

Unit 5: Graphs

Section 5.1: The Cartesian plane

Section 5.2: Working with Scale in the Cartesian Plane

Section 5.3: Characteristics of Graphs

Section 5.4: Interpreting Graphs

Section 5.5: Constructing good graphs from Data

KEY TERMS AND CONCEPTS	
Look for the following terms and concepts as you work through the Media Lesson. In the space below, explain the meaning of each of these concepts and terms <i>in your own words</i> . Provide examples that are not identical to those in the Media Lesson.	
Input	
Output	
Cartesian Coordinate System	
Ordered Pair	

Quadrants	
Scale	
Vertical Intercept	
Horizontal Intercept	
Local Maximum	
Local Minimum	
Behavior of Graphs	

Unit 5: Media Lesson

Section 5.1: The Cartesian Plane

In this chapter, we will begin looking at the relationships between two variables. Typically one variable is considered to be the **INPUT**, and the other is called the **OUTPUT**. The input is the value that is considered first, and the output is the value that corresponds to or is matched with the input. The input/output designation may represent a cause/effect relationship, but that is not always the case.

Ordered Pairs

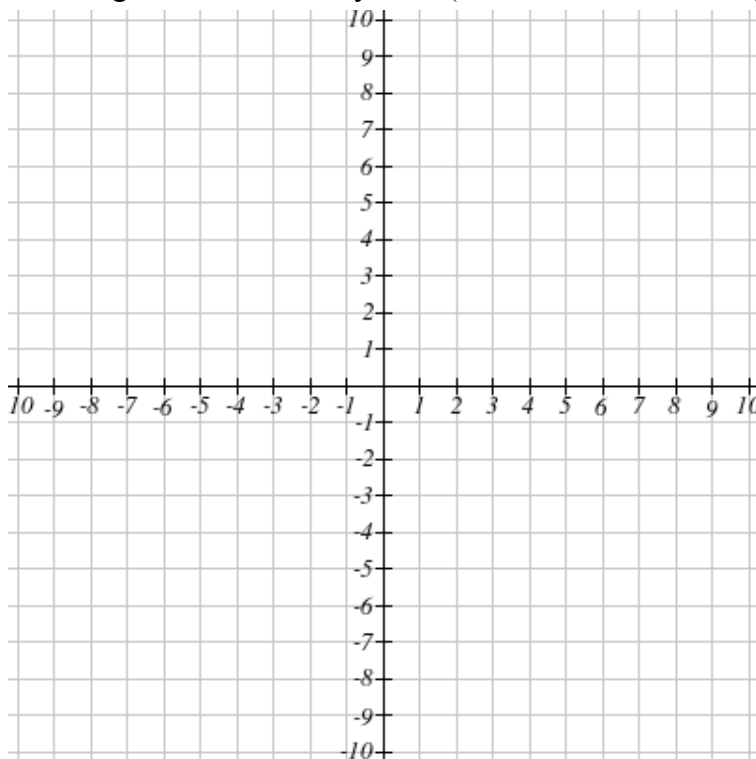


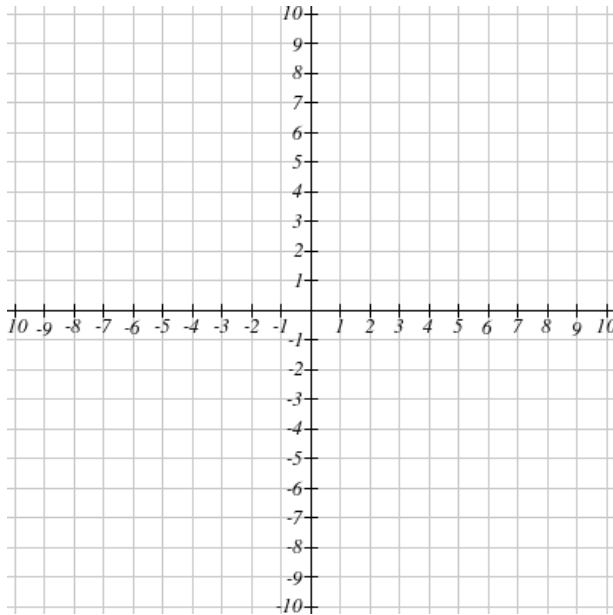
Example 1: Ordered Pairs (input value, corresponding output value)

Input	Output	Ordered Pairs (input, output)
4	-3	
5	8	
		(0, -4)
		(-2, 6)



Example 2: The Rectangular Coordinate System (Cartesian Coordinate System)



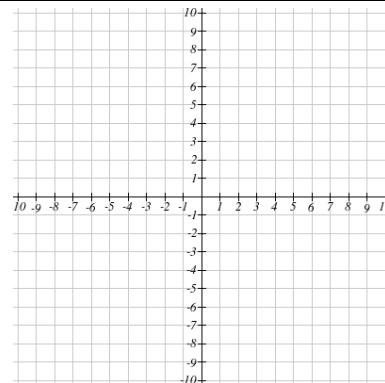


Plot and label the points.

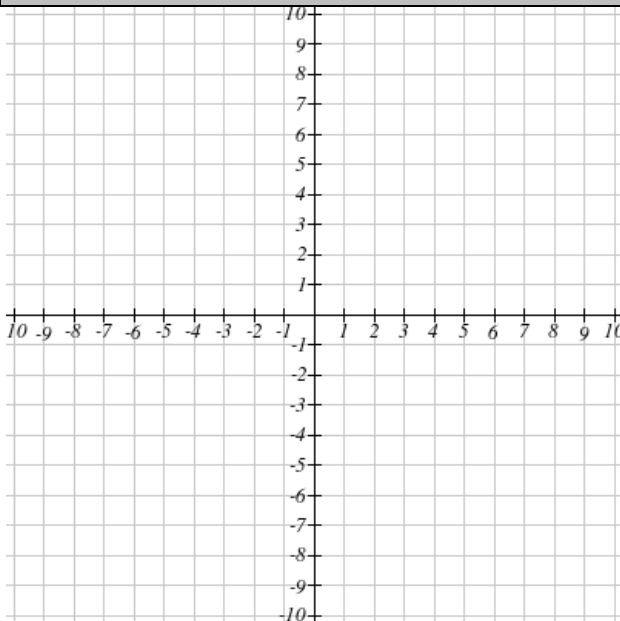
- A. $(-4, 2)$
- B. $(3, 8)$
- C. $(0, -5)$
- D. $(-6, -4)$
- E. $(5, 0)$
- F. $(2, -8)$
- G. $(0, 0)$

Quadrants

Quadrant	Coordinates
I	$(+, +)$
II	$(-, +)$
III	$(-, -)$
IV	$(+, -)$



Section 5.1 – You Try



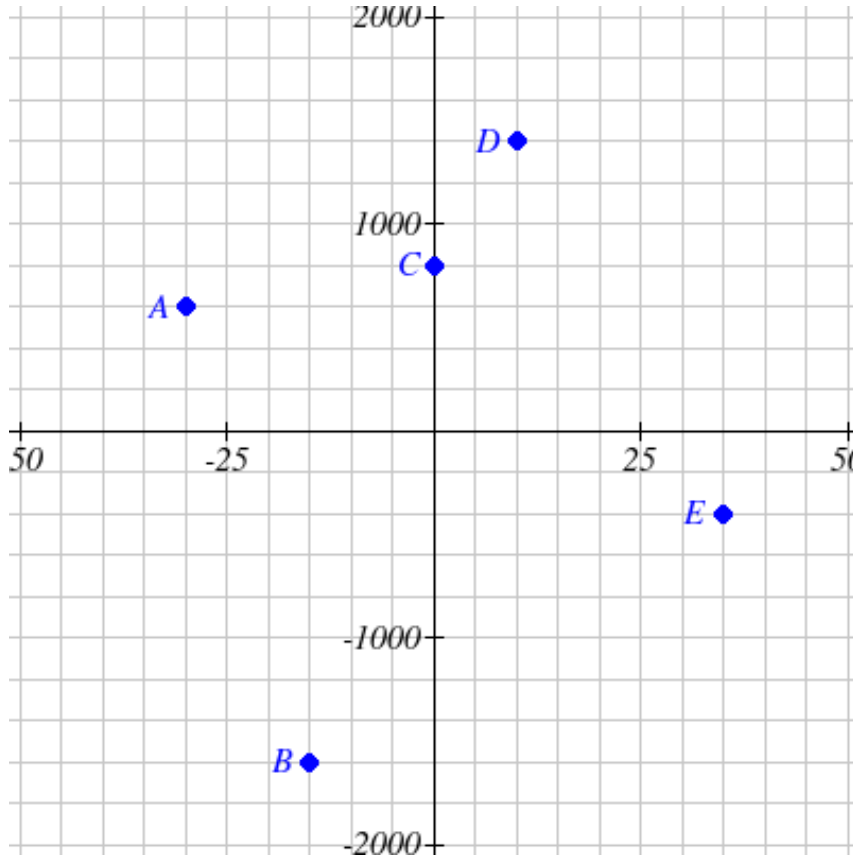
Plot and label the points.

- A. $(6, -3)$
- B. $(1, 9)$
- C. $(-4, 0)$
- D. $(-2, -8)$
- E. $(0, 5)$
- F. $(-9, 7)$

Section 5.2: Working with Scale in the Cartesian Plane



Example 1: Give the coordinates of each of the points shown below.



A. _____

B. _____

C. _____

D. _____

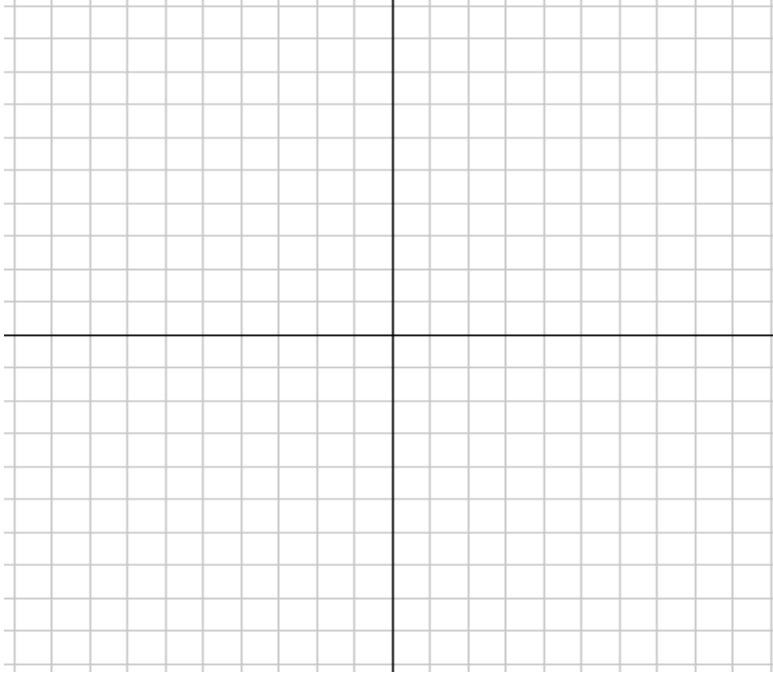
E. _____

Tips for Choosing a Scale

- For the horizontal axis, start by identifying the lowest input value and the highest input value that must be plotted. Your scale must *start* at or below the lowest value, and *end* at or above the highest value.
- Choose “nice” intervals for the tick marks on your scale. (In general, 10’s and 5’s are better than 7’s or 8’s). All tick marks must be equally spaced.
- Do the same for the output values on the vertical axis. NOTE: The scales for the input and output do not need to be the same!



Example 2: Plot the given points on the graph below.



A. $(-800, 1.8)$

B. $(550, 0.2)$

C. $(180, 0)$

D. $(0, -1.5)$

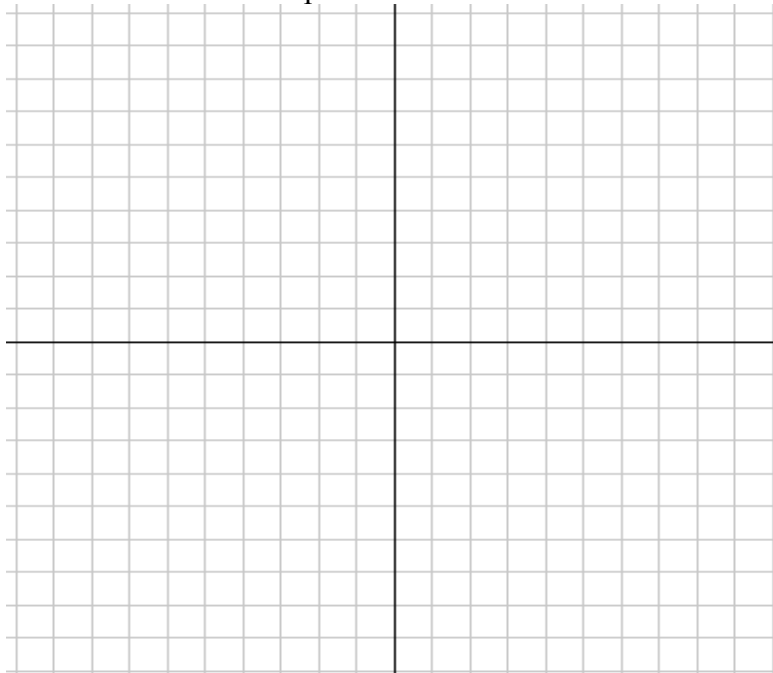
E. $(425, -0.4)$

F. $(-950, 1)$

Section 5.2 – You Try



Plot and label the points.



A. $(35, 125)$

B. $(0, 100)$

C. $(-40, 0)$

D. $(-30, 150)$

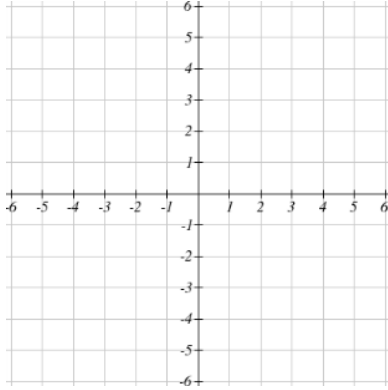
E. $(-25, -175)$

F. $(5, -75)$

Section 5.3: Characteristics of Graphs

Vertical and Horizontal Intercepts

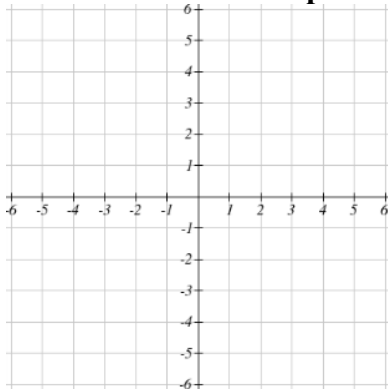
The **vertical intercept** is the point at which the graph crosses the vertical axis.



The input value of the vertical intercept is always _____

The coordinates of the vertical intercept will be _____

The **horizontal intercept** is the point at which the graph crosses the horizontal axis.

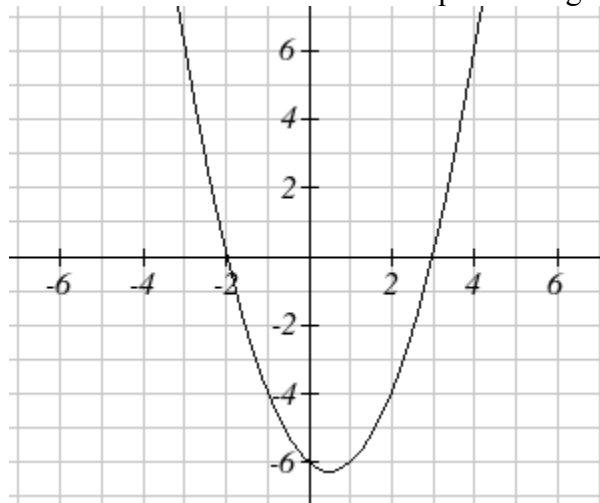


The output value of the horizontal intercept is always _____

The coordinates of the horizontal intercept will be _____



Example 1: Identify the vertical and horizontal intercepts of the graph below.



Behavior of Graphs

A graph is **increasing** if as the inputs increase, the outputs increase.

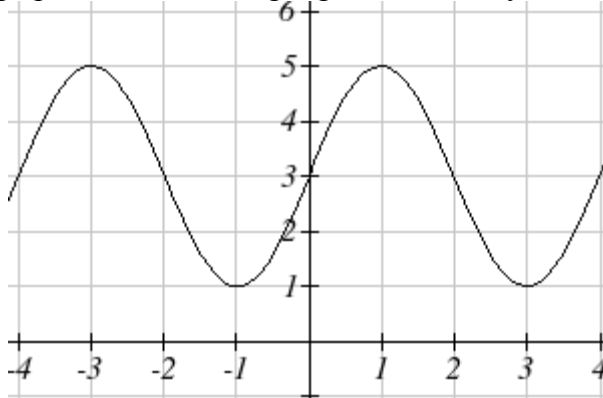
A graph is **decreasing** if as the inputs increase, the outputs decrease.

A graph is **constant** if as the inputs increase, the outputs do not change.

Increasing	Decreasing	Constant



Example 2: On the graph below, use a highlighter to identify where the graph is **increasing**.

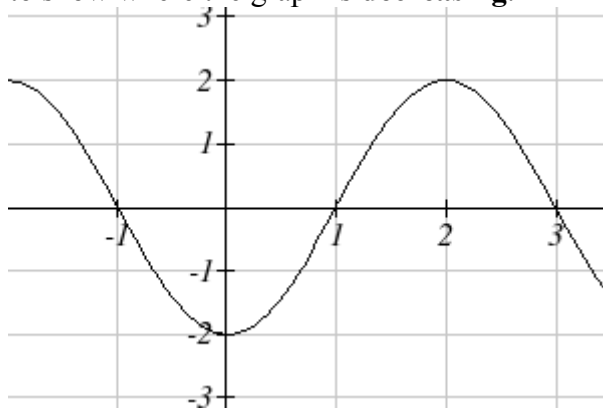


Section 5.3 – You Try



Consider the graph below.

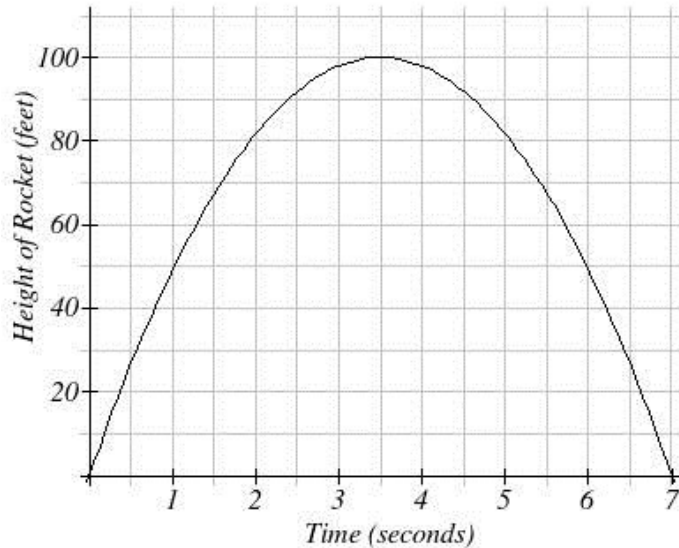
- Identify the vertical and horizontal intercepts of the graph. Mark these points on the graph and label them as ordered pairs.
- Use a highlighter to show where the graph is **decreasing**.



Section 5.4: Interpreting a Graph



Example 1: Consider the graph shown below.



Input Variable: _____


Units of Input Variable: _____

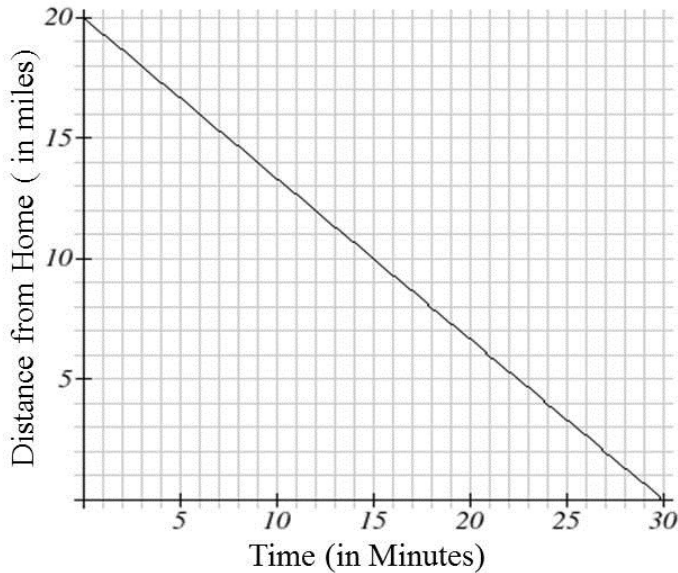
Output Variable: _____

Units of Output Variable: _____

- After 3.5 seconds, the rocket is _____ feet above the ground.
- The rocket is 50 feet above the ground after _____ seconds.
- Interpret the meaning of the ordered pair (5,82).
- Identify the vertical intercept. Write it as an ordered pair and interpret its meaning in a complete sentence.
- Identify the horizontal intercepts. Write them both as ordered pairs and interpret their meaning in a complete sentence.
- Use a highlighter to show where the graph is **increasing**, and explain what this means in terms of the rocket.

Section 5.4 - You Try

 The graph below shows Sally's distance from home over a 30 minute time period.



Input Variable: _____

Units of Input Variable: _____

Output Variable: _____

Units of Output Variable: _____

- Interpret the meaning of the ordered pair (15,10)
- After 3 minutes, Sally is _____ miles from home.
- After _____ minutes, Sally is 4 miles from home.
- Identify the vertical intercept. Write it as an ordered pair and interpret its meaning.
- Identify the horizontal intercept. Write it as an ordered pair and interpret its meaning.
- This graph is (circle one) **increasing** **decreasing**
 Explain what this means in terms of Sally's distance from home.

Section 5.5: Constructing a Graph from Data

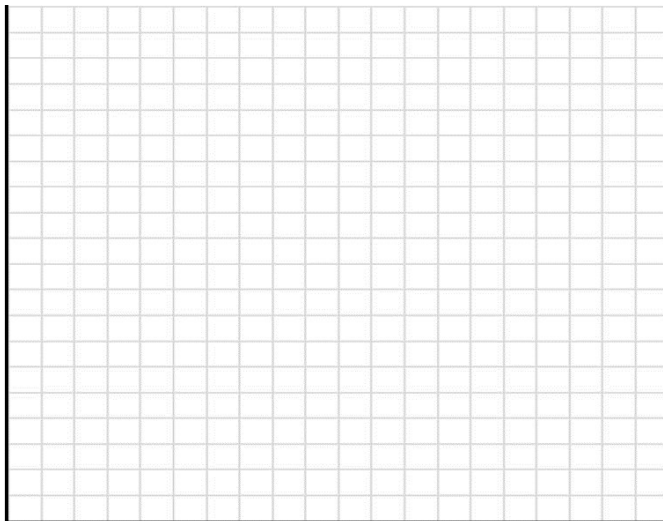
Criteria for a Good Graph

1. The horizontal axis should be properly labeled with the name and units of the input variable.
2. The vertical axis should be properly labeled with the name and units of the output variable.
3. Use an appropriate scale.
 - Start at or just below the lowest value.
 - End at or just above the highest value.
 - Scale the graph so the adjacent tick marks are equal distance apart.
 - Use numbers that make sense for the given data set.
 - The axes must meet at (0,0) Use a “//” between the origin and the first tick mark if the scale does not begin at 0.
4. All points should be plotted correctly, and the graph should make use of the available space.



Example 1: The table below shows the total distance (including reaction time and deceleration time) it takes a car traveling at various speeds to come to a complete stop.

Speed (miles per hour)	15	25	35	45	50	60	75	80
Stopping Distance (ft)	44	85	135	196	229	304	433	481



Input: _____

Lowest Value: _____

Highest Value: _____

Output: _____

Lowest Value: _____

Highest Value: _____

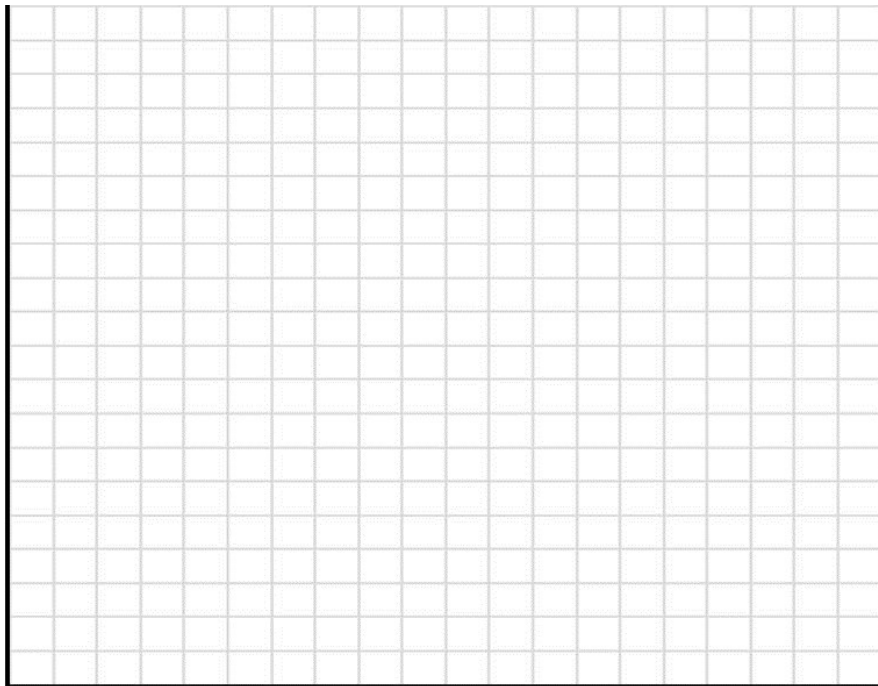
Section 5.5 – You Try



Consider the following data set.

Elapsed time (seconds)	0	1	1.5	2.4	3	3.8
Height of Golf Ball (feet)	0	59	77	88	81	54

- What is the input variable? _____
 - What was the height of the ball after 3 seconds? _____
 - After how many seconds was the ball 77 feet in the air? _____
 - In a complete sentence, interpret the meaning of the ordered pair (1, 59).
- e. Construct a good graph of this data.



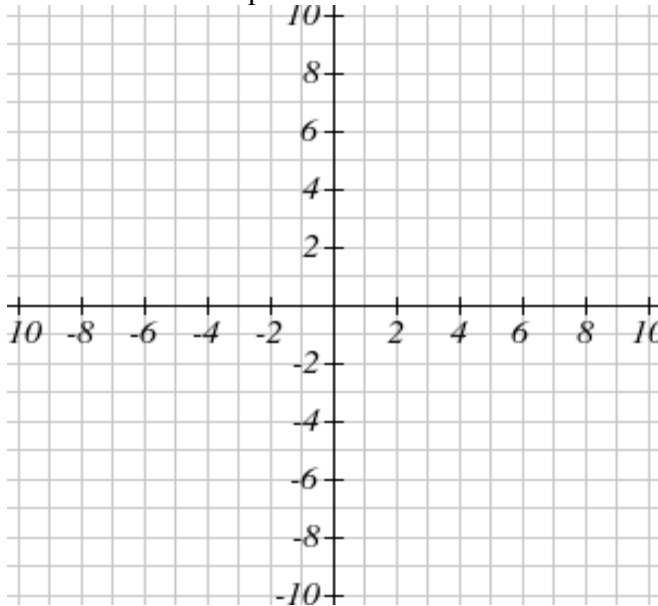
Name: _____

Date: _____

Unit 5: Practice Problems

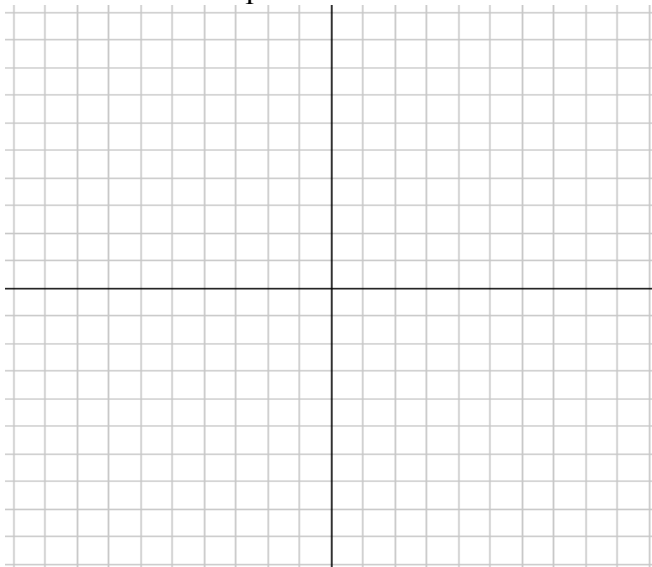
Skills Practice

1. Plot and label the points.



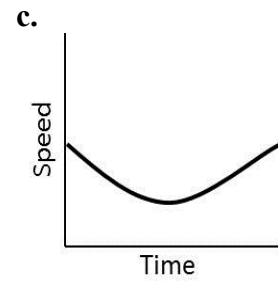
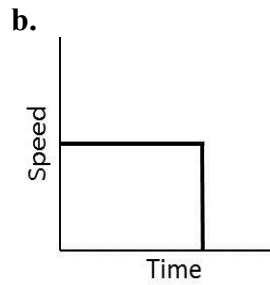
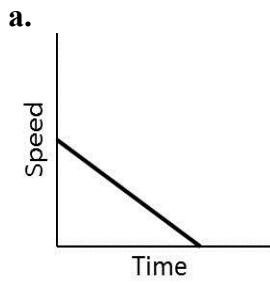
- A. (8, 2)
- B. (0, 0)
- C. (0, 5)
- D. (10, -10)
- E. (-4, 4)
- F. (-9, -1)
- G. (-5, 0)
- H. (2, -8)

2. Plot and label the points.

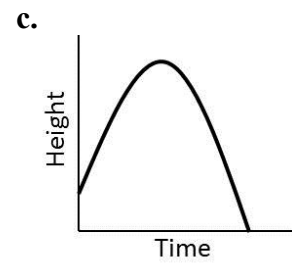
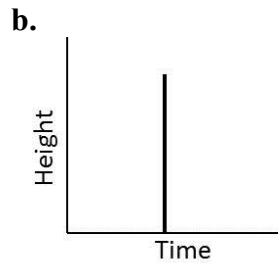
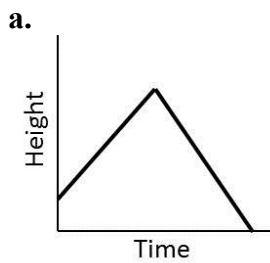


- A. (-800, 15)
- B. (650, 20)
- C. (100, 0)
- D. (0, -35)
- E. (-450, -40)
- F. (950, -30)

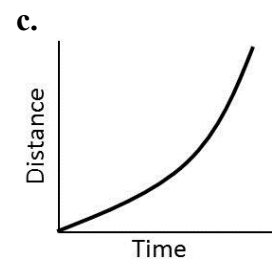
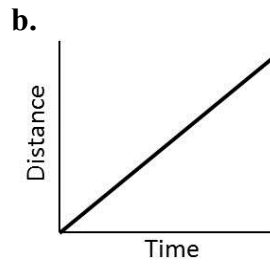
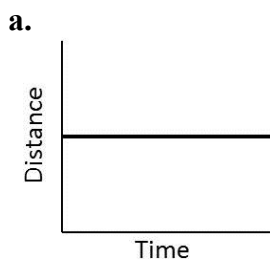
3. Identify the graph that best represents the speed of a car coming to a stop at a red light.



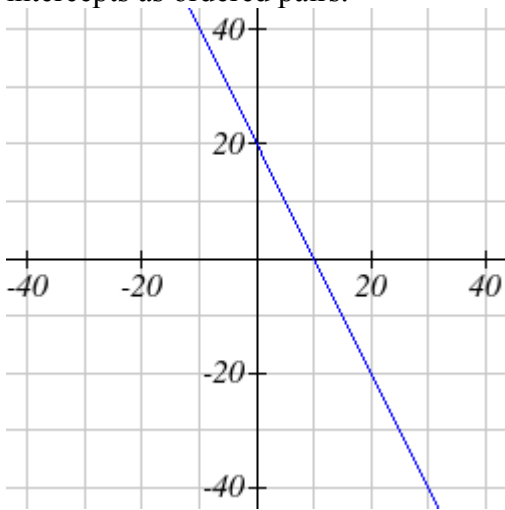
4. Identify the graph that best represents the height of an arrow that has been shot straight up in the air, and lands on the ground.



5. Identify the graph that best represents the distance traveled by a car driving at a constant speed.

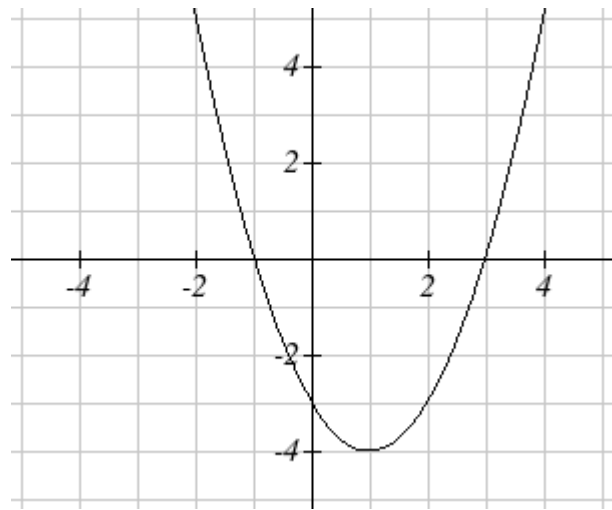


6. Identify the vertical and horizontal intercepts of each of the graphs below. Write the intercepts as ordered pairs.



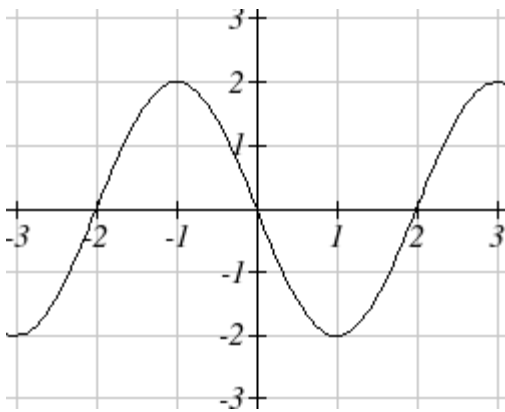
Vertical Intercept:

Horizontal Intercept:



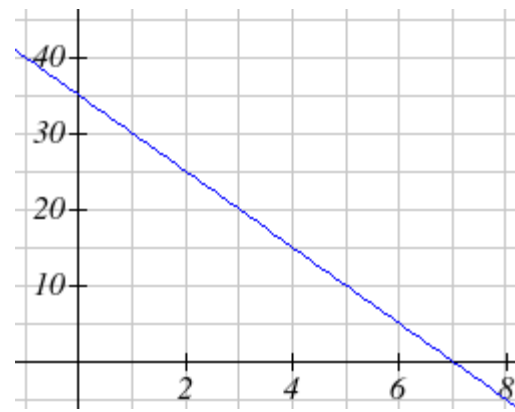
Vertical Intercept:

Horizontal Intercepts:



Vertical Intercept:

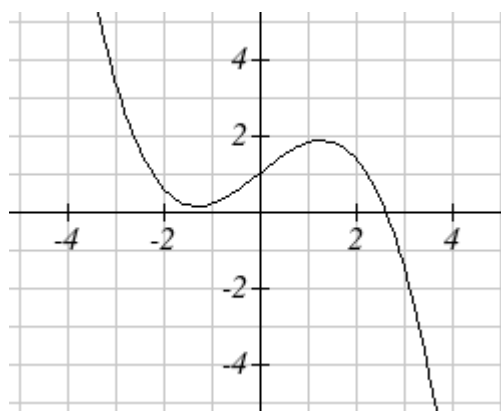
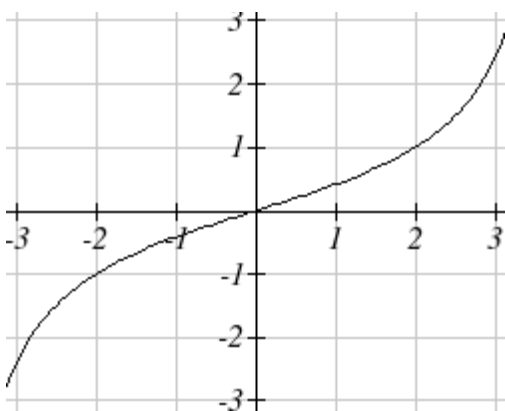
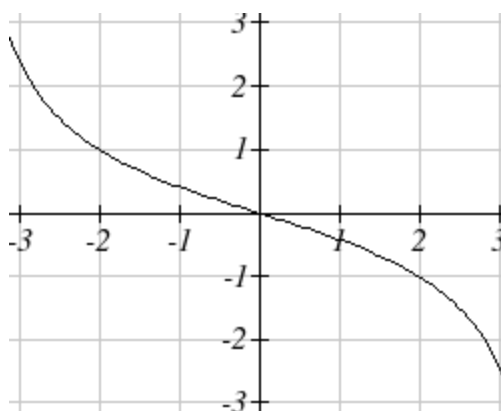
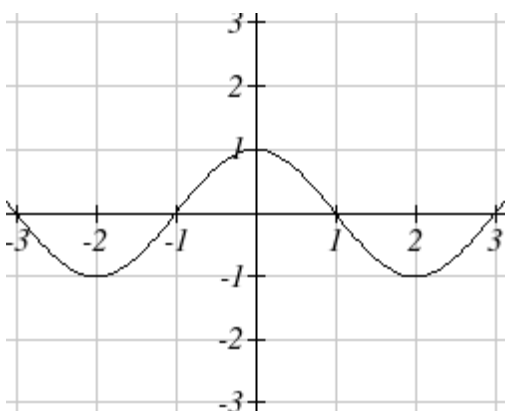
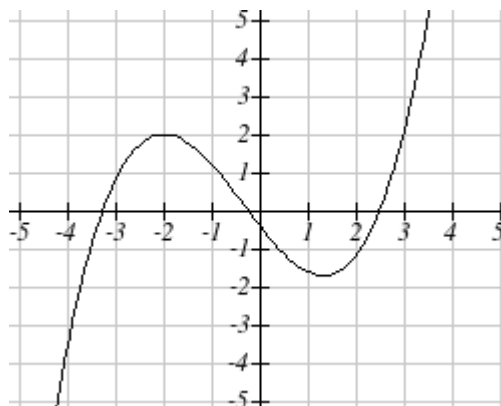
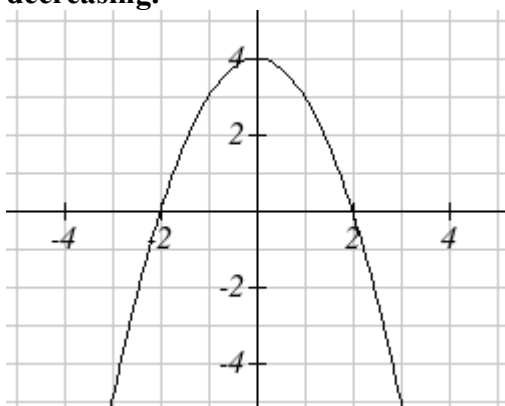
Horizontal Intercepts:



Vertical Intercept:

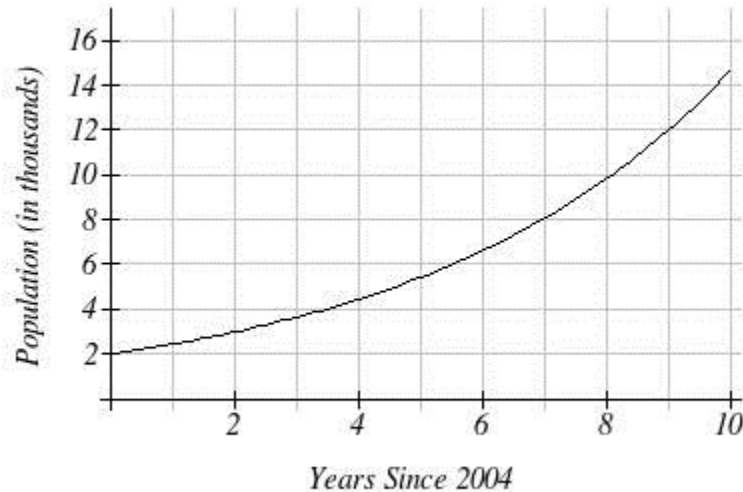
Horizontal Intercept:

7. For each of the graphs below, use a highlighter to indicate the intervals where the graph is **decreasing**.



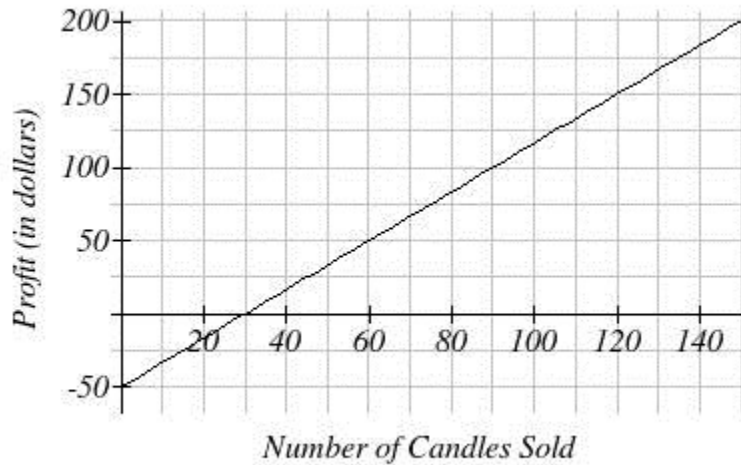
Applications

8. The graph below shows the population of a town over a 10-year time period.



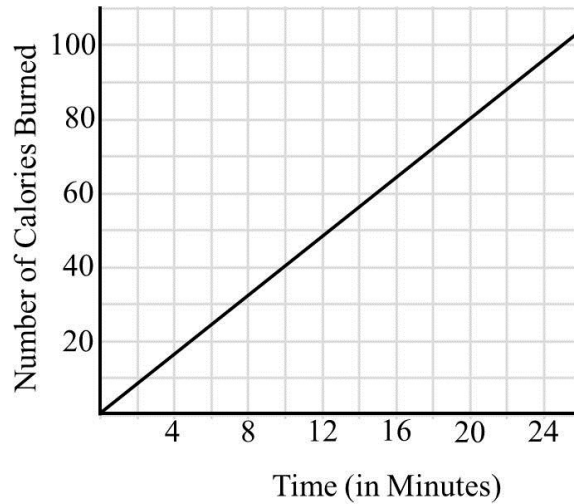
- a. What is the input variable? _____
- b. What is the output variable? _____
- d. The population of this town is (circle one) **increasing** **decreasing**
- e. The population of this town in the year 2006 was approximately _____.
- f. The population of this town in the year 2011 was approximately _____.
- g. The population of this town in the year _____ was approximately 10,000 people.
- h. Interpret the meaning of the ordered pair (9, 12).
- i. Identify the vertical intercept. Write it as an ordered pair and interpret its meaning in a complete sentence.

9. Janey is selling homemade scented candles. The graph below shows her profit from selling the candles.



- What is the input variable? _____
- What is the output variable? _____
- If Janey sells 90 candles, her profit will be _____.
- If Janey sells _____ candles, her profit will be \$200.
- If Janey sells 15 candles, her profit will be _____.
- Interpret the meaning of the ordered pair (60, 50).
- Identify the vertical intercept. Write it as an ordered pair and interpret its meaning in a complete sentence.
- Identify the horizontal intercept. Write it as an ordered pair and interpret its meaning in a complete sentence.

10. The graph below shows the number of calories burned while riding a stationary bike.

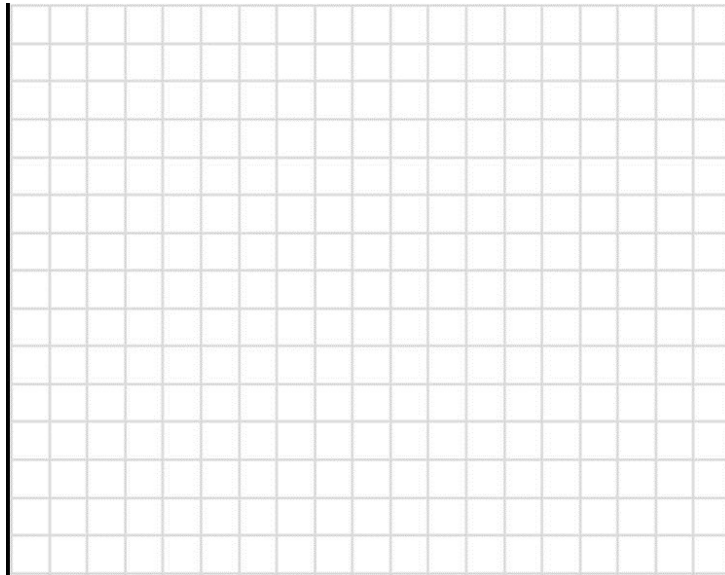


- a. What is the output variable? _____
- b. Interpret the meaning of the ordered pair (8, 32).
- c. _____ calories are burned in 10 minutes.
- d. 60 calories are burned in _____ minutes.
- e. _____ calories are burned in 16 minutes.
- f. 100 calories are burned in _____ minutes.
- g. Identify the vertical intercept. Write it as an ordered pair and interpret its meaning in a complete sentence.

11. The following data set gives the value of a car over time.

Years since purchase	Value in Dollars
0	20,025
1	17,822
2	15,862
3	14,117
5	11,182
8	7,883

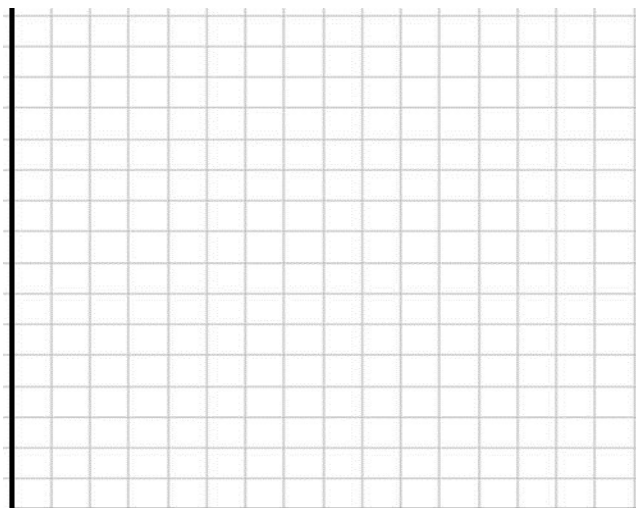
- What was the purchase price of the car? _____
- After one year the car will be worth what percent of its original value? Round your answer to the nearest tenth of a percent.
- After five years the car will be worth what percent of its original value? Round your answer to the nearest tenth of a percent.
- Use the values in the table to construct a properly scaled and labeled graph of the data.



12. A pebble falls from a bridge into the river below.

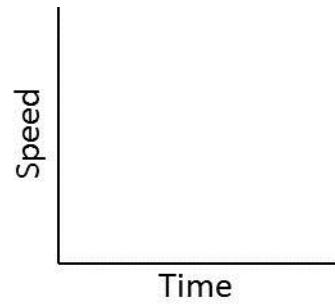
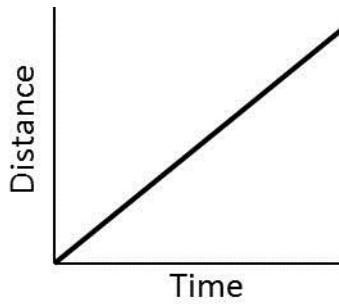
Time (seconds)	Height above the water (feet)
0	144
0.5	140
1	128
1.5	108
2	80
2.5	44
3	0

- What is the input variable? _____
- What is the output variable? _____
- In a complete sentence, interpret the meaning of the ordered pair (2, 80).
- Identify the vertical intercept. Write it as an ordered pair and interpret its meaning.
- Identify the horizontal intercept. Write it as an ordered pair and interpret its meaning.
- Use the values in the table to construct a properly scaled and labeled graph of the data.

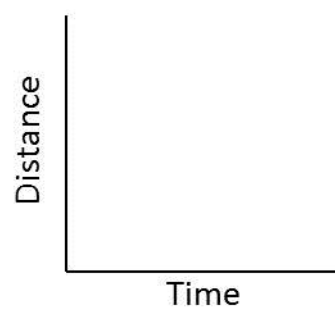
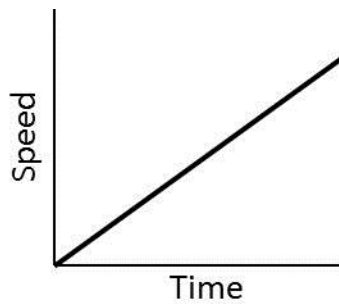


Extension

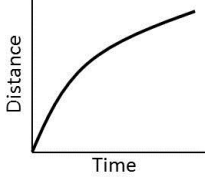
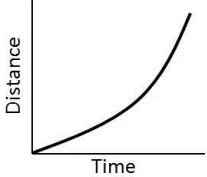
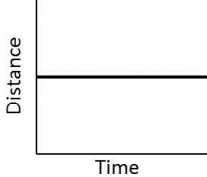
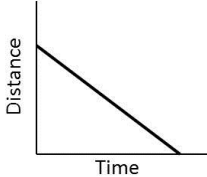
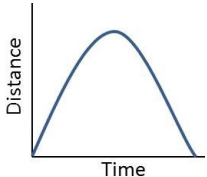
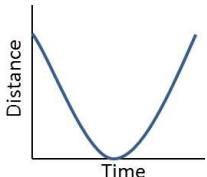
13. The graph below shows the *distance traveled* by a car. Draw a graph to represent the *speed* of the car during the same time period.



14. The graph below shows the *speed* of a car. Draw a graph to represent the *distance traveled* by the car during the same time period.

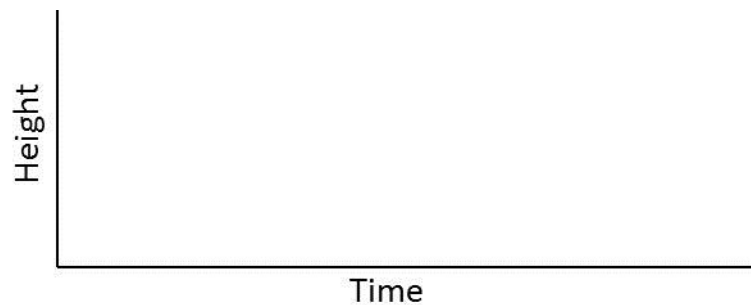


15. The graphs below shows Sara’s distance from home over time. Describe the story that each graph tells about the Sara’s journey.

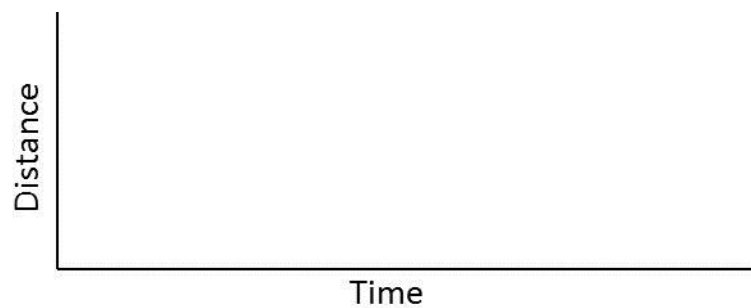
Graph	Story
	
	
	
	
	
	
	

16. Draw a graph to represent each situation.

- a. The height above the ground of a child swinging on a swing.



- b. Bill is walking to school when he realizes that he forgot his math book. He runs home to get it, and then jogs to school.



- c. The speed of a car stuck morning traffic.

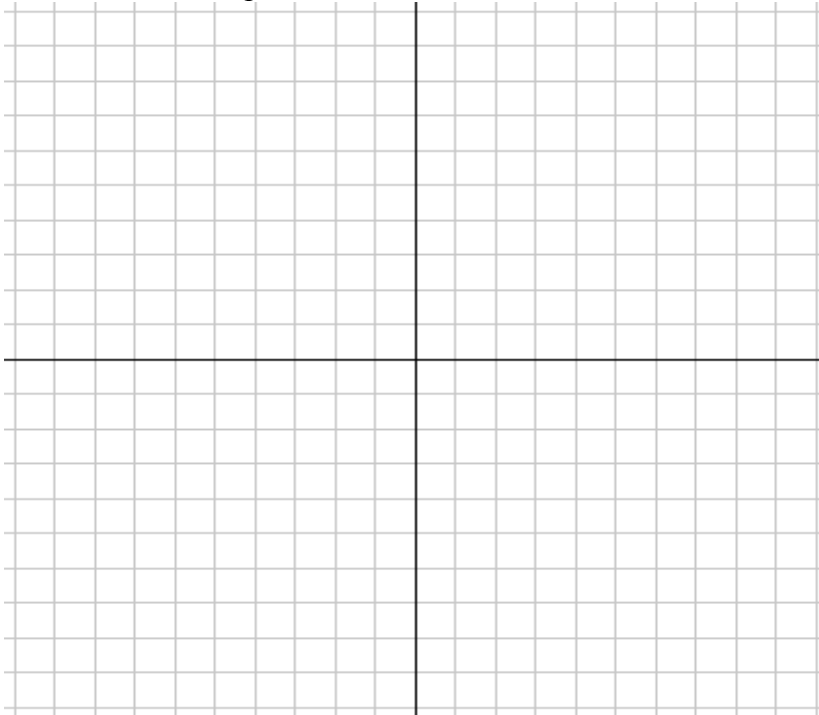


Name: _____

Date: _____

Unit 5: Review

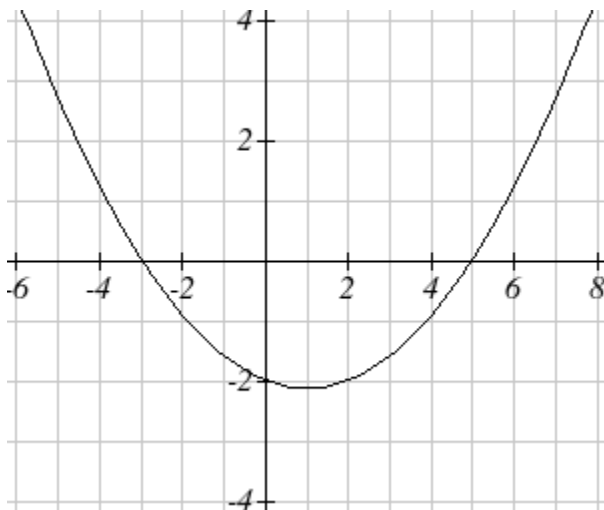
1. Plot and label the points.



- A. $(25, 2.5)$
- B. $(40, -0.5)$
- C. $(0, -3)$
- D. $(15, 0)$
- E. $(-45, 4)$
- F. $(-30, -1.5)$

2. Consider the graph below.

- a. Identify the vertical and horizontal intercepts of the graph. Mark these points on the graph and label them as ordered pairs.
- b. Use a highlighter to show where the graph is **increasing**.



3. Consider the following data set.

Years Since 1980	Sales (in millions of dollars)
0	3.2
5	2.4
10	1.5
15	1.3
21	1.1
25	2.6
26	3.5

- a. What is the input variable? _____
- b. What is the output variable? _____
- c. What were the sales in 1995? _____
- d. In a complete sentence, interpret the meaning of the ordered pair (0, 3.2).

- e. Use the values in the table to construct a properly scaled and labeled graph of the data.

