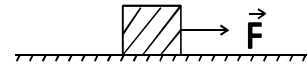


1. A 50kg block rests on a horizontal surface. The coefficient of static friction $\mu_s = 0.50$. The coefficient of kinetic friction $\mu_k = 0.35$. A horizontal force F of 250N is applied (see Fig.).



- The block accelerates to the right.
- The block moves and continues to move at constant velocity.
- The block remains at rest.
- The block does not move until f is increased to greater than 490N.
- No conclusions can be drawn concerning the movement of the block from the information given.

2. A block of mass m is at rest on an inclined plane that makes an angle of θ° with the horizontal which of the following statements about the force of static friction is true?

- $f_s > mg$
- $f_x > mg \cos \theta^\circ$
- $f_s = mg \cos \theta^\circ$
- None of these statements is true.

3. A car experiences both a centripetal and a tangential acceleration. For which of the following would this be true?

- It is going around a curve and slowing down.
- It is going around curve at a constant speed.
- It is going along a straight road at a constant speed.
- It is going along a straight road and increasing its speed.
- It is going along a straight road and decreasing its speed.

4. In the equation $F = bv$, F is the force acting on an object, b is a constant, and v is the speed of the object. The SI units of the constant b are:

- kg/s
- Kg/s
- m/s
- Kg/m
- m/s²

5. A body of mass slides a distance d along a horizontal surface. The work done by gravity is:

- a. mdg b. $-mdg$ c. zero d. one cannot tell from the given information
- e. None of these is correct

6. The kinetic energy of a car is 1.00×10^5 J. If the car's speed is increased by 20% the kinetic energy (in J) of the car becomes:

- a. 1.44×10^5 b. 1.20×10^5 c. 4.00×10^3 d. 104×10^5

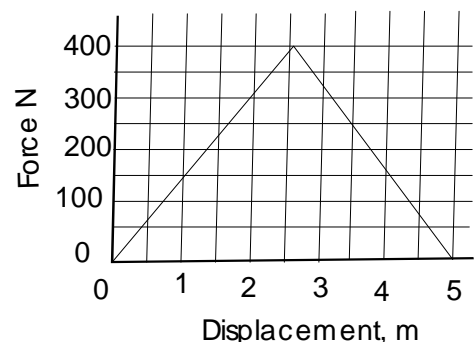
e. unknown, since the answer depends on the mass of the car which is not given

7. A mass $m = 2.5\text{kg}$ is sliding along a frictionless horizontal surface with initial speed V_0 . It strikes a relaxed spring of force constant ($k = 500\text{N/m}$) and momentarily comes to rest by compressing the spring 5.0cm. the initial speed V_0 (in m/s) of the block is:

- a. 1.7 b. 1.0 c. 0.50 d. 0.50 e. 0.71

8. In pushing a box, a woman exerts a force as given by the graph. The total work (in J) done by the woman is:

- a. 400 b. 1000 c. 2000.
- d. 200 e. 500.



9. The power developed by a certain engine is a function of time according to $P = 2 + 2t + 2t^2$ in SI units. The work (in J) done by the engine from $t = 0$ to $t = 2$ s is:

- a. 9 b. 16 c. 14 d. 10 e. 18

10. A body is acted upon by a force of 10N and undergoes displacement in the direction of the force. The position is given by $x = 3t^2$ in SU units. The rate at which the force is doing work (W) at the instant $t = 2s$ is:
- a. 14 b. 120 c. 12 d. 140 e. 160
11. A 5-kg box is pushed 5m up a plane that is inclined at 30° with the horizontal. The coefficient of kinetic friction between the box and the plane is 0.20. The change in potential energy (in J) of the box is approximately:
- a. 12.5 b. 34.2 c. 403 d. 123 e. 345
12. A 0.50- kg mass attached to the end of a string swings in a vertical circle (دائرة رأسية) of radius 2.0m. when the mass is at the lowest point on the circle, the speed of the mass is 12m/s. The magnitude of the force (in N) of the string on the mass at this position is approximately.
- a. 41 b. 36 c. 31 d. 46 e. 23
13. A roller- coaster car has a mass of 500kg when fully loaded with passengers. The car passes over a hill of radius 15m. At the top of the hill, when the car has a speed of 8.0m/s, the force (in kN) of the track on the car is:
- a. 7.0 up b. 2.8 up c. 2.8 down d. 7.0 down e. 5.6 down

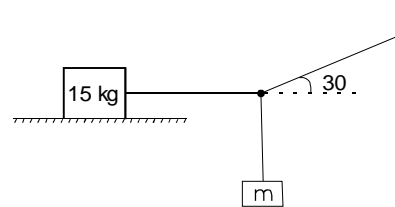
14. A force $F = (xi + yj)$ N acts on an object as it moves in the x-direction from the origin to $x= 2m$. the work done (in J) on the object by the force is:

- a. 1 B. 5 c. 3 d. 4 e. 2

15. A 5.0 kg object is suspended by a string from the ceiling (سقف) of an elevator that is accelerating downward at a rate of $2.6m/s^2$. The tension (in N) in the string is:

- a. 49 b. 13 c. 62 d. 36 e. 52

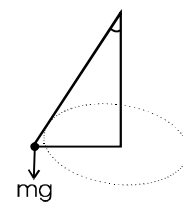
1. A 15kg block is placed on a rough horizontal surface of $\mu_s = 0.3$. The block is kept in equilibrium as shown in the figure.



The maximum hanging mass for which the system will remain in equilibrium is:

- a. 2.6 b. 25.5 c. 42.1 d. 76.4 e. 4.3

2. A conical pendulum is formed by attaching a small ball to a 1.2m sting. The ball swings with uniform velocity around a horizontal circle of radius 30cm as shown in the figure. The velocity (m.s-1) of the ball is:



- a. 11.5 b. 0.72 c. 0.87 d. 3.4 e. 0.52

3. A 4kg particle experiences a net force along the x-axis given by $F=3x^2$ - where F is in Newton and X is in meters. If the particle starts

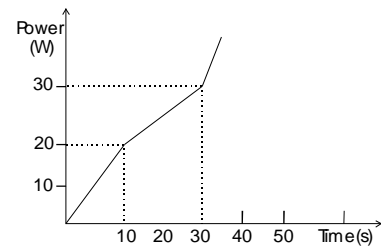
to move from rest at $x = 0$, the power (w) delivered to the particle when it is at $x = 4\text{m}$ is:

- a. 168 b. 150 c. 476 d. 345 e. 188

4. A force $F = (5y^2\text{N}\cdot\text{m}^{-2}) \mathbf{j}$ is applied to a particle. The work done (J) by the force on the particle as it moves along a straight line from (2, 3) to (5, 5) is:

- a. 527 b. 20 c. 1466 d. 163 e. 200

5. This graph represents the power developed by a motor. The energy (J) expended by the motor in time interval $t = 10\text{s}$ to $t = 30\text{s}$ is:



- a. 200 b. 100 c. 0.5 d. 600 e. 500

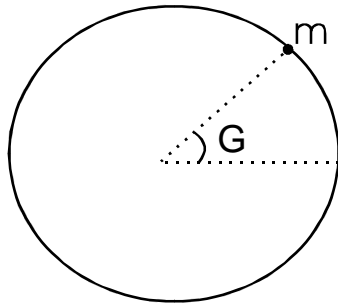
6. A 2.2kg block placed on a frictionless 20 inclined plane. A force of 16N acting parallel to the incline as shown the figure. The acceleration (m/s) of the block is:

- a. 2.0 down the incline. B. 5.3 up the incline
 c. 2.0 up the incline. D. 3.9 down the incline.
 e. 3.9 up the incline.

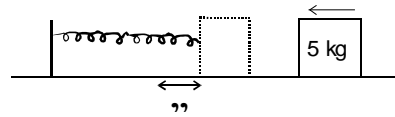
7. An object attached to the end of a string swings in a vertical circle of radius 1.2m, as shown in the figure. At an instant when $\theta = 30^\circ$, the speed of the object is 6.0m/s and the tension in the string is 38N.

The mass (kg) of the objects is:

- a. 2.0 b. 1.5 c. 1.8 d. 1.3 e. 0.80

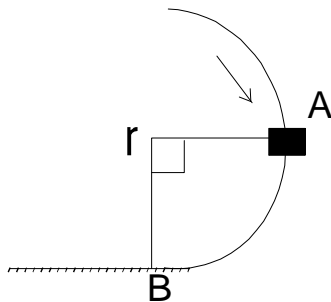


8. A block of mass 5.0kg is moving with 3.0 m/s on a rough horizontal surface (coefficient of kinetic friction = 0.40) when it collides with a spring, as shown in the figure. The spring is compressed a maximum distance of 0.20m. The spring constant (N/m) is:



- a. 1020 b. 1804 c. 2196 d. 361 e. 929

9. A 1.2kg mass is projected down a rough circular track (radius – 2.0m) as shown below. The speed of the mass at point A is 2.5m/s, and at point B, it is 6.0m/s. how much work is done on the mass between A and B by the force of friction.



- a. 0 9.3 J b. 0 7.3 J c. 0 8.1J d. 0 10.8 J e. -24J

10. A 4 kg mass is placed on smooth horizontal surface. Two force in the same plane act on the mass as shown in the figure.

The magnitude of the force F (N) that enable the 4kg mass to accelerate with $(3\text{m}\cdot\text{s}^{-2})$ is:

- a. 13.4 b. 7.5 c. 6.7 d. 4.8 e. 10.0

