Chapter 4

Name_____

Chapter 4 Graphing and Writing Linear Equations

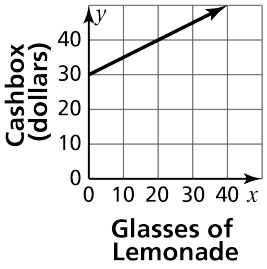
Dear Family,

Running a lemonade stand is a popular way for children to earn money. Suppose your child is running a lemonade stand to earn money for a new bike. You have provided the ingredients at no cost, so any sales are all profit.

The cashbox starts with $30 for making change. Your child can figure out how much money should be in the cashbox with a linear equation.

Amount in cashbox = (Initial amount) + (Glass price) × (Glasses sold)

$$y = 30 + 0.5x$$



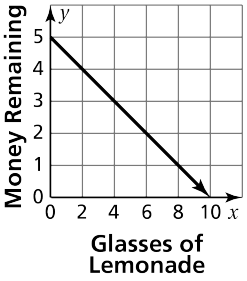
In a graph of the equation, the line slopes upward because the amount of money in the cash box is increasing. The slope is positive and equal to the unit price: $0.50 per glass of lemonade, or 0.5.

The *y*-intercept (0, 30) corresponds to the starting point (no sales) and the amount of money the cashbox starts with, $30.

Suppose a neighbor and her children visit the lemonade stand. You neighbor has $5 to spend on glasses of lemonade. The amount of money remaining depends on how many glasses of lemonade she purchases.

Amount remaining = (Initial amount) – (Glass price) × (Glasses bought)

$$y = 5 - 0.5x$$



In a graph of the equation, the line slopes downward because the money left to spend is decreasing. The slope is negative and equal to the cost of one glass of lemonade: –0.5. The intercepts (0, 5) and (10, 0) correspond to the starting point (no glasses bought and $5) and the possible ending point (10 glasses bought and no money remaining).

Enjoy your lemonade stand work!

Graphing and Writing Linear Equations (continued)

Lesson	Learning Target	Success Criteria
4.1 Graphing Linear Equations	Graph linear equations.	• I can create a table of values and write ordered pairs given a linear equation. • I can plot ordered pairs to create a graph of a linear equation. • I can use a graph of a linear equation to solve a real-life problem.
4.2 Slope of a Line	Find and interpret the slope of a line.	• I can explain the meaning of slope. • I can find the slope of a line. • I can interpret the slope of a line in a real-life problem.
4.3 Graphing Proportional Relationships	Graph proportional relationships.	• I can graph an equation that represents a proportional relationship. • I can write an equation that represents a proportional relationship. • I can use graphs to compare proportional relationships.
4.4 Graphing Linear Equations in Slope-Intercept Form	Graph linear equations in slope-intercept form.	• I can identify the slope and y-intercept of a line given an equation. • I can rewrite a linear equation in slope-intercept form. • I can use the slope and y-intercept to graph linear equations.
4.5 Graphing Linear Equations in Standard Form	Graph linear equations in standard form.	• I can rewrite the standard form of a linear equation in slope-intercept form. • I can find intercepts of linear equations written in standard form. • I can use intercepts to graph linear equations.
4.6 Writing Equations in Slope-Intercept Form	Write equations of lines in slope-intercept form.	• I can find the slope and the y-intercept of a line. • I can use the slope and the y-intercept to write an equation of a line. • I can write equations in slope-intercept form to solve real-life problems.
4.7 Writing Equations in Point-Slope Form	Write equations of lines in point-slope form.	• I can use a point on a line and the slope to write an equation of the line. • I can use any two points to write an equation of a line. • I can write equations in point-slope form to solve real-life problems.

Nombre _____

Capítulo 4

Graficar y escribir ecuaciones lineales

Querida familia:

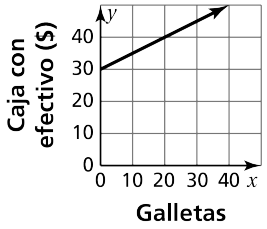
Vender refrescos es una forma popular de obtener dinero en eventos escolares. Usted o su estudiante pueden haberse presentado como voluntarios para trabajar en la mesa de refrescos y ayudar a apoyar un equipo o actividad favorita.

Supongamos que están trabajando en una venta de pasteles. La comida es donada, así que cualquier venta que hagan se considera como ganancia completa. La caja con efectivo empieza con $30 para dar vuelto. Se puede averiguar cuánto dinero debe haber en la caja con una ecuación lineal.

Cantidad en caja con efectivo = (Cantidad inicial) + (Precio de la galleta) × (Galletas vendidas)

$$y = 30 + 0.5x$$

En un gráfico de la ecuación, la línea va hacia arriba porque la cantidad de dinero en la caja está aumentando. La pendiente es positiva e igual al precio unitario: $0.50 por galleta ó 0.5.



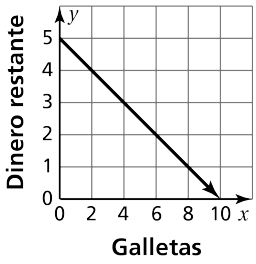
La intersección con el eje y (0, 30) corresponde al inicio punto (sin ventas) y la cantidad de dinero que la caja comienza con $30.

Supongamos que le entrega a su estudiante $5 para gastar en refrigerios con un grupo de amigos. La cantidad de dinero restante depende del número de objetos que ya han comprado.

Cantidad restante = (Cantidad inicial) + (Precio de la galleta) × (galletas vendidas)

$$y = 5 - 0.5x$$

En un gráfico de la ecuación, la línea va hacia abajo porque el dinero que queda para gastar está disminuyendo. La pendiente es negativa e igual al costo de una galleta: −0.5. Las intersecciones (0, 5) y (10, 0) corresponden al punto de inicio (sin galletas y $5) y el posible punto final (10 galletas y nada de dinero restante).



¡Disfruten su trabajo con la venta de pasteles o trabajo en la cafetería!

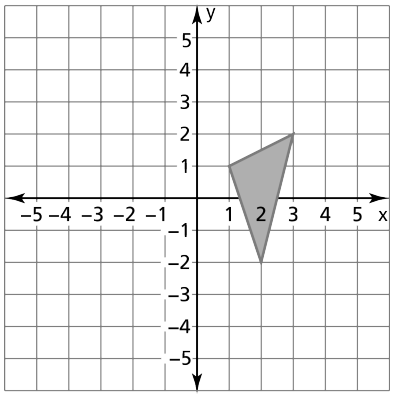
Capítulo 4 Graficar y escribir ecuaciones lineales (continuación)

Lección	Objetivo de aprendizaje	Criterios de éxito
4.1 Graficando ecuaciones lineales	Graficar ecuaciones lineales.	• Sé crear una tabla de valores y escribir pares ordenados dada una ecuación lineal. • Sé graficar pares ordenados para representar una ecuación lineal. • Sé usar el gráfico de una ecuación lineal para resolver un problema de la vida real.
4.2 Pendiente de una línea	Hallar e interpretar la pendiente de una línea.	• Sé explicar el significado de la pendiente. • Sé hallar la pendiente de una línea. • Sé interpretar la pendiente de una línea en un problema de la vida real.
4.3 Graficando relaciones proporcionales	Graficar relaciones proporcionales.	• Sé graficar una ecuación que representa una relación proporcional. • Sé escribir una ecuación que representa una relación proporcional. • Sé usar gráficos para comparar relaciones proporcionales.
4.4 Graficando ecuaciones lineales en forma de pendiente-intersección	Graficar ecuaciones lineales en forma de pendiente-intersección.	• Sé identificar la pendiente e intersección con el eje *y* de una línea dada una ecuación. • Sé rescribir una ecuación lineal en forma de pendiente-intersección. • Sé usar la pendiente y la intersección con el eje *y* para graficar ecuaciones lineales.
4.5 Graficando ecuaciones lineales en forma estándar	Graficar ecuaciones lineales en forma estándar.	• Sé rescribir la forma estándar de una ecuación lineal en forma de pendiente-intersección. • Se hallar la intersección de ecuaciones lineales escritas en forma estándar. • Sé usar la intersección para graficar ecuaciones lineales.
4.6 Escribiendo ecuaciones en forma de pendiente-intersección	Escribir ecuaciones de líneas en forma de pendiente-intersección.	• Sé hallar la pendiente e intersección con el eje *y* de una línea. • Sé usar la pendiente e intersección con el eje *y* para escribir una ecuación de una línea. • Sé escribir ecuaciones en forma de pendiente-intersección para resolver problemas de la vida real.
4.7 Escribiendo ecuaciones en forma punto-pendiente	Escribir ecuaciones de líneas en forma punto-pendiente.	• Sé usar un punto sobre una línea y la pendiente para escribir una ecuación de la línea. • Sé usar dos puntos para escribir la ecuación de una línea. • Sé escribir ecuaciones en forma punto-pendiente para resolver problemas de la vida real.

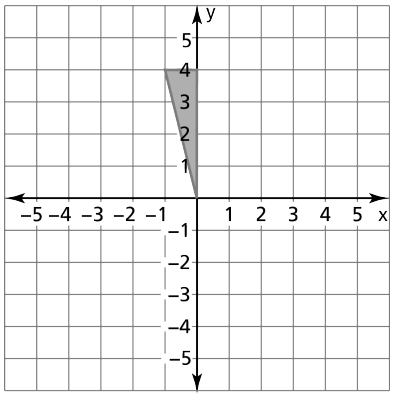
Lesson 4.1 Cumulative Practice

For use before Lesson 4.1

1. Translate the figure 4 units left and 1 unit up.



2. Translate the figure 4 units right and 3 unit down.



Lesson 4.1 Vocabulary Practice

For use before Lesson 4.1

1. Write what you know about this phrase.

Preview: linear equation

Lesson 4.1 Prerequisite Skills Practice

For use before Lesson 4.1

Copy and complete the table using the given equation.

1. $y = 2x - 3$

x	−1	0	1	2
y				

2. $y = -x + 1$

x	−1	0	1	2
y				

Name _____ Date _____

Lesson 4.1 Extra Practice

Copy and complete the table with two solutions. Plot the ordered pairs and draw the graph of the linear equation. Use the graph to find a third solution of the equation.

1.

x		
$y = 4x + 3$		

2.

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

Graph the linear equation.

3. $y = -2x$

4. $y = \frac{2}{5}x$

5. $y = -4$

6. $y = x + 2$

7. $y = -5x + 3$

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

9. The equation $y = \frac{2}{3}x$ represents the cost y (in dollars) for x pounds of bananas.

a. Graph the linear equation.

b. Use the graph to estimate the cost of 8 pounds of bananas.

c. Use the equation to find the exact cost of 8 pounds of bananas.

Solve for *y*. Then graph the linear equation.

10. $y - 2x = 5$

11. $6x + 5y = 15$

12. You have $110 in your lunch account and plan to spend $2.75 each school day.

a. Write and graph a linear equation that represents the balance in your lunch account.

b. How many school days will it take to spend all of the money in your lunch account?

Name _____ Date _____

Lesson 4.1 Reteach

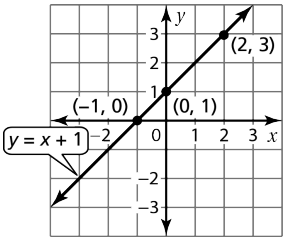
Key Idea

Linear Equations

The **linear equation** is an equation whose graph is a line. The points on the line are **solutions** of the equation.

You can use a graph to show the solutions of a linear equation. The graph below represents the equation $y = x + 1$.

x	y	(x, y)
-1	0	$(-1, 0)$
0	1	$(0, 1)$
2	3	$(2, 3)$



EXAMPLE Graphing a Linear Equation

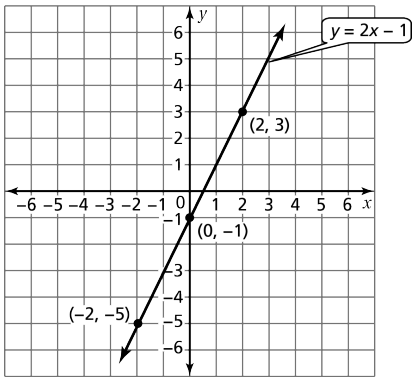
Graph $y = 2x - 1$.

Step 1: Make a table of values by substituting values for x into the equation and solving the equation for y.

x	$y = 2x - 1$	y	(x, y)
-2	$y = 2(-2) - 1$	-5	$(-2, -5)$
0	$y = 2(0) - 1$	-1	$(0, -1)$
2	$y = 2(2) - 1$	3	$(2, 3)$

Step 2: Plot the ordered pairs in a coordinate plane.

Step 3: Draw a line through the points.



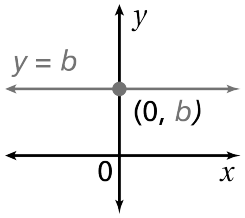
Name _____ Date _____

Lesson 4.1 Reteach (continued)

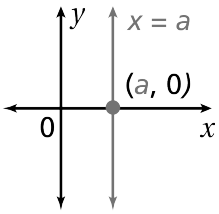
Key Idea

Graphing Horizontal and Vertical Lines

The graph of $y = b$ is a horizontal line passing through $(0, b)$.



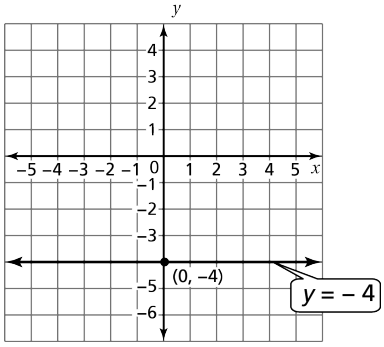
The graph of $x = a$ is a vertical line passing through $(a, 0)$.



EXAMPLE Graphing a Horizontal Line and a Vertical Line

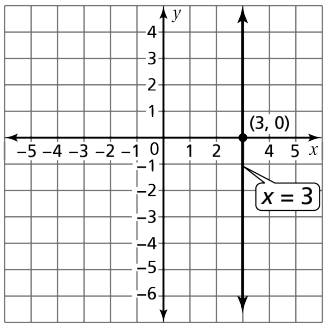
a. Graph $y = -4$.

The graph of $y = -4$ is a horizontal line passing through $(0, -4)$. Plot $(0, -4)$ and draw a horizontal line through it.



b. Graph $x = 3$.

The graph of $x = 3$ is a vertical line passing through $(3, 0)$. Plot $(3, 0)$ and draw a vertical line through it.



Graph the linear equation.

1. $y = 2x - 3$

2. $y = -x - 1$

3. $y = x - 4$

4. $y = -2x + 3$

5. $y = -3$

6. $y = 4-$

7. $x = -2$

8. $x = 5$

Name _____ Date _____

Lesson 4.1 Enrichment and Extension

Graphing Equations

You have studied the properties of linear equations. Now you will learn about two additional types of equations, a quadratic equation and an absolute value equation.

Copy and complete the table. Then plot the points and draw a graph of the equation.

1. $y = -2x + 3$

x	*y*
−2	7
−1	
0	
1	
2	

2. $y = 3x^2 - 1$

x	*y*
−2	11
−1	
0	
1	
2	

3. $y = -|x| + 2$

x	*y*
−2	0
−1	
0	
1	
2	

4. Linear equations can be written in the form $y = mx + b$. Which of the given equations is linear?

5. An equation of the form $y = ax^2 + b$ is called a quadratic equation. Which of the given equations is quadratic? Describe the graph of the quadratic equation.

6. An equation of the form $y = a|x| + b$ is called an absolute value equation. Which of the given equations is an absolute value equation? Describe the graph of the absolute value equation.

7. Compare and contrast the three different types of graphs.

8. How would each graph change if a different b value was selected?

Name _____ Date _____

4.1 Puzzle Time

What Arctic Bird Can Be Found In A Bakery?

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

Find the values of *y* that correspond to the given values of *x* for the linear equation.

1. $y = 4x + 3$ for $x = -1, 0, 1$
2. $y = -\frac{3}{2}x + 5$ for $x = 0, 2, 4$
3. $y = -9$ for $x = 0, 1, 2$
4. $y = -7x + 8$ for $x = -1, 0, 1$
5. $y = \frac{5}{3}x - 6$ for $x = -3, 0, 3$
6. $y = 1.4x - 9$ for $x = 0, 1, 2$

Solve for *y*. Then find the values of *y* that correspond to the given values of *x* for the linear equation.

7. $y + 8x = -2$ for $x = 0, 1, 2$
8. $12x + 3y = 15$ for $x = -1, 0, 1$
9. $\frac{1}{4}y - 3x = 9$ for $x = -2, 0, 2$
10. $0.4y + 2x = 1.2$ for $x = -3, 0, 3$
11. The equation $22 = 2y + x$ represents the perimeter of a flower garden with length y (in feet) and width x (in feet). Solve for y. Then find the length of the flower garden when the width is 2 feet, 3 feet, and 4 feet.
12. The equation $0.60 = 0.05x + 0.10y$ represents the number of nickels x and dimes y needed to add up to 60 cents. Solve for y. Then find the number of dimes that are needed to make 60 cents when the number of nickels is 0, 2, and 4.

Answers

E. $y = -9, -7.6, -6.2$

F. $y = 12, 36, 60$

P. $y = 18, 3, -12$

I. $y = -2, -10, -18$

A. $y = 15, 8, 1$

F. $y = 6, 5, 4$

M. $y = 10, 9.5, 9$

U. $y = -11, -6, -1$

C. $y = 9, 5, 1$

N. $y = 5, 2, -1$

R. $y = -9, -9, -9$

A. $y = -1, 3, 7$

1		8	3	6	4	11		10	5	9	12	7	2

Lesson 4.2 Cumulative Practice

For use before Lesson 4.2

1. Line s and line w are parallel. Both lines are translated 3 units down. Are the images of the lines parallel?

2. Line w and line j are parallel. Both lines are reflected in the x-axis. Are the images of the lines parallel?

Lesson 4.2 Vocabulary Practice

For use before Lesson 4.2

1. Write what you know about this word.

Preview: slope

Lesson 4.2 Prerequisite Skills Practice

For use before Lesson 4.2

Write the fraction in simplest form.

1. $\frac{6}{2}$

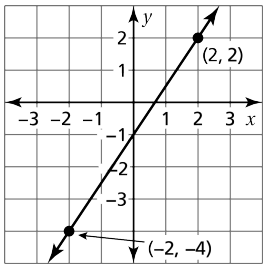
2. $\frac{8}{28}$

Name _____ Date _____

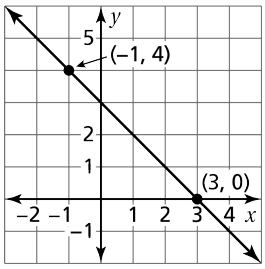
Lesson 4.2 Extra Practice

Find the slope of the line.

1.



2.



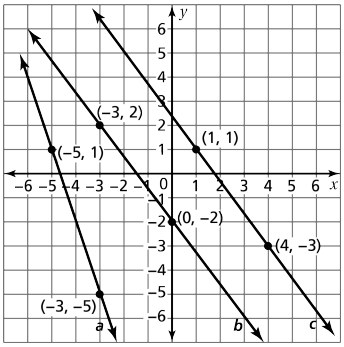
Find the slope of the line through the given points.

3. $(-1, -4), (1, 4)$

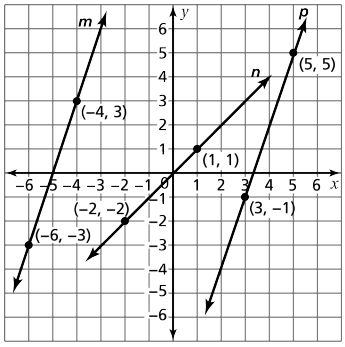
4. $(1, 2), (-3, 2)$

Which lines are parallel? How do you know?

5.



6.



Are the given lines parallel? How do you know?

7. $y = 0, x = 1$

8. $x = -2, x = 5$

The points in the table lie on a line. Find the slope of the line.

9.

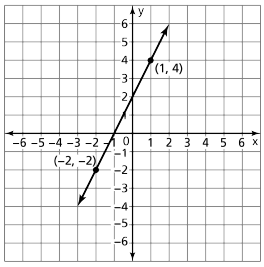
x	1	3	5	7
y	−7	−2	3	8

10.

x	−3	0	−1	2
y	6	3	2	−1

11. An awning covers a window that is 4 feet high. When the awning is opened, it extends 2 feet from the base of the window. Find the slope of the awning.

12. Your friend finds the slope of the line shown. Is your friend correct? Explain your reasoning.



$$m = \frac{-2-4}{-2-1}$$
$$= \frac{-6}{-3}$$
$$= 2$$

Name _____ Date _____

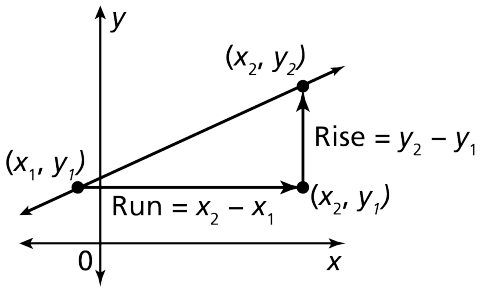
Lesson 4.2 Reteach

Key Idea

Slope

The **slope** m of a line is the value of the ratio of the change in y (the **rise**) to the change in x (the **run**) between any two points, (x_1, y_1) and (x_2, y_2), on the line. The slope of a line is a measure of the steepness of the line.

$$m = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$$



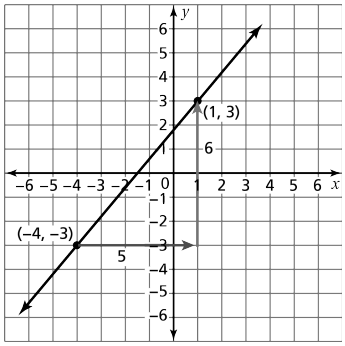
Lines with positive slopes rise from left to right.

Lines with negative slopes fall from left to right.

EXAMPLE Finding Slopes of Lines

Describe the slope of each line. Then find each slope.

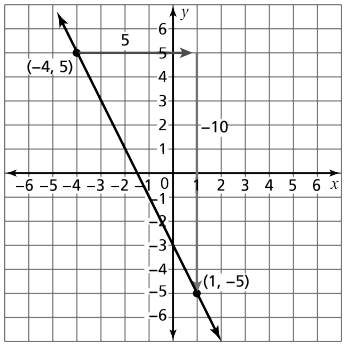
a.



The line rises from left to right. So, the slope is positive. Use the graph to find the rise and the run of the line. Substitute these values into the slope formula.

$$m = \frac{\text{rise}}{\text{run}} = \frac{6}{5}$$

b.



The line falls from left to right. So, the slope is negative. Use the coordinates $(x_1, y_1) = (-4, 5)$ and $(x_2, y_2) = (1, -5)$ to find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5 - 5}{1 - (-4)} = \frac{-10}{5}, \text{ or } -2$$

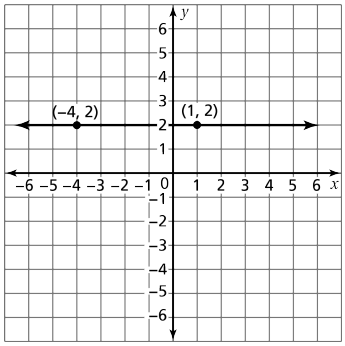
Name _____ Date _____

Lesson 4.2 Reteach (continued)

EXAMPLE Finding Slopes of Horizontal and Vertical Lines

Find the slope of each line.

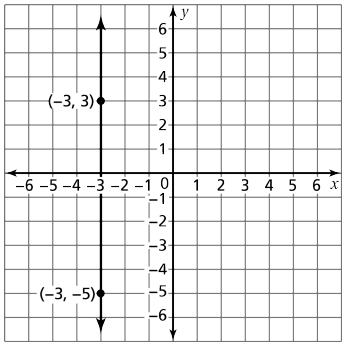
a.



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{2 - 2}{1 - (-4)}$$
$$= \frac{0}{5}, \text{ or } 0$$

▶ The slope is 0.

b.

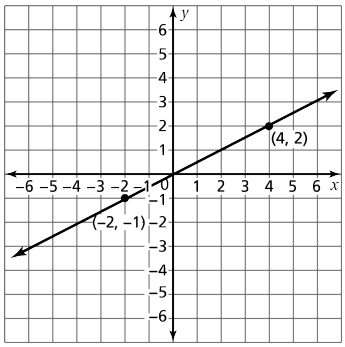


$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-5 - 3}{-3 - (-3)}$$
$$= \frac{-8}{0}$$ ✗

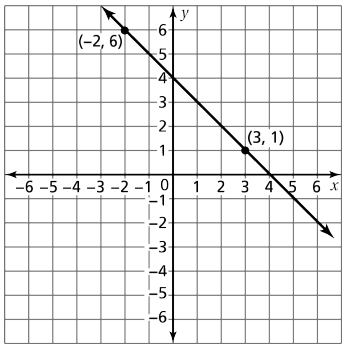
▶ Division by zero is undefined. So, the slope is undefined.

Find the slope of the line.

1.



2.



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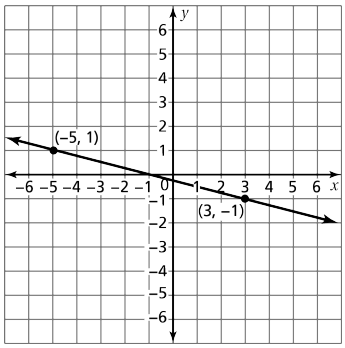

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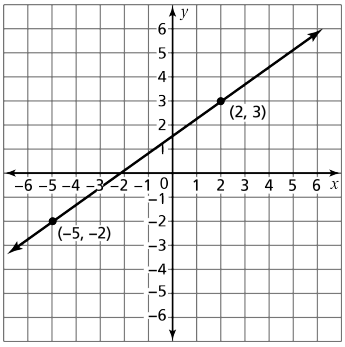

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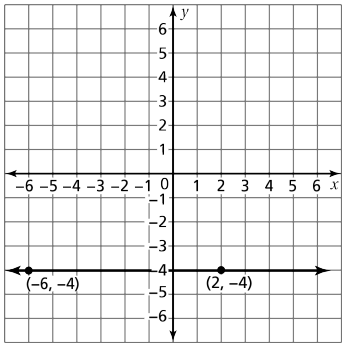
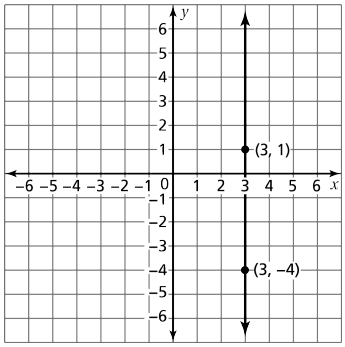


6.



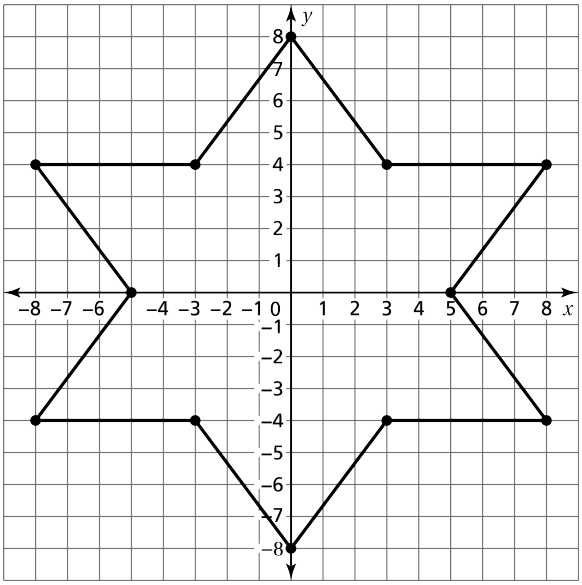
Name _____ Date _____

Lesson 4.2 Enrichment and Extension

Slope of a Line

1. Draw an octagon in a coordinate plane with the vertices (5, 2), (2, 5), (−2, 5), (−5, 2), (−5, −2), (−2, −5), (2, −5), and (5, −2).
2. Without doing any calculations, do you think any of the line segments have the same slope? If so, which ones? Explain.
3. Calculate the slope of each side of the octagon. Were your predictions in Exercise 2 correct?
4. Two different lines are *parallel* if they do not intersect and have the same slope. Are any line segments in the graph parallel? Explain.

In Exercises 5–7, use the graph of the star.



5. Without doing any calculations, do you think any of the line segments have the same slope? If so, which ones?
6. Calculate the slope of each line segment in the graph. Were your predictions in Exercise 5 correct?
7. Two lines in the same plane that intersect to form right angles are *perpendicular*. Two nonvertical lines are perpendicular if and only if the product of their slopes is −1. Are any line segments in the star perpendicular? Explain.

Name _____ Date _____

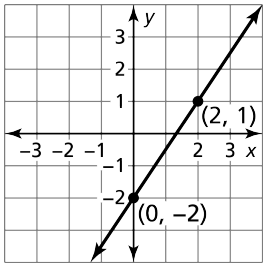
4.2 Puzzle Time

What Did One Poppy Seed Say To The Other?

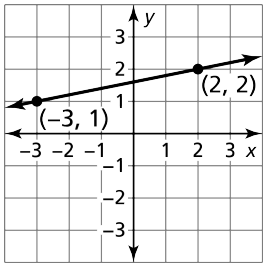
Circle the letter of each correct answer in the boxes below. The circled letters will spell out the answer to the riddle.

Find the slope of the line through the given points.

1.



2.



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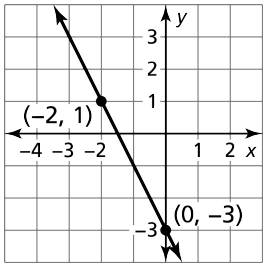
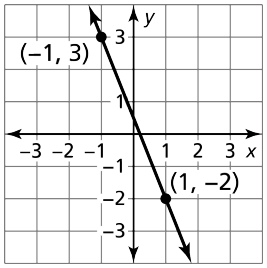


4.



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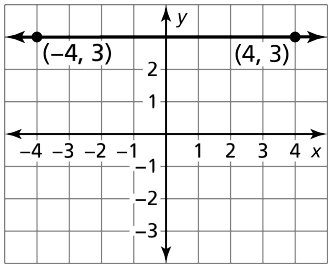
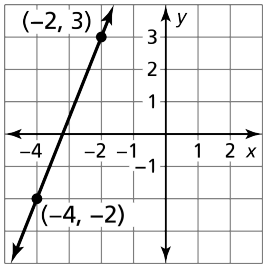


6.



7. (1, 4), (3, −2)

8. (1, 2), (1, −2)

9.

x	−5	−3	3	3
y	15	7	−17	−25

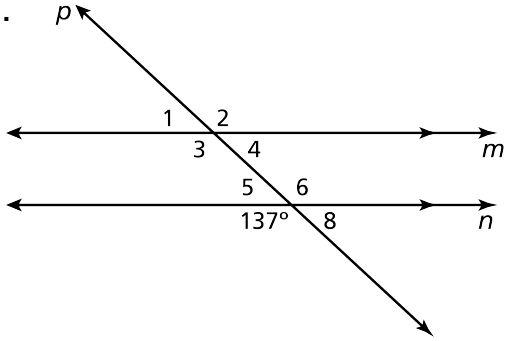
I	T	M	S	A	O	N	H	A	P	L	R	O	M	E	L	S	L
−2	$\frac{2}{5}$	0	$\frac{1}{6}$	$\frac{4}{3}$	$\frac{1}{5}$	−3	$\frac{1}{4}$	$\frac{3}{2}$	$\frac{1}{50}$	1	−4	$\frac{5}{2}$	$-\frac{1}{3}$	2	$-\frac{5}{2}$	5	und.

Lesson 4.3 Cumulative Practice

For use before Lesson 4.3

Find the measures of the numbered angles.

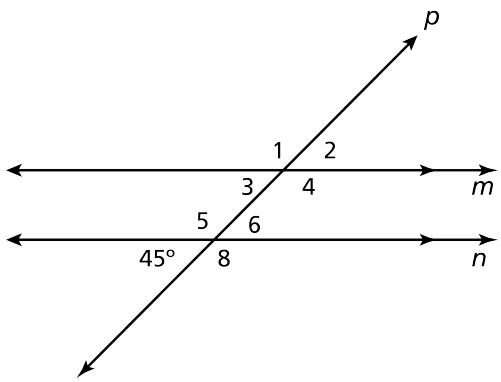
1.



∠1 = ____ ∠2 = ____ ∠3 = ____ ∠4 = ____

∠5 = ____ ∠6 = ____ ∠8 = ____

2.



∠1 = ____ ∠2 = ____ ∠3 = ____ ∠4 = ___

∠5 = ____ ∠6 = ____ ∠8 = ____

Lesson 4.3 Vocabulary Practice

For use before Lesson 4.3

1. Write what you know about this phrase.

Review: solution of a linear equation

Lesson 4.3 Prerequisite Skills Practice

For use before Lesson 4.3

Find the value of *x*.

1. $\frac{1}{2} = \frac{6}{x}$

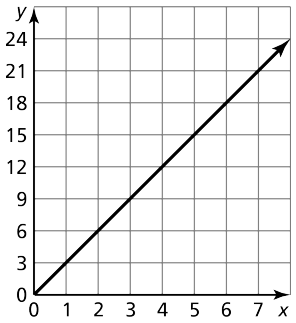
2. $\frac{3}{4} = \frac{x}{24}$

Name _____ Date _____

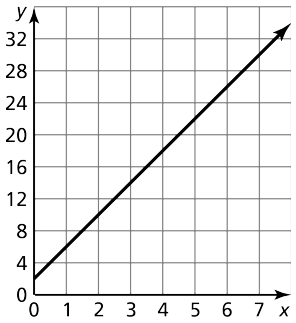
Lesson 4.3 Extra Practice

Tell whether *x* and *y* are in a proportional relationship. Explain your reasoning. If so, write an equation that represents the relationship.

1.



2.



3.

x	5	10	15	20
y	1	3	5	7

4.

x	4	8	12	16
y	1	2	3	4

5. The distance your friend travels y (in miles) running x hours is represented by the equation $y = 7.5x$.

a. Graph the equation and interpret the slope.

b. How many minutes does it take for your friend to run one mile?

6. At a concession stand, hamburgers are selling at a rate of 160 hamburgers per hour. The table shows the rate at which wraps are selling.

Minutes	1	2	3	4
Wraps Sold	2.5	5	7.5	10

a. Do hamburgers or wraps sell faster? Explain.

b. In the same coordinate plane, graph equations that represent the growth rates of hamburgers sold and wraps sold. Compare and interpret the steepness of each graph.

Name _____ Date _____

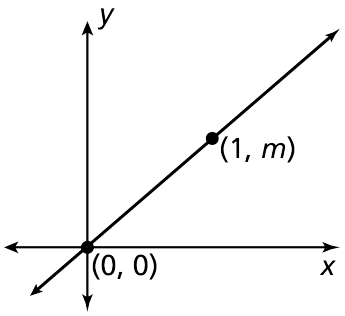
Lesson 4.3 Reteach

Key Idea

Proportional Relationships

Words When two quantities x and y are proportional, the relationship can be represented by the equation $y = mx$, where m is the constant of proportionality.

Graph The graph of $y = mx$ is a line with a slope of m that passes through the origin.



EXAMPLE Graphing a Proportional Relationship

The cost y (in dollars) for x pounds of apples is represented by $y = 1.5x$. Graph the equation and interpret the slope.

Method 1: Make a table of values

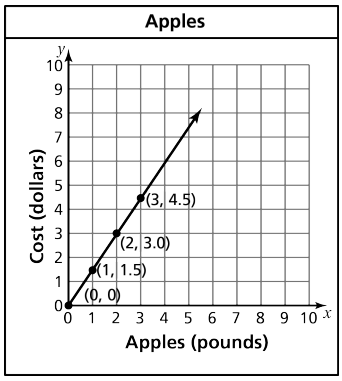
x	$y = 1.5x$	y	(x, y)
0	$y = 1.5(0)$	0	(0, 0)
1	$y = 1.5(1)$	1.5	(1, 1.5)
2	$y = 1.5(2)$	3	(2, 3)
3	$y = 1.5(3)$	4.5	(3, 4.5)

Method 2: Use the slope.

The equation is in the form $y = mx$, so the slope m is 1.5. The graph passes through (0, 0) and (1, 1.5).

Plot the ordered pairs and draw a line through the points. Because you cannot have negative pounds of apples, negative values of x do not make sense. Graph in the first quadrant only.

▶ The slope indicates that the unit cost for apples is \$1.50 per pound.



Name _____ Date _____

Lesson 4.3 Reteach (continued)

EXAMPLE Writing and Using an Equation

The distance y (in miles) that your friend rides his mountain bike is proportional to the time (in hours) that he rides. Your friend rides his bike 25 miles in 5 hours.

a. Write an equation that represents the situation.

Substitute the values given into the equation of a proportional relationship to find the slope of the line.

$y = mx$	Equation of a proportional relationship
$25 = m(5)$	Substitute 25 for y and 5 for x.
$\frac{25}{5} = \frac{m(5)}{5}$	Division Property of Equality: Divide each side by 5.
$5 = m$	Simplify.

▶ So, an equation that represents the situation is $y = 5x$.

b. At this rate, how many hours will it take your friend to ride his bike 225 miles?

$y = 5x$	Write the equation.
$225 = 5x$	Substitute 225 for y.
$\frac{225}{5} = \frac{5x}{5}$	Division Property of Equality: Divide each side by 5.
$45 = x$	Simplify.

▶ So, it will take your friend 45 hours to ride his bike 225 miles.

1. The cost y (in dollars) to rent an off-road vehicle is proportional to the time x (in hours) that you rent it. It costs \$48 to rent the off-road vehicle for 3 hours.

a. Write an equation that represents the situation.

b. Graph the equation and interpret the slope.

c. How much does it cost to rent the off-road vehicle for 5 hours?

Name _____ Date _____

Lesson 4.3 Enrichment and Extension

Direct Variation and Inverse Variation

A proportional relationship is also known as a *direct variation*. Two quantities x and y show direct variation when $y = kx$, where k is a nonzero constant. Two quantities x and y show *inverse variation* when $y = \frac{k}{x}$, where k is a nonzero constant.

1. Consider the inverse variation equation $y = \frac{1}{x}$.

a. As x increases, does y increase or decrease?

b. As x decreases, does y increase or decrease?

c. What do you know about the product of x and y for any point (x, y) on the graph of the equation?

2. Is the graph of an inverse variation equation a line? Explain your reasoning.

Tell whether *x* and *y* show *direct variation*, *inverse variation*, or *neither*.

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

4. $y = \frac{10}{x}$

5. $y = 3x - 2$

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

7. $y = 1.5x$

8. $8 - xy$

Tell whether the two quantities show *direct variation* or *inverse variation*. Write an equation that relates the variables.

9. You bring 200 granola bars to a party. Let n represent the number of people at the party and g represent the number of granola bars each person receives.

10. You work at a restaurant for 20 hours. Let r represent your hourly pay rate and p represent the total amount you earn.

Name _____ Date _____

4.3 Puzzle Time

What Do Ants Use For Hula Hoops?

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

The cost *y* (in dollars) to spend an evening bowling is proportional to the number of games *x* that are bowled. It costs $16 to bowl 4 games.

1. Write an equation that represents the situation.
2. How much does it cost (in dollars) to bowl 6 games?

The gasoline *y* (in fluid ounces) is proportional to the number of fluid ounces of oil *x* used to run a two-cycle motor. It takes 75 fluid ounces of gasoline for 3 fluid ounces of oil.

3. Write an equation that represents the situation.
4. How much gasoline (in fluid ounces) is needed for 8 fluid ounces of oil?

The number of pancakes *y* is proportional to the cups of pancake mix *x* that are used to make the pancake batter. The pancake batter will make 10 pancakes when 2 cups of pancake mix are used.

5. Write an equation that represents the situation.
6. How many pancakes are made when 5 cups of pancake mix are used in the pancake batter?

The toll charge *y* (in dollars) is proportional to the number of miles *x* traveled on the interstate. It costs $9 to travel 60 miles.

7. Write an equation that represents the situation.
8. How much does the toll charge cost (in dollars) when you travel 100 miles?

Answers

H. $y = 5x$

S. $y = 25x$

I. $y = 4x$

E. $y = 0.15x$

O. 25

C. 15

R. 200

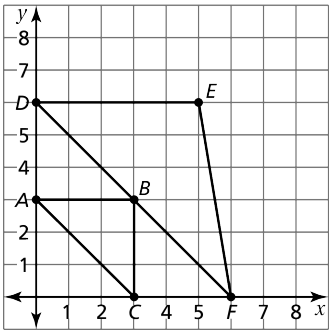
E. 24

8	5	2	7	4	1	6	3

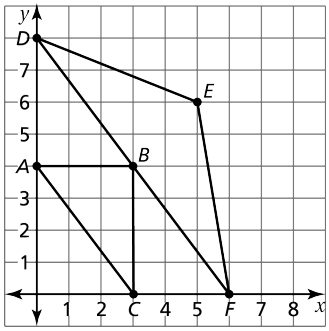
Lesson 4.4 Cumulative Practice

For use before Lesson 4.4

1. Are $\triangle ABC$ and $\triangle DEF$ similar?



2. Are $\triangle ABC$ and $\triangle DEF$ similar?



Lesson 4.4 Vocabulary Practice

For use before Lesson 4.4

1. Write what you know about this phrase.

Preview: slope-intercept form

Lesson 4.4 Prerequisite Skills Practice

For use before Lesson 4.4

Graph the linear equation using the input-output table.

1. $y = x - 1$

x	0	1	2	3
y				

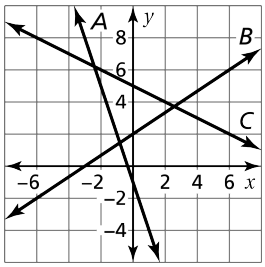
2. $y = \frac{1}{2}x + 2$

x	−2	0	2	4
y				

Name _____ Date _____

Lesson 4.4 Extra Practice

Match the equation with its graph. Identify the slope and *y*-intercept.



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

2. $y = -3x - 1$

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

Find the slope and the *y*-intercept of the graph of the linear equation.

4. $y = x + 4$

5. $y = -8x + 3$

6. $y = -\frac{5}{7}x - 2$

7. $y = 1.75x - 1$

8. $y - 2 = 6x$

9. $y + 7 = \frac{1}{9}x$

10. Your friend finds the slope and *y*-intercept of the graph of the equation $y = -5x + 4$. Is your friend correct? Explain your reasoning.

$y = -5x + 4$; The slope is 4 and the *y*-intercept is −5.

Graph the linear equation. Identify the *x*-intercept.

11. $y = 3x - 6$

12. $y = -\frac{1}{4}x + 12$

13. $y = 3.2x + 9.6$

14. $y - 2 = 5x$

15. The amount of fertilizer y (in cups) that is needed for x square feet of grass is $y = \frac{1}{4}x$.

a. Graph the equation.

b. Interpret the slope and *y*-intercept.

Name _____ Date _____

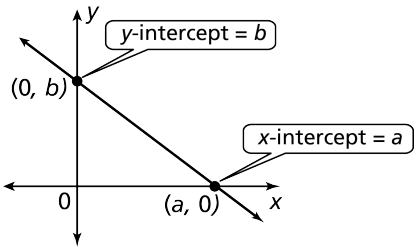
Lesson 4.4 Reteach

Key Idea

Intercepts

The ***x*-intercept** of a line is the x-coordinate of the point where the line crosses the x-axis. It occurs when $y = 0$.

The ***y*-intercept** of a line is the y-coordinate of the point where the line crosses the y-axis. It occurs when $x = 0$.



Slope-Intercept Form

Words A linear equation written in the form $y = mx + b$ is in **slope-intercept form**. The slope of the line is m, and the y-intercept of the line is b.

Algebra $y = mx + b$

slope: m — y-intercept: b

EXAMPLE Identifying Slopes and *y*-Intercepts

Find the slope and the *y*-intercept of the graph of each linear equation.

a. $y = 2x - 7$

$y = 2x + (-7)$ Write in slope-intercept form.

▶ The slope is 2, and the y-intercept is -7.

b. $y - 4 = \frac{2}{5}x$

$y = \frac{2}{5}x + 4$ Add 4 to each side to write the equation in slope-intercept form.

▶ The slope is $\frac{2}{5}$, and the y-intercept is 4.

Name _____ Date _____

Lesson 4.4 Reteach (continued)

EXAMPLE Graphing a Linear Equation in Slope-Intercept Form

Graph $y = -2x + 2$. Identify the x-intercept.

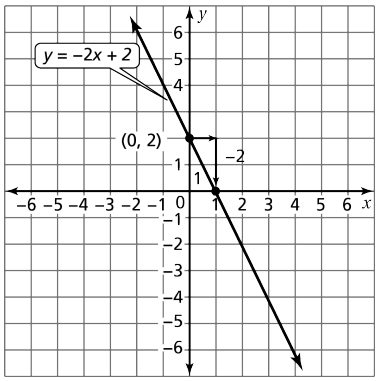
Step 1: Find the slope and the y-intercept.

$y = \boxed{-2}x + \boxed{2}$

slope — y-intercept

Step 2: To graph a line, you need two points. The y-intercept is where the graph crosses the y-axis, so the y-intercept gives you a point.

The y-intercept is 2. So plot (0, 2).



Step 3: Use the slope to find another point. The slope is −2.

$$m = \frac{\text{rise}}{\text{run}} = \frac{-2}{1}$$

Plot the point that is 1 unit right (denominator is positive) and 2 units down (numerator is negative) from (0, 2).
Draw a line through the two points.

▶ The line crosses the x-axis at (1, 0). So, the x-intercept is 1.

Find the slope and the y-intercept of the graph of the linear equation.

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

4. $y + 7 = 4x$ **5.** $y - 3 = -6x$ **6.** $y + 9 = \frac{3}{4}x$

Graph the linear equation. Identify the x-intercept.

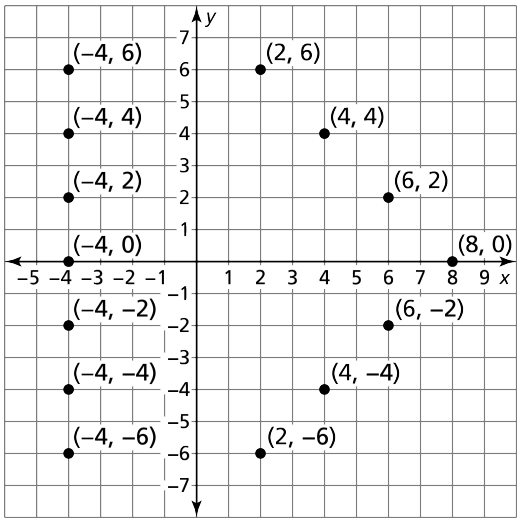
7. $y = x - 3$ **8.** $y = -2x - 4$ **9.** $y = 4x + 12$

Name _____ Date _____

Lesson 4.4 Enrichment and Extension

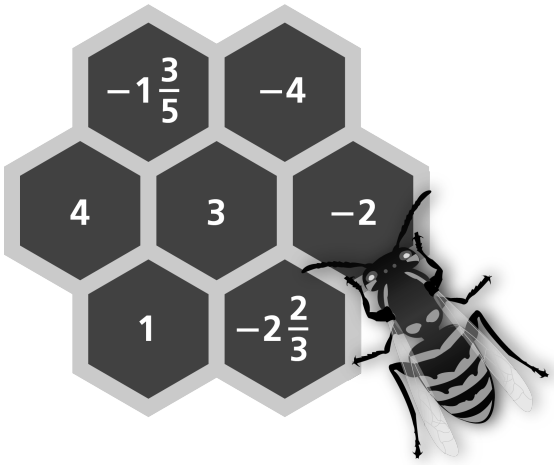
Matching Slopes and Intercepts

Each of the equations below is missing a *b*-value. Use each value in the b-Hive only once to complete the seven linear equations below. The graph of each linear equation should pass through two of the given points on the graph. No two equations pass through the same given point.



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

b-Hive



Name _____ Date _____

4.4 Puzzle Time

Did You Hear About...

A	B	C	D	E	F
G	H	I	J	K	L
M	N	O	P		

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

$\frac{3}{2}$ MANY	
$-\frac{1}{2}$ WHO	
–12 THAT	
–7 SO	
0.25 SEASON	
–5 GAVE	
–2 FOR	
16 TICKETS	
$\frac{2}{3}$ THE	
–8 DRIVING	

Find the slope of the graph of the linear equation.

A. $3y = 2x + 3$ **B.** $y = -x - 2$

C. $4y = -2x + 12$ **D.** $5y - 10 = x$

Find the *y*-intercept of the graph of the linear equation.

E. $y = 4x - 4$ **F.** $2y = x - 4$

G. $y - 12 = -9x$ **H.** $7 + y = 4.3x$

Find the *x*-intercept of the graph of the linear equation.

I. $y = 6x - 9$ **J.** $3y = 2x + 36$

K. $2y = -5x + 7$ **L.** $3y - 9 = 4x$

M. $y = 1.6x + 8$ **N.** $y + 15 = 12.5x$

O. Shannon's hair is 12 inches long and grows 0.25 inch per month. In an equation that represents the length y of her hair after x months, what number represents the slope?

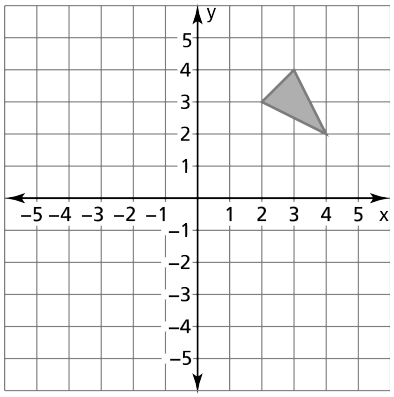
P. You have a \$20 gift card to a coffee shop. Each time you go there, you get chai tea for \$1.25. The equation $y = -1.25x + 20$ represents how much you have left on the gift card after x visits. How many chai teas can you purchase before the balance on your card runs out?

	–4 STOPPED
	5 HAD
	$-\frac{9}{4}$ POLICE
	–1 LADY
	22 CAR
	$\frac{7}{5}$ THE
	–18 TIMES
	$\frac{1}{5}$ GOT
	1.2 HER
	12 SPEEDING

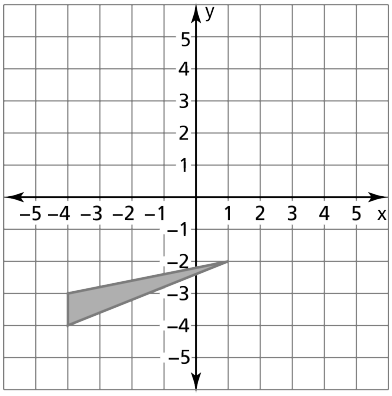
Lesson 4.5 Cumulative Practice

For use before Lesson 4.5

1. Draw the reflection of the figure in the y-axis.



2. Draw the reflection of the figure in the x-axis.



Lesson 4.5 Vocabulary Practice

For use before Lesson 4.5

1. Write what you know about this phrase.

Preview: standard form

Lesson 4.5 Prerequisite Skills Practice

For use before Lesson 4.5

Solve the equation for y.

1. $x + y = 4$

2. $2x + y = 10$

Name _____ Date _____

Lesson 4.5 Extra Practice

Write the linear equation in slope-intercept form.

1. $4x + y = 10$

2. $3x - y = 7$

Graph the linear equation.

3. $2x - 3y = 6$

4. $5x - 3y = 15$

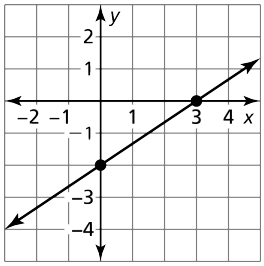
Match the equation with its graph.

5. $-9x + 3y = 0$

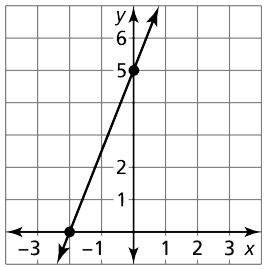
6. $4x - 6y = 12$

7. $25x - 10y = -50$

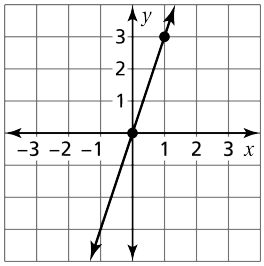
A.



B.



C.



8. Your friend finds the x-intercept of $4x - 5y = 20$. Is your friend correct? Explain your reasoning.

$$\begin{aligned} 4x - 5y &= 20 \\ 4(0) - 5y &= 20 \\ -5y &= 20 \\ y &= -4 \end{aligned}$$

Graph the linear equation using intercepts.

9. $4x + y = 8$

10. $3x - 2y = 12$

11. The total amount of fiber (in grams) in a package containing x apples and y oranges is given by the equation $5x + 10y = 110$.

a. Find and interpret the y-intercept.

b. Find and interpret the x-intercept.

c. How many grams of fiber does an orange contain?

d. How many grams of fiber does an apple contain?

e. Is it possible for the package to contain 15 apples? Explain.

Name _____ Date _____

Lesson 4.5 Reteach

Key Idea

Standard Form of a Linear Equation

The **standard form** of a linear equation is

$Ax + By = C$

where A and B are not both zero.

EXAMPLE Graphing a Linear Equation in Standard Form

Graph $2x + 3y = 9$.

Step 1: Write the equation in slope-intercept form.

$2x + 3y = 9$ Write the equation.

$3y = -2x + 9$ Subtract $2x$ from each side.

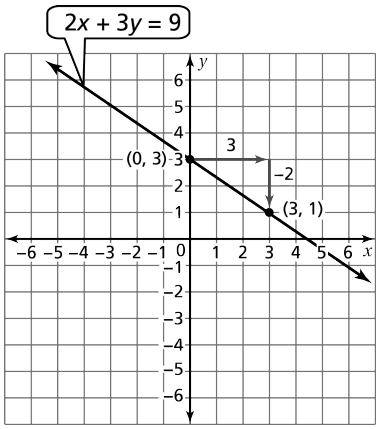
$y = -\frac{2}{3}x + 3$ Divide each side by 3.

Step 2: Use the slope and the y-intercept to graph the equation.

$y = \boxed{-\frac{2}{3}}x + \boxed{3}$

slope y-intercept

The y-intercept gives you a point. The y-intercept is 3, so plot (0, 3). Use the slope to find another point. The slope is $-\frac{2}{3}$. Plot the point that is 3 units right and 2 units down from (0, 3). Draw a line through the two points.



Name _____ Date _____

Lesson 4.5 Reteach (continued)

EXAMPLE Graphing a Linear Equation in Standard Form

Graph $-x + 2y = 6$ using intercepts.

Step 1: Find the x-intercept by substituting 0 for y in the equation.

$-x + 2y = 6$ Write the equation.

$-x + 2(0) = 6$ Substitute 0 for y.

$-x = 6$ Simplify.

$x = -6$ Divide each side by -1.

Step 2: Find the y-intercept by substituting 0 for x in the equation.

$-x + 2y = 6$ Write the equation.

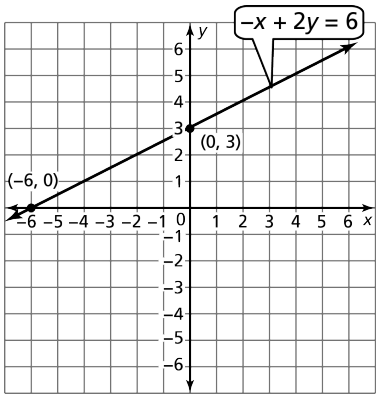
$-(0) + 2y = 6$ Substitute 0 for x.

$2y = 6$ Simplify.

$y = 3$ Divide each side by 2.

Step 3: Graph the equation.

The x-intercept is -6. So, plot $(-6, 0)$.
The y-intercept is 3. So, plot $(0, 3)$.
Draw a line through the two points.



Graph the linear equation.

1. $2x + y = -1$ **2.** $4x - y = 6$ **3.** $6x + 2y = 10$

Graph the linear equation using intercepts.

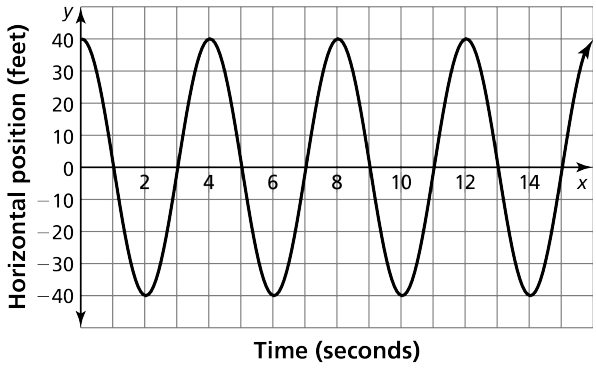
4. $-x + 3y = -12$ **5.** $2x + 3y = -6$ **6.** $x + y = 5$

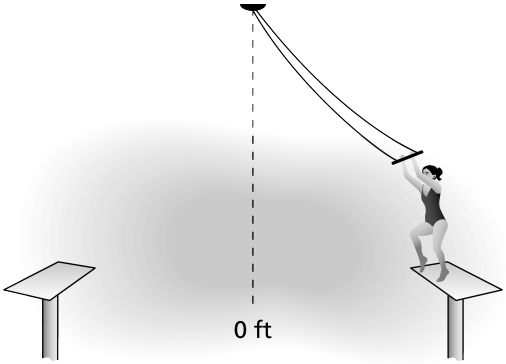
Name _____ Date _____

Lesson 4.5 Enrichment and Extension

Interpreting Intercepts

The graph shows the horizontal position y (in feet) of a trapeze artist after x seconds during an act.





1. Does the graph represent a linear equation? Explain.
2. What is the y-intercept of the graph?
3. Interpret the y-intercept.
4. How many x-intercepts does the graph have?
5. Why does the graph have more than one x-intercept?
6. How many seconds does the trapeze act last?
7. How many feet apart are the platforms?
8. Do you think the graph is a realistic representation of the situation? Why or why not?
9. Would it be a good idea to include Quadrants II and III in a realistic graph of the situation? Why or why not?

Name _____ Date _____

4.5 Puzzle Time

How Do Kangaroos Travel Across The Ocean?

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

Write the linear equation in slope-intercept form.

1. $3x + y = 8$

2. $9x - y = \frac{1}{3}$

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

4. $2x - 7y = 12$

Find the *x*- and *y*-intercepts of the linear equation.

5. $-3x + 5y = 15$

6. $2x - y = 4$

7. $4x - 9y = 36$

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

9. $\frac{2}{5}x - \frac{3}{4}y = 12$

10. $7.6x + 15.2y = 38$

11. The booster club sells popcorn at basketball games for \$0.75 per bag. Their cost for supplies is \$12. The equation $-0.75x + y = -12$ represents the booster club's income y after selling x bags of popcorn. Find the x- and y-intercepts of the linear equation.

12. You upload digital photos to an online photo processing website. You can print 4-inch-by-6-inch photos for \$0.30 each and 5-inch-by-7-inch photos for \$0.75 each. The linear equation $0.30x + 0.75y = 15$ represents the ways you can print x 4-inch-by-6-inch photos and y 5-inch-by-7-inch photos for \$15. Find the x- and y-intercepts of the linear equation.

Answers

H. $y = \frac{2}{7}x - \frac{12}{7}$

S. x-intercept: 5; y-intercept: 2.5

H. x-intercept: -3; y-intercept: -9

J. x-intercept: 50; y-intercept: 20

M. x-intercept: 2; y-intercept: -4

Y. x-intercept: 30; y-intercept: -16

U. x-intercept: 9; y-intercept: -4

P. x-intercept: 16; y-intercept: -12

T. $y = -3x + 8$

E. x-intercept: -5; y-intercept: 3

P. $y = 9x - \frac{1}{3}$

I. $y = \frac{1}{4}x + 3$

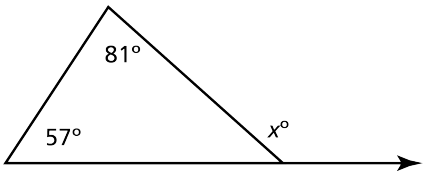
1	4	5	9		12	7	6	2		10	8	3	11

Lesson 4.6 Cumulative Practice

For use before Lesson 4.6

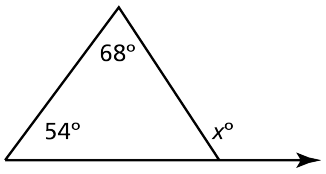
Find the value of x.

1.



$x =$ _____

2.



$x =$ _____

Lesson 4.6 Vocabulary Practice

For use before Lesson 4.6

1. Write what you know about this phrase.

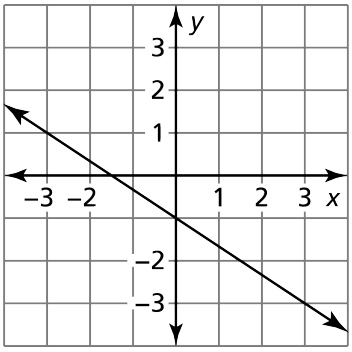
Review: *y*-intercept

Lesson 4.6 Prerequisite Skills Practice

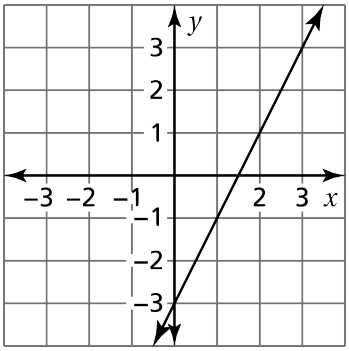
For use before Lesson 4.6

Find the slope of the line.

1.



2.

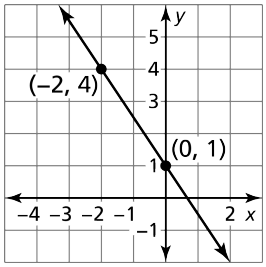


Name _____ Date _____

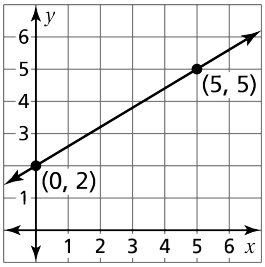
Lesson 4.6 Extra Practice

Write an equation in slope-intercept form of the line that passes through the given points.

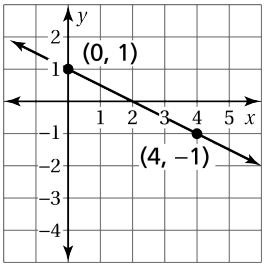
1.



2.



3.



4.

x	*y*
−2	11
0	5
2	−1
4	−7

5.

x	*y*
−4	−2
0	−1
4	0
8	1

6.

x	*y*
−3	1
0	3
3	5
6	7

Write an equation of the line that passes through the given points.

7. (0, 0), (4, −2)

8. (−2, 6), (0, 3)

9. (0, 2), (6, −4)

10. A plant is 3 inches tall when you purchase it and grows 2 inches per month. Write an equation in slope-intercept form that represents the height y (in inches) of the plant after x months.

11. A bucket is empty. You are filling the bucket with water at a rate of 3 inches per second.

a. Plot the points (0, 0) and (5, 15).

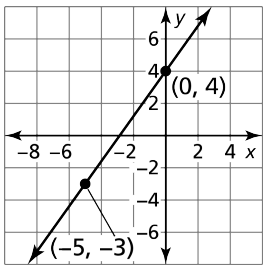
b. What do the points in part (a) represent?

c. Draw a line through the points.

d. What does the line represent?

e. Write an equation of the line.

12. Your friend writes an equation of the line shown. Is your friend correct? Explain your reasoning.



$y = \frac{7}{5}x + 4$

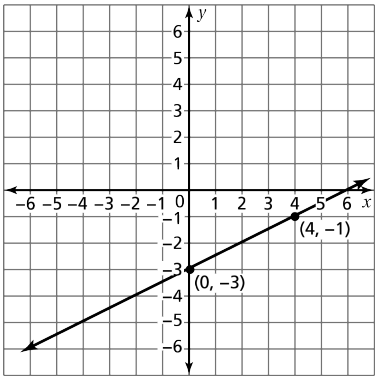
Name _____ Date _____

Lesson 4.6 Reteach

EXAMPLE Writing Equations in Slope-Intercept Form

Write an equation in slope-intercept form of the line that passes through the given points.

a.



Use the given points and the slope formula to find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-1)}{0 - 4} = \frac{-2}{-4}, \text{ or } \frac{1}{2}$$

Find the y-intercept. Because the line crosses the y-axis at $(0, -3)$, the y-intercept is -3.

slope: $\frac{1}{2}$ y-intercept: -3

▶ So, an equation is $y = \frac{1}{2}x + (-3)$, or $y = \frac{1}{2}x - 3$.

b.

x	*y*
−2	9
0	1
1	−3
2	−7

Use any two points in the table and the slope formula to find the slope. Using the points $(-2, 9)$ and $(0, 1)$:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 1}{-2 - 0} = \frac{8}{-2}, \text{ or } -4.$$

Find the y-intercept.
Because $y = 1$ when $x = 0$, the y-intercept is 1.

slope: -4 y-intercept: 1

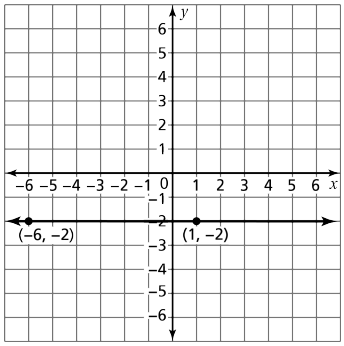
▶ So, an equation is $y = -4x + 1$.

Name _____ Date _____

Lesson 4.6 Reteach (continued)

EXAMPLE Writing an Equation

Which equation is shown in the graph?



A. $y = -2$ **B.** $y = 2$

C. $y = -2x$ **D.** $y = x$

Using the given points on the graph, find the slope. The line is horizontal, so the change in y is 0.

$$m = \frac{\text{change in } y}{\text{change in } x} = \frac{0}{7} = 0$$

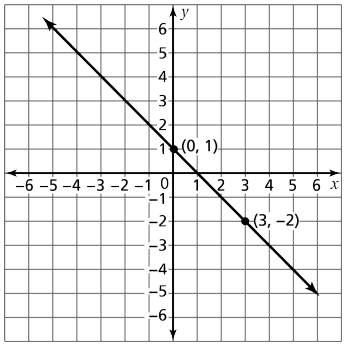
Find the y-intercept. Because the line crosses the y-axis at (0, –2), the y-intercept is –2.

So, the equation is $y = 0x + (-2)$, or $y = -2$.

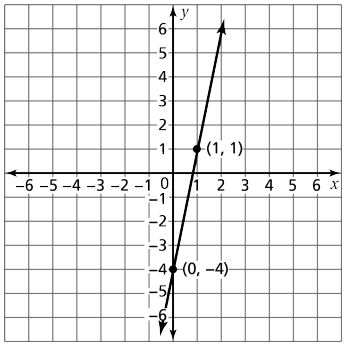
▶ So, the correct answer is **A**.

Write an equation in slope-intercept form of the line that passes through the given points.

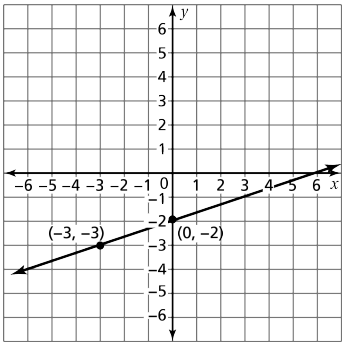
1.



2.



3.



4.

x	*y*
–4	1
–2	–3
0	–7
2	–11

5.

x	*y*
–6	–1
–3	1
0	3
3	5

6.

x	*y*
–4	0
–2	2
0	4
2	6

Write an equation of the line that passes through the given points.

7. (0, 0), (3, –9) **8.** (–2, 5), (0, 5) **9.** (–4, 3), (0, 5)

Name _____ Date _____

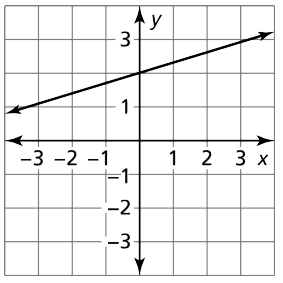
Lesson 4.6

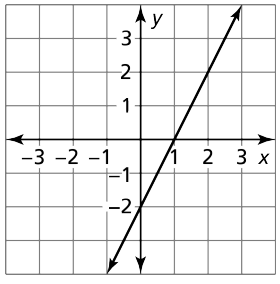
Enrichment and Extension

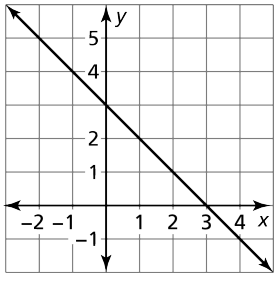
Matching Equations and Graphs

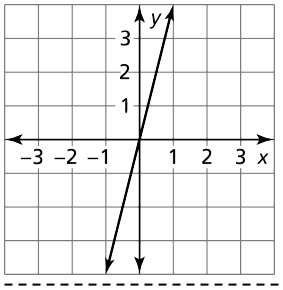
Copy the equations and graphs onto index cards. Mix the cards up and lay them face down. With a friend, take turns turning over pairs of cards. If you find a matching graph and equation, remove the pair and take another turn. If the pair doesn't match, turn both cards face down again. Continue until all pairs are removed. The player with the most pairs wins.

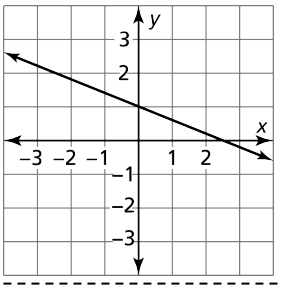
$y = \frac{1}{3}x + 2$	$y = 2x - 2$	$y = -x + 3$
$y = 4x$	$y = -\frac{2}{5}x + 1$	$y = \frac{3}{4}x - 3$
$y = -\frac{1}{2}x - 1$	$y = -3x$	$y = \frac{3}{5}x - 4$

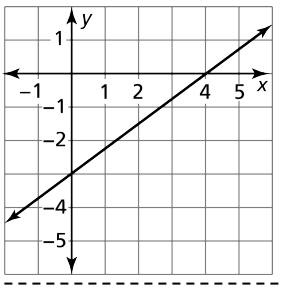


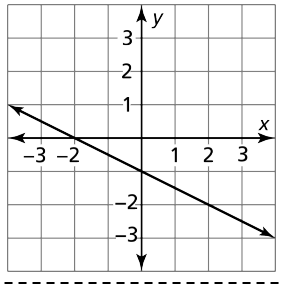


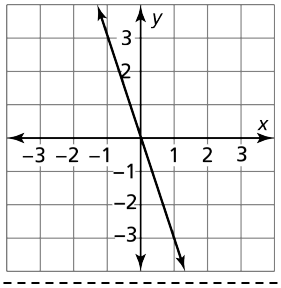


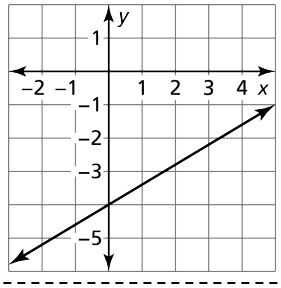












Name _____ Date _____

4.6 Puzzle Time

What Should You Know If You Want To Become A Lion Tamer?

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

Write an equation of the line that passes through the given points.

1. (0, 3), (1, 4)

2. (0, 0), (5, −2)

3. (−2, 0), (0, 4)

4. (−3, 2), (0, −3)

5. (−7, 4), (0, 4)

6. (0, −8), (4, 8)

7. (0, −2), (−5, −2)

8. (−12, −9), (0, −3)

9. (0, 10), (5, 0)

10. (−14, 12), (0, 6)

11. (0, −6), (6, −24)

12. (0, −15), (5, 0)

13. You are planning to make a scrapbook. The album costs $20 and each of the scrapbook papers costs an additional $1. Write an equation that represents the cost of the completed scrapbook where x represents the number of scrapbook papers you purchase.

14. A hot tub that holds 300 gallons of water drains at a rate of 8 gallons per minute. Write an equation that represents how many gallons of water are left in the tub after it has drained for x minutes.

15. An elevator in a tall building is at a point 180 feet above the ground. The elevator descends at a rate of 12 feet per second. Write an equation that represents how far above the ground the elevator is after descending for x seconds.

Answers

T. $y = -2x + 10$

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

H. $y = x + 3$

R. $y = -12x + 180$

E. $y = 2x + 4$

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

H. $y = -\frac{3}{7}x + 6$

N. $y = x + 20$

E. $y = 4$

T. $y = 4x - 8$

I. $y = 3x - 15$

L. $y = -3x - 6$

M. $y = -8x + 300$

O. $y = -2$

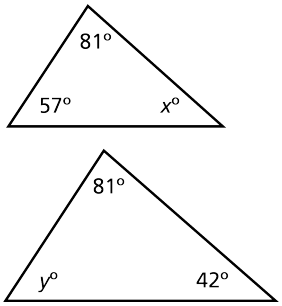
O. $y = -\frac{5}{3}x - 3$

14	7	15	3		6	10	2	13		9	1	5		11	12	4	8

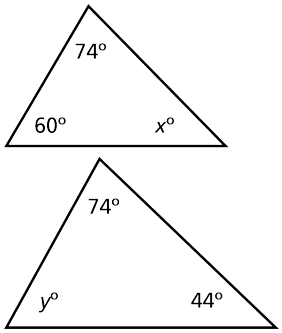
Lesson 4.7 Cumulative Practice

For use before Lesson 4.7

1. Are the triangles similar?



2. Are the triangles similar?



Lesson 4.7 Vocabulary Practice

For use before Lesson 4.7

1. Write what you know about this phrase.

Preview: point-slope form

Lesson 4.7 Prerequisite Skills Practice

For use before Lesson 4.7

Graph the linear equation.

1. $y = 2x + 3$

2. $y = -x + 2$

Name _____ Date _____

Lesson 4.7 Extra Practice

Write an equation in point-slope form of the line that passes through the given point and has the given slope.

1. $(4, -2)$; $m = \frac{1}{4}$

2. $(-3, 5)$; $m = -\frac{4}{3}$

3. $(2, 2)$; $m = -1$

4. $(-1, -5)$; $m = 4$

Write an equation in slope-intercept form of the line that passes through the given points.

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

6. $(-4, 12)$, $(2, -3)$

7. $(-1, -2)$, $(1, -6)$

8. $(-2, -9)$, $(1, 6)$

9. You and your friend are riding bicycles down the same road at different constant speeds. After 3 minutes, you are 60 feet ahead of your friend. After 5 minutes, you are 100 feet ahead of your friend.

a. Write an equation that represents the distance y (in feet) you are ahead of your friend after x minutes.

b. How far ahead will you be after 10 minutes?

10. You are knitting a blanket at a rate of 4 inches per day. After 4 days, you have knitted 16 inches.

a. Write an equation that represents the number of inches y you have knitted after x days.

b. How many inches will you have knitted after 7 days?

c. Will you have knitted 100 inches after 30 days?

11. After a laptop is purchased, its value decreases by \$150 each year. After 2 years, the laptop is worth \$600.

a. Write an equation that represents the value V (in dollars) of the laptop x years after it is purchased.

b. What was the original value of the laptop?

c. What is the value of the laptop 5 years after it is purchased?

Name _____ Date _____

Lesson 4.7 Reteach

Key Idea

Point-Slope Form

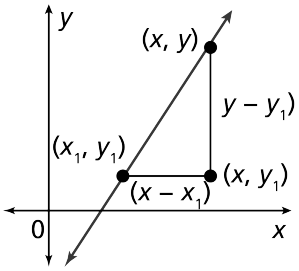
Words A linear equation written in the form $y - y_1 = m(x - x_1)$ is in **point-slope form**. The line passes through the point (x_1, y_1) and the slope of the line is m.

Algebra

$$y - y_1 = m(x - x_1)$$

slope

passes through (x_1, y_1)



EXAMPLE Writing an Equation Using a Slope and a Point

Write an equation in point-slope form of the line that passes through the point (–3, 2) with slope 4.

$y - y_1 = m(x - x_1)$ Write the point-slope form.

$y - 2 = 4[x - (-3)]$ Substitute 4 for m, –3 for x_1, and 2 for y_1.

$y - 2 = 4(x + 3)$ Simplify.

▶ So, an equation is $y - 2 = 4(x + 3)$.

Check: You can check that the given point is a solution of the equation.

$y - 2 = 4(x + 3)$ Write the equation.

$2 - 2 \stackrel{?}{=} 4(-3 + 3)$ Substitute –3 for x and 2 for y.

$0 = 0$ ✓ Simplify.

Name _____ Date _____

Lesson 4.7 Reteach (continued)

EXAMPLE Writing an Equation Using Two Points

Write an equation in slope-intercept form of the line that passes through the given points.

x	y
–1	–10
0	–7
1	–4

Find the slope using any two points in the table. Using (–1, –10) and (0, –7):

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - (-10)}{0 - (-1)} = \frac{-7 + 10}{0 + 1} = \frac{3}{1} = 3.$$

Then use the slope $m = 3$ and the point (–1, –10) to write an equation of the line.

$y - y_1 = m(x - x_1)$	Write the point-slope form.
$y - (-10) = 3[x - (-1)]$	Substitute 3 for m, -1 for x_1, and -10 for y_1.
$y + 10 = 3(x + 1)$	Simplify.
$y + 10 = 3x + 3$	Distributive Property
$y = 3x - 7$	Write in slope-intercept form.

▶ So, an equation is $y = 3x - 7$.

Write an equation in point-slope form of the line that passes through the given point and has the given slope.

1. (1, –4); $m = 3$ **2.** (5, 2); $m = -2$ **3.** (0, 6); $m = 1$

4. (–3, 0); $m = \frac{1}{2}$ **5.** (–1, 3); $m = 4$ **6.** (–2, –4); $m = 5$

Write an equation in slope-intercept form of the line that passes through the given points.

7. (0, 5), (–3, 2) **8.** (–2, 11), (4, –13) **9.** (1, –7), (4, –1)

10. (0, 0), (6, 2) **11.** (2, –4), (0, –5) **12.** (1, 4), (–2, –11)

Name _____ Date _____

Lesson 4.7 Enrichment and Extension

Ski Slopes

The grade of a ski trail describes the steepness of the ski slope. A skier can calculate the grade by dividing the vertical decrease (in meters) of the slope by the horizontal distance (in meters) it covers.

Frosty's Ski Center	
Trail	**Grade of Trail**
Bunny Slope	4%
Medium Trail	15%
Expert Route	30%

1. How does the grade of a trail relate to the slope of a line?
2. What is the slope of each of the ski trails?
3. There is a first aid station located at the point (750, 28) on the Bunny Slope. Write an equation that describes the Bunny Slope.
4. What is the y-intercept of your equation? What does the y-intercept mean in terms of the Bunny Slope?
5. What is the x-intercept of your equation? What does the x-intercept mean in terms of the Bunny Slope?
6. The halfway point on the Medium Trail is located at (5100, 765). Write an equation that describes the Medium Trail.
7. The Expert Route passes by the ski lodge located at the point (15,000, 1500). Write an equation that describes the Expert Route.
8. Beginner slopes for new skiers have a maximum grade of 5%. Two skiers on a trail are located at the points (700, 30) and (450, 50). Is the trail a beginner slope? Explain.

Name _____ Date _____

4.7 Puzzle Time

What Do You Call A Ghost Cheerleader?

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

Write an equation in point-slope form of the line that passes through the given point and has the given slope.

1. (1, 5); $m = 2$

2. (–2, 4); $m = -3$

3. (4, 2); $m = 3$

4. (–1, 5); $m = -2$

5. (2, –4); $m = -3$

6. (–5, 1); $m = 2$

Write an equation in slope-intercept form of the line that passes through the given points.

7. (–5, –5), (5, –7)

8. (–3, –4), (3, 0)

9. (–2, –7), (2, –1)

10. (–6, –4), (6, 4)

11. You go to an arcade and purchase a card with game credits. After playing 5 games, you have 33 credits left. You play 4 more games and have 21 credits left. Write an equation that represents the number of credits y on the card after x games.

12. You go to a school dance. There is an entrance fee, and there are wraps for sale. After having 1 wrap, you have spent a total of \$6. After having 2 more wraps, you have spent a total of \$10. Write an equation that represents the total cost y after buying x wraps at the dance.

13. You make 2 headbands and have 6 feet of ribbon left. You make 1 more headband and have 4 feet of ribbon left. Write an equation that represents the amount of ribbon y you have left after making x headbands.

Answers

R. $y - 4 = -3(x + 2)$

M. $y = \frac{2}{3}x$

E. $y = 2x + 4$

I. $y + 4 = -3(x - 2)$

P. $y = -2x + 10$

I. $y = -3x + 48$

A. $y - 2 = 3\,(x - 4)$

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

E. $y - 5 = 2\,(x - 1)$

T. $y - 1 = 2(x + 5)$

S. $y = \frac{3}{2}x - 4$

T. $y - 5 = -2(x + 1)$

H. $y = -\frac{1}{5}x - 6$

4	7	1		6	12	3	10		9	13	5	2	11	8