuscles combined with potassium.

**Q.49 Answer is “4ml”**

**Explanation:** As 50 ml of  $CO_2$  per 100 ml of blood is residual volume of arterial

blood. However, it becomes 54 ml of  $CO_2$  per 100 ml of blood in venuous blood.

**Q.50 Answer is “Breathing”**

**Explanation:** It is also called as organismic respiration, external respiration and ventilation.

**Q.51 Answer is “Breathing”**

**Explanation:** Mechanical movement of ribs diaphragm and associated muscles is carried out in it breathing and it consists of two phases i.e. inhalation and exhalation.

**Q.52 Answer is “Two phases”**

**Explanation:** Inspiration and expiration.

**Q.53 Answer is “Inspiration”**

**Explanation:** Inspiration or inhalation means bringing fresh air into lungs.

**Q.54 Answer is “Expiration”**

**Explanation:** Expiration or exhalation means bringing  $CO_2$  rich air from the lungs to the outside.

**Q.55 Answer is “Three aspects”**

**Explanation:**

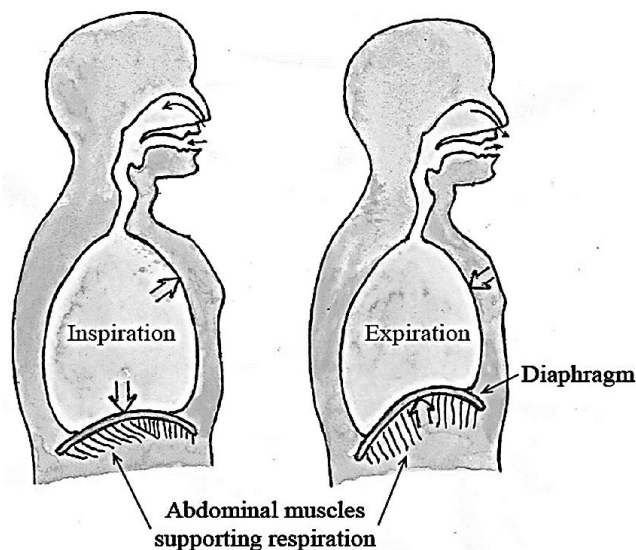
- (i) Passive role of lungs
- (ii) Role of diaphragm
- (iii) Role of chest wall and ribs

**Q.56 Answer is “During expiration passive contraction takes place”**

**Explanation:** As chest wall moves inward and downwards and diaphragm moves upwards the space around lungs is squeezed, they contract passively. During expiration these movements are reversed.

**Q.57 Answer is “When its muscles are relaxed”**

**Explanation:** Because by contraction it is flattened i.e. becomes less dome like.



**Q.58 Answer is “When its muscles contract”**

**Explanation:** By contraction of the muscles of diaphragm it is flattened and becomes less dome like.

**Q.59 Answer is “Ribs and inter costal muscles”**

**Explanation:** The walls of chest cavity consist of ribs and intercostal muscles

**Q.60 Answer is “Muscles between the ribs contract”**

**Explanation:** Ribs are lifted upwards and outwards by contraction of inter costal muscles and vice versa.

**Q.61 Answer is “Two ways”**

**Explanation:** When chest wall move outwards and diaphragm moves downwards, the space on lateral sides and lower side of lungs is increased.

**Q.62 Answer is “Elevate the ribs upwards and outwards”**

**Explanation:** When muscles of diaphragm contract it is flattened and becomes less dome like, creating space beneath the lungs.

**Q.63 Answer is “Contract and diaphragm becomes less dome like”**

**Explanation:** When muscles of diaphragm contract it is flattened and becomes less dome like, creating space beneath the lungs.

**Q.64 Answer is “Diaphragm downwards and ribs upwards”**

**Explanation:** During inspiration, to create space around the lungs rib cage is lifted upward and outwards whereas diaphragm moves downwards.

**Q.65 Answer is “Inspiration”**

**Explanation:** Inspiration means bringing free oxygen into lungs.

**Q.66 Answer is “Diaphragm” becomes less dome like”**

**Explanation:** Rest of the three events are associated with expiration whereas B choice is associated with inspiration, so it is odd among the rest of the three choices.

**Q.67 Answer is “Reduction is space of chest cavity”**

**Explanation:** Lungs contract when pressure outside the lungs increases due to decreased space and they are forced to squeeze.

**Q.68 Answer is “Relaxation of the muscles of diaphragm”**

**Explanation:** As muscles of the diaphragm relax, the sheet of diaphragm moves back to its normal place and becomes more dome like, reducing space below the lungs.

**Q.69 Answer is “Less than 7 months”**

**Explanation:** Because lungs attain maturity after 7 months of gestation period.

**Q.70 Answer is “Surfactant”**

**Explanation:** A substance which strengthens the alveolar membrane against surface tension.

**Q.71 Answer is “Hemoglobin”**

**Explanation:** Hemoglobin being respiratory protein (carrier protein) is the most important protein in many animals including man.

**Q.72 Answer is “Myoglobin”**

**Explanation:** Myoglobin is a hemoglobin like iron-containing protein pigment occurring in muscle fibers. Myoglobin is also known as muscle hemoglobin. It serves as intermediate compound for the transfer of oxygen from hemoglobin to aerobic metabolic processes of muscle cells.

**Q.73 Answer is “Tuberculosis”**

**Explanation:** Tuberculosis spreads through physical contact and air i.e. it is contagious.

**Q.74 Answer is “10”**

**Explanation:** As chances of lung cancer are 10 times more in smokers, thus these 10 times less in non-smokers.

**Q.75 Answer is “Emphysema”**

**Explanation:** Due to persistent and constant coughing weakened alveoli burst and fuse together.



**Worksheet-14 (ii)**  
**(Transport in Plants)**

**Q.1 Which one of the following is xerophyte?**

- A) Hydrilla                      C) *Cactus*  
B) Rose                          D) Corn

**Q.2 Most of the minerals enter the root hairs of roots along with water in the form:**

- A) Active transport  
B) Diffusion  
C) Bulk flow  
D) Facilitated diffusion

**Q.3 Which one of the following is always -ve?**

- A) Water potential  
B) Solute potential  
C) Pressure potential  
D) Water and pressure potential

**Q.4 Pulling upward of water and dissolved minerals towards the leaves through the xylem tissue is called:**

- A) Transpiration pull    C) Root pressure  
B) Ascent of sap          D) All of these

**Q.5 Translocation of food in phloem is due to:**

- A) Transpiration pull    C) Ascent of sap  
B) Pressure of flow      D) Cohesion

**Q.6 Most important pathway for transport of water and solutes in root is \_\_\_\_\_ pathway:**

- A) Vacuolar                  C) Symplast  
B) Apoplast                  D) Stomatal

**Q.7 At very high temperature, mesophyll cells secrete \_\_\_\_\_, which closes stomata:**

- A) Auxins                      C) Gibberellins  
B) Cytokinins                D) Absciscic acid

**Q.8 The guard cells are the only photosynthesizing cells of \_\_\_\_\_ of leaf:**

- A) Mesophyll                C) Endodermis  
B) Epidermis                D) Hypodermis

**Q.9 It constitutes the inner bark:**

- A) Xylem                      C) Endodermis  
B) Phloem                    D) Epidermis

**Q.10 The active transport of  $K^+$  ions into the guard cell is stimulated by:**

- A) High level of  $H_2$   
B) Low level of  $CO$   
C) Low level of  $O_2$   
D) Low level of  $CO_2$

**Q.11 It directly controlled by the opening and closing of stomata:**

- A) Gravity                      C) Light  
B) Temperature              D) Oxygen

**Q.12 Transpiration increases with increase in the:**

- A) Availability of light to the plant  
B) Dryness of the atmosphere  
C) Velocity of wind  
D) Availability of soil water

**Q.13 Rate of transpiration doubles by every rise of  $10^\circ C$  in temperature:**

- A) Respiration                C) Perspiration  
B) Photosynthesis            D) Transpiration

**Q.14 It is not directly related to the rate of transpiration:**

- A) Temperature  
B) Light  
C) Cellular respiration  
D) Wind

**Q.15 The evaporation of water through surface of plant is called:**

- A) Evaporation                C) Transpiration  
B) Condensation              D) Pressure flow

**Q.16 Transpiration decreases when guard cells of stomata become?**

- A) Flaccid                      C) Collapsed  
B) Turgid                        D) Ruptured

**Q.17 Companion cells are important in phloem tissue because they supply \_\_\_\_\_ to sieve elements:**

- A) Water                        C) Carbohydrates  
B) ATPs                         D) Proteins

**Q.18 The main force that draws water from the soil for plant is caused by a process called:**

- A) Evaporation  
B) Transpiration pull  
C) Guttation  
D) Wilting

- Q.19** The shrinkage of protoplast due to exosmosis is:  
 A) Ascent of sap      C) Plasmolysis  
 B) Guttation      D) Deplasmolysis
- Q.20** A plant requires nitrogen and sulphur for its:  
 A) Cell wall  
 B) Starch deposit  
 C) Enzyme  
 D) DNA replication
- Q.21** A rye plant less than \_\_\_\_\_ tall has branch roots about:  
 A) Two-meter      C) One meter  
 B) Five meter      D) Half meter
- Q.22** Which of the following process cause substances to move across membranes without expenditure of cellular energy?  
 A) Endocytosis      C) Active transport  
 B) Diffusion      D) None
- Q.23** The casparian strips are present in:  
 A) Cortex cells of root  
 B) Pericycle  
 C) Endodermis cells of roots  
 D) Xylem
- Q.24** Most of mycorrhizae are present in:  
 A) 50% of vascular plants  
 B) 70% of angiosperms  
 C) 70% of gymnosperms  
 D) 90% of angiosperms
- Q.25** Force exerted by protoplast against cell wall is called \_\_\_\_\_ potential:  
 A) Osmotic      C) Pressure  
 B) Solute      D) Generator
- Q.26** Hydathodes are associated with:  
 A) Transpiration      C) Guttation  
 B) Conduction      D) Deplasmolysis
- Q.27** The force of attraction between water molecules is:  
 A) Adhesion      C) Tensile  
 B) Cohesion      D) Imbibition
- Q.28** The xylem water tension is strong enough to pull water to \_\_\_\_\_:  
 A) 200 meters      C) 300 meters  
 B) 400 feet      D) 500 feet
- Q.29** Which of the following is soluble in water?  
 A) Cellulose      C) Pectin  
 B) Lignin      D) Glucose
- Q.30** The volume of dry seed increased by imbibitions is \_\_\_\_\_ times:  
 A) 100      C) 300  
 B) 200      D) 150
- Q.31** 1% of the absorbed water is used by plants in its activities during:  
 A) Metabolism      C) Photosynthesis  
 B) Respiration      D) Vernalisation
- Q.32** In tall trees large quantities of water is carried at speed of:  
 A)  $2\text{mh}^{-1}$       C)  $8\text{mh}^{-1}$   
 B)  $3\text{mh}^{-1}$       D)  $10\text{mh}^{-1}$
- Q.33** Total transpiration which can take place through stomata is  
 A) 60-70      C) 80-90%  
 B) 1-2%      D) 5-7%
- Q.34** Pick up the types of transpiration which does not occur in all plants:  
 A) Cuticular transpiration  
 B) Stomatal transpiration  
 C) Lenticular transpiration  
 D) Stem transpiration
- Q.35** During the exposure of blue light all of the following events occurs, EXCEPT:  
 A) Acidification of environment  
 B) Turgidity of guard cells  
 C) Uptake of K ions of guard cells  
 D) Flaccidity of guard cells
- Q.36** Which one of the following is involved in the closing of stomata?  
 A) Gibberellins      C) Abscisis acid  
 B) Ethane      D) Cytokinine

- Q.37** When leaves transpire the water potential of mesophyll cells is:  
 A) Increased  
 B) Does not change  
 C) Decreased  
 D) First increased and decreased
- Q.38** When guard cells become turgid, transpiration?  
 A) Increases  
 B) No effect  
 C) Decreases  
 D) Stops
- Q.39** Phloem is generally found on outer side of:  
 A) Xylem  
 B) Endodermis  
 C) Epidermis  
 D) Pericycle
- Q.40** Root of beet acts as:  
 A) Source  
 B) Sink  
 C) Producer  
 D) Source and sink both
- Q.41** Average velocity of movement of sugars in phloem is:  
 A) 1 meter/8 years  
 B) 1 meter/day  
 C) 1 meter/hour  
 D) 20cm/min
- Q.42** While moving towards the sieve elements sucrose takes the \_\_\_\_\_ mostly?  
 A) Apoplast pathway  
 B) Vacuolar pathway  
 C) Symplast pathway  
 D) Apoplast pathway
- Q.43** Cytoplasmic strands that extend through pores in adjacent cell walls are known as:  
 A) Pseudopods  
 B) Plasmodesmata  
 C) Symplasts  
 D) Pili
- Q.44** The movement of water molecules from a region of higher water potential to a region of lower water potential (through membrane):  
 A) Diffusion  
 B) Active transport  
 C) Osmosis  
 D) Facilitated diffusion
- Q.45** Cuticular transpiration is \_\_\_\_\_ of total transpiration:  
 A) 6-8%  
 B) 7-9%  
 C) 5-7%  
 D) 4-6%
- Q.46** Lenticular transpiration is \_\_\_\_\_ of total transpiration:  
 A) 2-3%  
 B) 1-4%  
 C) 1-3%  
 D) 1-2%
- Q.47** \_\_\_\_\_ have the adaptations for reduced rate of transpiration:  
 A) Hydrophytes  
 B) Xerophytes  
 C) Mesophytes  
 D) Halophytes
- Q.48** Many \_\_\_\_\_ possess small, thick leaves to limit water loss by reducing surface area proportional to the volume:  
 A) Hydrophytes  
 B) Xerophytes  
 C) Mesophytes  
 D) Halophytes
- Q.49** They have thick, waxy and leathery cuticle:  
 A) Hydrophytes  
 B) Mesophytes  
 C) Xerophytes  
 D) Sciophytes
- Q.50** Stomata are on lower surface of leaves and located in depression in:  
 A) Hydrophytes  
 B) Mesophytes  
 C) Sciophytes  
 D) Xerophytes

<b>ANSWER KEY</b> <b>(Worksheet-14(ii))</b>					
1	C	21	C	41	C
2	C	22	B	42	C
3	B	23	C	43	B
4	B	24	D	44	C
5	B	25	C	45	C
6	B	26	C	46	D
7	D	27	B	47	B
8	B	28	A	48	B
9	B	29	D	49	C
10	D	30	B	50	D
11	C	31	C		
12	B	32	C		
13	D	33	C		
14	C	34	C		
15	C	35	D		
16	A	36	C		
17	B	37	C		
18	B	38	A		
19	C	39	A		
20	C	40	D		

**EXPLANATION**

- Q.1** Answer is "Cactus"  
*Explanation:* Cactus is xerophytic plant.
- Q.2** Answer is "Bulk flow"  
*Explanation:* Most of the minerals enter the root hairs of roots along with water in the form bulk flow.
- Q.3** Answer is "Solute potential"  
*Explanation:* Solute potential is always -ve.
- Q.4** Answer is "Ascent of sap"  
*Explanation:* Pulling upward of water and dissolved minerals towards the leaves through the xylem tissue is called ascent of sap.
- Q.5** Answer is "Pressure of flow"  
*Explanation:* The theory called, Pressure – Flow Theory, is the most acceptable theory for the transport in the phloem of angiosperms. We have considerable evidence to support this theory. There

were two main categories of theories to account for movement of sap in phloem.

**Q.6** Answer is "Apoplast"

*Explanation:* The apoplast pathway is of greatest importance for both water and solutes. The symplast pathway is less important, except for salts in the region of the endodermis. Movement along the vacuolar pathway is negligible.

**Q.7** Answer is "Abscissic acid"

*Explanation:* Hormones are involved in stomatal movement in plants. At high temperature when leaf cells start wilting a hormone is released by mesophyll cells. This hormone is called abscissic acid. This hormone stops the active transport of  $K^+$  into guard cells, overriding the effect of light and  $CO_2$  concentration. So  $K^+$  pumping stops. Stomata close.

**Q.8** Answer is "Epidermis"

*Explanation:* The German botanist H. Van Mohl proposed that the guard cells are the only photosynthesizing cells of epidermis of leaf and sugars are produced in them during day time when light is available.

**Q.9** Answer is "Phloem"

*Explanation:* The phloem is generally found on the outer side of both primary and secondary vascular tissue in plants with secondary growth. The phloem constitute the inner bark. The cells of phloem that conduct or transport sugars and other organic material throughout the plant are called sieve elements.

**Q.10** Answer is "Low level of  $CO_2$ "

*Explanation:* What controls the movement of  $K^+$  into and out of guard cells? Level of carbon dioxide in the spaces inside the leaf and light, control this movement. A low level of carbon dioxide favours opening of the stomata, thus allowing an increased carbon dioxide level and increased rate of photosynthesis.

**Q.11 Answer is “Light”**

**Explanation:** The opening and closing of stomata is directly controlled by the light. In strong light the rate of transpiration is much more as compared with that in dim light or no light. As potassium actively enters the guard cells when light is available, water follows – and guard cells become turgid, and stoma opens.

**Q.12 Answer is “Dryness of the atmosphere”**

**Explanation:** When air is dry, the rate of diffusion of water molecules, from the surfaces of mesophyll cells, air spaces, and through stomata to outside the leaf, increases. So more water is lost, increasing the rate of transpiration. In humid air the diffusion rate is reduced. This decreases the rate of transpiration appreciably.

**Q.13 Answer is “Transpiration”**

**Explanation:** The rate of transpiration doubles by every rise of  $10^0$  C in temperature. Very high environmental temperature. i.e.  $40-45^0$  C cause closure of stomata, so that plant does not lose much needed water.

**Q.14 Answer is “Cellular respiration”**

**Explanation:** Cellular respiration is not directly related to the rate of transpiration. There are some important factors which affect the rate of transpiration in a plant.

- i. Light      ii. Temperature
- iii.  $\text{CO}_2$  concentration
- iv. Humidity and vapour pressure
- v. Wind
- vi. Availability of soil water

**Q.15 Answer is “Transpiration”**

**Explanation:** The evaporation of water through surface of plant is called transportation.

**Q.16 Answer is “Flaccid”**

**Explanation:** When guard cells become turgid the stoma or pore opens. When flaccid stoma or pore between them closes.

**Q.17 Answer is “ATPs”**

**Explanation:** Companion cells supply ATP and proteins to sieve tubes. The photosynthetic products from

photosynthesizing cells, the mesophyll and palisade layer of leaf, pass into sieve tubes, through the companion cell via plasmodesmata.

**Q.18 Answer is “Transpiration pull”**

**Explanation:** The main force that draws water from the soil for plant is caused by a process called Transpiration pull.

**Q.19 Answer is “Plasmolysis”**

**Explanation:** Plasmolysis can be defined as the shrinkage of protoplast due to exosmosis of water. When a living cell is placed in a solution having lower water potential than that of the cell, plasmolysis takes place and the cell is called plasmolysed.

**Q.20 Answer is “Enzyme”**

**Explanation:** A plant requires nitrogen and sulphur for its enzyme.

**Q.21 Answer is “One meter”**

**Explanation:** A rye plant less than one meter tall has some 14 million branch roots of a combined length of over 600 kilometers.

**Q.22 Answer is “Diffusion”**

**Explanation:** Diffusion cause substances to move across membranes without expenditure of cellular energy.

**Q.23 Answer is “Endodermis cells of roots”**

**Explanation:** The casparian strip separates the extracellular space in the root into two compartments: an outer compartment that is continuous with the soil water, and an inner compartment that is continuous with the inside of the conducting cells of the xylem.

**Q.24 Answer is “90% of angiosperms”**

**Explanation:** Mycorrhizal fungi get sugar, and shelter from the plant and in exchange increase the plant's mineral nutrient uptake efficiency. Mycorrhizae are present in 90% families of flowering plants.

**Q.25 Answer is “Pressure”**

**Explanation:** Force exerted by protoplast against cell wall is called pressure potential.



**Q.26 Answer is “Guttation”**

**Explanation:** Closely associated with root pressure is a phenomenon called guttation or exudation. Guttation is loss of liquid water through water secreting glands or hydathodes. The dew drops that can be seen on the tips of grass leaves or strawberry leaves are actually guttation droplets exuded from hydathodes.

**Q.27 Answer is “Cohesion”**

**Explanation:** The force of attraction between water molecules is cohesion. It is the attraction among water molecules which hold water together, forming a solid chain-like column within the xylem tubes. The water molecules form hydrogen bonds between them.

**Q.28 Answer is “200 meters”**

**Explanation:** It is provided when this water chain is pulled up in the xylem. Transpiration provides the necessary energy or force. Tension is between the molecules of water by hydrogen bonds. This xylem water tension is strong enough to pull water up to 200 meters (more than 600 feet) in plants.

**Q.29 Answer is “Glucose”**

**Explanation:** Glucose is soluble in water because it is a monosaccharide in nature.

**Q.30 Answer is “200”**

**Explanation:** The volume of dry seed increase up to 200 times by imbibition, as a result, the seed coat ruptures and makes the germination of seed effective.

**Q.31 Answer is “Photosynthesis”**

**Explanation:** 1% of the absorbed water is used by plants in its activities during photosynthesis.

**Q.32 Answer is “8mh<sup>-1</sup>”**

**Explanation:** Large quantities of water are carried at relatively high speed, upto 8mh<sup>-1</sup> being recorded in tall trees, and commonly in other plants at 1mh<sup>-1</sup>.

**Q.33 Answer is “80-90%”**

**Explanation:** The degree of opening of stomatal pores also affects the rate of

transpiration. 90% of total transpiration in a plant is stomatal.

**Q.34 Answer is “Lenticular transpiration”**

**Explanation:** Lenticular transpiration is the loss of water vapours through lenticels present in the stem of some plants. All plants do not possess lenticels.

**Q.35 Answer is “Flaccidity of guard cells”**

**Explanation:** Exposure to blue light, which is also effective in photosynthesis has been shown to acidify the environment of the guard cells (i.e. pumps out protons) which enable the guard cells to take up K<sup>+</sup> followed by water uptake resulting in increased turgidity of guard cells. So in general stoma are open during day and closed at night. This prevents needless loss of water by the plant when it is too dark for photosynthesis.

**Q.36 Answer is “Abscisis acid”**

**Explanation:** Hormones are involved in stomatal movement in plants. At high temperature when leaf cells start wilting a hormone is released by mesophyll cells. This hormone is called abscisic acid. This hormone stops the active transport of K<sup>+</sup> into guard cells, overriding the effect of light and CO<sub>2</sub> concentration. So K<sup>+</sup> pumping stops. Stomata close.

**Q.37 Answer is “Decreased”**

**Explanation:** When leaves transpire the water potential of mesophyll cells is decreased. As a leaf transpires the water potential of its mesophyll cells drops.

**Q.38 Answer is “Increases”**

**Explanation:** When sugar level rises i.e. solute concentration increases of water potential decreases- and the guard cells become turgid due to entry of water and they separate from one another, and stoma or pore opens.

**Q.39 Answer is “Xylem”**

**Explanation:** Phloem is generally found on outer side of xylem.

**Q.40 Answer is “Source and sink both”**

**Explanation:** Root of beet acts as source and sink both.

**Q.41 Answer is “1 meter/hour”**

**Explanation:** Average velocity of movement of sugars in phloem is 1 meter/hour.

**Q.42 Answer is “Symplast pathway”**

**Explanation:** While moving towards the sieve elements sucrose takes the symplast pathway mostly.

**Q.43 Answer is “Plasmodesmata”**

**Explanation:** Cytoplasmic strands that extend through pores in adjacent cell walls are known as plasmodesmata.

**Q.44 Answer is “Osmosis”**

**Explanation:** The movement of water molecules from a region of higher water potential to a region of lower water potential through membrane osmosis.

**Q.45 Answer is “5-7%”**

**Explanation:** The loss of water in the form of water vapours through the cuticle of leaves is called cuticular transpiration. About 5-7% of total transpiration takes place through this route.

**Q.46 Answer is “1-2%”**

**Explanation:** The lenticular transpiration is 1-2% of the total transpiration by a plant.

**Q.47 Answer is “Xerophytes”**

**Explanation:** Many xerophytes possess small, thick leaves to limit water loss by reducing surface area proportional to the volume. Their cuticle is thick, waxy and leathery.

**Q.48 Answer is “Xerophytes”**

**Explanation:** Many xerophytes possess small, thick leaves to limit water loss by reducing surface area proportional to the volume.

**Q.49 Answer is “Xerophytes”**

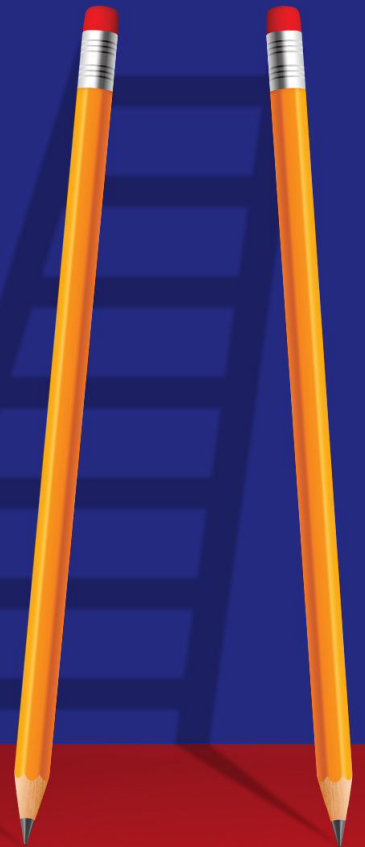
**Explanation:** Their cuticle is thick, waxy and leathery.

**Q.50 Answer is “Xerophytes”**

**Explanation:** Stomata are on lower surface of leaves and located in depression.

# STOP

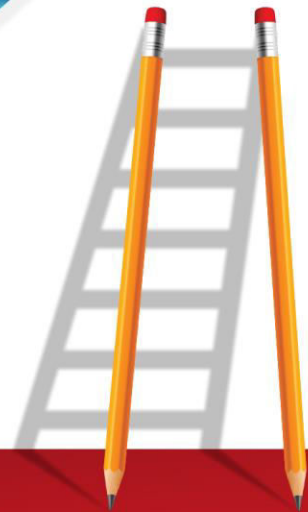
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# BIOLOGY



## Worksheet-15



**Worksheet-15 (i)**  
**(Transport in Human)**

**Q.1 Lymphatic system is responsible for the transport and returning of material:**

- A) From the tissues of the body to blood
- B) From the tissues of the body to lymph
- C) From the tissue of the body to external environment
- D) From the respiratory system to blood

**Q.2 A fluid that flows in the lymphatic system is called:**

- A) Circulatory fluid
- B) Tissue fluid
- C) Lymph
- D) Lymph or tissue fluid

**Q.3 The system that comprises lymph capillaries, lymph vessels, lymphoid masses, lymph nodes and lymph is called:**

- A) Transport system
- B) Blood vascular system
- C) Lymphatic system
- D) Immune system

**Q.4 Lymph capillaries end blindly in the body tissues, where pressure from the accumulation of \_\_\_\_\_ forces the fluid into the lymph capillaries:**

- A) Interstitial fluid
- B) Extracellular
- C) Intracellular fluid
- D) Interstitial or extracellular fluid

**Q.5 Lymph is a fluid in transit between interstitial fluids and:**

- A) Lymph
- B) Blood
- C) Tissue fluid
- D) Body fluid

**Q.6 The intercellular spaces in the walls of lymph vessels are larger than those of:**

- A) Capillaries of blood vascular system
- B) Veins of blood vascular system
- C) Arteries of blood vascular system
- D) Vanae Cavae

**Q.7 Lymph capillaries join to form:**

- A) Lacteals
- B) Larger and larger lymph vessels
- C) Smaller lymph vessels
- D) Venae cave

**Q.8 Lacteals are the branches of lymph capillaries located within:**

- A) Ileum
- B) Microvilli
- C) Villi
- D) Small intestine

**Q.9 Along the pathway, the lymph vessels have at certain points, masses of connective tissue, where lymphocytes are present; these are:**

- A) Lymphoid masses
- B) Lymph nodes
- C) Thymus
- D) Adenoid

**Q.10 Lymph nodes get supply by:**

- A) Many efferent lymph vessels
- B) Single efferent lymph vessels
- C) Many afferent lymph vessels
- D) Single afferent lymph vessels

**Q.11 Several \_\_\_\_\_ are present in the walls of digestive tract in the mucosa and sub mucosa.**

- A) Lymph nodes
- B) Lacteals
- C) Lymphoid masses
- D) Lymph vessels



**Q.12** The net difference between the fluid taken back by blood capillaries from interstitial spaces and the fluid given out by blood capillaries into the interstitial spaces in an average person per day is:

- A) 1000 ml                      C) 3000 ml  
B) 2000 ml                      D) 4000 ml

**Q.13** The lacteals of villi absorb:

- A) Small fat globules  
B) Large polypeptides  
C) Large fat globules  
D) Small polypeptides

**Q.14** \_\_\_\_\_ have lymphocytes and macrophages that destroy bacteria and viruses.

- A) Lymphoid masses  
B) Lymph nodes  
C) Lymphatic vessels  
D) Lymphatic ducts

**Q.15** The painful swelling of lymph nodes in certain diseases is largely a result of the accumulation of:

- A) Dead lymphocytes and microphages  
B) Dead lymphocytes and macrophages  
C) Living lymphocytes and microphages  
D) Living lymphocytes and macrophages

**Q.16** Just as the \_\_\_\_\_ filter the lymph, the \_\_\_\_\_ filters blood.

- A) Spleen, Lymph nodes  
B) Lymph nodes, Lymph nodes  
C) Spleen, Spleen  
D) Lymph nodes, Spleen

**Q.17** The heart is enclosed in a double membranous sac called:

- A) Thoracic cavity      C) Pericardial cavity  
B) Chest cavity        D) Pleural cavity

**Q.18** Pericardium prevents the heart from:

- A) Over extension      C) Physical trauma  
B) Abrasion              D) Contraction

**Q.19** \_\_\_\_\_ of the heart is made up of special type of muscles, the cardiac muscles.

- A) Pericardium              C) Myocardium  
B) Epicardium              D) Endocardium

**Q.20** The cardiac muscles contain:

- A) Myofibrils  
B) Myofilaments of actin  
C) Myofilaments of myosin  
D) Myofibrils and Myofilaments of actin and myosin

**Q.21** The heart contracts:

- A) Voluntarily              C) Irregularly  
B) Passively                D) Rhythmically

**Q.22** The left atrioventricular valve is:

- A) Tricuspid valve      C) Semilunar valve  
B) Bicuspid valve      D) Sphincter valve

**Q.23** There are four chambers of the heart:

- A) Two upper thick-walled atria  
B) Two lower thin walled ventricles  
C) Two upper thin walled atria and two lower thick-walled ventricles  
D) Two upper thin walled ventricles and two lower thick-walled atria

**Q.24** In human heart complete separation of deoxygenated blood occurs on/in:

- A) Right side              C) Lower chambers  
B) Left side                D) Upper chambers

**Q.25** In human heart complete separation of oxygenated blood occur on/in:

- A) Right side              C) Lower chambers  
B) Left side                D) Upper chambers

- Q.26** With respect to their relation with rest of the body, the lower chambers of human heart act as:  
 A) Expulsion pump      C) Dual pump  
 B) Suction pump      D) Reservoir
- Q.27** \_\_\_\_\_ receives deoxygenated blood via venae cavae.  
 A) Right atrium      C) Right ventricle  
 B) Left atrium      D) Left ventricle
- Q.28** Blood is passed on to right ventricle through:  
 A) Tricuspid valve      C) Semilunar valve  
 B) Bicuspid valve      D) Mitral valve
- Q.29** The flaps of tricuspid valve are attached to papillary muscles of the wall of right ventricle by means of:  
 A) Fibrous cords  
 B) Fibrous cords called chordae tendineae  
 C) Fibrous cords called ligaments  
 D) Epithelial extensions
- Q.30** Chordae tendineae are attached to the:  
 A) Papillary muscles  
 B) Papillary muscles and wall of tricuspid valve  
 C) Flaps of tricuspid valve  
 D) Walls of the right ventricle
- Q.31** When right ventricle contracts, the blood is passed to the:  
 A) Right atrium      C) Left ventricle  
 B) Pulmonary trunk      D) Left atrium
- Q.32** Pulmonary trunk is sub divided into:  
 A) Left and right pulmonary veins  
 B) Left and right pulmonary trunks  
 C) Left and right pulmonary arteries  
 D) Superior and inferior venae cavae
- Q.33** After oxygenation in lungs, the blood is brought by pulmonary veins to the:  
 A) Left atrium      C) Left ventricle  
 B) Right atrium      D) Right ventricle
- Q.34** Left atrium passes the blood via \_\_\_\_\_ to the left ventricle.  
 A) Tricuspid valve      C) Semilunar valve  
 B) Bicuspid valve      D) Sphincter valve
- Q.35** When left ventricle contracts, it pushes the blood through \_\_\_\_\_ to all parts of the body.  
 A) Aorta      C) Pulmonary artery  
 B) Pulmonary trunk      D) Pulmonary vein
- Q.36** At the base of aorta \_\_\_\_\_ valves are also present.  
 A) Bicuspid      C) Sphincter  
 B) Tricuspid      D) Semilunar
- Q.37** Coronary arteries supply the blood to the:  
 A) Liver      C) Heart  
 B) Spleen      D) Gut
- Q.38** The aorta forms an arch, and before descending down gives of:  
 A) Two branches      C) Four branches  
 B) Three branches      D) Five branches
- Q.39** Aorta gives many small branches to the chest wall and then passes down to the abdominal region; Here it gives branches, which supply blood to:  
 A) Different parts of alimentary canal  
 B) Kidneys  
 C) Lower abdomen  
 D) Different parts of alimentary canal, kidneys and Lower abdomen
- Q.40** The blood from the upper part of the body is collected by different veins, which join to form:  
 A) Aorta  
 B) Pulmonary trunk  
 C) Superior vena cava  
 D) Inferior vena cava

**Q.41 Femoral veins pour deoxygenated blood into:**

- A) Renal veins                      C) Iliac veins  
B) Femoral veins                  D) Hepatic veins

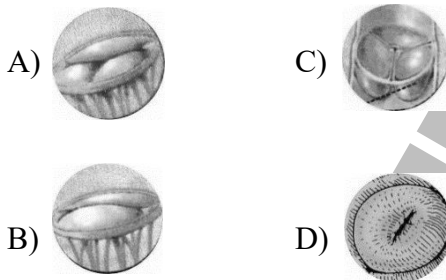
**Q.42 Renal veins pour blood into:**

- A) Superior vena cava  
B) Inferior vena cava  
C) Hepatic portal vein  
D) Jugular vein

**Q.43 The vein which is formed by many veins collecting deoxygenated blood with absorbed food from different parts of alimentary canal, is called:**

- A) Hepatic portal vein    C) Hepatic vein  
B) Iliac vein                      D) Renal vein

**Q.44 Identify the tricuspid valve:**



**Q.45 Identify the bicuspid valve:**



**Q.46 The walls of atria and walls of ventricles are relaxed during:**

- A) Systole  
B) Diastole  
C) Atrial systole  
D) Ventricular systole

**Q.47 As the atria are filled with blood, they become distended and have:**

- A) More pressure than ventricles  
B) Same pressure as ventricles  
C) Less pressure than ventricles  
D) Less volume than ventricles

**Q.48 'Lubb' sound is produced by closure of:**

- A) Outlet valves  
B) Atrioventricular valves  
C) Semilunar valves  
D) Inter ventricular valves

**Q.49 'Dubb' sound is produced by the closure of:**

- A) Bicuspid valves  
B) Tricuspid valves  
C) Bicuspid and tricuspid valves  
D) Semilunar valves

**Q.50 In one's life, heart contracts \_\_\_\_\_, without stopping.**

- A) 2-5 billion times    C) 2-5 million times  
B) 1-5 billion times    D) 1.5 million times

**Q.51 The oxygenated blood enters the left atrium through:**

- A) Pulmonary artery  
B) Pulmonary veins  
C) Inferior vena cava  
D) Superior vena cava

**Q.52 One complete heart beat consists of:**

- A) One systole  
B) One diastole  
C) One systole and one diastole  
D) One systole and two diastoles

**Q.53** What occurs, just prior to ventricular contraction:

- A) P wave                      C) QRS wave
- B) T wave                     D) S wave

**Q.54** Highest blood pressure is generated by:

- A) Atrial diastole
- B) Atrial systole
- C) Ventricular diastole
- D) Ventricular systole

**Q.55** Highest blood pressure is observed in:

- A) Capillaries                C) Venae cavae
- B) Veins                      D) Arteries

**Q.56** There is no pulse in:

- A) Veins
- B) Arteries
- C) Capillaries
- D) Veins and capillaries

**Q.57** There are no valves in:

- A) Arteries
- B) Capillaries
- C) Arteries and capillaries
- D) Veins

**Q.58** The role of globulins in maintenance of osmotic pressure of blood is:

- A) 75%                      C) 35%
- B) 65%                      D) 25%

**Q.59** The average life span of a RBC is:

- A) 120 days                C) 60 days
- B) 30 days                  D) 90 days

**Q.60** On one hand its high level in our blood produces cardiovascular disorder on the other hand it serves as a precursor for steroid hormones. It is:

- A) Acylglycerol            C) Animal fat
- B) Cholesterol             D) Edible oil

**Q.61** Which one of the following gives rise to macrophages?

- A) Neutrophils              C) Monocytes
- B) Eosinophils              D) Lymphocytes

**Q.62** They are without nucleus since their origin:

- A) RBCs                      C) Platelets
- B) WBCs                      D) Erythrocytes

**Q.63** A solid mass or plug of blood constituents in the blood vessels is called:

- A) Thrombus                C) Embolus
- B) Thrombosis              D) Atheroma

**Q.64** In thromboembolism:

- A) Thrombosis is followed by embolism
- B) Thrombosis follows the embolism
- C) Thrombosis and embolism occur simultaneously
- D) Thrombosis occurs independent of embolism

**Q.65** Damage to portion of cardiac muscle is called:

- A) Cerebral infraction
- B) Arythonia
- C) Myocardial infarction
- D) Heart attack

**Q.66** Cerebral infarction is also called as:

- A) Paralysis                C) Heart attack
- B) Stroke                    D) Hemorrhage

**ANSWER KEY (Worksheet-15 (i))**

1	A	23	C	45	B
2	D	24	A	46	B
3	C	25	B	47	A
4	D	26	A	48	B
5	B	27	A	49	D
6	A	28	A	50	A
7	B	29	B	51	B
8	C	30	B	52	C
9	A	31	B	53	C
10	C	32	C	54	D
11	C	33	A	55	D
12	C	34	B	56	D
13	C	35	A	57	C
14	B	36	D	58	D
15	B	37	C	59	A
16	D	38	B	60	B
17	C	39	D	61	C
18	A	40	C	62	C
19	C	41	C	63	A
20	D	42	B	64	A
21	D	43	A	65	C
22	B	44	A	66	B

**EXPLANATION**

**Q.1** Answer is "From the tissues of the body to blood"

**Explanation:** Lymph or tissue fluid is actually a fluid of interstitial spaces i.e. it oozes out from the blood in interstitial spaces then collected and drained through lymph vessels and finally it is returned to blood via subclavian vein. Thus lymph is a fluid in transit between interstitial fluid and the blood.

**Q.2** Answer is "Lymph or tissue fluid"

**Explanation:** Lymph capillaries end blindly in the body tissue, where pressure from the accumulation of interstitial fluid forces the fluid to enter the lymph capillaries. This fluid is called lymph. The lymph vessels empty in veins, so lymph is

fluid in transit between interstitial fluid and blood.

**Q.3** Answer is "Lymphatic system"

**Explanation:** The system that is responsible for the transport and returning of materials from the tissues of the body to the blood is called lymphatic system. It comprises lymph capillaries, lymph vessels, lymphoid masses, lymph nodes and lymph the fluid which flows in the system.

**Q.4** Answer is "Interstitial or extracellular fluid"

**Explanation:** Lymph capillaries or lymphatic capillaries are tiny, thin walled vessels located in the spaces between cells (except in the central nervous system and non-vascular tissues) which serve to drain and process extracellular fluid. Upon entering the lumen of a lymphatic capillary, the collected fluid along with associated cells (notably white blood cells) is known as lymph.

Lymphatic capillaries are slightly larger in diameter than blood capillaries and have closed ends. Their unique structure permits, interstitial fluid to flow into them but not out.

**Q.5** Answer is "Blood"

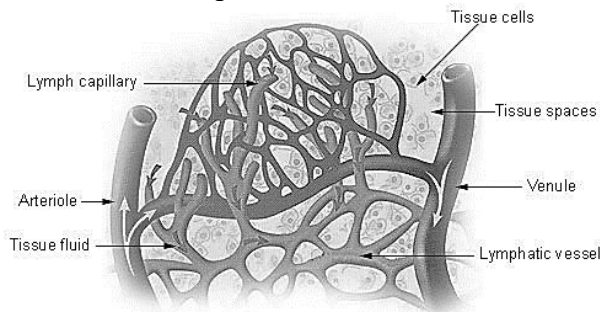
**Explanation:** Lymph is the fluid that circulates throughout the lymphatic system. The lymph is formed when the interstitial is collected through lymph capillaries. It is then transported through larger lymphatic vessels to lymph nodes, where it is cleaned by lymphocytes, before emptying ultimately into the right or the left sub-clavian vein, where it mixes back with the blood.

**Q.6** Answer is "Capillaries of blood vascular system"

**Explanation:** Lymph capillaries are slightly larger in diameter than blood capillaries and have closed ends. Their



unique structure permits interstitial fluid to flow into them but not out. The ends of the endothelial cells that make up the wall of a lymphatic capillary overlap. When pressure is greater in the interstitial fluid than in lymph, the cells separate slightly, like the opening of a one-way swinging door and interstitial fluid enters the lymphatic capillaries. When pressure is greater inside the lymphatic capillary, the cells adhere more closely and lymph cannot escape back into interstitial fluid.

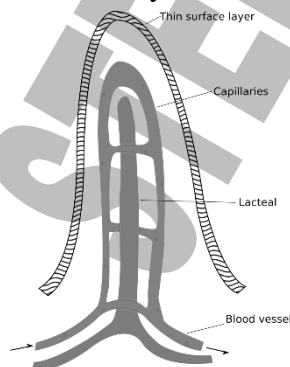


**Q.7 Answer is “Larger and larger lymph vessels”**

**Explanation:** Lymph capillaries join to form larger and larger lymph vessels and ultimately form thoracic lymphatic duct which opens into sub-clavian vein. The flow of lymph is always towards the thoracic duct.

**Q.8 Answer is “Villi”**

**Explanation:** They are called lacteal because fluid inside them contains fats and appears milky (lacteal-milk). In the intestine, the branches of lymph capillaries, within villi are called lacteals that absorb dietary fats.



**Q.9 Answer is “Lymphoid masses”**

**Explanation:** Several lymphoid masses are present in the walls of digestive tract, in the mucosa and sub-mucosa. The larger masses spleen and thymus, tonsils and adenoids are all lymphoid masses. These produce lymphocytes.

**Q.10 Answer is “Many afferent lymph vessels”**

**Explanation:** Several afferent lymph vessels bring lymph into lymph nodes whereas single efferent lymph vessel drains the lymph node.

**Q.11 Answer is “Lymphoid masses”**

**Explanation:** Several lymphoid masses are present in the walls of digestive tract, in the mucosa and sub-mucosa. The larger masses like spleen and thymus, tonsils and adenoids are all lymphoid masses. These produce lymphocytes.

**Q.12 Answer is “3000ml”**

**Explanation:** In an average person, about three liters more fluid leaves the blood capillaries than is reabsorbed by them each day. Lymphatic system returns this excess fluid and its dissolved proteins and other substances to the blood.

**Q.13 Answer is “Large fat globules”**

**Explanation:** The lacteals of villi absorb large fat globules, which are released by interstitial cells after the products of digestion of fats are absorbed. After a fatty meal these fat globules may make up 1% of the lymph.

**Q.14 Answer is “Lymph nodes”**

**Explanation:** The lymphatic system helps defend the body against foreign invaders. Lymph nodes have lymphocytes and macrophages that destroy bacteria and viruses. The painful swelling of lymph nodes in certain diseases (mumps is an extreme example) is largely a results of accumulation of dead lymphocytes and macrophages.

**Q.15** Answer is “Dead lymphocytes and macrophages”

**Explanation:** The lymphatic system helps defend the body against foreign invaders. Lymph nodes have lymphocytes and macrophages that destroy bacteria and viruses. The painful swelling of lymph nodes in certain diseases (mumps in an extreme example) is largely a results of accumulation of dead lymphocytes and macrophages.

**Q.16** Answer is “Lymph nodes, spleen”

**Explanation:** Just as the lymph nodes filter lymph, the spleen filters blood, exposing it to macrophages and lymphocytes that destroy foreign particles and aged red blood cells.

**Q.17** Answer is “Pericardial cavity”

**Explanation:** The heart of human is located in the chest cavity. The heart is enclosed in a double membranous sac the pericardial cavity, which contains pericardial fluid. Pericardium prevents the heart, prevents it from overextension and pericardial fluid protects it from abrasion.

**Q.18** Answer is “Overextension”

**Explanation:** Pericardium prevents the heart from overextension; Pericardial fluid prevents the heart from abrasion and ribcage prevents it from external physical trauma.

**Q.19** Answer is “Myocardium”

**Explanation:** Myocardium of the heart is made up of special type of muscles called cardiac muscles. These muscles contains myofibrils and myofilaments of myosin and actin. Their arrangement is similar to those in skeletal muscles fibres and their mechanism of contraction is essentially the same, except they are branched cells in which the successive cells are separated by junctions called intercalated discs.

**Q.20** Answer is “Myofibril and myofilaments of actin and myosin”

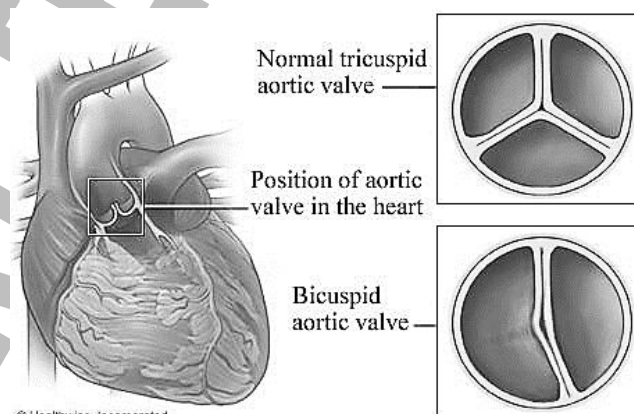
**Explanation:** The arrangement of cardiac muscle cells or fibres is similar to those in skeletal muscles fibre. These muscles also contains myofibrils and myofilaments of actin and myosin. The difference is that of branches and intercalated discs which are found in cardiac muscles fibres only.

**Q.21** Answer is “Rhythmically”

**Explanation:** Cardiac contraction is set at a rhythmic cycle.

**Q.22** Answer is “Bicuspid valve”

**Explanation:** It is also called mitral valve. It contains two flaps.



**Q.23** Answer is “Two upper thin walled atria and two lower thick-walled ventricles”

**Explanation:** Two upper chambers containing thin walls are called atria whereas two lower chambers containing thick wall are called ventricles.

**Q.24** Answer is “Right side”

**Explanation:** The right chambers of heart right i.e. atrium and right ventricle contain deoxygenated blood.

**Q.25** Answer is “Left side”

**Explanation:** The left chambers of heart (left atrium and left ventricle) contain oxygenated blood.

**Q.26** Answer is “expulsion pumps”

**Explanation:** As right ventricle pushes out the blood to pulmonary artery for pulmonary circulation whereas left ventricle pushes it to aorta for systemic circulation.

**Q.27 Answer is “Right atrium”**

**Explanation:** Both superior and inferior venae cavae open into right atrium.

**Q.28 Answer is “Tricuspid valve”**

**Explanation:** It is right atrioventricular valve or right inlet valve having three flaps.

**Q.29 Answer is “Fibrous cords called chordae tendineae”**

**Explanation:** These are called heart strings (tendons) which connect papillary muscles to the inlet valves of the heart. These are made up of 80% collagen and 20% elastin and epithelial cells.

**Q.30 Answer is “Papillary muscles and walls of tricuspid valve”**

**Explanation:** The flaps of bicuspid and tricuspid valves are similarly attached through chordae tendinae to papillary muscles of the walls of ventricles.

**Q.31 Answer is “Pulmonary trunk”**

**Explanation:** Right ventricle carrying deoxygenated blood, pushes it upon contraction to the lungs through pulmonary artery or pulmonary trunks.

**Q.32 Answer is “Left and right pulmonary arteries”**

**Explanation:** These bring the deoxygenated blood to right and left lungs respectively.

**Q.33 Answer is “Left atrium”**

**Explanation:** Left atrium receives oxygenated blood from lungs via pulmonary veins.

**Q.34 Answer is “Bicuspid valve”**

**Explanation:** The left atrioventricular valve, also called left inlet valve or mitral

valve controls the unidirectional flow of oxygenated blood from left atrium to left ventricle.

**Q.35 Answer is “Aorta”**

**Explanation:** Aorta or Aortic arch receives oxygenated blood from left ventricle and distributes it to the entire body through systemic circulation.

**Q.36 Answer is “Semilunar”**

**Explanation:** Outlet valves are called semilunar valves which exist at the base of all vessels leaving the heart or entering into heart.

**Q.37 Answer is “Heart”**

**Explanation:** Coronary arteries are the first arteries which emerge from the aorta before turning towards left side and they provide blood supply to the heart itself.

**Q.38 Answer is “Three branches”**

**Explanation:** An innominate artery, a left common carotid artery and left subclavian artery.

**Q.39 Answer is “different parts of alimentary canal, kidney and lower abdomen”**

**Explanation:** After arching towards left behind the heart aorta covers the chest area through bronchial arteries and then enters into the abdominal areas to cover the alimentary canal, kidneys and lower abdomen through renal arteries and mesenteric arteries.

**Q.40 Answer is “Superior vena cava”**

**Explanation:** It drains upper half of the body.

**Q.41 Answer is “Iliac veins”**

**Explanation:** Right and left iliac veins which fuse to give rise to inferior vena cava receive blood from right and left femoral veins and pour the blood into the inferior vena cava.

**Q.42 Answer is “Inferior vena cava”**

**Explanation:** Renal veins drain kidneys and pour the deoxygenated blood into inferior vena cava.

**Q.43 Answer is “Hepatic portal vein”**

**Explanation:** It fuses with hepatic vein and then opens into inferior vena cava.

**Q.44 Answer is “A”**

**Explanation:** Having three flaps, ‘A’ is a tricuspid valve.

**Q.45 Answer is “B”**

**Explanation:** Having two flaps.

**Q.46 Answer is “Diastole”**

**Explanation:** Diastole is a phase of relaxation of heart chambers.

**Q.47 Answer is “More pressure than ventricles”**

**Explanation:** Because they are filled with blood but ventricles are empty.

**Q.48 Answer is “Atrioventricular valves”**

**Explanation:** “Lubb” sound is produced when inlet valves or atrioventricular valves close and their flaps strike with each other.

**Q.49 Answer is “Semilunar valves”**

**Explanation:** Semilunar valves which are also called outlet valves produce dub sound on closure.

**Q.50 Answer is “2-5 billion times”**

**Explanation:** As per statistical evaluation given in text book.

**Q.51 Answer is “Pulmonary veins”**

**Explanation:** All veins carry deoxygenated blood except pulmonary veins, which carry blood from lungs to the left atrium.

**Q.52 Answer is “One systole and one diastole”**

**Explanation:** Two upper chamber (atria) contract in a single step and both lower chambers (ventricles) relax at that time, then both lower chambers contract simultaneously and upper chamber relax at that time.

**Q.53 Answer is “QRS wave”**

**Explanation:** A normal electrocardiogram (ECG) indicates that the heart is functioning properly. The P wave occurs just prior to atrial contraction; the QRS wave occurs just prior to ventricular contraction and the T wave occurs when the ventricles are recovering from contraction.

**Q.54 Answer is “Ventricular systole”**

**Explanation:** When ventricles contract, blood is pushed through aorta to arterial system and highest blood pressure is generated as the walls of ventricles are thicker than those of atria.

**Q.55 Answer is “Arteries”**

**Explanation:** As blood is directly pumped into aorta.

**Q.56 Answer is “Veins and capillaries”**

**Explanation:** Blood is not directly being pumped into veins and capillaries so they don’t exhibit pulse pressure.

**Q.57 Answer is “Arteries and capillaries”**

**Explanation:** The pumping pressure of heart does not allow blood to move backward in these two types of vessels.

**Q.58 Answer is “25%”**

**Explanation:** As per available statistical data from text book.

**Q.59 Answer is “120 days”**

**Explanation:** It is four months i.e. 120 days.

**Q.60 Answer is “Cholesterol”**

**Explanation:** Excess of cholesterol cause some cardiovascular problems however a fixed amount of cholesterol is inevitable for animals including human being due to its role in stabilization of the structure and fluidity of cell membranes and its role in hormone synthesis.

**Q.61 Answer is “Monocytes”**

**Explanation:** Monocytes carry out macrophagocytosis (destruction of larger foreign particles) however Neutrophils carry out microphagocytosis (destruction of smaller foreign particles).



**Q.62 Answer is “Platelets”**

**Explanation:** Platelets are fragments of megakaryocytes i.e., not complete cells.

**Q.63 Answer is “Thrombus”**

**Explanation:** This plug is thrombus but its formation is thrombosis.

**Q.64 Answer is “Thrombosis is followed by embolism”**

**Explanation:** First thrombosis occurs and then thrombus is dislodged and is trapped at new site. Now it is called embolus and process is called embolism. So as one follows the other so collectively called thromboembolism.

**Q.65 Answer is “Myocardial infarction”**

**Explanation:** Myocardial infarction will lead to heart attack as the supply of blood to heart muscles is reduced or stops.

**Q.66 Answer is “Stroke”**

**Explanation:** Cerebral infarction results in sudden death so that is why it is called stroke.



**Worksheet-15(ii)**  
**(Immunity)**

**Q.1 Immunity is a capacity to do following things, EXCEPT:**

- A) Recognition of intrusion
- B) Effective and timely removal of intruders
- C) Mobilization of cells and cell products
- D) Blockage of entrance of intruders

**Q.2 A biological defense of our body with greater speed and effectiveness is called:**

- A) Infestation                      C) Immunity
- B) Disinfestation                D) Antisepsis

**Q.3 The capacity of our body to identify and eradicate intruders is called:**

- A) Disinfestation                C) Antisepsis
- B) Chemotherapy               D) Immunity

**Q.4 The first defence line of our body is:**

- A) Skin
- B) Phagocytes
- C) Mucous membrane
- D) Skin and Mucous membranes both

**Q.5 Pick up the one which is part of general defense system of our body:**

- A) Antibodies
- B) Humoral immune response
- C) Phagocytes
- D) Cell mediated response

**Q.6 Lymphocyte B and T have been named due to their:**

- A) Relationship with bursa of Fabricius and thymus gland respectively
- B) Origin from bursa Fabricius and thymus, respectively
- C) Storage in bursa of Fabricius and thymus

D) Destruction in bursa of Fabricius

**Q.7 Thymus gland provides immunological competence to:**

- A) B lymphocytes
- B) Antibodies
- C) T-lymphocytes
- D) Immunoglobulins

**Q.8 An antibody molecule consists of:**

- A) Two identical light chains
- B) Two identical heavy chains
- C) Two identical light and two identical heavy chains
- D) Two identical light chains and two non-identical heavy chains

**Q.9 In light chain of antibodies:**

- A) Variable sequence of amino acid is longer one
- B) Variable sequence of amino acid is shorter one
- C) Both variable and constant amino acids sequences have equal length
- D) Only variable sequence of amino acids occurs

**Q.10 Globular blood proteins that are produced by B – lymphocytes and that bind specifically to foreign antigenic materials in the body and destroy them are called:**

- A) Antigens                              C) Antibodies
- B) Immunogens                        D) Antibiotics

**Q.11 The antigen – antibody complexes formed in the body are taken up by:**

- A) Phagocytes                        C) Monocytes
- B) Lymphocytes                      D) Leukocytes

**Q.12 In the case of snake bite venom passive immunity is produced by:**

- A) Antitoxins
- B) Antivenome serum
- C) Material from some similar disease

- D) Attenuated germs
- Q.13 The AIDS victim often succumbs to a:**
- A) Bacterial disease  
B) Cancer  
C) Viral disease  
D) Bacterial disease or cancer
- Q.14 There is no known cure of the:**
- A) Snake bite  
B) Rabies  
C) Infectious hepatitis  
D) AIDS
- Q.15 Antivenom serum is used to carry out:**
- A) Active immunization  
B) Natural immunization  
C) Passive immunization  
D) Innate immunity
- Q.16 Anti-rabies serum is a source of:**
- A) Active immunization  
B) Natural immunization  
C) Passive immunization  
D) Innate immunity
- Q.17 Anti-tetanus serum (ATS) is a source of:**
- A) Active immunization  
B) Natural immunization  
C) Passive immunization  
D) Innate immunity
- Q.18 Pick up the one which is not role of plasma cells:**
- A) Synthesis of antibodies  
B) Liberation of antibodies in blood plasma  
C) Attaching the antibodies to the surface of bacteria  
D) Liberation antibodies in tissue fluid
- Q.19 Pasteur next applied the principle of inoculation with attenuated cultures to the prevention of:**
- A) Small pox                      C) Cox pox
- B) Anthrax                      D) Chicken Cholera
- Q.20 Louis Pasteur used the word vaccine for:**
- A) Cow pox pus  
B) Attenuated cultures of bacteria  
C) Small pox pus  
D) Attenuated cultures of viruses
- Q.21 \_\_\_\_\_ include in second defense line.**
- A) Skin  
B) Mucus  
C) Neutrophils  
D) Saliva
- Q.22 Physical components of the skin defense include(s):**
- A) Sweat gland  
B) Dermis  
C) Dermis and epithelium  
D) Sweat gland, dermis and epithelium
- Q.23 Following provide defense against infections in our digestion tract:**
- A) HCl in stomach  
B) Mucus and cilia in nose/in nasal cavity  
C) Mucus of bronchi  
D) HCl in stomach, Mucus and cilia in nose/in nasal cavity and Mucus of bronchi.
- Q.24 A typical antibody molecule is \_\_\_\_\_ shaped:**
- A) X                                      C) J  
B) Y                                      D) H
- Q.25 Antibodies are proteins and made up of how many polypeptide chains?**
- A) One                                      C) Three  
B) Two                                      D) Four
- Q.26 A typical antibody molecule is composed of how many identical heavy chains?**
- A) One                                      C) Three  
B) Two                                      D) Four

- Q.27** A typical antibody molecule is made up of how many identical light chains?  
A) One C) Three  
B) Two D) Four
- Q.28** Which part of antibody recognizes the antigen during immune response?  
A) Heavy part C) Light part  
B) Variable part D) Constant part
- Q.29** Variable amino acid sequences in antibody molecule are found in:  
A) Both light chains only  
B) One heavy and one light chain  
C) Both heavy chains only  
D) Both heavy and light chains
- Q.30** In the structural diagram of an antibody molecule which portion is occupied by variable chains:  
A) Lower region  
B) Upper region  
C) Middle region  
D) In between chains
- Q.31** On antibody molecule, two heavy chains and two light chains are bonded by:  
A) Disulphide bonds  
B) Hydrogen bonds  
C) Phosphodiester bonds  
D) Ionic bonds
- Q.32** Substance that can be recognized by the receptor of B-cells:  
A) Antigen C) Immunogen  
B) Antibody D) Food
- Q.33** All antibodies of an individual are manufactured in:  
A) Alpha cells C) T-cells  
B) B-cells D) Delta cells
- Q.34** Any foreign substance, often a protein which stimulates the formation of antibodies is called:  
A) Antigen C) Prion  
B) Antibody D) Virion
- Q.35** Any substance that elicits an immune response, by inducing production of antibodies:  
A) Antigen C) Virion  
B) Antibody D) Food
- Q.36** The capacity to recognize the intrusion of any material foreign to the body and to mobilize cells products to help remove the particular sort of foreign material with greater speed and effectiveness is called:  
A) Prion C) Antigen  
B) Immunity D) Antibody
- Q.37** The study of our protection from foreign macromolecules or invading organisms and our responses to them is called:  
A) Bacteriology C) Ethology  
B) Virology D) Immunology
- Q.38** Globular blood proteins that are produced by B-lymphocytes and that bind specifically to foreign antigenic materials in the body and destroy them:  
A) Viroid C) Antigen  
B) Immunity D) Antibody
- Q.39** Cells of the immune system which responds to foreign substance; some time secrete antibodies:  
A) Lymphocytes C) Erythrocytes  
B) Monocytes D) Macrophages
- Q.40** The branch of biology which is the study of our protection from foreign macromolecules or invading organisms and our responses to them is called:  
A) Virology C) Protection  
B) Immunity D) Immunology
- Q.41** Vaccine is available for all, EXCEPT:  
A) Hepatitis B  
B) Tuberculosis  
C) Malaria  
D) Polio

- Q.42** The body's response to foreign particles such as the production of antibodies directed against a specific antigen is called:
- A) Immune response
  - B) Immunity
  - C) Temperature response
  - D) Inflammatory response
- Q.43** Which one of the following are called cytotoxic cells?
- A) B-lymphocyte
  - B) T-lymphocyte
  - C) Monocytes
  - D) Neutrophils
- Q.44** Which one of the following type of T cells secrete cytotoxin which triggers destruction of the pathogen's DNA?
- A) Helper T cells
  - B) Suppressor T cells
  - C) Memory T cells
  - D) Cytotoxic T cells
- Q.45** \_\_\_\_\_ are Y-shaped proteins that circulate through blood stream and bind to specific antigens thereby attacking microbes:
- A) Haemoglobin
  - B) Antibodies
  - C) Interferons
  - D) Myoglobulines
- Q.46** The antibodies are transported through \_\_\_\_\_ and the \_\_\_\_\_ to the pathogen invasion sites:
- A) Blood lymph
  - B) Water, flood
  - C) Water, injection
  - D) Food, injection
- Q.47** \_\_\_\_\_ is the kind of immunity which is obtained as a result of an infection:
- A) Natural active immunity
  - B) Artificial active immunity
  - C) Natural passive immunity
  - D) Artificial passive immunity
- Q.48** Passive immunity is developed by injecting
- A) Vaccine
  - B) Antiserum
  - C) Serum
  - D) Antibodies
- Q.49** Antibodies are specific i.e. cause the destruction of the antigen, are manufactured in:
- A) Monocytes
  - B) B-lymphocytes
  - C) Basophils
  - D) Granulocytes
- Q.50** Production of immunity when antibodies are injecting in form of antisera is called:
- A) Active immunity
  - B) Inoculation
  - C) Passive immunity
  - D) Antibodies

**ANSWER KEY (Worksheet-15(ii))**

1	D	23	A	45	B
2	C	24	B	46	A
3	D	25	D	47	A
4	D	26	B	48	D
5	C	27	B	49	B
6	A	28	B	50	C
7	C	29	D		
8	C	30	B		
9	C	31	A		
10	C	32	A		
11	A	33	B		
12	B	34	A		
13	D	35	A		
14	D	36	B		
15	C	37	D		
16	C	38	D		
17	C	39	A		
18	C	40	D		
19	B	41	C		
20	B	42	A		
21	C	43	B		
22	D	44	D		

**EXPLANATION**

**Q.1** Answer is “Blockage of entrance of intruder”

*Explanation:* Blockage is not responsibility of immune system rather it is carried out by physical barriers.

**Q.2** Answer is “Immunity”

*Explanation:* Infestation is a troublesome invasion of some parasite whereas disinfection and antisepsis minimize the chances of infestation. However, immunity becomes active after infestation. Speed and effectiveness are characteristics of defense provided by immune system.

**Q.3** Answer is “Immunity”

*Explanation:* In biology, immunity is the balanced state of multicellular organisms having adequate biological defenses to fight infection, diseases or other unwanted biological invasions, while having adequate tolerance to avoid allergy and autoimmune diseases.

**Q.4** Answer is “Skin and mucous membranes both”

*Explanation:* Skin provides physical barrier against outer threats whereas mucous membranes provide barrier against inner threats.

**Q.5** Answer is “Phagocytes”

*Explanation:* Phagocytes are part of general defence system of our body and make second line of defence in our body.

**Q.6** Answer is “Relationship with bursa of Fabricius and thymus gland”

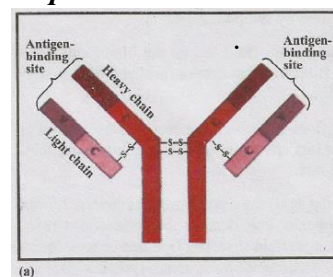
*Explanation:* T cells attain immunological competence by thymus gland whereas B cells were discovered from Bursa of Fabricius.

**Q.7** Answer is “T-lymphocytes”

*Explanation:* The influence of the thymus gland is essential in making the T-cells immunologically competent.

**Q.8** Answer is “Two identical light and two identical heavy chains”

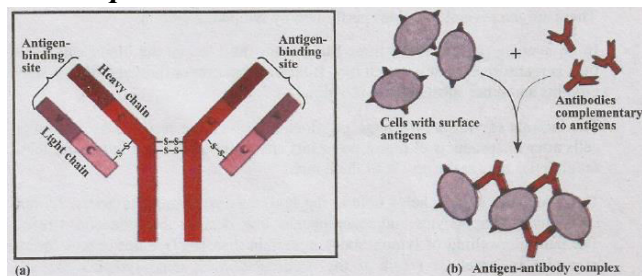
*Explanation:*





- Q.9** Answer is “Both variable and constant amino acid sequences have equal length”

**Explanation:**



- Q.10** Answer is “Antibodies”

**Explanation:** An antibody (Ab), also known as an immunoglobulin (Ig), is a large Y-shaped protein produced mainly by plasma cells that is used by the immune system to identify and neutralize pathogens such as bacteria and viruses. The antibody recognizes a unique molecule of the harmful agent, called antigen, via variable region.

- Q.11** Answer is “Phagocytes”

**Explanation:** Antibodies tag the foreign cells and help phagocytes identify and destroy them.

- Q.12** Answer is “Antivenome serum”

**Explanation:** A serum containing antibodies against venome.

- Q.13** Answer is “Bacterial disease or cancer”

**Explanation:** Because his/her immune system fails to defend him/her.

- Q.14** Answer is “AIDS”

**Explanation:** No cure have been discovered or developed for AIDS so far.

- Q.15** Answer is “Passive immunization”

**Explanation:** As antibodies are being introduced into the body, so it is passive immunization.

- Q.16** Answer is “Passive immunization”

**Explanation:** Antirabies serum contains antibodies against rabies and injection of antibodies to somebody is called passive immunization.

- Q.17** Answer is “Passive immunization”

**Explanation:** Anti tetanus serum contains antibodies against tetanus (*Clostridium tetani*), thus injection of anti-tetanus serum is a source of passive immunization.

- Q.18** Answer is “Attaching antibodies to the surface of bacteria”

**Explanation:** Antibodies are synthesized and liberated into the blood by plasma cells, however, they do not attach them. Antibodies are attached themselves, to the surface of bacteria.

- Q.19** Answer is “Anthrax”

**Explanation:** Pasteur made many discoveries concerning the cause and prevention of infectious diseases. In 1880s he isolated the bacterium responsible for chicken cholera. He grew it in a pure culture. To prove that he really had isolated the bacterium responsible for this disease Pasteur made use of the fundamental techniques devised by Koch. He arranged experiments for public demonstration in which he repeated an experiment that had been successful in many previous trails in his laboratory. Unluckily his demonstration failed badly, as he had used an attenuated culture for that. It was accidentally proved that attenuated culture of some pathogenic bacteria will be unable to cause infection, however it will be capable enough to stimulate the immune system to synthesize antibodies.

Pasteur next applied this principle of inoculation with attenuated cultures to the prevention of Anthrax.

- Q.20** Answer is “Attenuated cultures of bacteria”

**Explanation:** Louis Pasteur called the attenuated cultures of bacterial vaccine and immunization with attenuated cultures of bacteria vaccination.

**Q.21 Answer is “Neutrophils”**

**Explanation:** Once pathogens are able to neutralize the responses from the first line of defense i.e. skin and mucous membrane and are able to penetrate inside the body they are encountered by the second line of defense which is nonspecific because it handles a variety of microbes. Nonspecific defense includes macrophages, neutrophils, natural killer cells, the complement system etc.

**Q.22 Answer is “Sweat gland, Dermis and Epithelium”**

**Explanation:** Our first line of defense is nonspecific and includes structures, chemicals and processes that work to prevent pathogens entering the body. These first line defenders include the skin and mucous membranes of the respiratory, digestive, urinary and reproductive systems. Skin is comprised of two main layers

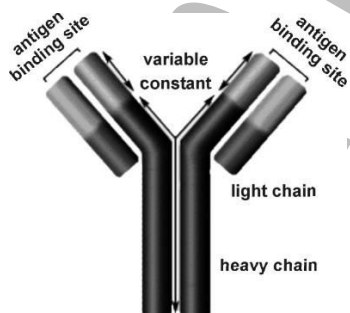
- Epidermis
- Dermis

**Q.23 Answer is “HCl in stomach”**

**Explanation:** Proper levels of HCl in the stomach are our first line of defense against bacterial and viral infections.

**Q.24 Answer is “Y”**

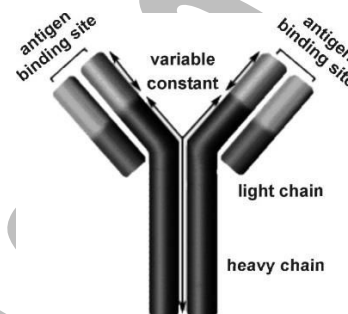
**Explanation:**



Each antibody consists of four polypeptides – two heavy chains and two light chains joined to form a “Y” shaped molecule.

**Q.25 Answer is “Four”**

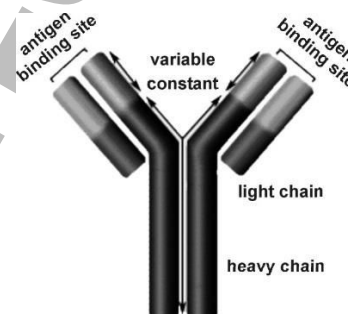
**Explanation:**



Each antibody consists of four polypeptides – two heavy chains and two light chains joined to form a “Y” shaped molecule.

**Q.26 Answer is “Two”**

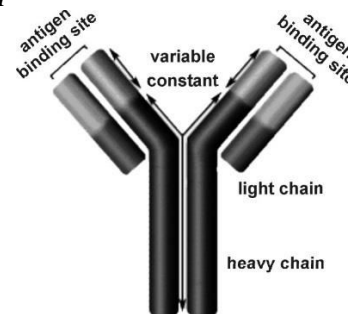
**Explanation:**



Each antibody consists of four polypeptides – two heavy chains and two light chains.

**Q.27 Answer is “Two”**

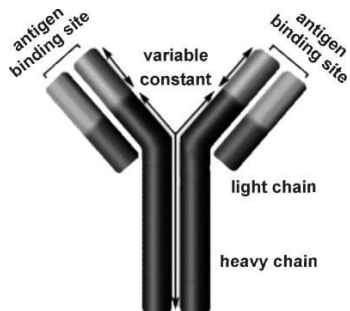
**Explanation:**



Each antibody consists of four polypeptides – two heavy chains and two light chains.

**Q.28** Answer is “Variable part”

**Explanation:**



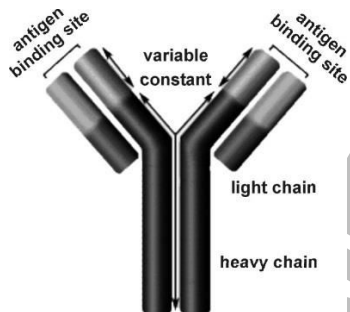
The variable region, composed of 110-130 amino acids, give the antibody its specificity for binding antigen. The variable region includes the ends of the light and heavy chains.

**Q.29** Answer is “Both heavy and light chains”

**Explanation:** The variable region includes the ends of the light and heavy chains.

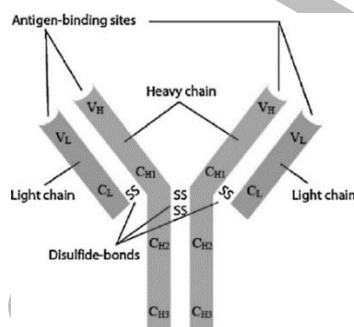
**Q.30** Answer is “Upper region”

**Explanation:**



**Q.31** Answer is “Disulphide bonds”

**Explanation:**



An antibody molecule consists of four polypeptide chains – two identical light chain and two identical heavy chains – linked by disulfide (-S - S -) bridges.

**Q.32** Answer is “Antigen”

**Explanation:** Any substance that elicits an immune response, by inducing production of antibodies is called antigen.

**Q.33** Answer is “B-cells”

**Explanation:** B-cells recognize antigen and form plasma cell clone. These plasma cells synthesize and liberate antibodies into the blood plasma and tissue fluid.

**Q.34** Answer is “Antigen”

**Explanation:** Any substance that elicits an immune response, by inducing production of antibodies is called antigen.

**Q.35** Answer is “Antigen”

**Explanation:** Any substance that elicits an immune response, by inducing production of antibodies is called antigen.

**Q.36** Answer is “Immunity”

**Explanation:** The capacity to recognize the intrusion of any material foreign to the body and to mobilize cells products to help remove the particular sort of foreign material with greater speed and effectiveness is called immunity.

**Q.37** Answer is “Immunology”

**Explanation:** The study of our protection from foreign macro molecules or invading organisms and our responses to them is called immunology.

**Q.38** Answer is “Antibody”

**Explanation:** Globular blood proteins that are produced by B-lymphocytes and that bind specifically to foreign antigenic materials in the body and destroy them is called antibody.

**Q.39 Answer is “Lymphocytes”**

**Explanation:** Lymphocytes of the immune system which responds to foreign substance; some time secrete antibodies.

**Q.40 Answer is “Immunology”**

**Explanation:** The branch of Biology which is the study of our protection from foreign macromolecules or invading organisms and our responses to them is called immunology.

**Q.41 Answer is “Malaria”**

**Explanation:** Malarial vaccine is not available.

**Q.42 Answer is “Immune response”**

**Explanation:** The body’s response to foreign particles, such as the production of antibodies directed against a specific antigen, is called immune response.

**Q.43 Answer is “T-lymphocytes”**

**Explanation:** Natural killer cells are the type of T-lymphocytes. They are also called cytotoxic T-cells. In general, natural killer cells do not directly attack invading microbes.

**Q.44 Answer is “Cytotoxin T cells”**

**Explanation:** these cells secrete cytotoxin which triggers destruction of the pathogen’s DNA or perforin which is a protein that creates holes in the pathogens plasma membrane. The holes cause the pathogen to lyse (rupture).

**Q.45 Answer is “Antibodies”**

**Explanation:** Antibodies (also called immunoglobulin or Ig’s) are Y-shaped proteins that circulate through the blood

stream and bind to specific antigens, thereby attacking microbes. The antibodies are transported through the blood and the lymph to the pathogen invasion site.

**Q.46 Answer is “Blood, lymph”**

**Explanation:** The antibodies are transported through blood and the lymph to the pathogen invasion sites.

**Q.47 Answer is “Natural active immunity”**

**Explanation:** Natural active immunity is the kind of immunity, which is obtained as a result of an infection. The body manufactures its own antibodies when exposed to an infectious agent. This type of immunity is most effective and generally persists for a long time, sometimes even for life.

**Q.48 Answer is “Antibodies”**

**Explanation:** In contrast to active immunity, in which case antigens are introduced to stimulate the production of antibodies, by artificial or natural method; antibodies are injected in the form of antisera, to make a person immune against a disease. This is called passive immunity.

**Q.49 Answer is “B-lymphocytes”**

**Explanation:** B-cells recognize antigen and form plasma cell clone. These plasma cells synthesise and liberate antibodies into the blood plasma and tissue fluid. Here antibodies attach to the surfaces of bacteria and speed up their phagocytosis, or combine with and neutralise toxins produced by micro-organisms, by producing antitoxins. This is called humoral Immune response..

**Q.50** Answer is “Passive immunity”

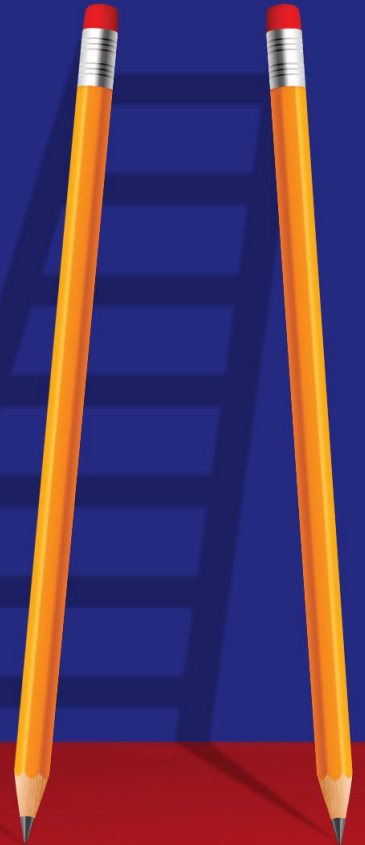
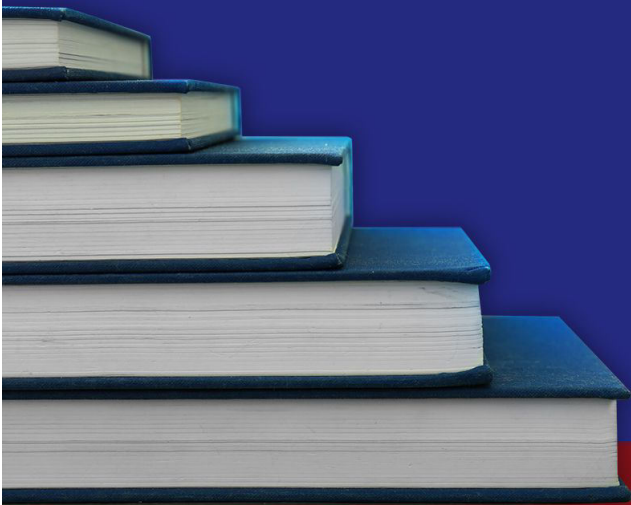
**Explanation:** In contrast to active immunity, in which case antigens are introduced to stimulate the production of antibodies, by artificial or natural method; antibodies are injected in the form of antisera, to make a person immune against a disease. This is called passive immunity.

STEP ENTRY TEST 2020



# STOP

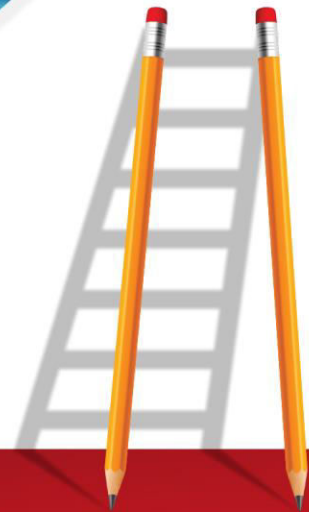
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# BIOLOGY



## Worksheet-16



**STP**

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**Worksheet-16****(Genetics)**

**Q.1 Humans have X – linked recessive traits like:**

- A) Hemophilia
- B) Vitamin D – resistant rickets
- C) Hypophosphatemic rickets
- D) SRY gene

**Q.2 Many X – linked traits in man are also found X – linked in other mammals like:**

- A) Mouse and rabbit
- B) Dog and Sheep
- C) Donkey and horse
- D) Mouse, rabbit, dog, sheep, donkey, cattle, kangaroo and chimpanzee all

**Q.3 Gene is a basic unit of:**

- A) Inheritance
- B) Coordination
- C) Excretion
- D) Respiration

**Q.4 Genes are actually parts of \_\_\_\_\_ comprising its base sequence:**

- A) Chromosome
- B) DNA
- C) RNA
- D) Chromatid

**Q.5 \_\_\_\_\_ are responsible for producing startling inherited resemblances as well as distinctive variations among generations.**

- A) Chromosomes
- B) Genes
- C) Genomes
- D) Nucleic acids

**Q.6 When genes pass in the form of intact parental combination between generations:**

- A) Inherited similarities are conserved
- B) Non-inherited similarities are conserved
- C) Variations energy
- D) Non-inherited variations emerge

**Q.7 When genes shuffle, mutate or juggle with each other:**

- A) Genetic continuity is conserved
- B) Inherited variations are conserved
- C) Variations occur
- D) Inherited similarities are conserved

**Q.8 Genes form \_\_\_\_\_ on \_\_\_\_\_ of homologous chromosomes.**

- A) Pairs, Pairs
- B) Pairs, tetrads
- C) Tetrads, pairs
- D) Tetrads, tetrads

**Q.9 When an effect caused by a gene or gene pair at one locus interferes with or hides the effect caused by another gene or gene pair at another locus, such phenomenon of gene interaction is called:**

- A) Epistasis
- B) Pleiotropy
- C) Over dominance
- D) Co dominance

**Q.10 ABO locus is on chromosome number:**

- A) 19
- B) 9
- C) 11
- D) 21

**Q.11 The epistatic gene H changes a precursor substance into substance:**

- A) H
- B) D
- C) A
- D) B

**Q.12 Substance H produces an enzyme that inserts sugar into a precursor \_\_\_\_\_ on the surface of RBC:**

- A) Lipoprotein
- B) Nucleoprotein
- C) Glycoprotein
- D) Glycolipids

**Q.13 Insertion of antigen A and B on the surface of RBC depends upon the product of gene:**

- A) H
- B) I<sup>A</sup>
- C) I<sup>B</sup>
- D) I<sup>A</sup> or I<sup>B</sup>

**Q.14** A person with Bombay phenotype lacks:

- A) Antigen A and B in blood
- B) Antigen A and B in body
- C) Antigen A and B on RBC
- D) Antigen A and B in lymph

**Q.15** Pick up the one which illustrate Bombay phenotype:

- A)  $I^A I^A$ , HH
- B)  $I^A I^B$ , Hh
- C)  $I^A I^B$ , hh
- D) ii, HH

**Q.16** A phenomenon of gene interaction in which a gene interferes in the effect of another gene is called:

- A) Pleiotropy
- B) Epistasis
- C) Over dominance
- D) Co dominance

**Q.17** Epistasis is an interaction between:

- A) Different alleles of the same gene
- B) Different genes occupying different loci
- C) Same gene of the different loci
- D) Different genes occupying same locus

**Q.18** Bombay phenotype is an example of:

- A) Dominance
- B) Pleiotropy
- C) Epistasis
- D) Gene linkage

**Q.19** The cells of \_\_\_\_\_ contains an enormous amount of DNA.

- A) Prokaryotes
- B) Protists
- C) Eukaryotes
- D) Fungi

**Q.20** The mutation in \_\_\_\_\_ have little evolutionary consequence than germ line changes.

- A) Sex cells
- B) Gametes
- C) Gamete mother cells
- D) Somatic cells

**Q.21** The mutation in \_\_\_\_\_ is passed to subsequent generations thus providing the raw material from which natural selection produces evolutionary changes.

- A) Somatic cells
- B) Non – reproductive cells
- C) Germ line cells
- D) Skin cells

**Q.22** Mutations can broadly be classified as:

- A) Chromosomal aberration of number and structure
- B) Point mutation and gene mutation
- C) Chromosomal aberration of number and point mutation
- D) Chromosomal aberration and point mutation

**Q.23** Allele  $I^A$  specifies production of antibodies:

- A) Against A
- B) Against B
- C) Against A and B
- D) Against O

**Q.24** Allele i is recessive to:

- A)  $I^A$
- B)  $I^B$
- C)  $I^A$  and  $I^B$  both
- D) D

**Q.25** Pick up the genotype which produces phenotype A:

- A)  $I^A I^A$
- B)  $I^A i$
- C)  $I^A I^A$  or  $I^A i$
- D) ii

**Q.26** The homozygous “ii” will produce phenotype:

- A) A
- B) B
- C) AB
- D) O

**Q.27** The blood group alleles start their expression at early embryonic stage and keep on expressing themselves till:

- A) Puberty
- B) Old stage
- C) Death
- D) Eighties

**Q.28 The blood serum of A phenotype contains:**

- A) Anti – A antibodies
- B) No antibodies
- C) Anti – B antibodies
- D) Both antibodies

**Q.29 B phenotype of blood contains:**

- A) Anti – A antibodies
- B) Anti – B antibodies
- C) Anti A and Anti B antibodies
- D) No antibody

**Q.30 Blood phenotype AB have:**

- A) Anti – A antibodies
- B) Anti – B antibodies
- C) Both Anti A and B antibodies
- D) Neither anti – A nor Anti – B antibodies

**Q.31 Any blood transfusion is ideally safe if it:**

- A) Does not cause agglutination in the recipient
- B) Cause agglutination in the recipient
- C) Does not cause agglutination in the donor
- D) Cause agglutination in the donor

**Q.32 Agglutination of blood leads to serious results because clumped blood cells cannot:**

- A) Carry O<sub>2</sub>
- B) Pass through fine capillaries
- C) Carry CO<sub>2</sub>
- D) Carry food and wastes

**Q.33 Before giving transfusion the blood samples of the donor and the recipient are:**

- A) Screened for compatibility
- B) Cross matched for compatibility
- C) Filtered for compatibility
- D) Centrifuged for compatibility

**Q.34 If incompatible blood is transfused, the RBCs of the:**

- A) Recipient are destroyed
- B) Either recipient or donor or both are destroyed
- C) Donor are destroyed
- D) No body are destroyed

**Q.35 Blood group A can be transfused only into:**

- A) A recipient
- B) B recipient
- C) AB recipient
- D) A and AB recipient

**Q.36 AB blood can be transfused only into:**

- A) B recipient
- B) A recipient
- C) AB recipient
- D) B and AB recipient

**Q.37 ABO blood system is encoded by a single:**

- A) Polymorphic gene
- B) Homomorphic gene
- C) Isomorphic gene
- D) Amorphic gene

**Q.38 The gene I at chromosome # 9 of human population have:**

- A) Two alleles
- B) Three alleles
- C) Four alleles
- D) Five alleles

**Q.39 If the alterations involve only one or a few base pairs in the coding sequence they are called:**

- A) Chromosomal mutations
- B) Mega changes
- C) Chromosomal aberrations
- D) Point mutations



- Q.40** Modern industrial societies are exposed to point mutations mainly by:
- A) Mutagenic radiations
  - B) Spontaneous pairing errors
  - C) Chemical mutagens
  - D) Non-disjunction
- Q.41** Sickle cell anemia and phenyl ketonuria are well known examples of:
- A) Point mutations
  - B) Chromosomal aberrations
  - C) Chromosomal mutations
  - D) Non-disjunctions
- Q.42** In sickle cell anemia a point mutations leads to the change of \_\_\_\_\_ at position 6 from N terminal end in hemoglobin  $\beta$  chain.
- A) Glutamic acid into serine
  - B) Serine into glutamic acid
  - C) Glutamic acid into valine
  - D) Valine into glutamic acid
- Q.43** Sickle cell hemoglobin have reduced ability to:
- A) Carry  $\text{CO}_2$
  - B) Carry  $\text{O}_2$
  - C) Release  $\text{O}_2$
  - D) Release  $\text{CO}_2$
- Q.44** Humans have:
- A) 46 chromosomes
  - B) 46 pairs of chromosomes
  - C) 23 chromosomes
  - D) 22 pairs of chromosomes
- Q.45** In humans division of chromosomes is as under:
- A) 23 autosome, one pair of sex chromosomes
  - B) 22 autosome, one pair of sex chromosomes
  - C) 23 pairs of autosome, one pair of sex chromosomes
  - D) 22 pairs of autosome, one pair of sex chromosomes
- Q.46** The human female differs from human male in having:
- A) X chromosome
  - B) Two X chromosomes
  - C) Y chromosome
  - D) XY chromosomes
- Q.47** Human female differs from human male in having:
- A) 22 homologous pairs of chromosomes
  - B) 22 homologous pairs of autosomes
  - C) 23 homologous pairs of chromosomes
  - D) One pair of sex chromosomes
- Q.48** Human male differs from human female in having:
- A) One non-homologous pairs of chromosomes
  - B) 23 non-homologous pairs of chromosomes
  - C) 22 homologous pairs of chromosome
  - D) 23 homologous pairs of chromosome
- Q.49** The male determining gene of the Y – chromosome is called:
- A) tfm
  - B) SRY
  - C) SDRY
  - D) TSDRY
- Q.50** It is essential for triggering the development of maleness in humans:
- A) Presence of Y chromosome
  - B) Presence of SRY gene on Y chromosome
  - C) X – Y balance
  - D) Autosome and X chromosome balance
- Q.51** In humans:
- A) Same type of gametes are produced
  - B) Same type of sperms are produced
  - C) Same type of eggs are produced
  - D) Different type of eggs are produced

- Q.52** In humans, the chances of male and female offspring are theoretically:  
A) 1:2:1                      C) 1:1  
B) 2:1                         D) 3:1
- Q.53** In humans, if X-carrying sperm fertilizes the egg, the offspring will be:  
A) Female  
B) Male  
C) Abnormal male  
D) Abnormal female
- Q.54** All sixty four codons were tested by making artificial mRNA and triplet codons by:  
A) Nierenberg  
B) Leader  
C) Khorana  
D) Nierenberg, Leader and Khorana
- Q.55** Many different alleles of a gene may be produced by:  
A) Evolution                      C) Reshuffling  
B) Mutation                       D) Crossing over
- Q.56** All such altered, alternative forms of a gene, whose number is more than two, are called:  
A) Allelomorphs                      C) Multiple alleles  
B) Fixed alleles                       D) Pseudo alleles
- Q.57** ABO blood system have:  
A) Two different phenotypes  
B) Four different phenotypes  
C) Three different phenotypes  
D) Five different phenotypes
- Q.58** A person having antigen A on the surface of RBC, has:  
A) Antibodies against A  
B) Antibodies against O  
C) Antibodies against B  
D) Antibodies against A and B
- Q.59** A person having neither antigen A nor B have:  
A) No antibodies  
B) Antibodies against B  
C) Antibodies against A  
D) Antibodies against A and B both
- Q.60** In phenylketonuria:  
A) Phenylalanine hydroxylase is not formed  
B) Phenylalanine hydroxylase is not degraded  
C) Phenylalanine is not formed  
D) Adenosine deaminase is not formed
- Q.61** In phenylketonuria, phenylalanine accumulates in the cells leading to mental retardation as the brain fails to develop:  
A) During embryonic development  
B) In childhood  
C) In infancy  
D) During puberty
- Q.62** ABO locus is found on chromosome number:  
A) 19                                      C) 11  
B) 9                                         D) 21
- Q.63** Genetics of wheat grain color was studied by:  
A) Darwin                                C) Mendel  
B) Nilsson-Ehle                         D) Correns
- Q.64** When we cross a true breeding dark red grain wheat plant with a true breeding white grain wheat plant, all F<sub>1</sub> grains will have:  
A) Pink color                              C) Red color  
B) Light red color                        D) Dark red color

- Q.65** Nilson–Ehle got seven shades of color in  $F_2$  of wheat grain with ratio of:  
A) 1:6:15:20:15:6:1  
B) 1:2:3:04:03:2:1  
C) 3:6:9:12:9:6:3  
D) 5:10:15:20:15:10:5
- Q.66** A wheat plant with Aabbcc genotype will have how many doses of red pigment in its grains:  
A) One  
B) Two  
C) Three  
D) Four
- Q.67** Human skin color is also a quantitative trait which is controlled by:  
A) Three gene pairs  
B) Three to four gene pairs  
C) Three to five gene pairs  
D) Three to six gene pairs
- Q.68** In polygenic traits majority of the population will represent the:  
A) Extreme phenotypes  
B) Any phenotype  
C) Intermediate phenotype  
D) Strange phenotype
- Q.69** A continuously varying trait is encoded by:  
A) Alleles of two or more different gene pairs  
B) Alleles of a gene pair  
C) Alleles of two or more genomes  
D) Multiple alleles of two or more different gene pairs
- Q.70** Pick up the discontinuously varying trait:  
A) Human intelligence  
B) Skin color in humans  
C) Grain color of wheat  
D) 4 O'clock flower color
- Q.71** MN blood group system is an example of:  
A) Complete dominance  
B) Incomplete dominance  
C) Over dominance  
D) Co-dominance
- Q.72** If both contrasting alleles of a gene are fully expressed in a heterozygous condition their mutual relation will be called as:  
A) Dominance  
B) Over dominance  
C) Co-dominance  
D) Incomplete dominance

**ANSWER KEY (Worksheet-16)**

1	A	21	C	41	A	61	C
2	D	22	D	42	C	62	B
3	A	23	B	43	B	63	B
4	B	24	C	44	A	64	B
5	B	25	C	45	D	65	A
6	A	26	D	46	B	66	A
7	C	27	C	47	C	67	D
8	A	28	C	48	A	68	C
9	A	29	A	49	B	69	A
10	B	30	D	50	B	70	D
11	A	31	A	51	C	71	D
12	C	32	B	52	C	72	D
13	A	33	B	53	A		
14	C	34	B	54	D		
15	C	35	D	55	B		
16	B	36	C	56	C		
17	B	37	A	57	B		
18	C	38	B	58	C		
19	C	39	D	59	D		
20	D	40	C	60	A		

**EXPLANATION****Q.1 Answer is “Hemophilia”**

**Explanation:** The gene for hemophilia is located on X-chromosome and it is a recessive trait. However, vitamin D resistant rickets also called as hypophosphatemic rickets is controlled by a dominant allele located on X – chromosome. SRY gene is located on short arm of Y – chromosome

**Q.2 Answer is “Mouse, rabbits, dog, sheep, donkey, cattle, kangaroo and chimpanzee”**

**Explanation:** As man along with mouse, rabbit, dog, sheep, donkey, cattle, kangaroo and chimpanzees belong to class mammalia of vertebrates and have close evolutionary link, their genetic similarity is no surprise.

**Q.3 Answer is “Inheritance”**

**Explanation:** Gene are physical units of inheritance located on chromosomes and control the traits of organisms.

**Q.4 Answer is “DNA”**

**Explanation:** The sequence of nucleotides that determines the amino acid sequence of a protein is called a gene. In fact DNA stores all sorts of biological information coded in the sequence of its bases in a linear order and genes are actually parts of DNA comprising its basic sequences.

**Q.5 Answer is “Genes”**

**Explanation:** As genes are basic units of biological information, so they are responsible for transmission of parental characters to their offsprings as well as for the creation of new characters by the combination of maternal-paternal genes i.e. non parental characters.

**Q.6 Answer is “Inherited similarities are conserved”**

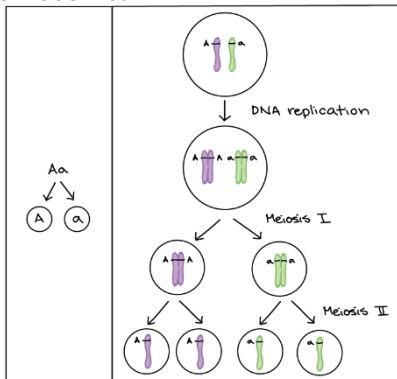
**Explanation:** If an entire set of genes of a parent are transferred to an offspring that offspring will be a clone of that parent i.e. it will have 100% similarities with that parent and as a result all parental characters will be conserved in offspring.

**Q.7 Answer is “Variations occur”**

**Explanation:** By reshuffling of genetic makeup of parents variants are produced and recombination occurs.

**Q.8 Answer is “Pairs, Pairs”**

**Explanation:** Gene pair occurs on pair of homologous chromosomes which indicates a parallelism in the behavior of gene and chromosome.

**Q.9 Answer is “Epistasis”**

**Explanation:** It is definition of epistasis.

**Q.10 Answer is “9”**

**Explanation:** It is a fact.

**Q.11 Answer is “H”**

**Explanation:** Substance H is associated with insertion of antigens on the surface of RBCs.

**Q.12 Answer is “Glycoproteins”**

**Explanation:** Glycoproteins develop particular receptor sites on cell surfaces.

**Q.13 Answer is “H”**

**Explanation:** As gene H will produce a receptor site for antigen A or/and B on the surface of RBCs.

**Q.14 Answer is “Antigen A and B on RBC”**

**Explanation:** Bombay phenotype is actually a person having AB antigen but lacking the substance H which is required for insertion of antigens on the surface of RBC. Thus phenotypically he or she will be O.

**Q.15 Answer is “ $I^A I^B, hh$ ”**

**Explanation:** Substance H is required for the insertion of AB antigen on the surface

of RBCs and for that purpose at least on H (dominant) is required at locus H.

**Q.16 Answer is “Epistasis”**

**Explanation:** It is definition of epistasis.

**Q.17 Answer is “Different genes occupying different loci”**

**Explanation:** An interaction between the alleles of a same gene is called dominance relation, however, an interaction between alleles of two different genes is called epistasis and hypostasis.

**Q.18 Answer is “Epistasis”**

**Explanation:** In Bombay phenotype the phenotypic effect of AB gene located on chromosome number 9 is being interfered by H gene located on chromosome number 19.

**Q.19 Answer is “Eukaryotes”**

**Explanation:** They have more chromosomes.

**Q.20 Answer is “Somatic cells”**

**Explanation:** As they have no role in sexual reproduction.

**Q.21 Answer is “Germ line cells”**

**Explanation:** As germ line cells are involved in sexual reproduction.

**Q.22 Answer is “Chromosomal aberrations or point mutation”**

**Explanation:** Chromosomal aberrations occur at chromosome level while point mutations occur at nucleotide level.

**Q.23 Answer is “Against- B”**

**Explanation:** As that person lacks antigen B

**Q.24 Answer is “ $I^A$  or  $I^B$  both”**

**Explanation:** These are alleles of same gene located on some locus.



**Q.25** Answer is " $I^A I^A$  or  $I^A i$ "

**Explanation:** As 'i' is recessive to  $I^A$  a person with ' $iI^A$ ' will be heterozygous for blood type A. A person with  $I^A I^A$  will be homozygous for blood type-A.

**Q.26** Answer is "O"

**Explanation:** As there will be neither antigen A nor antigen B.

**Q.27** Answer is "Death"

**Explanation:** As the antigens persist throughout life.

**Q.28** Answer is "Anti-B antibodies"

**Explanation:** A person with A blood type lacks antigens B thus antigen B is foreign to him/her and it will produce antibodies against it.

**Q.29** Answer is "Anti-A antibodies"

**Explanation:** A person having blood group 'B' will lack antigen 'A' and thus produce antibodies against 'A'.

**Q.30** Answer is "Neither Anti-A nor Anti-B antibodies"

**Explanation:** As it contains both antigens.

**Q.31** Answer is "Does not cause agglutination in the recipient"

**Explanation:** It means donor blood either matches to that of recipient or it lacks any antibodies i.e O type. (a universal donor)

**Q.32** Answer is "Pass through fine capillaries"

**Explanation:** It is life threatening situation as blood vessels will be choked by it.

**Q.33** Answer is "Cross matched for compatibility"

**Explanation:** Cross matching is carried out to check the compatibility whereas screening is carried out to ensure that it is infection free.

**Q.34** Answer is "Either recipient or donor or both are destroyed"

**Explanation:** It is consequence of incompatibility which means either donor's blood have antibodies against that of recipient or vice versa or both have antibodies against each other's blood.

**Q.35** Answer is "A and AB"

**Explanation:** AB is universal recipient and A is same blood group.

**Q.36** Answer is "AB recipient"

**Explanation:** AB blood lacks any antibody, thus it can be transfused to only 'AB' recipient because any other blood type will have antibodies against it and its agglutination will occur.

**Q.37** Answer is "Polymorphic gene"

**Explanation:** Having more than two morphological (Phenotypic) manifestations or having more than two alleles.

**Q.38** Answer is "Three alleles"

**Explanation:**  $I^A$ ,  $I^B$  or i

**Q.39** Answer is "Point mutation"

**Explanation:** As it occurs at nucleotide level or molecular level and is called point mutation or molecular mutation of gene mutation.

**Q.40** Answer is "Chemical mutagens"

**Explanation:** Such chemicals which cause point mutations are called chemical mutagens.

**Q.41** Answer is "Point mutations"

**Explanation:** These genetic disorders are consequence of a change in the nucleotide sequence of DNA which results in a change in amino acid sequence of proteins and as a result the function of that associated with that protein is stopped.

**Q.42** Answer is “Glutamic acid into valine”

**Explanation:** Glutamic acid is replaced by valine as thymine have been replaced by adenine in gene regulating the synthesis of hemoglobin.

**Q.43** Answer is “Carry O<sub>2</sub>”

**Explanation:** As it have modified  $\beta$  chains.

**Q.44** Answer is “46 chromosomes”

**Explanation:** 44 autosomes and 2 sex chromosomes.

**Q.45** Answer is “22 pairs of autosomes, one pair of sex chromosome”

**Explanation:** T.H. Morgan classified the chromosomes into two functional categories i.e. autosomes and sex chromosomes.

**Q.46** Answer is “Two X chromosomes”

**Explanation:** Female have XX chromosomes whereas male have XY chromosome.

**Q.47** Answer is “23 homologous pairs of chromosomes”

**Explanation:** Sex chromosomes are also homologous in female (XX) whereas autosomes are homologous in both male and females both. However in male sex chromosomes (XY) are non-homologous.

**Q.48** Answer is “One non-homologous pair of chromosomes”

**Explanation:** Sex chromosomes are also homologous in female (XX) whereas autosomes are homologous in both male and females. However in male sex chromosomes (XY) are non-homologous.

**Q.49** Answer is “SRY”

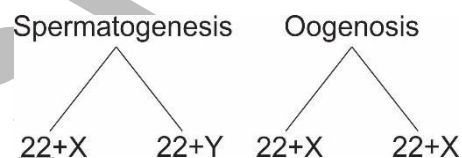
**Explanation:** Sex determining region of the Y-chromosome.

**Q.50** Answer is “Presence of SRY gene on Y chromosome”

**Explanation:** Presence of SRY on the short arm of Y-chromosome is inevitable for triggering male development in the embryo.

**Q.51** Answer is “Same type of eggs are produced”

**Explanation:** As all pairs of chromosomes are homologous in female. However, sperms are of two types.



**Q.52** Answer is “1:1”

**Explanation:** According to probability rule, the chances for two types of sperms in fertilizing the single type of egg are fifty fifty.

**Q.53** Answer is “Female”

**Explanation:** All the eggs of human female carry X-chromosome. However male produces two types of sperms; half having X-chromosomes and half having Y-chromosomes. Thus the gender of the offspring will depend upon the type of sperm used in fertilization. If X chromosome carrying sperm fertilized the egg the offspring will be female (XX) otherwise male XY.

**Q.54** Answer is “Nierenberg, Leader and Khorana”

**Explanation:** As a historical fact.

**Q.55** Answer is “Mutation”

**Explanation:** Mutation is a source of formation of multiple alleles.

**Q.56** Answer is “Multiple alleles”

**Explanation:** If a gene have more than two alternate forms or allelomorphs it is called a multiple alleles e.g. ABO blood

type. Such multiple variants of a gene come into being by mutation.

**Q.57 Answer is “Four different phenotypes”**

*Explanation:* A, B, AB and O.

**Q.58 Answer is “Antibodies against B”**

*Explanation:* Antibodies are formed against that antigen which is absent in that body.

**Q.59 Answer is “Antibodies against A and B both”**

*Explanation:* A person lacking both antigen A and B will produce antibodies against both antigens as both antigens are foreign to him or her.

**Q.60 Answer is “Phenylalanine hydroxylase is not formed”**

*Explanation:* Phenylalanine hydroxylase enzyme is required to degrade phenylalanine. As a result phenylalanine accumulates in the cells leading to mental retardation, as the brain fails to develop in infancy. So synthesis of phenylalanine hydroxylase is inevitable and any mutation causing its deficiency will result in a disease called phenylketonuria.

**Q.61 Answer is “in infancy”**

*Explanation:* Phenylalanine accumulates during infancy in post embryonic development as during embryonic phase phenylalanine is metabolized by mother and fetus gets metabolized food. Thus phenylketonuria occurs in infancy as an in born error of metabolism.

**Q.62 Answer is “9”**

*Explanation:* It is a fact.

**Q.63 Answer is “Nilsson-Ehle”**

*Explanation:* Nilsson – Ehle studied the genetics of wheat grain color. When he crossed a true breeding dark red grain plant with true breeding white grain plant, all  $F_1$  grains had light red color,

intermediate between two parental shades. It seemed as if it was a case of incomplete dominance. But when  $F_1$  grains were grown to mature to mature plants and crossed with each other.  $F_2$  grains had exactly seven shades of color in the ratio of 1 dark red : 6 modestly dark red : 15 red : 20 light red : 15 pink : 6 light pink : 01 white.

**Q.64 Answer is “Light red color”**

*Explanation:* See explanation of Q # 63.

**Q.65 Answer is “1:6:15:20:15:6:1”**

*Explanation:* See explanation of Q # 63.

**Q.66 Answer is “One”**

*Explanation:* Alleles A, B and C code for equal amount (dose) of red pigment, which is a positive effect. But none of a, b, and c code red pigment.

**Q.67 Answer is “Three to six gene pairs”**

*Explanation:* Human skin color is also a quantitative trait which is controlled by three to six gene pairs. The greater the number of pigment specifying genes, the darker the skin. A child can have darker or lighter skin than his parents.

**Q.68 Answer is “Intermediate phenotype”**

*Explanation:* It is evident from the ratio obtained by Nilsson-Ehle in  $F_2$  i.e.;

$$1 : 6 : 15 : 20 : 15 : 6 : 1$$

**Q.69 Answer is “Alleles of two or more different gene pairs”**

*Explanation:* A continuously varying trait is encoded by two or more different gene pairs found at different loci all influencing the same trait in an additive way. These quantitative traits are called polygenes. Each polygene has a small positive or negative effect on the character.

**Q.70** Answer is “4 O’clock flower color”

**Explanation:** Human intelligence, human skin color and grain color of wheat are continuously varying polygenic traits however flower color in four O clock plants is a single gene controlled trait with incomplete dominance and three phenotypes.

**Q.71** Answer is “Co-dominance”

**Explanation:**

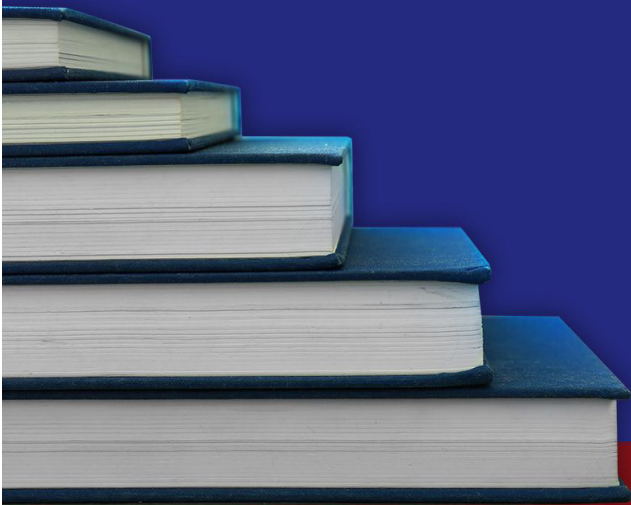
Dominance relations	Examples
Traits of pea studied by Mendel	Complete dominance
Flower color in four O clock plant	Incomplete dominance
MN and ABO blood groups	Co-dominance
Eye color in <i>Drosophila</i>	Over dominance

**Q.72** Answer is “Incomplete dominance”

**Explanation:** See explanation of Q # 71.

# STOP

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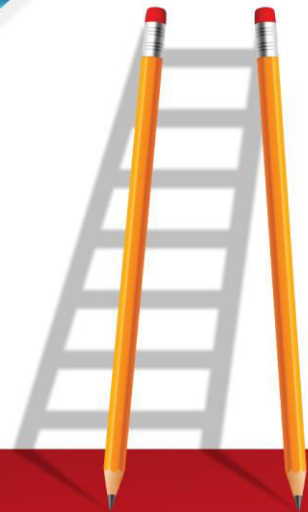




# BIOLOGY



## Worksheet-17



**STP**

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**Worksheet-17 (i)****(Genetics)**

**Q.1 Hemophiliac's blood fails to clot properly after an injury, because of the following reasons, EXCEPT:**

- A) A reduction of blood clotting factors
- B) A malfunction of blood clotting factors
- C) A complete absence of blood clotting factors
- D) A reduction in hemopoietic stem cells

**Q.2 Hemophilia is a serious:**

- A) Hereditary disease
- B) Cardiovascular disease
- C) Physiological disease
- D) Immunodeficiency

**Q.3 A hemophiliac may:**

- A) Suffer from immune deficiency
- B) Suffer from respiratory infection
- C) Bleed to death
- D) Suffer from hypertension

**Q.4 Hemophilia is of:**

- A) Two types
- B) Three types
- C) Four types
- D) One types

**Q.5 Pick up the odd pair:**

- A) Hemophilia – A, Factor VIII
- B) Hemophilia – C, Factor XI
- C) Hemophilia – B, Factor XI
- D) Hemophilia – B, Factor IX

**Q.6 Pick up the choice not true with respect to both hemophilia A and hemophilia-B:**

- A) Non – allelic
- B) Recessive
- C) Allelic
- D) Sex linked

**Q.7 The percentage of hemophiliacs suffering from type – B of hemophilia is:**

- A) 10%
- B) 80%
- C) 20%
- D) 30%

**Q.8 The percentage of Hemophiliac patients suffering from type – C is:**

- A) Negligible
- B) 80%
- C) 20%
- D) 30%

**Q.9 Pick up the one that affects more men as compared to women:**

- A) Hemophilia – A
- B) Both Hemophilia A and B
- C) Hemophilia – B
- D) Hemophilia – C

**Q.10 Type of Hemophilia which affects the both men and women equally is:**

- A) Hemophilia – A
- B) Both Hemophilia – A and Hemophilia – B
- C) Hemophilia – B
- D) Hemophilia – C

**Q.11 Chances for a man to be affected by Hemophilia – A and B are:**

- A) Greater than a woman
- B) Equal to a woman
- C) Less than a woman
- D) Variable as compared to woman

**Q.12 A woman can suffer from Hemophilia A or B only when she is:**

- A) Homozygous dominant
- B) Heterozygous dominant
- C) Homozygous recessive
- D) Homozygous dominant

**Q.13 Pick up the disorder that occurs by one recessive allele in man but by two recessive alleles in woman:**

- A) Hemophilia – A
- B) Hemophilia – C
- C) Hemophilia – B
- D) Hemophilia – A and B

**Q.14** It zigzags from maternal grandfather through a carrier daughter to a grandson:

- A) Hemophilia – A
- B) Hemophilia – C
- C) Hemophilia – B
- D) Hemophilia – A and B

**Q.15** Hemophilia A and B always pass from:

- A) Father to son
- B) Maternal grandfather to grandson
- C) Father to daughter
- D) Paternal grandfather to grandson

**Q.16** A hemophiliac father passes his 'h' gene directly to his:

- A) Son
- B) Son's son
- C) Daughter
- D) Daughter's son

**Q.17** A hemophiliac man receive 'X<sup>h</sup>' indirectly from his:

- A) Father's father
- B) Mother's father
- C) Grandfather's father
- D) Grandmother's father

**Q.18** The single recessive allele for hemophilia is expressed successfully in the:

- A) Hemizygous daughter
- B) Homozygous son
- C) Hemizygous son
- D) Heterozygous son

**Q.19** A son of a carrier daughter will be affected by hemophilia if he inherits X chromosome of:

- A) Maternal grandmother or paternal grandmother
- B) Maternal grandfather or maternal grandmother
- C) Paternal grandmother or paternal grandfather
- D) Paternal grandfather, maternal grandfather

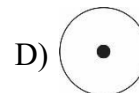
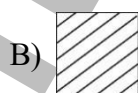
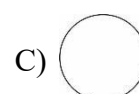
**Q.20** Queen Victoria's hemophiliac son was prince:

- A) Prince Nicholas
- B) Leopold
- C) Rupert
- D) Charles

**Q.21** The pedigree of Queen Victoria's family shows hemophilic sons in generation no.:

- A) II
- B) III
- C) IV
- D) II, III and IV all

**Q.22** Pick up the sign denoting carrier daughter:



**Q.23** Three primary colors associated with normal trichromatic vision are:

- A) Orange, green and blue
- B) Red, green and blue
- C) Red, green and yellow
- D) Red, green and purple

**Q.24** Mutations in opsin genes cause \_\_\_\_\_ types of colorblindness.

- A) One
- B) Two
- C) Three
- D) Four

**Q.25** Red blindness is called:

- A) Protanopia
- B) Deuteranopia
- C) Tritanopia
- D) Dichromacy

**Q.26** Deuteranopia is:

- A) Blue blindness
- B) Green blindness
- C) Red blindness
- D) Colors blindness

**Q.27** Blue blindness is called:

- A) Protanopia
- B) Deuteranopia
- C) Tritanopia
- D) Protanomaly

**Q.28** Blue cone monochromacy is an:

- A) X – linked recessive trait
- B) Autosomal trait
- C) X – linked dominant trait
- D) Y – linked trait

**Q.29** A person suffering from blue cone monochromacy will be:

- A) Red blind
- B) Green blind
- C) Blue blind
- D) Red and Green blind

**Q.30** The type of color blindness which inherits equally in men and women is called:

- A) Blue blindness
- B) Green blindness
- C) Red blindness
- D) Red and Green blindness

**Q.31** A normal woman, whose father was red blind marries a red blind man, what proportion of their children can have normal color vision?

- A) 100%                      C) 25%
- B) 33%                      D) 50%

**Q.32** The cause of testicular feminization syndrome is:

- A) A recessive gene on X – chromosome
- B) A recessive gene on Y – chromosome
- C) A dominant gene on X – chromosome
- D) A dominant gene on Y – chromosome

**Q.33** Following are the symptoms of testicular feminization syndrome EXCEPT:

- A) Female genitalia
- B) No breast
- C) Blind vagina
- D) Degenerated testes

**Q.34** “Such persons are happily married as female but are sterile”, because they suffer from:

- A) Down’s syndrome
- B) Turner’s syndrome
- C) Testicular feminization syndrome
- D) Klinefelter’s syndrome

**Q.35** All daughters of an affected father, but none of his sons are affected in case of:

- A) X – linked dominant traits
- B) Y – linked dominant traits
- C) X – linked recessive traits
- D) Y – linked recessive traits

**Q.36** The example of X – linked dominant trait is:

- A) Color blindness
- B) Pattern baldness
- C) Hemophilia
- D) Hypophosphatemic rickets

**Q.37** It cannot be cured by taking vitamin D:

- A) Dietary rickets
- B) Hypophosphatemic rickets
- C) Osteomalacia
- D) Weakness of bones

**Q.38** It does not result from vitamin – D deficiency:

- A) Dietary rickets
- B) Hypophosphatemic rickets
- C) Osteomalacia
- D) Weakness of bones

**Q.39** Its cause is genetic communication failure at molecular level:

- A) Dietary rickets
- B) Hypophosphatemic rickets
- C) Osteomalacia
- D) Weakness of bones

**Q.40 Gene for hypophosphatemic rickets is:**

- A) d C) H  
B) D D) h

**Q.41 Maleness is a:**

- A) X – linked trait  
B) Y – linked trait  
C) XY – linked trait  
D) XX – linked trait

**Q.42 Maleness passes through:**

- A) Y – chromosome from father to son only  
B) X – chromosome from father to son only  
C) Y – chromosome from mother to son only  
D) X – chromosome from mother to son only

**Q.43 All sons of an affected father will be affected in case of:**

- A) X – linked recessive traits  
B) Y – linked traits  
C) X – linked dominant traits  
D) X X linked traits

**Q.44 \_\_\_\_\_ gene on Y chromosome determines maleness in man.**

- A) tfm C) SRY  
B) D D) H

**Q.45 It is a male sex switch which triggers developmental process towards maleness after six week pregnancy:**

- A) SRY gene C) D gene  
B) tfm gene D) H gene

**Q.46 Such traits affect a structure or function of the body part and occur only in males or only in females:**

- A) Sex – linked traits  
B) Sex limited traits  
C) Sex influenced traits  
D) X – linked traits

**Q.47 Pick up the one not true about a woman:**

- A) She does not grow a beard herself  
B) She cannot have a gene for beard  
C) She can have a gene for beard  
D) She can pass the genes specifying heavy beard growth to her sons

**Q.48 A trait that can occur in both male and female but it is more common in one sex, cannot be:**

- A) X linked recessive trait  
B) Sex influenced trait  
C) Sex limited trait  
D) X linked dominant trait

**Q.49 It is controlled by an allele which is dominant in one sex but recessive in other:**

- A) Sex – limited trait  
B) Sex – influenced trait  
C) Y – linked trait  
D) X – linked trait

**Q.50 Pattern baldness is a:**

- A) Sex – limited trait  
B) Sex – influenced trait  
C) Y – linked trait  
D) X – linked trait

**Q.51 Gregor John Mendel laid down the foundation of:**

- A) Modern genetics  
B) Classical genetics  
C) Population genetics  
D) Phylogenetics

**Q.52 Mendel performed series of breeding experiments on garden pea:**

- A) In his farmhouse garden  
B) In his monastery garden  
C) In a public park garden  
D) In his school garden



**Q.53** Pick up the dominant one among the following traits of *Pisum sativum*:

- A) Yellow pod
- B) Constricted pod
- C) Green colored seed
- D) Round shaped seed

**Q.54** As a result of monohybrid cross Mendel got:

- A) 25% round                      C) 75% round
- B) 50% round                    D) 100% round

**Q.55** Punnet square indicates that \_\_\_\_\_ of  $F_2$  progeny would have been homozygous round \_\_\_\_\_ heterozygous round and \_\_\_\_\_ wrinkled, respectively:

- A) 1/4, 2/4, 1/4                  C) 2/4, 1/4, 1/4
- B) 1/4, 1/4, 2/4                  D) 2/4, 1/4, 2/4

**Q.56** Mendel devised a cross called test cross, which is used to test the \_\_\_\_\_ of an individual showing a dominant \_\_\_\_\_:

- A) Genotype, phenotype
- B) Phenotype, genotype
- C) Vigor, phenotype
- D) Vigor, genotype

**Q.57** \_\_\_\_\_ could be homozygous (RR) or heterozygous (Rr):

- A) A genotypically round seed
- B) A phenotypically round seed
- C) A genotypically wrinkled seed
- D) A phenotypically wrinkled seed

**Q.58** Wrinkled seed plant is:

- A) Always heterozygous recessive
- B) Always heterozygous dominant
- C) Always homozygous recessive
- D) Always homozygous dominant

**Q.59** What is depicted from the results of test cross given here below?

Round = 50%

Wrinkled = 50%

- A) The tested individual was heterozygous dominant
- B) The tested individual was heterozygous recessive
- C) The tested individual was homozygous dominant

D) The tested individual was homozygous recessive

**Q.60** What was the ratio of new phenotypic combination in  $F_2$  of Mendel's dihybrid?

- A) 3/16                                  C) 9/16
- B) 1/16                                D) 6/16

**Q.61** What type of gametes will be formed by a plant with RrYy genotype?

- A) RR, YY, rr, yy                  C) RY, Ry, rY, ry
- B) RR, yy, Rr, Yy                  D) Rr, Yy, rr, yy

**Q.62** In  $F_2$  offspring of a monohybrid cross the independent chance for a pea seed to be round is:

- A) 3/4                                    C) 4/4
- B) 1/4                                   D) 2/4

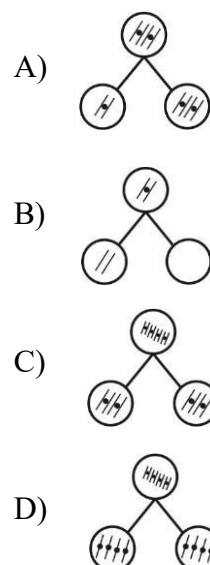
**Q.63** Independent assortment of \_\_\_\_\_ depends upon independent assortment of their \_\_\_\_\_, respectively:

- A) Genes, chromosomes
- B) Chromosomes, genes
- C) Genes, nucleotide sequence
- D) Genes, cells

**Q.64** Mendel's work was rediscovered and acknowledged after:

- A) Sixteen years of his death
- B) Twenty years of his death
- C) Twenty-four years of his death
- D) Thirty-four years of his death

**Q.65** Which one of the following exhibits segregation?



**Q.66 Genes for color blindness, hemophilia and gout form a linkage group on:**

- A) Sex chromosome
- B) Autosome
- C) X – chromosome
- D) Y – chromosome

**Q.67 In F<sub>2</sub> of dihybrid cross Mendel obtained \_\_\_\_% parental types:**

- A) 37.5
- B) 62.5
- C) 66.5
- D) 33.5

**Q.68 In P<sub>1</sub> of test cross, one parent will always be:**

- A) Homozygous dominant
- B) Homozygous recessive
- C) Heterozygous dominant
- D) Heterozygous recessive

**Q.69 Gene linkage means:**

- A) Linkage of a gene with male
- B) Linkage of a gene with female
- C) Linkage of a gene with particular gender
- D) Linkage of a gene with a particular gene

**Q.70 Linked genes can be separated by:**

- A) Meiosis
- B) Crossing over
- C) Mitosis
- D) Gametogenesis

**ANSWER KEY (Worksheet-17(i))**

1	D	21	D	41	B	61	C
2	A	22	D	42	A	62	A
3	C	23	B	43	B	63	A
4	B	24	C	44	C	64	A
5	C	25	A	45	A	65	D
6	C	26	B	46	B	66	C
7	C	27	C	47	B	67	B
8	A	28	A	48	C	68	B
9	B	29	D	49	B	69	D
10	D	30	A	50	B	70	B
11	A	31	D	51	B	71	
12	C	32	A	52	B	72	
13	D	33	B	53	D	73	
14	D	34	C	54	C	74	
15	B	35	A	55	A	75	
16	C	36	D	56	B	76	
17	B	37	B	57	B	77	
18	C	38	B	58	C	78	
19	B	39	B	59	A	79	
20	B	40	B	60	D	80	

**EXPLANATION**

**Q.1** Answer is “A reduction in hemopoietic stem cells”

**Explanation:** Hemopoiesis is associated with formation of new blood cells. It is not associated with blood clotting. However deficiency of blood clotting factors, malfunction of blood clotting factors and a complete absence of blood clotting factors may cause hemophilia of different types.

**Q.2** Answer is “Hereditary disease”

**Explanation:** Hemophilia A, B and C are exclusively inherited and most prevalent types of hemophilia, however, hemophilia A and B are sex-linked recessive traits, whereas hemophilia C is autosomal.

Parahemophilia is a type of hemophilia which may be inherited or acquired. Acquired hemophilia (caused by autoantibodies against factor VIII) is non-

inherited. So majority of the types of hemophilia are inherited

**Q.3** Answer is “Bleed to death”

**Explanation:** As there is some deficiency or complete absence of clotting factors, in case of an injury bleeding will not stop.

**Q.4** Answer is “Three types”

**Explanation:** There are three major inherited types of hemophilia i.e. A, B and C which have been mentioned in textbook of Biology. However there are two other types of hemophilia as well i.e. **parahemophilia** and **acquired hemophilia**. But according to textbook three is correct answer.

**Q.5** Answer is “Hemophilia B, factor XI”

**Explanation:** Hemophilia B is due to disturbance in factor IX. Whereas factor XI is associated with hemophilia C

**Q.6** Answer is “Allelic”

**Explanation:** Hemophilia A and Hemophilia B are non-allelic recessive sex linked traits because they exhibit discriminative inheritance.

**Q.7** Answer is “20%”

**Explanation:**

Type	Percentage of Sufferers
1. Hemophilia -A	80%
2. Hemophilia-B	20%
3. Hemophilia-C	Less than 1%

**Q.8** Answer is “Negligible”

**Explanation:** The frequency of Hemophilia-C in human population is less than 1 percent.

**Q.9** Answer is “Hemophilia A and B”

**Explanation:** Hemophilia A and B being sex linked (X-linked) recessive traits

occurs 17% more in men as compared to women.

**Q.10 Answer is “Hemophilia - C”**

**Explanation:** As it is autosomal.

**Q.11 Answer is “Greater than a woman”**

**Explanation:** The gene of sex linked (X-linked) traits is located on X-chromosome. In such traits female (having homologous pair of X-chromosome) is diallelic and can have three types of genotypes i.e.  $X^H X^H$  or  $X^H X^h$  or  $X^h X^h$ . Out of these three types of genotypes only  $X^h X^h$  will cause hemophilia i.e.  $1/3$  or 33%.

On the other hand male having single X chromosome is monoallelic and as a result only two types of genotypes are possible  $X^H Y$  or  $X^h Y$  :  $X^h Y$  will be hemophilic which represents  $\frac{1}{2}$  or 50% subtracting 33 from 50 we get 17. Thus sex-linked (X-linked) recessive traits appear 17% more in male as compared to female.

**Q.12 Answer is “Homozygous recessive”**

**Explanation:** Female will suffer from hemophilia by being homozygous recessive  $X^h X^h$  only.

**Q.13 Answer is “Hemophilia A and B”**

**Explanation:** All X-linked traits including Hemophilia A and B are monoallelic in male ( $X^h Y$ ) because their genes are located on X chromosome and male have single X-chromosome however female will be diallelic (having two X chromosomes).

**Q.14 Answer is “Hemophilia A and B”**

**Explanation:** All X-linked recessive traits exhibit zigzag inheritance. An affected male will transfer his single X chromosome ( $X^h$ ) to his daughter and other X chromosome will be contributed by mother ( $X^H$ ). Thus daughter will be carrier ( $X^H X^h$ ). Now she will produce two types of gametes i.e. 50%  $X^H$  and 50%  $X^h$ .

Her son getting  $X^h$  from mother will be hemophiliac. Thus the gene of disorder of maternal grandfather after passing through female gender in next generation appears again in male gender in third generation.

**Q.15 Answer is “Maternal grandfather to grandson”**

**Explanation:** Hemophilia A and B are X-linked recessive traits and their genes are located on X-chromosome. For a son X-chromosome is always contributed by mother.

**Q.16 Answer is “Daughter”**

**Explanation:** A father always contribute Y-chromosome to son and X-chromosome to daughter. Gene for hemophilia (H or h) is carried by X chromosome. So father will transfer it to his daughters, not to sons.

**Q.17 Answer is “Mother’s father”**

**Explanation:**  $X^h$  is inherited by a male directly from his affected or carrier mother. However, the mother have inherited it from her father or mother. Thus the male will inherit it indirectly from mother’s father or mother’s mother.

**Q.18 Answer is “Hemizygous son”**

**Explanation:** In sex linked (X-linked) traits male cannot be homozygous because the genes for such traits are located on X-chromosomes and male have single X-chromosome. Thus male will be hemizygous dominant  $X^H$  (Normal) or hemizygous recessive  $X^h$  (hemophiliac).

**Q.19 Answer is “Maternal grandfather or maternal grandmother”**

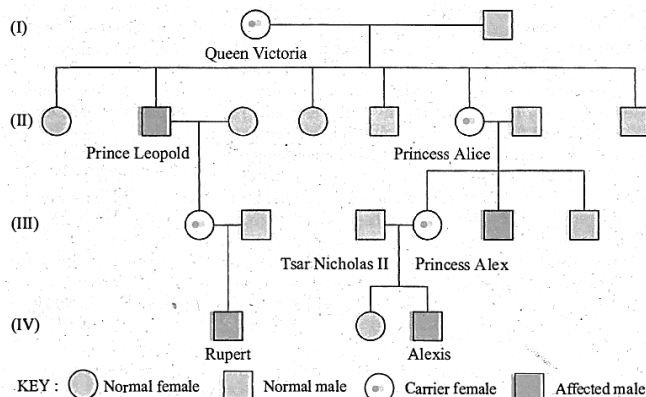
**Explanation:**  $X^h$  is inherited by a male directly from his affected or carrier mother. However, the mother have inherited it from her father or mother. Thus the male will inherit it indirectly from mother’s father or mother’s mother.

**Q.20 Answer is “Leopold”**

**Explanation:** See pedigree of British Royal family given at page 194 of textbook of biology book part II.

**Q.21 Answer is “II, III and IV all”**

**Explanation:** Except generation-I, all the rest of the generations shown in figure 22.28 of Textbook of biology have hemophiliac sons.

**Q.22 Answer is “D”**

**Explanation:** A circle with dot in centre indicates carrier daughter.

**Q.23 Answer is “Red, green and blue”**

**Explanation:** These represent three opsins found in the cone cells of a person with normal trichromatic vision.

**Q.24 Answer is “Three”**

**Explanation:** There are three types of opsins in the cone cells of our eyes which are associated with normal trichromatic vision. These three types of opsins are controlled by three different types of genes. Thus mutation in these three genes can cause three types of color blindness.

**Q.25 Answer is “Protanopia”**

**Explanation:** A form of colorblindness characterized by defective perception of red and confusion of red with green.

**Q.26 Answer is “Green blindness”**

**Explanation:** Defective color vision with confusion of greens with reds.

**Q.27 Answer is “Tritanopia”**

**Explanation:** Defective color vision in which the blue sensitive pigment of the retinal cones is absent.

**Q.28 Answer is “X-linked recessive trait”**

**Explanation:** That person will have only blue opsin and lack both red and green opsin.

**Q.29 Answer is “Red and green blind”**

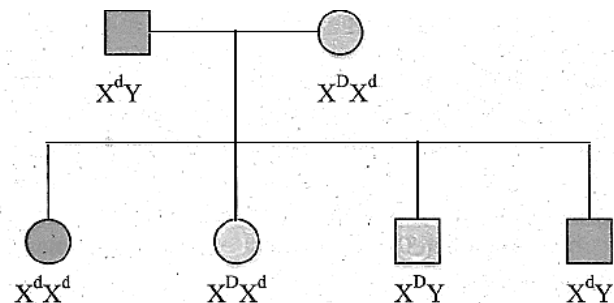
**Explanation:** Because he/she have only blue opsin in cone cells.

**Q.30 Answer is “Blue blindness”**

**Explanation:** Because it is autosomal.

**Q.31 Answer is “50%”**

**Explanation:** As it becomes a testcross where mother is heterozygous normal and father is hemizygous colour blind.

**Q.32 Answer is “a recessive gene on X-chromosome”**

**Explanation:** tfm gene located on X-chromosome controls it.

**Q.33 Answer is “No breasts”**

**Explanation:** A person suffering from testicular feminization syndrome have breasts like a female.



**Q.34 Answer is “Testicular feminization syndrome”**

**Explanation:** Persons suffering from testicular feminization syndrome physically look female. They have breast, female genitalia, a blind vagina but no uterus. Degenerated testis are also present in abdomen. Such individuals are happily married as females but are sterile. It is an androgen insensitivity syndrome. Male sex hormone testosterone has no effect on them.

**Q.35 Answer is “X-linked dominant trait”**

**Explanation:** As sons receive Y-chromosome from father and X-chromosome from mother. Whereas daughters receive X chromosome from both parents

**Q.36 Answer is “Hypophosphatemic Rickets”**

**Explanation:** Hypophosphatemic rickets inherits 17% more in females as compared to that in males.

**Q.37 Answer is “Hypophosphatemic Rickets”**

**Explanation:** Because the patient is vitamin-D resistant i.e., unable to receive vitamin D's message.

**Q.38 Answer is “Hypophosphatemia Rickets”**

**Explanation:** The person have become resistant to vitamin D's message, though vitamin D is not deficient, rather it is genetic communication failure at molecular level. The genes encoding bone proteins never receive vitamin D's message to function.

**Q.39 Answer is “Hypophosphatemia Rickets”**

**Explanation:** Vitamin-D enhances the mineral uptake by increasing absorption of calcium and phosphorus from the digestive tract. If a person becomes deficient in vitamin D or becomes insensitive (resistant) against vitamin D his mineral uptake will be dangerously reduced and

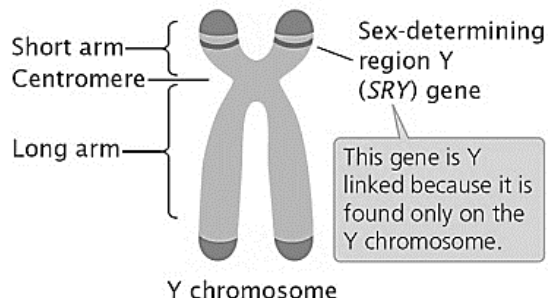
bones will become weak and he/she will suffer from rickets.

**Q.40 Answer is “D”**

**Explanation:** D gene is dominant gene which is associated with vitamin-D resistance and as result hypophosphatemia.

**Q.41 Answer is “Y-linked trait”**

**Explanation:** As SRY gene is carried by short arm of Y-chromosome.



**Q.42 Answer is “Y-chromosome from father to son only”**

**Explanation:** As Y-chromosome is received by male zygote only and SRY is carried by male

**Q.43 Answer is “Y-linked traits”**

**Explanation:** Genes carried by Y chromosome are transferred to son only as son inherit Y-chromosome from father.

**Q.44 Answer is “SRY”**

**Explanation:** SRY (Sex determining region of Y) is located on short arm of Y-chromosome and it determines the maleness in humans.

**Q.45 Answer is “SRY gene”**

**Explanation:** SRY is considered a male sex switch. It triggers the developmental.

**Q.46 Answer is “sex limited traits”**

**Explanation:** They limited to one sex gender only i.e. either male or female due to their anatomical differences.

**Q.47** Answer is “She cannot have a gene for beard”

**Explanation:** She can have gene for beard but never have beard because she lacks hair follicle underneath the skin required to produce beard.

**Q.48** Answer is “Sex limited trait”

**Explanation:** Sex-limited trait of exclusively occur in either male or female. However, x-linked dominant traits occur more in male. Whereas, X-linked recessive traits occur more in female, but both can occur in opposite gender as well.

**Q.49** Answer is “Sex-influenced traits”

**Explanation:** In such traits a particular sex hormone magnifies the effect of single allele up to that shown by two alleles e.g. pattern boldness.

**Q.50** Answer is “Sex influenced trait”

**Explanation:** It is influenced by a particular sex hormone, so that is why it is called so.

**Q.51** Answer is “Classical genetics”

**Explanation:** Gregor Johann Mendel laid down the foundation of classical genetics by formulating two laws of heredity. Law of segregation and law of independent assortment.

**Q.52** Answer is “In his monastery garden”

**Explanation:** Mendel was a priest. He performed series of breeding experiments on garden pea *Pisum sativum* in his monastery garden for eleven years (1854-1865).

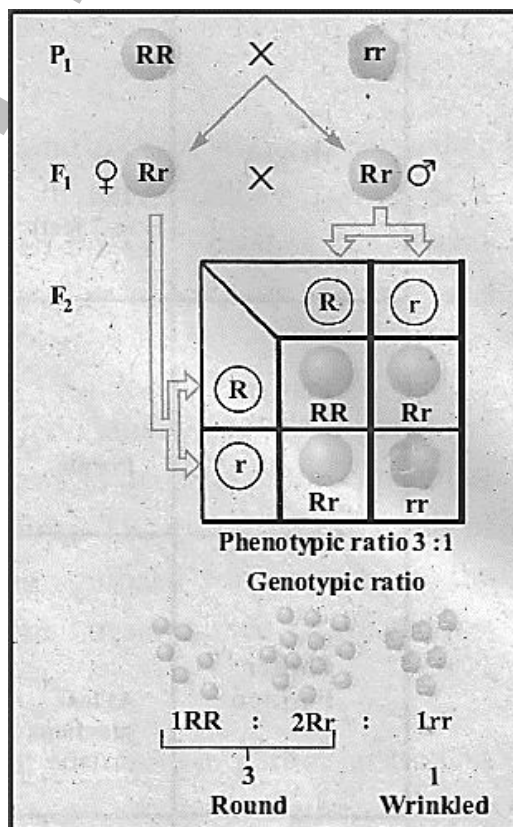
**Q.53** Answer is “Round shaped seed”

**Explanation:**

Trait	Dominant	Recessive
Plant height	Tall	Short
Flower color	Purple	White
Flower position	Axial	Terminal
Pod color	Green	Yellow
Pod shape	Inflated	Constricted
Seed color	Yellow	Green
Seed shape	Round	Wrinkled

**Q.54** Answer is “75% round”

**Explanation:**



**Q.55** Answer is “1/4, 2/4, 1/4”

**Explanation:** As per previous explanation.

**Q.56** Answer is “Phenotype, genotype”

**Explanation:** Mendel devised a cross called test cross, which is used to test the genotype of an individual showing a dominant phenotype. It is a mating in which an individual showing a dominant phenotype is crossed with an individual showing its recessive phenotype. This cross finds out the homozygous and heterozygous nature of the genotype.

**Q.57** Answer is “A phenotypically round seed”

**Explanation:** Round shape in pea seed is dominant character and a dominant phenotype may have two genotypes RR (homozygous round) and Rr (heterozygous round).

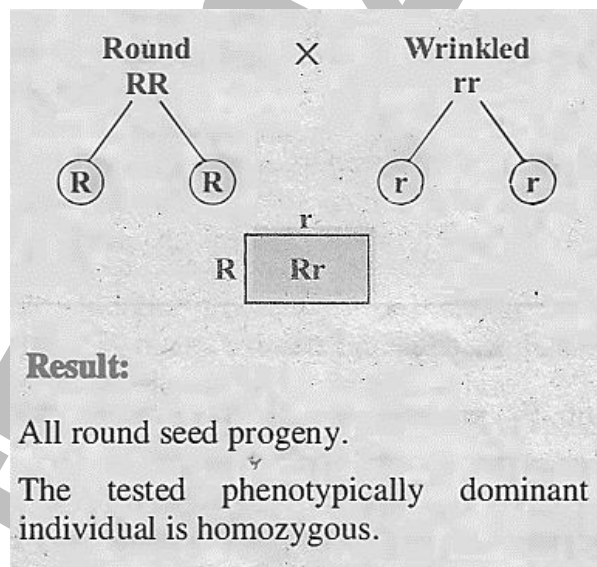
**Q.58** Answer is “Always homozygous recessive”

**Explanation:** Wrinkled shape in pea seed is a recessive trait having single genotype rr (homozygous recessive) as recessive can't be heterozygous.

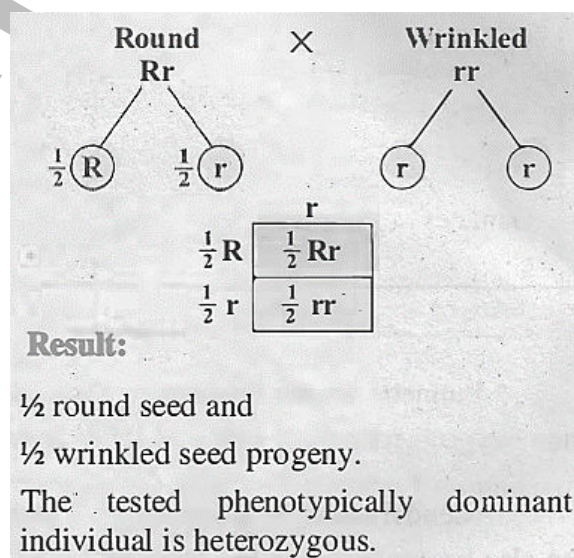
**Q.59** Answer is “The tested individual was heterozygous dominant”

**Explanation:**

Test cross (Case I)



Test cross (Case II)





**Q.60** Answer is “6/16”

**Explanation:** Phenotypic ratio of F<sub>2</sub> of Mendel’s dihybrid cross was as under.

Round yellow	9/16	Parental type
Wrinkled yellow	3/16	Recombinants i.e. new combinations
Round green	3/16	
Wrinkled green	1/16	Parental type

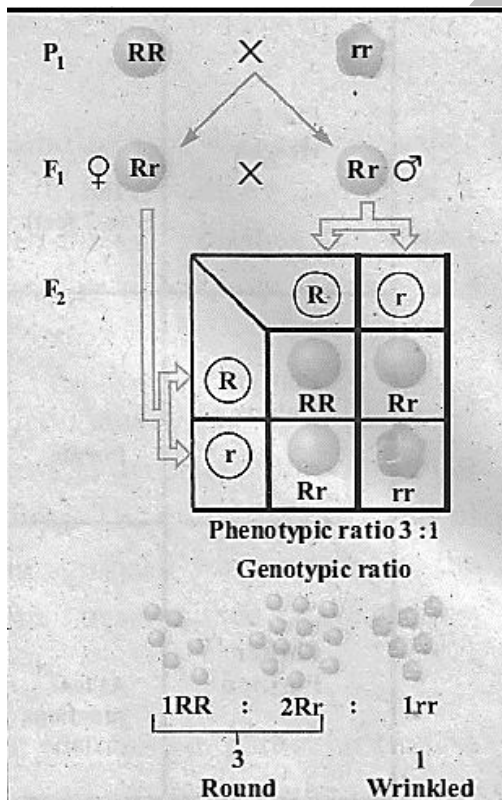
**Q.61** Answer is “RY, Ry, rY, ry”

**Explanation:**

RrYy		
	R	r
Y	RY	rY
y	Ry	ry

**Q.62** Answer is “3/4”

**Explanation:**



**Q.63** Answer is “Genes, chromosomes”

**Explanation:** as given are carried by chromosomes so both exhibit parallel behavior.

**Q.64** Answer is “Sixteen years of his death”

**Explanation:** In 1900, 16 years after Mendel’s death, three botanists, Correns, DeVries and Tschermach independently rediscovered and acknowledged his work.

**Q.65** Answer is “ ”

**Explanation:** According to the Mendel’s law of segregation chromosomes split up into their respective chromatids during gametogenesis (meiosis) and each gamete receives one chromatid (with one allele of gene pairs).

**Q.66** Answer is “X – chromosome”

**Explanation:** Human linkage group number 11 represented by homologous pair number 11 of chromosomes carries linked genes for sickle cell anemia, leukemia and albinism.

**Q.67** Answer is “62.5”

**Explanation:**

$$\frac{9}{16} \text{ round yellow} + \frac{1}{16} \text{ wrinkled yellow}$$

$$\text{Total} = \frac{10}{16} \times 100 = 62.5\%$$

**Q.68** Answer is “Homozygous recessive”

**Explanation:** See explanation of Q # 59.

**Q.69** Answer is “Linkage of a gene with a particular gene”

**Explanation:** All genes located on the same chromosomes are linked to each other. This phenomenon of staying

together is called linkage. Gene linkage is a physical relationship between genes.

**Q.70** Answer is “Crossing over”

**Explanation:** Linked genes can be separated by crossing over. Closer the gene loci, more strongly are their genes linked. The farther apart two genes lie, greater are chances of their separation through crossing over.

STEP ENTRY TEST 2020



**Worksheet-17 (ii)****(Evolution)**

- Q.1 Charles Darwin was born in:**  
 A) Cantbury  
 B) Shrewsbury in western England  
 C) Eastern England  
 D) Cantbury in Eastern England
- Q.2 Darwin joined the expedition on Beagle to:**  
 A) North American coastline  
 B) South African coastline  
 C) South American coastline  
 D) North African coastline
- Q.3 Darwin observed and collected thousands of specimens of diverse:**  
 A) Fauna of South America  
 B) Fauna and flora of South America  
 C) Flora of South America  
 D) Fauna and flora of North America
- Q.4 Most of the animal species on Galapagos:**  
 A) Live nowhere else in the continents  
 B) Live nowhere else in the world  
 C) Live everywhere in the world  
 D) Live everywhere else in the continent
- Q.5 Pick up the one not true about the finches collected by Darwin on the Galapagos:**  
 A) Although quite different seemed to be of same species  
 B) Although quite similar, seemed to be different species  
 C) Separated from original habitats by geographical barriers  
 D) Some were unique to individual islands
- Q.6 Out of the 13 types of finches collected by Darwin from Galapagos:**  
 A) All were unique to individual islands  
 B) Some were distributed on two or more islands  
 C) Some were unique to individual islands  
 D) Majority were unique to individual islands
- Q.7 The history of life is like a tree, with multiple branching and rebranching from a common trunk, in view of:**  
 A) Darwin  
 B) Cuvier  
 C) Lamarck  
 D) Lyell
- Q.8 In Darwinian view, at each fork of evolutionary tree is an ancestor common to all lines branching from that:**  
 A) Tree  
 B) Trunk  
 C) Stem  
 D) Fork
- Q.9 Darwin suggested that populations of individual species become better adapted to their local environments through:**  
 A) Artificial selection  
 B) Adaptation  
 C) Variation  
 D) Natural selection
- Q.10 Those individuals whose hereditary characteristics fit them best to their environment are likely to leave \_\_\_\_\_ than the less fit individuals:**  
 A) More offspring  
 B) Less offspring  
 C) No offspring  
 D) All offspring
- Q.11 The unequal ability of individuals to survive and reproduce will lead to gradual change in a population, with favorable characteristics accumulating over the generations, thus leading to the:**  
 A) Struggle for existence  
 B) Evolution of new species  
 C) Overpopulation  
 D) Persistence of species
- Q.12 An important turning point for evolutionary theory was the birth of population genetics, which emphasizes the extensive genetic variation within populations and recognizes the importance of:**  
 A) Qualitative characters  
 B) Analytical characters  
 C) Quantitative characters

- D) Morphological characters
- Q.13 With progress in population genetics Mendelism and Darwinism were reconciled and the genetic basis of \_\_\_\_\_ and \_\_\_\_\_ was worked out.**
- A) Variation, artificial selection  
B) Overpopulation, natural selection  
C) Variation, evolution  
D) Variation, natural selection
- Q.14 By the reconciliation of Mendelism and Darwinism, a comprehensive theory of evolution was developed, that became to be known as:**
- A) Modern synthesis  
B) Modern Darwinism  
C) Neo synthesis  
D) Modern synthesis or Neo Darwinism
- Q.15 In “Modern Synthesis” or “Neo-Darwinism” the word synthesis depicts:**
- A) Origin of discoveries and ideas  
B) Integration of discoveries and ideas  
C) Modification of discoveries and ideas  
D) Confirmation of discoveries and ideas
- Q.16 Evolution leaves:**
- A) No signs  
B) Observable signs  
C) Non-observable signs  
D) Visible signs
- Q.17 Darwin’s theory of evolution was mainly based on the evidence from the:**
- A) Geographical distribution of species  
B) Fossil record  
C) Population genetics  
D) Geographical distribution of species and fossil record
- Q.18 A mammal that lives only in America is:**
- A) Armadillo  
B) Tasmanian Wolf  
C) Kangaroo  
D) Indus Dolphin
- Q.19 The evolutionary view of biogeography predicts that contemporary armadillos are modified descendants of earlier species that occupied:**
- A) Distant continents  
B) Neighboring continents  
C) Other continents  
D) These continents
- Q.20 Most of the animal species on the \_\_\_\_\_ live no-where else in the world:**
- A) South America      C) Cape Verde  
B) North America      D) Galapagos
- Q.21 Calculate the value of P when the  $p^2 = 0.49$ ,  $2pq = 0.42$  and  $q^2 = 0.09$ :**
- A) 0.8      C) 0.6  
B) 0.7      D) 0.5
- Q.22 According to Hardy-Weinberg \_\_\_\_\_ is not a potent force evolution:**
- A) Sexual recombination  
B) Mutation  
C) Migration  
D) Genetic drift
- Q.23 In Hardy-Weinberg theorem  $2pq$  stands for the frequency of:**
- A) Homozygous dominant individuals  
B) Heterozygous dominant individuals  
C) Homozygous recessive individuals  
D) Dominant alleles
- Q.24 In small populations \_\_\_\_\_ may lead to the loss of particular alleles:**
- A) Genetic drift      C) Migration  
B) Mutation      D) Selection
- Q.25 The breeders select for the desired characters in:**
- A) Natural selection      C) Plant breeding  
B) Artificial selection      D) Animal breeding

**ANSWER KEY (Worksheet-17 (ii))**

1	B	13	D
2	C	14	D
3	B	15	B
4	B	16	B
5	A	17	D
6	C	18	A
7	A	19	D
8	D	20	D
9	D	21	B
10	A	22	A
11	B	23	B
12	C	24	A
		25	B

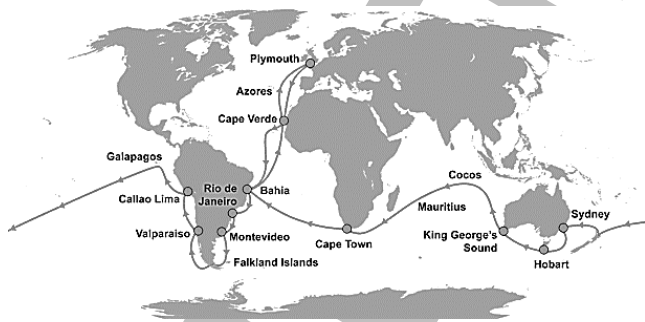
**EXPLANATION**

**Q.1** Answer is “Shrewsbury in Western England”

**Explanation:** Charles Darwin was born in Shrewsbury, in Western, in 1809.

**Q.2** Answer is “South American coastline”

**Explanation:** He was invited by the British Government to joint an expedition of naturalists. That expedition was sent by British Govt. to study the fauna and flora of South American coastline. It is called Beagle’s Voyage, as the ship was H.M.S Beagle.



**Q.3** Answer is “Fauna and flora of South America”

**Explanation:** Darwin observed and collected thousands of specimens of diverse fauna and flora of South America.

**Q.4** Answer is “Live nowhere else in the world”

**Explanation:** A particularly puzzling case of geographical distribution was the fauna and flora of Galapagos Islands. Most of the animals species on the Galapagos live nowhere else in the World, although they resemble species living on the South American mainland.

**Q.5** Answer is “Although quite different seemed to be of same species”

**Explanation:** Among the birds Darwin collected on the Galapagos were 13 types of finches which were, although quite similar but seemed to be of different species.

**Q.6** Answer is “Some were unique to individual islands”

**Explanation:** Among the birds Darwin collected, on the Galapagos were 13 types of finches that, although quite similar seemed to be different species. Some were unique to individual islands, while other species were distributed on two or more islands that were close together.

**Q.7** Answer is “Darwin”

**Explanation:** In Darwinian view the history of life is like a tree with multiple branching and rebranching from a common trunk all the way to the tips of the living twigs, symbolic of the current diversity of organisms. At each fork of the evolutionary tree is an ancestor common to all lines of evolution branching from that fork.

**Q.8** Answer is “Fork”

**Explanation:** In Darwinian view the history of life is like a tree with multiple branching and rebranching from a common trunk all the way to the tips of the living twigs, symbolic of the current diversity of organisms. At each fork of the

evolutionary tree is an ancestor common to all lines of evolution branching from that fork.

**Q.9 Answer is “Natural selection”**

**Explanation:** Natural selection promotes the adaptation which are fit to the environment. Darwin suggested that populations of individual species become better adapted to their local environments through natural selection

**Q.10 Answer is “More offspring”**

**Explanation:** It is in accordance with the principle of the Survival of the fittest.

**Q.11 Answer is “Evolution of new species”**

**Explanation:** This is evolution through natural selection.

**Q.12 Answer is “Quantitative characters”**

**Explanation:** Population genetics is mostly based on quantitative characters.

**Q.13 Answer is “Variation and natural selection”**

**Explanation:** Population genetics explains the variations and natural selection.

**Q.14 Answer is “Modern synthesis or neo Darwinism”**

**Explanation:** With the progress in population genetics in 1930s, Mendalism and Darwinism were reconciled and the genetic basis of variation and natural selection was worked out.

**Q.15 Answer is “Integration of discoveries and ideas”**

**Explanation:** It is called synthesis because it integrated discoveries and ideas from many different fields including paleontology, taxonomy, biogeography and of course population genetics.

**Q.16 Answer is “Observable signs”**

**Explanation:** Evolution leaves observable signs in the form of fossils, vestigial organs, analogous organs and homologous organs etc.

**Q.17 Answer is “Geographical distribution of species and fossil record”**

**Explanation:** It was impact of Beagl’s Voyage.

**Q.18 Answer is “Armadillo”**

**Explanation:** It is an example of geographical distribution. Armadillo is also called armored mammal. It is only found in America.

**Q.19 Answer is “These continents”**

**Explanation:** The fossil record confirms that such ancestor existed in past as well.

**Q.20 Answer is “Galapagos”**

**Explanation:** Charles Darwin joined the expedition on H.M.S. Beagle to south American coastline. He observed and collected thousands of specimens of diverse fauna and flora of South America. A particularly puzzling case geographical distribution was the fauna of Galapagos islands. Most of the animal species on Galapagos live nowhere else in the world, although they resemble species living on the South American mainland. It was as though the Islands were colonized by plants and animals that strayed from the South American mainland and then diversified on different islands.

**Q.21 Answer is “0.7”**

**Explanation:**

$$P + q = 01$$

$$0.7 + 03 = 01$$

**Q.22 Answer is “Sexual recombination”**

**Explanation:** Hardy Weinberg principle states that the frequencies of alleles and genotypes in a populations gene pool remain constant over the generations unless acted upon by agents other than sexual recombination.

**Q.23 Answer is “Heterozygous dominant individuals”**

**Explanation:** In Hardy Weinberg theorem;

$p^2$  = homozygous dominant.

$2pq$  = heterozygous dominant

$q^2$  = homozygous recessive

**Q.24 Answer is “Genetic drift”**

**Explanation:** It is the change in frequency of alleles at a locus that occurs by chance. In small populations, such fluctuations may lead to the loss of particular alleles. This may occur in a small population when a few individual fail to reproduce and then genes are lost from the population.

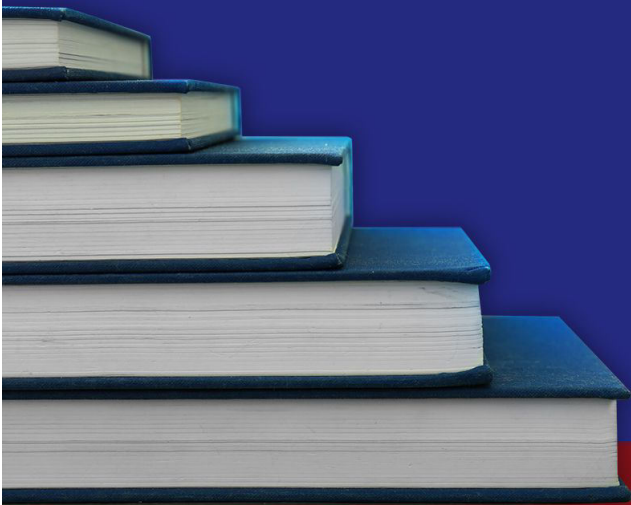
**Q.25 Answer is “Artificial selection”**

**Explanation:** In artificial selection, the breeders select for the desired characters. In natural selection, the environment plays this role, thus affecting the proportions of gene in a population.



# STOP

A PROGRAM BY PUNJAB GROUP



# BIOLOGY



## Worksheet-18



**STP**

A PROJECT BY PUNJAB GROUP

**Worksheet-18**  
**(Biotechnology)**

- Q.1** If DNA from two different sources is fused:
- A) Recombinant DNA is formed
  - B) Complementary DNA is formed
  - C) Mutant DNA is formed
  - D) cDNA is formed
- Q.2** A DNA molecule synthesized from mRNA by reverse transcriptase in laboratory is called:
- A) cDNA
  - B) Extra chromosomal DNA
  - C) Chromosomal DNA
  - D) Cytoplasmic DNA
- Q.3** Complementary DNA is synthesized by:
- A) DNA polymerases
  - B) DNA ligases
  - C) Restricted endonucleases
  - D) Reverse transcriptases
- Q.4** The first restriction enzyme was isolated by:
- A) John Hopkins
  - B) Hamilton O. Smith
  - C) Kary B-Mullis
  - D) Maxim Gilbert
- Q.5** Bacteria produce a variety of restriction enzymes, which cut the DNA at specific sites, characterized by specific sequence of:
- A) Four nucleotides
  - B) Eight nucleotides
  - C) Six nucleotides
  - D) Four or six nucleotides
- Q.6** Bacteria produce a variety of restriction enzymes, which cut the DNA at specific sites, characterized by specific sequence of DNA arranged:
- A) Symmetrically in reverse order
  - B) Asymmetrically in reverse order
  - C) Symmetrically in same order
  - D) Asymmetrically in same order
- Q.7** So far 400 such enzymes have been isolated out of which about 20 are frequently used in recombinant DNA technology:
- A) Reverse transcriptase
  - B) Helicases
  - C) Ligase
  - D) Restriction endonucleases
- Q.8** The single stranded but complementary ends of the two DNA molecules are called “sticky ends” because:
- A) They cannot bind
  - B) They can bind by complementary base pairing
  - C) They can bind by non-complementary base pairing
  - D) They cannot bind due to non-complementary base pairing
- Q.9** To make a recombinant DNA, one often begins by selecting a \_\_\_\_\_, the means by which recombinant DNA is introduced into a host cell.
- A) Restriction endonuclease
  - B) DNA ligase
  - C) Vector
  - D) Primase
- Q.10** Plasmids were discovered by the investigators studying the sex-life of the \_\_\_\_\_ bacterium *Escherichia coli*.
- |               |         |
|---------------|---------|
| A) Faecal     | C) Milk |
| B) Intestinal | D) Soil |

- Q.11** What was discovered by investigators studying the sex-life of the intestinal bacterium *Escherichia coli*?  
A) Restriction enzymes  
B) Plasmids  
C) DNA ligases  
D) Sticky ends
- Q.12** Plasmid having antibiotic resistant gene for tetracycline is called:  
A) pBR 322                      C) RP4  
B) pSC 101                      D) R388
- Q.13** A plasmid that provides resistance against tetracycline as well as ampicillin is called:  
A) pSC101                      C) RP4  
B) pBR322                      D) R388
- Q.14** For preparation of recombinant DNA, the plasmid is cut with the same enzyme which was used for:  
A) Isolation of the gene of interest  
B) Cutting all such plasmids  
C) Cutting any piece of DNA  
D) Cutting extrachromosomal DNA
- Q.15** The enzyme that seals the foreign piece of DNA into the vector is called:  
A) DNA – polymerase  
B) DNA helicase  
C) DNA – ligase  
D) DNA – Primase
- Q.16** A clone can be identical copy of a/an:  
A) Molecule  
B) Organism  
C) Cell  
D) Molecule, Cell and Organisms
- Q.17** Bacterial cells take up \_\_\_\_\_, especially, if they are treated with calcium chloride to make them more permeable.  
A) Recombinant DNA  
B) Plasmid  
C) Recombinant plasmid  
D) Extra chromosomal DNA
- Q.18** Besides plasmids, the other molecular carrier or vector is:  
A) DNA of bacteria  
B) DNA of plant viruses  
C) DNA of bacterial viruses  
D) DNA of animal viruses
- Q.19** The second step of PCR technique is:  
A) Heating DNA for one minute to denature  
B) Cooling for two minutes and adding primer  
C) Addition of DNA polymerase and waiting for 1.5 minutes  
D) Recycling
- Q.20** Third step in PCR technique is:  
A) Heating DNA for one minute to denature  
B) Cooling for two minutes and adding primer  
C) Addition of DNA polymerase and waiting for 1.5 minutes  
D) Recycling
- Q.21** PCR can create:  
A) Thousands of copies of a single gene  
B) Millions of copies of a single gene  
C) Hundreds of copies of a single gene  
D) Tens of copies of a single gene
- Q.22** PCR can create millions of copies of a single gene or any specific piece of DNA quickly in:  
A) Bioreactor  
B) Test tube  
C) Expression system  
D) Petridish
- Q.23** PCR is very specific, the targeted DNA sequence can be \_\_\_\_\_ of total DNA sample.  
A) One part in a million  
B) Less than one part in a million  
C) More than one part in a million  
D) Two parts in a million

- Q.24** PCR is considered a chain reaction because DNA polymerase will carry out replication over and over again, until there are:
- A) Thousand of copies of desired DNA
  - B) Millions of copies of desired DNA
  - C) Hundreds of copies of desired DNA
  - D) Billions of copies of desired DNA
- Q.25** Before carrying out PCR:
- A) Gene product must be available
  - B) Vector must be available
  - C) Primers must be available
  - D) Bacteriophage must be available
- Q.26** In PCR, primers are sequences of 20 bases that are complementary to the bases on either side of the:
- A) Target DNA
  - B) DNA polymerase
  - C) Primase
  - D) RNA polymerase
- Q.27** DNA polymerase \_\_\_\_\_ the replication process.
- A) Continue
  - B) Initiate
  - C) Extend
  - D) Continue and extend
- Q.28** DNA polymerase copies the target DNA, after the:
- A) Primers bind by complementary base pairing
  - B) The target DNA duplex is unwound
  - C) The target DNA get denatured
  - D) The primers get separated from target DNA
- Q.29** *Thermus aquaticus* bacterium lives in:
- A) Hot springs
  - B) Hot pools
  - C) Hot thermal vents
  - D) Hot ponds
- Q.30** By using Taq polymerase in PCR there will be no need to:
- A) Add more enzyme
  - B) Interrupt the process to add more enzyme
  - C) Interrupt the process
  - D) Use high temperature
- Q.31** An animal developed from an egg, having foreign gene inserted in it is called:
- A) Transgenic animal
  - B) Transgender animal
  - C) Clone
  - D) Trans sexual animal
- Q.32** It is possible to insert a foreign DNA into an animal egg by:
- A) Manual microinjection
  - B) Vortex mixing
  - C) Manual microinjection or vortex mixing
  - D) Using electric current
- Q.33** The procedure of transgenic animals has been used to produce larger:
- A) Fishes and cows
  - B) Rabbits and sheeps
  - C) Cows and pigs
  - D) Fishes, cows, pig, rabbits and sheep
- Q.34** Genetically engineered fishes are now being kept in ponds, that offer:
- A) No escape to the wild
  - B) Mutualistic help to the wild
  - C) Easy escape to the wild
  - D) Symbiotic help to the wild
- Q.35** A goat is genetically engineered to produce \_\_\_\_\_, which is secreted in her milk.
- A) Prothrombin
  - B) Antithrombin-III
  - C) Heparin
  - D) Fibrin



- Q.36** Genes that code for \_\_\_\_\_ proteins are incorporated into the animal's DNA and the protein appear in the animal's milk.
- A) Therapeutic
  - B) Therapeutic and diagnostic
  - C) Diagnostic
  - D) Osmotic
- Q.37** There are plans to produce drugs by transgenic animals, for the treatment of:
- A) Cystic fibrosis
  - B) Blood diseases
  - C) Cancer
  - D) Cystic fibrosis, Cancer & Blood diseases
- Q.38** The scientists of United States Department of Agriculture have been able to genetically engineer \_\_\_\_\_ to produce human growth hormone in their urine, instead of in milk.
- A) Cows
  - B) Goats
  - C) Mice
  - D) Squirrels
- Q.39** Urine is preferable vehicle for a biotechnology product than milk because of following reasons, EXCEPT:
- A) Only female produce milk
  - B) Females don't produce milk until maturity
  - C) Each animal urinate throughout life
  - D) It is less easier to extract proteins from urine than from milk
- Q.40** Although each cell contains a copy of all the genes of that genome, certain genes are:
- A) Amplified in mature specialized cells
  - B) Turned off in mature specialized cells
  - C) Lost in mature specialized cells
  - D) Mutated in mature specialized cells
- Q.41** Insertion of genetic material into human cells for treatment of a disorder is called:
- A) Genetic engineering
  - B) Gene therapy
  - C) Biotechnology
  - D) Gene mutation
- Q.42** Gene therapy includes procedures that give a patient healthy genes to make up for faulty genes to treat various human illnesses such as:
- A) Cancer
  - B) Cardiovascular diseases
  - C) Cancer and cardiovascular diseases
  - D) Tetanus
- Q.43** There are two main methods used for gene therapy i.e.
- A) Ex – vivo and in vivo
  - B) Ex vivo – Ex vitro
  - C) Ex – vivo and in vitro
  - D) In vitro – Ex vitro
- Q.44** The children suffering from SCIDS lack an enzyme called:
- A) Adenosine deaminase
  - B) Homogentisic and hydroxylase
  - C) Phylalanine hydroxylase
  - D) Homogentisic and dehydrogenase
- Q.45** Both T and B cells get maturation by the involvement of gene called:
- A) Phenyl alanine hydroxylase
  - B) ADA
  - C) Homogentisic acid dehydrogenase
  - D) Phospho hexokinase
- Q.46** Pick up the correct sequence:
- A) Mutation → Deficient ADA → Immature T and B cells → SCIDS
  - B) SCIDS → Deficient ADA → Immature T and B cells → Mutation
  - C) Mutation → Deficient ADA → SCIDS → Immature T and B cells
  - D) Mutation → Immature B and T cells → Deficient ADA → SCIDS

- Q.47** For the treatment of SCIDS bone marrow stem cells are removed from the blood and are infected with a:  
A) Bacteriophage      C) Lambda virus  
B) Retrovirus      D) Bacterium
- Q.48** For treatment of SCIDS, the bone marrow stem cells are infected with a retrovirus that carries:  
A) A normal enzyme  
B) A mutant gene for the enzyme  
C) A normal gene for the enzyme  
D) A normal gene for T and B cells
- Q.49** Bone marrow stem cells are preferred for gene therapy of SCIDS, because:  
A) They are larger in size  
B) They are numerous in number  
C) They divide to produce more cells with same gene  
D) They store much enzyme inside them
- Q.50** The high levels of cholesterol make a patient subject to:  
A) Fatal heart attack at old age  
B) A curable heart attack at old age  
C) A curable heart attack at young age  
D) Fatal heart attack at young age
- Q.51** Liver cells are infected with retrovirus containing normal gene for the receptor for the treatment of:  
A) SCIDS  
B) Cystic fibrosis  
C) Hypercholesterolemia  
D) Cardio vascular disorder
- Q.52** If the patient die due to numerous infections of the respiratory tract, it means he/she suffered from:  
A) SCIDS  
B) Cystic fibrosis  
C) Hypercholesterolemia  
D) Parkinsonism
- Q.53** In vivo method of treatment is being tried in:  
A) SCIDS  
B) Cystic fibrosis  
C) Hypercholesterolemia  
D) Familial hypercholesterolemia
- Q.54** Microscopic vesicles that spontaneously form when lipoproteins are put into a solution, are called:  
A) Liposomes      C) Nucleosomes  
B) Lysosomes      D) Peroxisomes
- Q.55** In case of cystic fibrosis, the solution containing gene coated liposomes is sprayed into patients:  
A) Oral cavity      C) Thoracic cavity  
B) Nostrils      D) Mouth
- Q.56** The in-vivo method of treatment of cystic fibrosis by gene coated liposomes, has not yet been successful due to:  
A) Non gene transfer  
B) Limited gene transfer  
C) Excessive gene transfer  
D) High cost
- Q.57** In clinical trials researchers have given genes to cancer patients, that make:  
A) Healthy cells more tolerant of chemotherapy  
B) Tumor more vulnerable to chemotherapy  
C) Healthy cells more tolerant and tumor more vulnerable to chemotherapy  
D) Healthy cells more vulnerable and tumor more tolerant to chemotherapy
- Q.58** To cure Parkinson's disease, dopamine producing cells, could be grafted directly into the brain as a:  
A) Gene therapy  
B) Transplant therapy  
C) Chemotherapy  
D) Gene therapy through transplant

**Q.59** The use of natural biological system to produce a product or to achieve an end desired by humans is called:

- A) Biotechnology
- B) Bioenergetics
- C) Genetic engineering
- D) Gene therapy

**Q.60** Nucleotides sequence that is identical to its complementary strand when each is read in the same chemical direction for example GATC i-e;

5' ... GATC ... 3'

3' ... CATG ... 5' these are called as:

- A) Flanking sequences
- B) Nucleotide order
- C) Palindromic sequences
- D) Antagonistic sequences

**Q.61** An enzyme that cleaves a DNA duplex molecule, at a particular base sequence, usually within or near a palindromic sequence, is called:

- A) Polymerase
- B) Helicase
- C) Restriction endonuclease
- D) Ligase

**Q.62** To clean up environmental pollutants, increase the fertility of the soil and kill insect pests, genetically engineered:

- A) Animals have been used
- B) Bacteria have been used
- C) Plants have been used
- D) Viruses have been used

**Q.63** A technique used for correcting defective genes responsible for disease development:

- A) Gene therapy
- B) Cloning
- C) Tissue culture
- D) Gene sequencing

**Q.64** Which one of the following technique rapidly replicates specific target fragment of DNA without cloning?

- A) DNA sequencing
- B) Genetic probe
- C) Gele electrophoresis
- D) Polymerase chain reaction

**ANSWER KEY (Worksheet-18)**

1	A	23	B	45	B
2	A	24	B	46	A
3	D	25	C	47	B
4	B	26	A	48	C
5	D	27	D	49	C
6	A	28	A	50	D
7	D	29	A	51	C
8	B	30	B	52	B
9	C	31	A	53	B
10	B	32	C	54	A
11	B	33	D	55	B
12	B	34	A	56	B
13	B	35	B	57	C
14	A	36	B	58	D
15	C	37	D	59	A
16	D	38	C	60	C
17	C	39	D	61	C
18	C	40	B	62	B
19	B	41	B	63	A
20	C	42	C	64	D
21	B	43	A		
22	B	44	A		

**EXPLANATION**

**Q.1** Answer is “Recombinant DNA is formed”

**Explanation:** Recombinant DNA (rDNA) molecules are DNA molecules formed by laboratory methods of genetic recombination (such as molecular cloning) to bring together genetic material from multiple sources, creating sequence that would not otherwise be found in the genome. Recombinant DNA is possible because DNA molecules from all organisms share the same chemical structure. However, a recombinant DNA formed by the fusion of DNAs taken from two organisms have remotest evolutionary relation is called chimeric DNA as well.

**Q.2** Answer is “cDNA”

**Explanation:** In genetics complimentary DNA (cDNA) is synthesized from a single

stranded RNA (e.g. mRNA) template in a reaction catalyzed by the enzyme reverse transcriptase.

**Q.3** Answer is “Reverse transcriptases”

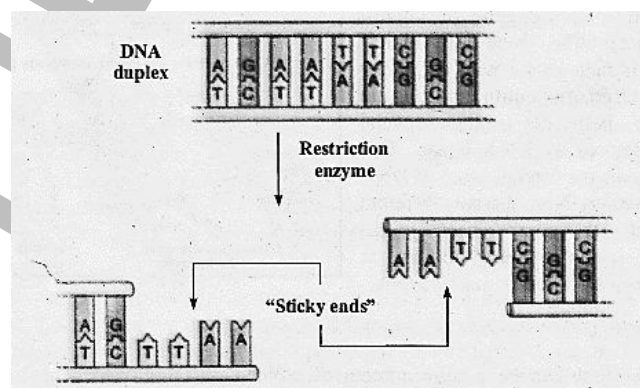
**Explanation:** Reverse transcriptases are used to synthesize cDNA from RNA (e.g. mRNA) template.

**Q.4** Answer is “Hamilton O smith”

**Explanation:** It is a historical fact.

**Q.5** Answer is “Four or six nucleotides”

**Explanation:** Restriction enzymes cut the DNA at very specific sites characterized by specific sequence of four or six nucleotides arranged symmetrically in reverse order. Such sequences are known as palindromic sequences.



**Q.6** Answer is “Symmetrically is reverse order”

**Explanation:** In palindromic sequences four or six nucleotides are arranged symmetrically in reverse order, as the cleavage occurs in zigzag sequence leaving upper longer strand and lower shorter strand on one end and upper shorter strand and lower longer strand in other end.

**Q.7** Answer is “Restriction endonucleases”

**Explanation:** So far 400 restriction endonucleases have been isolated out which about 20 are frequently used in recombinant DNA technology.

**Q.8** Answer is “They can bind by complementary base pairing”

**Explanation:** Due to base pairing affinity sticky ends can stick together, whenever brought closer to each other.

**Q.9** Answer is “Vector”

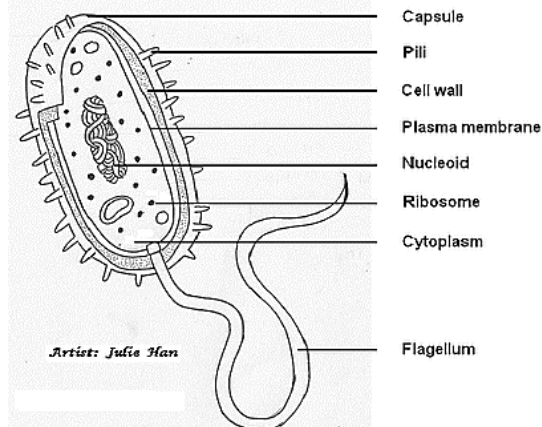
**Explanation:** To make recombinant DNA, one often begins by selecting a vector, the means by which recombinant DNA is introduced into a host cell. One common type of vector is a plasmid. Plasmids were discovered by investigators studying the sex life of the intestinal bacterium *Escherichia coli*.

**Q.10** Answer is “Intestinal”

**Explanation:** Plasmids were discovered by investigators studying the sex life of the intestinal bacterium *Escherichia coli*.

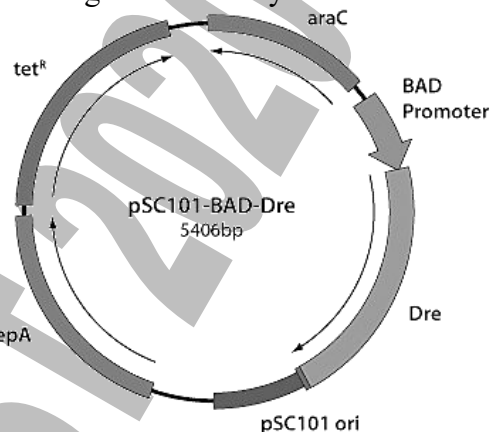
**Q.11** Answer is “Plasmids”

**Explanation:** Plasmids were discovered by investigators studying the sex life of the intestinal bacterium *Escherichia coli*.



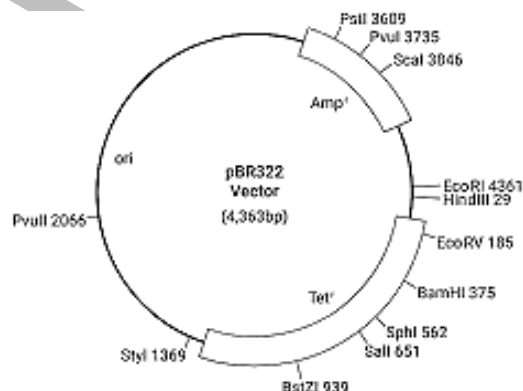
**Q.12** Answer is “pSC 101”

**Explanation:** pSC 101 has antibiotic resistant gene for tetracycline.



**Q.13** Answer is “pBR322”

**Explanation:** pBR 322 has antibiotic resistant genes for tetracycline as well as ampicillin.



**Q.14** Answer is “Isolation of gene of interest”

**Explanation:** Because restriction enzymes cut the DNA at specific sites.

**Q.15** Answer is “DNA ligase”

**Explanation:** Because it is DNA binding enzyme.

**Q.16** Answer is “Molecule, Cell and Organism”

**Explanation:** Cloning can be carried out at these three levels i.e. cell, organism and molecule (gene cloning) level.

**Q.17** Answer is “Recombinant plasmid”



**Explanation:** Aqueous calcium chloride is used in genetic transformation of cells by increasing the cell membrane permeability, inducing competence for DNA uptake (allowing DNA fragments to enter the cell more readily).

**Q.18 Answer is “DNA of bacterial viruses”**

**Explanation:** DNA of bacteriophage or phage virus or bacterial virus is also used as vector.

**Q.19 Answer is “Cooling for two minutes and adding primer”**

**Explanation:** First the DNA to be cloned is heated for one minute to break the duplex and separate the both strands.

Then it is cooled down for 2 minutes and primer is added

**Q.20 Answer is “Addition of DNA polymerase and waiting for 1.5 minutes”**

**Explanation:** In third step of PCR DNA polymerase is added and then we wait for 1.5 minutes.

**Q.21 Answer is “Millions of copies of a single gene”**

**Explanation:** As it is less time taking and more efficient method in which a chain reaction is generated.

**Q.22 Answer is “Test tube”**

**Explanation:** PCR is carried out in a laboratory test tube.

**Q.23 Answer is “Less than one part in a million”**

**Explanation:** Because it is carried out in a test tube without interruption.

**Q.24 Answer is “Millions of copies of desired DNA”**

**Explanation:** PCR can create millions of copies of a single gene or any specific piece of DNA quickly in test tube.

**Q.25 Answer is “Primers must be available”**

**Explanation:** As DNA polymerase cannot initiate a polynucleotide chain, rather it can elongate a polynucleotide chain.

**Q.26 Answer is “Target DNA”**

**Explanation:** Target DNA is a DNA to be cloned.

**Q.27 Answer is “Continue and extend the replication process”**

**Explanation:** It starts a chain reaction and keep on carrying out replication until test tube is filled.

**Q.28 Answer is “Primer binds by complementary base pairing”**

**Explanation:** In PCR both strands of DNA act as template for new strands to be synthesized.

**Q.29 Answer is “Hot springs”**

**Explanation:** As these are thermal bacteria, they are adapted to survive in high temperature.

**Q.30 Answer is “Interrupt the process to add more enzyme”**

**Explanation:** A high temperature is maintained to discourage duplex formation and chain reaction proceeds in which same enzyme is used again and again.

**Q.31 Answer is “Transgenic animal”**

**Explanation:** An animal in which we have incorporated a desired foreign gene to get produced our desired product is called transgenic animal.

**Q.32 Answer is “Manual microinjection and vertex mixing”**

**Explanation:** These are two available methods to insert a desired gene into an animal egg.

**Q.33** Answer is “Fishes, Cows, Pigs, Rabbits and sheeps”

**Explanation:** It is possible by tempering their genetic makeup.

**Q.34** Answer is “No escape to the wild”

**Explanation:** Due to their massive size and more vigour the wild flora fall easy prey to them.

**Q.35** Answer is “Antithrombin-III”

**Explanation:** It is an anti-clotting factor used in microsurguries to discourage formation of clot at site of surgery.

**Q.36** Answer is “Therapeutic and diagnostic proteins”

**Explanation:** Some proteins are used for treatment of diseases. They are called therapeutic proteins and diagnostic proteins as they are used to diagnose and treat diseases. Both are being produced as biotechnology products.

**Q.37** Answer is “Cystic Fibrosis, Cancer and blood diseases”

**Explanation:** In future it is being envisioned to get drugs prepared by transgenic animals against cystic fibrosis, cancer and blood diseases.

**Q.38** Answer is “Mice”

**Explanation:** The scientists of United States Department of Agriculture have been able to genetically engineer mice to produce human growth hormone in their urine, instead of in milk.

**Q.39** Answer is “It is less easier to extract proteins from urine than from milk”

**Explanation:** As urine normally does not contain any protein thus it is easier to extract proteins from urine than from milk.

**Q.40** Answer is “Turned off in mature specialized cells”

**Explanation:** When a cell is assigned a specialized job, only those genes remain active which are associated with that particular job, rest are turned off, however, they can be switched on again if needed.

**Q.41** Answer is “Gene therapy”

**Explanation:** Treating some genetic disorder by replacing a faulty gene with normal gene is called gene therapy.

**Q.42** Answer is “Cancer and cardiovascular diseases”

**Explanation:** Gene therapy is effective against disorders of genetic origin. Tetanus is not a genetic disease, it is infectious disease.

**Q.43** Answer is “Ex-vivo and In-vivo”

**Explanation:** In ex-vivo method cells or tissues are taken out of the body and after insersion of normal genes they are implanted in the body. However in in-vivo method genes/gene is/are inserted into the cells or at their original site in the body

**Q.44** Answer is “Adenosine deaminase”

**Explanation:** Such children lack an enzyme adenosine deaminase (ADA) that is involved in the maturation of T and B cells and therefore, they are subjected to life threatening infections.

**Q.45** Answer is “ADA”

**Explanation:** ADA (adenosine deaminase) is involved in the maturation of T and B cells and therefore, the person lacking it are subjected to life threatening infection.

**Q.46** Answer is “Mutation – Deficient ADA – immature Tand B cells → SCIDS”

**Explanation:** When that gene which is responsible for the formation of ADA

mutates, no ADA will be formed and as a result T and B cells will remain unable to acquire maturity and as a consequence severe immune deficiency will occur.

**Q.47 Answer is “Retrovirus”**

**Explanation:** The retrovirus acts as a vector for gene therapy.

**Q.48 Answer is “A normal gene for the enzyme”**

**Explanation:** Retrovirus acts a vector and carrier a normal gene for the synthesis of ADA enzyme with its DNA (recombinant DNA).

**Q.49 Answer is “They divide to produce more cells with same gene”**

**Explanation:** Stem cells keep on dividing by mitosis and in this way the number is continuously added up which gradually overcome the immune deficiency.

**Q.50 Answer is “Fatal heart attack at young man”**

**Explanation:** Otherwise at young age the tendency of heart attack is much lesser.

**Q.51 Answer is “Hypercholesterolemia”**

**Explanation:** In familial hypercholesterolemia liver cells lack specific receptor sites needed to remove cholesterol from blood.

**Q.52 Answer is “Cystic fibrosis”**

**Explanation:** Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of chloride ions.

**Q.53 Answer is “Cystic fibrosis”**

**Explanation:** The gene is introduced into the nasal sinus by coating it on liposomes which are sprayed just like inhalers in the nasal sinuses.

**Q.54 Answer is “Liposomes”**

**Explanation:** Liposomes are spherical vesicles of phospholipid bilayer which are used as a vehicle for administration of nutrients and pharmaceutical drugs and for insertion of desired genes into cells or tissues.

**Q.55 Answer is “Nostrils”**

**Explanation:** For treatment of cystic fibrosis a solution containing gene coated liposomes is sprayed into patient's nostrils.

**Q.56 Answer is “Limited gene transfer”**

**Explanation:** Due to limited gene transfer, this methodology has not yet been successful.

**Q.57 Answer is “Healthy cells more tolerant and tumor more vulnerable to chemotherapy”**

**Explanation:** It will help a lot in cancer treatment.

**Q.58 Answer is “Gene therapy through transplant”**

**Explanation:** Parkinson's disease is caused by deficiency of dopamine, a neurotransmitter of brain. When its deficiency is made up it is cured.

**Q.59 Answer is “Biotechnology”**

**Explanation:** The definition have been given in glossary at page II of textbook of biology part-II.

**Q.60 Answer is “Palindromic sequences”**

**Explanation:** The definition and example have been given in glossary at page VIII of textbook of biology part-II.

**Q.61 Answer is “Restriction endonuclease”**

**Explanation:** The definition have been given in glossary at page IX of textbook of biology part-II.

**Q.62** Answer is “Bacteria have been used”

*Explanation:* Bacteria have been used for such purposes.

**Q.63** Answer is “Gene therapy”

*Explanation:* Researchers may use one of the several approaches for correcting faulty genes. Gene therapy is the most common approach.

**Q.64** Answer is “Polymerase chain reaction”

*Explanation:* In this technique DNA polymerase is compelled to polymerize a given piece of DNA again and again, So that multiple copies are produced, thus the technique is known as polymerase chain reaction (PCR).

STEP ENTRY TEST 2020

# STOP

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