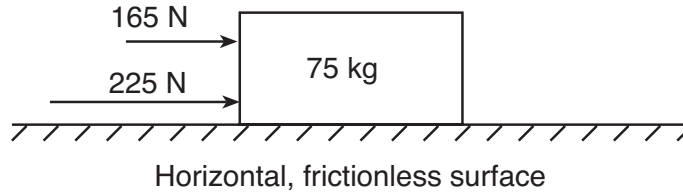


Chapter 5 Newton's Second Law

Example Problems

5.3 Net Force

E1. Two horizontal forces, 225 N and 165 N, are exerted in the same direction on a 75 kg crate as shown below. Find the net force and the acceleration of the crate.

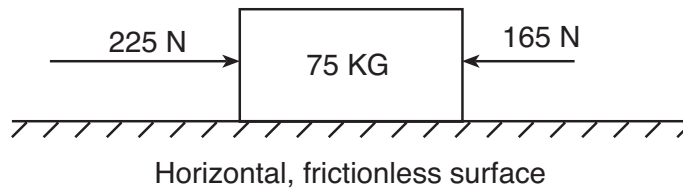


Label a coordinate system, write the formula, substitute and solve

$F_{net} =$
 $F_1 =$
 $F_2 =$
 $a =$
 $m =$

a) _____ ← units b) _____ ← units

E2. Two horizontal forces, 225 N and 165 N, are exerted in opposite directions on a 75 kg crate as shown below. Find the net force and the acceleration of the crate.

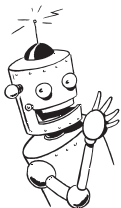


Label a coordinate system, write the formula, substitute and solve

$F_{net} =$
 $F_1 =$
 $F_2 =$
 $a =$
 $m =$

a) _____ ← units b) _____ ← units

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Chapter 5 Newton's Second Law

E3. A monkey and gorilla are playing tug-of-war with an old tire. The monkey pulls towards the left with a force of -400 N and the gorilla pulls towards the right with a force of 425 N. If the tire has a mass of 35 kg, calculate the net force and the acceleration of the tire.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$F_1 =$

$F_2 =$

$a =$

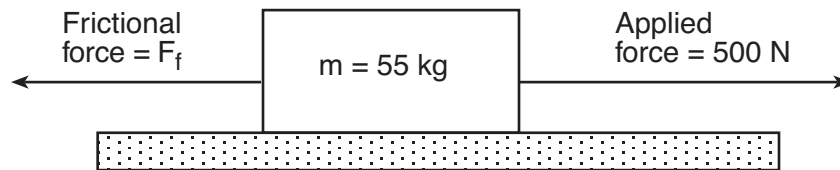
$m =$

a) _____ ← units

b) _____ ← units

E4. A 55 kg crate is pulled across the floor with a force of 500 N towards the right. If the acceleration of the crate is 7.5 m/s^2 , calculate the magnitude of the frictional force.

Acceleration = 7.5 m/s^2 →



Label a coordinate system, write the formula, substitute and solve

$F_p =$

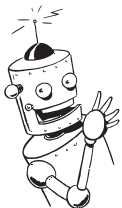
$f_f =$

$a =$

$m =$

a) _____ ← units

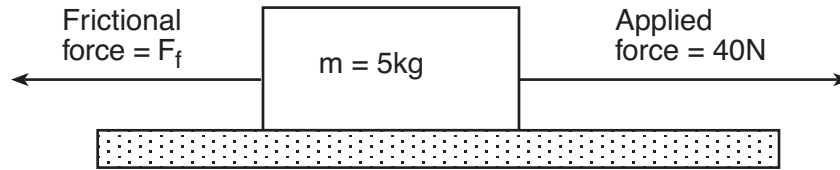
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Chapter 5 Newton's Second Law

E5. A 5 kg crate is pushed across the floor with a force of 40 N towards the right. If the acceleration of the crate is 6.0 m/s^2 , calculate the magnitude of the frictional force.

Acceleration = 6.0 m/s^2 \longrightarrow



Label a coordinate system, write the formula, substitute and solve

$F_p =$

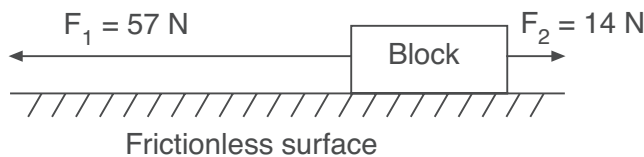
$f_f =$

$a =$

$m =$

a) _____ \longleftarrow units

E6. Two forces, F_1 and F_2 , are applied in opposite directions to a block on a frictionless, horizontal surface as shown below. If the magnitude of the block's acceleration is 4.3 m/s^2 , calculate the mass of the block.



Label a coordinate system, write the formula, substitute and solve

$F_1 =$

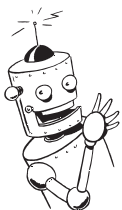
$F_2 =$

$a =$

$m =$

a) _____ \longleftarrow units

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Chapter 5 Newton's Second Law

E7. A 225 kg crate is pushed along the floor by a monkey with a force of 710 N. If the coefficient of friction is 0.20 N/N, calculate the size of the frictional force and the acceleration of the crate.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$$F_p =$$

$$f_f =$$

$$a =$$

$$m =$$

a) _____ ← units b) _____ ← units

E8. A 50 kg crate, initially at rest, is pushed with a constant force of 280 N. If after 2 seconds the crate is traveling at 7 m/s, calculate the force of friction acting on the crate's motion.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$$F_p =$$

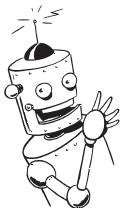
$$f_f =$$

$$a =$$

$$m =$$

a) _____ ← units

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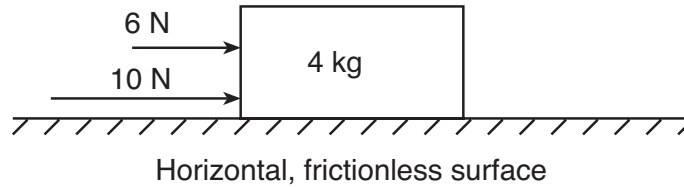


Chapter 5 Newton's Second Law

Student Problems

5.3 Net Force

- Two horizontal forces, 6 N and 10 N, are exerted in the same direction on a 4 kg crate as shown below. Find the net force and the acceleration of the crate.



Label a coordinate system, write the formula, substitute and solve

$$F_{net} =$$

$$F_1 =$$

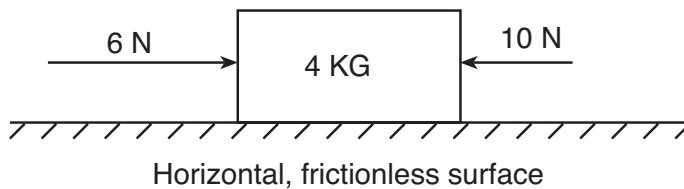
$$F_2 =$$

$$a =$$

$$m =$$

- a) _____ ← units b) _____ ← units

- Two horizontal forces, 6 N and 10 N, are exerted in opposite directions on a 4 kg crate as shown below. Find the net force and the acceleration of the crate.



Label a coordinate system, write the formula, substitute and solve

$$F_{net} =$$

$$F_1 =$$

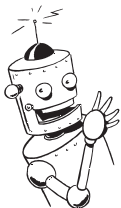
$$F_2 =$$

$$a =$$

$$m =$$

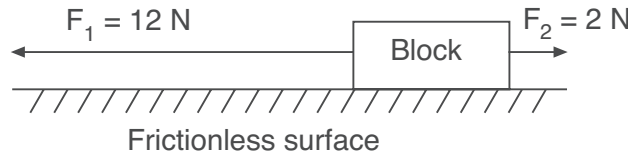
- a) _____ ← units b) _____ ← units

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Chapter 5 Newton's Second Law

3. Two forces, F_1 and F_2 , are applied in opposite directions to a block on a frictionless surface as shown below. If the magnitude of the block's acceleration is 2.0 m/s^2 , calculate the mass of the block.



Label a coordinate system, write the formula, substitute and solve

$F_1 =$

$F_2 =$

$a =$

$m =$

a) _____ ← units

4. Two forces are applied to a block on a frictionless, horizontal surface. A -65 N force is applied to one side of the block and a 71 N force is applied to the other side. If the magnitude of the block's acceleration is 1.6 m/s^2 , calculate the mass of the block.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

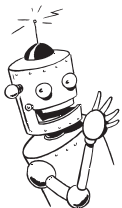
$F_1 =$

$F_2 =$

$a =$

$m =$

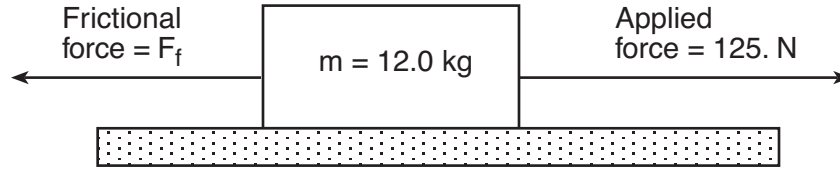
a) _____ ← units



Chapter 5 Newton's Second Law

5. A 12 kg crate is pushed across the floor with a force of 125 N towards the right. If the acceleration of the crate is 8.0 m/s^2 , calculate the magnitude of the frictional force.

Acceleration = 8.0 m/s^2 \longrightarrow



Label a coordinate system, write the formula, substitute and solve

$F_p =$

$f_f =$

$a =$

$m =$

a) _____ \longleftarrow units

6. A 100 kg crate is pushed across the floor by a force of 400 N causing the crate to accelerate at a rate of 2.58 m/s^2 , calculate the magnitude of the frictional force?

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$F_p =$

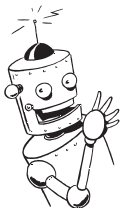
$f_f =$

$a =$

$m =$

a) _____ \longleftarrow units

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Chapter 5 Newton's Second Law

7. A 55 kg crate is pushed horizontally with a force of 220 N. If the coefficient of friction is 0.35, calculate the size of the frictional force and the acceleration of the crate.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$$F_p =$$

$$f_f =$$

$$a =$$

$$m =$$

- a) _____ ← units b) _____ ← units

8. You have run out of gas on the highway so you and a buddy push your 2,000 kg car to the nearest gas station. If both you and your buddy each apply a force of 800 N (1,600 N total) and the coefficient of friction in the bearings of the car is 0.08 N/N, calculate the size of the frictional force and the acceleration of the car.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$$F_p =$$

$$f_f =$$

$$a =$$

$$m =$$

- a) _____ ← units b) _____ ← units

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