Chapter 3

Linear Motion
You’re lying on the sand on a breezy day when a pesky fly wishes to join you. The breeze is blowing at a steady 2 m/s. In order for the fly to land on you it should hover over you while flying

a. against the breeze at 2 m/s.
b. with the breeze at 2 m/s.
c. a bit faster than 2 m/s.
d. about 4 m/s relative to the breeze.
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b. with the breeze at 2 m/s.
c. a bit faster than 2 m/s.
d. about 4 m/s relative to the breeze.
A glance at your speedometer will tell you your

a. average speed.
b. instantaneous speed.
c. overall speed.
d. acceleration.
A glance at your speedometer will tell you your (blank).

a. average speed.
b. instantaneous speed.
c. overall speed.
d. acceleration.
Nellie runs the length of a 100-yard football field in a time of 20 seconds. Her average running speed is

a. 1/2 yard/s.
b. 5 yards/s.
c. 50 yards/s.
d. No way to say.
Nellie runs the length of a 100-yard football field in a time of 20 seconds. Her average running speed is:

a. 1/2 yard/s.
b. 5 yards/s.
c. 50 yards/s.
d. No way to say.
The average speed of a deer traveling a distance of 2 km in a time of 1/2 hour is

a. 1 km/h.
b. 2 km/h.
c. 4 km/h.
d. more than 4 km/h.
The average speed of a deer traveling a distance of 2 km in a time of 1/2 hour is

a. 1 km/h.
b. 2 km/h.
c. 4 km/h.
d. more than 4 km/h.
Suppose you hike a distance of 1 km in a time of 1/2 hour. Then your average speed is

a. almost 1 km/h.
b. 1 km/h.
c. slightly more than 1 km/h.
d. twice 1 km/h.
Suppose you hike a distance of 1 km in a time of 1/2 hour. Then your average speed is

a. almost 1 km/h.
b. 1 km/h.
c. slightly more than 1 km/h.
d. twice 1 km/h.
Your average speed in skateboarding to your friend’s house is 5 mi/h. It is possible that your instantaneous speed at some point was

a. less than 5 mi/h.
b. 5 mi/h.
c. more than 5 mi/h.
d. Any of these.
Your average speed in skateboarding to your friend’s house is 5 mi/h. It is possible that your instantaneous speed at some point was

a. less than 5 mi/h.
b. 5 mi/h.
c. more than 5 mi/h.
d. Any of these.
Sophia runs along the aisle of a train car that moves at 8 m/s. Sophia’s speed relative to the floor is 3 m/s. Her speed relative to an observer at rest on the ground is

a. 3 m/s.
b. 5 m/s.
c. 11 m/s.
d. either 11 m/s or 5 m/s depending on whether she runs in the same or opposite direction to the train’s motion.
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d. either 11 m/s or 5 m/s depending on whether she runs in the same or opposite direction to the train’s motion.
When you walk at an average speed of 4 m/s, in 5 s you’ll cover a distance of

a. 2 m.
b. 10 m.
c. 15 m.
d. 20 m.
When you walk at an average speed of 4 m/s, in 5 s you’ll cover a distance of

a. 2 m.
b. 10 m.
c. 15 m.
d. 20 m.
When a ball increases in speed by the same amount each second, its acceleration

a. also increases each second.
b. decreases each second.
c. is constant.
d. fluctuates.
When a ball increases in speed by the same amount each second, its acceleration

a. also increases each second.
b. decreases each second.
c. is constant.
d. fluctuates.
If a ball rolls down an inclined plane and picks up 4 m/s each second it rolls, its acceleration is

a. one-half of 4 m/s.
b. one-half of 4 m/s².
c. 4 m/s².
d. 10 m/s².
If a ball rolls down an inclined plane and picks up 4 m/s each second it rolls, its acceleration is

a. one-half of 4 m/s.
b. one-half of 4 m/s².
c. 4 m/s².
d. 10 m/s².
A motor scooter undergoes acceleration when it

a. gains speed.
b. decreases speed.
c. changes direction.
d. All of these.
A motor scooter undergoes acceleration when it

a. gains speed.
b. decreases speed.
c. changes direction.
d. All of these.
Velocity and acceleration are actually

a. one and the same concept, but expressed differently.
b. rates of one another.
c. expressions for changing speeds.
d. entirely different concepts.
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a. one and the same concept, but expressed differently.
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The acceleration of a raindrop that falls at constant velocity

a. is zero.
b. is directed downward.
c. decreases over time.
d. increases over time.
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a. is zero.
b. is directed downward.
c. decreases over time.
d. increases over time.
If a falling object gains 10 m/s each second it falls, its acceleration is

a. 10 m/s.
b. 10 m/s².
c. directed upward.
d. steadily increasing.
If a falling object gains 10 m/s each second it falls, its acceleration is

a. 10 m/s.
b. $10 \text{ m/s}^2$.
c. directed upward.
d. steadily increasing.
During each second of free fall, the speed of an object

a. increases by the same amount.
b. changes by increasing amounts each second.
c. remains constant.
d. doubles each second.
During each second of free fall, the speed of an object

a. increases by the same amount.
b. changes by increasing amounts each second.
c. remains constant.
d. doubles each second.
At the end of 1 second of free fall, an apple falling from rest has a speed of

a. 1 m/s.
b. 5 m/s.
c. 10 m/s.
d. more than 10 m/s.
At the end of 1 second of free fall, an apple falling from rest has a speed of

a. 1 m/s.
b. 5 m/s.
c. 10 m/s.
d. more than 10 m/s.
An object in free fall has a speed of 60 m/s. One second later its speed is

a. 10 m/s.
b. 30 m/s.
c. 60 m/s.
d. 70 m/s.
An object in free fall has a speed of 60 m/s. One second later its speed is

a. 10 m/s.
b. 30 m/s.
c. 60 m/s.
d. 70 m/s.
A free-falling object has a speed of 30 m/s at one instant. Exactly 1 second later its speed will be

a. the same.
b. 35 m/s.
c. more than 35 m/s.
d. 60 m/s.
A free-falling object has a speed of 30 m/s at one instant. Exactly 1 second later its speed will be

a. the same.
b. 35 m/s.
c. more than 35 m/s.
d. 60 m/s.
The speed of a vertically thrown ball at the top of its path is

a. 0.
b. 10 m/s².
c. between 0 and 10 m/s².
d. dependent on the mass of the ball.
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a. 0.
b. 10 m/s².
c. between 0 and 10 m/s².
d. dependent on the mass of the ball.
Which of these statements is true about the coin-and-feather experiment cited in your textbook?

a. Air drag doesn’t act in a vacuum.
b. Gravity doesn’t act in a vacuum.
c. A feather and a coin will accelerate equally in air.
d. A feather will accelerate more than a coin in a vacuum.
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