

- What is the radian measure between the arms of watch at 5:00 pm?
 A. 1 radian
 B. 2 radians
 C. 3 radians
 D. 4 radians
- $1^\circ =$ _____
 A. 0.01745 radian
 B. 1 radian
 C. 3.14 radian
 D. 2π radian
- The metric prefix for 0.000001 is
 A. Hecto
 B. Micro
 C. Deca
 D. Nano
- Which of the following is the CORRECT way of writing units?
 A. 71 Newton
 B. 12 mgs
 C. 8 Kg
 D. 43 kg m⁻³
- A student measures a distance several times. The readings lie between 49.8 cm and 50.2 cm. This measurement is best recorded as
 A. (49.8 ± 0.2) cm.
 B. (49.8 ± 0.4) cm.
 C. (50.0 ± 0.2) cm.
 D. $50.0 \pm 0.4)$ cm.
- The percent uncertainty in the measurement of (3.76 ± 0.25) m is
 A. 4%
 B. 6.6%
 C. 25%
 D. 376%
- The temperatures of two bodies measured by a thermometer are $t_1 = (20 \pm 0.5)^\circ\text{C}$ and $t_2 = (50 \pm 0.5)^\circ\text{C}$. The temperature difference and the error therein are
 A. $(30 \pm 0.0)^\circ\text{C}$
 B. $(30 \pm 0.5)^\circ\text{C}$
 C. $(30 \pm 1)^\circ\text{C}$
 D. $(30 \pm 1.5)^\circ\text{C}$
- $(5.0\text{m} \pm 4.0\%) \times (3.0\text{s} \pm 3.3\%) =$
 A. $15.0 \pm 13.2\%$
 B. $15.0\text{ ms} \pm 7.3\%$
 C. $15.0 \pm 0.7\%$
 D. $15.0\text{ ms} \pm 15.3\%$
- $(2.0\text{m} \pm 2.0\%)^3$
 A. $8.0\text{ m}^3 \pm 1.0\%$
 B. $8.0\text{ m}^3 \pm 2.0\%$
 C. $8.0\text{ m}^3 \pm 5.0\%$
 D. $8.0\text{ m}^3 \pm 6.0\%$
- The number of significant figures in measurement of 0.00708600 cm are
 A. 3
 B. 4
 C. 6
 D. 9
- How many significant figures does $1.362 + 25.2$ have?
 A. 2
 B. 3
 C. 5
 D. 8
- Compute the result to correct number of significant digits
 $1.513\text{m} + 27.3\text{m} =$
 A. 29 m
 B. 28.8 m
 C. 28.81m
 D. 28.813 m

13. If 7.635 and 4.81 are two significant numbers. Their multiplication in significant digits is:

- A. 36.72435
- B. 36.724
- C. 36.72
- D. 36.7

14. The precision of the measurement 385,000 km is

- A. 10 km
- B. 100 km
- C. 1000 km
- D. 1000000 km

15. $[M^0L^0T^0]$ are dimension of

- A. strain
- B. refractive index
- C. magnification
- D. All of these

16. The dimensions of torque are

- A. $[MLT]$
- B. $[M^2L^2T]$
- C. $[ML^2T^{-2}]$
- D. $[ML^2T^2]$

17. vectors lie with their tails at the same point. When the angle between them is increased by 20° their scalar product has the same magnitude but changes from positive to negative. The original angle between them was:

- A. 0°
- B. 60°
- C. 70°
- D. 80°

18. The minimum number of vectors of unequal magnitude required to produce a zero resultant is

- A. 2
- B. 3
- C. 4
- D. 5

19. If the resultant of two vectors, each of magnitude A is also a magnitude of A. The angle between the two vectors will be:

- A. 30°
- B. 45°
- C. 60°
- D. 120°

20. The magnitude of vector

$$A = 2\hat{i} + \hat{j} + 2\hat{k}$$

- A. 9
- B. 5
- C. 3
- D. 1

21. When $F_x=3N$ and $F=5N$ then $F_y=$

- A. 6N
- B. 4N
- C. 2N
- D. 0N

22. A meter stick is supported by a knife-edge at the 50-cm mark. Arif hangs masses of 0.40 kg and 0.60 kg from the 20-cm and 80-cm marks, respectively. Where should Arif hang a third mass of 0.30 kg to keep the stick balanced?

- A. 20 cm
- B. 70 cm
- C. 30 cm
- D. 25 cm

23. If $A_x=1.5cm$, $A_y=-1.0$ into which quadrant do the vector A point?

- A. I
- B. II
- C. III
- D. IV

24. $A \cdot (\vec{A} \times \vec{B}) = ?$

- A. 0
- B. 1
- C. AB
- D. A^2B

25. Two forces of magnitude 20 N and 50 N act simultaneously on a body. Which one of the following forces cannot be a resultant of the two forces?

A. 20 N
B. 30 N
C. 40 N
D. 70 N

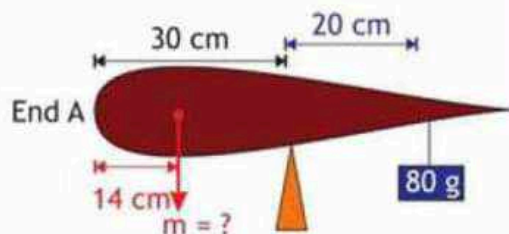
26. If the dot product of two nonzero vectors A and B is zero then the magnitude of their cross product is

A. 0
B. 1
C. AB
D. -AB

27. The sum of magnitudes of two forces is 16N. If the resultant force is 8N and its direction is perpendicular to minimum force then the forces are

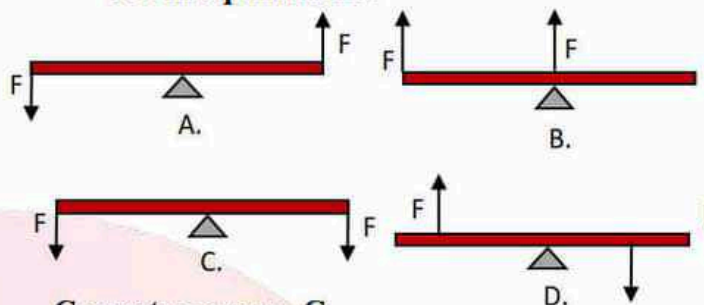
A. 6N and 10N
B. 8N and 8N
C. 4N and 12N
D. 2N and 14N

28. Find the mass of the uneven rod shown in the figure. If its center of gravity is 14 cm from end A is _____.



A. 100 g
B. 150 g
C. 80 g
D. 5g

29. The following diagrams show a uniform rod with its midpoint on the pivot. Two equal forces F are applied on the rod, as shown in the Figure. Which diagram shows the rod in equilibrium?



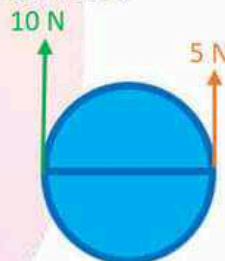
Correct answer: - C

30. For which angle the equation $|\vec{A} \cdot \vec{B}| = |\vec{A} \times \vec{B}|$ is correct.

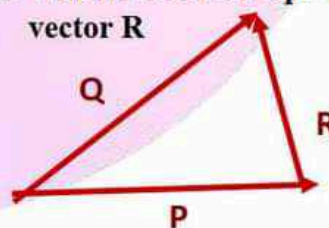
A. 30°
B. 45°
C. 60°
D. 90°

31. What is the net torque on wheel radius 2 m as shown?

A. 10 N anticlockwise
B. 10 Nm anticlockwise
C. 10 Nm clockwise
D. 5 Nm clockwise



32. Which is correct equation for vector R

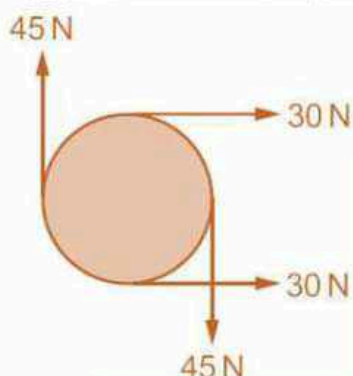


A. $R = P - Q$
B. $R = Q - P$
C. $R = P + Q$
D. None

33. Which of the following represents a vector and a scalar respectively?

Options	Vector	Scalar
A.	Speed	Velocity
B.	Acceleration	Deceleration
C.	Force	Power
D.	Work	Density

34. Diagram shows four forces applied to circular object.



Which of following describes resultant force and resultant torque on the object?

	Resultant force	Resultant torque
A.	None-Zero	None-Zero
B.	None-Zero	Zero
C.	Zero	None-Zero
D.	Zero	Zero

35. A person walks first 10 km north and 20 km east, then the resultant vector is

A. 22.36 km
B. 22.46 km
C. 25.23 km
D. 20.36 km

36. A ball is thrown vertically upwards at 19.6 m/s. For its complete trip (up and back down to the starting position), its average speed is:

A. 19.6 m/s.
B. 9.8 m/s.
C. 6.5 m/s.
D. 4.9 m/s.

37. If you throw a ball downward, then its acceleration immediately after leaving your hand, assuming no air resistance, is

A. 9.8 m/s^2 .
B. less than 9.8 m/s^2 .
C. more than 9.8 m/s^2 .
D. Speed of throw is required for answer

38. The time rate of change of momentum gives

A. Force
B. Impulse
C. Acceleration
D. Power

39. The area between the velocity-time graph is numerically equal to:

A. Velocity
B. Displacement
C. Acceleration
D. Time

40. If the slope of velocity-time graph gradually decreases, then the body is said to be moving with:

A. Positive acceleration
B. Uniform velocity
C. Negative acceleration
D. ZERO acceleration

41. A 7.0-kg bowling ball experiences a net force of 5.0 N. What will be its acceleration?

A. 35 m/s^2 .
B. 7.0 m/s^2
C. 5.0 m/s^2
D. 0.71 m/s^2

42. SI unit of impulse is:

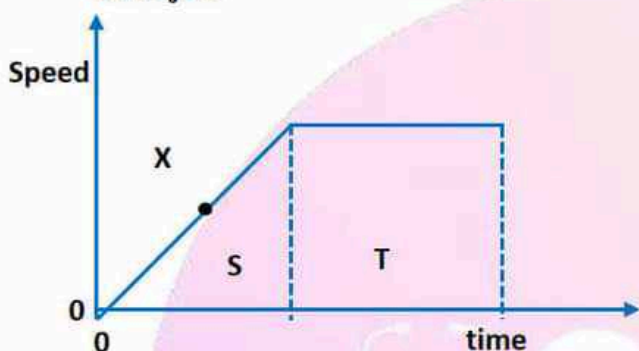
A. kg me
B. Ns
C. Ns^{-1}
D. Nm

43. A ball with original momentum $+4.0 \text{ kg x m/s}$ hits a wall and bounces straight back without losing any kinetic energy. The change in momentum of the ball is:
 A. $+4\text{Ns}$
 B. -4Ns
 C. $+8\text{Ns}^2$
 D. -8Ns
44. A body is traveling with a constant acceleration of 10 m s^{-2} . If S_1 is the distance traveled in 1st second and S_2 is the distance traveled in 2nd second, which of the following shows a correct relation between S_1 and S_2 ?
 A. $S_1=S_2$
 B. $S_1=3S_2$
 C. $S_2 = 3S_1$
 D. $2S_2=3S_1$
45. During projectile motion, the horizontal component of velocity:
 A. Changes with time
 B. Remains constant
 C. Becomes zero
 D. Increases with time
46. A projectile is thrown horizontally from a 490m high cliff with a velocity of 100 ms^{-1} . The time taken by projectile to reach the ground is
 A. 2.5s
 B. 5.0s
 C. 7.5s
 D. 10s
47. A projectile is launched at 45° to the horizontal with an initial kinetic energy E . Assuming air resistance to be negligible what will be the kinetic energy of the projectile when it reaches its highest point?
 A. $0.50 E$
 B. $0.71 E$
 C. $0.70 E$
 D. E
48. To improve the jumping record the long jumper should jump at an angle of
 A. 30°
 B. 45°
 C. 60°
 D. 90°
49. Range of a projectile on a horizontal plane is same for the following pair of angles:
 A. 15° and 18°
 B. 43° and 47°
 C. 20° and 80°
 D. 52° and 62°
50. A car takes 1 hour to travel 100 km along a main road and then hour to travel 20 Km alongside road. What is the average speed of the car for the whole journey?
 A. 60 km h^{-1}
 B. 70 km h^{-1}
 C. 80 km h^{-1}
 D. 100 km h^{-1}
51. How is the motion of a body affected by balanced and unbalanced forces acting on it?

	Balanced forces	Unbalanced force
A.	Velocity constant	Velocity constant
B.	Velocity changes	Velocity constant
C.	Velocity constant	Velocity changes
D.	Velocity changes	Velocity changes

52. When a block of Wood of mass 2 kg is pushed along a horizontal flat surface of a bench, the force friction is 4N. When the block is pushed along the bench with a force of 10N, it moves with a constant
- Speed of 3 m s^{-1}
 - Speed of 5 m s^{-1}
 - Acceleration of 3 m s^{-2}
 - Acceleration of 5 m s^{-2}

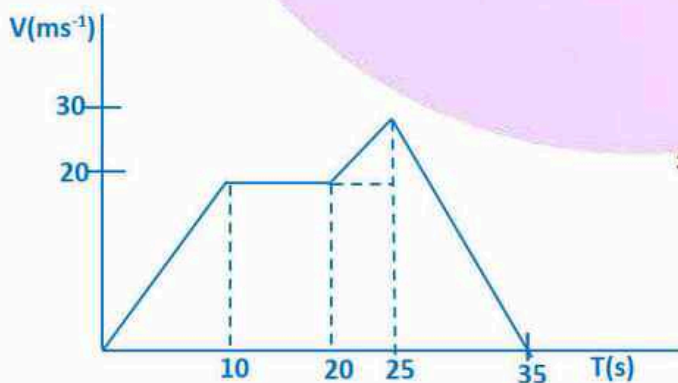
53. The graph illustrates the motion of an object



Which features of the graph represent the distance traveled by the object while moving at a constant speed?

- Area S
- Area S + area T
- Area T
- The gradient at point X

54. The journey of a car is shown in the velocity — time graph. How much distance it traveled?



- 1250 m
- 2500 m
- 3120m

D. None

55. You push a heavy crate down a ramp at a constant velocity. Only four forces act on the crate. Which force does the greatest magnitude of work on the crate?

- The force of friction.
- The force of gravity.
- The normal force.
- The force you pushing.

56. The force constant of a wire is k and that of another wire is $3k$ when both the wires are stretched through same distance, if work done are W_1 and W_2 , then

- $W_2 = W_1$
- $W_2 = 9W_1$
- $W_1 = 3W_2$
- $W_2 = 3W_1$

57. Escape velocity on the surface of the earth is 11.2 kms^{-1} . If the mass of the earth increases to twice its value and the radius of the earth becomes half the escape velocity is

- 5.6 kms^{-1}
- 11.2 kms^{-1}
- 22.4 kms^{-1}
- 33.6 kms^{-1}

58. An example of non-conservative force is:

- Electric force
- Frictional force
- Gravitational Force
- Magnetic force

59. When the speed of your car is doubled, by what factor does its kinetic energy increase?

- 2
- 2
- 4
- 8

60. One horse power is given by:
A. 746W
B. 746 KW
C. 746 MW
D. 746 GW
61. Work is said to be negative when \vec{F} and \vec{d} are:
A. A Parallel
B. Anti-Parallel
C. Perpendicular
D. at 45°
62. Two bodies of masses m_1 and m_2 have equal momentum their kinetic energies E_1 and E_2 are in the ratio
A. $\sqrt{m_1} : \sqrt{m_2}$
B. $m_1 : m_2$
C. $m_2 : m_1$
D. $\sqrt{m_1^2} : \sqrt{m_2^2}$
63. The atmosphere is held to the earth by
A. Winds
B. Gravity
C. Clouds
D. The rotation of earth
64. If momentum is increased by 20% then K.E increases by
A. 44%
B. 55%
C. 66%
D. 77%
65. If the K.E of a body becomes four times of the initial value, then new momentum will
A. Become twice its initial value
B. Become three times, its initial value
C. Become four times, its initial value
D. Remains constant.
66. Two bodies with kinetic energies in the ratio of 4 : 1 are moving with equal linear momentum. The ratio of their masses is
A. 1:2
B. 1:1
C. 4:1
D. 1:4
67. A body of mass 5 kg is moving with a momentum of 10 kg ms^{-1} . A force of 0.2 N acts on it in the direction of motion of the body for 10s. The increase in its kinetic energy is
A. 2.8 J
B. 3.2 J
C. 3.8 J
D. 4.4 J
68. If force and displacement of particle in the direction of force are doubled. Work would be
A. Double
B. 4 times
C. Half
D. 1/4 times
69. The angular speed in radians/hours for daily rotation of our earth is?
A. 2π
B. 4π
C. $\pi/6$
D. $\pi/12$
70. What is moment of inertia of a sphere
A. MR^2
B. $1/2 MR^2$
C. $2/5 MR^2$
D. $1/2 M^2 R$
71. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of particle. The motion of the particle takes place in a horizontal plane. It follows
A. Linear momentum is constant
B. Velocity is constant
C. It moves in a circular path
D. particle moves in straight line
72. A body moving in a circular path with constant speed has
A. Constant acceleration
B. Constant retardation
C. Variable acceleration

- D. Variable speed and constant velocity
73. Astronauts appear weightless in space because
- A. There is no gravity in space
 - B. There is no floor pushing upwards
 - C. Satellite is freely falling
 - D. There is no air in space
74. Which one is constant for a satellite in orbit?
- A. Velocity
 - B. K.E
 - C. Angular Momentum
 - D. Potential Energy
75. If the earth suddenly stops rotating the value of 'g' at equator would:
- A. Decrease
 - B. Remain unchanged
 - C. Increase
 - D. Become Zero
76. If solid sphere and solid cylinder of same mass and density rotate about their own axis, the moment of inertia will be greater for
- A. Solid sphere
 - B. Solid cylinder
 - C. The one that has the largest mass arrives first.
 - D. The one that has the largest radius arrives first.
77. The gravitational force exerted on an astronaut on Earth's surface is 650N down. When she is in the International Space Station, the gravitational force on her is
- A. Larger,
 - B. Exactly the same,
 - C. Smaller,
 - D. Nearly but not exactly zero, or
 - E. Exactly zero
78. A solid cylinder of mass M and radius R rolls down an incline without slipping. Its moment of inertia about an axis through its center of mass is $\frac{MR^2}{2}$. At any instant while in motion, its rotational kinetic energy about its center of mass is what fraction of its total kinetic energy?
- A. $\frac{1}{2}$
 - B. $\frac{1}{4}$
 - C. $\frac{1}{3}$
 - D. $\frac{2}{5}$
79. Tuning of a radio set is an example of
- A. Mechanical resonance
 - B. Musical resonance
 - C. Electrical resonance
 - D. Free vibrations.
80. The heating and cooking of food evenly by microwave oven is an example of:
- A. S.H.M
 - B. Resonance
 - C. Damped Oscillation
 - D. Free oscillation
81. The time period of the same pendulum at Karachi and Murre are related as
- A. $T_k = T_M$
 - B. $T_k > T_M$
 - C. $T_k < T_M$
 - D. $2T_k = 3T_M$
82. In an isolated system the total energy of vibrating mass and spring is:
- A. Variable
 - B. Low
 - C. High
 - D. Constant
83. While deriving the equation of time period for simple pendulum which quantity should be kept small: -
- A. Length of simple pendulum
 - B. Amplitude
 - C. Mass of simple pendulum

- D. Gravitational acceleration g
84. If the period of oscillation of mass (M) suspended from a spring is 2s, then the period of mass 4M will be
A. 1s
B. 2s
C. 3s
D. 4s
85. The time period of a simple pendulum is 2 seconds. If its length is increased by 4 times then its period becomes
A. 16 s
B. 12 s
C. 8s
D. 4s
86. To make the frequency double of a spring oscillation, we have to:
A. Reduce the mass to one fourth
B. Quadruple the mass
C. Double the mass
D. Half the mass
87. The restoring force of SHM is maximum when particle:
A. Displacement is maximum
B. Half way between them
C. Crossing mean position
D. At rest
88. Two springs of spring constants and are joined in series. The effective spring constant of the combination is given by
A. $(k_1+k_2)/2$
B. k_1+k_2
C. $k_1k_2/(k_1 + k_2)$
D. $\sqrt{k_1k_2}$
89. When a wave goes from one medium to another medium, which one of the following characteristics of the wave remains constant?
A. Velocity
B. Frequency
C. Wavelength
D. Phase
90. When a transverse wave is reflected from the boundary of a denser to a rarer medium, it under goes a phase change of
A. 0
B. $\pi/2$
C. π
D. 2π
91. If the tension in the string is doubled and its mass per unit length is reduced to half. Then the speed of transverse wave on it is
A. Doubled
B. Halved
C. One fourth
D. Constant
92. Which one of the following properties is not exhibited by the longitudinal waves?
A. Reflection
B. Interference
C. Diffraction
D. Polarization
93. A sounding source and a listener are both at rest relative to each other. If wind blows from the listener towards the source, then which one of the following of sound will change?
A. Frequency
B. Speed
C. Phase
D. wavelength
94. Which one of the following factors has no effect on the speed of sound in a gas?
A. Humidity
B. Pressure
C. Temperature
D. Density
95. There is no net transfer of energy by particles of medium in
A. Longitudinal wave
B. Transverse wave
C. Progressive wave

- D. Stationary wave
96. Which one of the following could be the frequency of ultraviolet radiation?
- $1.0 \times 10^6 \text{ Hz}$
 - $1.0 \times 10^9 \text{ Hz}$
 - $1.0 \times 10^{12} \text{ Hz}$
 - $1.0 \times 10^{15} \text{ Hz}$
97. When a stationary wave is formed then its frequency is
- Same as that of the individual waves
 - Twice that of the individual waves
 - Half that of the individual waves
 - That of the individual waves
 - Triple that of the individual waves
98. The fundamental frequency of a closed organ pipe is f . If both the ends are opened then its fundamental frequency will be
- f
 - $0.5f$
 - $2f$
 - $4f$
99. If the amplitude of a wave is doubled, then its intensity is
- Doubled
 - Halved
 - Quadrupled
 - One fourth
100. A sound source is moving towards stationary listener with $1/10$ th of the speed of sound. The ratio of apparent to real frequency is
- $\frac{11}{10}$
 - $\left[\frac{11}{10}\right]^2$
 - $\left[\frac{9}{10}\right]^2$
 - $\frac{10}{9}$
101. Assume we can change the equilibrium state of a system via two different processes. Assume that the initial and the final state are the same. Which of the quantities ΔU , ΔQ , ΔW , and ΔT must be the same for the two processes?
- Only ΔQ and ΔW
 - Only ΔQ and ΔT
 - Only ΔU and ΔT
 - Only ΔU and ΔW
102. In any process the maximum amount of mechanical energy that can be converted to heat
- Depends upon the amount of friction
 - Depends upon the intake and exhaust temperature
 - Depends upon whether kinetic or potential energy is involved
 - Is 100 %
103. In an isothermal change, internal energy
- Decreases
 - Becomes zero
 - Increases
 - Remains constant
104. A thermos bottle containing hot coffee is vigorously shaken. Consider coffee as the system, then its temperature
- Increases
 - Decreases below than 0°C
 - Remains the same
 - Decreases
105. Maximum work can be obtained in the process called
- Cyclic
 - Isothermal
 - Adiabatic
 - Isochoric
106. A heat engine takes in 800 J of heat at 1000 K and exhausts 600 J of heat at 400 K. What is the actual efficiency of this engine?
- 25%
 - 40%
 - 50%
 - 75%

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107. If the temperature of the heat source is increased, the efficiency of a Carnot's engine

- A. Increases
- B. Decreases
- C. Remains constant
- D. First increases and then becomes constant

108. Triple point of water is

- A. 273.16 F
- B. 273.16 F
- C. 372.16 K
- D. 273.16 K

109. Areal gas can be approximated to an ideal gas at

- A. Low density
- B. High pressure
- C. High density
- D. Low temperature

110. If the volume of the gas is to be increased by 4 times, then

- A. Temperature and pressure must be double
- B. At constant P the temperature must be increased by four times
- C. At constant T the pressure must be increased by four times
- D. It cannot be increased

111. In which of the systems listed below is the entropy decreasing?

- A. A gas is cooled.
- B. A plate is shattered.
- C. An egg is scrambled.
- D. A drop of dye diffuses in a cup of water.

112. If the temperature of source and sink of a Carnot engine having efficiency η are each decreased by 100K, then the efficiency

- A. Remain constant
- B. Increases.
- C. Become 1.
- D. Decreases