Chapter 4

Exercises

Exercise 1

A kilogram is a measure of an object's

A) weight.

B) force.

C) mass.

D) size.

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A) weight.

B) force.

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D) size.

Exercise 2

Compared to a 1-kg block of solid iron, a 2-kg block of solid iron has twice as much

A) inertia.

B) mass.

C) volume.

D) all of these

E) none of these

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A) inertia.

B) mass.

C) volume.

D) all of these

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Exercise 3

- Your weight is
- A) equal to your mass.
- B) the gravitational attraction force between you and the Earth.
- C) a property of mechanical equilibrium.
- D) all of these

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- A) equal to your mass.
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Exercise 4

- Is acceleration proportional to net force, or does acceleration equal net force?

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Acceleration is proportional to net force.

Exercise 5

- How does friction affect the net force on an object?

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- How does friction affect the net force on an object?

  Friction reduces the net force.

Exercise 6

- The Standard International unit for mass is ……

  and the Standard International unit for weight is …….

Exercise 6

- The Standard International unit for mass is kilo gram (kg)

  and the Standard International unit for weight is Newton (N)

Exercise 7

- What is the weight of a 1 kg brick?

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  $W = mg = 1kg \times 10\ m/s^2 = \underline{10\ N}$

Exercise 8

- If the net force acting on a sliding block is somehow tripled, by how much the acceleration increase?

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$F = ma \rightarrow a = F/m$

$F_{new} = m\, a_{new}$

$3F = m\, a_{new} \rightarrow a_{new} = 3F/m = 3a$

$a_{new} = 3a$

Exercise 9

- What is ‘free fall’ ?

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  when the force of gravity is the only force acting on a falling object, the object is in free fall.

Exercise 10

- What is the net force that acts on a 10N freely falling object?

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10 N.

Object is in free fall, so the only force acting on it is its weight.

Exercise 11

- What is the net force that acts on a 10 N falling object when it encounters 4N of air resistance?

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- What is the net force that acts on a 10 N falling object when it encounters 4N of air resistance?

Net force = 6N down

Does the object accelerate?

Exercise 12

- What is the net force that acts on a 10 N falling object when it encounters 10N of air resistance?

Exercise 12

- What is the net force that acts on a 10 N falling object when it encounters 10N of air resistance?

  Net force = 0

  Does the object accelerate?

Exercise 13

- What is the acceleration of a falling object that has reached its terminal velocity?

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  Zero. When at terminal velocity, the net force acting on the object is zero. (weight = air drag). Therefore, the acceleration is zero.

Exercise 14

- Gravity on the surface of the Moon is only 1/6 as strong as gravity on Earth. What is the weight of a 10kg object on the Moon and on Earth?

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On the Moon: $W = mg_{Moon} = 10\ kg \times (10/6)\ m/s/s$

$= \underline{16.7\ N}$

On Earth: $W = mg = 10\ kg \times (10\ m/s/s) = \underline{100\ N}$

Exercise 15

- Gravity on the surface of the Moon is only 1/6 as strong as gravity on Earth. What is the mass of a 10kg object on the Moon and on Earth?

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- Gravity on the surface of the Moon is only 1/6 as strong as gravity on Earth. What is the mass of a 10kg object on the Moon and on Earth?

  10 kg on each.

Exercise 16

- A race car travels along a raceway at a constant velocity of 200 km/h. What horizontal net force acts on the car?

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  zero net force. (car is in dynamic equilibrium)

Exercise 17

- Consider a 40 kg block of cement that us pulled sideways with a net force of 200N. What is its acceleration?

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  $F = ma$

  $a = F/m = 200N/40kg = \underline{5\ m/s/s}$

Exercise 18

A 10-kg brick and a 1-kg book are dropped in a vacuum. The force of gravity on the 10-kg brick is

A) the same as the force on the 1-kg book.

B) 10 times as much.

C) one-tenth as much.

Exercise 18

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B) 10 times as much.

C) one-tenth as much.

Exercise 19

An apple weighs 1 N. When held at rest above your head, the net force on the apple is

A) 0 N.

B) 0.1 N.

C) 1 N.

D) 9.8 N.

Exercise 19

An apple weighs 1 N. When held at rest above your head, the net force on the apple is

A) 0 N.

B) 0.1 N.

C) 1 N.

D) 9.8 N.

Exercise 20

An apple at rest weighs 1 N. The net force on the apple when it is in free fall is

A) 0 N.

B) 0.1 N.

C) 1 N.

D) 9.8 N.

E) none of these

Exercise 20

An apple at rest weighs 1 N. The net force on the apple when it is in free fall is

A) 0 N.

B) 0.1 N.

C) 1 N.

D) 9.8 N.

E) none of these

Exercise 21

When a falling object has reached its terminal velocity, its acceleration is

A) constant.

B) zero.

C) g.

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When a falling object has reached its terminal velocity, its acceleration is

A) constant.

B) zero.

C) g.

Exercise 22

Two objects of the same size, but unequal weights are dropped from a tall tower. Taking air resistance into consideration, the object to hit the ground first will be the

A) lighter object.

B) heavier object.

C) Both hit at the same time.

D) not enough information

Exercise 22

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C) Both hit at the same time.

D) not enough information

Exercise 23

A light woman and a heavy man jump from an airplane at the same time and open their same-size parachutes at the same time. Which person will get to a state of zero acceleration first?

A) the light woman

B) the heavy man

C) Both should arrive at the same time.

D) not enough information

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D) not enough information

Exercise 24

A skydiver, who weighs 500 N, reaches terminal velocity of 90 km/h. The air resistance on the diver is then

A) 90 N.

B) 250 N.

C) 410 N.

D) 500 N.

E) none of these

Exercise 24

A skydiver, who weighs 500 N, reaches terminal velocity of 90 km/h. The air resistance on the diver is then

A) 90 N.

B) 250 N.

C) 410 N.

D) 500 N.

E) none of these