Physicsaholics

DPP – 2 (Friction)

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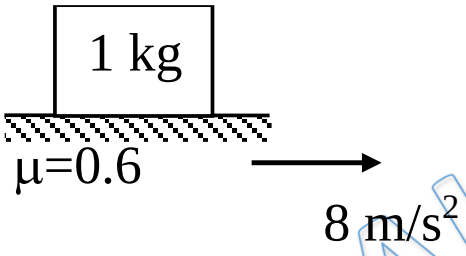
Q 1. If the surface is moving at 8 m/s^2. What is the acceleration of block in m/s^2?



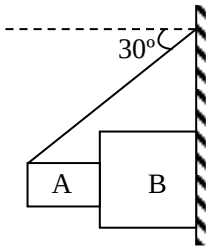
Q 2. A body is placed on a rough inclined plane of inclination θ. As the angle θ is increased from 0°to 90° the contact force between the block and the plane
(a) remains constant
(b) first remains constant then decreases
(c) first decreases then increases
(d) first increases then decreases.

Q 3. A block of mass m slides down an inclined plane of inclination θ with uniform speed. The coefficient of friction between the block and the plane is . The contact force between the block and the plane is:
(a) mg
(b) mg sin θ $\sqrt{1+\mu^2}$
(c) mg sin θ
(d) $\sqrt{(mg\sin\theta)^2+(\mu mg\cos\theta)^2}$

Q 4. A block is placed over a plank. The coefficient of friction between the block and the plank is μ = 0.2. Initially both are at rest, suddenly the plank starts moving with acceleration a_0 = 4 m/s^2. The displacement of the block in 1s is : (g = 10 m/s^2)
(a) 1 m relative to ground (b) 1 m relative to plank
(c) zero relative to plank (d) 2 m relative to ground

Q 5. A block of mass m = 2 kg is resting on a rough inclined plane of inclination 30° . The coefficient of friction between the block and the plane is μ = 0.5. What minimum force F should be applied perpendicular to the plane on the block, so that block does not slip on the plane: (g = 10 m/s^2)
(a) zero (b) 6.24 N
(c) 2.68 N (d) 4.34 N

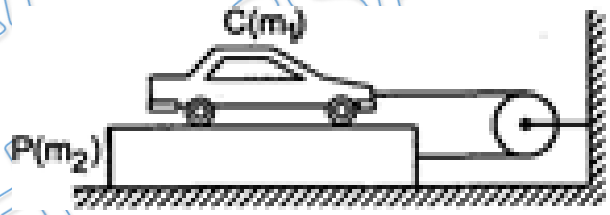
Q 6. Two blocks A and B of mass 10 kg and 20 kg respectively are placed as shown in figure. Coefficient of friction between all the surfaces is 0.2. Then– (g = 10 m/s^2)



(a) tension in the string is 306 N
(b) tension in the string is 132 N
(c) acceleration of block B is 2.6 m/s^2
(d) acceleration of block B is 4.7 m/s^2

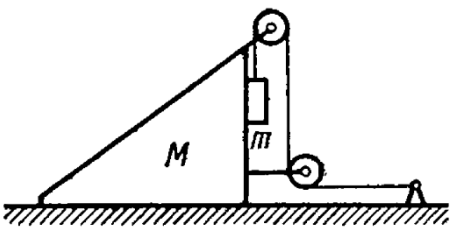
Q 7. A weight W can be just supported on a rough inclined plane by a force P either acting along the plane or horizontally. The limiting angle of friction is f and is q the angle which incline makes with the horizontal. Then –
(A) the incline makes an angle with the horizontal twice the limiting angle of friction i.e. q = 2f
(B) the incline makes an angle with the horizontal equal to the limiting angle of friction i.e. q = f
(C) the ratio of the force to the weight is $\frac{P}{W}$ = cot f
(D) the ratio of the force to the weight is $\frac{P}{W}$ = tan f

Q 8. A car C of mass m_1 rests on a plank P of mass m_2. The plank rests on a smooth floor. The string and pulley are ideal. The car starts and moves towards the pulley with acceleration.



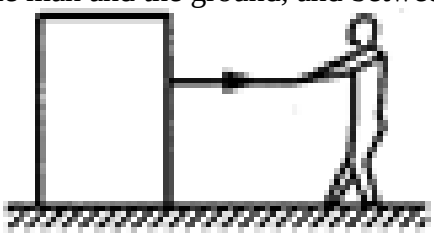
(a) If $m_1 > m_2$, the string will remain under tension.
(c) If $m_1 < m_2$, the string will become slack.
(c) If $m_1 = m_2$, the string will have no tension, and C and P will have accelerations of equal magnitude.
(d) C and P will have accelerations of equal magnitude if $m_1 > m_2$.

Q 9. In the figure shown, friction exists between wedge and block and also between wedge and floor. The system is in equilibrium in the shown position. Which of the following is incorrect



(a) minimum coefficient of friction required to hold the system in equilibrium is $\frac{m}{M+m}$.
(b) frictional force between wedge and block is 0.
(c) frictional force between wedge and surface is mg.
(d) none of these

Q 10. A man pulls a block heavier than himself with a light rope. The coefficient of friction is the same between the man and the ground, and between the block and the ground.



(a) The block will not move unless the man also moves.
(b) The man can move even when the block is stationary.
(c) If both move, the acceleration of the man is greater than the acceleration of the block.
(d) None of the above assertions is correct.

Q 11. For what maximum value of force F, can all the three blocks move together?
(a) 8N (b) 18N (c) 12N (d) 6N

Q 12. If F = 3N, the value of frictional force acting between blocks B and C is
(a) 2N (b) 1N (c) 0.5N (d) Zero

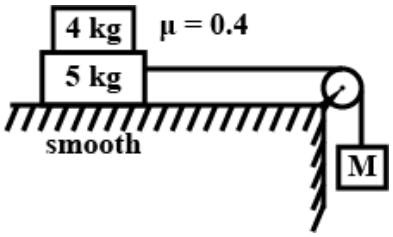
Q 13. If F = 15N, the value of frictional force acting between blocks A and B is
(a) 2N (b) 4N (c) 8N (d) 7N

Q 14. Velocity of the block in time interval t=0 to t=1sec will
A) remains constant B) decreases
C) increases D) none of these

Q 15. Displacement of the block in time interval t=0 to t=3sec
(a) 20 m (b) 30 m (c) 50 m (d) 60 m

Q 16. Velocity of the plank after a long time is
(a)2 m/s (b) 5 m/s
(c) 10 m/s (d) 12 m/s

Q 17. What should be the maximum value of M so that the 4 kg block does not slip over the 5 kg block: (Take g=10m/s^2)



(a) 12 kg (b) 8 kg
(c) 10 kg (d) 6 kg

Answer Key

Q.1 6	**Q.2 b**	**Q.3 a**	**Q.4 a,b**	**Q.5 c**
Q.6 a,d	**Q.7 a,d**	**Q.8 A,b,c,d**	**Q.9 d**	**Q.10 a,b,c**
Q.11 c	**Q.12 a**	**Q.13 b**	**Q.14 a**	**Q.15 c**
Q.16 b	**Q.17 d**			