Questions

Chapter 5
Force and Motion - I

5-1 Force
5-2 Some Particular Forces
5-3 Mass
5-4 Newton's Second Law
5-5 Newton's First Law
5-6 Newton's Third Law
5-7 Applying Newton's Laws

5-3 Mass
M1-041

The weight of an astronaut on Earth is 800 N. What is his weight on planet Mars, where g = 3.76 m/s^2?

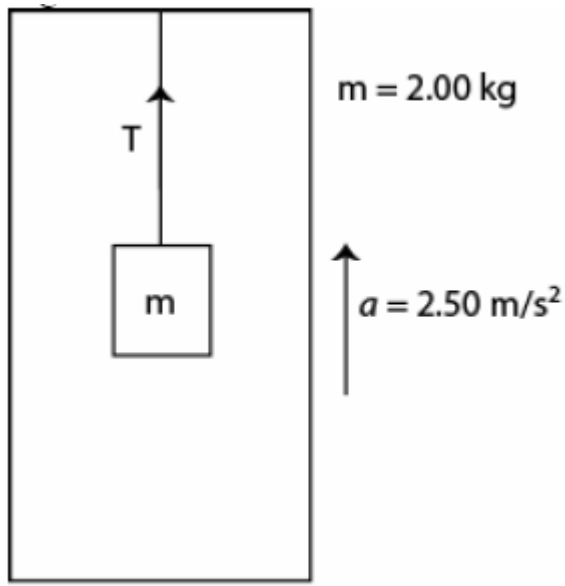
A) 135 N
B) 213 N
C) 930 N
D) 307 N
E) 800 N

Answer D

5-4 Newton's Second Law
M1-062

A 2.00-kg mass is hanging from the ceiling of an elevator accelerating upward at a = 2.50 m/s^2 (see Fig. 6). What is the tension T in the string?

A) 24.6 N
B) 19.8 N
C) 27.7 N
D) 33.4 N
E) 5.50 N



Answer A

5-4 Newton's Second Law
M1-061

A 4.0 kg block is pushed upward a 30° inclined frictionless plane with a constant horizontal force *F* (Fig 4). If the block moves with a constant speed find the magnitude of the force *F*.

A) 40 N
B) 33 N
C) 23 N
D) 0 N
E) 9.8 N

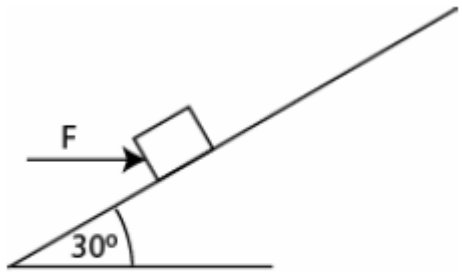


Figure 4

Answer C

5-4 Newton's Second Law
M1-061

An elevator cab with a total mass of 2000 kg is pulled upward by a cable. If the elevator accelerates at 2.00 m/s^2 upward, find the tension in the cable.

A) 0.00 N
B) 3.25×10^4 N
C) 1.56×10^4 N
D) 2.36×10^4 N
E) 9.80 N

Answer D

5-4 Newton's Second Law
M1-042

Acceleration is always in the direction:

A) of the final velocity.
B) of the initial velocity .
C) of the net force .
D) of the displacement.
E) opposite to the frictional force.

Answer C

5-4 Newton's Second Law
M1-041

A 20.0 kg block is resting on a frictionless horizontal table. A horizontal string pulls the block. If the tension in the string is 20.0 N, what is the speed of the block after moving 2.0 m?

A) 2.0 m/s
B) 4.0 m/s
C) 1.0 m/s
D) 3.0 m/s
E) 5.0 m/s

Answer A

5-7 Applying Newton's Laws
M1-062

Two blocks of masses $m_1 = 4.00\ kg$ and $m_2 = 2.00\ kg$ are connected by a string passing over a massless and frictionless pulley and placed on a frictionless horizontal table as shown in Fig. 3. A force of $F = 10.0\ N$ at an angle of 60.0° with the horizontal is applied to m_1. The magnitude of acceleration of the system is:

A) 3.27 m/s^2
B) 9.80 m/s^2
C) 2.43 m/s^2
D) 10.84 m/s^2
E) 1.36 m/s^2

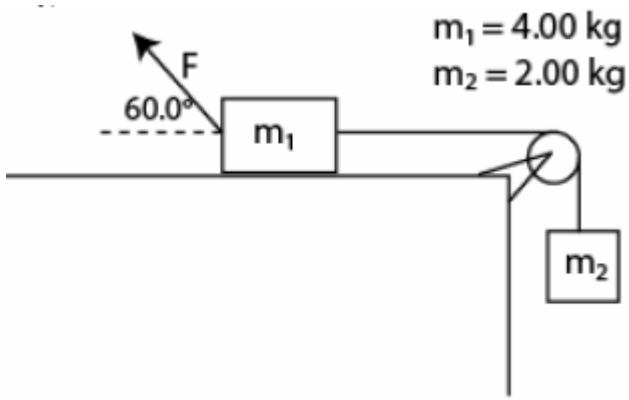


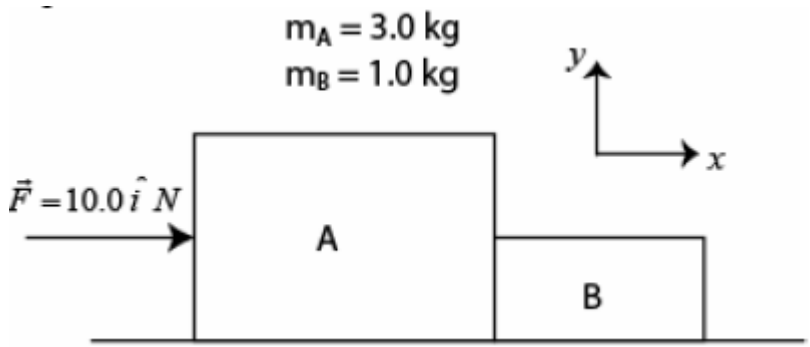
Figure 3

Answer C

5-7 Applying Newton's Laws
M1-062

Two boxes *A* and *B* (m_A = 3.0 *kg* and m_B =1.0 *kg*) are in contact on a horizontal frictionless surface and move along the x-axis (see Fig. 4). A horizontal force **F** = 10.0 **i** N is applied on Box *A*. The net force acting on *A* is $\mathbf{F_1}$ and on *B* is $\mathbf{F_2}$. Which one of the following statements is correct?

A) $\mathbf{F_1}$ = 5.0 **i** N and $\mathbf{F_2}$ = -5.0 **i** N
B) $\mathbf{F_1}$ = 7.5 **i** N and $\mathbf{F_2}$ = 2.5 **i** N
C) $\mathbf{F_1}$ = 2.5 **i** N and $\mathbf{F_2}$ = 7.5 **i** N
D) $\mathbf{F_1}$ = 0 N and $\mathbf{F_2}$ = 0 N
E) $\mathbf{F_1}$ = 2.5 **i** N and $\mathbf{F_2}$ = - 2.5 **i** N



Answer B

5-7 Applying Newton's Laws
M1-062

Two boxes, one of mass *m* = 5.00 *kg* and the other with an unknown mass *M* are connected with a string passing over a massless frictionless pulley and are placed on frictionless planes as shown in Fig. 5. What must be the mass *M*, if it goes down the plane with an acceleration of *a* = 2.45 m/s^2?

A) 2.50 *kg*
B) 8.70 *kg*
C) 13.5 *kg*
D) 19.1 *kg*
E) 10.0 *kg*

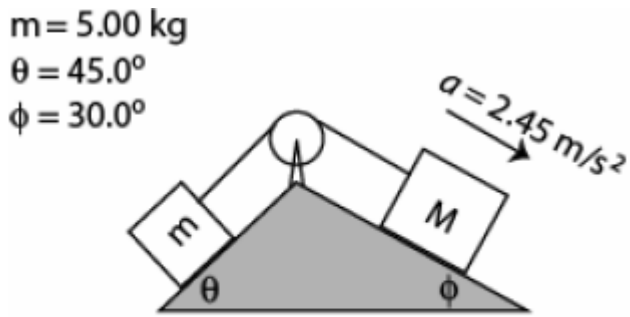


Figure 5

Answer D

5-7 Applying Newton's Laws
M1-061

To measure your weight, you stand on a spring scale on the floor of an elevator. Among the following situations, select the one that gives the highest reading on the scale:

A) The elevator moves downward at constant speed.
B) The elevator moves upward with decreasing speed.
C) The elevator remains stationary.
D) The elevator moves downward with increasing speed.
E) The elevator moves upward with increasing speed.

Answer E

5-7 Applying Newton's Laws
M1-061

A 7.0 kg block and a 3.0 kg block are connected by a string as shown in Fig 5. If the pulley is massless and the surface is frictionless, the magnitude of the acceleration of the 3.0 kg block is:

A) 6.7 m/s^2
B) 3.3 m/s^2
C) 4.9 m/s^2
D) 2.9 m/s^2
E) 9.8 m/s^2

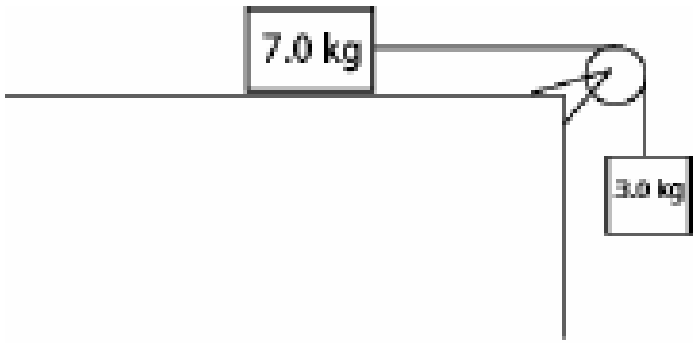


Figure 5

Answer D

5-7 Applying Newton's Laws
M1-042

Two blocks are in contact on a frictionless table . A horizontal force is applied to block (m2), as shown in Fig. 4. If m1=3.0 kg, m2=2.0 kg, and F=5.0 N, find the magnitude of the force between the two blocks.

A) 4.7 N
B) 2.0 N
C) 4.0 N
D) 5.0 N
E) 3.0 N

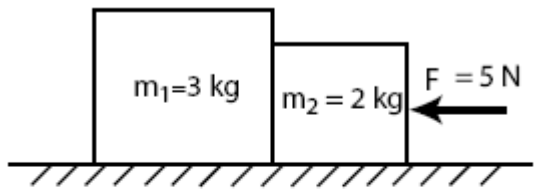


Figure 4

Answer E

5-7 Applying Newton's Laws
M1-041

A 2.0 kg box slides down a frictionless vertical wall while you push on it with a force F at a 30 degrees angle with the vertical (see Fig 3). What is the magnitude of the normal force of the wall on the box if it is to slide down at a constant speed?

A) zero N
B) 5.67 N
C) 15.6 N
D) 2.56 N
E) 11.3 N

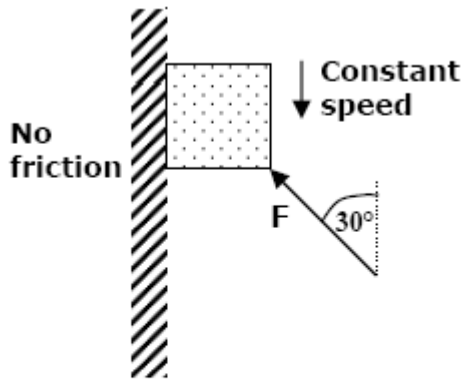


Figure 3

Answer E

5-7 Applying Newton's Laws
M1-041

Two masses m1 (= 2.0 kg) and m2 (= 3.0 kg) are connected as shown in Fig 4. Find the tension T2 if the tension T1 = 50.0 N.

A) zero
B) 50.0 N
C) 20.0 N
D) 30.0 N
E) 10.0 N

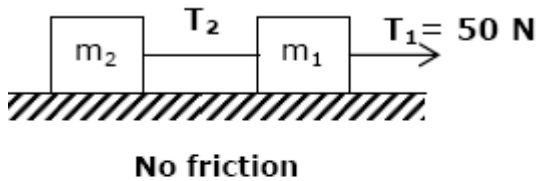


Figure 4

Answer D