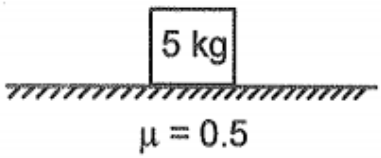
1.

A mass of 5 kg is placed on a horizontal rough surface. The coefficient of friction between body and surface is 0.5. The minimum horizontal force with which the block will just be able to move is: [Take g = 10 m/s^2]



(1) 25 N

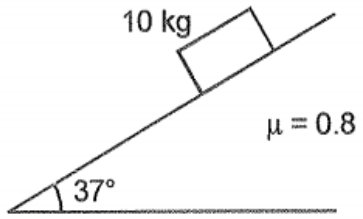
(2) $\sqrt{(50)^2 + (25)^2}$ N

(3) 50 N

(4) 22.5 N

2.

What is the value of friction acting on the block kept at rest on the inclined surface? [Take g = 10 $\mathrm{m/s^2}$)



1. 60 N

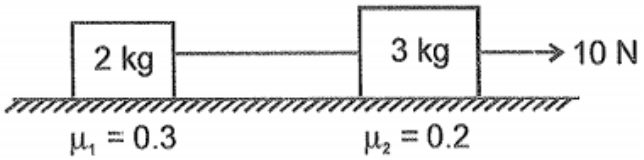
2. 64 N

3. 80 N

4. 100 N

3.

Two blocks of masses 2 kg and 3 kg placed on a horizontal surface are connected by a massless string. If 3 kg is pulled by 10 N as shown in the figure, then the force of friction acting on the 2 kg block is: [Take g = 10 $\mathrm{m/s^2}$]



1. 6 N

2. 4 N

3. 8 N

4. 12 N

4.

Mark the correct statement:

1. The value of the coefficient of friction is always smaller than 1

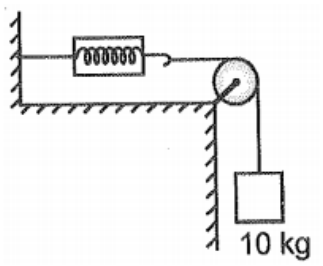
2. A body slides on a surface, the force of friction always acts in the opposite direction of applied force

3. Force of friction is zero for a block kept on a rough inclined plane

4. The frictional force can never be more than the contact force on the body from the surface on which it is kept

5.

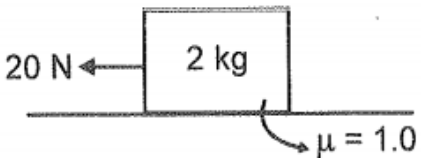
The system shown in the figure is in equilibrium. Then the reading of spring balance(in kg-f) is:



1. 10
2. 20
3. 100
4. Zero

6.

The contact force between surface and mass in the given figure is: (g = 10 m/s^2)



1. 20 N
2. $20\sqrt{2}$N
3. 30 N
4. Zero

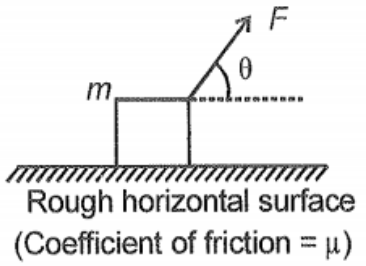
7.

The parallel component of the contact force is called:

1. Normal reaction
2. Weight
3. Mechanical force
4. Friction

8.

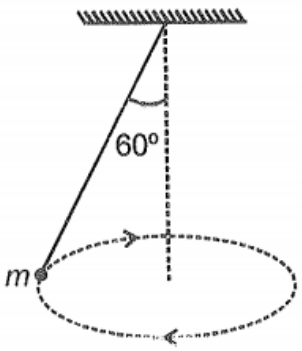
The block of mass m (shown in the figure) does not move on applying the inclined force F. Friction force acting on the block is:



1. $\mathrm{F}\ \cos\ \theta$
2. $\mathrm{F}\ \sin\ \theta$
3. $\mu(\mathrm{mg}\ -\ \mathrm{F}\ \sin\ \theta)$
4. $\mu\mathrm{mg}$

9.

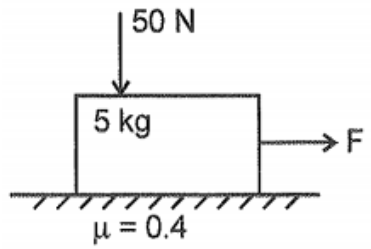
A particle of mass m is suspended from a ceiling through a massless string. The particle moves in a horizontal circle as shown in the given figure. Tension in the string is:



1. mg
2. 2mg
3. 3mg
4. 4mg

10.

For what minimum value of the horizontal force F, the block kept on the rough horizontal surface will start moving? ($g = 10\ m/s^2$)



1. 20 N
2. 30 N
3. 40 N
4. 60 N

11.

A block of mass 5 kg is placed on a rough horizontal plane. A time-dependent horizontal force $F = (t^2 + 2t)$ N acts on the block. The friction force between the block and the plane at t =3 s is: ($\mu = 0.4$)

1. 8 N
2. 15 N
3. 20 N
4. Zero

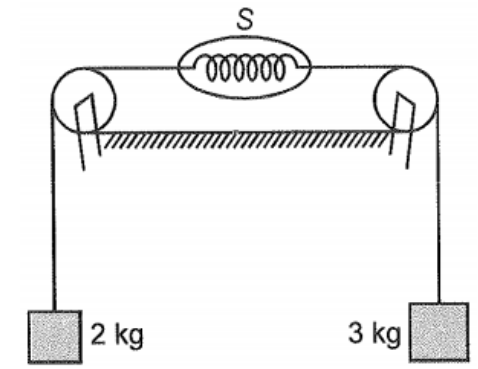
12.

When we are walking on a horizontal road, the friction acting on the front foot and backward foot are respectively:

1. Forward, forward
2. Backward, backward
3. Forward, backward
4. Backward, forward

13.

The strings and pulleys shown in the figure are massless. The reading is shown by the light spring balance is:



1. 2.4 kg
2. 5 kg
3. 2.5 kg
4. 3 kg

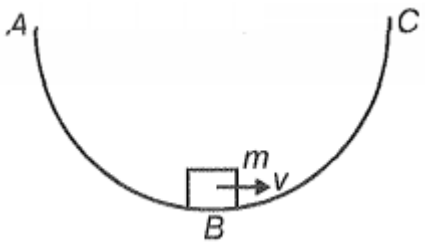
14.

The length of a spring is l_1 and l_2 when stretched with a force of 4 N and 5 N respectively. Its natural length is:

1. $l_2 + l_1$
2. $2(l_2 - l_1)$
3. $5l_1 - 4l_2$
4. $5l_2 - 4l_1$

15.

A body of mass m is moving on a concave bridge ABC of the radius of curvature R at a speed v. The normal reaction by the bridge on the body at the instant it is at the lowest point of the bridge is:



1. $mg - \frac{mv^2}{R}$
2. $mg + \frac{mv^2}{R}$
3. mg
4. $\frac{mv^2}{R}$

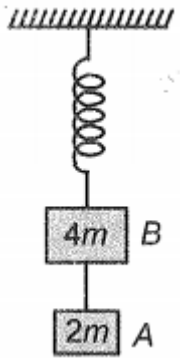
16.

Which of the following is correct about friction?

1. Sliding friction is self-adjusting
2. Static friction is self-adjusting
3. Kinetic friction is more than static friction
4. Static friction is independent of driving force

17.

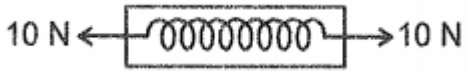
Two blocks A and B of masses 2m and 4m are connected by a string. The block of mass 4m is connected by a spring (massless). The string is suddenly cut. The ratio of the magnitude of accelerations of masses 2m and 4m at that instant is:



1. 1: 2
2. 2: 1
3. 1: 4
4. 4: 1

18.

In the given figure, the reading of spring balance is:



1. 0 N
2. 20 N
3. 10 N
4. 5 N

19.

The angle of banking for a cyclist taking a turn at a curve is given by $\tan\theta = \frac{v^n}{rg}$ where symbols have their usual meaning. The value of n is:

1. 1
2. 2
3. 3
4. 4

20.

The maximum constant speed with which a car can move on a flat horizontal circular road of the radius of curvature 20 m and coefficient of static friction 0.5 is: (g = 10 m/s^2)

1. 36 km/h
2. 54 km/h
3. 72 km/h
4. 90 km/h

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