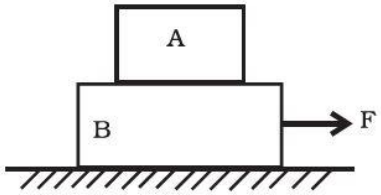
Topic: Friction **Class: XI** **PP: 01** **Date: 13-07-2015** **Course: VIKAAS**

Objective questions

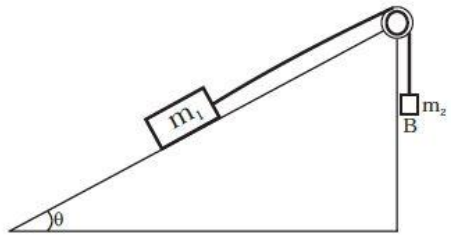
1. A body with mass 5 kg is acted upon by a force $\mathbf{F} = (-3\hat{i} + 4\hat{j})$N. If its initial velocity at $t = 0$ is $\boldsymbol{v} = (6\hat{i} - 12\hat{j})ms^{-1}$, the time at which it will just have a velocity along the y-axis is
(a) never (b) 10 s (c) 2 s (d) 15 s

2. In Fig., the co-efficient of friction between the floor and the body B is 0.1. The co-efficient of friction between the bodies B and A is 0.2. A force **F** is applied as shown on B. The mass of A is $m/2$ and of B is m. Which of the following statements are true?(more than one answer correct)



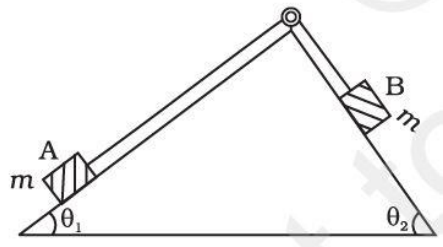
(a) The bodies will move together if $F = 0.25\ mg$.
(b) The body A will slip with respect to B if $F = 0.5\ mg$.
(c) The bodies will move together if $F = 0.5\ mg$.
(d) The bodies will be at rest if $F = 0.1\ mg$.
(e) The maximum value

3. Mass m_1 moves on a slope making an angle θ with the horizontal and is attached to mass m_2 by a string passing over a frictionless pulley as shown in Fig. The co-efficient of friction between m_1 and the sloping surface is μ. Which of the following statements are true? (more than one answer correct)



(a) If $m_2 > m_1 \sin\theta$, the body will move up the plane.
(b) If $m_2 > m_1(\sin\theta + \mu\cos\theta)$, the body will move up the plane.
(c) If $m_2 < m_1 (\sin\theta + \mu\cos\theta)$, the body will move up the plane.
(d) If $m_2 < m_1 (\sin\theta - \mu\cos\theta)$, the body will move down the plane.

4. In Fig, a body A of mass m slides on plane inclined at angle θ_1 to the horizontal and μ_1 is the coefficient of friction between A and the plane. A is connected by a light string passing over a frictionless pulley to another body B, also of mass m, sliding on a frictionless plane inclined at angle θ_2 to the horizontal. Which of the following statements are true? (more than one answer correct)



(a) A will never move up the plane.
(b) A will just start moving up the plane when. $\mu = \dfrac{\sin\theta_2 - \sin\theta_1}{\cos\theta_1}$
(c) For A to move up the plane, θ_2 must always be greater than θ_1 .
(d) B will always slide down with constant speed.

Subjective Questions

5. A block placed on a rough horizontal surface is pulled by a horizontal force *F*. Let *f* be the force applied by the rough surface on the block. Plot a graph of *f* versus *F*.

6. A block of mass M is held against a rough vertical wall by pressing it with a finger. If the coefficient of friction between the block and the wall is μ and the acceleration due to gravity is *g*, calculate the minimum force required to be applied by the finger to hold the block against the wall ?

7. A rectangular box lies on a rough inclined surface. The co-efficient of friction between the surface and the box is μ. Let the mass of the box be *m*.
   (a) At what angle of inclination θ of the plane to the horizontal will the box just start to slide down the plane?
   (b) What is the force acting on the box down the plane, if the angle of inclination of the plane is increased to $\alpha > \theta$?
   (c) What is the force needed to be applied upwards along the plane to make the box either remain stationary or just move up with uniform speed?
   (d) What is the force needed to be applied upwards along the plane to make the box move up the plane with sacceleration *a*?