Chapter 6

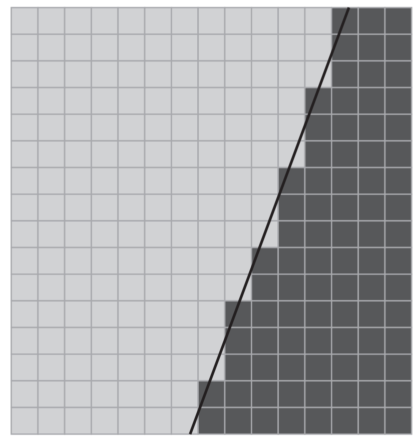
Name____ Date__________

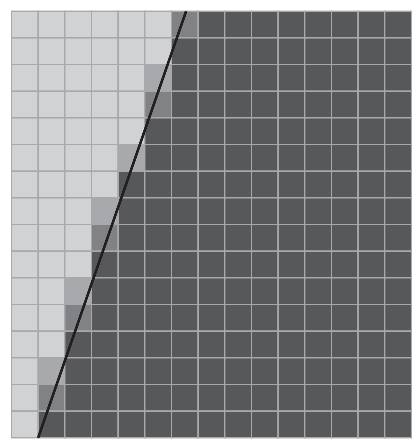
Chapter 6 Functions

Dear Family,

Many people enjoy putting their photos on their computers and sharing them online with friends and family. Sometimes, when sharing a photo online, you can see jagged edges that don't appear in the actual photo. These jagged edges happen because digital photos are actually created by a grid of colored dots.

The colors in the world we see are an example of a continuous range—any number of colors can exist. However, the colors in our camera are an example of a discrete range—a limited number of colors can exist.





When an edge passes through a dot, the camera has to decide whether to choose the color on one side of the edge or the other. Over a long edge, this can lead to a jagged look as the camera chooses one color or the other.

You and your student can model this using graph paper. Draw a slanted line on the graph paper. Color the blocks on one side of the line with red and the other side with blue. Choose one color or the other for blocks that the line passes through.

- Do you see a jagged pattern?
- What if you change the angle of the line—is the line *more jagged* or *less jagged*?
- What happens if you draw the line using blocks? Does the line look straight or jagged?

To see this, it might help to stand some distance away from the paper so the blocks appear smaller.

Modern computer applications try to eliminate the jagged edges by blending the colors on each side of the line. Try this with your student on a piece of graph paper. Does it improve the appearance of the line—especially from a distance?

Take a picture of your project and share it!

Nombre ____ Fecha ________

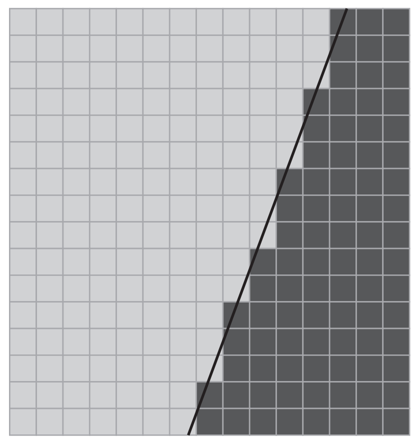
Capítulo 6 Funciones

Estimada Familia:

Muchas personas disfrutan colocando sus fotografías en la computadora y compartiéndolas en línea con familiares y amigos. A veces, cuando se comparten fotografías en línea, se pueden ver líneas que no están definidas, las cuales no aparecen en la foto real. Estos bordes irregulares ocurren porque las fotos digitales son creadas mediante una cuadrícula de puntos de colores.

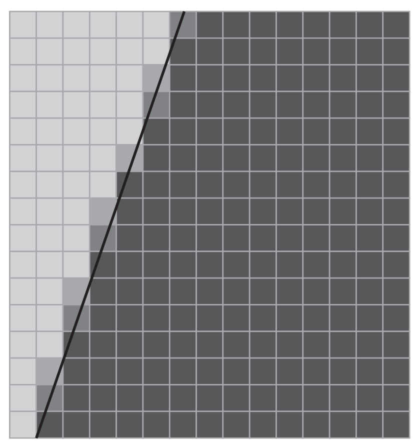
Los colores que vemos en el mundo son un ejemplo de un rango continuo—puede existir un sinfín de colores. Sin embargo, los colores en nuestras cámaras son un ejemplo de un rango definido—existe un número limitado de colores.

Cuando un borde pasa por un punto, la cámara tiene que decidir si escoge entre un color u otro. En un borde largo, esto puede producir una apariencia irregular al elegir la cámara un color u otro.



Usted y su estudiante pueden replicar este modelo usando papel cuadriculado. Dibujen una línea oblicua en el papel. Coloreen los cuadrados de un lado con rojo y los del otro lado con azul. Escojan un color u otro para los cuadrados por donde pasa la línea.

- ¿Observan el patrón irregular?
- Y si cambiara el ángulo de inclinación de la línea—¿la línea *es más o menos irregular*?
- ¿Qué pasaría si dibujaran la línea usando cuadrados? La línea aparece recta o irregular?



Para ver esto, ayudaría apreciar el papel a cierta distancia para que los cuadrados aparezcan más pequeños.

Los programas modernos de computadora tratan de eliminar los bordes irregulares mezclando los colores en cada lado de la línea.

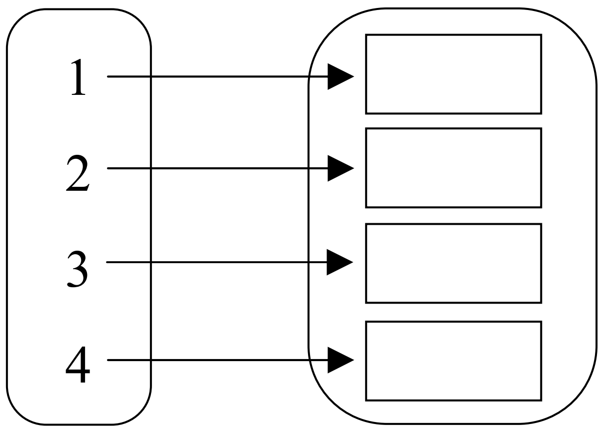
Intente hacerlo con su estudiante en un pedazo de papel cuadriculado. ¿Esto mejora la apariencia de la línea—particularmente desde una distancia?

¡Tomen una foto de su proyecto y compártanlo!

Activity 6.1 Start Thinking!
For use before Activity 6.1

Use the cost of a container of milk at your school cafeteria to complete the diagram.

Containers of Milk **Cost**



This type of diagram is called a *mapping diagram*. Why do you think it is called that?

Activity 6.1 Warm Up
For use before Activity 6.1

Solve the equation. Check your solution.

1. $-2.3 + x = 9.1$

2. $6\frac{1}{2} + x = -4\frac{3}{4}$

3. $x - 7.74 = -0.4$

4. $x - \left(-2\frac{1}{4}\right) = -5$

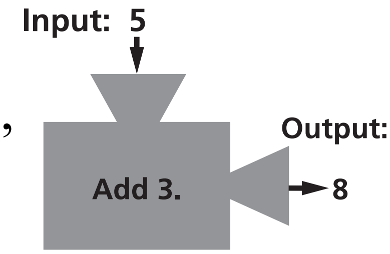
5. $-\frac{4}{7}x = 15$

6. $-8x = 4\frac{4}{5}$

Lesson 6.1 Start Thinking!

For use before Lesson 6.1

The function machine shown is for the rule “Add 3.” Using this function machine, what is the output for an input of 12?



Guess the Function Game (2 players)

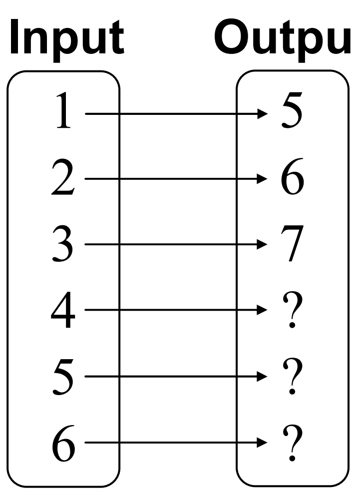
1. Decide who will be Player A and Player B.
2. Player A makes up a function rule. Do NOT tell Player B!
3. Player B gives an input number.
4. Player A uses the rule and mental math to calculate the output. Tell Player B the output.
5. Repeat Steps 3 and 4 until Player B can correctly guess the function rule.
6. Switch roles and play again.

Lesson 6.1 Warm Up

For use before Lesson 6.1

Describe the pattern in the mapping diagram. Copy and complete the diagram.

1.



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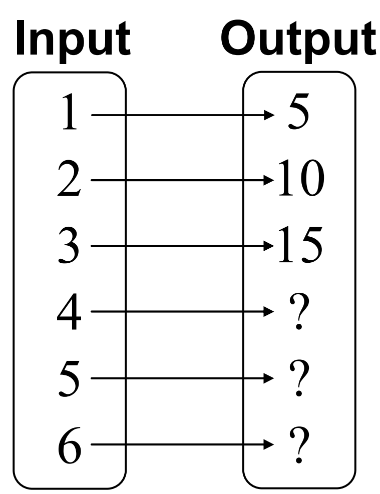
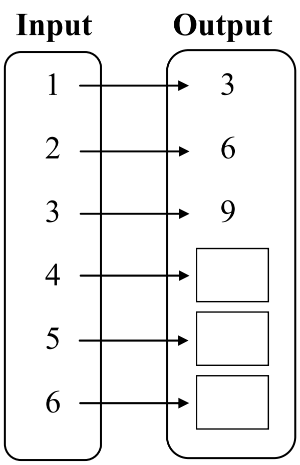
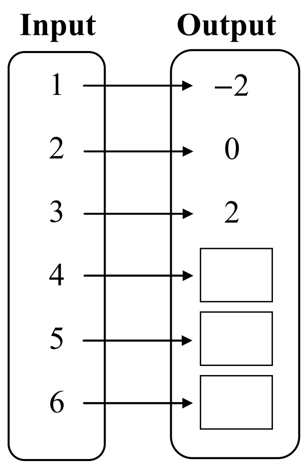


Name________________________________ Date__________

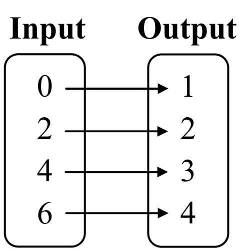
6.1 Practice A

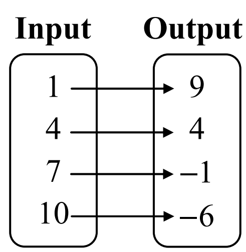
Describe the pattern in the mapping diagram. Copy and complete the diagram.

1. 

2. 

List the ordered pairs shown in the mapping diagram.

3. 

4. 

Draw a mapping diagram of the set of ordered pairs.

5. $(1, 2), (3, 5), (6, 9), (10, 12)$

6. $(-2, 7), (0, 5), (5, 8), (4, 9)$

7. The table shows the number of tickets purchased and the total cost.

Tickets	Total Cost
1	\$14
2	\$24
3	\$30
4	\$32

a. Use the table to draw a mapping diagram.

b. Is the relation a function? Explain.

c. Describe the pattern. How does the cost per ticket change as you buy more tickets?

d. Based on this pattern, how much would you expect to pay for 5 tickets?

e. Compare the costs for 3 tickets and 5 tickets. What can you suggest?

f. Explain why this pattern could not continue for up to 8 tickets.

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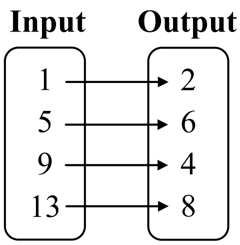
6.1 Practice B

List the ordered pairs shown in the mapping diagram.

1.



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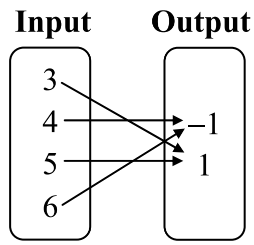


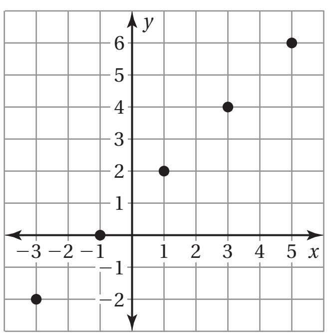
Draw a mapping diagram of the set of ordered pairs.

3. $(0, -3), (4, 12), (6, 13), (7, 0)$

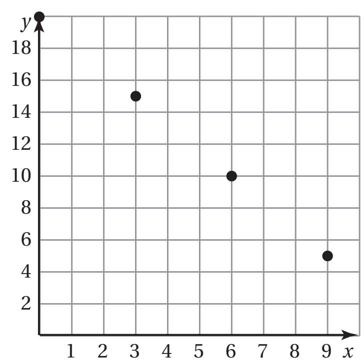
4. $(1, 0), (3, 0), (5, 4), (7, 4), (9, 4)$

Draw a mapping diagram for the graph. Then describe the pattern of inputs and outputs.

5.



6.



7. The table shows the cost of a collect call.

Minutes	1	2	3	4	5	6	7
Cost	\$3	\$3.25	\$3.50	?	?	?	?

a. Complete the table.

b. Draw a mapping diagram for the table.

c. Is the relation a function? Explain.

d. List the ordered pairs.

e. Graph the ordered pairs in a coordinate plane.

f. Describe the pattern. How does the cost change as the number of minutes increases?

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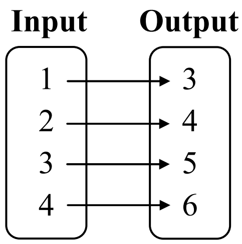
6.1 Enrichment and Extension

Identifying Functions

You learned that a *function* pairs each input with exactly one output. Tell whether the mapping diagram represents a function. Explain.

1.



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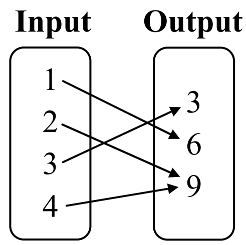
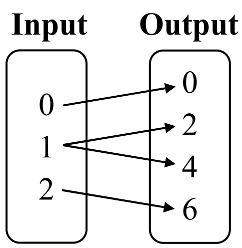


3.



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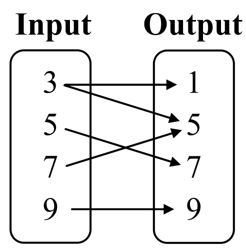
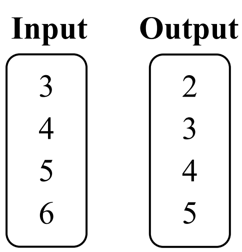
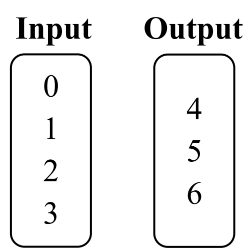


(a) Draw arrows to complete a mapping diagram of a function. (b) Draw one more arrow so that the mapping diagram does not represent a function.

5.



6.



(a) Find another point (x, y) so that the set of points represents a function.

(b) Find a point so that the set of points does not represent a function.

7. $(0, 0), (1, 1), (2, 2), (x, y)$

8. $(0, 9), (2, 8), (4, 7), (6, 6), (8, 5), (x, y)$

9. $(1, 3), (2, 3), (3, 4), (4, 4), (5, 5), (6, 5)\ (x, y)$

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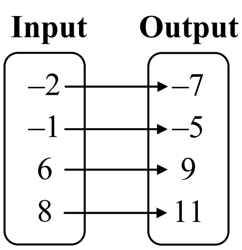
6.1 Puzzle Time

What Flowers Grow Between Your Nose and Your Chin?

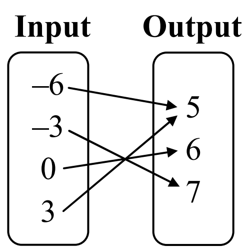
Write the letter of each answer in the box containing the exercise number.

List the ordered pairs shown in the mapping diagram.

1.



2.



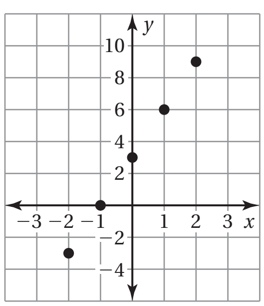
Draw a mapping diagram of the ordered pairs.

3. $(-15, -17), (-9, -11), (-6, 4), (-2, 8)$

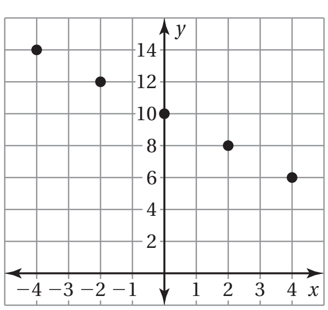
4. $(-5, 3), (-3, 1), (2, 1), (6, 3)$

Describe the pattern of inputs and outputs.

5.



6.

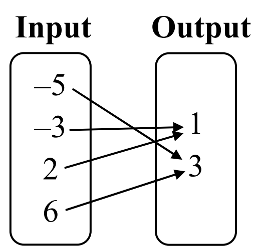


Answers

S. As each input increases by 2, the output decreases by 2.

L. $(-2, -7), (-1, -5), (6, 9), (8, 11)$

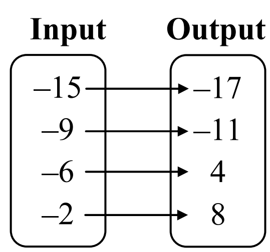
P.



M. As each input decreases by 2, the output decreases by 2.

R. $(2, 11), (4, 9), (6, 7), (8, 5)$

I.



U. $(-6, 5), (-3, 7), (0, 6), (3, 5)$

T. As each input increases by 1, the output increases by 3.

A. $(1, 5), (2, 6), (3, 7), (4, 5)$

D. As each input increases by 1, the output decreases by 3.

5	2	1	3	4	6

Activity 6.2

Start Thinking!

For use before Activity 6.2

Think about the function rule "Multiply by 7."

How can you write an equation for this function?

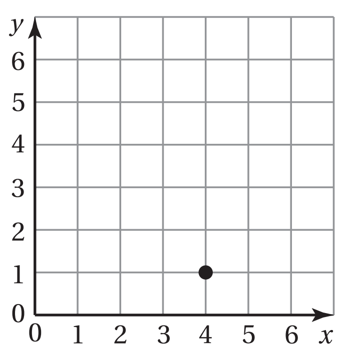
Explain how this equation can be used to describe the area of a rectangle with a length of 7 meters.

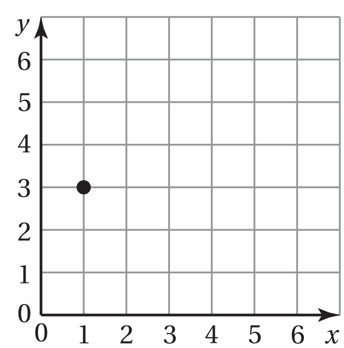
Activity 6.2

Warm Up

For use before Activity 6.2

Name the ordered pair.

1. 

2. 

Lesson 6.2 Start Thinking!

For use before Lesson 6.2

Using two variables, write an equation for a function that describes a real-life situation. Explain the situation and what each of the variables represents. Which variable represents input values? Which variable represents output values? Then make a mapping diagram that includes four different input values.

Lesson 6.2 Warm Up

For use before Lesson 6.2

Write an equation that describes the function.

1.

Input, x	Output, y
0	0
1	10
2	20
3	30

2.

Input, x	Output, y
1	17
2	18
3	19
4	20

3.

Input, x	Output, y
2	1
4	2
6	3
8	4

4.

Input, x	Output, y
20	10
40	30
60	50
80	70

Name____ Date__________

6.2 Practice A

Write an equation that describes the function.

1.

Input, x	Output, y
0	10
1	11
2	12
3	13

2.

Input, x	Output, y
0	0
1	3
2	6
3	9

Write a function rule for the statement.

3. The output is eight less than the input.

4. The output is double the input.

Find the value of *y* for the given value of *x*.

5. $y = x - 8; x = 5$

6. $y = 8x; x = 3$

7. $y = 4x - 1; x = 10$

8. $y = \dfrac{x}{2} + 5; x = -4$

Graph the function.

9. $y = x + 5$

10. $y = 9x$

11. $y = 2x + 3$

12. $y = \dfrac{x}{2} - 4$

13. You are running at a rate of 6 miles per hour.

a. Write a function that represents the distance d traveled in h hours.

b. How many miles do you run in 2 hours?

14. The cost of admission for a student is \$4 less than the cost of admission for an adult.

a. Write a function that relates the cost of admission for a student s with the cost of admission for an adult a.

b. What is the cost of admission for a student when the cost of admission for an adult is \$7.50?

c. What is the cost of admission for an adult when the cost of admission for a student is \$2?

Name ____ Date __________

6.2 Practice B

Write an equation that describes the function.

1. **Input, x Output, y**

Input, x	Output, y
10	14
20	24
30	34
40	44

2. **Input, x Output, y**

Input, x	Output, y
10	-5
12	-6
14	-7
16	-8

Write a function rule for the statement.

3. The output is five times the input.

4. The output is two less than the input.

Find the value of *y* for the given value of *x*.

5. $y = 3x - 4;\ x = 2$

6. $y = \frac{x}{3} - 1;\ x = -6$

Graph the function.

7. $y = \frac{x}{3} - 4$

8. $y = 2x + 7$

9. You are traveling on a turnpike at a rate of 70 miles per hour.

a. Write a function that represents the distance d traveled in h hours.

b. How many miles do you travel in 3.5 hours?

Find the value of *x* for the given value of *y*.

10. $y = 6x - 4;\ y = 20$

11. $y = \frac{x}{2} + 3;\ y = 1$

12. Your school club is selling popcorn at the football game. The cost of making the popcorn is \$90. You charge \$1.50 for each bag of popcorn.

a. Write a function you can use to find the profit P for selling b bags of popcorn.

b. You will *break even* if the cost of making the popcorn equals your income. How many bags of popcorn must you sell to break even?

13. Write a function for the area A of a square given the perimeter P of the square.

Name____ Date__________

6.2 Enrichment and Extension

Function Notation

In Lesson 6.2, you wrote functions as equations in two variables, *x* and *y*, with *x* as the input and *y* as the output. Another way to write a function is to use *function notation*.

Function in *x* and *y*		**Function notation**
$y = 4x$	$\longrightarrow$	$f(x) = 4x$
$y = 3x + 5$	$\longrightarrow$	$f(x) = 3x + 5$

$f(x)$ is the output. The symbol $f(x)$ is read as "*f* of *x*."

Example: Find $f(4)$ for $f(x) = x + 3$.

$f(x) = x + 3$	Write function.
$f(\mathbf{4}) = \mathbf{4} + 3$	Substitute 4 for *x*.
$f(4) = 7$	Add.

So, *f* of 4 is equal to 7.

Rewrite the function using function notation.

1. $y = 2x$ **2.** $y = x - 1$ **3.** $y = 4x + 7$ **4.** $\frac{3}{4}x + 5 = y$

Find $f(0)$, $f(2)$, and $f(4)$ for the function.

5. $f(x) = 8x$ **6.** $f(x) = 7 + x$ **7.** $f(x) = 5 - x$

8. $f(x) = 3x + 8$ **9.** $f(x) = 9 - 2x$ **10.** $f(x) = \frac{1}{2}x$

11. $f(x) = \frac{1}{4}x + 6$ **12.** $f(x) = 3 + 1.6x$ **13.** $f(x) = x^2 + 1$

14. Critical Thinking Find a function where $f(0) = 2$ and $f(1) = 2$.

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6.2 Puzzle Time

Did You Hear The Story About The Smog?

A	B	C	D	E	F
G	H	I	J	K	

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

44 IS
$y = x - 5$ HAVE
$y = 3x$ YOU
$y = 10x$ TOWN
$y = 8x$ TO
-1 ALL

Write an equation that describes the function.

A.

Input, x	Output, y
-2	-6
-1	-3
0	0
1	3
2	6

B.

Input, x	Output, y
-55	-65
-45	-55
15	5
25	15
35	25

Write a function rule for the statement.

C. The output is five less than the input.

D. The output is eight times the input.

E. The output is one-third the input.

F. The output is thirteen more than four times the input.

Find the value of *y* for the given value of *x*.

G. $y = x + 7;\ x = -5$ **H.** $y = 6x - 4;\ x = 8$

I. $y = 2x + 4;\ x = -2.5$ **J.** $y = 9x - 3;\ x = 3$

K. The number of multiple-choice questions on a test y is 10 times the number of open-ended questions x. Write a function that describes the relationship.

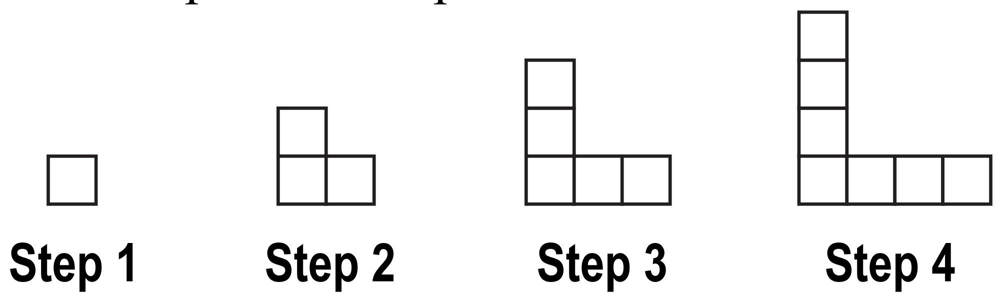
21 AIR
$y = \frac{1}{3}x$ TELL
24 OVER
2 IT
$y = x - 10$ DON'T
$y = 4x + 13$ ME

Activity 6.3

Start Thinking!

For use before Activity 6.3

In the block pattern below, two blocks are added in each step to form a pattern.



Use blocks to come up with a different pattern in which the same number of blocks is added in each step. Sketch the first 4 steps in your pattern.

Complete the table. Then graph the function.

Step number, *x*				
Number of blocks, *y*				

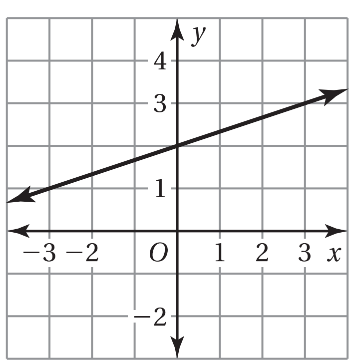
Activity 6.3

Warm Up

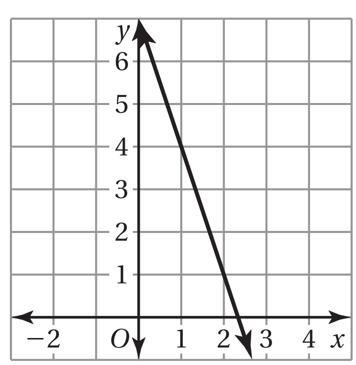
For use before Activity 6.3

Write an equation of the line in slope-intercept form.

1.



2.



Lesson 6.3 Start Thinking!

For use before Lesson 6.3

Think about the term *linear function*.

What do you think it means?

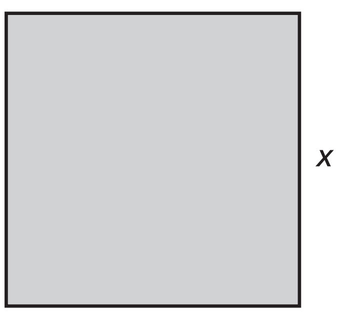
Give an example.

Lesson 6.3 Warm Up

For use before Lesson 6.3

The table shows a familiar pattern from geometry.

x	1	2	3	4	5
y	4	8	12	16	20



1. Write a function that relates y to x.

2. What do the variables x and y represent?

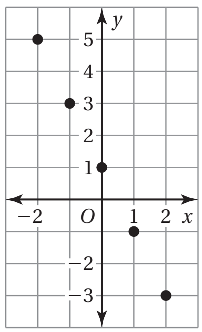
3. Graph the function.

Name______________________________ Date__________

6.3 Practice A

Use the graph or table to write a linear function that relates *y* to *x*.

1.



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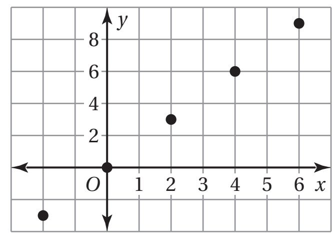


3.

x	–1	0	1	2
y	3	0	–3	–6

4.

x	–10	–5	0	5
y	–2	–1	0	1

5. The table shows the cost y (in dollars) of x fluid ounces of brewed coffee.

Fluid Ounces, *x*	0	8	16	24
Cost, *y*	0	0.5	1	1.5

a. Which variable is independent? dependent?

b. Write a linear function that relates y to x. Interpret the slope.

c. Graph the linear function.

d. How much does it cost to purchase 32 fluid ounces of brewed coffee?

6. The table shows the area y (in square feet) of a triangle with a height of x feet.

Height, *x*	0	1	2	3
Area, *y*	0	3	6	9

a. Which variable is independent? dependent?

b. Write a linear function that relates the area of the triangle to the height of the triangle.

c. Graph the linear function.

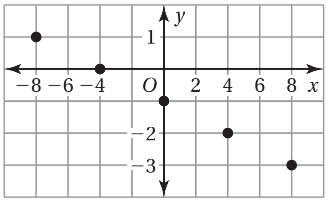
d. The formula for the area of a triangle is $A = \frac{1}{2}bh$. What is the length (in feet) of the base of the triangle?

Name ____ Date __________

6.3 Practice B

Use the graph or table to write a linear function that relates *y* to *x*.

1.



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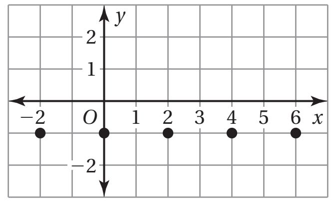


3.

x	–4	–2	0	2
y	8	4	0	–4

4.

x	–5	0	5	10
y	1	3	5	7

5. The table shows the time y (in minutes) it takes to make x burritos.

Burritos, x	1	2	3	4
Minutes, y	0.75	1.5	2.25	3

a. Which variable is independent? dependent?

b. Write a linear function that relates y to x. Interpret the slope.

c. Graph the linear function.

d. How long does it take to make 7 burritos?

6. The table shows the distance traveled y (in miles) in a car in x hours.

Hours, x	0	2	4	6
Miles, y	0	128	256	384

a. Which variable is independent? dependent?

b. Write a linear function that relates distance traveled to hours.

c. Graph the linear function.

d. What was the distance traveled in 5 hours?

e. The formula $d = rt$ relates distance with time for a given rate. Use the formula to determine the rate at which the car was traveling.

f. How long will it take to travel 400 miles?

Name________________________________ Date__________

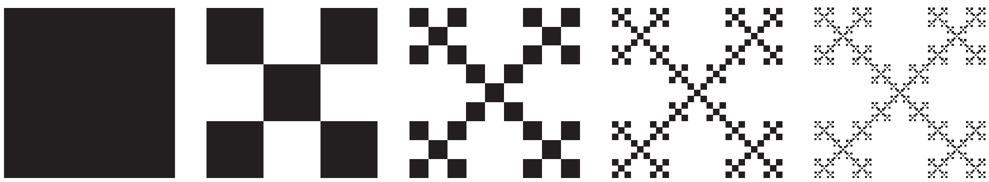
6.3 Enrichment and Extension

Describing a Pattern

A *fractal* is a geometric object that is self-similar. In other words, if you enlarge any part of the fractal, it will be similar to the whole fractal.

Fractals can be produced by repeating the same set of steps multiple times. The number of times you have performed the procedure is call the *iteration number*.

This example is called the *Box Fractal*.



0 1 2 3 4 Iteration Number

1. Describe the procedure used to transform the box at iteration 0 into the box at iteration 1.

2. What is the relationship between the original box and each of the five boxes in iteration 1?

3. Copy and complete the table using the fractal pattern.

Iteration	Number of Squares
0	1
1	5
2	
3	
4	

4. What pattern do you notice in the table? Can you generalize the pattern?

5. Is the pattern in the table linear? Explain your reasoning.

6. How many iterations do you expect to perform in this pattern? Explain your reasoning.

Name ______________________________ Date __________

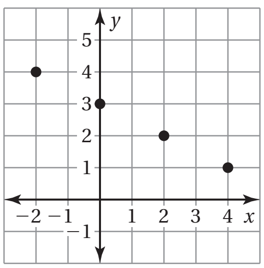
6.3 Puzzle Time

What Would You Get If You Crossed A Vampire With A Snowman?

Write the letter of each answer in the box containing the exercise number.

Use the graph or table to write a linear function that relates *y* to *x*.

1.



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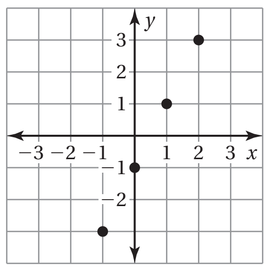

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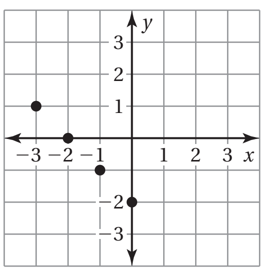

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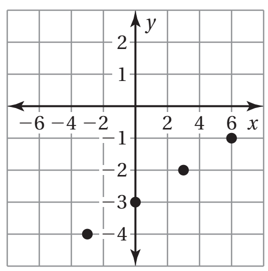


5.

x	–2	0	2	4
y	4	5	6	7

6.

x	–4	–2	0	2
y	0	–2	–4	–6

7.

x	–2	0	2	4
y	–8	–5	–2	1

8.

x	0	2	4	6
y	2	0	–2	–4

9. The table shows how many cups of pancake mix x are needed to make y pancakes. Find the linear function that relates the number of pancakes to the number of cups of pancake mix.

Cups of Mix, *x*	1	2	3	4
Pancakes, *y*	6	12	18	24

Answers

S. $y = 2x - 1$

R. $y = \frac{1}{2}x + 5$

E. $y = -\frac{1}{2}x + 3$

O. $y = \frac{1}{3}x - 3$

T. $y = \frac{3}{2}x - 5$

I. $y = -x - 2$

B. $y = 6x$

F. $y = -x + 2$

T. $y = -x - 4$

8	5	4	2	7	9	3	6	1

Activity 6.4

Start Thinking!

For use before Activity 6.4

Consider the following:

- the height of a bouncing ball
- the height of a plane during takeoff
- the height of a baseball hit over an outfield fence
- the height of a roller coaster car

Draw a graph to represent each situation and then tell whether it is *linear* or *nonlinear*.

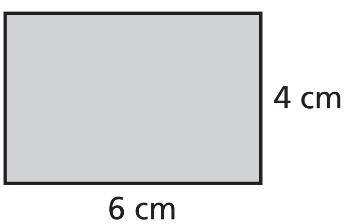
Activity 6.4

Warm Up

For use before Activity 6.4

Find the perimeter and area of the rectangle.

1.



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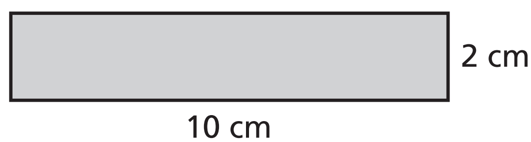

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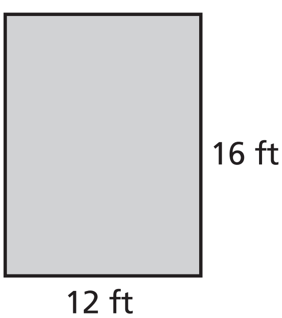

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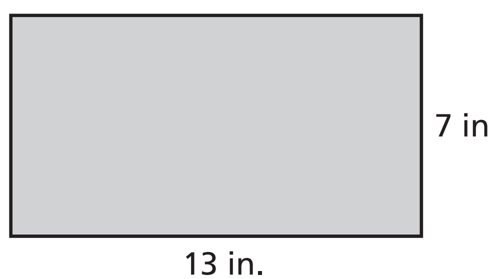


Lesson 6.4

Start Thinking!

For use before Lesson 6.4

Describe two real-life situations at an amusement park: one that can be represented by a linear function and one that can be represented by a nonlinear function.

Lesson 6.4

Warm Up

For use before Lesson 6.4

Graph the data in the table. Decide whether the graph is *linear* or *nonlinear.*

1.

x	0	1	2	3
y	6	4	2	0

2.

x	0	1	2	3
y	3	5	8	12

3.

x	0	1	2	3
y	15	25	20	30

4.

x	0	1	2	3
y	–7	–2	3	8

Name____ Date__________

6.4 Practice A

Graph the data in the table. Decide whether the graph is *linear* or *nonlinear*.

1.

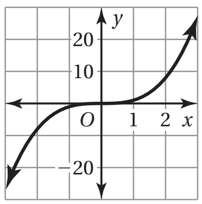
x	0	1	2	3
y	5	10	15	20

2.

x	1	2	3	4
y	4	6	9	13

Does the table or graph represent a *linear* or *nonlinear* function? Explain.

3.



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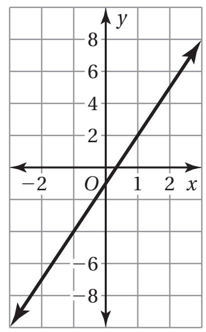


5.

x	3	5	7	9
y	5	3	0	3

6.

x	4	7	10	13
y	–2	0	2	4

7. The table shows the area A (in square centimeters) of a circle with radius r centimeters. Does the table represent a *linear* or *nonlinear* function? Explain.

Radius, *r*	1	2	3	4	5	6	7	8
Area, *A*	π	4π	9π	16π	25π	36π	49π	64π

8. The table shows the cost y (in dollars) of x ounces of cereal.

Ounces, *x*	8	12	16
Cost, *y*	?	2.5	3.5

a. What is a missing y-value that makes the table represent a nonlinear function?

b. What is the missing y-value that makes the table represent a linear function?

c. Write a linear function that represents the cost y of x ounces of cereal. Interpret the slope.

Name ______________________________ Date __________

6.4 Practice B

Graph the data in the table. Decide whether the graph is *linear* or *nonlinear*.

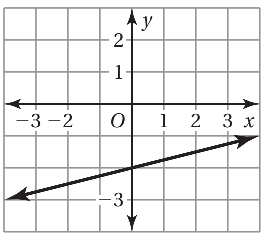
1.

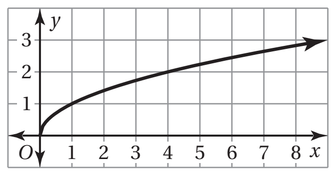
x	4	3	2	1
y	1	3	7	11

2.

x	2	5	8	11
y	3	6	9	12

Does the graph or equation represent a *linear* or *nonlinear* function? Explain.

3. 

4. 

5. $y = \frac{3}{x} - 1$

6. $5x - y = 8$

7. The table shows the profit P (in dollars) of selling x pairs of flip flops. Does the table represent a *linear* or *nonlinear* function? Explain.

Flip Flops, *x*	1	2	3	4	5
Profit, *P*	4	8	12	16	20

8. The table shows the commission y (in dollars) of selling x cell phone plans.

Cell Phone Plans, *x*	1	2	3	4
Commission, *y*	100	150	250	400

   a. Does the table represent a *linear* or *nonlinear* function? Explain.

   b. Based on the pattern in the table, what is the commission of selling 5 cell phone plans?

9. The formula for the volume V of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.

   Does this formula represent a *linear* or *nonlinear* function? Explain.

Name____ Date__________

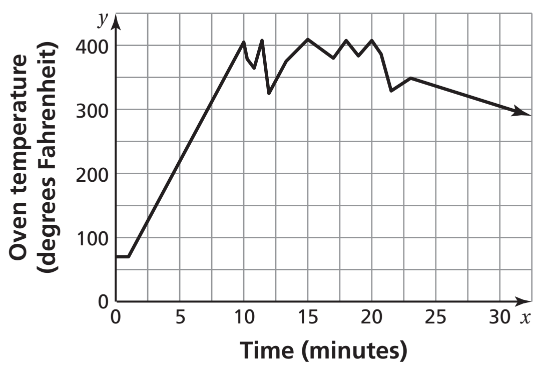
6.4 Enrichment and Extension

Linear and Nonlinear Functions

In Exercises 1–6, describe two real-life patterns for each topic—one that is linear and one that is nonlinear.

1. monthly allowance
2. music
3. television
4. airplane flight
5. geometric shape
6. shopping mall

A family is baking sugar cookies using the recipe at the right. The graph below shows the oven temperature (in degrees Fahrenheit) over time.



Super Easy Sugar Cookies

Ingredients

1 cup butter
1 cup sugar
1 large egg
1 teaspoon vanilla extract
2 teaspoons baking powder
$2\frac{3}{4}$ cups flour

Directions

1. Cream butter and sugar.
2. Add egg and vanilla.
3. Mix all dry ingredients and add slowly to butter cream mixture until incorporated
4. Roll out on lightly floured board to $\frac{1}{4}$-inch thickness.
5. Cut out $2\frac{1}{2}$-inch hearts.
6. Bake at ______ degrees for _______ minutes.

7. Is the graph *linear* or *nonlinear*?

8. Describe the graph as it relates to baking cookies. Be sure to include the following in your description:
- starting temperature
- time it took to preheat the oven
- times when the oven door was opened
- time that the oven was turned off

9. Why do you think the oven temperature fluctuates once the oven reaches the desired temperature?

10. Use the graph to complete Step 6 of the recipe.

Name ____ Date __________

6.4 Puzzle Time

What Belongs To You, But Is Used More By Other People?

Write the letter of each answer in the box containing the exercise number.

Choose the equation that represents a *nonlinear* function.

1. **N.** $y + x = 2x - 1$ **O.** $xy = 2x - 1$ **P.** $2y + 1 = 2x$

2. **P.** $3y = 4x + 3$ **Q.** $x - y = 4$ **R.** $y = 3x^2 + 4$

3. **A.** $5y = \frac{7}{x}$ **B.** $7y = 5x$ **C.** $5y + x = 7x$

4. **C.** $y = 6\pi$ **D.** $y = 6\pi x$ **E.** $y = 6\pi x^2$

Choose the missing *y*-value that makes the points represent a linear function.

5. $(1, 15), (2, 19), (3, ?)$

U. 23 **V.** 24 **W.** 25

6. $(-3, 9), (-2, ?), (-1, 7)$

K. 12 **L.** 6 **M.** 8

7. $(4, ?), (7, -3), (10, -3)$

X. -2 **Y.** -3 **Z.** -4

8. $(25, 360), (40, 320), (55, ?)$

L. 300 **M.** 380 **N.** 280

7	1	5	2		8	3	6	4

Activity 6.5 Start Thinking!

For use before Activity 6.5

Review with a partner what the difference is between a *linear function* and a *nonlinear function*. Give an example of each.

Activity 6.5 Warm Up

For use before Activity 6.5

Graph the data.

1.

Input, *x*	1	2	3	4
Output, *y*	2	4	6	8

2.

Input, *x*	0	2	4	6
Output, *y*	1	2	3	4

3.

Input, *x*	1	2	3	4
Output, *y*	3	5	7	9

Lesson 6.5

Start Thinking!

For use before Lesson 6.5

Draw a graph that represents the following situation.

You go shopping. You buy a shirt and spend half of your money. You meet a friend who owes you a quarter of the amount of money you have left and pays you back. You buy lunch with the rest of your money.

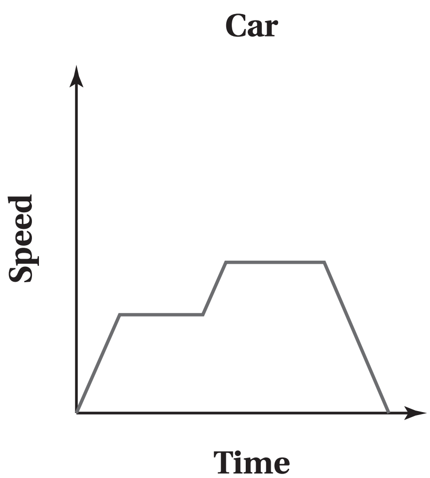
Lesson 6.5

Warm Up

For use before Lesson 6.5

Describe the relationship between the two quantities.

1.



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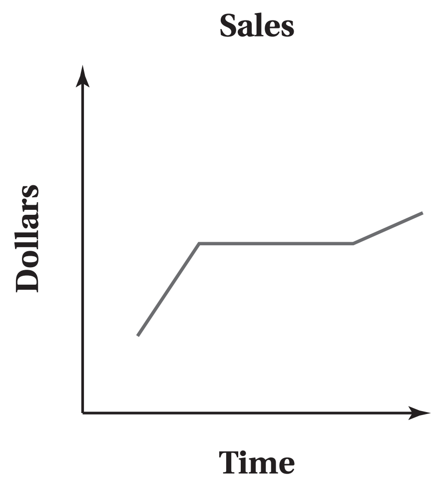
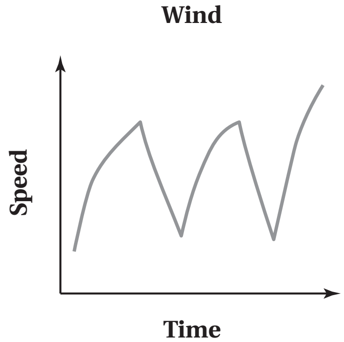


Name______________________________ Date__________

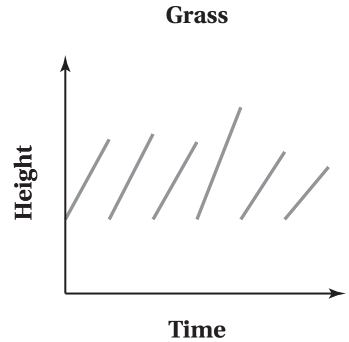
6.5 Practice A

Describe the relationship between the two quantities.

1.



2.



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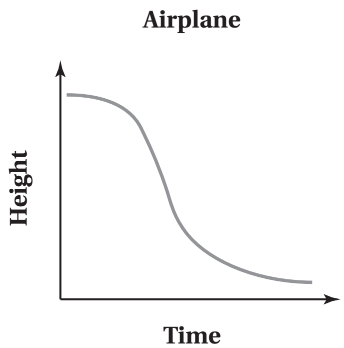

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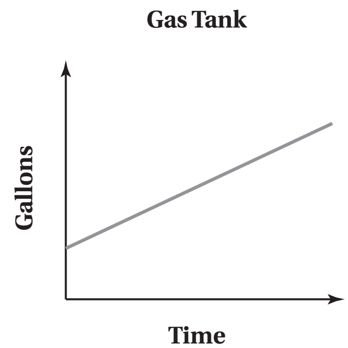
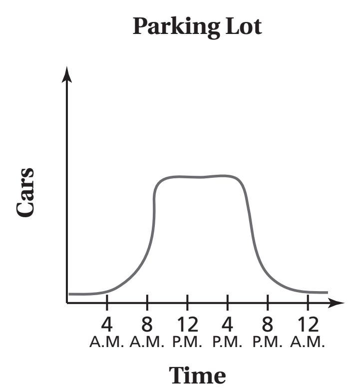


5. The graph shows the number of cars in the parking lot over a 24 hour period.

a. Describe the change in the number of cars from 7:00 A.M. to 9:00 A.M.

b. Describe the change in the number of cars from 5:00 P.M. to 7:00 P.M.



Sketch a graph that represents a situation.

6. The flu virus spreads quickly at first and then more slowly.

7. The sales of a new cell phone increase at an increasing rate, then the sales remain the same, and then the sales decrease at a constant rate.

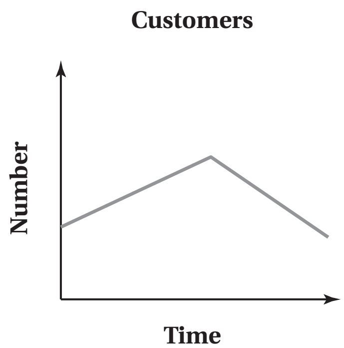
8. The outside temperature decreased at a decreasing rate and then decreased at a constant rate.

Name ______________________________ Date __________

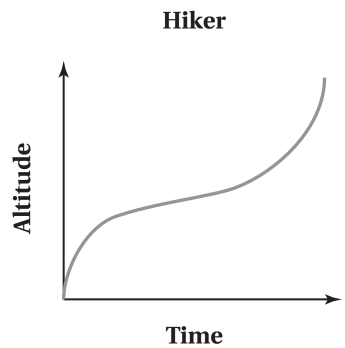
6.5 Practice B

Describe the relationship between the two quantities.

1.



2.



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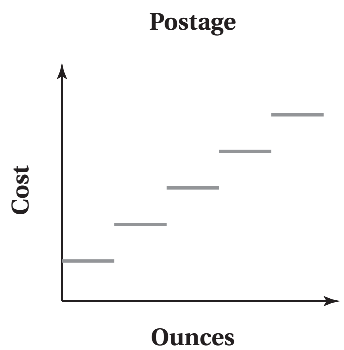

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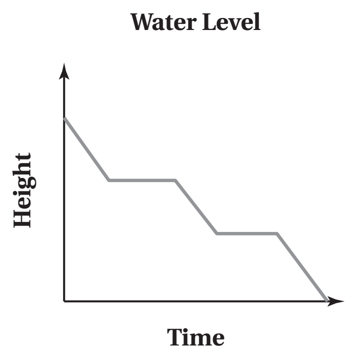
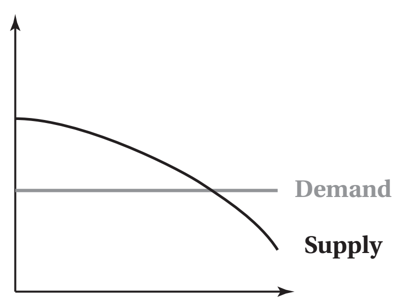


5. The supply and demand model shows how the price of the shares of a new stock changes in a market.



a. Describe and interpret each curve.

b. Which part of the graph represents a surplus? a shortage? Explain your reasoning.

c. The curve intersects at the *equilibrium point*, which is where the number of shares equals the quantity demanded. Suppose that demand for the shares suddenly increases, causing the entire demand curve to shift up. What happens to the equilibrium point?

Name____ Date__________

6.5 Enrichment and Extension

Discrete and Continuous Data

In some situations, only certain numbers in an interval make sense in a graph. Data that fit this description are called **discrete data**. Data that are not discrete are continuous. **Continuous data** use any number in an interval in a graph.

Example: Keenan performs an experiment in which he measures the temperature of tap water when he turns on the hot water nozzle to his kitchen sink. He records the temperatures in 5-second intervals. Determine whether the data are discrete or continuous.

The data are discrete, because Keenan only records the temperature every five seconds.

Determine if the situation describes *discrete data* or *continuous data*. Explain your reasoning.

1. Keenan's next experiment is to record the temperature for each day in October. He will record the temperature at 1:00 P.M. each day.

2. Keenan's father works at a large corporation. His job requires him to make a graph showing a employee's salary each year.

3. Keenan works at a photo booth in the local mall. Keenan keeps track of how many people buy photos.

4. One of Keenan's classmates is making a chart showing people's weights on the moon.

5. On the wall in Keenan's science room is a graph of his teacher's hike into the Grand Canyon. The graph shows how far beneath the edge of the canyon she hiked.

Name ____ Date __________

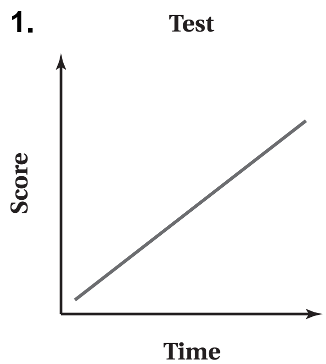
6.5 Puzzle Time

What Has Many Keys That Fit No Locks?

Write the letter of each answer in the box containing the exercise number.

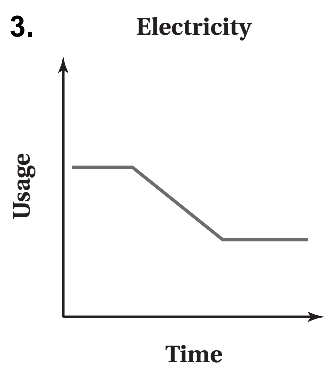
Describe the relationship between the two quantities.

1.

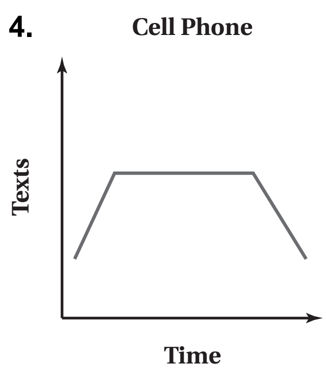


2.

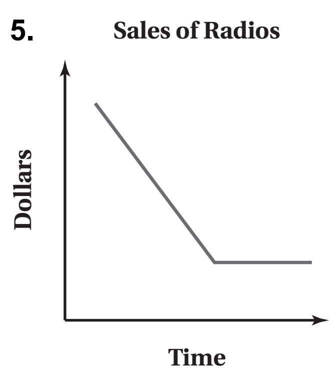
3.



4.



5.



5	3	1	4	2

Answers

P. The amount of money in sales of radios decreased at a constant rate then remained constant.

K. Test scores decreased at a constant rate.

L. The amount of usage of electricity was constant, increased at a constant rate, then remained constant.

N. The number of texts increased at a constant rate, then was constant, and finally decreased at a constant rate.

A. During the shopping trip, the amount of money increased at an increasing rate.

I. The amount of usage of electricity was constant, decreased at a constant rate, then remained constant.

E. The number of texts decreased at a constant rate, then was constant, and finally increased at a constant rate.

A. Test scores increased at a constant rate.

B. The amount of money in sales of radios increased at a constant rate then remained constant.

O. During the shopping trip, the amount of money decreased at a decreasing rate.

Name____ Date__________

Chapter 6

Technology Connection

For use after Section 6.2

Making Graphs from Spreadsheets

A spreadsheet is a computer application used to organize and work with data. Each cell in a spreadsheet can be empty, or it can contain letters, numbers, or a formula. Spreadsheets can perform calculations with numeric data. They can also generate graphs from the data.

Open a spreadsheet. Column A should be headed *x* with the values of 1, 2, 3, 4, 5, 6 listed below. Column B should be headed *y*. Use the formula $y = 2x - 1$ to fill in the values for *y*. (You may calculate the values yourself, or use the formula function of the spreadsheet.)

1. Find the *chart or graph* function on the spreadsheet. One of the choices should be a scatter plot. Make a scatter plot of the data.

2. Change the y-value in cell B5 from 7 to 8. This new value is within the range of y-values already included in the graph. Does the graph change automatically? Describe what happens.

3. Change the y-value in cell B5 to 12. This new value is outside the range of the original graph. Does this change the graph automatically? Describe what happens.

4. Return the value in cell B5 to 7. Add the value $x = 10$ and the corresponding y-value to your spreadsheet in row 8. Does this change the graph automatically? Describe what happens.

5. Add a new column of data, $y2$ in column C. Use the formula $y = 2x + 1$ to generate the values for the column. Does the graph change automatically?

6. If the graph did not change in Exercise 5, make a new graph that includes all the new data. You may need to highlight all the data. Describe your new graph.

7. What other chart options would be a good choice to display the data? Explain your reasoning.