

Section 9.2

Calculating Acceleration

Check Your Understanding



Checking Concepts

1. What is the SI unit for acceleration?
2. What quantity does the slope of a velocity-time graph represent?
3. How is constant acceleration represented on a velocity-time graph?
4. If an object has constant acceleration, describe the change in velocity during equal time intervals.
5. For constant acceleration, what is the mathematical relationship between acceleration, change in velocity, and time interval?
6. In the absence of air resistance, what is the magnitude and direction of the acceleration due to gravity near the surface of Earth?

Use the diagram below to help you answer question 7.



7. A penny and a feather are located at the top of a vertical container with all air removed. If they are released at the same time, describe the motion of the two objects in terms of:

(a) change in velocity

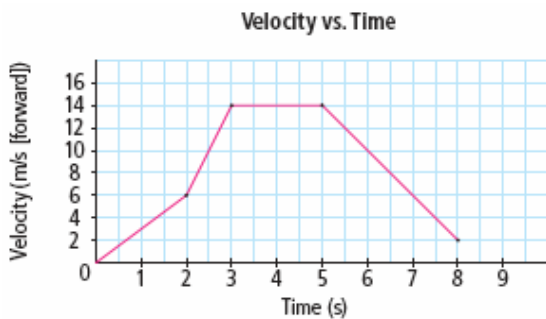
(b) acceleration

(c) time to fall

Understanding Key Ideas

8. What is the acceleration of a golf ball that is accelerated uniformly from rest to 55 m/s forward in 0.00045 s?
9. A car travelling south at 12 m/s stops uniformly in 3.0 s. What is the car's acceleration?
10. A ball changes its velocity from 25 m/s [S] to 32 m/s [N] in 0.65 s. What is the ball's average acceleration?

Use the graph below to help you answer questions 11 to 13.



11. What is the velocity of the object at the following times? Be sure to include direction.
 - (a) $t = 1.0$ s
 - (b) $t = 4.0$ s
 - (c) $t = 6.0$ s

12. What is the acceleration during each of the following time intervals? Be sure to include direction.

(a) $t = 0.0 \text{ s} - t = 2.0 \text{ s}$

(b) $t = 2.0 \text{ s} - t = 3.0 \text{ s}$

(c) $t = 3.0 \text{ s} - t = 5.0 \text{ s}$

(d) $t = 5.0 \text{ s} - t = 8.0 \text{ s}$

13. In a short sentence, describe the motion of the object in each of the following time intervals.

(a) $t = 0.0 \text{ s} - t = 2.0 \text{ s}$

(b) $t = 2.0 \text{ s} - t = 3.0 \text{ s}$

(c) $t = 3.0 \text{ s} - t = 5.0 \text{ s}$

(d) $t = 5.0 \text{ s} - t = 8.0 \text{ s}$

Pause and Reflect

A circus trapeze artist falls 12 m into the safety net and stretches the net 1.5 m before coming to rest. What would you do to make the landing safer (that is, create a smaller acceleration): would you stiffen the net or loosen the net? Use the concepts of acceleration, change in velocity, and time interval to explain your answer.