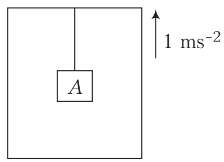
1 A metre scale is moving with uniform velocity. This implies

(a) the force acting on the scale is zero, but a torque about the centre of mass can act on the scale
(b) the force acting on the scale is zero and the torque acting about centre of mass of the scale is also zero
(c) the total force acting on it need not be zero but the torque on it is zero
(d) Neither the force nor the torque need to be zero

2 Conservation of momentum in a collision between particles can be understood from

(a) conservation of energy
(b) Newton's first law only
(c) Newton's second law only
(d) Both Newton's second and third law

3 If the elevator in the shown figure is moving upwards with constant acceleration $1\ \text{ms}^{-2}$, the tension in the string connected to block A of mass 6 kg would be (Take, $g = 10\ \text{ms}^{-2}$)



(a) 60 N (b) 66 N
(c) 54 N (d) 42 N

4 A block is placed on the top of a smooth inclined plane of inclination θ kept on the floor of a lift. When the lift is descending with a retardation a, the block is released. The acceleration of the block relative to the incline is

(a) $g\sin\theta$ (b) $a\sin\theta$
(c) $(g-a)\sin\theta$ (d) $(g+a)\sin\theta$

5 A cricket ball of mass 150 g has an initial velocity $\mathbf{u} = (3\hat{\mathbf{i}} + 4\hat{\mathbf{j}})\ \text{ms}^{-1}$ and a final velocity $\mathbf{v} = -(3\hat{\mathbf{i}} + 4\hat{\mathbf{j}})\ \text{ms}^{-1}$, after being hit. The change in momentum (final momentum – initial momentum) is (in kg-ms^{-1})

(a) zero (b) $-(0.45\hat{\mathbf{i}} + 0.6\hat{\mathbf{j}})$
(c) $-(0.9\hat{\mathbf{i}} + 1.2\hat{\mathbf{j}})$ (d) $-5(\hat{\mathbf{i}} + \hat{\mathbf{j}})\hat{\mathbf{i}}$

6 In the previous question (5), the magnitude of the momentum transferred during the hit is

(a) zero (b) 0.75 kg-ms^{-1}
(c) 1.5 kg-ms^{-1} (d) 14 kg-ms^{-1}

7 A block of mass m is placed on a smooth plane inclined at an angle θ with the horizontal. The force exerted by the plane on the block has a magnitude

(a) mg (b) $mg\sec\theta$ (c) $mg\cos\theta$ (d) $mg\sin\theta$

8. A block has been placed on an inclined plane. The slope angle θ of the plane is such that the block slides down the plane at a constant speed. The coefficient of kinetic friction is equal to

(a) $\sin\theta$ (b) $\cos\theta$ (c) g (d) $\tan\theta$

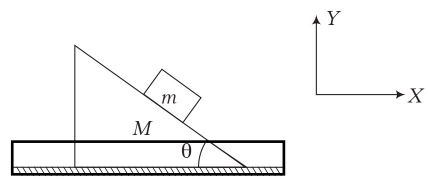
9 A body is projected up a 45Υrough incline. If the coefficient of friction is 0.5, then the retardation of the block is

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

10 A rope of length L and mass M is hanging from a rigid support. The tension in the rope at a distance x from the rigid support is

(a) Mg (b) $\left(\frac{L-x}{L}\right)Mg$ (c) $\left(\frac{L}{L-x}\right)Mg$ (d) $\frac{x}{L}Mg$

11 Consider the shown arrangement. Assume all surfaces to be smooth. If N represents magnitudes of normal reaction between block and wedge, then acceleration of M along horizontal is equal to



(a) $\frac{\boxed{N\sin\theta}}{M}$ along + ve X-axis
(b) $\frac{N\cos\theta}{M}$ along – ve X-axis
(c) $\frac{N\sin\theta}{M}$ along – ve X-axis
(d) $\frac{N\sin\theta}{m+M}$ along – ve X-axis

12 In the above problem, normal reaction between ground and wedge will have magnitude equal to

(a) $N\cos\theta + Mg$ (b) $N\cos\theta + Mg + mg$
(c) $N\cos\theta - Mg$ (d) $N\sin\theta + Mg + mg$