Stay HOME

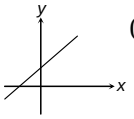
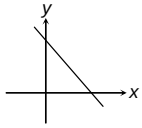
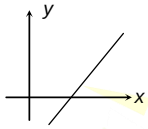
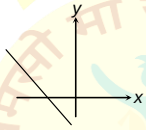
Stay Safe , Complete Physics' Assignment.

Topic Cover : **01. Mathematical Tools**

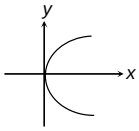
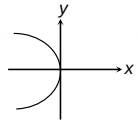
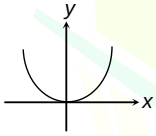
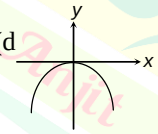
1. The value of sin (–150°) is-

(a) $\frac{\sqrt{3}}{2}$ (b) $-\frac{\sqrt{3}}{2}$ (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

2. Which of the following may represent the curve x = 2y - 3

(a)  (b)  (c)  (d) 

3. Which of the following can represent the curve $x^2 = 2y$?

(a)  (b)  (c)  (d 

4. If y = $\frac{1}{2}\ sinx^2$, $\frac{dy}{dx}$ will be,

(a) $\frac{1}{2}cosx^2$ (b) $xcosx^2$ (c) $\frac{1}{2}x^2cosx^2$ (d) sinx

5. Find out value of I = $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} sin2x\ dx$

(a) zero (b) – 1 (c) 1 (d) 2

02. Unit Dimension and Measurement

6. If velocity (V), acceleration (a) and force (F) are taken as fundamental quantities instead of mass (M), length (L) and time (T), the dimensions of Young's modulus of elasticity would be (with M, L and T as fundamental, [Young's modulus] = ML–1T–2

(a) FA2V–2 (b) FA2V–3 (c) FA2V–4 (d) FA2V–5

7. The number of significant figures in the number 0.020740×10^{-3}

(a) 6 (b) 5 (c) 7 (d) 4

8. Which pair have not equal dimensions-

(a) Energy and torque
(b) Force and impulse
(c) Angular momentum and Plank's constant
(d) Elastic modulus and pressure

9. The dimension of Plank's constant equals to that of-

(a) Energy (b) Momentum
(c) Angular momentum (d) Power

10. Which of the following is not the unit of time ?

(a) Micro second (b) Leap year
(c) Lunar months (d) Parallactic second

11. Which of the following is smallest unit ?

(a) Milimetre (b) Angstrom
(c) Fermi (d) Metre

12. Which of the following is not the unit of length ?

(a) micron (b) light year
(c) angstrom (d) radian

13. Parsec is the unit of-

(a) Speed (b) Time
(c) Distance (d) None of the above

14. Which of the following pairs does not have similar dimensions ?

(a) Planck's constant & angular momentum
(b) Tension and surface tension
(c) Angle and strain
(d) Stress and pressure

15. A dimensionless quantity-

(a) never has a unit (b) always has a unit
(c) may have a unit (d) does not exist

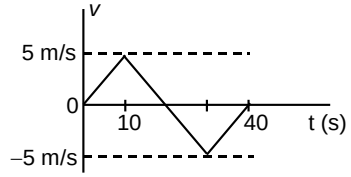
03. Motion in a straight Line

16. On a displacement-time graph two straight lines make angles 30° and 60° with the time-axis. The ratio of the velocities represented by them is

(a) $1 : \sqrt{3}$ (b) 1 : 3 (c) $\sqrt{3} : 1$ (d) 3 : 1

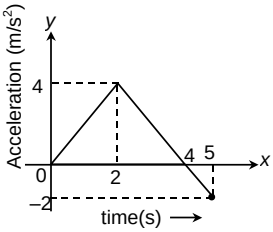
17. The velocity-time plot is shown in figure. Find the average speed in time interval t = 0 to *t* = 40s during the period

(a) zero (b) 2.5 m/s (c) 5 m/s (d) none



18. Figure shows the graph of acceleration of particle as a function of time. The maximum speed of the particle is (particle starts from rest)

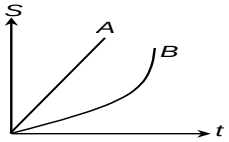
(a) 7 m/s (b) 8 m/s (c) 4 m/s (d) 16 m/s



19. If the displacement (s) and time (t) graph of two moving

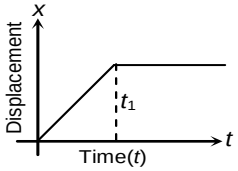
particles *A* and *B* in straight line is shown in the figure, then which of following is incorrect.

(a) *A* is moving with constant velocity
(b) *B* is moving with increasing speed
(c) *A* is moving with non-zero constant acceleration
(d) acceleration of *B* may be constant for some time



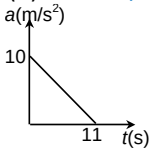
20. The *x* – *t* graph shown in figure represents

(a) Constant velocity
(b) Velocity of the body is continuously changing
(c) constant acceleration
(d) The body travels with constant speed up to time t_1 & then stops



21. A particle starting from rest undergoes a rectilinear motion with acceleration *a*. The variation of *a* with time *t* is shown in the figure. The maximum velocity attained by the particle during the motion is

(a) 55 m/s (b) 550 m/s (c) 110 m/s (d) 650 m/s



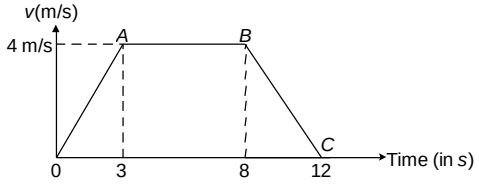
22. A bullet is fired into a fixed target looses half of its velocity after penetrating 3 cm. How much further it will penetrate before coming to rest assuming that it faces constant resistance to motion?

(a) 0.5 cm (b) 1 cm (c) 1.5 cm (d) none

23. A trolley runs down a slope from rest with constant acceleration. In the first second of its motion it travels 1.6 m. Its acceleration (in m/s2) is

(a) 3.2 (b) 1.6 (c) 0.8 (d) 2.4

24. From the velocity-time graph given of a particle moving in a straight line, one can conclude that



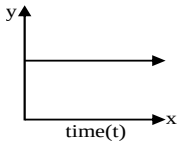
(a) its average velocity during the 12 sec. interval is 24/7 m/s
(b) its velocity for the first 3 sec is uniform and is equal to 4 m/s
(c) the body has zero acceleration between t = 3 s and t = 8 s
(d) the body has a uniform velocity from *t* = 8 s to *t* = 12 s

25. Two trains each of length 90 m moving in opposite directions along parallel tracks meet when their speeds are 60 km/hr and 40 km/hr. If their accelerations are 0.3 m/s^2 and 0.15 m/s^2 respectively, find the time they take to pass each other.

(a) 8s (b) 4s (c) 2s (d) 6.17s

04. Motion in a Plane (Projectile Motion)

26. In the graph shown in fig. the time is plotted along x-axis. Which quantity associated with the projectile motion is plotted along the y-axis-



(a) kinetic energy (b) momentum
(c) horizontal velocity (d) none of the above

27. The range of a projectile when fired at 75° with the horizontal is 0.5 km. what will be its range when fired at 45° with same speed -

(a) 0.5 km (b) 1.0 km (c) 1.5 km (d) 2.0 km

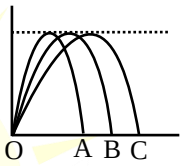
28. A particle is projected with a velocity u making an angle θ with the horizontal. At any instant, its velocity v is at right angles to its initial velocity u; then v is -

(a) u cosθ (b) u cosθ (c) u cotθ (d) u secθ

29. What is the ratio of P.E. w.r.t. ground and K.E. at the top most point of the projectile motion -

(a) $\cos^2\theta$ (b) $\sin^2\theta$ (c) $\tan^2\theta$ (d) $\cot^2\theta$

30. Three projectile A,B and C are thrown from the same point in the same plane. Their trajectories are shown in the figure. Then which of the following statement is true.



(a) The time of flight is the same for all the three
(b) The launch speed is greatest for particle C
(c) The horizontal velocity component is greatest for particle
(d) All of the above

31. A marble is dropped vertically, Another identical marble B is projected horizontally from the same point at the same instant

(a) A will reach the ground earlier than B
(b) B will reach the ground earlier than A
(c) Both A and B will reach the ground at the same instant
(d) None of the above

32. If air resistance is not considered in projectiles, the horizontal motion takes place with -

(a) Constant velocity (b) Constant acceleration
(c) Constant retardation (d) Variable velocity

33. A ball is projected upwards. Its acceleration at the highest point is –

(a) zero (b) directed upwards
(c) directed downwards (d) such as cannot be predicted

34. A projectile is thrown into space so as to have the maximum possible horizontal range equal to 400 m. Taking the point of projection as the origin, the coordinates of the point where the velocity of the projectile is minimum are -

(a) (400, 100) (b) (200, 100)
(c) (400, 200) (d) (200, 200)

35. A particle is fired with velocity u making angle ⍰ with the horizontal. What is the change in velocity when it is at the highest point ?

(a) u cosθ (b) u (c) u sinθ (d) (u cosθ– u)

36. In the above, the change in speed is -

(a) u cosθ (b) u (c) u sinθ (d) (u cosθ– u)

37. An arrow is shot into the air. Its range is 200 metres and its time of flight is 5s. If the value of g is assumed to be 10 ms^{-2}, then the horizontal component of the velocity of arrow is -

(a) 25 m/s (b) 40 m/s (c) 31.25 m/s (d) 12.5 m/s

38. Galileo writes that for angles of projection of a projectile at angle $(45° + \theta)$ and $(45° - \theta)$, the horizontal ranges described by the projectile are in the ratio of -

(a) 2 : 1 (b) 1 : 2 (c) 1 : 1 (d) 2 : 3

39. During projectile motion, the quantities that remain unchanged are -

(a) force and vertical velocity
(b) acceleration and horizontal velocity
(c) kinetic energy and acceleration
(d) acceleration and momentum

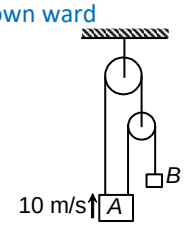
40. A body is thrown with some velocity from the ground. Maximum height when it is thrown at 60° to horizontal is 90 m. What is the height reached when it is thrown at 30° to the horizontal

(a) 90 m (b) 45 m (c) 30 m (d) 15 m

05. Newton's Laws of Motion

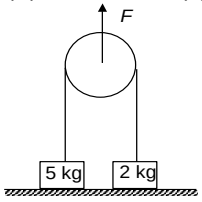
41. At a certain moment of time velocity of *A* is 10 m/s upward. The velocity of *B* at that time will be

(a) 30 m/s downward (b) 20 m/s downward
(c) 10 m/s down ward (d) 5 m/s down ward



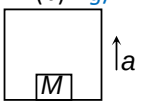
42. Two blocks of masses 5 kg and 2 kg are initially at rest on the floor as shown in figure. A light string, passing over a light frictionless pulley, connects them. An upward force F is applied on the pulley and maintained constant. Find the maximum value of F applied so that the accelerations of 5 kg is zero (g = 10 ms-2)

(a) 50 N (b) 100 N. (c) 200 N. (d) none



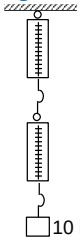
43. With what acceleration 'a' should the box of figure moving up so that the block of mass M exerts a force $7Mg/4$ on the floor of the box?

(a) g/4 (b) g/2 (c) 3g/4 (d) 4g



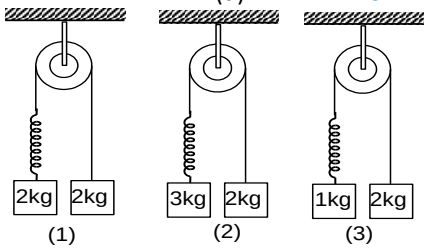
44. A block of mass 10 kg is suspended through two light spring balances as shown in figure.

(a) Both the scales will read 10 kg
(b) Both the scales will read 5 kg
(c) The upper scale will read 10 kg and the lower zero
(d) The readings may be anything but their sum will be 10 kg



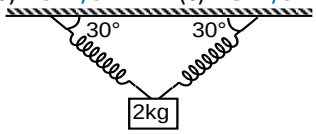
45. Same spring is attached with 2 kg, 3kg and 1 kg blocks in three different cases as shown in the figure. If x_1, x_2 and x_3 be the extensions in the spring in these three cases respectively then

(a) x1 = 0, x3 > x2 (b) x2 > x1 > x3
(c) x3 > x1 > x2 (d) x1 > x2 > x3



46. A block of mass 2 kg is hanging with two identical massless springs as shown in figure. The acceleration of the block just at the moment, the right spring breaks is (g = 10 m/s^2)

(a) 10 m/s^2 (b) 5 m/s^2 (c) 25 m/s^2 (d) 4 m/s^2



47. The force required to just move a body up an inclined plane is double the force required to just prevent it from sliding down. If ϕ is angle of friction and θ is the angle which incline makes with the horizontal, then

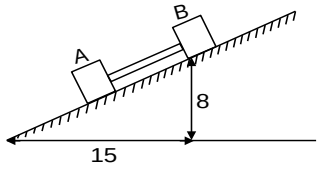
(a) tan θ = tan ϕ (b) tan θ = 2 tan ϕ
(c) tan θ = 3 tan ϕ (d) tan ϕ = tan θ

48. A body is placed on a rough inclined plane of inclination θ. As the angle θ is increased from 0° to 90°, the contact force between the block and the plane

(a) remains constant
(b) first remains constant then decreases
(c) first decreases then increases
(d) first increases then decreases

49. Blocks A and B in the figure are connected by a bar of negligible mass. If masses of A and B are 170 kg each respectively and μA = 0.2 and μB = 0.4, where μA and μB are the coefficients of limiting friction between blocks and plane, calculate the force in the bar. (g = 10 m/s^2).

(a) 150 N (b) 75 N (c) 200 N (d) 250 N



50. A particle stays at rest as seen in a frame. We can conclude that

(a) the frame is inertial
(b) resultant force on the particle is zero
(c) the frame may be inertial but the resultant force on the particle is zero
(d) the frame may be no inertial but the resultant force on the particle is zero

06. Circular Motion

51. A wheel is subjected to uniform angular acceleration about its axis. Initially its angular velocity is zero. In the first 2 sec, it rotates through an angle θ_1; in the next 2 sec, it rotates through an additional angle θ_2. The ratio of θ_2 /θ_1; is-

(a) 1 (b) 2 (c) 3 (d) 5

52. In applying the equation for motion with uniform angular acceleration $\omega = \omega_0 + \alpha t$, the radian measure -
(a) must be used for both ω and α
(b) may be used for both ω and α
(c) may be used for ω but not α
(d) cannot be used for both ω and α

53. The linear and angular acceleration of a particle are 10 m/sec^2 and 5 rad/sec^2 respectively it will be at a distance from the axis of rotation -
(a) 50 m (b) 1/2 m (c) 1 m (d) 2 m

54. A tachometer is a device to measure -
(a) gravitational pull
(b) speed of rotation
(c) surface tension
(d) tension in a spring

55. Two cars of masses m_1 and m_2 are moving along the circular path of radius r_1 and r_2. They take one round in the same time. The ratio of angular velocities of the two cars will be-
(a) $m_1 : m_2$ (b) $r_1 : r_2$ (c) 1 : 1 (d) $m_1 r_1 : m_2 r_2$

56. A bottle of soda water is grasped by the neck and swing briskly in a vertical circle. Near which portion of the bottle do the bubbles collect ?
(a) near the near bottom
(b) in the middle of the bottle
(c) near the neck
(d) uniformly distributed in the bottle

57. The ratio of angular speeds of minutes hand and hour hand of a watch is -
(a) 1 : 12 (b) 6 : 1 (c) 12 : 1 (d) 1 : 6

58. A particle moves in a circle of radius 25 cm at two revolutions per second. The acceleration of particle in m/s^2 is -
(a) π^2 (b) $8\pi^2$ (c) $4\pi^2$ (d) $2\pi^2$

59. In uniform circular motion-
(a) both velocity and acceleration are constant
(b) acceleration and speed are constant but velocity changes
(c) both acceleration and velocity change
(d) both acceleration and speed are constant

60. When a body moves with a constant speed along a circle-
(a) no work is done on it
(b) no acceleration is produced in the body
(c) no force acts on the body
(d) its velocity remains constant

61. What happens to the centripetal acceleration of a revolving body if you double the orbital speed v and halve the angular velocity ω?
(a) the centripetal acceleration remains unchanged
(b) the centripetal acceleration is halved
(c) the centripetal acceleration is doubled
(d) the centripetal acceleration is quadrupled

62. A string of length 1 m is fixed at one end and carries a mass of 100 gm at the other end. The string makes $(2/\pi)$ revolutions per second around vertical axis through the fixed end. Calculate the tension in the string-
(a) 1.0 N (b) 1.6 N (c) 2 N (d) 4 N

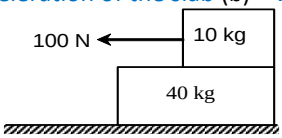
63. A particle is acted upon by a constant force always normal to the direction of motion of the particle. It is therefore inferred that- (1) Its velocity is constant
(2) It moves in a straight line
(3) Its speed is constant
(4) It moves in circular path
(a) 1, 4 (b) 3, 4 (c) 1, 2 (d) 1, 2, 3

64. A body of mass 2 kg is moving in a vertical of radius 2 m. The work done when it moves from the lowest point to the highest point is-
(a) 80 J (b) 40 J (c) 20 J (d) 0

65. A mass m is revolving in a vertical circle at the end of a string of length 20 cm. By how much does the tension of the string at the lowest point exceed the tension at the top most point?
(a) 2 m g (b) 4 m g (c) 6 m g (d) 8 m g

07. Friction

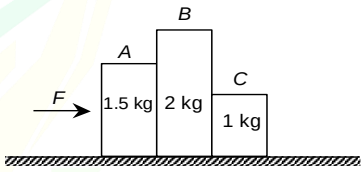
66. A 40 kg slab (b) rests on a smooth floor as shown in figure. A 10 kg block (a) rests on the top of the slab. The static coefficient of friction between slab and block is 0.6 while the kinetic friction coefficient is 0.4. The block (a) is acted upon by a horizontal force 100 N. If g = 9.8 m/s^2, the resulting acceleration of the slab (b) will be



(a) 0.98 m/s^2 (b) 1.47 m/s^2 (c) 1.52 m/s^2 (d) 6.1 m/s^2

67. On a slippery road with a coefficient of friction reduced to 0.2, the maximum speed at which a car can go round a curve of radius 100 m is-
(a) 5 m/s (b) 7 m/s (c) 14 m/s (d) 20 m/s

68. In the system of three blocks A, B and C shown in figure, (i) how large a force F is needed to give the blocks an acceleration of 3 m/s^2, if the coefficient of friction between blocks and table is 0.3 (ii) how large a force does the block A exert on the block B? (g = 10 m/s^2)



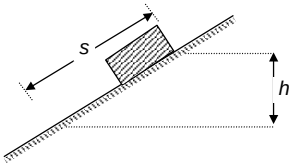
(a) 27,18 (b) 9,3 (c) 6,2 (d) 81,27

08. Work Energy and Power

69. The work done by all the forces (external and internal) on a system equals the change in
(a) total energy (b) kinetic energy
(c) potential energy (d) none of these

70. The work done by the external forces on a system equals the change in
(a) total energy (b) kinetic energy
(c) potential energy (d) none of these

71. The work done against gravity in moving the block of mass *m* a distance *s* up the slope as shown in the figure is
(a) mh (b) mgs (c) ms (d) mgh



72. An object of mass 10 kg falls from rest through a vertical distance of 10 m and acquires a velocity of 10 m/s. The work done by the push of air on the object is (g = 10 m/s2)
(a) 500 J (b) –500 J (c) 250 J (d) –250 J

73. A chain of mass m and length l is placed on a table with one-

sixth of it hanging freely from the table edge. The amount of work done to pull the chain on the table is
(a) mgl/72 (b) mgl/36 (c) mgl/6 (d) mgl/4

74. How much work must be done by a force on 100 kg body to accelerate it from 0 to 20 m/s in 20 s?
(a) 2×10^3 W (b) 2×10^3 J (c) 2×10^4 J (d) 4×10^4 J

75. A 2 kg body and a 3 kg body have equal momentum. If the kinetic energy of 3 kg body is 10J, the K.E. of 2 kg body will be
(a) 6.66 J (b) 15 J (c) 22.5 J (d) 45 J

76. A position dependent force F = 7 – 2x + 3x2 newton acts on a small body of mass 2 kg and displaces it from x = 0 to x = 5 m. The work done in joules is
(a) 70 (b) 270 (c) 35 (d) 135

77. The natural length of spring is 0.3 m and its spring constant is 30 N/m. How much work is done by the applied external force to stretch the spring from 0.1 to 0.2 m?
(a) 0.68 J (b) 0.45 J (c) 0.55 J (d) 0.70 J

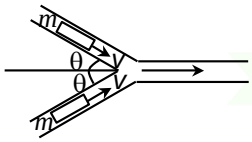
78. A wind-powered generator converts wind energy into electrical energy. Assume that the generator converts a fixed fraction of the wind energy intercepted by its blades into electrical energy. For wind speed *v*, the electrical power output will be proportional to
(a) v (b) v^2 (c) v^3 (d) v^4

79. A person of mass 60 kg is moving with a velocity of 20 m/s. A boy of mass 40 kg is moving with a speed of 10 m/s. The ratio of kinetic energy of person and boy is
(a) 1 : 2 (b) 6 : 1 (c) 1 : 6 (d) 4 : 3

80. A pump can hoist 9000 kg of coal per hour from a mine of 120 m deep. Then the power in watts, assuming that its efficiency is 75%, is
(a) 4920 watt (b) 5920 watt (c) 3920 watt (d) none of these

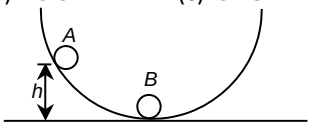
09. Impulse, Momentum and Centre of Mass

81. Two vehicles of equal masses are moving with same speed *v* on two roads making an angle θ. They collide inelastically at the junction and then move together. The speed of the combination is

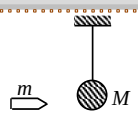


(a) $v \cos \theta$ (b) $2v \cos \theta$ (c) $\frac{v}{2} cos\ \theta$ (d) $\frac{v}{2} cos \frac{\theta}{2}$

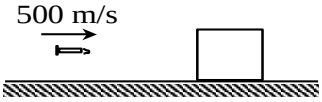
82. A sphere *A* of mass 4 kg is released from rest on a smooth hemispherical shell of radius 0.2 m. The sphere *A* slides down and collides elastically with another sphere *B* of mass 1 kg placed on the bottom of the shell. If the sphere *B* has to just reach the top, the height *h* from where the sphere *A* should be released is
(a) 0.08 m (b) 0.02 m (c) 0.18 m (d) 0.10 m



83. A bullet of mass *m* is fired along the bob of a pendulum hanging by a string. If α is angle of deflection of the bob after the bullet hits the bob, the angle α is maximum when
(a) bullet passes through the bob
(b) bullet gets stuck inside the bob
(c) bullet is reflected back
(d) in all circumstances



84. A bullet of mass 20 g travelling horizontally with a speed of 500 m/s passes through a wooden block of mass 10.0 kg initially at rest on a surface. The bullet emerges with a speed of 100 m/s and the block slides 20 cm on the surface before coming to rest, the coefficient of friction between the block and the surface. (g = 10 m/s^2)
(a) 0.16 (b) 0.6 (c) 0.5 (d) 0.25



85. When two bodies stick together after collision, the collision is said to be
(a) partially elastic (b) elastic
(c) perfectly inelastic (d) none of the above

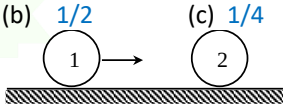
86. A sphere of mass *m* moving with a constant velocity *u* hits another stationary sphere of same mass. If *e* is the coefficient of restitution, the ratio of velocity of two spheres after collision is
(a) $\frac{1-e}{1+e}$ (b) $\frac{1+e}{e}$ (c) $\frac{e+1}{e-1}$ (d) $\frac{e-1}{e+1}$

87. A body of mass m_1 strikes a stationary body of mass m_2. If the collision is elastic, the fraction of kinetic energy transferred by the first body to the second is
(a) $\frac{m_1 m_2}{m_1+m_2}$ (b) $\frac{2m_1 m_2}{m_1+m_2}$ (c) $\frac{4m_1 m_2}{(m_1+m_2)^2}$ (d) $\frac{2m_1 m_2}{(m_1+m_2)^2}$

88. In the elastic collision of a heavy vehicle moving with a velocity of 10 ms^{-1} and a small stone at rest, the stone will fly away with a velocity equal to
(a) 5 ms^{-1} (b) 10 ms^{-1} (c) 20 ms^{-1} (d) 40 ms^{-1}

89. A body of mass 2 kg moving with a velocity of 6 m/s strikes inelastically to another body of same mass at rest. The amount of heat evolved during collision is
(a) 36 J (b) 18 J (c) 9 J (d) 3 J

90. Ball 1 collides with an another identical ball 2 at rest as shown in figure. For what value of coefficient of restitution *e*, the velocity of second ball becomes two times that of 1 after collision.
(a) 1/3 (b) 1/2 (c) 1/4 (d) 1/6



91. A ball *P* of mass 2 kg undergoes an elastic collision with another ball Q at rest. After collision, ball *P* continues to move in its original direction with a speed one-fourth of its original speed. What is the mass of ball Q?
(a) 0.9 kg (b) 1.2 kg (c) 1.5 kg (d) 1.8 kg

92. Two masses of 1 g and 9 g are moving with equal kinetic energies. The ratio of the magnitudes of their respective linear momentum is
(a) 1 : 9 (b) 9 : 1 (c) 1 : 3 (d) 3 : 1

93. If two balls each of mass 0.06 kg moving in opposite directions with same speed 4 m/s collide and rebound with the same speed, then the impulse imparted to each ball due to other is
(a) 0.48 kg m/s (b) 0.24 kg m/s (c) 0.81 kg m/s (d) zero

94. A ball approaches a moving wall of infinite mass with speed *v* along normal to the wall. The speed of the wall is *u* away from the ball and $u < v$. The speed of ball after an elastic collision is
(a) $u + v$ away from the wall (b) $2u + v$ away from the wall
(c) $v - u$ towards from the wall (d) $v - 2u$ away from the wall

95. Blocks *A* and *B* of equal masses are arranged as shown in figure.

The surface of *A* is smooth while *B* is rough and has a coefficient of friction 0.1 with surface. The block *A* moves with speed 10 m/s and collides with *B*. The collision is perfectly elastic. Find the distance moved by *B* before it comes to rest.

(a) 25 m (b) 100 m (c) 50 m (d) 75 m

96. A sphere collides with another sphere of identical mass kept at rest. After collision, the two spheres move. The collision is perfectly inelastic, then the angle between the directions of motion of the two spheres is

(a) 0° (b) 45° (c) different from 90° (d) 90°

97. If momentum is increased by 20%, then K.E. increased by

(a) 44% (b) 55% (c) 66% (d) 77%

98. A bullet is shot from a rifle. As a result the rifle recoils. The kinetic energy of rifle as compared to that of bullet

(a) is less (b) is greater
(c) is equal (d) cannot be concluded

99. A body falling vertically downwards under gravity breaks in two parts of unequal masses. The centre of mass of the two parts taken together shifts horizontally towards

(a) heavier piece (b) lighter piece
(c) does not shift horizontally
(d) depends on the vertical velocity at the time of breaking

100. Two blocks of masses 10 kg and 4 kg connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/s to the heavier block in the direction of the lighter block. The velocity of the centre of mass is -

(a) 30 m/s (b) 20 m/s (c) 10 m/s (d) 5 m/s

10. Motion of System of Particle and Rigid Body

101. A body falling vertically downwards under gravity breaks in two parts of unequal masses. The centre of mass of the two parts taken together shifts horizontally towards

(a) heavier piece (b) lighter piece
(c) does not shift horizontally
(d) depends on the vertical velocity at the time of breaking

102. If I1 is the moment of inertia of a thin rod about an axis perpendicular to its length and passing through its centre of mass and I2 is the moment of inertia of the ring about an axis passing through its centre and perpendicular to its plane formed by bending this rod to the ring shape. Then

(a) I1 : I2 = 1 : 1 (b) I1 : I2 = π2 : 3
(c) I1 : I2 = π : 4 (d) I1 : I2 = 3 : 5

103. A wheel rotates at 500 rpm on a shaft of negligible inertia (M.I.). A second identical wheel initially at rest is suddenly coupled to the same shaft. The angular speed of the resultant combination of the shaft and two wheels is

(a) 100 rpm (b) 150 rpm (c) 200 rpm (d) 250 rpm

104. A string is wrapped over the edge of a uniform disc and its free end is fixed to the ceiling. The disc moves down unwinding the string with an acceleration equal to (assume string to be vertical)

(a) $\frac{2}{3}$g (b) $\frac{2}{5}$g (c) $\frac{2}{7}$g (d) $\frac{g}{2}$

105. A hoop of radius 3 m weighs 160 kg. It rolls on a horizontal surface so that its centre of mass has a speed 25 cm/s. How much work should be done to stop it?

(a) 10 J (b) 5 J (c) 2.5 J (d) 3.375 J

106. A body is rolling down an inclined plane. If the kinetic energy due to rotation is 40% of kinetic energy due to translation, the body is-

(a) a ring (b) a cylinder
(c) a hollow sphere (d) a solid sphere

107. A thick hollow sphere rolls down a rough inclined plane without slipping and reaches the bottom with speed v0, when it is again released on a similar but smooth inclined plane, it reaches the bottom with $\frac{5v0}{4}$, the radius of gyration of sphere about an axis through its centre is (R is the radius of outer surface of the sphere)

(a) $\frac{3R}{5}$ (b) $\frac{2R}{5}$ (c) $\frac{3R}{4}$ (d) $\frac{R}{2}$

108. If moment of Inertia of a solid sphere about any axis passing through its centre is I. Then find the moment of inertia of solid sphere about any tangent.

(a) $\frac{7}{2}$I (b) $\frac{2}{5}$I (c) $\frac{2}{7}$I (d) $\frac{5}{2}$I

109. The angular velocity of a body is $\vec{\omega} = 2\hat{\imath} + \hat{\jmath} + 4\hat{k}$ rad/s. A torque $\vec{\tau} = 2\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ N-m acts on it. The rotational power

(a) 14 W (b) 10 W (c) 15 W (d) 18 W

110. A circular disc of radius *R* rolls without slipping along the horizontal surface with constant velocity v_0. We consider a point *A* on the surface of the disc. Then the acceleration of the point *A* is-

(a) constant (b) constant in magnitude
(c) constant in direction
(d) constant in magnitude as well as direction

111. If R is the radius of the earth and g the acceleration due to gravity on the earth's surface, the mean density of the earth is-

(a) 4πG/3gR (b) 3πR/4gG (c) 3g/4πRG (d) πRg/12G

112. The weight of an object in the coal mine, sea level, at the top of the mountain are W1, W2 and W3 respectively, then-

(a) W1 < W2 > W3 (b) W1 = W2 = W3
(c) W1 < W2 < W3 (d) W1 > W2 > W3

113. The height above surface of earth where the value of gravitational acceleration is one fourth of that at surface, will be-

(a) Re/4 (b) Re/2 (c) 3Re/4 (d) Re

114. At the surface of a certain planet acceleration due to gravity is one quarter of that on earth. If a brass ball is transported to this planet, then which one of the following statements is not correct ?

(a) the mass of the brass ball on this planet is a quarter of its mass as measured on the earth
(b) the weight of the brass ball on this planet is a quarter of the weight as measured on the earth
(c) the brass ball has same mass on the another planet as on the earth
(d) the brass ball has the same volume on the other planet as on earth

115. The weight of a person in a lift accelerating upwards-

(a) is zero (b) decrease (c) increases (d) remains

116. The decrease in the value of g on going to a height $\frac{R}{2}$ above the earth's surface will be -

(a) $\frac{g}{2}$ (b) $\frac{5g}{9}$ (c) $\frac{4g}{9}$ (d) $\frac{g}{3}$

117. If the earth suddenly stops rotating, the value of g at any place will -

(a) remain same (b) decrease
(c) increase (d) none of these

118. If the rotational motion of earth increases, then the weight of

the body -
(a) will remain same (b) will increase
(c) will decrease (d) none of these

119. If 'R' is the radius of earth and 'g' the acceleration due to gravity then mass of earth will be :
(a) $\frac{gR^2}{G}$ (b) $\frac{Rg^2}{G}$ (c) $\frac{Rg}{G}$ (d) $\frac{GR^2}{g}$

120. The dimensions of G are -
(a) ML^3T^{-2} (b) $M^{-1}LT^{-2}$ (c) $M^{-1}L^3T^{-2}$ (d) $M^{-1}L^3T^{-2}$

11. Mechanical Properties of Matter (Solid + Fluid)

121. The Young's modulus of a rubber string 8 cm long and density 1.5 kg/m^3 is 5 × 10^8 N/m^2, is suspended on the ceiling in a room. The increase in length due to its down weight will be -
(a) 9.6 × 10^{-5} m (b) 9.6 × 10^{-11} m
(c) 9.6 × 10^{-3} m (d) 9.6 m

122. The bulk modulus of a metal is 10^{10} N/m^2 and poison's ratio 0.20. If average distance between the molecules is 3Å, then the inter atomic force constant-
(a) 5.4 N/m (b) 7.5 N/m (c) 75 N/m (d) 30 N/m

123. For a constant hydraulic stress on an object, the fractional change in the object's volume $\frac{\Delta V}{V}$ and its bulk modulus (b)are related as -
(a) $\frac{\Delta V}{V} \propto B$ (b) $\frac{\Delta V}{V} \propto \frac{1}{B}$ (c) $\frac{\Delta V}{V} \propto B^2$ (d) $\frac{\Delta V}{V} \propto B^{-1}$

124. When a certain weight is suspended from a long uniform wire, its length increases by one cm. If the same weight is suspended from another wire of the same material and length but having a diameter half of the first one then the increase in length will be -
(a) 0.5 cm (b) 2 cm (c) 4 cm (d) 8 cm

125. The area of cross-section of a wire of length 1.1 meter is 1mm^2. It is loaded with 1 kg. If Young's modulus of copper is 1.1 × 10^{11} N/m^2, then the increase in length will be (If g = 10 m/s^2) -
(a) 0.01 mm (b) 0.075 mm (c) 0.1 mm (d) 0.15 mm

126. Two wires of same diameter of the same material having the length L and 2L. If the force F is applied on each, the ratio of the work done in the two wires will be -
(a) 1 : 2 (b) 1 : 4 (c) 2 : 1 (d) 1 : 1

127. On increasing the length by 0.5 mm of a steel wire of length 2 m and area of cross-section 2 mm^2, the force required is - [Y for steel = 2.2 × 10^{11}N/m^2]
(a) 1.1 × 10^5 N (b) 1.1 × 10^4 N
(c) 1.1 × 10^{3}N (d) 1.1 × 10^2 N

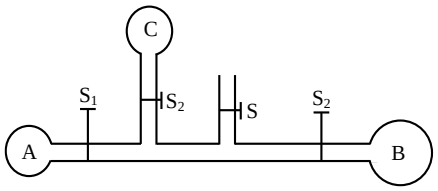
128. In CGS system, the Young's modulus of a steel wire is 2 × 10^{12} dyne/cm2. To double the length of a wire of unit cross-section area, the force required is -
(a) 4 × 10^6 dynes (b) 2 × 10^{12} dynes
(c) 2 × 10^{14} dynes (d) 2 × 10^8 dynes

129. The material which practically does not show elastic after effect is -
(a) Copper (b) Rubber
(c) Steel (d) Quartz

130. A force F is needed to break a copper wire having radius R. The force needed to break a copper wire of radius 2R will be-
(a) F/2 (b) 2F (c) 4F (d) F/4

131. The surface tension of a liquid at its boiling point:
(a) Becomes zero (b) Becomes infinity
(c) is equal to the value at room temperature
(d) is half to the value at the room temperature

132. The adjoining diagram shows three soap bubbles A, B and C prepared by blowing the capillary tube A, B and C prepared by blowing the capillary tube fitted with stop cocks S, S1,S2 and S3 With stop cock S closed and stop clocks S1, S2 and S3 opened



(a) B will start collapsing with volumes of A and C increasing
(b) C will start collapsing with volumes of A and B increasing
(c) C and A will both start collapsing with the volume of B increasing
(d) Volumes of A, B and C will become equal at equilibrium

133. Pressures inside two soap bubbles are 1.01 and 1.02 atmospheres. Ratio between their volumes is
(a) 102 : 101 (b) $(102)^3 : (101)^3$
(c) 8 : 1 (d) 2 : 1

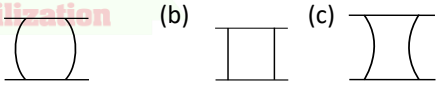
134. The height of which water rises in a capillary will be-
(a) Maximum at 4ºC (b) Maximum at 0ºC
(c) Minimum at 0ºC (d) Minimum at 4ºC

135. When a capillary tube of glass dipped in mercury then-
(a) Mercury level rises in tube
(b) Mercury rises in tube and come out
(c) Mercury level in tube descends
(d) Level of mercury neither ascends or descends

136. Two soap bubbles each of radius r are touching each other. The radius of curvature of the common surface will be-
(a) Infinite (b) 2r (c) r (d) r/2

137. The lower end of a capillary tube touches a liquid whose angle of contact is 90º. The liquid
(a) will neither rise nor will fall inside the tube.
(b) will rise inside the tube.
(c) will rise to the top of the tube
(d) will be depressed inside the tube

138. If a water drop is kept between two glass plates, then its shape is:
(a) (b) (c) (d) None



139. Water rises in a capillary upto a height h. If now this capillary is tilted by an angle of 45º, then the length of the water column in the capillary becomes-
(a) 2h (b) h/2 (c) h/$\sqrt{2}$ (d) h$\sqrt{2}$

140. If the surface tension of water is 0.06 N m^{-1}, then the capillary rise in a tube of diameter 1 mm is (θ = 0º)
(a) 1.22 cm (b) 2.44 cm (c) 3.12 cm (d) 3.86 cm

❑ ❑ ❑
☎ आपका परिश्रम + हमारा मार्गदर्शन = निश्चित सफलता ☎
❑ ❑ ❑

Answer Key

1.	d	2.	a	3.	d	4.	b	5.	a
6.	c	7.	a	8.	b	9.	b	10.	d
11.	c	12.	d	13.	c	14.	b	15.	c
16.	b	17.	b	18.	b	19.	c	20.	d
21.	a	22.	b	23.	a	24.	c	25.	d
26.	c	27.	b	28.	c	29.	c	30.	d
31.	c	32.	a	33.	c	34.	b	35.	c
36.	d	37.	b	38.	c	39.	b	40.	c
41.	a	42.	b	43.	c	44.	a	45.	b
46.	a	47.	c	48.	b	49.	a	50.	c
51.	c	52.	b	53.	d	54.	b	55.	c
56.	c	57.	c	58.	c	59.	c	60.	c
61.	a	62.	b	63.	b	64.	a	65.	c
66.	a	67.	c	68.	a	69.	b	70.	a
71.	d	72.	b	73.	a	74.	c	75.	b
76.	d	77.	b	78.	c	79.	b	80.	c
81.	a	82.	a	83.	c	84.	a	85.	c
86.	a	87.	c	88.	c	89.	b	90.	a
91.	b	92.	c	93.	a	94.	d	95.	c
96.	a	97.	a	98.	a	99.	c	100.	c
101.	c	102.	b	103.	d	104.	a	105.	a
106.	d	107.	c	108.	a	109.	d	110.	b
111.	c	112.	a	113.	d	114.	a	115.	c
116.	b	117.	c	118.	c	119.	a	120.	c
121.	b	122.	a	123.	b	124.	c	125.	c
126.	a	127.	d	128.	b	129.	d	130.	c
131.	a	132.	c	133.	c	134.	d	135.	c
136.	a	137.	a	138.	c	139.	d	140.	b