Physicsaholics

DPP – 6 (NLM)

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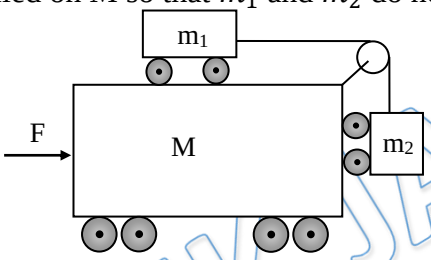
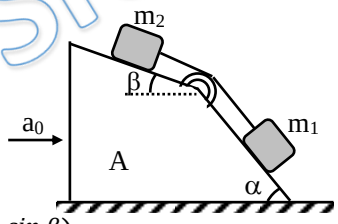
Q 1. A frictionless cart of mass M carries two other frictionless carts having masses m_1 and m_2 connected by a string passing over a pulley as shown in figure. The horizontal force that must be applied on M so that m_1 and m_2 do not move relative to it will be -



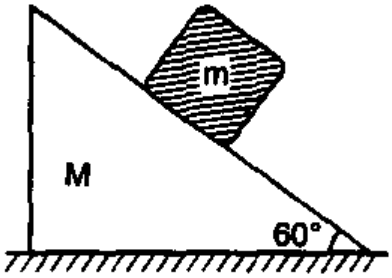
(a) $(M + m_1 + m_2)\,(m_2/m_1)\,g$
(b) $(M + m_1 + m_2)\,(m_1/m_2)\,g$
(c) $(M + m_1)\,[(m_1 + m_2)/m_2]g$
(d) $(M + m_2)\,[m_2/(m_1 + m_2)]g$

Q 2. Two cubes of masses m1 and m2 lie on frictionless slopes of a block A which rests on a horizontal table. The cubes are connected by a string which passes over a pulley as shown in figure. If a_0 be the horizontal acceleration to which the whole system (block + masses) is subjected so that m1 and m2 do not move and T be the tension in the string in that situation then–



(a) $a_0 = \left(\frac{m_1 \sin\alpha + m_2 \sin\beta}{m_1 + m_2}\right) g$
(b) $a_0 = \left(\frac{m_1 \sin\alpha + m_2 \sin\beta}{m_1 \cos\alpha + m_2 \cos\beta}\right) g$
(c) $T = \frac{m_1 m_2}{m_1 + m_2}\, g \sin(\alpha + \beta)$
(d) $T = \left(\frac{m_1 m_2}{m_1 \cos\alpha + m_2 \cos\beta}\right) g \sin(\alpha - \beta)$

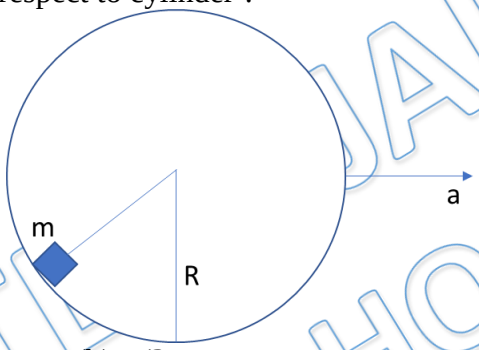
Q 3. In the arrangement shown in figure wedge of mass M moves towards left with an acceleration a. All surfaces are smooth. The acceleration of block in relative to wedge is:



(a) a/2 (b) $\frac{2Ma}{m}$

(c) $\frac{a}{2}+\frac{g\sqrt{3}}{2}$ (d) $\frac{(M+m)a}{m}$

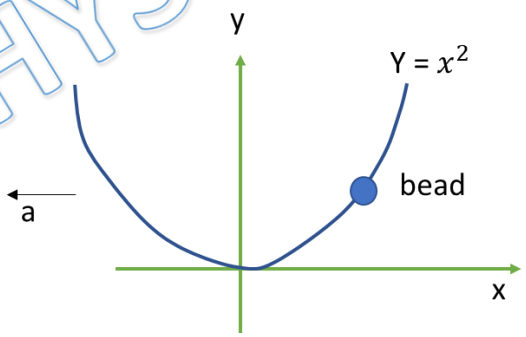
Q 4. A block is placed in a smooth cylinder which is moving horizontaly with constant acceleration a = 3g/4 . Find height of block from bottommost point of cylinder if block is stationary with respect to cylinder ?



(a) R/5 (b) R/3

(c) R/4 (d) R/2

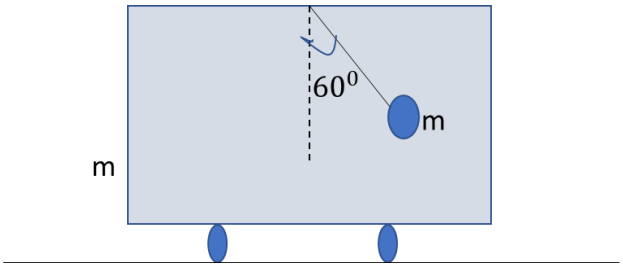
Q 5. x-y plane is a vertical plane in which a parabolic wire of shape y = x^2 is moving with constant acceleration a in negative x direction. At position shown in figure a bead is stationary with respect to wire. Find height of bead ?



(a) a/g (b) a/2g

(c) $\frac{a^2}{4g^2}$ (d) none of these

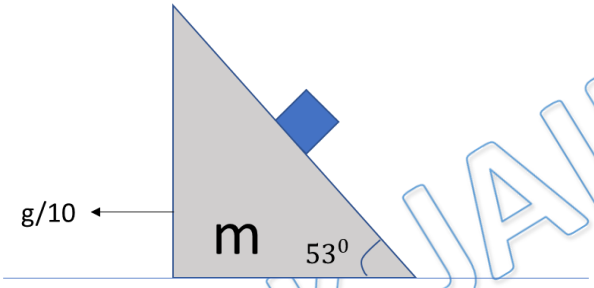
Q 6. In given figure all suraces are smooth and string is massless. System is released from given position. Find initial acceleration of cart ?



(a) g/7 (b) 2g/7

(c) $\frac{g\sqrt{3}}{7}$ (d) $\frac{g}{7\sqrt{3}}$

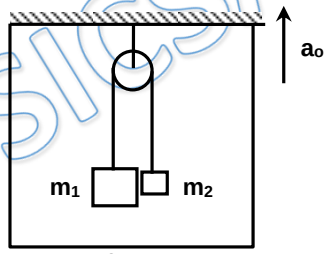
Q 7. After releasing triangular wedge of mass m moves left by acceleration g/10. find mass of block if all surfaces are smooth ?



(a) m (b) m/37

(c) 5m/52 (d) 25m/104

Q 8. A pulley fixed to the ceiling of an elevator car carries a thread whose ends are attached to the masses m_1 = 3 kg and m_2 = 6 kg . The car starts going up with an acceleration a_o = 2 m/sec^2 Assuming the masses of the pulley and the thread as well as the friction to be negligible, find acceleration of m_1 with respect to ground ?



(a) 4 m/Sec^2 (b) 2 m/Sec^2

(c) 6 m/Sec^2 (d) 8 m/Sec^2

Answer Key

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