

Dynamics

- A car is travelling at a velocity of 10 km/h on a straight road. The driver of the car throws a parcel with a velocity of $10\sqrt{2} \text{ km/hr}$ when the car is passing by a man standing on the side of the road. If the parcel is to reach the man, the direction of throw makes the following angle with the direction of the car
 (a) 135° (b) 45° (c) $\tan^{-1}(\sqrt{2})$ (d) $\tan^{-1}(1/\sqrt{2})$
- A person travelling towards eastwards at the rate of 4 km/hr . finds that the wind seems to blow directly from the north. On doubling his speed it appears to come from north-east. The velocity and direction of the wind are
 (a) $4\sqrt{2} \text{ km/hr}, 90^\circ$ (b) $5\sqrt{2} \text{ km/hr}, 60^\circ$ (c) $4\sqrt{2} \text{ km/hr}, 135^\circ$ (d) None of these
- A 30 m wide canal is flowing at the rate of 20 m/min . A man can swim at the rate of 25 m/min . in still water. The time taken by him to cross the canal perpendicular to the flow is
 (a) 1.0 min (b) 1.5 min . (c) 2.0 min . (d) 2.5 min .
- A man crosses a 320 m wide river perpendicular to the current in 4 minutes . If in still water he can swim with a speed $5/3$ times that of the current, then the speed of the current in m/min is
 (a) 30 (b) 40 (c) 50 (d) 6
- A particle is moving in a straight line with initial velocity u and uniform acceleration f . If the sum of the distances travelled in t^{th} and $(t+1)^{\text{th}}$ seconds is 100 cm , then its velocity after t seconds, in cm/sec . is
 (a) 20 (b) 30 (c) 50 (d) 80
- Two particles A and B are dropped from the height of 5 m and 20 m respectively. Then the ratio of time taken by A to that taken by B , to reach the ground is
 (a) $1 : 4$ (b) $2 : 1$ (c) $1 : 2$ (d) $1 : 1$
- A body weighs most
 (a) At the earth's surface (b) Above the earth's surface (c) Inside the earth (d) At the centre of the earth
- Two masses m_1 and m_2 are connected by a light inextensible string and suspended over a smooth fixed pulley. Then
 (a) Pressure on the pulley = $m_1 g$ (b) Pressure on the pulley = $m_2 g$
 (c) Pressure $< (m_1 + m_2)g$ (d) Pressure $> (m_1 + m_2)g$
- A particle is projected with the speed of $10\sqrt{5} \text{ m/sec}$ at an angle of 60° from the horizontal. The velocity of the projectile when it reaches the height of 10 m is ($g = 9.8 \text{ m/sec}^2$)
 (a) $4\sqrt{19} \text{ m/sec}$ (b) $\sqrt{179} \text{ m/sec}$ (c) 15 m/sec (d) $5\sqrt{15} \text{ m/sec}$
- AB is the vertical diameter of a circle in a vertical plane. Another diameter CD makes an angle of 60° with AB , then the ratio of the time taken by a particle to slide along AB to the time taken by it to slide along CD is
 (a) $1 : 1$ (b) $\sqrt{2} : 1$ (c) $1 : \sqrt{2}$ (d) $3^{1/4} : 2^{1/2}$
- A particle is projected up a smooth inclined plane of inclination 60° along the line of greatest slope. If it comes to instantaneous rest after 2 second then the velocity of projection is ($g = 9.8 \text{ m/sec}^2$)
 (a) 9.8 m/s (b) 10 m/s (c) 16.97 m/s (d) 19.6 m/s
- If a projectile having horizontal range of 24 acquires a maximum height of 8 , then its initial velocity and the angle of projection are
 (a) $24\sqrt{g}, \sin^{-1}(0.6)$ (b) $8\sqrt{g}, \sin^{-1}(0.8)$ (c) $5\sqrt{g}, \sin^{-1}(0.8)$ (d) $5\sqrt{g}, \sin^{-1}(0.6)$
- The greatest and least magnitudes of the resultants of two velocities of constant magnitudes are u and v respectively. If a particle has these velocities inclined at an angle 2α , then the resultant velocity is of magnitude
 (a) $\sqrt{u^2 \cos^2 \alpha + v^2 \sin^2 \alpha}$ (b) $\sqrt{u^2 \sin^2 \alpha + v^2 \cos^2 \alpha}$ (c) $\sqrt{u^2 \cos \alpha + v^2 \sin \alpha}$ (d) None of these
- A particle possesses simultaneously two velocities 10 m/sec . and 15 m/sec . in directions inclined at an angle of 60° , then its resultant velocity is
 (a) 15 m/sec . (b) $5\sqrt{19} \text{ m/sec}$ (c) 25 m/sec (d) None of these
- A thief, when detected, jumps out of a running train at right angles to its direction with a velocity of 5 m/min . If the velocity of the train is 36 km/hr , then the angle θ between the direction in which the thief falls and the direction of motion of the train is given by
 (a) $\tan^{-1}\left(\frac{5}{36}\right)$ (b) $\tan^{-1}\left(\frac{1}{20}\right)$ (c) $\tan^{-1}\left(\frac{5}{120}\right)$ (d) None of these