Physicsaholics

DPP – 6

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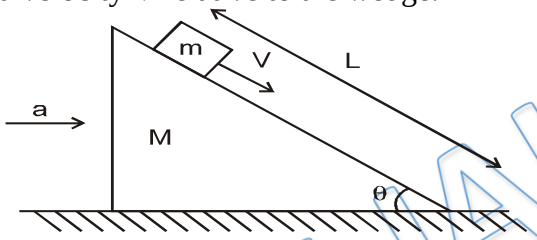
Q 1. A wedge of mass M is pushed with an constant acceleration of a = gtanq along a smooth horizontal surface and a block of mass m is projected down the smooth incline of the wedge with a velocity V relative to the wedge.



(a) The time taken by the block to cover distance L on the incline plane is $\frac{L}{V}$

(b) The time taken by the block to cover distance L on the incline plane is $\sqrt{\frac{2L}{g\sin\theta}}$

(c) The normal reaction between the block and wedge is mg secq

(d) The horizontal force applied on the wedge to produce acceleration a is (M + m) g tanq.

Q 2. A man goes up in a uniformly accelerating lift. He returns downward with the lift accelerating at the same rate. The ratio of apparent weighs in the two cases is 2 : 1. The acceleration of the lift is -

(a) g/3 (b) g/4

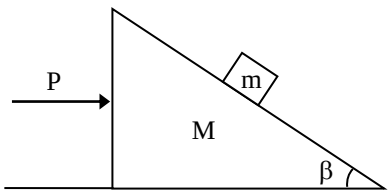
(c) g/5 (d) g/6

Q 3. A block can slide on a smooth inclined plane of inclination q kept on the floor of a lift. When the lift is descending with a retardation a. the acceleration of the block relative to incline is -

(a) (g + a) sin q (b) (g – a)

(c) g sin q (d) (g – a) sin q

Q 4. Two wooden blocks are moving on a smooth horizontal surface such that the mass m remains stationary with respect to block of mass M as shown in figure. The magnitude of force P is –



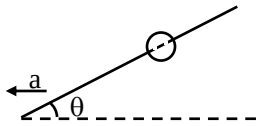
(a) (M + m) g tan b (b) g tan b

(c) mg cos b (d) (M + m) cosec b

Q 5. Two weights w_1 and w_2 are suspended from the ends of a light string passing over a smooth fixed pulley. If the pulley is pulled up at an acceleration g , the tension in the string will be-

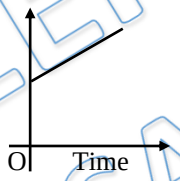
(a) $4w_1\ w_2 / (w_1 + w_2)$
(b) $2w_1\ w_2 / (w_1 + w_2)$
(c) $(w_1 - w_2) / (w_1 + w_2)$
(d) $w_1\ w_2 /\{2\ (w_1 + w_2)\}$

Q 6. A pearl of mass m is in a position to slide over a smooth wire. At the initial instant the pearl is in the middle of the wire. The wire moves linearly in a horizontal plane with an acceleration *a* in a direction having angle q with the wire. The acceleration of the pearl w.r.t. wire is–



(a) g sin q – a cos q
(b) g sin q – g cos q
(c) g sin q + a cos q
(d) g cos q + a sin q

Q 7. A particle is observed from two frames S_1 and S_2. The graph of relative velocity of S_1 with respect to S_2 is shown in figure. Let F_1 and F_2 be the pseudo forces on the particle when seen from S_1 and S_2 respectively. Which one of the following is not possible ?



(a) $F_1 = 0, F_2 \neq 0$
(b) $F_1 \neq 0, F2 = 0$
(c) $F_1 \neq 0, F2 \neq 0$
(d) $F_1 = 0, F2 = 0$

Q 8. A particle slides down a smooth inclined plane of elevation a. The incline is fixed end to end in an elevator of base length l accelerating up with acceleration a_0. Assume at t = 0 the particle is at the top of the incline then–

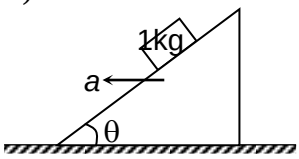
(a) the particle has to travel a length l cosa with acceleration (g + a_0)sina down the incline in a time $\sqrt{\frac{\ell}{(g+a_0)\sin 2\alpha}}$

(b) the particle has to travel a length $\frac{\ell}{\cos\alpha}$ with acceleration g sin α down the incline in a time $\sqrt{\frac{2\ell}{a_0 \sin 2\alpha}}$

(c) the particle has to travel a length $\frac{\ell}{\cos\alpha}$ with acceleration g sin α down the incline in a time $\sqrt{\frac{2\ell}{a_0 \sin 2\alpha}}$

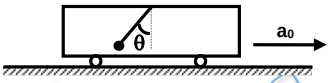
(d) the incline offers a normal reaction m(a_0 + g)cos a to the block so that it remains in contact with the incline.

Q 9. A block of mass 1 kg is at rest relative to a smooth wedge moving leftwards left with constant acceleration a = 5 m/s^2. Let N be the normal reaction between the block and the wedge. Then (g = 10 m/s^2)



(a) $N = 5\sqrt{5}$ N
(b) N = 15 N
(c) $tan\,\theta = \frac{1}{2}$
(d) $tan\,\theta = 2$

Q 10. A pendulum of mass m is hanging from the ceiling of a car having an acceleration a_o with respect to the road in the direction shown. If angle made by the string with the vertical is θ , find tan θ ?



(a) a_o/g (b) $a_o/2g$
(c) 2 a_o/g (d) none of these

Answer Key

Q.1 a,c,d	**Q.2 a**	**Q.3 a**	**Q.4 a**	**Q.5 a**
Q.6 a	**Q.7 d**	**Q.8 d**	**Q.9 a,c**	**Q.10 a**