Name _____ Date _____ Class _____

SECTION 1-3 SECTION SUMMARY

Acceleration

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Guide for Reading

- **What happens to the motion of an object as it accelerates?**
- **How is acceleration calculated?**

Acceleration is the rate at which velocity changes. Recall that velocity has two components—direction and speed. Acceleration involves a change in either of these components. **In science, acceleration refers to increasing speed, decreasing speed, or changing direction.**

Any time the speed of an object changes, the object experiences acceleration. That change can be an increase or decrease. A decrease in speed is sometimes called deceleration, or negative acceleration.

An object that is changing direction is also accelerating, even if it is moving at a constant speed. A car moving around a curve or changing lanes at a constant speed is accelerating because it is changing direction.

Many objects continuously change direction without changing speed. The simplest example of this type of motion is circular motion, or motion along a circular path. The moon accelerates because it is continuously changing direction as it revolves around Earth.

Acceleration describes the rate at which velocity changes. **To determine the acceleration rate of an object, you must calculate the change in velocity during each unit of time.** This is summarized by the following formula.

$$\text{Acceleration} = \frac{\text{Final velocity} - \text{Initial velocity}}{\text{Time}}$$

If velocity is measured in meters/second and time is measured in seconds, the unit of acceleration is meters per second per second, which is written as m/s^2.

If an object is accelerating by the same amount during each unit of time, the acceleration at every point in its motion is the same. If the acceleration varies, however, only the average acceleration can be calculated. For an object moving without changing direction, the acceleration is the change in its speed during one unit of time.

A line graph can be used to analyze acceleration by showing speed versus time. When a graph shows speed versus time as a straight line, the acceleration is constant. If an object accelerates by a different amount each time period, a graph of its acceleration will not be a straight line. A graph of distance versus time for an accelerating object is curved.

Name _____ Date _____ Class _____

SECTION 1-3 REVIEW AND REINFORCE

Acceleration

1

◆ Understanding Main Ideas

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

_____ **1.** If a train is slowing down, it <u>is</u> accelerating.

_____ **2.** To find the acceleration rate, you must calculate the change in <u>distance</u> during each unit of time.

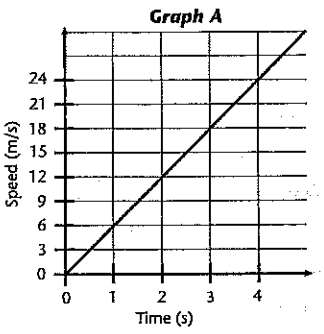
_____ **3.** A Ferris wheel turning at a constant speed of 5 m/s <u>is not</u> accelerating.

_____ **4.** An airplane is flying west at 200 km/h. Two hours later, it is flying west at 300 km/h. Its average acceleration is <u>100</u> km/h^2.

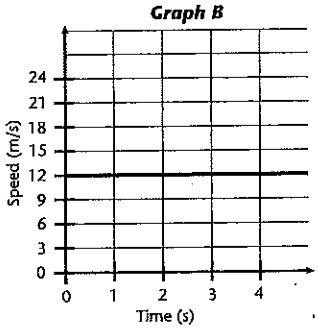
_____ **5.** Graph A plots a race car's speed for 5 seconds. The car's rate of acceleration is <u>6</u> m/s^2.

_____ **6.** Graph B plots the same car's speed for a different 5-second interval. The car's acceleration during this interval is <u>12</u> m/s^2.

Graph A



Graph B



◆ Building Vocabulary

From the list below, choose the term that best completes each sentence. Write your answers on the line provided.

acceleration velocity speed distance

7. _____ occurs when the velocity of an object changes.

8. When you say that a race car travels northward at 100 km/h, you are talking about its _____.