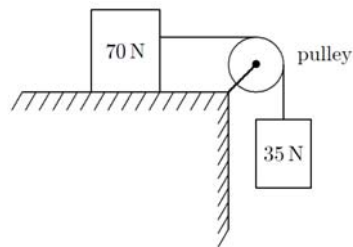


Q1.

A 70 N block and a 35 N block are connected by a massless inextendable string which is wrapped over a frictionless pulley as shown in **Figure 1**. If the pulley is massless and the surface is frictionless, find the magnitude of the acceleration of the 35 N block.

Fig#



- A) 3.3 m/s^2
- B) 2.3 m/s^2
- C) 1.3 m/s^2
- D) 9.8 m/s^2
- E) 4.9 m/s^2

Q2.

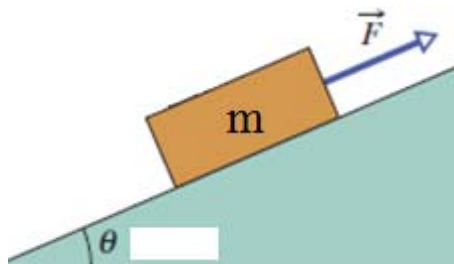
You stand on a spring scale on the floor of an elevator. The scale shows the **highest reading** when the elevator (choose the **CORRECT** answer):

- A) Moves upward with increasing speed
- B) Moves upward with decreasing speed
- C) Remains stationary
- D) Moves downward with increasing speed
- E) Moves downward at constant speed

Q3.

A 40.0 kg mass is pulled up by a rope along an inclined frictionless surface which makes an angle of 18.5° with the horizontal. The pulling rope is parallel to the incline and has a tension of 140 N. Assume that the mass starts from rest at the bottom of the incline; find its velocity after moving 80.0 m up the incline?

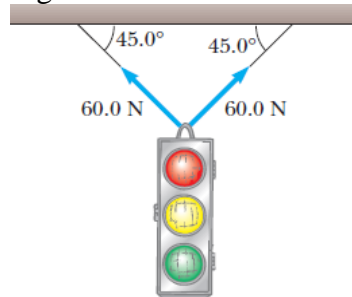
- A) 7.90 m/s
- B) 3.90 m/s
- C) 1.39 m/s
- D) 0
- E) 9.80 m/s



Q4.

Find the resultant force exerted by the two cables supporting the traffic light as shown in **Figure 2**.

Fig#

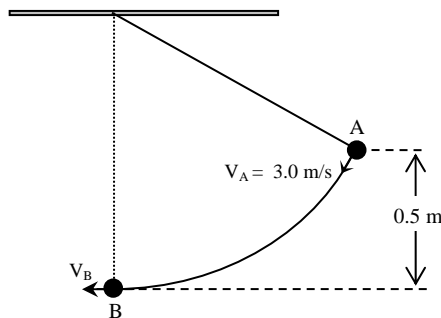


- A) 84.9 N vertically upward
- B) 60.0 N vertically upward
- C) 84.9 N vertically downward
- D) 120 N vertically upward
- E) 120 N vertically downward

Q5.

The pendulum, shown in **Figure 3**, is pulled aside until the ball has risen 0.50 m above the lowest position (B). It is then given an initial speed of $V_A = 3.0$ m/s. The speed (in m/s) of the ball V_B at its lowest position (B) is: [Note: Neglect the air resistance]

Fig#

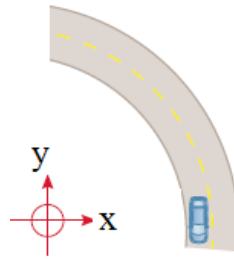


- A) 4.3
- B) 3.0
- C) 2.1
- D) 5.3
- E) 6.6

Q6.

A 55.0 kg man drives his car through a flat circular track of radius 300 m with a constant speed of 80.0 km/h. What is the magnitude of the net force exerted by the seat of the car on the man at the moment shown in **Figure 4**?

Fig#

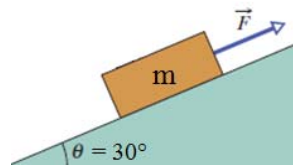


- A) 546.5 N
- B) 402.4 N
- C) 300.0 N
- D) 600.0 N
- E) 354.4 N

Q7.

A block, of mass $m = 4.0$ kg, is pulled upward an inclined rough plane with a constant force \vec{F} parallel to the incline (See Figure 5). The incline makes an angle $\theta = 30^\circ$ with the horizontal and the coefficient of the kinetic friction between the plane and the block is 0.35. What value of \vec{F} is required to move the block up the incline at constant velocity?

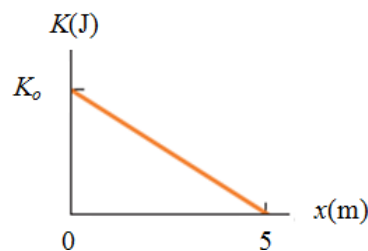
Fig#



Q8.

An object, of mass $= 8.0$ kg, is moving in the positive direction of an x axis. **Figure 6** gives its kinetic energy $K(\text{J})$ versus position $x(\text{m})$ as it moves from $x = 0$ to $x = 5.0$ m; $K_0 = 30.0$ J. What is the magnitude of the constant force applied on the object?

Fig#



- A) 6.0 N
- B) 8.0 N
- C) 0
- D) 3.7 N
- E) 78 N

Q9.

An elevator, fully loaded with passengers, has a mass of 4000 kg. What power must be delivered by the motor (tension in the cable) so that the elevator moves up at constant speed of 2.0 m/s?

- A) 78.4 kW
- B) 18.4 kW
- C) 71.3 W
- D) 80.0 kW
- E) 98.2 kW

Q10.

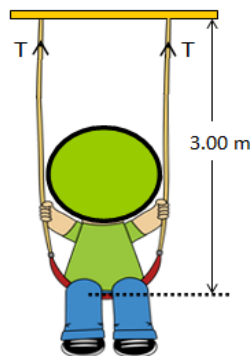
A student lifted his bag to a height h . The work done by both the student and the gravitational force (mg), respectively are:

- A) Positive, negative
- B) Negative, positive
- C) Negative, negative
- D) Positive, positive
- E) Positive, mg does no work

Q11.

A 40.0 kg child swings in a swing supported by two chains, each 3.00 m long, as shown in **Figure 7**. The tension, T , in each chain at the lowest point of his swing is 350 N. Find the child's speeds at the lowest point of his swing.

Fig#

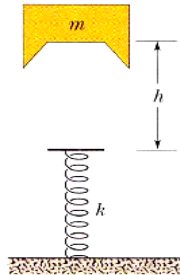


- A) 4.8 m/s
 - B) 5.3 m/s
 - C) 2.3 m/s
 - D) 6.6 m/s
 - E) 1.0 m/s
-

Q12.

Figure 8 shows a spring (with $k = 1600 \text{ N/m}$) placed vertically with one end fixed to the floor. A block of mass $m = 1.5 \text{ kg}$ is dropped from rest onto the spring from a height h above the top of the spring. If the maximum distance that the spring will be compressed is 0.13 m , what is the value of h ? [Note: Neglect the air resistance]

Fig#



- A) 0.79 m
- B) 0.52 m
- C) 0.20 m
- D) 0.25 m
- E) 0.02 m

Q13.

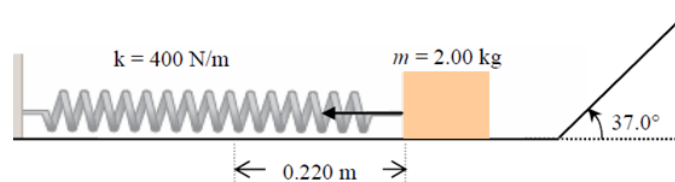
A 2.4 kg block, on a horizontal floor, is attached to a horizontal spring of spring constant 840 N/m which is initially compressed by 0.03 m . The coefficient of kinetic friction between the floor and the block is 0.40 . What is the speed of the block when it has moved a distance of 0.03 m from its initial position?

- A) 0.28 m/s
- B) 0.12 m/s
- C) 0.98 m/s
- D) 0.63 m/s
- E) 0.37 m/s

Q14.

A 2.00 kg block is pushed against a spring, of force constant $k = 400 \text{ N/m}$, compressing it by 0.220 m . When the block is released, it moves along a frictionless, horizontal surface and then up a frictionless incline with angle 37° (see **Figure 9**). How far does the block travel up the incline before coming to a stop?

Fig#



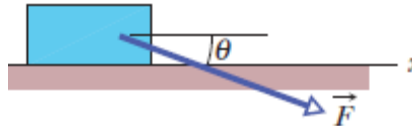
- A) 0.821 m
- B) 0.234 m
- C) 0.533 m

- D) 0.115 m
- E) 0.271 m

Q15.

As shown in **Figure 10**, a box is stationary on a rough surface and the force \vec{F} acting on the block makes an angle θ with the horizontal. If the angle θ is increased from 0° to 90° in the fourth quadrant (choose the **CORRECT** statement):

Fig#



- A) The magnitude of the normal force on the block increases
 - B) The x-component of the force \vec{F} increases
 - C) The coefficient of static friction increases
 - D) The magnitude of the force of static friction decreases
 - E) The magnitude of the vertical component of the force \vec{F} decreases
-