1.1 Use a Problem Solving Plan

Georgia Performance Standard(s)

MM1P1d, MM1P3a

Your Notes

Goal • Use a problem solving plan to solve problems.

VOCABULARY

Formula

A PROBLEM SOLVING PLAN

Step 1 ________________________ Read the problem carefully. Identify what you know and what you want to find out.

Step 2 ________________________ Decide on the approach to solving the problem.

Step 3 ________________________ Carry out your plan. Try a new approach if the first one isn't successful.

Step 4 ________________________ Once you obtain your answer, check to see that it is reasonable.

Example 1 ***Read a problem and make a plan***

You have $7 to buy orange juice and bagels at the store. A juice box costs $1.25 and a bagel costs $.75. If you buy two juice boxes, how many bagels can you buy?

Solution

Step 1 ________________________ *What do you know?* You know how much money you have, the price of a _______, and the price of a juice box.

What do you want to find out? You want to find out the number of _________ you can buy.

Step 2 ______________ Use what you know to write a _______________ that represents what you want to find out. Then write an ___________ and solve it.

Your Notes

Example 2 ***Solve a problem and look back***

Solve the problem in Example 1 by carrying out the plan. Then check your answer.

Step 3 ________________ Write a verbal model. Then write an equation. Let *b* be the number of bagels.

Price of juice (in dollars)	·	Number of boxes	+	Price of bagel (in dollars)	·	Number of bagels	=	Cost (in dollars)
↓		↓		↓		↓		↓
______	·	___	+	______	·	b	=	___

The equation is _____ + ______b = ___. Solve the equation using the strategy *guess*, *check*, and *revise*.

Guess an even number that is easily multiplied by ______. Try 4.

_____ + ______b = ___ **Write equation.**

_____ + ______(4) $\stackrel{?}{=}$ ___ **Substitute 4 for *b*.**

___________ **Simplify; 4 ___________ check.**

Because _________, try an even number _________ _____ 4. Try 6.

_____ + ______b = _ **Write equation.**

_____ + ______(6) $\stackrel{?}{=}$ _ **Substitute 6 for *b*.**

__________ **Simplify.**

For ____ you can buy ___ bagels and ___ juice boxes.

Step 4 ____________ Each additional bagel you buy adds ______ to the total cost. Make a table.

Bagels	0	1	2	3	4	5	6
Total Cost	______	______	____	______	_____	______	____

The total cost is _____ when you buy ___ bagels and ___ juice boxes. The answer in Step 3 is _________.

Your Notes

✔ ***Checkpoint*** **Complete the following exercises.**

1. Suppose in Example 1 that you have $12 and you decide to buy three containers of juice. How many bagels can you buy?

2. In Example 1, the store where you bought the juice and bagels had an income of $7 from your purchase. The profit the store made from your purchase is $2.50. Find the store's expense for the juice and bagels.

Homework

Name ______________________ Date ______________

LESSON 1.1 Practice

In Exercises 1–3, identify what you know and what you need to find out. You do *not* need to solve the problem.

1. In science class, you compare the growths of plants subject to different conditions. Plant A grows 25 inches in the same amount of time plant B grows 17.5 inches. How many times taller is plant A than plant B?

2. Your class plans to make a mosaic mural out of 1-inch by 1-inch colored tiles. The rectangular mural is 8 feet long and 4 feet tall. How many tiles does your class need to make the mural?

3. Your baseball team raises \$240 to buy new T-shirts and hats. It costs \$15 for each of the 20 players to have a T-shirt and a hat. How much more money does each player have to pay to cover the cost?

In Exercises 4 and 5, state the formula that is needed to solve the problem. You do *not* need to solve the problem.

4. The temperature is 74°C. What is the temperature in degrees Fahrenheit?

5. You travel 150 miles to your cousin's house at a rate of 50 miles per hour. When will you get to your cousin's house?

Name ______________________ Date ______________

LESSON 1.1

Practice *continued*

6. **Stamp Collection** Your stamp collection consists of 120 stamps. Each stamp has either a cancellation mark or no cancellation mark. There are 75 more stamps with cancellation marks than stamps without cancellation marks. Let x be the number of stamps without cancellation marks. Which equation correctly models this situation?

A. $x + 75 = 120$

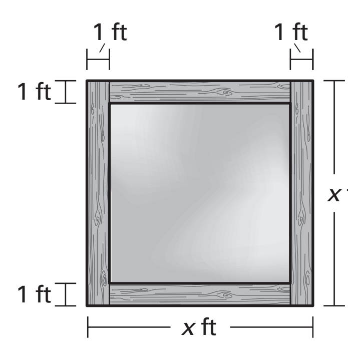
B. $x + (x + 75) = 120$

C. $x + (x - 75) = 120$

7. **Picnic** You are responsible for buying the hamburger rolls for an upcoming picnic. Each bag of rolls costs $1.30 and contains 8 rolls. You need to buy a total of 64 rolls. How much money will it cost for the rolls?

8. **Temperature** Yesterday's high and low temperatures were 50°F and 41°F, respectively. What are these temperatures in degrees Celsius?

9. **Sandbox** A civic group builds a sandbox that is enclosed by 1-foot wide railroad ties. The group needs to find the area inside the sandbox to find the amount of sand needed. Use the figure and the formula for area to write an expression that represents the area inside the sandbox.



1.2 Represent Functions as Rules and Tables

Georgia Performance Standard(s)

MM1A1d

Goal • Represent functions as rules and as tables.

Your Notes

VOCABULARY

Function

Domain

Input

Range

Output

Independent variable

Dependent variable

Example 1 ***Identify the domain and range of a function***

The input-output table shows temperatures over various increments of time. Identify the domain and range of the function.

Input (hours)	0	2	4	6
Output (°C)	24	27	30	33

Solution

The domain is the set of inputs: ______________.

The range is the set of outputs: __________________.

Your Notes

Example 2 ***Make a table for a function***

The domain of the function $y = 3x$ is 0, 1, 2, and 3. Make a table for the function, then identify the range of the function.

Solution

x	___	___	___	___
$y = 3x$	______	______	______	______

The range of the function is ________.

Example 3 ***Write a function rule***

Write a rule for the function.

Input	3	5	7	9	11
Output	6	10	14	18	22

Solution

Let x be the input and let y be the output. Notice that each output is ______ the corresponding input. So, a rule for the function is ______.

Checkpoint **Complete the following exercises.**

1. The domain of the function $y = x - 1$ is 1, 4, 5, and 8. Make a table for the function, then identify the range of the function.

2. Write a rule for the function. Identify the domain and range.

Input	1	2	3	4
Output	1.5	3	4.5	6

Homework

Name ____________________ Date ____________

LESSON 1.2 Practice

Complete the sentence.

1. The collection of all output values is called the __?__ of a function.

2. The collection of all input values is called the __?__ of a function.

Identify the domain and range of the function.

3.

Input	Output
1	8
3	7
5	6
7	5

4.

Input	Output
7	4
2	2
5	1
3	5

5.

Input	Output
0.4	15
0.5	13
0.6	11
0.7	9

Tell whether the pairing is a function.

6.

Input	Output
3	8
6	3
9	4
12	7

7.

Input	Output
6	3
3	1
0	2
3	4

8.

Input	Output
10	9
11	3
12	6
13	9

Name ____________________ Date ____________

LESSON 1.2

Practice *continued*

Make a table for the function. Identify the range of the function.

9. $y = 5x$

Domain: 0, 1, 2, 3

10. $y = x + 2$

Domain: 11, 15, 22, 27

11. $y = x - 5$

Domain: 5, 9, 14, 19

12. **Flower Garden** You have a flat of 12 flowers to plant in your garden.

a. Write a rule for the number of flowers y you have left in the flat as a function of the number of flowers x you have put in the garden so far.

b. Make a table and identify the range of the function.

13. **Centerpieces** A florist makes centerpieces for a charity event. She uses 9 flowers in each centerpiece. Write a rule for the total number of flowers used as a function of the number of centerpieces created.

14. **Kickboxing** You join a kickboxing class at a local gym. The cost is $5 per class plus $25 for the initial membership fee. Write a rule for the total cost of the class in dollars as a function of the number of classes you attend. How much will it cost if you attend 8 classes?

1.3 Represent Functions as Graphs

Georgia Performance Standard(s)

MM1A1d

Your Notes

Goal • Represent functions as graphs.

Example 1 ***Graph a function***

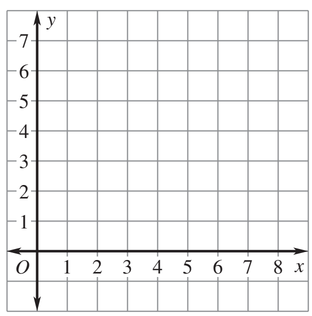
Graph the function $y = x + 1$ with domain 1, 2, 3, 4, and 5.

Solution

Step 1 Make an ______________ table.

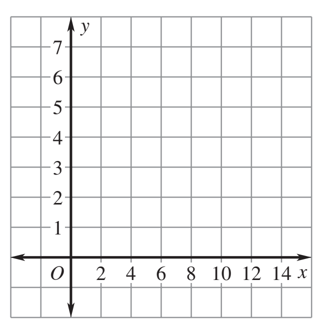
x	____	____	____	____	____
y	____	____	____	____	____

Step 2 Plot a point for each ______________ (x, y).



Checkpoint **Complete the following exercise.**

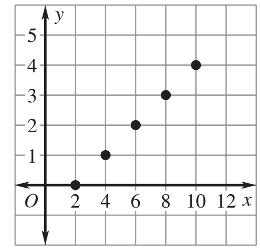
1. Graph the function $y = \frac{1}{3}x + 1$ with domain 0, 3, 6, 9, and 12.



Your Notes

Example 2 *Write a function rule for a graph*

Write a rule for the function represented by the graph. Identify the domain and the range of the function.



Solution

Step 1 Make a _______ for the graph.

x	____	____	____	____	____
y	____	____	____	____	____

Step 2 Find a ______________ between the inputs and outputs.

____

____

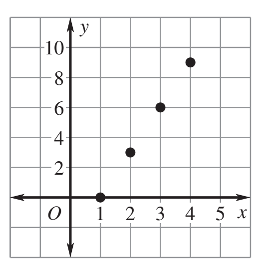
Step 3 Write a _______________ that describes the relationship: $y =$ ________ .

The domain of the function is __________________.

The range is _________________.

✔ ***Checkpoint*** **Write a rule for the function represented by the graph. Identify the domain and the range of the function.**

2.



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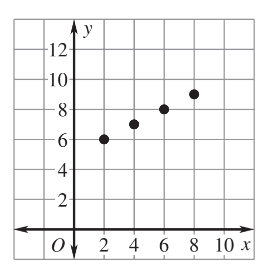


Homework

Name ______________________ Date ______________

LESSON 1.3 Practice

Write the ordered pairs that can be formed from the table.

1.

Input	Output
0	2
1	4
2	6
3	8

2.

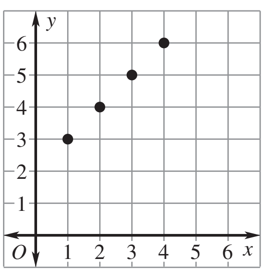
Input	Output
3	2
6	2
9	2
12	2

3.

Input	Output
10	4
9	8
8	12
7	16

Identify the ordered pairs in the graph. Then identify the domain and range.

4.



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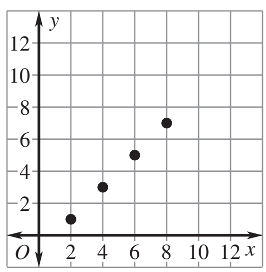

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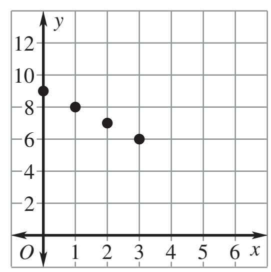
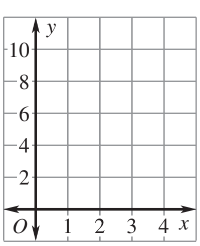


Graph the function.

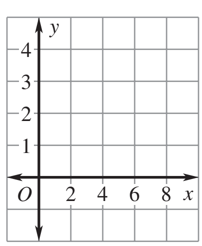
7. $y = x + 5$

Domain: 0, 1, 2, 3



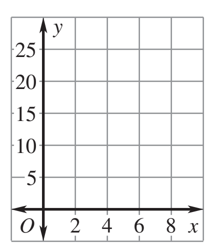
8. $y = x - 3$

Domain: 6, 5, 4, 3



9. $y = 3x$

Domain: 1, 3, 5, 7



Name ______________________ Date ____________

LESSON 1.3

Practice *continued*

Match the rule for the function with its graph.

10. $y = 6x$

11. $y = 6x - 1$

12. $y = x + 6$

13. $y = \frac{1}{6}x$

14. $y = x - 6$

15. $y = 6x + 1$

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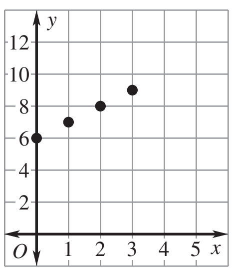

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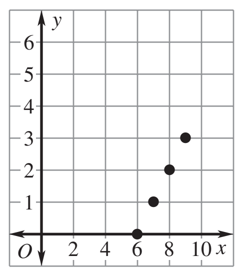

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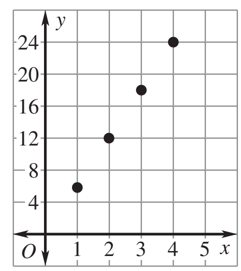

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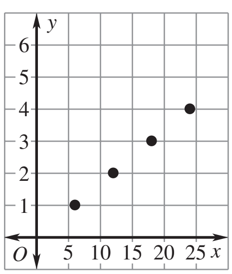

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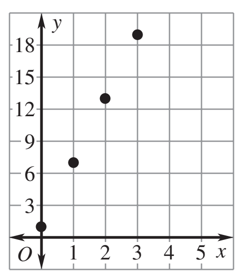

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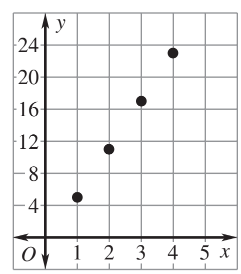
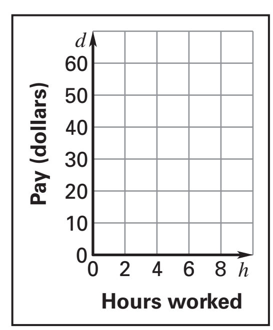


16. **Hourly Pay** The table shows the pay *d* (in dollars) as a function of the number of hours worked *h*. Graph the function.

Hours worked, *h*	1	2	3	5	8
Pay (dollars), *d*	6.75	13.50	20.25	33.75	54



1.4 Graph Using Intercepts

Georgia Performance Standard(s)

MM1A1b, MM1A1d

Your Notes

Goal • Graph a linear equation using intercepts.

VOCABULARY

x-intercept

y-intercept

Example 1 ***Find the intercepts of a graph of an equation***

Find the *x*-intercept and the *y*-intercept of the graph of $8x - 2y = 32$.

Solution

To find the *x*-intercept, substitute ___ for *y* and solve for *x*.

$8x - 2y = 32$ **Write original equation.**

$8x - 2(\_\_\_) = 32$ **Substitute ___ for *y*.**

$x = \frac{\square}{\square} = \_\_\_$ **Solve for ___.**

To find the *y*-intercept, substitute ___ for *x* and solve for *y*.

$8x - 2y = 32$ **Write original equation.**

$8(\_\_\_) - 2y = 32$ **Substitute ___ for *x*.**

$y = \frac{\square}{\square} = \_\_\_\_\_\_$ **Solve for ___.**

The *x*-intercept is ___. The *y*-intercept is ______.

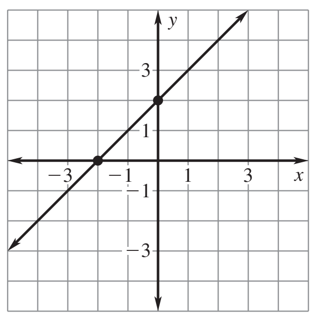
Your Notes

✔ ***Checkpoint*** **Find the *x*-intercept and *y*-intercept of the graph of the equation.**

1. $2x + 3y = 18$	**2.** $-12x - 4y = 36$

Example 2 ***Use a graph to find the intercepts***

Identify the *x*-intercept and *y*-intercept of the graph.

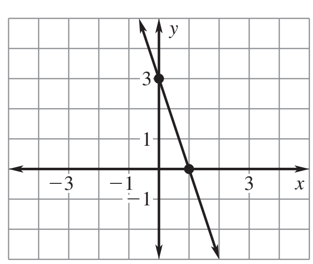


Solution

To find the *x*-intercept, look to see where the graph crosses the ________. The *x*-intercept is _____. To find the *y*-intercept, look to see where the graph crosses the ________. The *y*-intercept is ___.

✔ ***Checkpoint*** **Complete the following exercise.**

3. Identify the *x*-intercept and *y*-intercept of the graph.



Example 3 *Use intercepts to graph an equation*

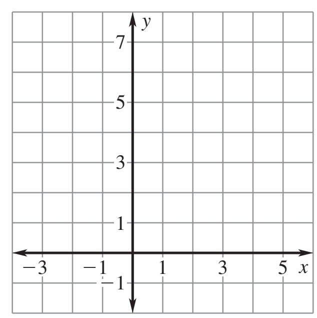
Graph $3.5x + 2y = 14$. Label the points where the line crosses the axes.

Solution

Step 1 Find the ___________.

$3.5x + 2y = 14$	$3.5x + 2y = 14$
$3.5x + 2(\_\_\_) = 14$	$3.5(\_\_\_) + 2y = 14$
$x = \frac{\square}{\square} = \_\_\_$	$y = \frac{\square}{\square} = \_\_\_$

Step 2 Plot the points that correspond to the intercepts. The x-intercept is ___, so plot and label the point _______. The y-intercept is ___, so plot and label the point _______.



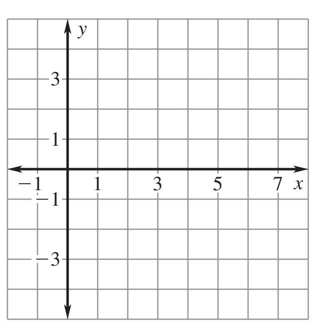
Step 3 __________ the points by drawing a line through them.

CHECK

You can check the graph of the equation by using a third point. When $x = 2$, $y =$ _____, so the ordered pair _________ is a third solution of the equation. You can see that _________ lies on the graph, so the graph is correct.

✔ ***Checkpoint*** **Complete the following exercise.**

4. Graph $2x - 7y = 14$. Label the points where the line crosses the axes.



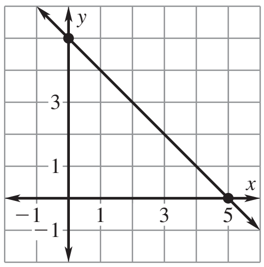
Homework

Name ______________________ Date ______________

LESSON 1.4 Practice

Identify the *x*-intercept and the *y*-intercept of the graph.

1.



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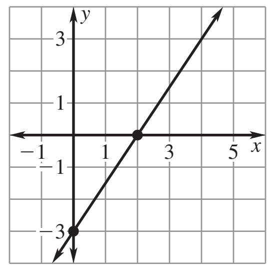

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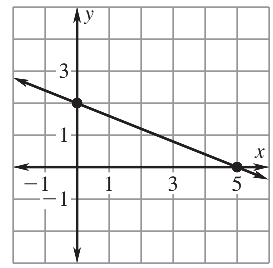

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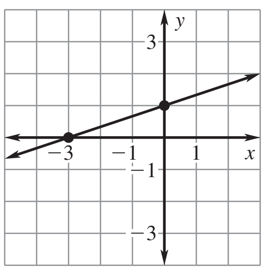

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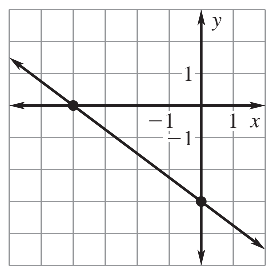

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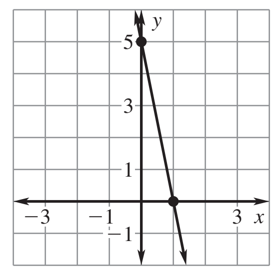


Find the *x*-intercept of the graph of the equation.

7. $x + y = 9$

8. $x - y = 4$

9. $x - y = -1$

10. $3x + y = 15$

11. $4y - x = 18$

12. $2x + 5y = 14$

13. $2x + 3y = 12$

14. $3y - 7x = 35$

15. $9x - 4y = 10$

Name ______________________________ Date ______________

LESSON 1.4

Practice *continued*

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

16. $x + y = -7$

17. $x - y = 11$

18. $y - x = 6$

19. $x + 4y = 24$

20. $6x - y = 7$

21. $5x + 2y = 16$

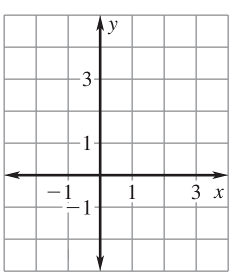
22. $4x + 5y = 20$

23. $9y - 8x = 27$

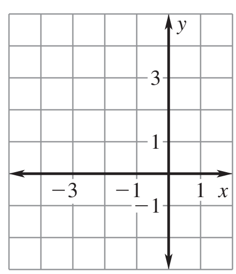
24. $3x - 5y = 15$

Draw the line that has the given intercepts.

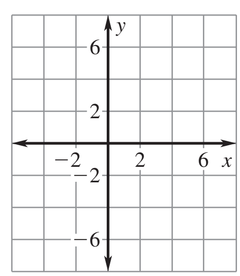
25. x-intercept: 2
y-intercept: 1



26. x-intercept: -4
y-intercept: 3



27. x-intercept: 3
y-intercept: -5



Name ____________________ Date ____________

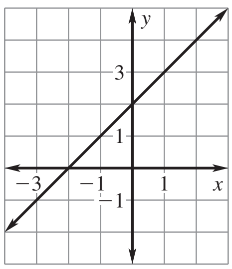
LESSON 1.4

Practice *continued*

Match the equation with its graph.

28. $x + y = 2$ **29.** $x - y = 2$ **30.** $y - x = 2$

A.



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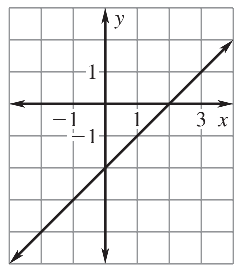
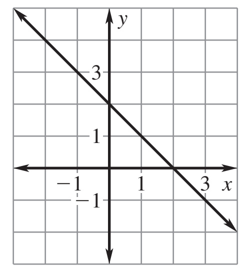
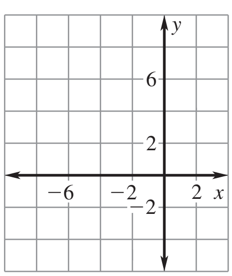


C.

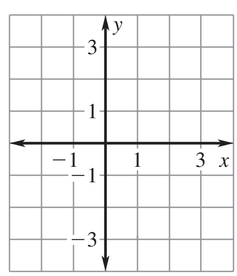


Graph the equation. Label the points where the line crosses the axes.

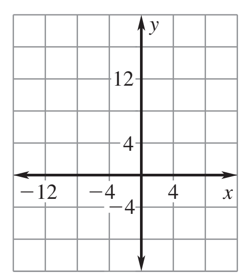
31. $y = x + 6$



32. $y = x - 3$



33. $y = 2x + 8$

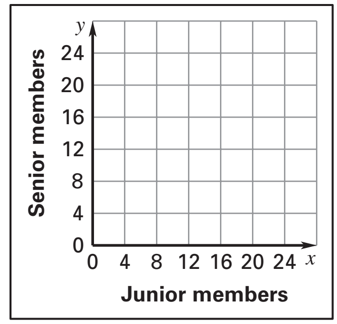


Name ______________________ Date ______________

LESSON 1.4

Practice *continued*

34. Club Membership The computer club at your school is open to juniors and seniors. There are now 24 members in the club. Let x be the number of junior members and let y be the number of senior members.

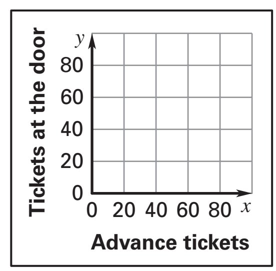


a. Write an equation for the total number of members in the club.

b. Find the intercepts of the equation.

c. Graph the equation.

35. Ticket Sales You sold tickets to the school play. Advance tickets were \$6. Tickets sold at the door were \$8. Total ticket sales were \$480. This situation can be represented by the equation $6x + 8y = 480$ where x is the number of advance tickets sold and y is the number of tickets sold at the door.



a. Find the intercepts of the graph of the equation.

b. Graph the equation.

c. If 52 advance tickets were sold, how many tickets were sold at the door?

1.5 Find Slope and Rate of Change

Georgia Performance Standard(s)

MM1A1g

Your Notes

Goal • Find the slope of a line and interpret slope as a rate of change.

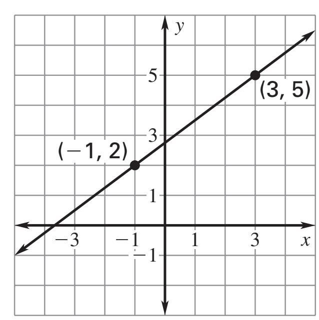
VOCABULARY

Slope

Rate of change

Example 1 ***Find a positive slope***

Find the slope of the line shown.



Solution

Let $(x_1, y_1) = (-1, 2)$ and $(x_2, y_2) = (3, 5)$.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ **Write formula for slope.**

$= \frac{\square - 2}{\square - (-1)}$ **Substitute.**

$= \frac{}{\_\_}$ **Simplify.**

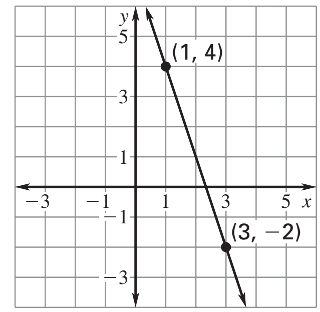
The line ______ from left to right. The slope is __________.

Keep the *x*- and *y*-coordinates in the same order in the numerator and denominator when calculating slope. This will help avoid error.

Your Notes

Example 2 ***Find a negative slope***

Find the slope of the line shown.



Solution

Let $(x_1, y_1) = (1, 4)$
and $(x_2, y_2) = (3, -2)$.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ **Write formula for slope.**

$= \frac{\square - 4}{\square - 1}$ **Substitute.**

$= \frac{\underline{\quad}}{\underline{\quad}}$ **Simplify.**

$= \underline{\quad\quad}$ **Simplify.**

The line _______ from left to right. The slope is ___________.

Checkpoint **Find the slope of the line passing through the points.**

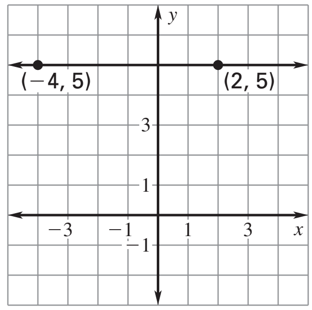
1. (−3, −1) and (−2, 1)	**2.** (−6, 3) and (5, −2)

Your Notes

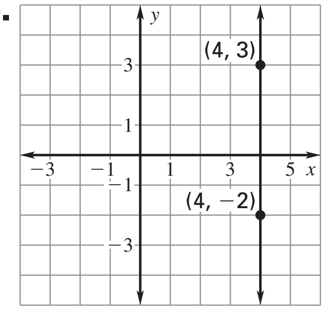
Example 3 ***Find the slope of a line***

Find the slope of the line shown.

a.



b.



Solution

a. Let $(x_1, y_1) = (2, 5)$ and $(x_2, y_2) = (-4, 5)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - \square}{-4 - \square} = \underline{\quad} = \underline{\quad}$$

The line is ____________. The slope is ____________.

b. Let $(x_1, y_1) = (4, -2)$ and $(x_2, y_2) = (4, 3)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - \square}{4 - \square} = \underline{\quad}$$

The line is ____________. The slope is ____________.

✔ ***Checkpoint*** **Find the slope of the line passing through the points. Then classify the line by its slope.**

3. (1, −2) and (1, 3)	**4.** (−3, 7) and (4, 7)

Your Notes

Example 4 ***Find a rate of change***

Gas Prices The table shows the cost of a gallon of gas for several days. Find the rate of change in price with respect to time.

Time (days)	Day 1	Day 3	Day 5
Price/gal ($)	1.99	2.09	2.19

$$\text{Rate of change} = \frac{\text{change in cost}}{\text{change in time}}$$ **Write formula.**

$$= \frac{2.09 - \square}{3 - \square}$$ **Substitute.**

$$= \frac{\square}{\square} = \underline{\qquad}$$ **Simplify.**

The rate of change in price is ________ per day.

✔ ***Checkpoint*** **Complete the following exercise.**

5. The table shows the temperature of a solution over time. Find the rate of change in temperature with respect to time.

Temperature (°F)	**Time (hours)**
38	0
43	2
48	4
53	6

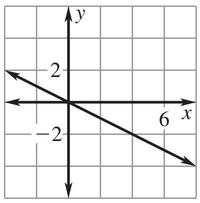
Homework

Name ______________________ Date ____________

LESSON 1.5 Practice

Tell whether the slope of the line is *positive, negative, zero,* or *undefined*.

1.



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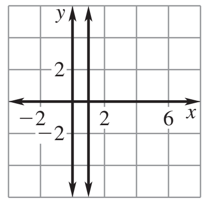

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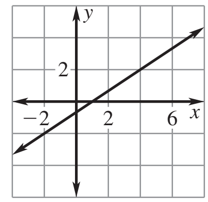

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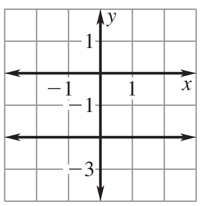

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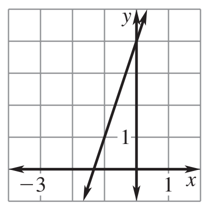

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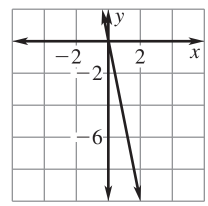
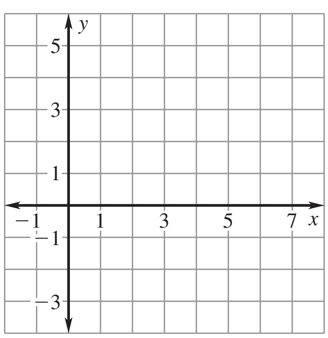
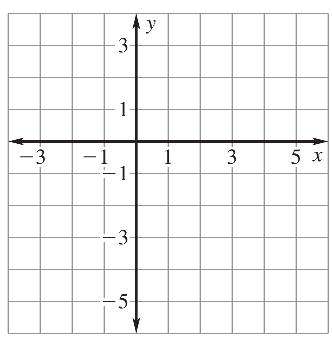


Plot the points and draw a line through them. Without calculating, tell whether the slope of the line is *positive, negative, zero,* or *undefined*.

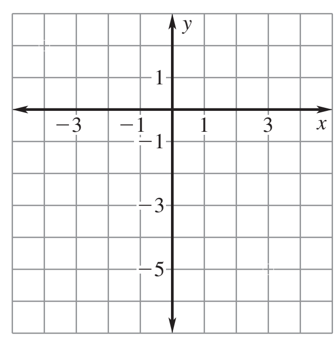
7. (1, 0) and (5, 3)



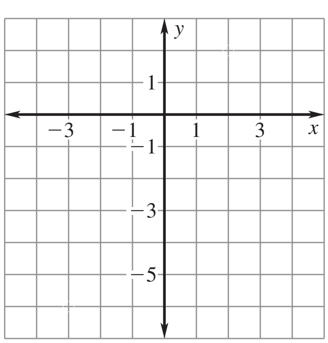
8. (−3, −2) and (5, −2)



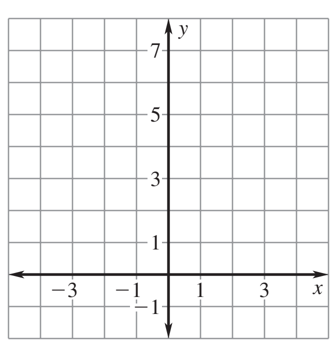
9. (−4, 2) and (3, −5)



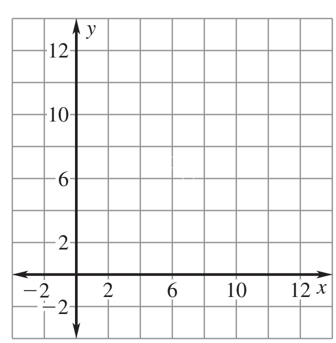
10. (2, 2) and (−3, −6)



11. (−1, 1) and (−1, 5)



12. (6, 7) and (7, 6)



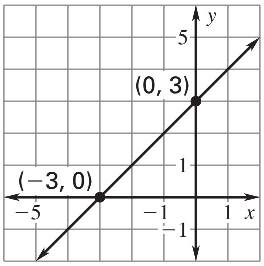
Name ______________________ Date ______________

LESSON 1.5

Practice *continued*

Find the slope of the line that passes through the points.

13.



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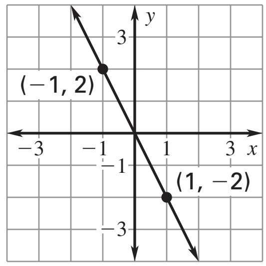

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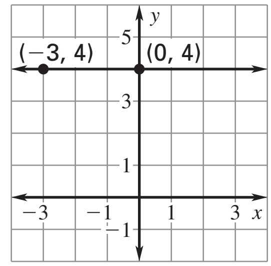

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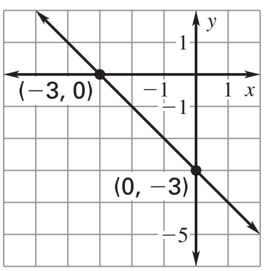

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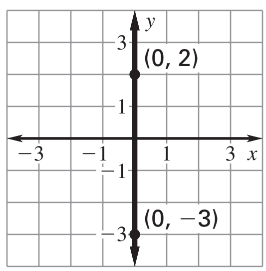

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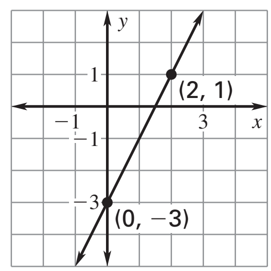

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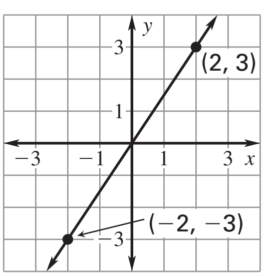

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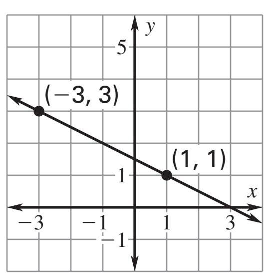

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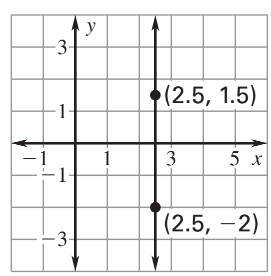


Name ______________________ Date ______________

LESSON 1.5

Practice *continued*

Find the slope of the line that passes through the points.

22. (0, 4) and (3, 7)

23. (2, 5) and (3, 0)

24. (1, 2) and (2, 5)

25. (4, −8) and (−3, 6)

26. (4, 1) and (3, 7)

27. (4, 8) and (6, 10)

28. (−3, 7) and (1, −1)

29. (4, 5) and (−6, 5)

30. (3, −2) and (3, 4)

Find the value of *y* so that the line passing through the two points has the given slope.

31. $(0, y), (2, 7); m = \frac{1}{2}$

32. $(5, 4), (2, y); m = -\frac{1}{3}$

33. $(4, 2), (5, y); m = 4$

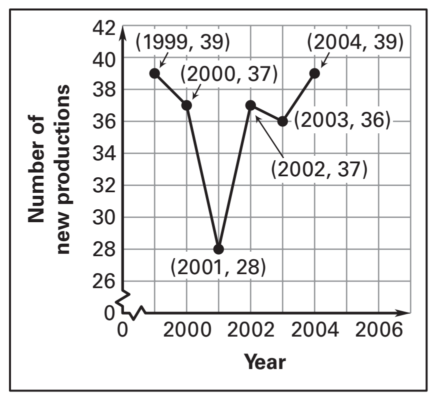
Name ______________________ Date ______________

LESSON 1.5 **Practice** *continued*

34. Plant and Flower Sales The table shows the amount of money (in dollars) spent by a household on plants and flowers for several years. *Describe* the rates of change in the number of dollars spent during the time period.

Year	2001	2002	2003	2004	2005
Amount spent (dollars)	127	134	139	137	136

35. Broadway Shows The graph shows the number of new Broadway show productions for several years.



a. *Describe* the rates of change in the number of shows with respect to time.

b. Determine the time interval(s) during which the number of new shows showed the greatest rate of change.

c. Determine the time interval during which the number of new shows showed the least rate of change.

1.6 Graph Using Slope-Intercept Form

Georgia Performance Standard(s)

MM1A1b, MM1A1d

Your Notes

Goal • Graph linear equations using slope-intercept form.

VOCABULARY

Slope-intercept form

Parallel

Perpendicular

Example 1 ***Identify the slope and y-intercept***

Identify the slope and *y*-intercept of the line with the given equation.

a. $y = x + 3$ **b.** $-2x + y = 5$

Solution

a. The equation is in the form __________. So, the slope of the line is ___, and the *y*-intercept is ___.

b. Rewrite the equation in slope-intercept form by solving for ___.

$-2x + y = 5$ **Write original equation.**

$y =$ ________ **Add ____ to each side.**

The line has a slope of ___ and a *y*-intercept of ___.

Your Notes

✔ ***Checkpoint*** **Identify the slope and *y*-intercept of the line with the given equation.**

1. $y = 4x - 1$	**2.** $4x - 2y = 8$

Example 2 ***Graph an equation using slope-intercept form***

Graph the equation $4x + y = 2$.

Solution

Step 1 **Rewrite** the equation in slope-intercept form.

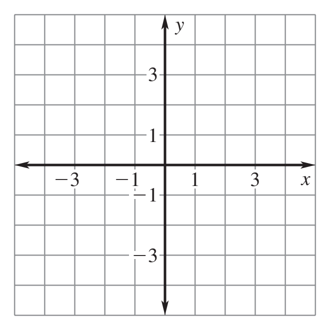
____

Step 2 __________ the slope and the *y*-intercept.

$m =$ _____ $b =$ ___

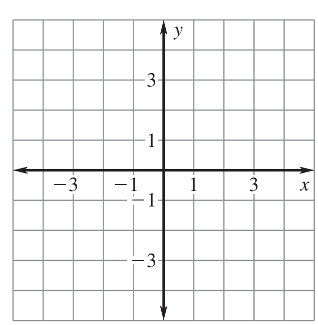
Step 3 ______ the point that corresponds to the *y*-intercept, (______).

Step 4 **Use** the slope to locate a second point on the line. Draw a line through the two points.



✔ ***Checkpoint*** **Complete the following exercise.**

3. Graph the equation $-\frac{1}{2}x + y = 1$.



Your Notes

Example 3 *Identify parallel and perpendicular lines*

Determine which of the lines are parallel or perpendicular: line *a* through (−4, −2) and (2, 4), line *b* through (−1, 4) and (5, −5), line *c* through (−3, −4) and (6, 2), and line *d* through (−2, −3) and (4, 3).

Solution

Find the slope of each line.

Line *a*: $\dfrac{\square - (-2)}{\square - (-4)} = \dfrac{\square}{\square} = \_\_\_$

Line *b*: $\dfrac{\square - 4}{\square - (-1)} = \dfrac{\square}{\square} = \_\_\_$

Line *c*: $\dfrac{\square - (-4)}{\square - (-3)} = \dfrac{\square}{\square} = \_\_\_$

Line *d*: $\dfrac{\square - (-3)}{\square - (-2)} = \dfrac{\square}{\square} = \_\_\_$

Lines ___ and ___ have the same slope, so they are _________. Lines ___ and ___ have slopes that are negative reciprocals, so they are _______________.

Checkpoint **Complete the following exercise.**

4. Determine which of the lines are parallel or perpendicular.

Line *a*: through (2, 5) and (−2, 2)

Line *b*: through (4, 1) and (−3, −4)

Line *c*: through (2, 3) and (−2, 0)

Line *d*: through (−8, 6) and (2, −8)

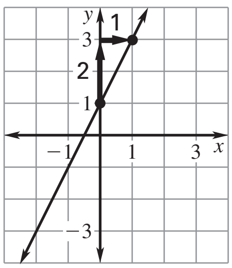
Homework

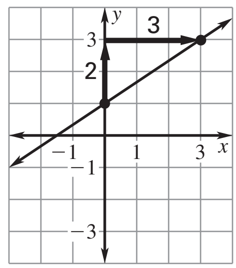
Name ______________________ Date ______________

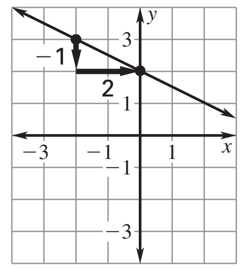
LESSON 1.6

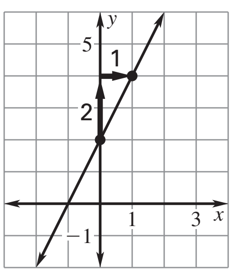
Practice

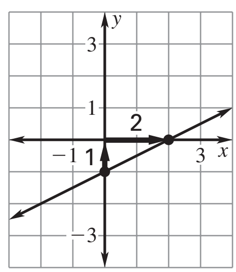
Identify the slope and *y*-intercept of the line whose graph is shown.

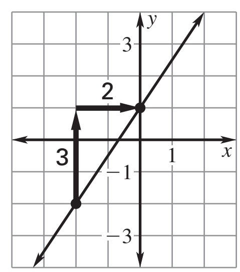
1. 

2. 

3. 

4. 

5. 

6. 

Identify the slope and *y*-intercept of the line with the given equation.

7. $y = 3x + 4$

8. $y = 5x - 2$

9. $y = -2x + 8$

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

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

12. $y - 4x = 4$

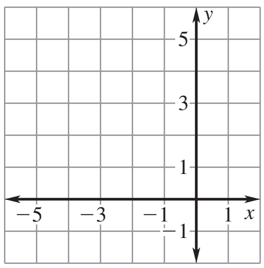
Name ______________________________ Date ______________

LESSON 1.6

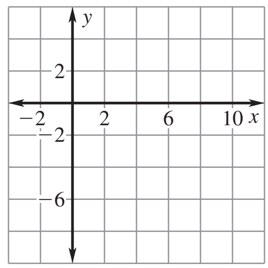
Practice *continued*

Graph the equation.

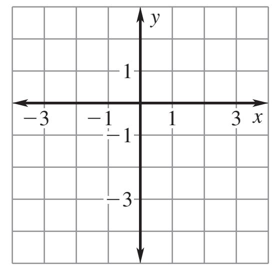
13. $y = x + 5$



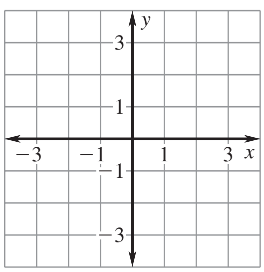
14. $y = x - 7$



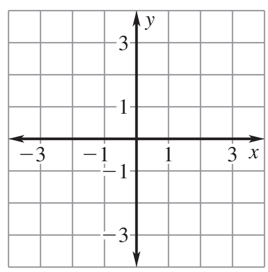
15. $y = 2x - 3$



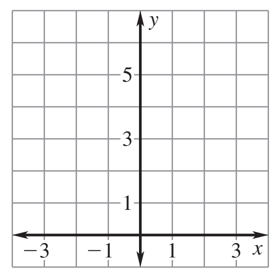
16. $y = -4x + 1$



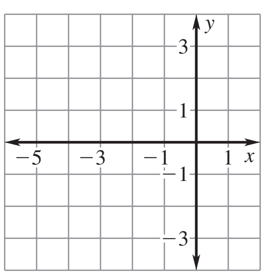
17. $y = -3x - 1$



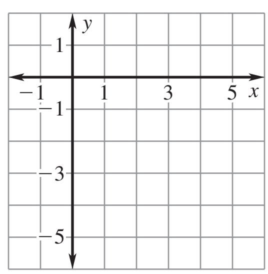
18. $y = 6x$



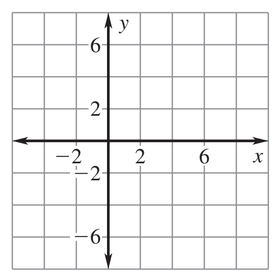
19. $y = \frac{1}{3}x + 2$



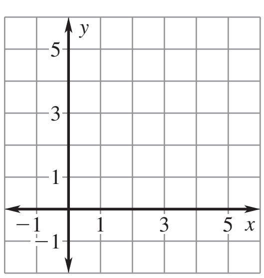
20. $y = \frac{1}{5}x - 4$



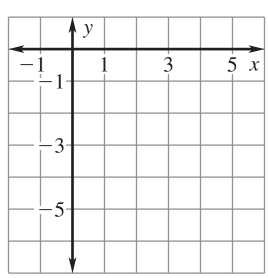
21. $y = \frac{2}{3}x - 4$



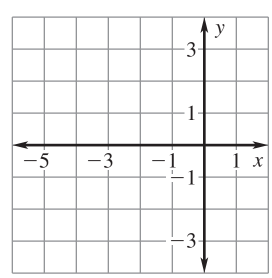
22. $y = -\frac{1}{4}x + 3$



23. $y = -\frac{1}{2}x - 4$



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



Name ______________________ Date ______________

LESSON 1.6

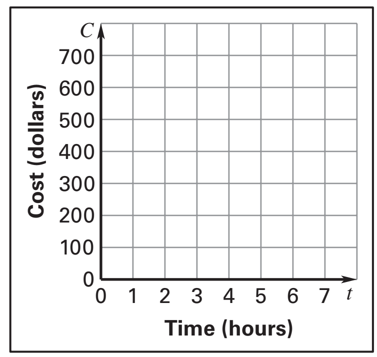
Practice *continued*

Tell whether the graphs of the two equations are *parallel lines, perpendicular lines,* or *neither*.

25. $y = 3x - 1, y = 4 + 3x$

26. $y = 5x + 2, y = 6 - 5x$

27. Landscape Architect A landscape architect charges \$100 for an initial consultation and then charges \$85 an hour to design the landscaping for an area. The total cost C (in dollars) is given by the equation $C = 100 + 85t$ where t is the time (in hours) the architect works on the design.

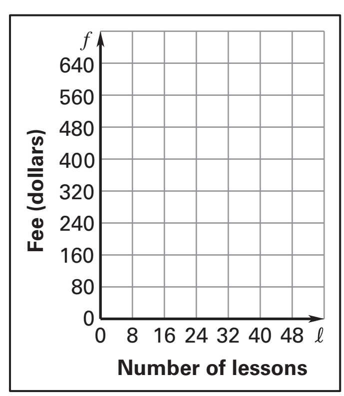


a. Graph the equation.

b. Suppose the architect raises the fee for the initial consultation to \$125 so that the total cost of a design that takes t hours to create is given by the equation $C = 125 + 85t$. Graph the equation on the same coordinate plane as the equation in part (a).

c. How much more does it cost for a design if it takes the architect 6 hours to create the design?

28. Drum Lessons You are taking drum lessons at a studio. Last year, the studio charged \$10 per lesson. This year, the studio raised its rates and charges \$12 per lesson. The total fee f (in dollars) for taking lessons last year is given by the equation $f = 10\ell$ where ℓ is the number of lessons you took. The total fee this year is given by the equation $f = 12\ell$. Graph the equations in the same coordinate plane. Use the graphs to find the difference between the fees a person could be charged for taking 48 lessons.



1.7 Graph Linear Functions

Georgia Performance Standard(s)

MM1A1a, MM1A1b, MM1A1c

Your Notes

Goal • Use function notation.

VOCABULARY
Function notation
Family of functions
Parent linear function

Example 1 ***Find a function value***

Evaluate $f(x) = -5x + 1$ when $x = 3$.

Solution

$f(x) = -5x + 1$	**Write original function.**
$f(\_\_\_) = -5(\_\_\_) + 1$	**Substitute ___ for *x*.**
$= \_\_\_\_\_\_$	**Simplify.**

When $x = 3$, $f(x) =$ ______.

Example 2 ***Find an x-value***

For the function $f(x) = 3x + 1$, find the value of x so that $f(x) = 10$.

Solution

$f(x) = 3x + 1$	**Write original function.**
$\_\_\_\_ = 3x + 1$	**Substitute ____ for *f*(*x*).**
$\_\_\_ = x$	**Solve for *x*.**

When $x =$ ___, $f(x) = 10$.

Your Notes

✓ *Checkpoint* Complete the following exercises.

1. Evaluate $f(x) = 7x + 3$ when $x = 2$.

2. For $f(x) = 6x - 6$, find the value of x so that $f(x) = 24$.

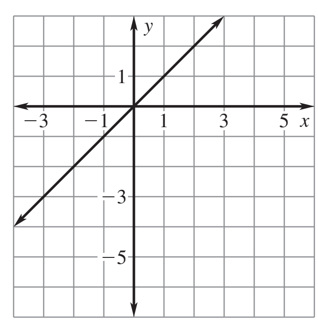
Example 3 ***Compare graphs with the graph of $f(x) = x$***

Graph the function. Compare the graph with the graph of $f(x) = x$.

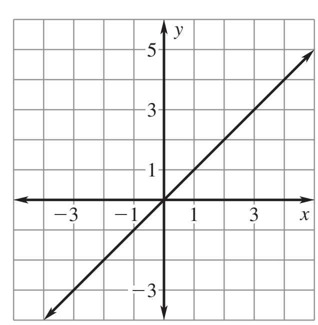
a. $p(x) = x - 4$ **b.** $r(x) = x + 2$

Solution

a. Because the graphs of p and f have the same slope, $m = 1$, the lines are __________. Also, the y-intercept of the graph of p is ___ less than the y-intercept of the graph of f. The graph of p is a ______________________________ _______ from the graph of f.



b. Because the graphs of r and f have the same slope, $m = 1$, the lines are __________. Also, the y-intercept of the graph of r is ___ more than the y-intercept of the graph of f. The graph of r is a ______________________________ from the graph of f.



Your Notes

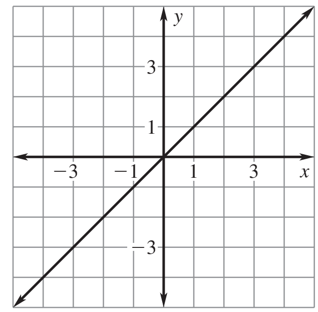
Example 4 ***Compare graphs with the graph of f(x) = x***

Graph the function. Compare the graph with the graph of $f(x) = x$.

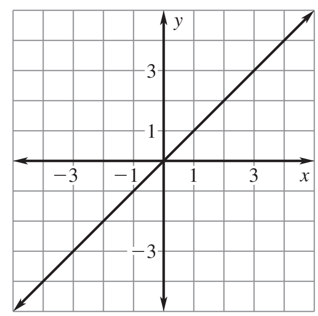
a. $q(x) = 4x$ **b.** $h(x) = \frac{1}{6}x$

Solution

a. The graph of q is ___$f(x)$ which means each value of f is multiplied by ___. The graph of q is a vertical _________ of the graph of f using a scale factor of ___.

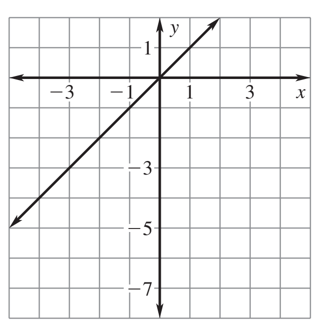


b. The graph of h is $\frac{}{}$ $f(x)$ which means each value of f is multiplied by ___. The graph of h is a vertical ________ of the graph of f using a scale factor of ___.

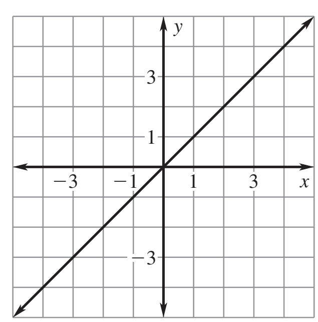


Checkpoint **Graph the function. *Compare* the graph with the graph of $f(x) = x$.**

3. $d(x) = x - 6$



4. $r(x) = \frac{1}{2}x$



Your Notes

Example 5 *Compare graphs*

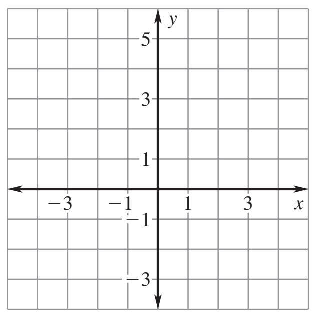
Graph the functions. Compare the graphs.

a. $g(x) = x + 1$,
$h(x) = -x + 1$

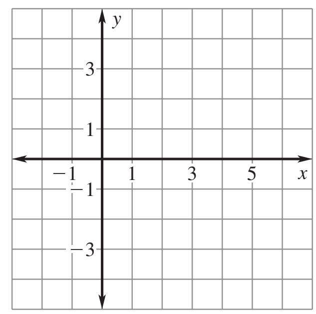
b. $p(x) = x - 2$,
$q(x) = -x + 2$

Solution

a. The graph of h is a reflection of the graph of g in the ________.

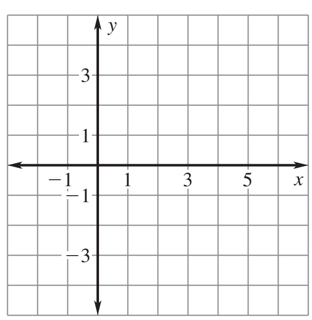


b. The graph of q is a reflection of the graph of p in the ________.



Checkpoint Complete the following exercise.

5. Graph $v(x) = \frac{1}{2}x - 3$ and $w(x) = -\frac{1}{2}x + 3$.
Compare the graphs.



Homework

Name ______________________ Date ____________

LESSON 1.7

Practice

Evaluate the function when $x = -3$, 0, and 2.

1. $f(x) = 10x + 3$
2. $g(x) = 7x - 5$
3. $p(x) = -x + 4$
4. $p(x) = x + 9$
5. $d(x) = -3x + 1$
6. $f(x) = 4x - 3$
7. $h(x) = -2x + 11$
8. $m(x) = -5x - 8$
9. $f(x) = 1.1x$
10. $s(x) = -3.2x$
11. $d(x) = \frac{1}{3}x$
12. $h(x) = -\frac{1}{4}x$

Find the value of x so that the function has the given value.

13. $h(x) = x + 12; 9$
14. $m(x) = 3x - 2; 7$
15. $p(x) = -2x + 5; -1$
16. $f(x) = 4x + 3; 9$
17. $g(x) = -x + 8; 1$
18. $h(x) = 6x - 5; 7$
19. $m(x) = -8x + 10; -6$
20. $p(x) = 8x + 22; 6$
21. $d(x) = -5x - 3; 2$
22. $f(x) = 2x - 8; 0$
23. $g(x) = -5x + 10; 20$
24. $h(x) = -8x + 10; -6$

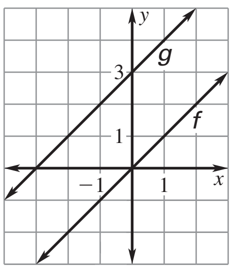
Name ______________________________ Date ______________

LESSON 1.7

Practice *continued*

Compare **the graph of $g(x)$ to the graph of $f(x) = x$.**

25.



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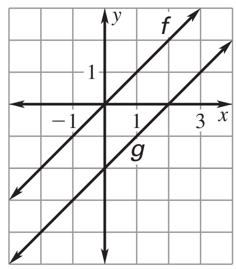

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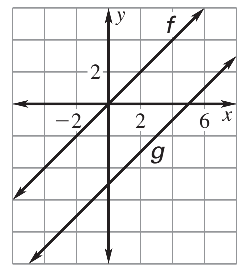

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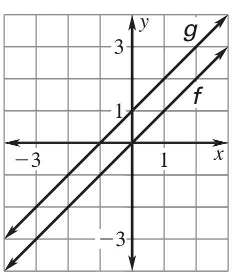

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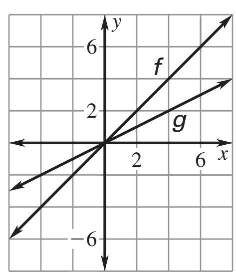

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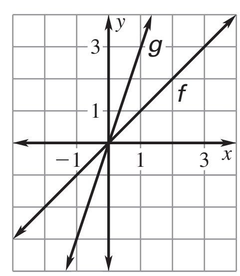


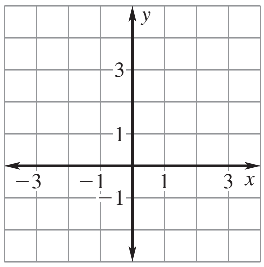
Name ________________________________ Date ________________

LESSON 1.7

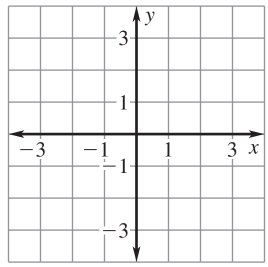
Practice *continued*

Graph the function. *Compare* the graph of $g(x)$ to the graph of $f(x) = x$.

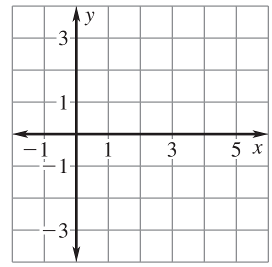
31. $g(x) = x + 4$



32. $g(x) = x - 3$

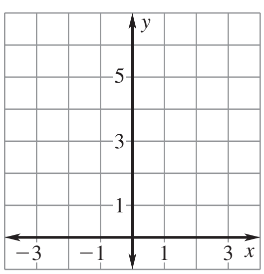


33. $g(x) = \frac{1}{5}x$

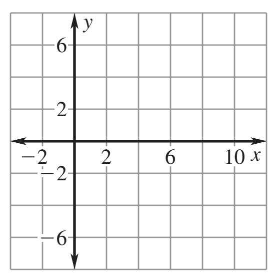


Graph the functions. *Compare* the graphs.

34. $g(x) = x + 3, h(x) = -x + 3$



35. $p(x) = x - 5, q(x) = -x + 5$



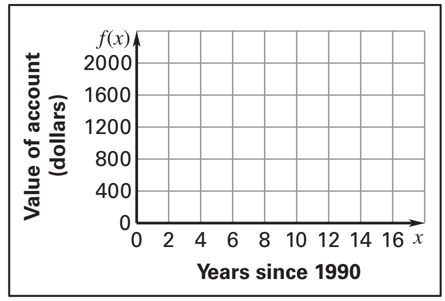
Name ______________________ Date ______________

LESSON 1.7

Practice *continued*

36. Savings The value of a savings account (in dollars) from 1990 to 2006 can be modeled by the function $f(x) = 106x + 185$ where x is the number of years since 1990.

a. Graph the function and identify its domain and range.

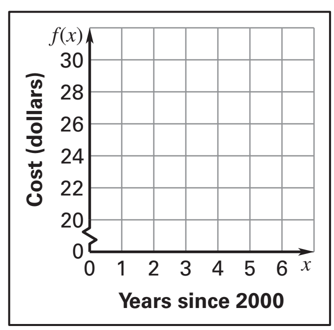


b. Find the value of $f(x)$ when $x = 5$. *Explain* what the solution means in this situation.

c. Find the value of x so that $f(x) = 1000$. *Explain* what the solution means in this situation.

37. Newspapers The average monthly cost (in dollars) of a subscription to a newspaper from 2000 to 2006 can be modeled by the function $f(x) = 1.56x + 21.5$ where x is the number of years since 2000.

a. Graph the function and identify its domain and range.



b. Find the value of x so that $f(x) = 28$. *Explain* what the solution means in this situation.

1.8 Predict with Linear Models

Georgia Performance Standard(s)

MM1A1d

Goal • Make predictions using best-fitting lines.

Your Notes

VOCABULARY

Best-fitting line

Linear interpolation

Linear extrapolation

Zero of a function

Your Notes

Example 1 ***Interpolate using an equation***

Salaries The table shows a company's annual salary expenditure (in thousands of dollars) from 2000 to 2004.

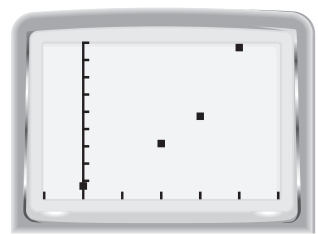
Year	2000	2002	2003	2004
Annual Salary Expenditure (in thousands of dollars)	585	708	787	986

a. Make a scatter plot of the data.

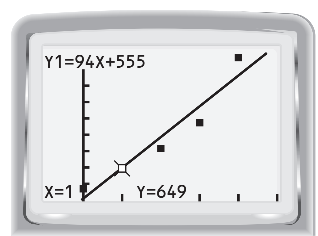
b. Find an equation that models the annual salary expenditure (in thousands of dollars) as a function of the number of years since 2000.

c. Approximate the annual salary expenditure in 2001.

Solution



a. Enter the data into lists on a graphing calculator. Make a scatter plot, letting the number of years since 2000 be the __________ (0, 2, 3, 4) and the annual salary expenditure be the __________.



b. Use a calculator to find the best-fitting line. The equation of the best-fitting line is $y =$ ___________.

c. Graph the best-fitting line. Use the trace feature and the arrow keys to find the value of the equation when $x =$ ___.

The annual salary expenditure in 2001 was _____ thousand dollars.

Your Notes

Example 2 ***Extrapolate using an equation***

Salaries Look back at Example 1.

a. Use the equation from Example 1 to approximate the annual total salary expenditure in 2005 and 2006.

b. In 2005, the annual total salary expenditure was actually 1180 thousand dollars. In 2006, the annual total salary expenditure was actually 1259 thousand dollars. Describe the accuracy of the extrapolations made in part (a).

Solution

a. Evaluate the equation of the best-fitting line from Example 1 for $x =$ ___ and $x =$ ___. The model predicts the average annual salary expenditure as ______ thousand dollars in 2005 and ______ thousand dollars in 2006.

b. The differences between the predicted annual salary expenditure and the actual annual salary expenditure in 2005 and 2006 are _____ thousand dollars and _____ thousand dollars, respectively. The difference in actual and predicted annual salary expenditures increased from 2005 to 2006. So, the equation of the best-fitting line gives a less accurate prediction for years farther from the given data.

Checkpoint **Complete the following exercise.**

1. Population The table shows the population of a town from 2002 to 2006.

Year	2002	2004	2005	2006
Population	1337	1607	1896	2139

Find an equation that models the population as a function of the number of years since 2002. Approximate the population in 2003, 2007, and 2008.

Your Notes

Example 3 *Find the zero of a function*

Public Transit The percentage y of people in the U.S. that use public transit to commute to work can be modeled by the function $y = -0.045x + 5.7$ where x is the number of years since 1983. Find the zero of the function to the nearest whole number. Explain what the zero means in this situation.

Solution

Substitute ___ for y in the model and solve for x.

y	$= -0.045x + 5.7$	**Write the equation.**
___	$= -0.045x + 5.7$	**Substitute ___ for y.**
________		**Solve for x.**

The zero of the function is about _____. According to the model, there will be no people who use public transit to commute to work _____ years after ______, or in ______.

✔ ***Checkpoint*** **Complete the following exercise.**

2. Profit The profit p of a company can be modeled by $p = 300 - 3t$ where t is the number of years since 2000. Find the zero of the function. *Explain* what the zero means in this situation.

Homework

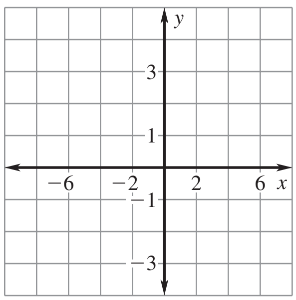
Name ______________________ Date ______________

LESSON 1.8
Practice

Create a scatter plot of the data.

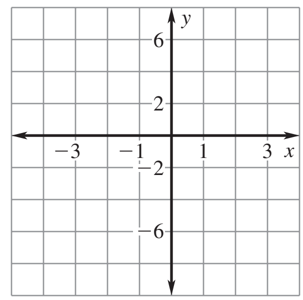
1.

x	−4	−2	0	2	4
y	2	1	0	−1	−1



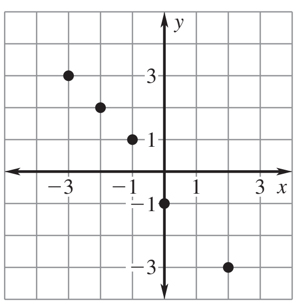
2.

x	−3	−2	−1	0	1
y	−8	−5	−2	1	4



Find the equation of the best-fitting line. Approximate the value of *y* for *x* = 1.

3.



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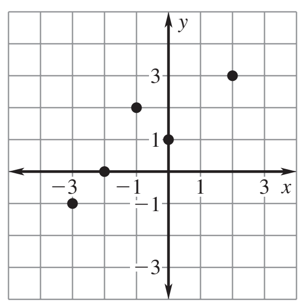

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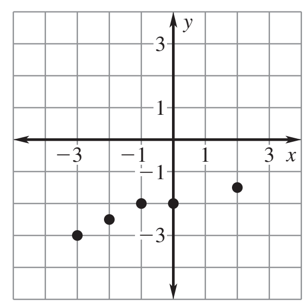

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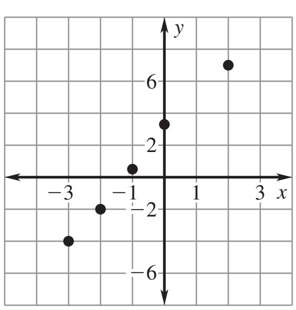

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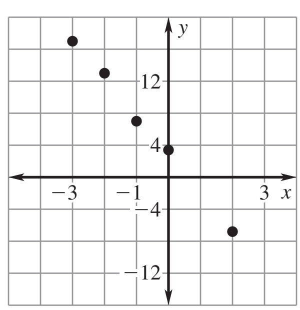

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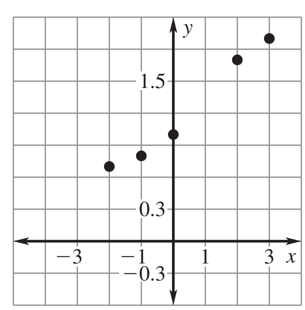


Name ______________________ Date ______________

LESSON 1.8

Practice *continued*

Determine whether the *x*-value is a zero of the function.

9. $f(x) = x - 5, x = -5$

10. $f(x) = 2x - 8, x = 4$

11. $f(x) = 24 - 3x, x = -8$

12. $f(x) = 3x + 6, x = -2$

13. $f(x) = 7x - 21, x = -3$

14. $f(x) = \frac{1}{2}x - 3, x = 6$

15. $f(x) = \frac{3}{4}x + 8, x = -\frac{32}{3}$

16. $f(x) = 6x - \frac{1}{4}, x = \frac{2}{3}$

17. $f(x) = 6 - 10x, x = 0.6$

18. $f(x) = 12x - 9, x = 0.8$

19. $f(x) = 2x + 15, x = 7.5$

20. $f(x) = 1.2 - 3x, x = 0.4$

21. $f(x) = \frac{2}{5}x + 2, x = -5$

22. $f(x) = 4x - \frac{5}{4}, x = \frac{5}{16}$

23. $f(x) = 1.6 + 4x, x = -0.4$

Name ______________________ Date ______________

LESSON 1.8

Practice *continued*

Find the zero of the function.

24. $f(x) = x + 10$

25. $f(x) = x - 15$

26. $f(x) = 8 - x$

27. $f(x) = -x - 3$

28. $f(x) = 3x + 9$

29. $f(x) = 12 - 6x$

30. $f(x) = 8x - 24$

31. $f(x) = 20x - 10$

32. $f(x) = \frac{3}{2}x + 3$

33. $f(x) = -\frac{1}{4}x + 8$

34. $f(x) = -7x - 21$

35. $f(x) = \frac{1}{2} - 5x$

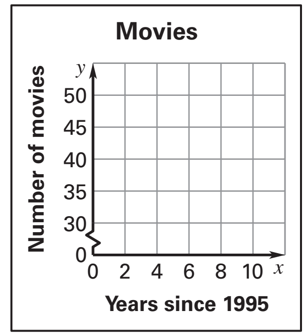
Name ______________________ Date ______________

LESSON 1.8

Practice *continued*

36. **Movies** The table shows the number of movies for several years watched by a critic.

Year	1995	2000	2003	2004	2005
Number of movies	30	36	37	42	49

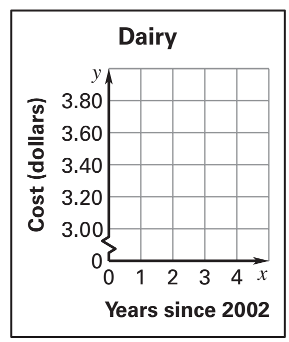


a. Make a scatter plot of the data. Let x represent the number of years since 1995 and let y represent the number of movies.

b. Find an equation that models the number of movies as a function of the number of years since 1995.

37. **Dairy** The table shows the cost of a dairy product from 2002 to 2006.

Year	2002	2003	2004	2005	2006
Cost (dollars)	3.02	3.30	3.40	3.66	3.84



a. Make a scatter plot of the data. Let x represent the number of years since 2002 and let y represent the cost of the dairy product.

b. Find an equation that models the cost (in dollars) of the dairy product as a function of the number of years since 2002.

c. Approximate the cost of the dairy product in 2007.

1.9 Graph Absolute Value Functions

Georgia Performance Standard(s)

MM1A1a, MM1A1b, MM1A1c

Your Notes

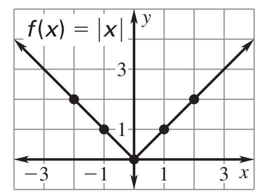
Goal • Graph absolute value functions.

VOCABULARY

Absolute value

Absolute value function

GRAPH OF PARENT FUNCTION FOR ABSOLUTE VALUE FUNCTIONS



COMPARING GRAPHS OF ABSOLUTE VALUE FUNCTIONS WITH THE GRAPH OF $f(x) = |x|$

$g(x) = |x - h|$

The graph of g is a ___________ shift of the graph of $f(x) = |x|$. The shift is h units ______ if $h > 0$ and $|h|$ units _____ if $h < 0$. The graph of $h(x) = |x + h|$ is a ___________ in the y-axis of the graph of g.

$g(x) = |x| + k$

The graph of g is a _________ shift of the graph of $f(x) = |x|$. The shift is k units _____ if $k > 0$ and $|k|$ units _______ if $k < 0$.

$g(x) = a|x|$

If $|a| > 1$, the graph of g is a vertical ________ of the graph of $f(x) = |x|$. If $0 < |a| < 1$, the graph of g is a vertical ________ of the graph of $f(x) = |x|$. The graph of $h(x) = -a|x|$ is a ___________ in the x-axis of the graph of g.

Your Notes

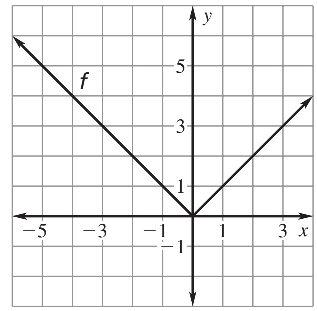
Example 1 ***Graph $g(x) = |x - h|$ and $g(x) = |x| + k$***

Graph (a) $g(x) = |x + 1|$ and (b) $g(x) = |x| - 2$. Compare the graph with the graph of $f(x) = |x|$.

Make a table of values. Graph the function. Compare the graphs of g and f.

a.

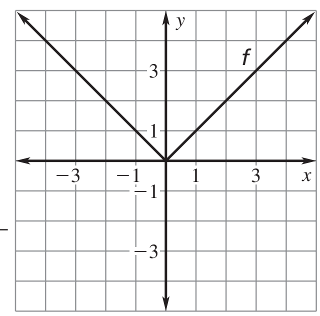
x	−3	−2	−1	0	1
$g(x)$	___	___	___	___	___



The graph of $g(x) = |x + 1|$ is a ______________________ ___________ of the graph of $f(x) = |x|$.

b.

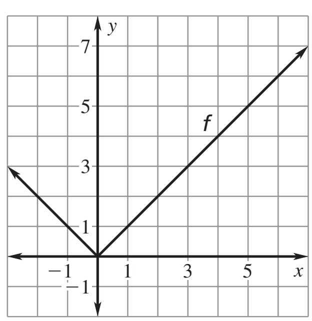
x	−2	−1	0	1	2
$g(x)$	___	___	___	___	___



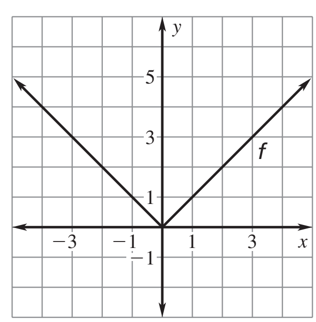
The graph of $g(x) = |x| - 2$ is a ______________________________ of the graph of $f(x) = |x|$.

✔ ***Checkpoint*** **Graph the function. *Compare* the graph with the graph of $f(x) = |x|$.**

1. $g(x) = |x - 3|$



2. $g(x) = |x| + 2$



Your Notes

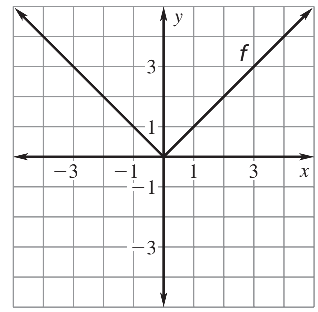
Example 2 ***Graph $g(x) = a|x|$***

Graph (a) $g(x) = -2|x|$ and (b) $g(x) = 0.6|x|$. Compare the graph with the graph of $f(x) = |x|$.

Make a table of values. Graph the function. Compare the graphs of g and f.

a.

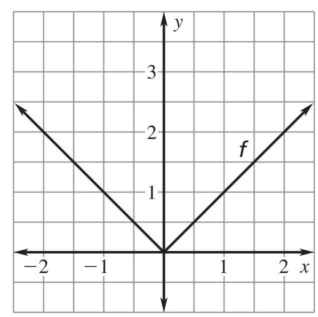
x	−2	−1	0	1	2
$g(x)$	____	____	____	____	____



The graph of $g(x) = -2|x|$ opens ________ and is a ________________ of the graph of $f(x) = |x|$.

b.

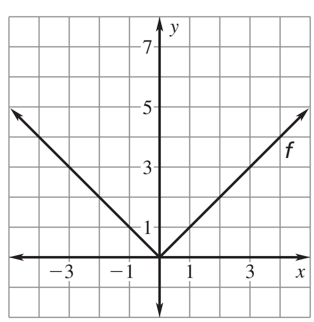
x	−2	−1	0	1	2
$g(x)$	____	____	____	____	____



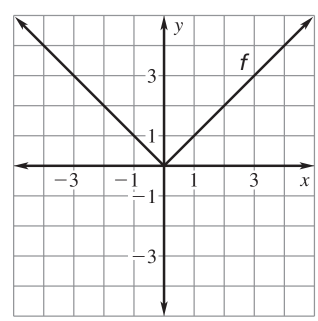
The graph of $g(x) = 0.6|x|$ opens _____ and is a ________________ of the graph of $f(x) = |x|$.

✔ ***Checkpoint*** **Graph the function. *Compare* the graph with the graph of $f(x) = |x|$.**

3. $g(x) = 1.5|x|$



4. $g(x) = -0.4|x|$



Homework

Name ________________________________ Date ____________________

LESSON 1.9 Practice

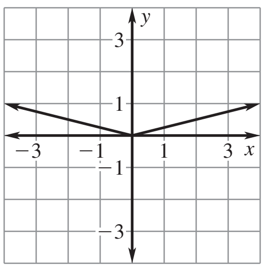
Match the function with its graph.

1. $f(x) = 4|x|$

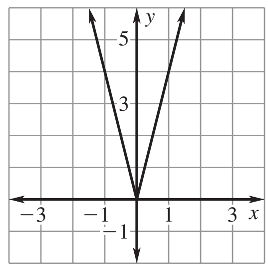
2. $f(x) = \frac{1}{4}|x|$

3. $f(x) = -4|x|$

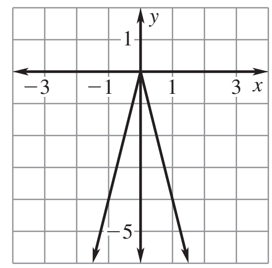
A.



B.



C.



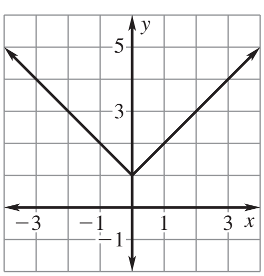
Match the function with its graph.

4. $f(x) = |x| - 1$

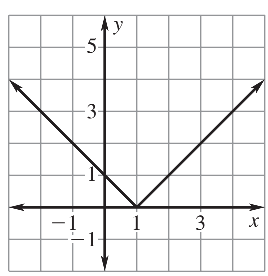
5. $f(x) = |x| + 1$

6. $f(x) = |x - 1|$

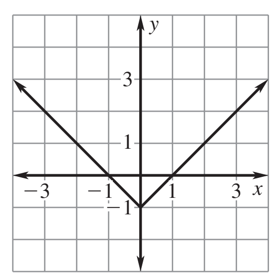
A.



B.



C.



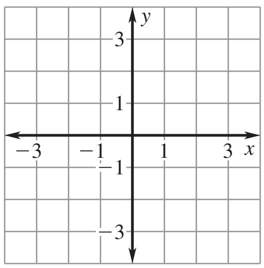
Name ______________________ Date ______________

LESSON 1.9

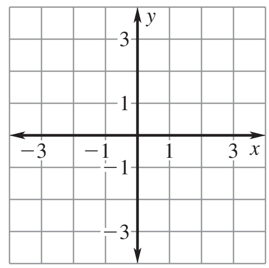
Practice *continued*

Graph the function. *Compare* the graph with the graph of $f(x) = x$.

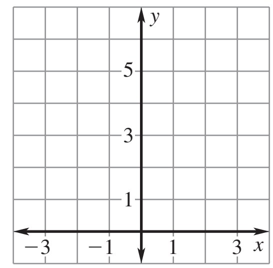
7. $g(x) = -|x|$



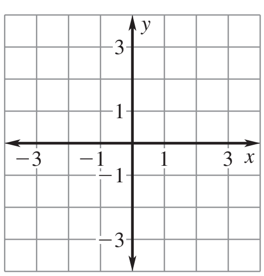
8. $g(x) = |x + 2|$



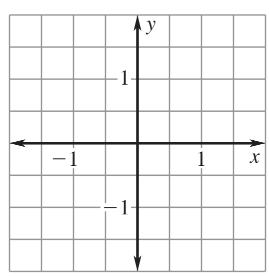
9. $g(x) = |x| + 4$



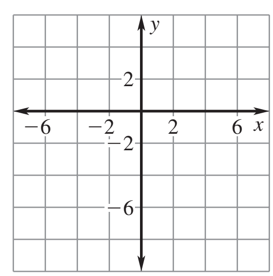
10. $g(x) = |x| - 3$



11. $g(x) = \frac{3}{10}|x|$



12. $g(x) = -5|x|$



Words to Review

Give an example of the vocabulary word.

Formula	Function
Domain, Input	Range, Output
Independent variable	Dependent variable
x-intercept	*y*-intercept
Slope	Rate of change

Slope-intercept form	**Parallel**
Perpendicular	**Function notation**
Family of functions	**Parent linear function**
Best-fitting line	**Linear interpolation**
Linear extrapolation	**Zero of a function**
Absolute value	**Absolute value function**