Lesson 3.11. Brown Arrow on the Velocity Graph

Name: _____

Date: _____ Period: _____

The *total change of velocity* is represented by brown shading on the speedometer, and by a brown arrow and its dotted line on the velocity graph. Here is an example:

A car, traveling at 20 mph, northward, slowly increases velocity for 4 seconds, ending at 32 mph, northward, then continues at a constant velocity. Determine its total change of velocity.

☐ With your regular writing pencil, *draw and label* velocity dots on the speedometer at t_i = 0 s and t_f = 4 s. *Circle* the dots and their labels with a red colored pencil.

☐ *Draw and label* red *velocity* arrows at t_i = 0 s and t_f = 4 s on the velocity graph at right.

☐ In brown, *shade in* the region from 0 s to 4 s on the speedometer.

☐ *Draw and label* a brown *change of velocity* arrow along with its dotted line for the interval from 0 s to 4 s.
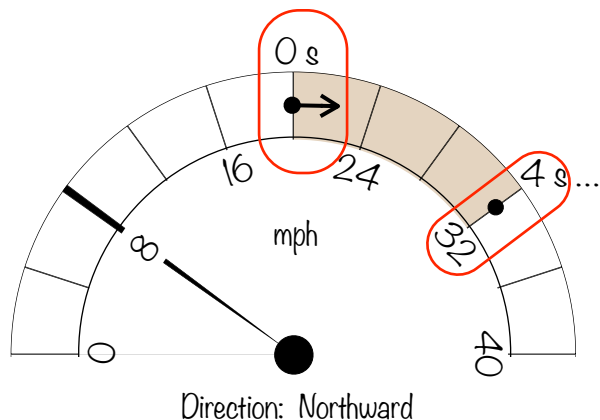
Calculation

total change of velocity$_{i \to f}$ = final velocity − initial velocity

total change of velocity$_{0 \to 4}$ = 32 mph − 20 mph

total change of velocity$_{0 \to 4}$ = 12 mph, northward

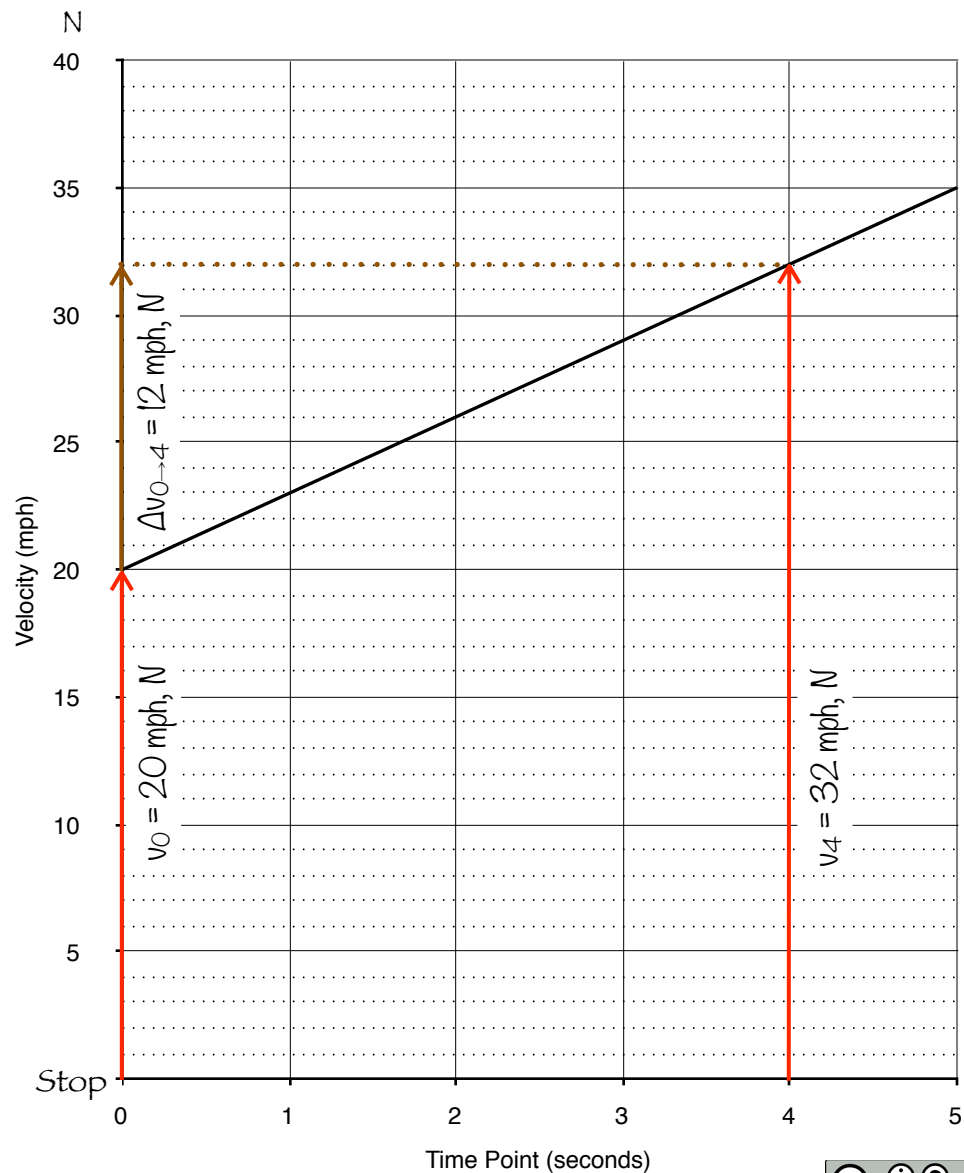$$\Delta v_{i \to f} = v_f - v_i$$

$$\Delta v_{0 \to 4} = 32 \text{ mph} - 20 \text{ mph}$$

$$\Delta v_{0 \to 4} = 12 \text{ mph, Nward}$$

Consider the velocity graph at right.
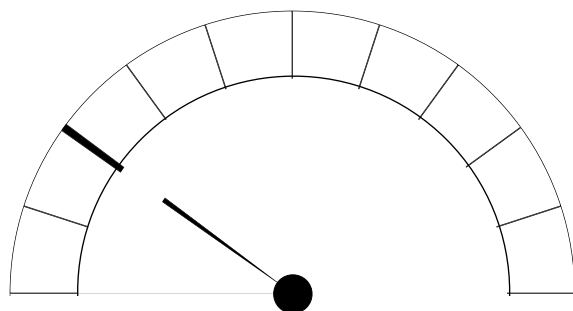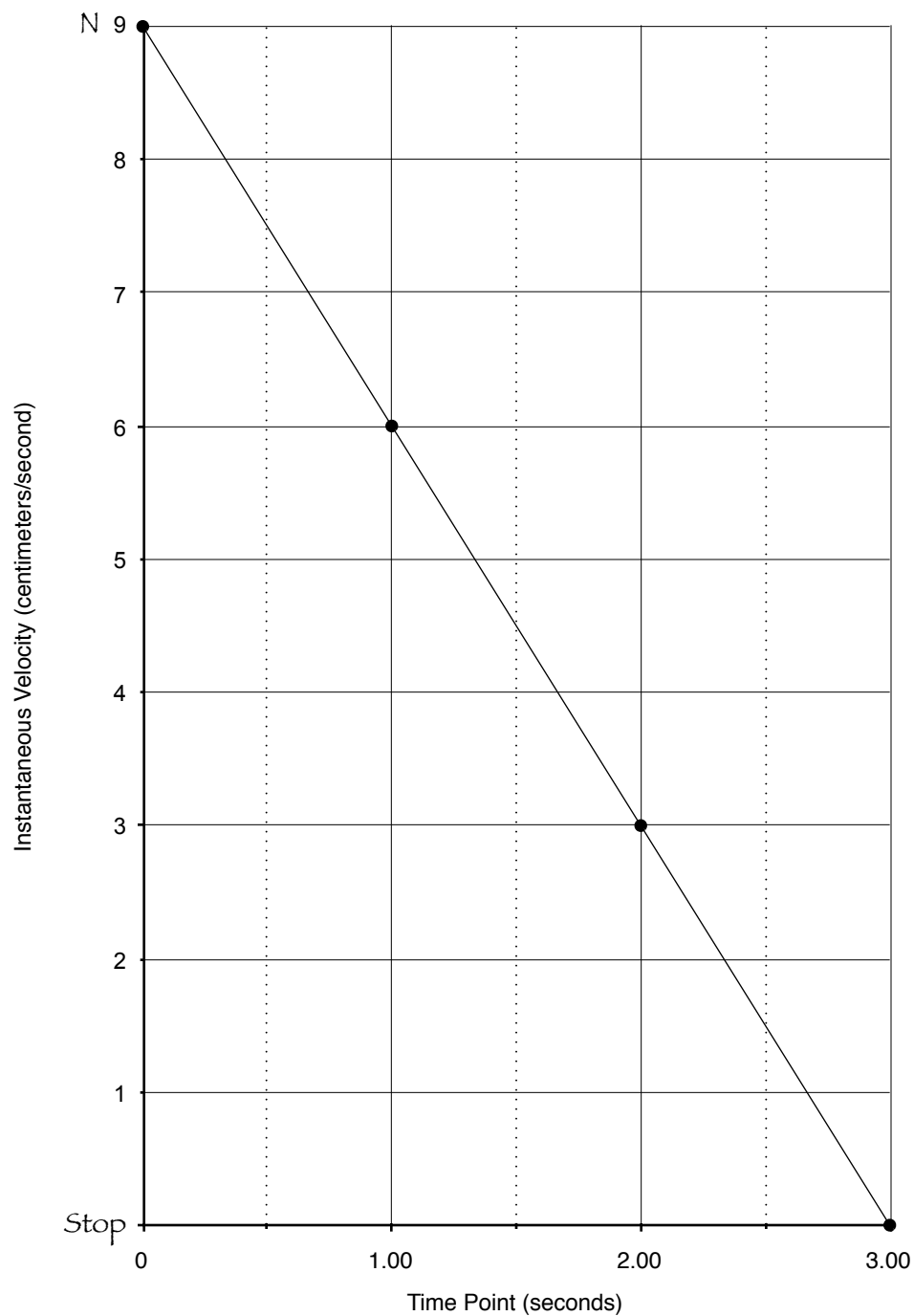
- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 1.00 s to t_f = 3.00 s.

    ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

    ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

    ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.
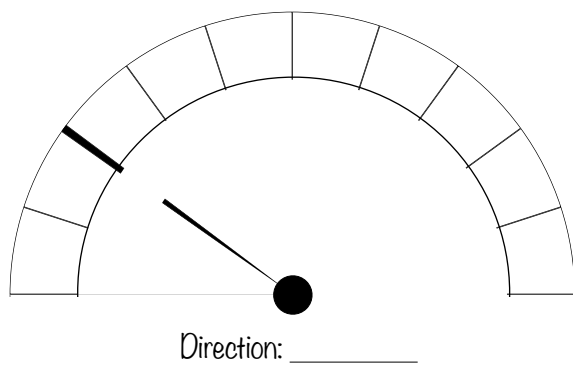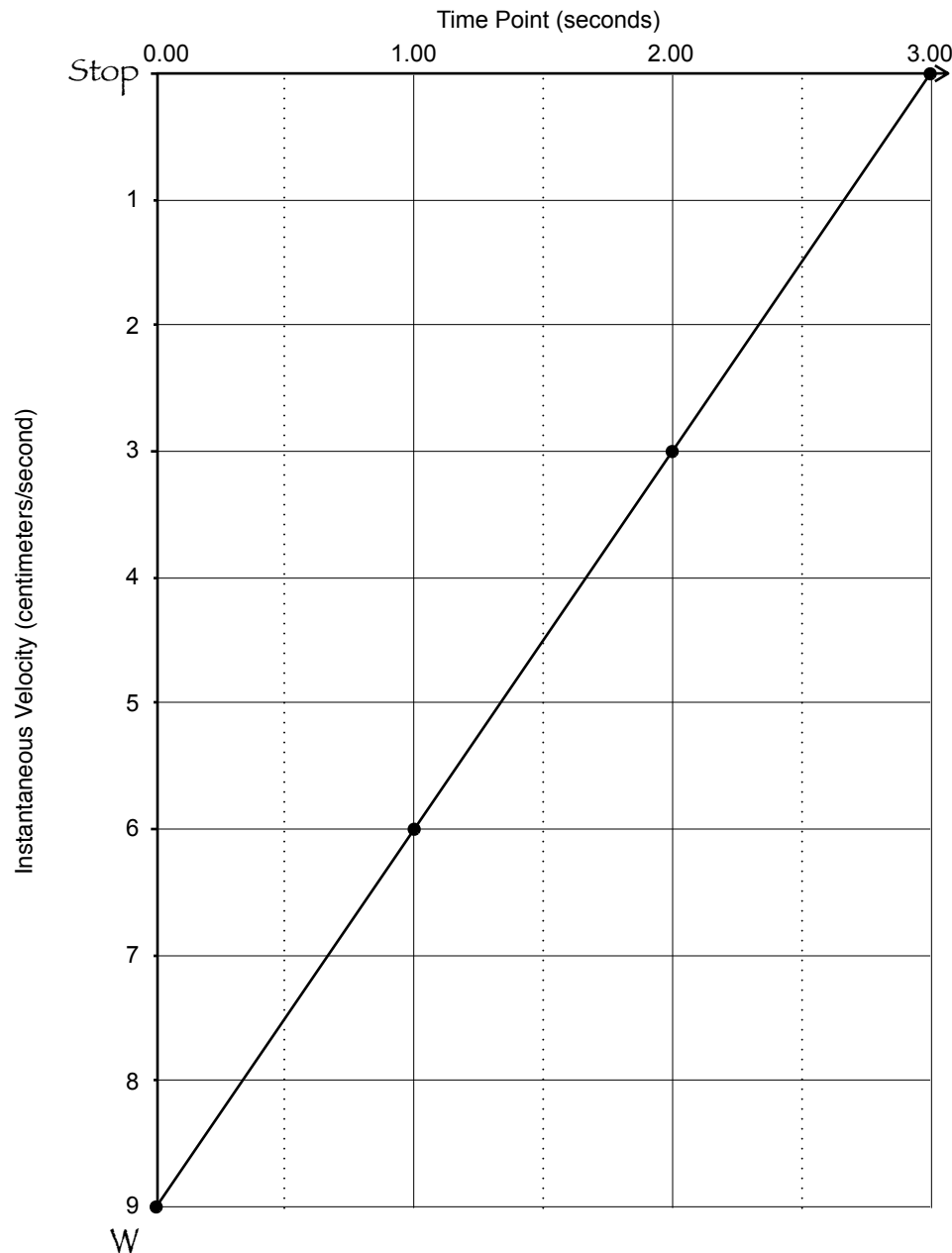
Direction: _____

Calculation

Instantaneous Velocity (centimeters/second)

Time Point (seconds)

Consider the velocity graph at right.

- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 1.00 s to t_f = 3.00 s.

   ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

   ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

   ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.
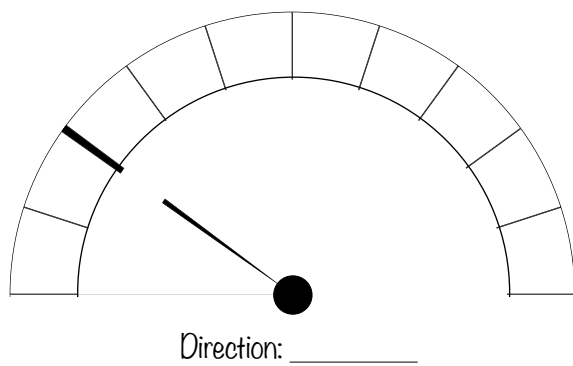
Direction: _____

Calculation

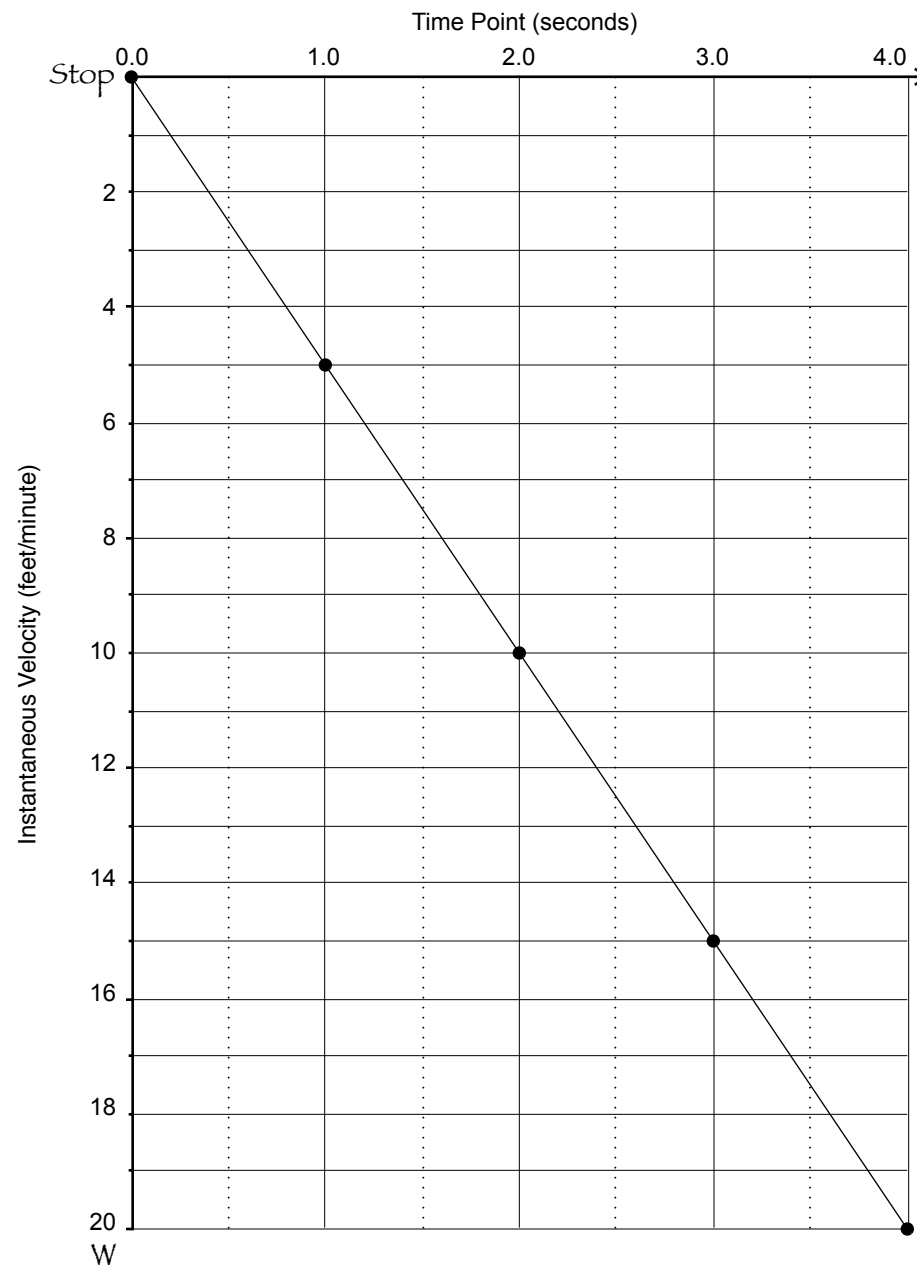Time Point (seconds)

Instantaneous Velocity (centimeters/second)

Consider the velocity graph at right.

- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 1.00 s to t_f = 3.00 s.

  ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

  ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

  ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 1.00 s to t_f = 3.00 s.

Direction: _____

Calculation

Time Point (seconds)

Instantaneous Velocity (feet/minute)

Name: _____

Homework 3.11. Brown Arrow on the Velocity Graph
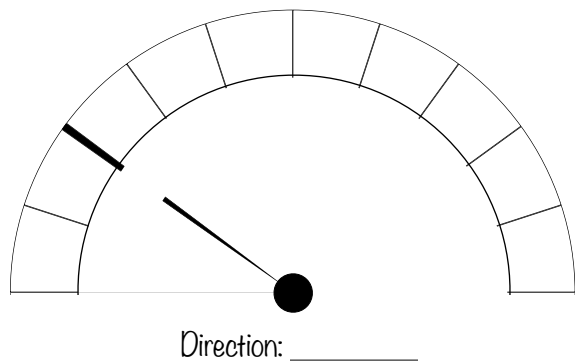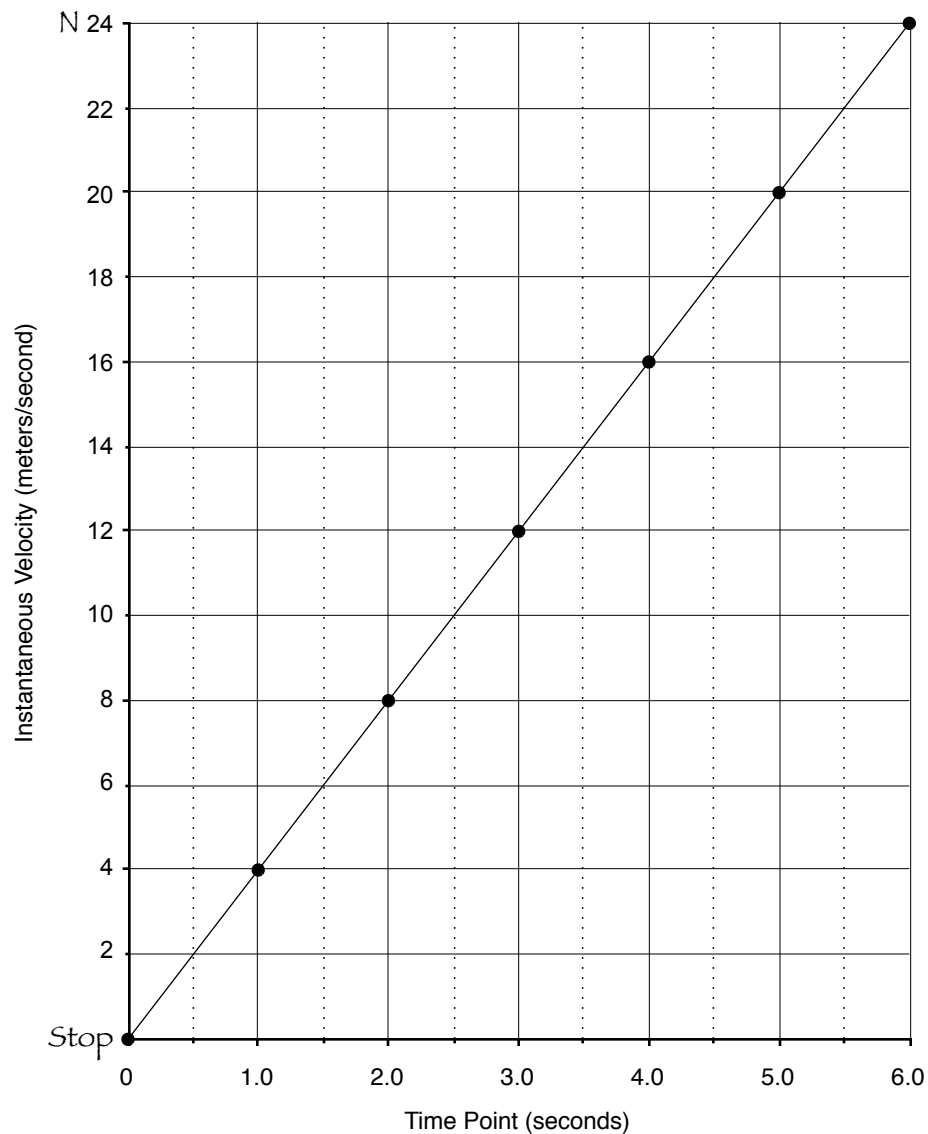
Date: _____ Period: _____

Consider the velocity graph at right.

- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 1.00 s to t_f = 6.00 s.

  ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 6.00 s.

  ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 1.00 s to t_f = 6.00 s.

  ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 1.00 s to t_f = 6.00 s.

Direction: _____
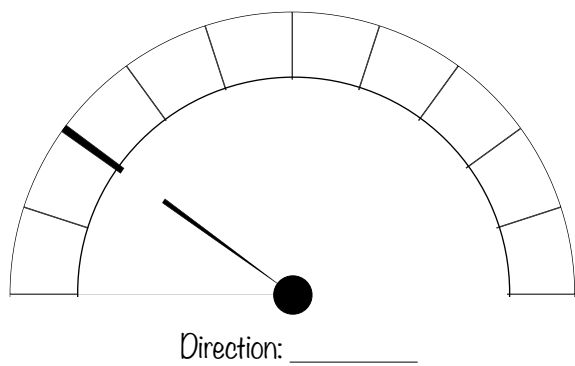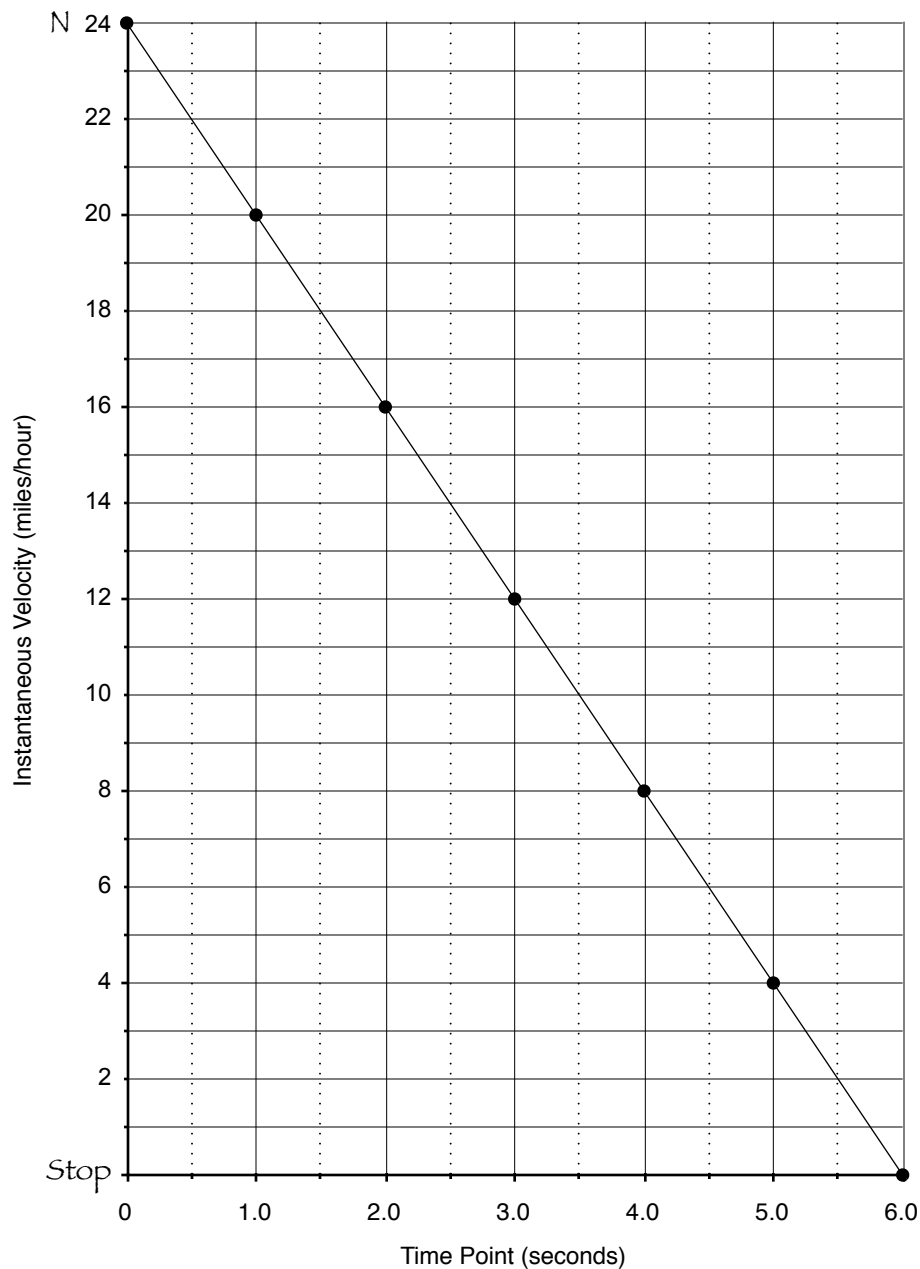
Calculation

Consider the velocity graph at right.

- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 2.00 s to t_f = 5.00 s.

   ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 2.00 s to t_f = 5.00 s.

   ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 2.00 s to t_f = 5.00 s.

   ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 2.00 s to t_f = 5.00 s.

Direction: _____
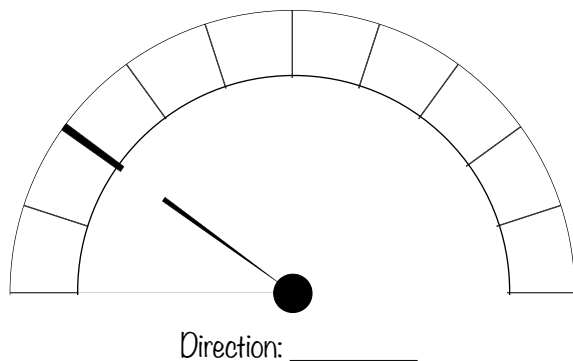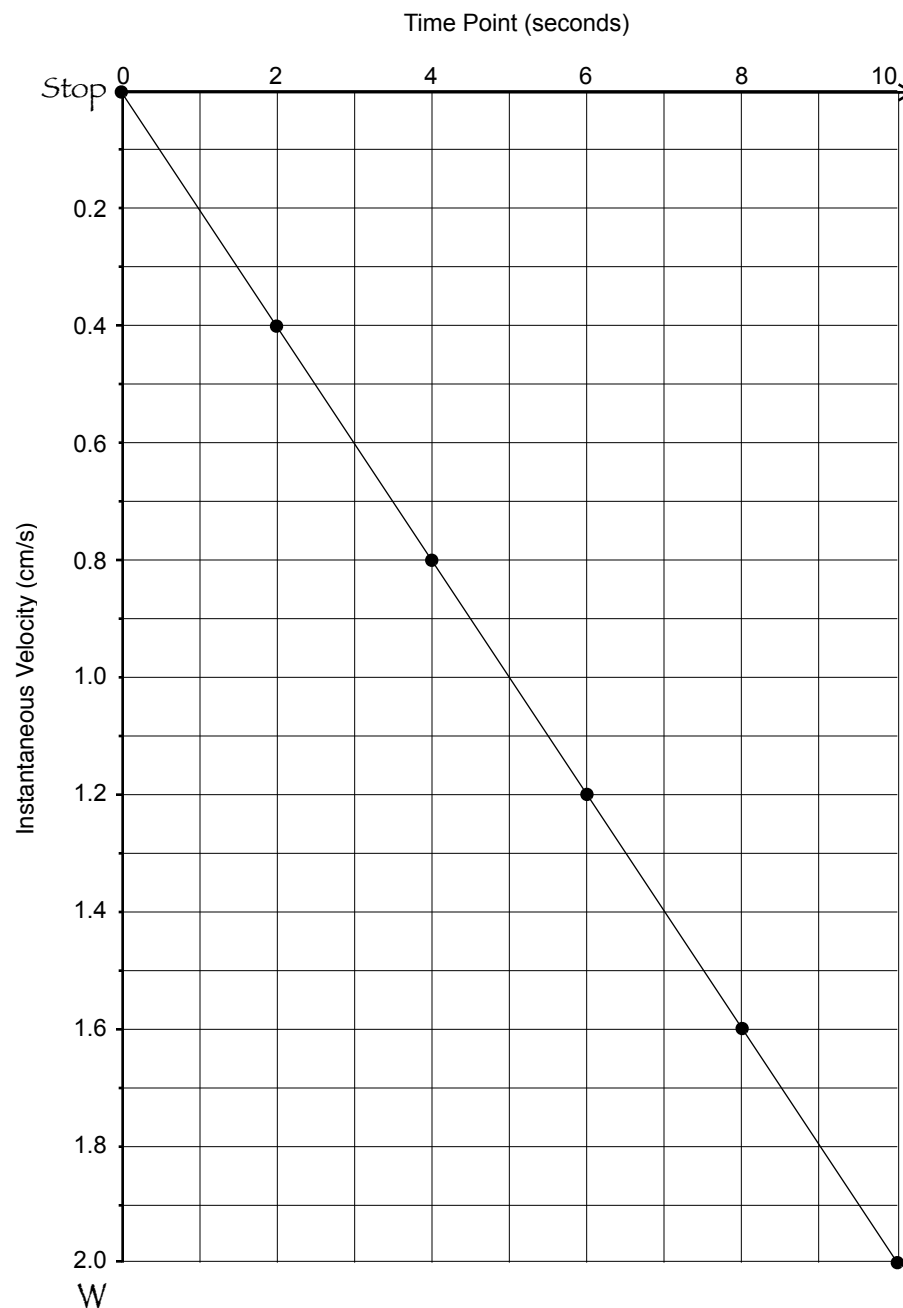
Calculation

Consider the velocity graph at right.

- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 3.00 s to t_f = 9.00 s.

   ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 3.00 s to t_f = 9.00 s.

   ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 3.00 s to t_f = 9.00 s.

   ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 3.00 s to t_f = 9.00 s.

Direction: _____

Calculation

Time Point (seconds)

Instantaneous Velocity (cm/s)

Stop

W

Consider the velocity graph at right.

- In what direction did the object travel? _____

- Did the velocity increase, or did it decrease? _____

☐ Please determine the magnitude (size) and direction of the *total change of velocity* during the interval from t_i = 4.00 s to t_f = 10.00 s.

  ☐ On the speedometer below, represent the total change of velocity during the interval from t_i = 4.00 s to t_f = 10.00 s.

  ☐ On the velocity graph at right, represent the total change of velocity during the interval from t_i = 4.00 s to t_f = 10.00 s.

  ☐ In the space below, show your calculation of the total change of velocity during the interval from t_i = 4.00 s to t_f = 10.00 s.
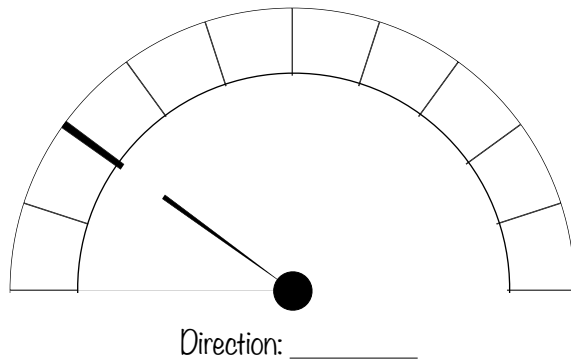
Direction: _____

Calculation

Time Point (seconds)

Stop

Instantaneous Velocity (tiles/beat)

W