

Chapter 4

MOTION

Chapter 4 Assessment

Vocabulary

Select the correct term to complete the sentences.

average speed	projectile	slope
acceleration due to gravity	speed	free fall
velocity	constant speed	acceleration
instantaneous speed		

Section 4.1

- Speed with direction is called _____.
- The formula for _____ is distance divided by time.
- _____ is the total distance divided by the total time of a trip.

Section 4.2

- The actual speed of a moving object at any moment is called _____.
- Speed that stays the same is called _____.

Section 4.3

- The rate at which velocity changes is defined as _____.
- An object in _____ is accelerating due to the force of gravity with no other forces acting on it.
- An object moving in a curved path affected only by gravity is called a(n) _____.
- An object in free fall will accelerate toward Earth at 9.8 m/s^2 , the _____.

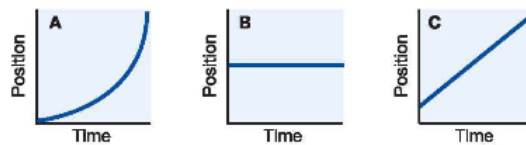
Concepts

Section 4.1

- What is the speed of an object that is standing still?
- Name three common units for measuring speed.
- Write the form of the speed equation that you would see in each of the following scenarios.
Let v = speed, t = time, and d = distance.
 - You know distance and speed and want to find the time.
 - You know time and distance and want to find the speed.
 - You know speed and time and want to find the distance.
- How are the variables speed and velocity different? How are they similar?

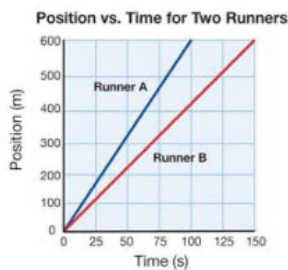
Section 4.2

- Which of the graphs below shows an object that is stopped?



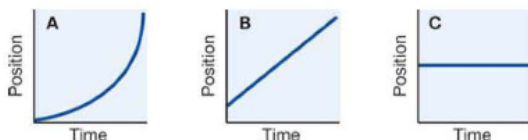
- Which of the graphs above shows an object moving at a constant speed?
- Look at the graph on the next page and answer the following questions.
 - What is the average speed of runner B at 100 seconds?
 - How much time did runner A take to get to the 300-meter mark?

- c. Make a sketch of this graph in your notebook. Add a line to the graph that represents a third runner who has a speed that is slower than the speeds of runner A and B. This new line should begin at the origin of the graph.



Section 4.3

- How would it be possible for an object to be traveling with constant speed and still be accelerating?
- Can an object have a speed of zero while it has an acceleration that is not zero? Explain.
- Which of these graphs show acceleration occurring?



Problems

Section 4.1

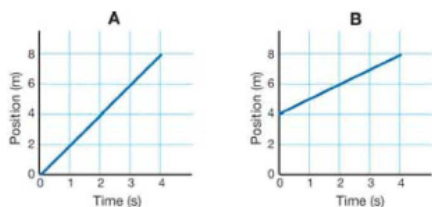
- A high-speed train travels at 300 km/h. How long (in hours) would it take the train to travel 1,500 km at this speed?
- Lance Armstrong's teammate, George Hincapie, averaged a speed of 33.6 km/h in the 15th stage of the Tour de France, which took 4.00 hours. How far (in kilometers) did he travel in the race?
- You are traveling on an interstate highway at a speed of 65 mph. What is your speed in km/h? The conversion factor is 1.0 mph = 1.6 km/h.
- A pelican flies at a speed of 52 km/h for 0.25 hours. How many miles does the pelican travel? The conversion factor is 1.6 km/h = 1.0 mph.
- A snail crawls 300 cm in 1 hour. Calculate the snail's speed in each of the following units.
 - centimeters per hour (cm/h)
 - centimeters per minute (cm/min)
 - meters per hour (m/h)
- You want to arrive at your friend's house by 5 p.m. Her house is 240 kilometers away. If your average speed will be 80 km/h on the trip, when do you need to leave your house in order to get to her house in time?

Section 4.2

- Draw the position vs. time graph for a person walking at a constant speed of 1 m/s for 10 seconds. On the same axes, draw the graph for a person running at a constant speed of 4 m/s.

Chapter 4 MOTION

8. Calculate the speed represented by each position vs. time graph below.



9. Draw the speed vs. time graph that shows the same motion as each position vs. time graph above.

Section 4.3

- When a ball is first dropped off a cliff in free fall, it has an acceleration of 9.8 m/s^2 . What is its acceleration as it gets closer to the ground? Assume no air friction.
- Why is the position vs. time graph for an object in free fall a curve?
- Draw a speed vs. time graph for each of the following situations.
 - A person walks along a trail at a constant speed.
 - A ball is rolling up a hill and gradually slows down.
 - A car starts out at rest at a red light and gradually speeds up.

Applying Your Knowledge

Section 4.1

- If you take a one hour drive at an average speed of 65 mph, is it possible for another car with an average speed of 55 mph to pass you? Explain your answer.

Section 4.2

- Oliver is warming up for a track meet. First he walks 1 m/s for 100 seconds. Then he runs at 3 m/s for 200 seconds. His shoe comes untied, so he stops for 20 seconds to tie it. Finally he runs at 4 m/s for 200 seconds.

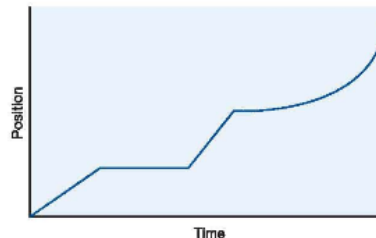
- Draw a position vs. time graph of Oliver's motion. Hint: Use the table below to calculate the distance he travels during each segment.

speed (m/s)	time (s)	distance (m)

- Draw a speed vs. time graph of Oliver's motion.
- What is the total distance that Oliver travels?
- What is Oliver's average speed during his 520 second warm-up?

Section 4.3

- Look at the graph below and make up a story involving motion that would create a graph shaped like this.



- Draw a speed vs. time graph that shows the same motion as the position vs. time graph above.