

Chapter 11 Motion

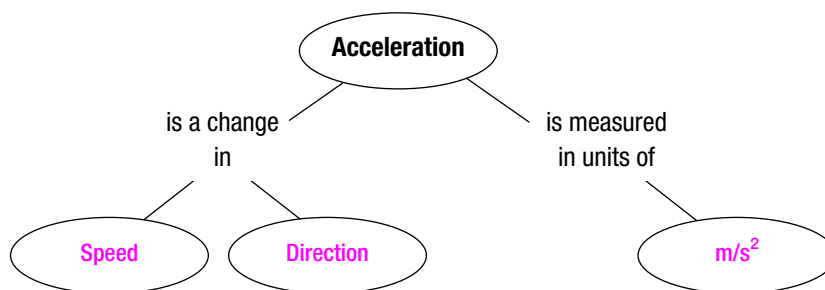
Section 11.3 Acceleration

(pages 342–348)

This section describes the relationships among speed, velocity, and acceleration. Examples of these concepts are discussed. Sample calculations of acceleration and graphs representing accelerated motion are presented.

Reading Strategy (page 342)

Summarizing Read the section on acceleration. Then complete the concept map to organize what you know about acceleration. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



What Is Acceleration? (pages 342–345)

- The rate at which velocity changes is called acceleration.
- In terms of speed and direction, in what ways can an object accelerate? It can change its speed, its direction, or both its speed and direction.
- Because acceleration is a quantity that has both magnitude and direction, it is a(n) vector.
- Is the following sentence true or false? Acceleration is the result of increases or decreases in speed. true
- Ignoring air resistance, a rock in free fall will have a velocity of 39.2 m/s after 4.0 seconds.
- A horse on a carousel that is moving at a constant speed is accelerating because its direction is constantly changing.
- Describe constant acceleration. Constant acceleration is a steady change in velocity.

Calculating Acceleration (pages 345–346)

- Write the equation used to calculate the acceleration of an object.
Acceleration = Change in velocity / Total time

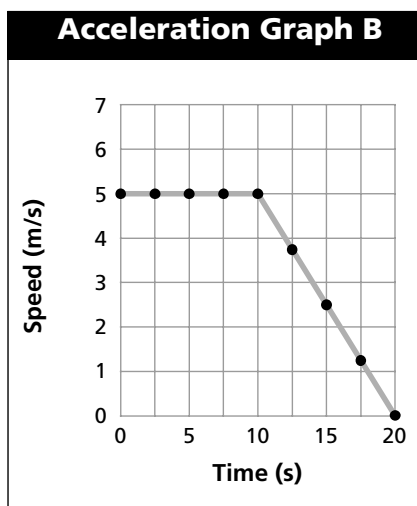
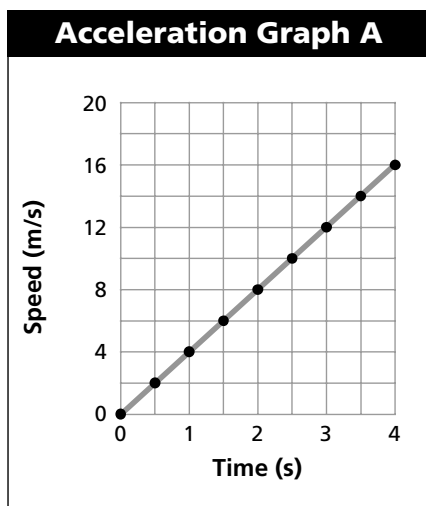
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9. Is the following sentence true or false? When the final velocity is less than the initial velocity of an object, the acceleration is negative. true
10. A skateboarder begins down a ramp at a speed of 1.0 m/s. After 3 seconds, her speed has increased to 4.0 m/s. Calculate her acceleration.
- a. 1.0 m/s² b. 3.0 m/s²
 c. 5.0 m/s² d. 9.8 m/s²

Graphs of Accelerated Motion (pages 346–348)

11. A speed-time graph in which the displayed data forms a straight line is an example of a(n) linear graph.

For questions 12 through 15, refer to the graphs below.



12. Graph A represents the motion of a downhill skier. How fast was the skier moving after traveling down the hill for 2.5 seconds? 10 m/s
13. In which graph does an object move at constant speed during the first 4 seconds? Graph B
14. Graph B represents the motion of a mountain biker. What is the biker's speed at times of 10 s and 20 s? 5 m/s (at 10 s); 0 m/s (at 20 s)
15. Determine the acceleration of the mountain biker during the 10 second to 20 second time period. Show your work.

$$a = (v_f - v_i)/t = (0 \text{ m/s} - 5 \text{ m/s})/10 \text{ s} = -0.5 \text{ m/s}^2$$

16. The plotted data points representing acceleration in a distance-time graph form a(n) curve.

Instantaneous Acceleration (page 348)

17. The measure of how fast a velocity is changing at a specific instant is known as instantaneous acceleration.