(a) $\sqrt{\dfrac{2L}{\sqrt{a\sin\theta}}}$ (b) $\sqrt{\dfrac{2L}{g\sin\theta}}$

(c) $\sqrt{\dfrac{2L}{(g-a)\sin\theta}}$ (d) $\sqrt{\dfrac{2L}{(g+a)\sin\theta}}$

34 A body of mass M at rest explodes into three pieces, two of which of mass $M/4$ each are thrown off in perpendicular directions with velocities of 3 ms^{-1} and 4 ms^{-1}, respectively. The third piece will be thrown off with a velocity of

(a) 1.5 ms^{-1} (b) 2 ms^{-1} (c) 2.5 ms^{-1} (d) 3 ms^{-1}

35 A wooden box of mass 8 kg slides down an inclined plane of inclination 30ϒ to the horizontal with a constant acceleration of 0.4 ms^{-2}. What is the force of friction between the box and inclined plane? (Take, $g = 10\ \text{ms}^{-2}$)

(a) 36.8 N (b) 76.8 N

(c) 65.6 N (d) None of these

36 A mass of 3 kg descending vertically downwards supports a mass of 2 kg by means of a light string passing over a pulley. At the end of 5 s, the string breaks . How much high from now the 2 kg mass will go? (Take, $g = 9.8\ \text{ms}^{-2}$)

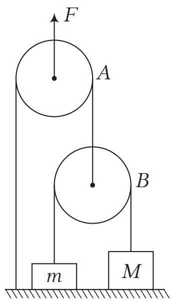
(a) 4.9 m (b) 9.8 m (c) 19.6 m (d) 2.45 m

37 The rear side of a truck is open and a box of mass 20 kg is placed on the truck 4 m away from the open end ($\propto = 0.15$ and $g = 10\ \text{ms}^{-2}$). The truck starts from rest with an acceleration of $2\ \text{ms}^{-2}$ on a straight road. The box will fall off the truck when it is at a distance from the starting point equal to

(a) 4 m (b) 8 m

(c) 16 m (d) 32 m

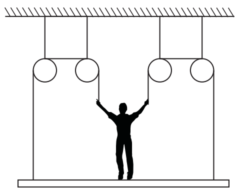
38 Two blocks of masses m = 5 kg and M = 10 kg are connected by a string passing over a pulley B as shown. Another string connects the centre of pulley B to the floor and passes over another pulley A as shown. An upward force F is applied at the centre of pulley A. Both the pulleys are massless. The accelerations of blocks m and M, if F is 300 N are (Take, $g = 10\ \text{ms}^{-2}$)



(a) 5 ms^{-2}, zero (b) zero, 5 ms^{-2}

(c) zero, zero (d) 5 ms^{-2}, 5 ms^{-2}

39 A man of mass m stands on a platform of equal mass m and pulls himself by two ropes passing over pulleys as shown in figure. If he pulls each rope with a force equal to half his weight, his upward acceleration would be



(a) $\dfrac{g}{2}$ (b) $\dfrac{g}{4}$

(c) g (d) zero

40 A 40 N block supported by two ropes. One rope is horizontal and the other makes an angle of 30ϒ with the ceiling. The tension in the rope attached to the ceiling is approximately

(a) 80 N (b) 40 N

(c) $40\sqrt{3}$ N (d) $\dfrac{40}{\sqrt{3}}$ N

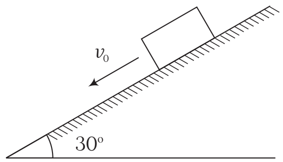
41 Starting from rest, a body slides down a 45ϒinclined plane in twice the time, it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is

(a) 0.2 (b) 0.25 (c) 0.75 (d) 0.5

42 A block of mass 0.1 kg is held against a wall applying a horizontal force of 5 N on the block. If the coefficient of friction between the block and the wall is 0.5, the magnitude of the frictional force acting the block is

(a) 2.5 N (b) 0.98 N (c) 4.9 N (d) 0.49 N

43 A block of mass m is given an initial downward velocity v_0 and left on an inclined plane (coefficient of friction = 0.6). The block will



(a) continue of move down the plane with constant velocity v_0
(b) accelerate downward
(c) decelerate and come to rest
(d) first accelerate downward then decelerate

44 Pushing force making an angle θ to the horizontal is applied on a block of weight w placed on a horizontal table. If the angle of friction is ϕ, the magnitude of force required to move the body is equal to

(a) $\dfrac{w\cos\phi}{\cos(\theta-\phi)}$ (b) $\dfrac{w\sin\phi}{\cos(\theta+\phi)}$

(c) $\dfrac{w\tan\phi}{\sin(\theta-\phi)}$ (d) $\dfrac{w\sin\phi}{\tan(\theta-\phi)}$

45 In the arrangement shown in figure, there is a friction force between the blocks of masses m and $2m$ kept on a smooth horizontal surface. The mass of the suspended block is m. The block of mass m is stationary with respect to block of mass 2 m.