Amplify Desmos Math

Algebra 1

Additional Practice
Student Resources

About Amplify

Amplify is dedicated to collaborating with educators to create learning experiences that are rigorous and riveting for all students. Amplify creates K–12 core and supplemental curriculum, assessment, and intervention programs for today's students.

A pioneer in K–12 education since 2000, Amplify is leading the way in next-generation curriculum and assessment. All of our programs provide teachers with powerful tools that help them understand and respond to the needs of every student.

Amplify gratefully acknowledges the work of distinguished program advisors from the English Learners Success Forum (ELSF), who have been integral in the development of Amplify Desmos Math. ELSF is a 501(c)(3) nonprofit organization whose mission is to expand educational equity for multilingual learners by increasing the supply of high-quality instructional materials that center their cultural and linguistic assets.

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ISBN: 979-8-89180-605-4
Printed in the United States of America
BR.2025.04

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Algebra 1 | Unit 1

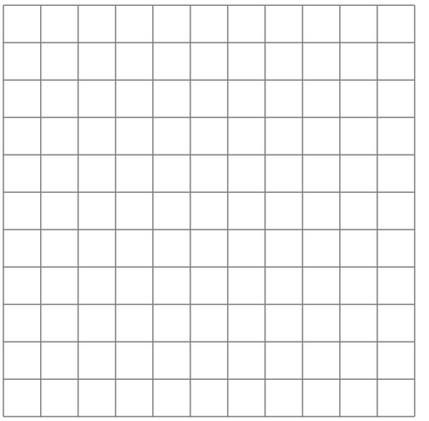
Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 1.01

1. Sketch a 2×2 square on the grid.



2. How many tiles does the square cover in the grid?

3. Figures 1–3 represent the square growing in size.

Here are the number of tiles in Figures 1–3 of the pattern.

Figure #	Number of Tiles
1	9
2	16
3	25

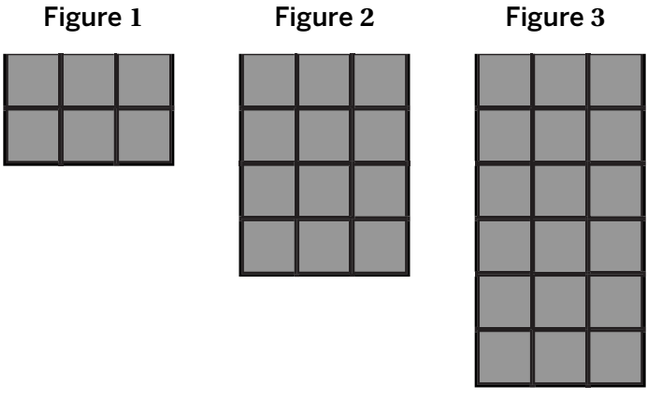
a Draw three figures to match the patterns in the table.

Figure 1	Figure 2	Figure 3

b How many tiles will there be in Figure 4?

Name: Date: Period:

4. Here is a visual pattern.



a Describe what Figure 4 will look like.

b How many tiles will there be in Figure 4?

Problems 5–6. This table shows the number of tiles in Figures 1–3.

Figure #	Number of Tiles
1	6
2	12
3	18

5. Do you agree that Figure 5 will have $24 + 6$ tiles? Circle one. Explain your reasoning.

Yes No I'm not sure

6. How many tiles will there be in Figure 6?

Name: ..... Date: ..... Period: .....

Additional Practice 1.02

1. Here is a sequence that has a *constant ratio*.

$$200,\ 100,\ 50,\ \ldots$$

What is the next term? Explain your thinking.

Problems 2–4: Fill in the blanks to complete each sequence. Each sequence has a *constant difference*.

2. $10,\ 13,\ 16,$ ..... , ..., 25

3. ....., $11,\ 17,$ ....., $29,$ .....

4. $1.5,\ 1.0,\ 0.5,$ ....., ..., ...

5. Which sequence has a *constant ratio* of 4?

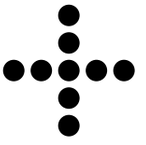
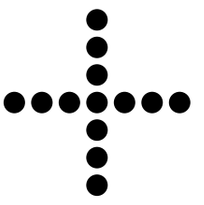
A. $16,\ 64,\ 256,\ \ldots$

B. $24,\ 20,\ 16,\ \ldots$

C. $80,\ 20,\ 5,\ \ldots$

D. $4,\ 8,\ 12,\ \ldots$

6. Here is a visual pattern. Sketch Figure 4.

Figure 1	Figure 2	Figure 3	Figure 4
			

Name: ..... Date: ..... Period: .....

7. How many dots will Figure 6 have? Show or explain your reasoning.

8. What rule does the sequence for this visual pattern follow?

A. Constant ratio of 2

B. Constant ratio of 4

C. Constant difference of 2

D. Constant difference of 4

9. A sequence has a first term of 12 and a constant ratio of $\frac{1}{2}$.What are the first four terms of the sequence?

A. $12, 12\frac{1}{2}, 13, 13\frac{1}{2}$

B. $\frac{1}{2}, 12\frac{1}{2}, 24\frac{1}{2}, 36\frac{1}{2}$

C. $12, 6, 3, \frac{3}{2}$

D. $12, 24, 36, 48$

Name: ..... Date: ..... Period: .....

Additional Practice 1.03

1. This sequence has a *constant ratio* of 5. Fill in the missing terms.

$\frac{1}{5}$, 1, 5, ..., ..., ...

2. This sequence has a *constant difference* of 7. Find the missing terms.

....., ..., 8, ..., ...

3. Here is the start of a sequence: $-2, 1, 4, \ldots$

a Write a rule for this sequence.

b Write the next three terms of this sequence.

Problems 4–5: Here is a start of a sequence: $1, 6, \ldots.$

4. Write a rule and the next three terms the sequence could follow.

Rule: Terms:

5. Write a *different* rule and the next three terms the sequence could follow.

Rule: Terms:

6. Brenden is saving money to buy a new phone. He started with $\$200$ and is saving an additional $\$50$ each month. Write a recursive definition to model the situation.

First term: Rule:

Name: ..... Date: ..... Period: .....

Problems 7–9: Here is a visual pattern.

7. Complete the table with the number of tiles in each figure.

Figure #	Tiles
1	
2	
3	

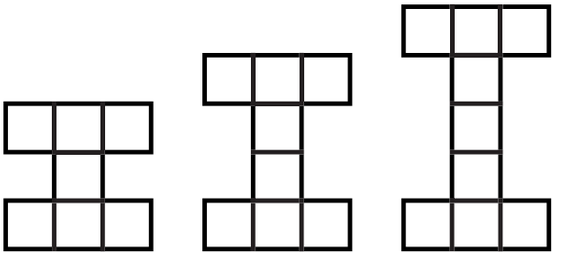


Figure 1 **Figure 2** **Figure 3**

8. Write a recursive definition to model the situation.

First term: Rule:

9. How many tiles would be in Figure 10? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 1.04

1. Determine whether each sequence is arithmetic, geometric, or neither.

Sequence	$3, 10, 17, 24$	$1, 10, 100, 1000$	$12, 6, 3, \frac{3}{2}$	$1, 4, 9, 25$
Arithmetic, Geometric, Or Neither				

2. Complete each arithmetic sequence with its missing terms.

a $-10, -4,$ ....., $8,$ ....., 20

b $14,$ ....., $214,$ ....., 414

c ....., $4.25, 5.50,$ ....., ...

d $12,$ ....., $-2, \ -9 ,$ .....

3. Complete each geometric sequence with its missing terms.

a $10, 20,$ ....., $80,$ ....., 320

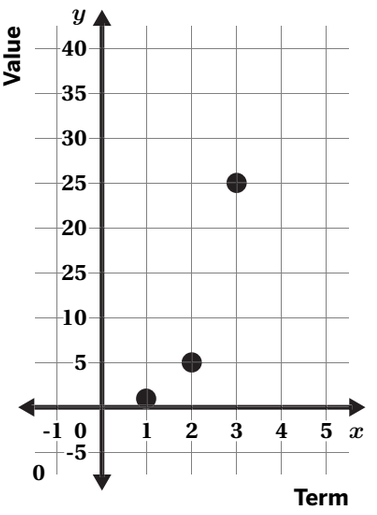
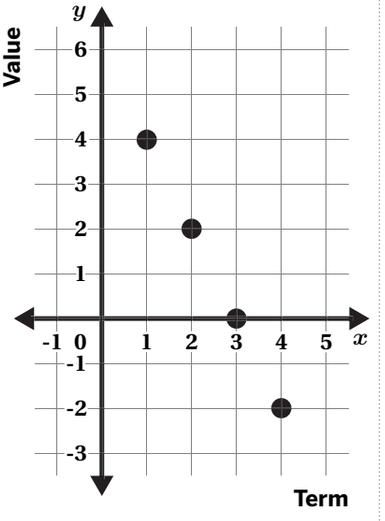
b $12,$ ....., $3,$ ....., $\frac{3}{4}$

c ....., $4, \ 12,$ ....., ...

d $1,$ ....., $25, 125,$ .....

Name: ..... Date: ..... Period: .....

Problems 4–6: For the following sequences, identify the **type** of sequence, the **first term**, and the **rule** of the following sequences.

4. Sequence 1	5. Sequence 2	6. Sequence 3
<table><tr><th>Term</th><th>Value</th></tr><tr><td>1</td><td>−2</td></tr><tr><td>2</td><td>5</td></tr><tr><td>3</td><td>12</td></tr><tr><td>4</td><td>19</td></tr><tr><td>5</td><td>25</td></tr></table>		
Type: **First term:** **Rule:**	**Type:** **First term:** **Rule:**	**Type:** **First term:** **Rule:**

Problems 7–9: Given the first term and rule:

a **Circle** if it is an arithmetic sequence, geometric sequence, or neither.

b **Write** the first 4 terms of each sequence.

7. **First Term**: 2 **Rule:** Multiply the previous term by 4	8. **First Term**: 1 **Rule:** Add 1 to the previous number and square it	9. **First Term**: −12 **Rule:** Add 4 to the previous number
Arithmetic Sequence **Geometric Sequence** **Neither**	**Arithmetic Sequence** **Geometric Sequence** **Neither**	**Arithmetic Sequence** **Geometric Sequence** **Neither**

Name: ..... Date: ..... Period: .....

Additional Practice 1.05

1. Hannah's family decides to save money for a vacation. They start by saving $\$100$ in the first month, and each subsequent month they save 1.5 times the amount they saved the previous month. Select *all* the expressions that represent how much money they will save in the 5th month.

- ☐ **A.** $100 + 1.5^5$
- ☐ **B.** $100 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5$
- ☐ **C.** $100 \cdot 5^{1.5}$
- ☐ **D.** $100 \cdot 1.5 \cdot 1.5 \cdot 1.5 \cdot 1.5 \cdot 1.5$
- ☐ **E.** $100 \cdot 1.5^5$

2. The tables below show the number of red and yellow globs each day.

Day	0	1	2	3	4
Red Globs	50	70	90	110	

Day	0	1	2	3	4
Yellow Globs	5	10	20	40	

a Determine how many globs there will be on Day 4 and complete each table. Show or explain your thinking.

b Will there be more red or yellow globs on Day 10? Show or explain your thinking.

c Which group of globs grows by a *constant difference*? Show or explain your thinking.

3. In a body of water, each foot of water screens out 60% of the light above it. The equation $l = 1 \cdot 0.40^d$ represents this situation.

a Explain what the 1 and the 0.40 represent in this situation.

b What percent of light is available after passing through 5 feet of water? Show your thinking.

Name: ..... Date: ..... Period: .....

Problems 4–5: Here is a table representing a pattern.

x	y
0	50
1	40
2	30
3	20
4	10

4. Circle the equation that represents the table.

A. $y = 50 + 10x$

B. $y = 50 \cdot 10x$

C. $y = 50 - 10x$

D. $y = 50 \cdot \left(\frac{1}{10}\right)^x$

5. Explain your thinking.

6. Kai is saving pennies in a jar that already contained 20 pennies.The first day he saves 6 more pennies. The second day, he saves 12 more pennies. The third day, he saves 24 more pennies, and so on.

a Complete the table to show the amount of pennies in the jar, after n days.

Day n	0	1	2	3	...	n
Number of Pennies	20					

b Write an explicit expression for this situation.

c Use your expression to determine how many pennies are in the jar on the 8th day? Show or explain your thinking.

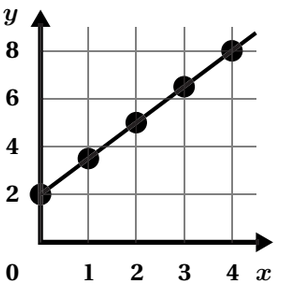
7. Determine whether each table or graph shows a constant difference or a constant ratio. Circle your choice.

x	y
0	4
1	8
2	16
3	32

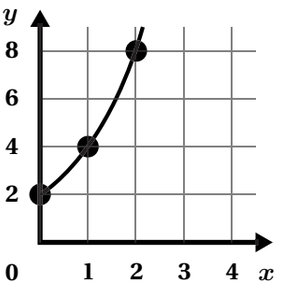
Constant Difference
Constant Ratio

x	y
0	4
1	8
2	12
3	16

Constant Difference
Constant Ratio



Constant Difference
Constant Ratio



Constant Difference
Constant Ratio

Name: ..... Date: ..... Period: .....

Additional Practice 1.06

1. Match each sequence to its explicit expression.

Sequence	Explicit Expression
a. $3, 12, 48, 192$	..... $3 \cdot 2^{(n-1)}$
b. $3, 4, 7, 11$	..... $3 \cdot 4^{(n-1)}$
c. $3, 6, 12, 24$	..... $3 + 4(n-1)$
d. $3, 7, 11, 15$	..... $3 + 2(n-1)$

2. Determine whether each table represents a line relationship, an exponential relationship, or neither. Circle your choice.

x	y
0	1
1	3
2	5
3	7
4	9

Linear Relationship

Exponential Relationship

Neither

x	y
0	1
1	3
2	9
3	19
4	33

Linear Relationship

Exponential Relationship

Neither

x	y
0	1
1	3
2	9
3	27
4	81

Linear Relationship

Exponential Relationship

Neither

3. Select *all* the expressions that could represent the number of tiles in Figure n of this pattern

- ☐ **A.** $3 + 2n$
- ☐ **B.** $4 + 1(n-1)$
- ☐ **C.** $6n - 1$
- ☐ **D.** $5 + 2(n-1)$
- ☐ **E.** $4n + 1$

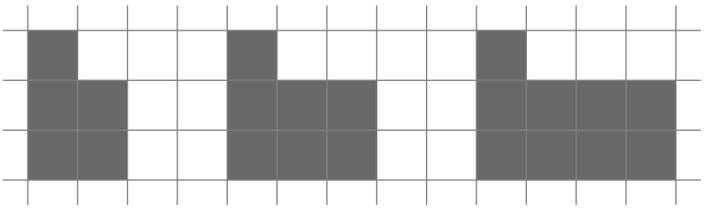


Figure 1 **Figure 2** **Figure 3**

Name: ..... Date: ..... Period: .....

4. The first four terms in a sequence are $2, 6, 18, 54$.

a Is this an arithmetic sequence or a geometric sequence? Explain your thinking.

b What is the common difference (if arithmetic sequence) or common ratio (if geometric sequence)? How did you determine this value?

c Write an explicit expression for term n of this sequence?

Problems 5–7: Here is a visual pattern.

5. Complete the table with the number of tiles in Figures $1–4$.

Figure	# of Tiles
1	
2	
3	
4	
...	...
12	

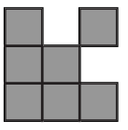


Figure 1

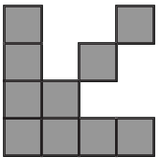


Figure 2

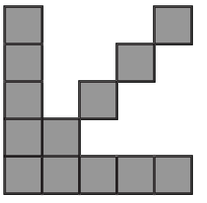


Figure 3

6. Write *two* explicit expressions for the number of tiles in Figure n.

7. Use one of your expressions to determine the number of tiles in Figure 12. Show or explain your thinking.

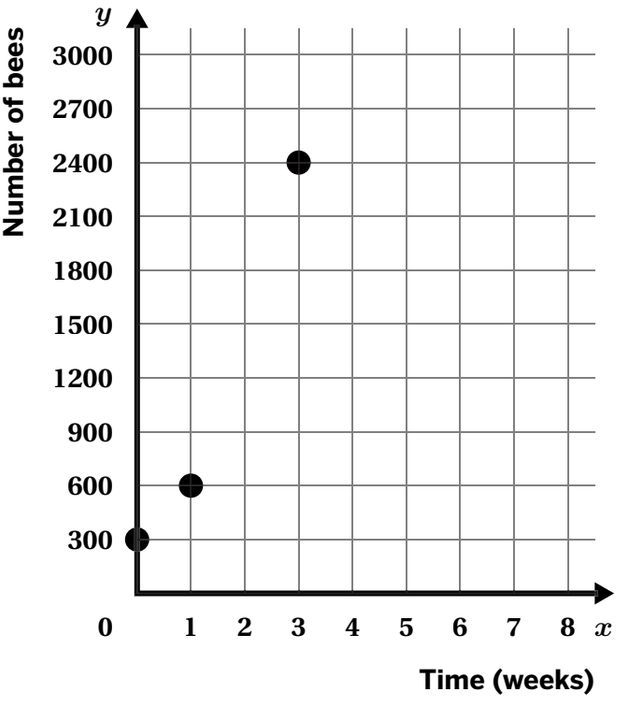
Name: ..... Date: ..... Period: .....

Additional Practice 1.07

1. The population of a city was $100{,}000$ in 1980. This population has doubled 3 times since 1980. Select *all* the expressions that represent the population of the city today.

- ☐ **A.** $300{,}000$
- ☐ **B.** $800{,}000$
- ☐ **C.** $10{,}000 \cdot 2 \cdot 2 \cdot 2$
- ☐ **D.** $100 \cdot 3^2$
- ☐ **E.** $100 \cdot 2^3$

Problems 2–6: A group of scientists are tracking a population of bees. They count the number of bees each week in the Spring. Some of their data is shown in the graph below.



2. How many bees were there at the beginning of Spring?

3. How many weeks will it be until there are 2400 bees?

4. Does the number of bees represent a linear relationship, an exponential relationship, or neither. Explain your thinking.

5. Write an explicit expression to represent the number of bees after n weeks.

6. Using your explicit expression,

a Calculate the number of estimated bees present after 2 weeks.

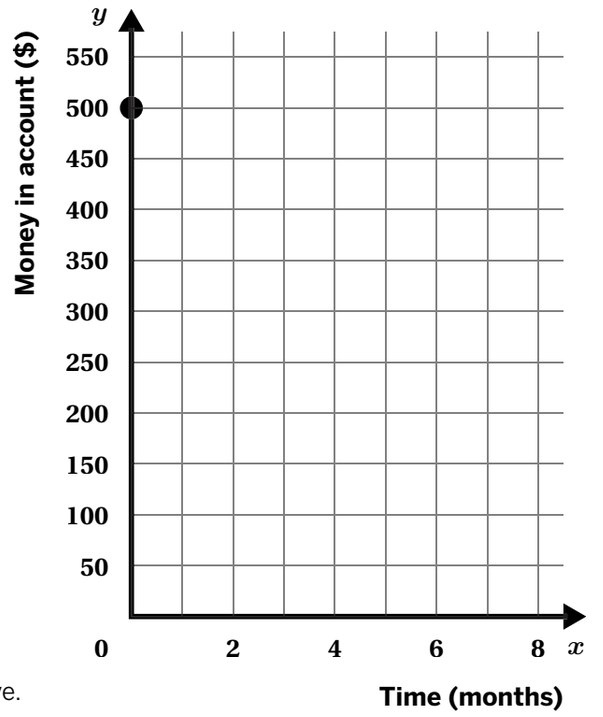
b Plot your answer on the graph. Does it match the pattern of the other points? Why or why not?

Name: ..... Date: ..... Period: .....

Problems 7–10: Aayana has $\$500$ in her checking account. She pays her parents $\$75$ each month for her part of their cell phone plan. No other money is deposited or withdrawn from her account.

7. **a** Complete the table below with the amount of money Aayana has in her checking account for Weeks 1–4.

# of Months	Money in Account ($)
0	500
1	
2	
3	
...	...
6	



b Plot the points on the graph provided above.

8. Is this a linear relationship or exponential relationship? Explain your thinking.

9. Write an explicit expression to represent the amount of money in Aayana's account after n weeks.

10. Using your explicit expression,

a Calculate the amount of money Aayana will have in her account after 6 weeks.

b Plot your answer on the graph. Does it match the pattern of the other points? Why or why not?

Algebra 1 | Unit 2

Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 2.01

1. Match each of the three equations in Set A with an equivalent equation in Set B. Note that not all of the answer choices in Set B will be used.

Set A	Set B
a. $2x + 4 = 5x + 3$	..... $2x + 8 = 5x$
b. $5x + 2x = 3 - 4$	..... $2x = 5x - 1$
	..... $2x + 1 = 5x$
c. $2(x + 4) = 5x$	..... $6x = 5x + 3$
	..... $7x = -1$

2. Equations A and B have the same solution. Select the statement that explains why this is true.

Equation A: $4(x - 9) = 20$

Equation B: $4x - 36 = 20$

- ☐ **A.** Adding 4 to both sides of Equation A results in $4x - 36 = 20$.
- ☐ **B.** Dividing both sides of Equation A by 4 results in $4x - 36 = 20$.
- ☐ **C.** Subtracting 4 from both sides of Equation A results in $4x - 36 = 20$.
- ☐ **D.** Applying the Distributive Property to Equation A results in $4x - 36 = 20$.

3. Is 2 a solution to the equation $3x - 5 = 8x + 5$? Explain or show your thinking.

4. Solve the equation $\frac{5x + 3}{4} = x - 2$. Show your thinking.

Name: ..... Date: ..... Period: .....

5. Jada's work for solving an equation is shown. Are the operations performed by Jada correct?

Jada's work:

$$4x + 6 = 3(x + 2)$$

Step 1: $4x + 6 = 3x + 2$

Step 2: $x + 6 = 2$

Step 3: $x = -4$

- ☐ **A.** All the operations are correct.
- ☐ **B.** All the operations are correct, except Step 1. Jada applied the Distributive Property incorrectly.
- ☐ **C.** All the operations are correct, except Step 2. Jada incorrectly subtracted $3x$ from both sides of the equation.
- ☐ **D.** All the operations are correct, except Step 3. Jada incorrectly subtracted 6 from both sides of the equation.

6. Which equations have a solution of 0? Select *all* that apply.

- ☐ **A.** $-2x = \frac{4}{3}x$
- ☐ **B.** $4x = 20$
- ☐ **C.** $3x - 8 = 2(x - 4)$
- ☐ **D.** $\frac{8}{x} - 5 = 1$
- ☐ **E.** $7(x - 1) = 14$
- ☐ **F.** $2(x + 3) = 5x + 6$

7. The equation $24 = 6(x + 11)$ is true for a certain value of x. Explain why $8 = 2(x + 11)$ must also be true for this same value of x.

8. Clare claims that Equation 1 and Equation 2 must have the same solution. Lin claims that the equations must have different solutions. Who is correct? Explain your thinking.

Equation 1: $7 = 3 - 2x$

Equation 2: $12 - 8x = 28$

Name: ..... Date: ..... Period: .....

Additional Practice 2.02

1. Which equation is equivalent to $9x + 12 = 21$?

A. $x + 12 = 21$

B. $3x + 4 = 7$

C. $9x + 21 = 12$

D. $3x + 3 = 14$

Problems 2–3: Anna wants to create another equivalent equation to $9x + 12 = 21$. Here is Anna's equation.

$$18x + 24 = 42$$

2. Is Anna's equation equivalent to $9x + 12 = 21$? Circle one.

Yes No Maybe

3. Explain how Anna determined her equivalent equation to $9x + 12 = 21$.

4. Select *all* the equations that are equivalent to $\frac{-6x - 9}{3} = 11$.

☐ **A.** $-6x - 9 = 11$

☐ **B.** $-6x - 9 = 33$

☐ **C.** $-2x - 3 = 11$

☐ **D.** $-18x - 27 = 33$

5. Solve the equation $\frac{1}{3}x + 6 = x - 2$.

Name: ..... Date: ..... Period: .....

Problems 6–7: Diego completed the following steps to solve $-4(x + 9) = 16$ for x.

Diego's Work

Step 1	$-4(x + 9) = 16$
Step 2	$x + 9 = 20$
Step 3	$x = 11$

6. What is one thing Diego did incorrectly?

7. Correct Diego's mistake and solve for x.

Name: ..... Date: ..... Period: .....

Additional Practice 2.03

Problems 1–2: Louise wants to solve the following equation.

$$3(2x + 5) = 6x + 15$$

1. Here is Louise's work to solve the equation.

Step 1	$3(2x + 5) = 6x + 15$
Step 2	$6x + 15 = 6x + 15$
Step 3	$15 = 15$

Is Louise's work correct? Circle one.

Yes No Maybe

2. How many solutions does this equation have?

A. One solution

B. No solution

C. Infinitely many solutions

D. Not enough information.

Problems 3–4: A taxi and truck are traveling on a highway. The equation $7t + 6 = 7t + 9$ represents the time, t, when the taxi and the truck will be in the same position.

3. When will the taxi and the truck be in the same position? Circle one.

Once Never Always

4. Explain how you know.

Name: ..... Date: ..... Period: .....

5. Group the equations based on their number of solutions.

A. $-2x = 6 - 2(x + 3)$

B. $3x = 9 - 3x$

C. $7x + 8 = 7(x + 1)$

D. $5x + 2 = 1 + 5x$

E. $6x = 2x$

One Solution	No Solution	Infinitely Many Solutions
B. $3x = 9 - 3x$	**C.** $7x + 8 = 7(x + 1)$ **D.** $5x + 2 = 1 + 5x$ **E.** $6x = 2x$	**A.** $-2x = 6 - 2(x + 3)$

Problems 6–7: Create two equations that each have a solution of $x = 2$.

6. Fill in each blank using the digits 0 to 9 only once each.

$$\square x + \square = \square x + \square$$
$$\square x + \square = \square x + \square$$

7. Explain what you notice about your equations.

Name: ..... Date: ..... Period: .....

Additional Practice 2.04

1. Which shows the equation $x + 2y = 14$ solved for y?

A. $2y = -x + 14$

B. $y = -x + 14$

C. $x = -2y + 14$

D. $y = -\frac{1}{2}x + 7$

2. Select *all* the expressions that are equivalent to the expression $\frac{-9x + 12}{3}$.

- ☐ **A.** $-3x + 4$
- ☐ **B.** $3x - 4$
- ☐ **C.** $-\frac{9x + 12}{3}$
- ☐ **D.** $\frac{1}{3}(-3x + 4)$
- ☐ **E.** $\frac{1}{3}(-9x + 12)$

3. Elena purchases tubes of watercolor paint for $\$4.49$ each and a set of watercolor brushes for $\$13.99$.

a Write an equation that would efficiently determine the total cost C in dollars, without tax, for the purchase of t tubes of paint and the set of brushes.

b If Elena spent $\$49.91$, without tax, how many tubes of paint did she purchase?

c Write an equation that would efficiently determine t, the number of tubes of paint she purchased, if the total cost of the paint and brushes, without tax, is C.

4. Priya buys s student tickets and a adult tickets to the school play. She pays $\$8$ for each student ticket and $\$12$ for each adult ticket and spends a total of $\$52$. The equation $8s + 12a = 52$ describes this relationship. If Priya solves the equation for a, which equation would result?

A. $a = 5s$

B. $a = \frac{52 - 8s}{12}$

C. $a = 40 - 8s$

D. $a = 52 - 8s$

5. Consider the linear equation $3a - 4b - 36 = 27$.

a Solve the equation for a.

b Solve the equation for b.

Name: Date: Period:

6. Mai earned $\$310.50$ selling her homemade dog treats one afternoon at a farmer's market. She sold small bags of treats for $\$5.40$ per bag and large bags of treats for $\$13.50$ per bag. The equation $5.40x + 13.50y = 310.50$ represents the relationship between the quantities in this scenario. Which of the following is a true statement? Select *all* that apply.

- ☐ **A.** $x = -2.5y + 57.5$ is equivalent to the original equation. This equation is more efficient to determine the number of small bags sold if the number of large bags sold is known.
- ☐ **B.** $y = 0.4x + 23$ is equivalent to the original equation. This equation is more efficient to determine the number of large bags sold if the number of small bags sold is known.
- ☐ **C.** $x = -2.5y + 57.5$ is equivalent to the original equation. This equation is more efficient to determine the number of large bags sold if the number of small bags sold is known.
- ☐ **D.** $y = -0.4x + 23$ is equivalent to the original equation. This equation is more efficient to determine the number of large bags sold if the number of small bags sold is known.
- ☐ **E.** $y = -0.4x + 23$ is equivalent to the original equation. This equation is more efficient to determine the number of small bags sold if the number of large bags sold known.

7. A bakery purchases $\$34.70$ worth of blueberries and zucchini to make muffins. Blueberries cost $\$3.25$ per pound and zucchini cost $\$3.80$ per pound. The equation $3.25b + 3.8z = 34.7$ represents the relationship between the quantities in this scenario.

a What equivalent equation is more efficient to determine the pounds of blueberries bought if the pounds of zucchini bought is known? Show your thinking.

b What equivalent equation is more efficient to determine the pounds of zucchini bought if the pounds of blueberries bought is known? Show your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 2.05

1. Which of the following shows the equation $2x + 5y = 10$ solved for x?

A. $2x = 10 - 5y$

B. $x = 2 - 0.4y$

C. $x = 5 - 5y$

D. $x = 5 - 2.5y$

2. Renting an outdoor facility at a park costs $\$25$ per hour plus a deposit of $\$100$. Which equation represents the relationship between the total cost C of the rental for h hours?

A. $25 + 100h = C$

B. $25h + 100 = C$

C. $25 + 100C = h$

D. $25C + 100 = h$

3. Peanut butter costs $\$2.40$ per jar and bread costs $\$1.50$ per loaf. A school cafeteria spent $\$18$ on peanut butter and bread. Select *all* equations that could represent the relationship between the number of jars of peanut butter p, the number of loaves of bread b, and the amount of money the school cafeteria spent on these two items.

☐ **A.** $18 - 2.4b = p$

☐ **B.** $18 + 1.5b = p$

☐ **C.** $18 - 2.4p = 1.5b$

☐ **D.** $18 + 2.4b = 1.5p$

☐ **E.** $b = 12 - 1.6p$

☐ **F.** $p = 12 - 1.6b$

4. An equation to calculate the area of a trapezoid A is $A = \frac{1}{2}(a + b)h$, where a and b represent the length of the trapezoid's bases and h represents its height. Which equation could be used to efficiently calculate the height of the trapezoid?

A. $h = \frac{2A}{a + b}$

B. $h = A - 2(a + b)$

C. $Ah = \frac{a + b}{2}$

D. $2h = A(a + b)$

Name: ..... Date: ..... Period: .....

5. The drama club earned $\$1{,}150$ in ticket sales for its Saturday performance of its play. Student tickets s cost $\$10$ and adult tickets a cost $\$15$. Determine the number of student tickets that were sold if it sold each number of adult tickets.

a 40 adult tickets **b** 60 adult tickets **c** a adult tickets

6. A cone has a volume of 12π cm^3. The volume of a cone V can be calculated using the equation $V = \frac{1}{3}\pi r^2 h$, where r is the radius of the cone and h is its height.

a Determine the height of the cone if the radius is 3 cm.

b Write an equation to determine the height h of the cone if the radius is r and the volume is V.

7. Shawn has budgeted $\$120$ per month for spin classes and pilates classes. Spin classes cost $\$10$ each and pilates classes cost $\$15$ each.

a Write an equation to represent how much money, in dollars, Shawn spends on the exercise classes each month if Shawn takes s spin classes and p pilates classes.

b How many spin classes can Shawn take in a month by also taking 4 pilates classes? p pilates classes?

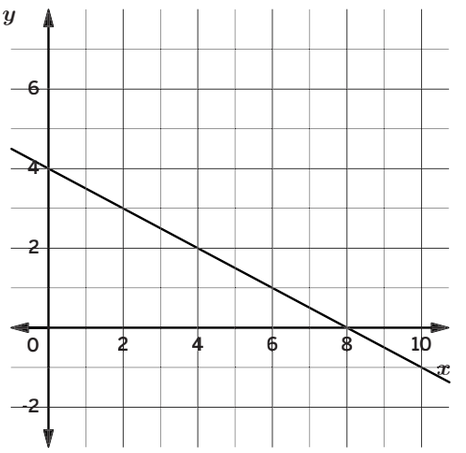
c Write an equation that Shawn could use to efficiently determine the number of pilates classes that can be taken next month if the number of spin classes is known.

d Determine the number of pilates classes Shawn can take in 4 weeks by also taking 2 spin classes per week. Explain or show your thinking.

Name: ..... Date: ..... Period: .....

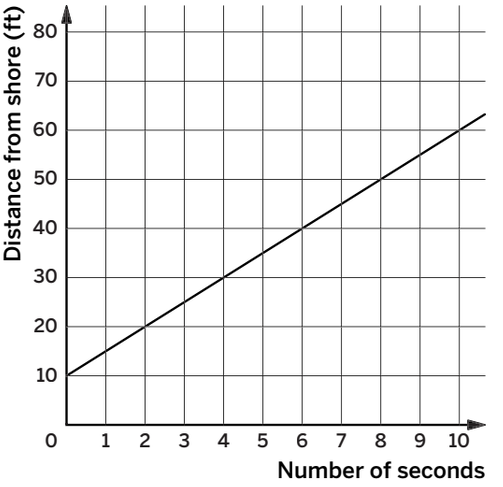
Additional Practice 2.06

1. Refer to the graph of the equation $x + 2y = 8$. Select *all* ordered pairs that represent a solution to the equation.



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

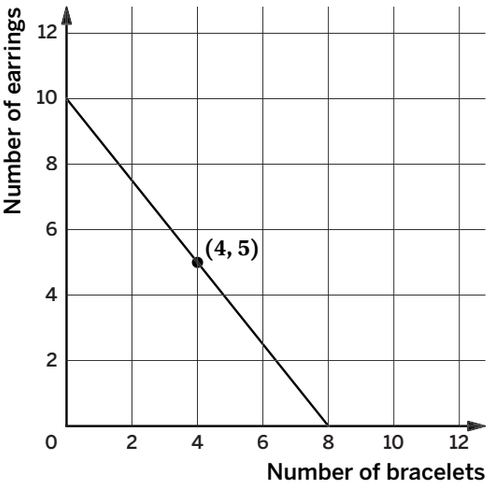
2. The graph shows the relationship between the distance Han's canoe is from shore, in feet, and the number of seconds that Han is rowing.



a Determine Han's distance from shore 8 seconds after he starts rowing.

b How far from the shore is Han when he starts rowing?

3. Jada makes and sells bracelets for $\$10$ and earrings for $\$8$. She earns $\$80$ after selling x bracelets and y earrings. What does the point $(4, 5)$ represent in this situation?



A. Jada sells 4 bracelets and 5 pairs of earrings to earn $\$80$.

B. Jada sells 4 pairs of earrings and 5 bracelets to earn $\$80$.

C. Jada sells 1 bracelet and 1 pair of earrings to earn $\$18$.

D. Jada sells 9 bracelets and 2 pair of earrings to earn $\$18$.

Name: ..... Date: ..... Period: .....

4. Use graphing technology to graph the equation $y = \frac{5}{2}x - 8$.

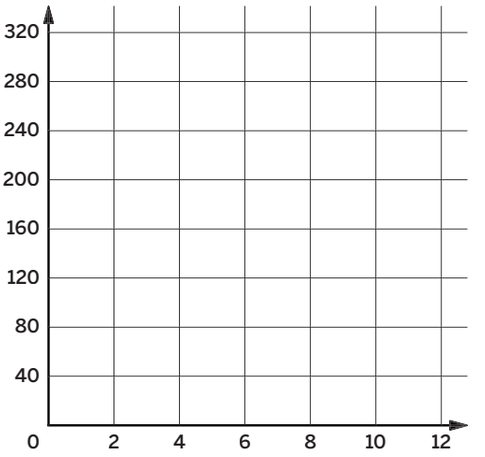
a What is the x-intercept?

b What is the y-intercept?

5. Lin earned $\$40$ for raking leaves one time. Then she earned $\$20$ per week for w weeks for babysitting.

a Write an equation that represents the relationship between the total dollar amount d that Lin earned for raking leaves and babysitting and the number of weeks.

b Graph your equation using graphing technology. Sketch the graph and label the point on the graph that represents the total amount that Lin earned after 5 weeks. How much did Lin earn after 5 weeks?



c Use your graph to determine the number of weeks it took Lin to earn $\$240$. Label the point on the graph and write its coordinates. What are the coordinates? How many weeks did it take?

6. A race organizer is purchasing bottles of water and sports drinks for a 5K race. She wants to have 450 bottles total. Water bottles come in cases of 24 and sports drinks come in cases of 18.

a Let x represent the number of cases of water and y represent the number of cases of sports drinks. Write an equation to represent the relationship between x and y.

b State whether the following statement is true or false. The coordinate point $(8, 15)$ represents 8 cases of bottled water and 15 cases of sports drinks, and it is a solution to the equation that you wrote. Explain your thinking.

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Additional Practice 2.07

Problems 1–3: A movie theatre sells matinee and evening tickets. Matinee tickets cost $\$5$ each and evening tickets cost $\$10$ each. The movie theatre collected a total of $\$500$ in ticket sales on Friday.

- m represents the number of matinee tickets sold.
- e represents the number of evening tickets sold.

1. Which equation represents this relationship?

A. $m + e = 500$

B. $5m + 10e = 500$

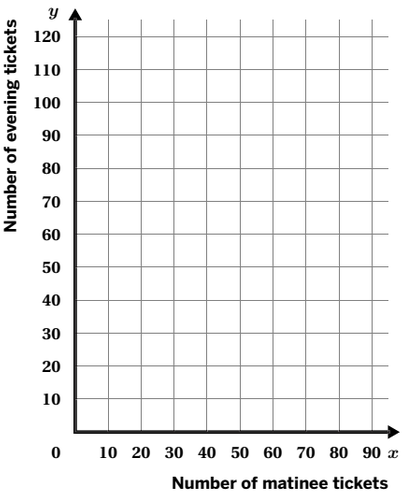
C. $5m - 10e = 500$

D. $10m + 5e = 500$

2. Complete the table representing this relationship.

Number of matinee tickets, m	Number of evening tickets, e
0	
10	

3. Make a graph showing this relationship.



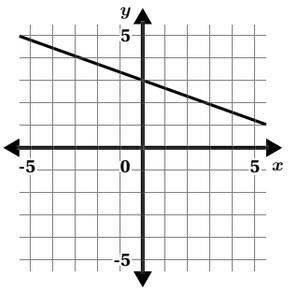
Name: ..... Date: ..... Period: .....

Problems 4–5: Here is the equation $2x + 6y = 18$.

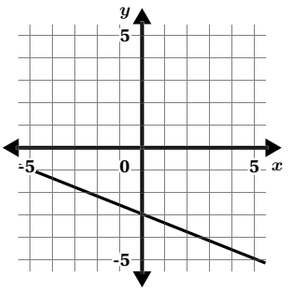
4. Explain how you can determine that $2x + 6y = 18$ is equivalent to $x + 3y = 9$.

5. Which graph matches the equations $2x + 6y = 18$ and $x + 3y = 9$?

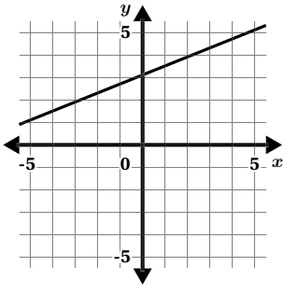
A.



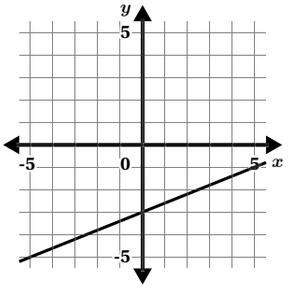
C.



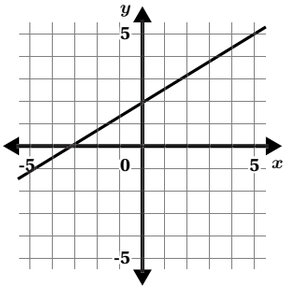
B.



D.



6. Select *all* the equations that match with the graph.



- ☐ **A.** $y = \frac{1}{2}x + 2$
- ☐ **B.** $y = 2x + 2$
- ☐ **C.** $2y - x = 4$
- ☐ **D.** $2y - 4x = 4$

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Additional Practice 2.08

1. Diego has $\$12$ left on a gift card. Which inequality represents d, the amount in dollars Diego can spend using the gift card?

A. $d < 12$ **B.** $d > 12$ **C.** $d \leq 12$ **D.** $d \geq 12$

2. Tyler has more money in his pocket than the amount that Clare and Bard have combined. Which inequality can be used to model the relationship between the amount of money that Tyler has t and the amounts that Clare c and Bard b have?

A. $t > c + b$

B. $t \geq c + b$

C. $t < c + b$

D. $t \leq c + b$

3. Noah needs to score at least 8 points in his last basketball game to break the school record for most points scored in one season.

a Write an inequality that represents the number of points p Noah needs to score to break the school record.

b Write an inequality that represents the number of points scored for which Noah will *not* break the school record.

4. A dog trainer trains 3 to 5 dogs each day. Each day she has sessions of the same length, but all of them are between 45 and 90 minutes long. The trainer works no more than 7 hours a day. Here are some inequalities that represent the situation:

$$3 \leq a \leq 5 \qquad 0.75 \leq b \leq 1.5 \qquad ab \leq 7$$

Select *all* the true statements about the constraints in the scenario.

- ☐ **A.** The variable a represents the number of dogs the trainer trains each day.
- ☐ **B.** The variable a represents the length of each training session, in minutes.
- ☐ **C.** The variable b represents the length of each training session, in minutes.
- ☐ **D.** The expression ab represents the number of training sessions that the trainer has each day.
- ☐ **E.** The expression ab represents the amount of time, in hours, that the trainer spends training dogs each day.

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5. Write an inequality to represent each statement.

a For her craft project, Elena uses less than 15 in. of ribbon. Let r represent the number of inches of ribbon that Elena uses.

b Priya practiced playing the clarinet for more than 30 minutes today. Let m represent the number of minutes that Priya practiced playing the clarinet today.

c Kiran has at least 4 highlighters in his desk drawer. Let h represent the number of highlighters that Kiran has in his desk drawer.

6. Lin wants to make cheddar cheese popcorn for movie night with her friends. She determines the following:

- She expects to host a total of 4 to 6 people (including herself).
- She plans to serve 1.5 cups of popcorn per person.
- The cheddar cheese popcorn recipe requires 8 tbsp of cheddar cheese powder for every 6 cups of popped popcorn.
- Each cup is equivalent to 16 tbsp.

Let n represent the number of people at movie night, c the number of cups of popped popcorn, and t the number of tablespoons of cheddar cheese powder. Select *all* the mathematical statements that represent the quantities and constraints in the scenario. Explain your thinking.

- ☐ **A.** $t = 0.5c$
- ☐ **B.** $c = 1.5n$
- ☐ **C.** $4 \leq n \leq 6$
- ☐ **D.** $4 < n < 6$
- ☐ **E.** $6 \leq c \leq 9$
- ☐ **F.** $6 \leq t \leq 9$

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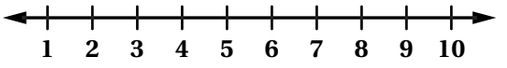
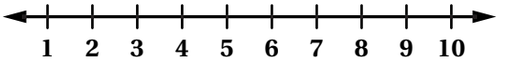
Additional Practice 2.09

1. Graph each inequality on the following number lines.

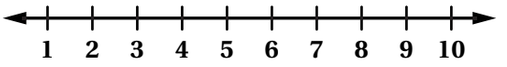
a $x < 8$



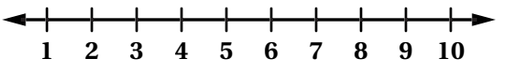
b $x \leq 4$



c $x > 7$



2. Solve the inequality $4x \geq 20$. Graph the solution set on the number line.



3. Noah is solving the inequality $10 + x \geq 12$. He knows the solution to the equation $10 + x = 12$ is $x = 2$. To determine whether $x \leq 2$ or $x \geq 2$ is the solution set to the inequality, Noah substitutes a number into the inequality. Which is a true statement?

A. If he substitutes a number greater than 2 and it makes a true statement, then $x \geq 2$ is the solution set.

B. If he substitutes a number greater than 2 and it makes a true statement, then $x \leq 2$ is the solution set.

C. If he substitutes a number less than 2 and it makes a false statement, then $x \leq 2$ is the solution set.

D. If he substitutes a number equal to 2 and it makes a true statement, then $x \geq 2$ is the solution set.

4. Gym membership A charges a monthly fee of $\$49$ plus $\$5$ per exercise class. Gym membership B charges a monthly fee of $\$29$ plus $\$10$ per exercise class. Bard determines that it is cheaper to purchase the gym membership B rather than the gym membership A. Write an inequality to represent this situation. Use x to represent the number of exercise classes that Bard takes.

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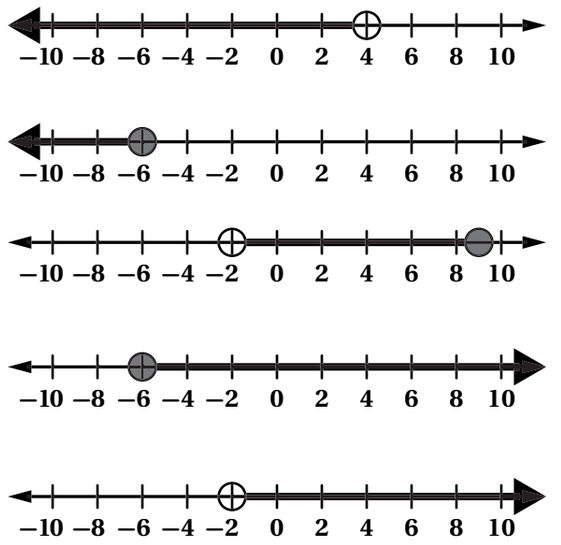
5. Diego has a budget of $\$70$ to purchase bubble wrap and large boxes for moving. He plans to buy large boxes that cost $\$3.65$ each. He also plans to buy three rolls of bubble wrap at $\$7.98$ per roll. Let b represent the number of large boxes Diego could buy without going over budget. Represent the constraints in the situation mathematically.

6. Match each inequality to the graph that represents its solutions.

Inequality	Graph
a $\frac{1}{3}x \geq -2$	.....
b $\frac{2x+1}{3} < 3$	.....
c $3x + 4 \leq x - 8$	.....
d $6x + 2 > -2(x + 7)$	.....
e $-9 < 3(x - 1) \leq 24$	.....



7. This year, Andre plans to tutor younger students at least 72 hours, but no more than 282 hours. He wants to volunteer the same amount of time each month.

a Write an inequality (or inequalities) to represent all possible values of h, the number of hours per month that Andre plans to volunteer.

b What are all the possible values for h? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 2.10

1. Which value of x is a solution to the inequality $-x - 4 > 0$?

A. $x = -5$

B. $x = -1$

C. $x = 0$

D. $x = 2$

2. Which is the solution to the inequality $2x - 3 \leq x$?

A. $x \geq 3$

B. $x \leq 3$

C. $x \geq -3$

D. $x \leq -3$

3. Consider the inequality $\frac{8x - 5}{3} \geq 2x + 1$. Select *all* of the values that are a solution to the inequality.

☐ **A.** $x = -1$

☐ **B.** $x = 0$

☐ **C.** $x = 2$

☐ **D.** $x = 4$

☐ **E.** $x = 5$

☐ **F.** $x = 6$

4. Lin is solving the inequality $8x - 6 < 3x + 19$. She solves the equation $8x - 6 = 3x + 19$ and gets $x = 5$. Which statements show how the solution to the equation $8x - 6 = 3x + 19$ helps Lin solve the inequality $8x - 6 < 3x + 19$? Select *all* that apply.

☐ **A.** She can substitute 5 into the inequality to determine the correct solution.

☐ **B.** She can substitute 4 or 6 into the inequality to determine the correct solution.

☐ **C.** She can substitute -1 or 1 into the inequality to determine the correct solution.

☐ **D.** She knows that the solution must be either all the values less than 5 or all the values greater than 5.

☐ **E.** She knows that the solution must be either all the values less than or equal to 5 or all the values greater than or equal to 5.

Name: Date: Period:

5. Solve the inequality $\frac{1}{4}(-7x - 8) \geq \frac{5x + 16}{4}$. Show your thinking.

6. Solve each inequality for the variable y. Show your thinking.

a $-3y + 1 \leq 4(x - 5)$

b $2x - 1 - 8x > 3(3 - 2y)$

c $-\frac{4}{3}\left(\frac{1}{8}y + 6\right) \geq 4x - 5$

7. Consider the inequality $-2x + 1 < \frac{1}{2}x - 14$.

a What value of x makes $-2x + 1$ and $\frac{1}{2}x - 14$ equal?

b For what values of x is $-2x + 1$ less than $\frac{1}{2}x - 14$? Greater than $\frac{1}{2}x - 14$?

c What is the solution to $-2x + 1 < \frac{1}{2}x - 14$? Explain your thinking.

8. Tyler argues that $x = 0$ is a solution to the inequality $-4x < -24$ because it is possible to divide both sides by -4 and get $x < 4$. Diego argues that $x = 0$ is not a solution to the inequality. Who is correct? Explain your thinking.

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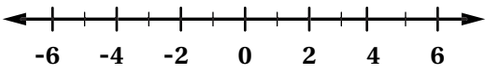
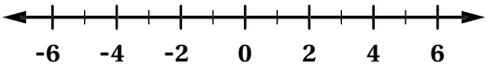
Additional Practice 2.11

Problems 1–3. Graph all the solutions to each equation.

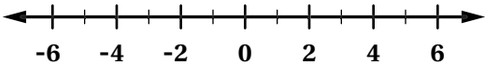
1. $|x - 4| = 1$



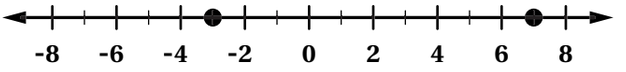
2. $|x - 3| = 2$



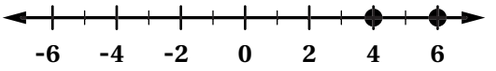
3. $|x - 1| = 3$



4. What value of t would make $|x - t| = 5$ match the graph?



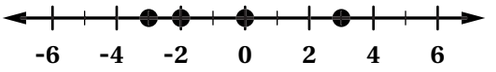
5. Which equations solutions are shown by the graph?



- ☐ **A.** $|x - 1| = 5$
- ☐ **B.** $|x - 5| = 1$
- ☐ **C.** $|x + 5| = 1$
- ☐ **D.** $|x + 1| = 5$

Name: Date: Period:

6. Piper is thinking of a number somewhere between -6 and 6. Here are some guesses from their friends. No guess was more than 3 away. Only one guess was correct. What is Piper's number? Explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 2.12

1. What is the solution to the absolute value equation $|2x - 1| = 9$?

A. $x = -4, x = 5$

B. $x = 4, x = 5$

C. $x = -5, x = -4$

D. $x = -5, x = 5$

2. Which of the following values are solutions to the absolute value equation $|3x + 6| = 12$? Select *all* that apply.

☐ **A.** $x = -8$

☐ **B.** $x = -6$

☐ **C.** $x = -4$

☐ **D.** $x = 2$

☐ **E.** $x = 4$

Problems 3–4: Theodore wrote the following absolute value equations.

$$|3x + 6| = -12$$
$$|2x - 4| = -9$$
$$|x| = -7$$

3. What do you notice about Theodore's equations?

4. How many solutions do all of these three absolute value equations have? Circle one.

Two Solutions One Solution No Solutions

Name: ..... Date: ..... Period: .....

5. Group the equations based on their number of solutions.

A. $|x| = 9$

B. $|x| = 0$

C. $|2x - 3| = -7$

D. $|3x - 1| = 0$

E. $|4x + 1| = 5$

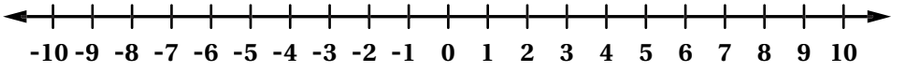
Two Solutions	One Solution	No Solutions
A. $\|x\| = 9$ **E.** $\|4x + 1\| = 5$	**B.** $\|x\| = 0$ **D.** $\|3x - 1\| = 0$	**C.** $\|2x - 3\| = -7$

Problems 6–7: Michele wrote an absolute value equation to represent the minimum and maximum temperatures on a cold winter day in her hometown.

$$\left|\frac{1}{3}x + 1\right| = 2$$

6. What are the solutions to the absolute value equation?

7. Graph the minimum and maximum temperatures on the cold winter day in Michele's hometown.



Name: ..... Date: ..... Period: .....

Additional Practice 2.13

Problems 1–3: Selena can spend up to $\$25$ on bagels and croissants at the bakery. A bagel costs $\$2$ and a croissant costs $\$3$.

- b is the number of bagels.
- c is the number of croissants.

1. Which inequality represents the situation?

A. $2b + 3c \leq 25$

B. $2b + 3c \geq 25$

C. $3b + 2c \leq 25$

D. $3b + 2c \geq 25$

2. Explain how you know that $b = 2$ and $c = 3$ are solutions to this situation.

3. Determine another option for the number of bagels and the number of croissants that Selena can buy at the bakery.

4. Write an ordered pair for a point that is not a solution to $x + 5y \geq 42$.

Name: ..... Date: ..... Period: .....

5. Anthony is at an art store and needs to buy red and green paint tubes for a project. A red paint tube costs $\$6$ and a green paint tube costs $\$7$. Anthony cannot spend more than $\$49$ on red and green paint at the art store.

- g is the number of green paint tubes
- r is the number of red paint tubes

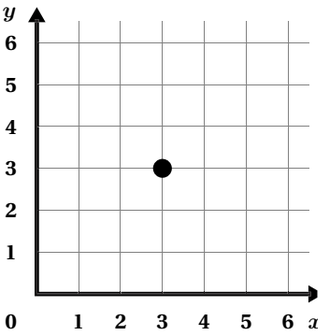
Anthony says that the inequality $6g + 7r \geq 49$ represents all the green and red paint tubes that he can buy at the art store for his project. Do you agree with him? Explain your thinking.

6. Determine if each ordered pair in the table is a solution to the inequality. Circle Yes or No in the table.

$$2x + 7y \leq 67$$

Ordered Pair	Is the ordered pair a solution?
$(2,4)$	Yes or No
$(3,7)$	Yes or No
$(4,9)$	Yes or No

7. Is the point in the graph below a solution to the inequality $x + 0.5y \geq 4$? Circle one.

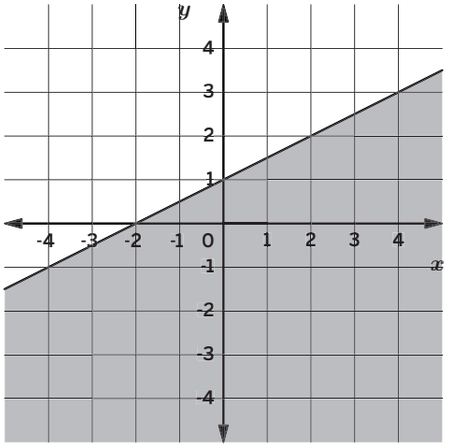


Yes No Maybe

Name: ..... Date: ..... Period: .....

Additional Practice 2.14

1. Refer to the graph of the inequality $x - 2y \geq -2$. Select *all* the points that are solutions to the inequality.

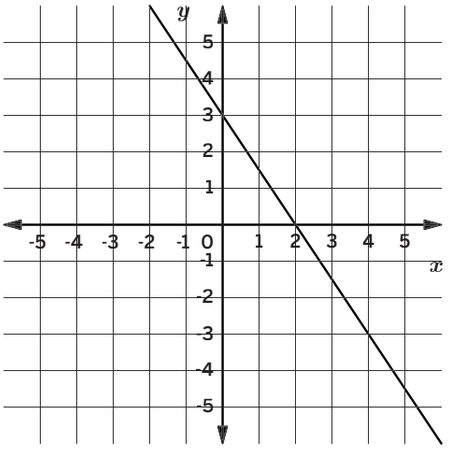


- ☐ **A.** $(-3, 4)$
- ☐ **B.** $(-1, -2)$
- ☐ **C.** $(0, 0)$
- ☐ **D.** $(1, 3)$
- ☐ **E.** $(2, 2)$
- ☐ **F.** $(4, -1)$

2. Which of the following ordered pairs makes the value of the expression $6x - 3y$ *less than* 10?

- **A.** $(0, -5)$
- **B.** $(1, 3)$
- **C.** $(2, -1)$
- **D.** $(4, 0)$

3. Refer to the graph of the equation $2y + 3x = 6$.



a Are either of the points $(1, 1.5)$ or $(3, -1)$ solutions to the equation? Explain your thinking.

b Select *all* the points that are solutions to the inequality $2y + 3x \leq 6$.

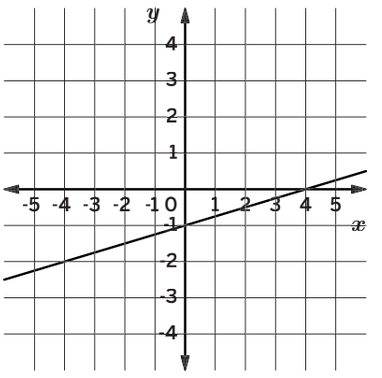
- ☐ **A.** $(-1, 1)$
- ☐ **B.** $(2, 0)$
- ☐ **C.** $(0, 2)$
- ☐ **D.** $(4, 3)$
- ☐ **E.** $(5, -4)$

4. Select *all* the ordered pairs that are solutions to the inequality $8x - 3y > 24$.

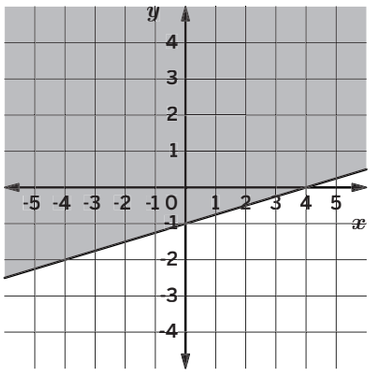
- ☐ **A.** $(0, 0)$
- ☐ **B.** $(0, 3)$
- ☐ **C.** $(1, -1)$
- ☐ **D.** $(3, -8)$
- ☐ **E.** $(3, 0)$
- ☐ **F.** $(4, 1)$

Name: ..... Date: ..... Period: .....

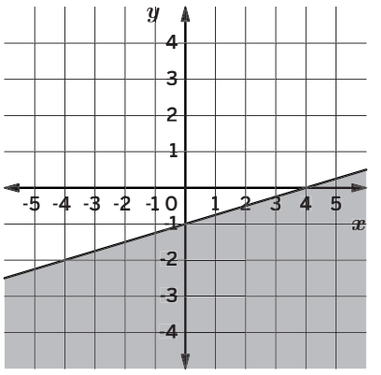
5. Refer to the graph of the equation $x - 4y = 4$. Which of the following represents the solution set to the inequality $x - 4y \leq 4$?



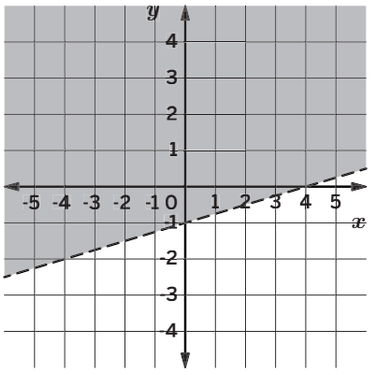
A.



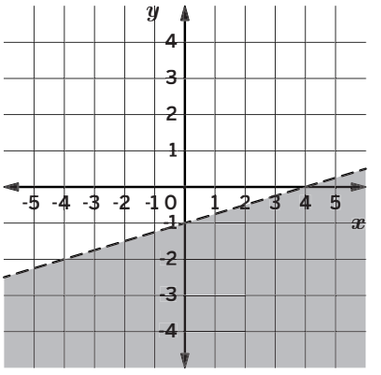
C.



B.



D.



6. Consider the inequality $3x + 7y > -6$. Priya argues that $(-4, 2)$ is a solution to the inequality and Shawn argues that $(3, -2)$ is a solution. Who is correct? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 2.15

1. Clare has at least $\$0.65$ in nickels on her dresser. Which statement *best* represents the number of nickels n that she has?

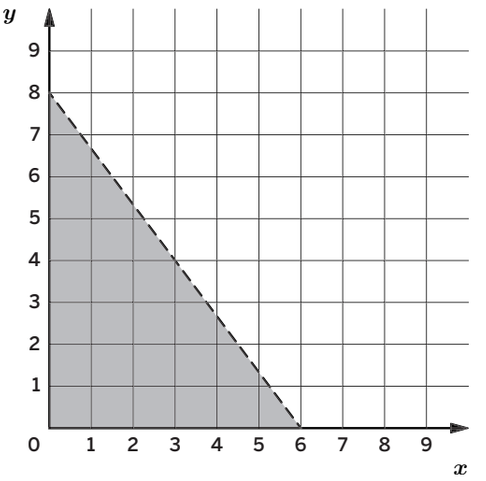
A. $0.05n \leq 0.65$

B. $0.05n \geq 0.65$

C. $0.65n \leq 0.05$

D. $0.65n \geq 0.05$

2. Which inequality is represented by the graph?



A. $4x + 3y < 24$

B. $4x + 3y > 24$

C. $4x + 3y \leq 24$

D. $4x + 3y \geq 24$

3. Small gift bags cost $\$0.89$ each and small gift boxes cost $\$1.12$ each. Han needs to purchase these items for his jewelry business, but he wants to spend no more than $\$25$. Using x to represent the number of gift bags and y to represent the number of gift boxes, which statement best represents this situation?

A. $0.89x + 1.12y < 25$

B. $0.89y + 1.12x < 25$

C. $0.89x + 1.12y \leq 25$

D. $0.89y + 1.12x \leq 25$

4. Elena is ordering yarn to make scarves. Acrylic yarn y costs $\$8$ per skein. Cashmere yarn c costs $\$12$ per skein. She wants to spend less than $\$65$ altogether.

a Write an inequality to describe the constraints.

b Which of the following correctly describes a solution to the inequality?

A. $(4, 3)$, which means she buys 4 skeins of acrylic yarn and 3 skeins of cashmere yarn.

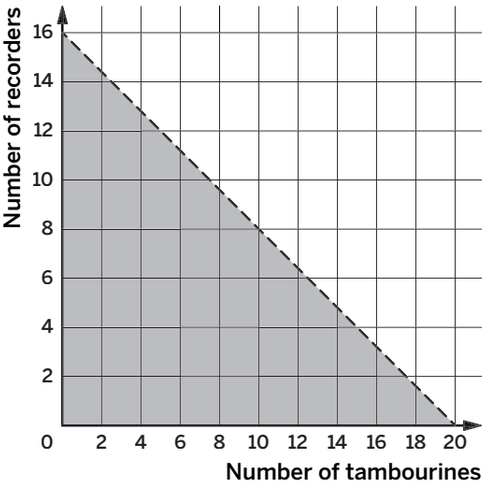
B. $(4, 3)$, which means she buys 4 skeins of cashmere yarn and 3 skeins of acrylic yarn.

C. $(5, 2)$, which means she buys 5 skeins of acrylic yarn and 2 skeins of cashmere yarn.

D. $(5, 2)$, which means she buys 5 skeins of cashmere yarn and 2 skeins of acrylic yarn.

Name: ..... Date: ..... Period: .....

5. Tyler is buying tambourines and recorders for the music classes he teaches. Tambourines cost $\$8$ each and recorders cost $\$10$ each. Tyler spends less than $\$160$ on t tambourines and r recorders. The graph shown represents this situation.



a Write an inequality that represents this situation.

b Which of the following numbers of tambourines and recorders can Tyler purchase?

A. 6 tambourines, 10 recorders

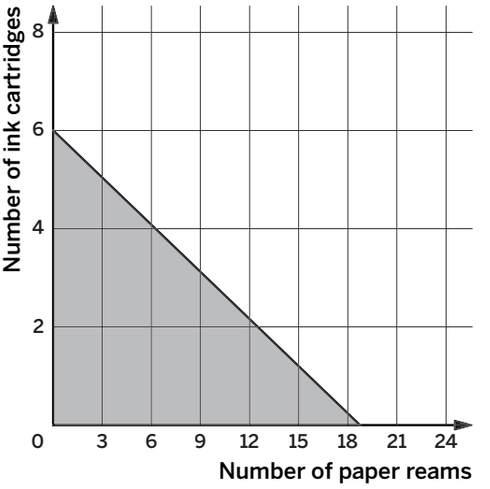
B. 8 tambourines, 10 recorders

C. 12 tambourines, 8 recorders

D. 14 tambourines, 6 recorders

6. Mai is buying pans for her online bakery business. Tart pans t cost $\$3.88$ each and bread loaf pans b cost $\$8.95$ each. She wants to spend no more than $\$90$ on these two types of pans. Write an inequality to represent this scenario.

7. Bard is ordering printer paper and ink. Paper costs $\$7.20$ per ream and ink costs $\$22.50$ per cartridge. Bard spends no more than $\$135$ on r reams of paper and c ink cartridges. The graph shown represents this situation.



a Write an inequality that represents this situation.

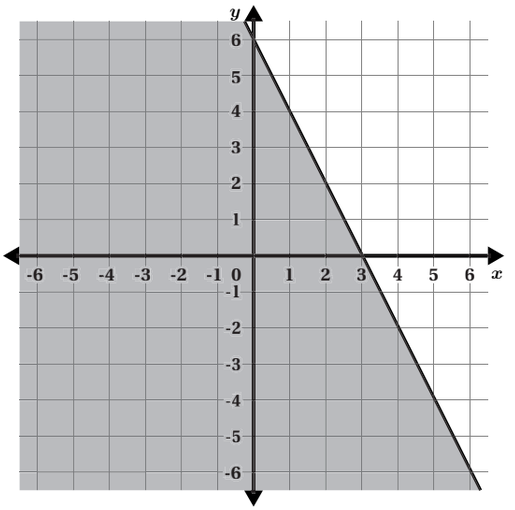
b Can Bard purchase 6 reams of paper and 5 ink cartridges? Explain your thinking.

c Can Bard purchase 9 reams of paper and 2 ink cartridges? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 2.16

1. Here is the graph of $y \leq 6 - 2x$. Select *all* the points that are solutions to the inequality.



- ☐ **A.** $(0,0)$
- ☐ **B.** $(-1,2)$
- ☐ **C.** $(1,2)$
- ☐ **D.** $(3,4)$
- ☐ **E.** $(5,4)$

Problems 2–3: Josephine is selling tickets to a play at their school. Her goal is to sell more than $\$227$ worth of tickets. Student tickets, s, cost $\$6$ each. Adult tickets, a, cost $\$10$ each.

2. Which inequality represents the number of tickets Josephine could sell to achieve her goal?

- **A.** $6s + 10a < 227$
- **B.** $6s + 10a > 227$
- **C.** $10s + 6a > 227$
- **D.** $10s + 6a < 227$

Name: Date: Period:

3. Is $s = 15$ and $a = 14$ a reasonable solution in this situation? Explain your thinking.

Problems 4—5: Frederick and Annie have a lawn care service. They both use a lawn mower for less than 75 minutes when mowing a customer's lawn. Let f represent the number of minutes Frederick uses the lawn mower and a represent the number of minutes Annie uses the lawn mower.

4. Write an inequality to represent all the ways Frederick and Annie could share the time they have to use the lawn mower.

5. Determine a solution to your inequality that you think is fair for Frederick and Anna. Explain your thinking.

6. Isla is buying books at a local bookshop. She has exactly $\$52.50$ left on her gift card. Isla likes mystery and fantasy books. A mystery book costs $\$12.50$ and a fantasy book costs $\$14.25$. The inequality represents the number of mystery books, m, and fantasy books, f, that Isla can buy for no more than $\$52.50$.

$$12.50m + 14.25f \leq 52.50$$

Can Isla buy 2 mystery books and 2 fantasy books for no more than $\$52.50$? Circle one.

Yes No Maybe

Algebra 1 | Unit 3

Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 3.01

1. Which would *not* be a good survey question?

A. How many servings of fruits and vegetables do you eat daily?

B. What are your favorite healthy snacks?

C. Why do people dislike eating healthy foods?

D. How much water do you drink daily?

2. Determine which type of data these questions produce.

Question	Categorical or Quantitative?
What is your favorite type of music?	
How many cups of coffee or tea do you drink daily?	
What is your average screen time in hours per day?	

3. Select *all* the questions that would produce categorical data.

- ☐ **A.** What mode of transportation do you use most often?
- ☐ **B.** How many cups of coffee or tea do you drink daily?
- ☐ **C.** Which season do you prefer the most?
- ☐ **D.** Where do you spend your time after school?
- ☐ **E.** How many pets do you have?

4. Maya claims that students who play musical instruments have better grades than those who do not. Write two survey questions that Maya could ask to investigate the claim.

1. .....

2. .....

Name: ..... Date: ..... Period: .....

5. Liam wants to know about the types of movies his classmates prefer. Write a survey question that would give him *categorical* data about his classmates' movie preferences.

6. A survey asks students how many hours they spend on homework each week and whether they prefer group work or individual work. Identify what data is collected and whether it is categorical or quantitative.

Problems 7–8: Here are some responses to the question: *What is your grade level in school?*

9th Grade 10th grade 8th grade

7. Brett is not sure whether the data is categorical or quantitative. Explain why this type of data is unclear.

8. What is another question that might generate data that is unclear?

Name: ..... Date: ..... Period: .....

Additional Practice 3.02

1. Priya surveys some of her classmates to determine whether or not they have more than one pet. She records their grade level and responses to her question. Some of the results of her survey are shown in the table. Complete the two-way table.

	Has more than one pet	Does not have more than one pet	Total
11th Grade			55
12th Grade		40	
Total		62	120

2. Refer to your completed table in Problem 1. How many students surveyed have more than one pet?

3. Kiran conducts a survey of children and adults asking whether they have allergies. The results of his survey are shown.

	Allergies	No allergies	Total
Under 18	41	23	64
18 or older	17	55	72
Total	58	78	136

a How many people participated in Kiran's survey?

b How many people surveyed do not have allergies?

c How many of the people surveyed under 18 have allergies?

Name: ..... Date: ..... Period: .....

4. Does the table show column relative frequency, row relative frequency, or total relative frequency?

	Plays an instrument	Does not play an instrument
Part-time job	27%	18%
No part-time job	13%	42%

5. A study was done to investigate the relationship between exercise and blood pressure levels. The relative frequency table displays the data collected. It shows the percentages of people with normal and high blood pressure, based on whether or not they exercise regularly.

	Normal blood pressure	High blood pressure
Regular exercise	76%	24%
No regular exercise	63%	37%

Which of the following statements are true? Select *all* that apply.

- ☐ **A.** Among those surveyed, 63% have normal blood pressure.
- ☐ **B.** Among those in the survey with normal blood pressure, 76% exercise regularly.
- ☐ **C.** Among those in the survey with high blood pressure, 37% do not exercise regularly.
- ☐ **D.** Among those in the survey who exercise regularly, 76% have normal blood pressure.
- ☐ **E.** Among those in the survey who do not exercise regularly, 37% have high blood pressure.

Name: Date: Period:

Additional Practice 3.03

1. The frequency table shows the results of a survey in which students were asked whether they read each week and if they play a musical instrument.

	Musical instrument	No musical instrument
Read	43	20
Did not read	22	35

a What percent of the students surveyed read each week? Round to the nearest tenth.

b What percent of the students surveyed read each week, but do not play a musical instrument? Round to the nearest tenth.

2. The table shows the results of a survey in which people were asked when they prefer to exercise and what type of exercise they do. Create a relative frequency table that could be used to show the percentages of types of exercise, based on the time of exercising. Round to the nearest tenth if necessary.

	Aerobic	Weights
Morning	80	55
Evening	42	70

	Aerobic	Weights
Morning		
Evening		

3. Tyler conducts a survey of students in the 9th and 10th grades, asking whether they have a fear of heights. The results of his survey are shown.

	Fear of heights	No fear of heights	Total
9th Grade	33	82	115
10th Grade	40	103	143
Total	73	185	258

a How many students surveyed do not have a fear of heights?

b Of the 10th grade students surveyed, how many of them have a fear of heights?

Name: ..... Date: ..... Period: .....

4. A survey of $1{,}600$ high school students asked about their participation in extracurricular activities and volunteering. The table shows the data collected from the students. Create a relative frequency table that could be used to show the percentages of those who do or do not volunteer regularly, based on extracurricular activity participation. Round to the nearest tenth if necessary.

	Volunteers regularly	Does not volunteer regularly
Extracurricular activities	600	500
No extracurricular activities	200	300

	Volunteers regularly	Does not volunteer regularly
Extracurricular activities		
No extracurricular activities		

5. Refer to Problem 4. Create a relative frequency table that could be used to show the percentages of extracurricular activity participation, based on whether or not they volunteer regularly.

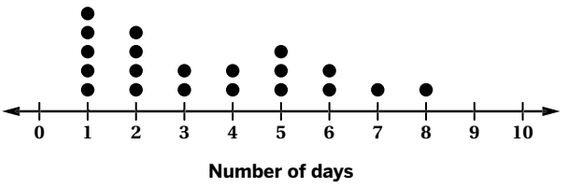
	Volunteers regularly	Does not volunteer regularly
Extracurricular activities		
No extracurricular activities		

6. Mai claims that the percentages in a frequency table and the percentages in a relative frequency table all add up to 100%. Do you agree or disagree? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.04

1. The dot plot shows the number of days in May that a city had a low temperature less than $40°\text{F}$, for each year from 2010 to 2024. In how many years was the low temperature in May less than $40°\text{F}$ for 5 days or more?



A. 3

B. 5

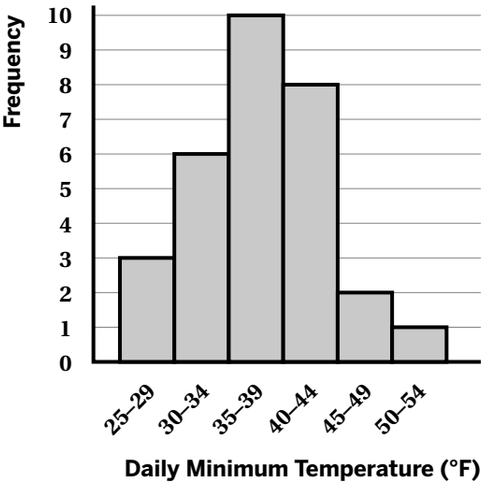
C. 7

D. 8

Problems 2–3: Elena created a histogram about the different minimum temperature in his hometown of Hartford, Connecticut, in degrees Fahrenheit, for each day in March 2020. The histogram below shows how many days the temperatures were in each temperature range.

2. Select *all* of the statements that must be true.

- ☐ **A.** There were 5 days when the minimum temperature was in the range of $30–34°\text{F}$.
- ☐ **B.** There were 11 days when the minimum temperature was $40°\text{F}$ or higher.
- ☐ **C.** The most common minimum temperature range was $35\text{-}39°\text{F}$.
- ☐ **D.** There are 31 days of minumum temperature data collected.

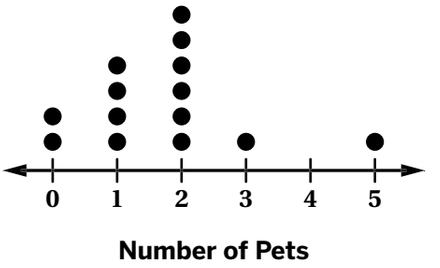


3. Elena claims that half the minimum temperatures are $37°\text{F}$ or less and half are $37°\text{F}$ or greater. Tyler claims that half of the minimum temperatures are $39°\text{F}$ or less and half are $40°\text{F}$ or greater.

Who do you agree with, if either? Explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 4–6: Sharla asked her scout troop about the number of family pets they each had. She collected the data on the dot plot shown below.



4. How many members of Sharla's scout troop were surveyed?

5. How many of the surveyed members have two or more pets?

6. Write one true statement that can be answered using the dot plot above that is different from Problems 4 and 5.

7. Jerome collected the data below about the length of the stop light cycle, in seconds, at three different intersections in his town over the course of an hour.

60	62	85	120	75	106
90	110	90	90	78	120
80	82	115	95	92	95

Would this data be best displayed using a dot plot or histogram?
Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.05

1. The following data set represents the number of minutes ten students spend walking to school each morning. What is the median?

7, 9, 9, 10, 15, 15, 16, 18, 18, 20

2. What is the IQR of the following data set?

32, 35, 36, 41, 41, 44, 46, 52, 56, 61

A. 16

B. 24

C. 42.5

D. 52

3. A food truck owner tracks the number of customers they have each hour they are open for a month. They determine the median number of customers per hour is 62. What information does this tell the food truck owner about the number of customers per hour?

A. The average number of customers per hour for the food truck is 62.

B. Most of the time, the food truck has 62 customers per hour.

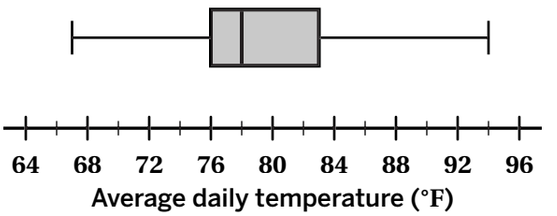
C. Twenty-five percent of the time, the food truck has 62 customers per hour.

D. Half of the time, the food truck has 62 or fewer customers per hour, and half the time, the food truck has 62 or more customers per hour.

4. Calculate the median of the following data set.
32, 35, 35, 41, 42, 44, 49, 51, 56, 60

Name: ..... Date: ..... Period: .....

5. The box plot represents the distribution of average daily temperatures of a town during 20 days of summer. Determine the five-number summary that represents this data.



a Minimum **b** Q1 **c** Median

d Q3 **e** Maximum

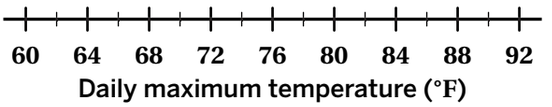
6. The table summarizes the daily maximum temperatures of Charlotte, North Carolina, in degrees Fahrenheit, for the first 18 days of May 2020.

70	75	84	82	70	72	66	63	64
70	66	64	70	81	81	84	82	79

a Determine the five-number summary of the data.

Minimum: ..... Q1: ..... Median: ..... Q3: ..... Maximum: .....

b Create a box plot that represents the data.



Name: ..... Date: ..... Period: .....

Additional Practice 3.06

1. Which distribution shape has a long right tail?

A. Bell-shaped

B. Bimodal

C. Skewed

D. Uniform

2. A dot plot has a uniform distribution. Which of the following is always *true*?

A. There are more data values near the center.

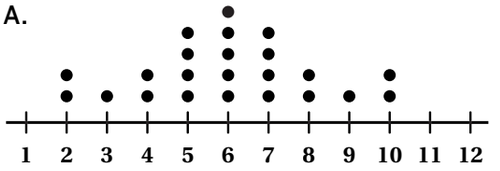
B. The data values are distributed equally for the same frequency.

C. There are more data values on the left or on the right side of the center.

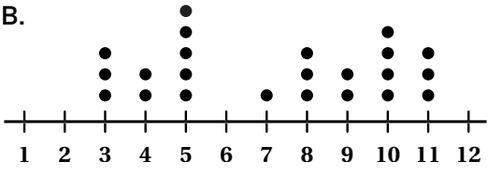
D. There are few data values near the center of the data, with two peaks on the left and right of the center.

3. Select *all* dot plots that have a symmetric, or approximately symmetric, distribution.

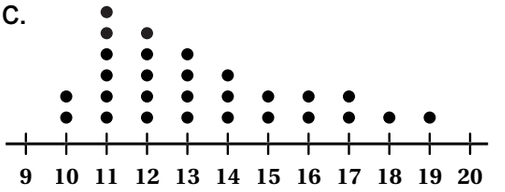
☐ **A.**



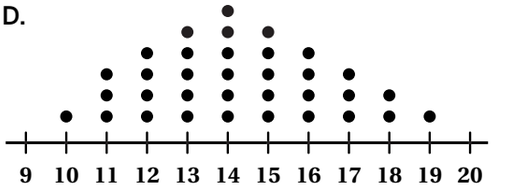
☐ **B.**



☐ **C.**



☐ **D.**



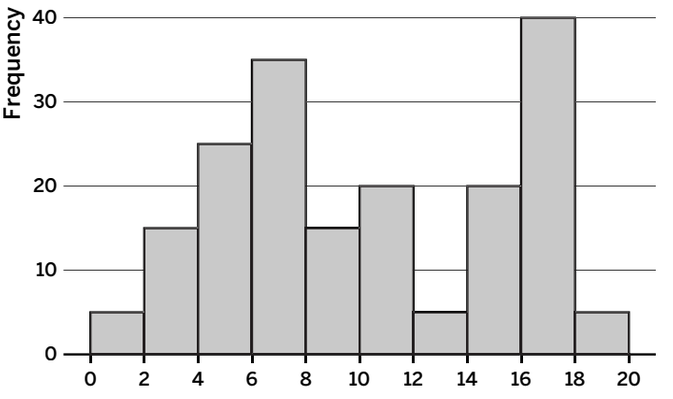
4. Which describes the shape of the distribution of data shown in the histogram?

A. Bimodal

B. Bell-shaped

C. Skewed

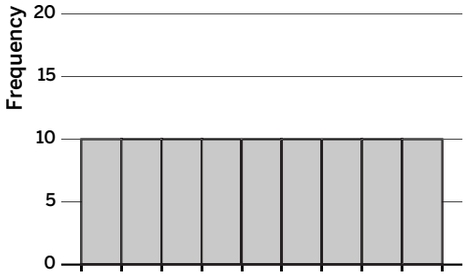
D. Symmetric



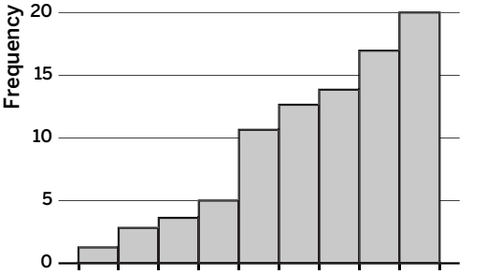
Name: ..... Date: ..... Period: .....

5. Describe the shape of each distribution shown.

a



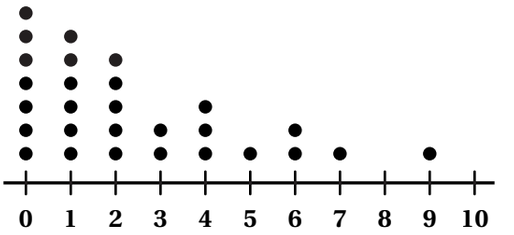
b



6. A histogram has a symmetric distribution. Which of the following could be possible shapes of the distribution? Select *all* that apply.

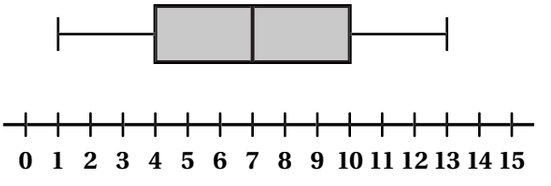
- ☐ **A.** Bell-shaped
- ☐ **B.** Bimodal
- ☐ **C.** Skewed
- ☐ **D.** Uniform

7. Which statements correctly describe how the data is distributed in the given dot plot? Select *all* that apply.



- ☐ **A.** The data is bimodal
- ☐ **B.** The data is skewed.
- ☐ **C.** The data is distributed symmetrically.
- ☐ **D.** The data is bunched mostly in the lower values of 0–2.
- ☐ **E.** The data is uniform.

8. Consider the box plot shown. Lin claims that the distribution of the data is both symmetric and uniform. Andre argues that the distribution is symmetric, but not uniform. Who is correct? Explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 3.07

1. Consider the following data set: 13, 22, 5, 4, 7, 13, 8, 11, 10, 41. What is the mean?

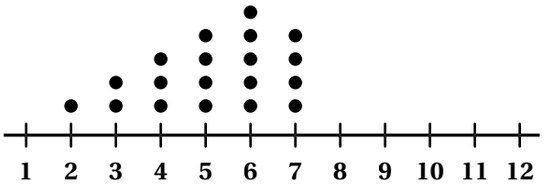
A. 10

B. 10.5

C. 13

D. 13.4

2. Consider the data shown in the dot plot. What is the median?



A. 4

B. 4.5

C. 5

D. 6

3. For each distribution shape, determine whether it is more appropriate to use the mean or median as a measure of center.

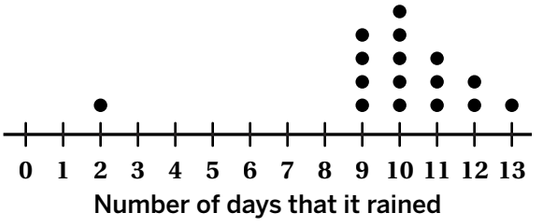
a Uniform

b Skewed

c Symmetric

d Bell-shaped

4. The number of days that it rained in one month for several cities is displayed in the dot plot. Which is greater, the mean or the median? Explain your thinking using the shape of the distribution.



Name: Date: Period:

5. The data set represents the scores of Han's assignments. Is 56 an outlier? Explain your thinking.

56, 78, 78, 80, 83, 85, 88, 94, 97, 100

6. The following data set represents the number of pounds of paper recycled by 12 different classrooms in a school year. What effect does eliminating the least value, 8, from the data set have on the mean and the median?

8, 45, 48, 51, 52, 58, 60, 64, 65, 68, 69, 70

A. Only the mean will increase.

B. Only the median will increase.

C. Both the mean and median will increase, and the mean will increase more.

D. Both the mean and median will increase, and the median will increase more.

7. Consider the following data set: 2, 13, 4, 9, 1, 0, 11, 5, 5, 24, 2, 8. Mai claims that there is an outlier in this data set. Han thinks that there are no outliers. Who is correct? Explain your thinking.

8. Consider the following data set: 45, 45, 46, 46, 50, 50, 50. Shawn claims that the values 50, 55, 55, 60, and 10 are added to the data set, the median will be greater than the mean. Do you agree? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.08

1. The data set represents the grams of protein in all the breakfast bars in a box.

$8, 8, 8, 8, 8, 8, 8, 8$

a What is the mean?

b What is the standard deviation?

2. Which of the following data sets has the same mean as the data set $3, 3, 3, 3, 3, 3$?

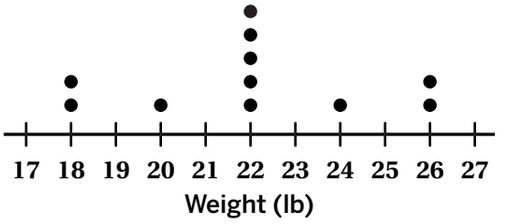
A. $-3, -3, -3, -3, -3, -3$

B. $-2, -2, -2, 4, 4, 4$

C. $1, 1, 1, 5, 5, 5$

D. $1, 4, 1, 4, 1, 4$

3. The dot plot represents the weights of 11 watermelons. Determine which of the following *best* estimates the standard deviation of the weights of the watermelons.



A. 2 lb

B. 10 lb

C. 22 lb

D. 44 lb

4. The mean of Data set A is 30.1 and the standard deviation is 4.3. The mean of Data set B is 15.9 and the standard deviation is 2.5.

a Which data set shows greater variability? Explain your thinking.

b Complete each statement to describe what differences you would expect to see when comparing dot plots of the two data sets.

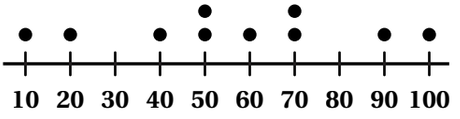
Data set A's dot plot will have most of the data centered around ..... with the data, on average, ... units above or below that value.

Data set B's dot plot will have most of the data centered around ..... with the data, on average, ... units above or below that value.

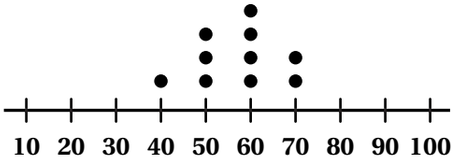
Name: ..... Date: ..... Period: .....

5. Refer to the two dot plots. Which dot plot shows greater variability? Explain your thinking.

Dot plot A

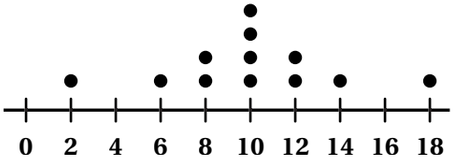


Dot plot B

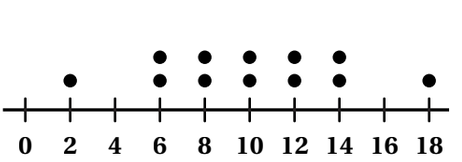


6. Which of the following statements is true about Dot plots J and K?

Dot plot J



Dot plot K



A. The dot plots have the same mean and the same standard deviation.

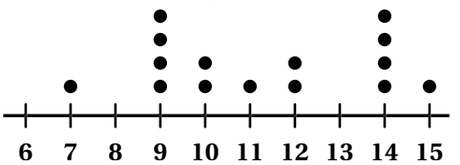
B. The dot plots have the same mean, but different standard deviations.

C. The dot plots have the same standard deviation, but different means.

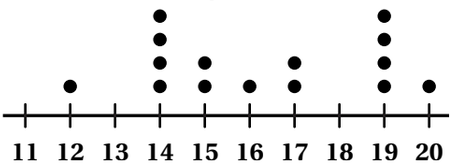
D. The dot plots have different means and different standard deviations.

7. Refer to the two dot plots. Priya claims that the standard deviation of the data in Dot plot D is greater than the standard deviation of the data in Dot plot C. Do you agree with Priya? Explain your thinking.

Dot plot C



Dot plot D



Name: ..... Date: ..... Period: .....

Additional Practice 3.09

1. Create three data sets, each with 5 numbers and a mean of 8.

....., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ...

2. Here is some data about the cost of renting an apartment in Chicago, Illinois and Denver, Colorado.

	Mean ($)	Standard Deviation ($)
Chicago, IL	$2,331	$825
Denver, CO	$1,975	$550

Select *all* the true statements, based on this data.

- ☐ **A.** In general, the cost of renting an apartment is higher in Chicago than in Denver.
- ☐ **B.** The most someone pays for rent in Chicago is $3156.
- ☐ **C.** The least someone pays for rent in Denver is $1375.
- ☐ **D.** The cost of rent in Denver varies more than the cost of rent in Chicago.
- ☐ **E.** A typical cost of rent in Chicago is $825.

Problems 3–4: Siddhartha asked random students during his lunch period and then during his Social Studies class: *How many hours of sleep do you get each night?*

	Lunch Period	Social Studies
Number of Sleeping Hours	7, 6, 8, 5, 7, 6, 8, 8, 6, 7	5, 6, 6, 7, 6, 5, 7, 9, 6, 5

3. Which data set has the higher mean? Show or explain your thinking.

4. Which data set has a higher standard deviation? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 5–6: DesTires and DesAutoShop both sell a variety of tires. Here is the mean and standard deviation for the price of tires for each company.

DesTires	**DesAutoShop**
Mean: $185	Mean: $192
Standard Deviation: $45	Standard Deviation: $23

5. Which company has more consistent prices? Explain.

6. Which company is likely to have the tires with the highest price? Explain.

7. Here is a data set: 4, 4, 6, 6, 8, 12, 14, 15, 15, 17, 20. If the 20 is changed to 18, what would happen to each of these statistics?

Circle your choice for each statistic.

Mean:	Increase	Decrease	Stay the same
Median:	Increase	Decrease	Stay the same
Standard Deviation:	Increase	Decrease	Stay the same

Name: ..... Date: ..... Period: .....

Additional Practice 3.10

1. A set of data has values that are clustered closely near the center. Which of the following is a *true* statement?

A. The distribution is uniform.

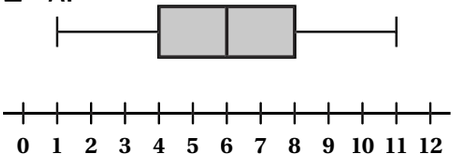
B. The distribution is skewed.

C. The distribution has high variability.

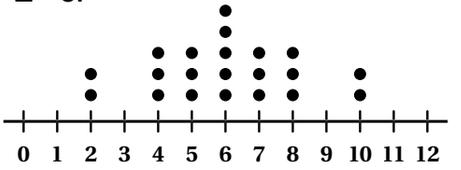
D. The distribution has low variability.

2. Which of the following distributions are symmetric? Select *all* that apply.

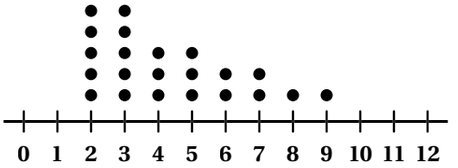
☐ A.



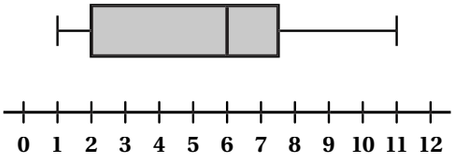
☐ C.



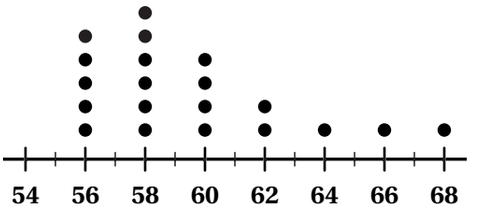
☐ B.



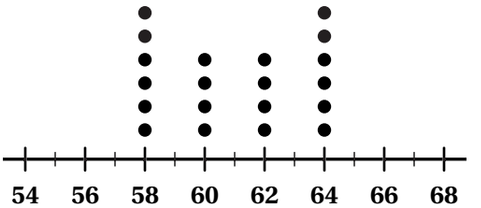
☐ D.



3. The heights, in inches, of 20 students from two different classrooms are shown in the dot plots.



Classroom A



Classroom B

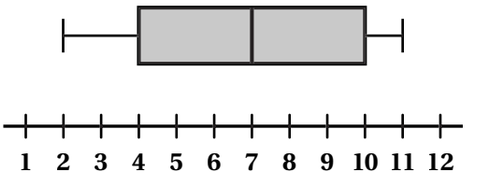
a What are the appropriate measures of center and variability to use with each data set? Explain your thinking.

b Which classroom shows a greater typical height? Explain your thinking.

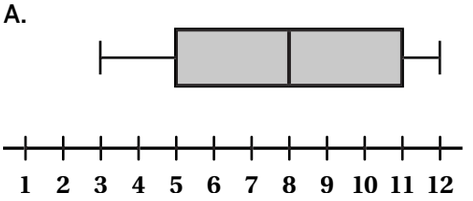
c Which classroom shows a greater variability? Explain your thinking.

Name: ..... Date: ..... Period: .....

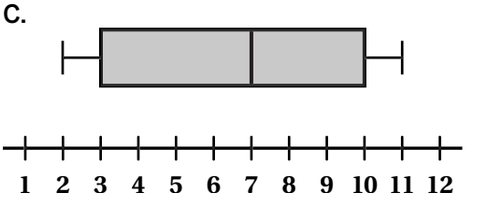
4. Consider the box plot shown. Which of the following box plots has a smaller measure of variability but the same minimum and maximum values?



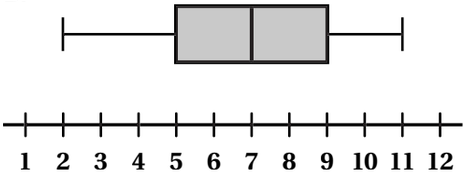
A.



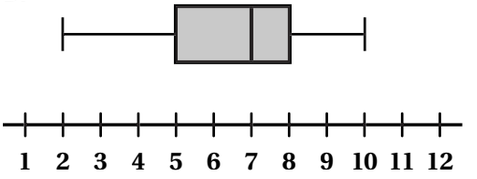
C.



B.

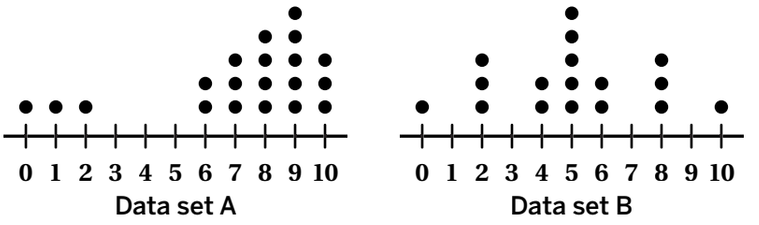


D.



5. Consider the two graphs.

a For which data set would the most appropriate measure of center be the mean? Explain your thinking.



b For which data set would the most appropriate measure of variability be the IQR? Explain your thinking.

6. The mean height of 30 trees in one orchard is 20.4 ft with a standard deviation of 0.8 ft. The mean height of 30 trees in a second orchard is 20.1 ft with a standard deviation of 4.5 ft. Both distributions are close to being symmetric in shape. Trees that are 20 ft or taller need to be pruned. Which orchard do you think has more trees that need pruning? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.11

1. Consider this data set: $0, 0, 1, 1, 2, 4, 4, 5, 6, 20$. Which measure of center is greater: the mean or the median?

2. Consider this data set: $30, 30, 32, 33, 35, 35, 35, 36, 38, 90$.

a Determine the mean and median.

b Eliminate the greatest value, 90, from the data set. Determine the mean and median.

c Was the mean or median affected by eliminating the greatest value?

3. Consider this data set: $70, 70, 70, 75, 75, 75, 78, 78, 79, 80$.

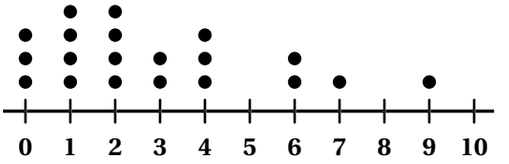
a Do the mean and standard deviation of the data set increase or decrease if the 80 is changed to an 8?

b If the 80 is changed to an 8, would the median or the mean be a more appropriate measure of center? Explain your thinking.

4. Consider this data set: $-8, 5, 5, 6, 8, 8, 9, 10, 10, 10$. If the least value is eliminated from the data set, which measure is affected more: the mean or the median? Explain your thinking.

Name: ..... Date: ..... Period: .....

5. Refer to the dot plot.



a Which measure of center do you think is more appropriate for this data set? Explain your thinking.

b Which measure of variability do you think is more appropriate for this data set? Explain your thinking.

c If the maximum value is replaced by a value that is twice as large, which measures of center and variability would change? Explain your thinking.

Name: Date: Period:

Additional Practice 3.12

Problems 1–3: Nolan is interested in the length of time that men and women work-out at his gym. He found this data about the lengths of work-out times, in minutes, of hundreds of men and women.

	Mean Time (minutes)	Standard Deviation (minutes)
Men	52.5	7.5
Women	48.5	7.09

1. Write a question you could answer using this data.

2. Write a question you could *not* answer using this data.

3. How do the lengths of times that men and women work out compare? Use statistics to support your answer.

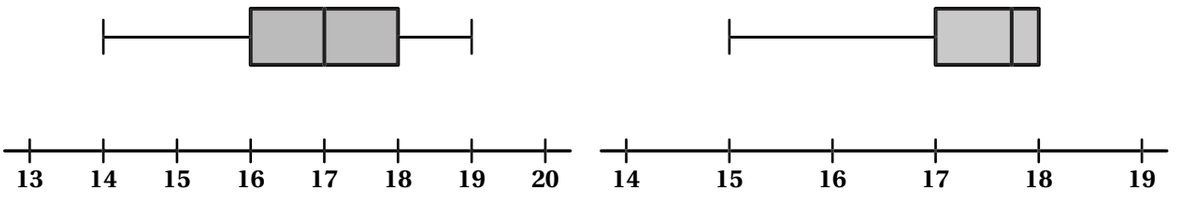
4. The table shows some statistics about the typical daily screen time, in hours, of a 14-year old in 2020 and 2024.

	Median Time (hours)	Mean Time (hours)	Standard Deviation (hours)	IQR (hours)
2020	3.62	3.75	0.89	0.88
2024	5.49	5.4	0.51	0.65

How has the number of minutes of daily screen time changed from 2020–2024? Use statistics to support your answer.

Name: ..... Date: ..... Period: .....

Problems 5–6: The box plots below represent the minimum legal driving age in all 50 United States compared to that of European Countries.



Minimum legal driving age in 50 United States

Minimum legal driving age in 11 European Countries

5. What do you notice about the data?

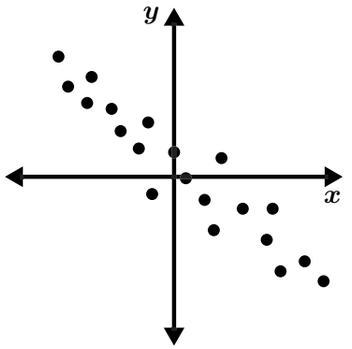
6. Provide a detailed description of how the two data sets compare regarding their center and spread. Use statistics to support your answer.

Name: ..... Date: ..... Period: .....

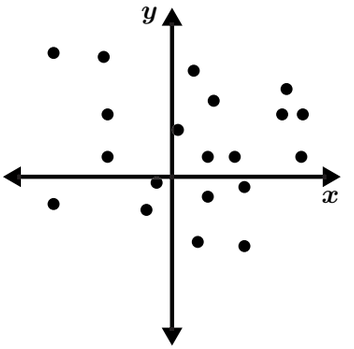
Additional Practice 3.13

Problems 1–4: Determine whether each scatterplot has a strong linear relationship, weak linear relationship, or no linear relationship. Circle your choices for each problem.

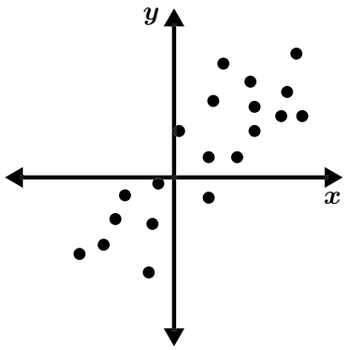
1. Strong Weak None



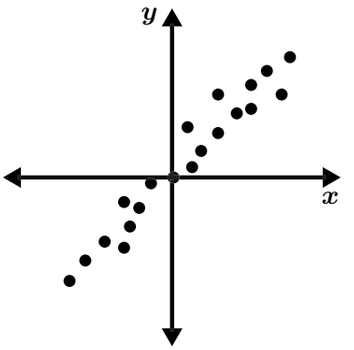
2. Strong Weak None



3. Strong Weak None



4. Strong Weak None



5. A scatter plot is found to have a correlation coefficient of $r = 0.88$. What does this tell you about the data? Select *all* that apply.

- ☐ **A.** The data has a weak association.
- ☐ **B.** The data has a strong association.
- ☐ **C.** The trend of the data has a positive association.
- ☐ **D.** The trend of the data has a negative association.

Name: Date: Period:

6. Which correlation coefficient indicates the *weakest* association?

A. $r = 0.75$

B. $r = 0.23$

C. $r = -0.32$

D. $r = -0.94$

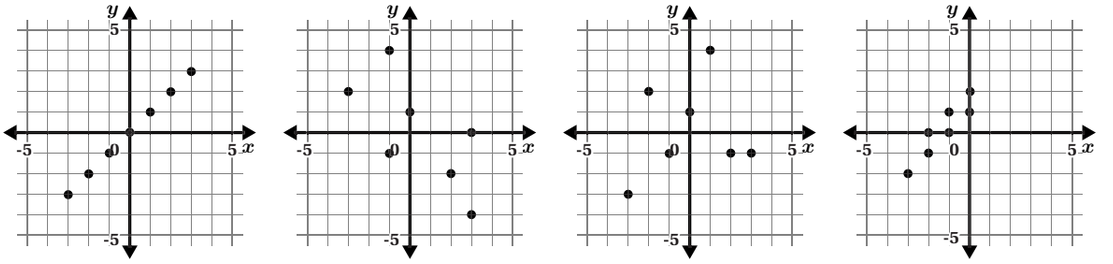
7. Merilyn was talking about the strength of linear associations. She said that all data with negative r-values are weak associations and all data with positive r-values are strong associations. What is incorrect about Merilyn's thinking? How would you convince her otherwise?

Name: ..... Date: ..... Period: .....

Additional Practice 3.14

1. Match each scatter plot to its correlation coefficient, r.

A. $r = 0.92$. **B.** $r = 0.16$ **C.** $r = 1$ **D.** $r = -0.68$



....

2. A scatter plot is found to have a correlation coefficient of $r = -0.49$. Select *all* the conclusions you can make about the data.

- ☐ **A.** There is a weak association between the two variables.
- ☐ **B.** There is a strong association between the two variables.
- ☐ **C.** There is no association between the two variables.
- ☐ **D.** As one variable increases, the other increases.
- ☐ **E.** As one variable increases, the other decreases.

3. The data in the table represents the number of cans students collected during a school food drive. Elena graphs the data and claims the correlation coefficient for the data would likely be a number between 0.5 and 1. Lin argues that the correlation coefficient would likely be a number between 0 and 0.5. Who do you agree with? Explain your thinking.

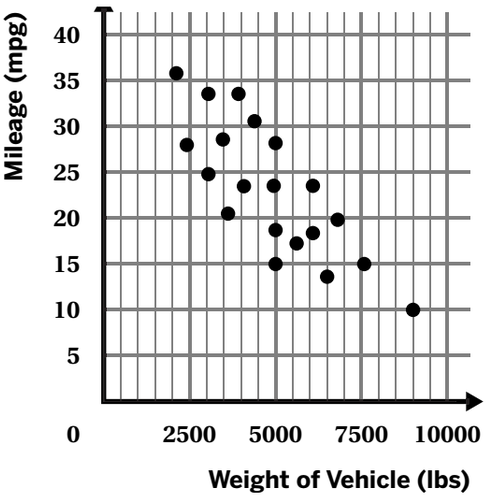
Day	1	2	3	4	5	6	7	8
Number of Cans	20	50	45	53	60	62	71	80

Name: ..... Date: ..... Period: .....

Problems 4–6: Marcus is interested in buying a new car that gets good gas mileage. He found data about two variables:

- Weight of vehicle (in pounds)
- Mileage of vehicle (miles/gallon)
- $r = -0.78$

Here is a scatter plot for the data.



4. The point $(2200, 36)$ represents a Honda Civic. What do the coordinates tell us about the Honda Civic?

5. Based on the r-value of $r = -0.88$, what relationship is there between the variables? Circle one.

Positive Negative Neither

6. What is the strength of the relationship? Circle one.

Weak Strong

7. Which of the following claims can be made about the relationship between the weight of a car and its average mileage?

A. The lighter the vehicle, the better its gas mileage.

B. The heavier the vehicle, the better its gas mileage.

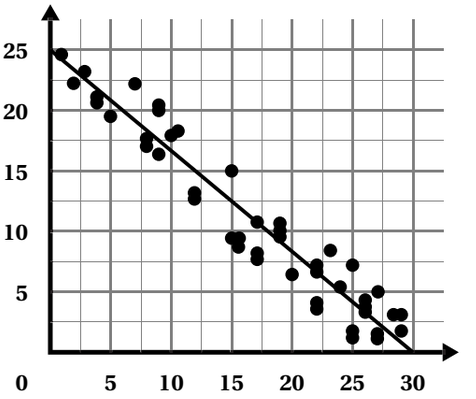
C. There is a negative association between the weight of a vehicle and its average gas mileage.

D. There is a positive association between the weight of a vehicle and its average gas mileage.

Name: Date: Period:

Additional Practice 3.15

1. Which is the best estimate for the slope of the line?



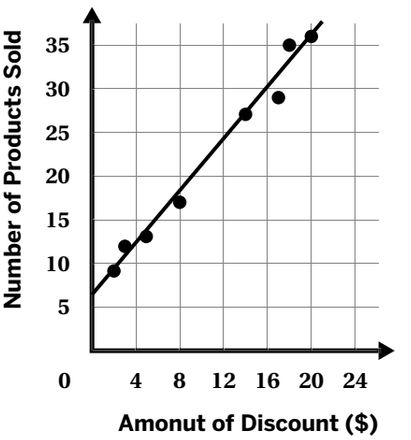
A. $-\frac{5}{6}$

B. $-\frac{1}{2}$

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

D. $\frac{5}{6}$

Problems 2–5. The scatter plot shows the amount of a discount on a product and the number of products that are sold in Store A owned by a company.



2. The scatter plot includes a point at $(8, 17)$. Describe what this point means in context.

3. What is another point that would fit this trend line? What does it represent?

4. The equation for the line that best fits this data is $y = 1.48x + 6.15$. What do the numbers 1.48 and 6.15 mean in this context?

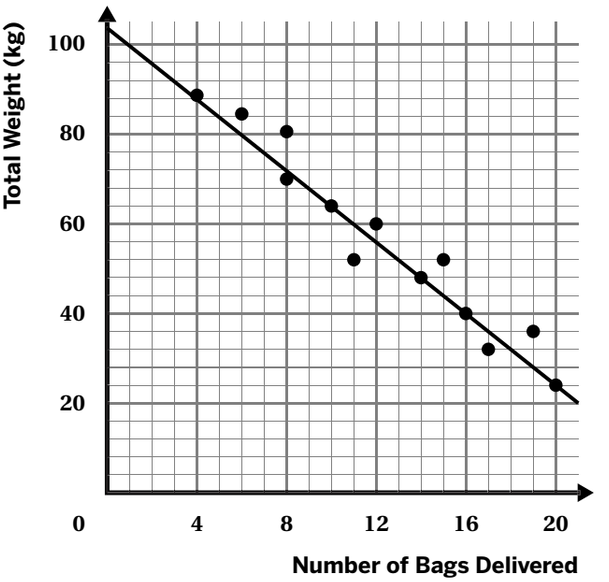
5. The company decides to collect the same data at their other two stores. The equation of their lines of best fit are shown in the table.

Store	Line of Best Fit
A	$y = 1.4x + 6.15$
B	$y = 0.85x + 5$
C	$y = 1.72x + 5.5$

Which store is the *least* profitable, or sells the *least* amount of products with each $1 of discount? Explain your thinking.

Name: ..... Date: ..... Period: .....

6. The scatter plot shows the total weight of bags of groceries to be delivered to customers and the number of bags delivered. The equation for the line of fit is given by $y = -4x + 105.6$, where y represents the total weight in kilograms and x represents the number of bags that are delivered. The slope of the line is -4 and the y-intercept is 105.6.



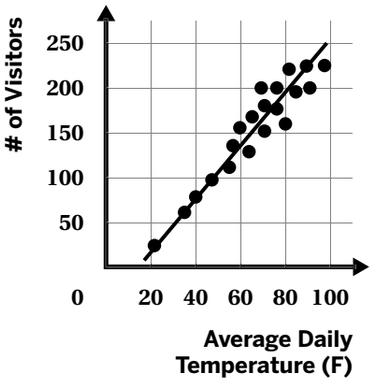
Which of the following statements are *true*?
Select *all* that apply.

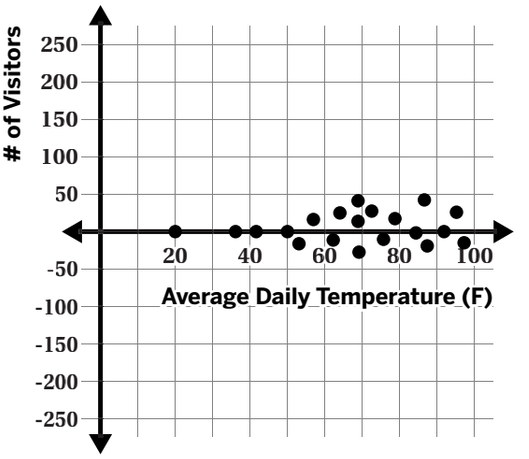
- ☐ **A.** Each additional bag delivered increases the total weight by about 4 kilograms.
- ☐ **B.** Each additional bag delivered decreases the total weight by about 4 kilograms.
- ☐ **C.** Each additional bag delivered decreases the total weight by about 105.6 kilograms.
- ☐ **D.** Before any bags are delivered, the total weight of the groceries is 105.6 kilograms.
- ☐ **E.** After about 106 bags are delivered, the total weight is 0 kilograms.

Name: ..... Date: ..... Period: .....

Additional Practice 3.16

Problems 1–2: The scatterplot shows the number of visitors to a local beach, the average daily temperature, and a line that best fits the data. The residual plot is also shown.

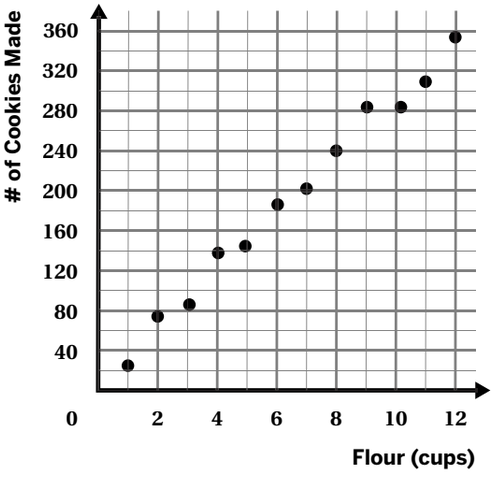


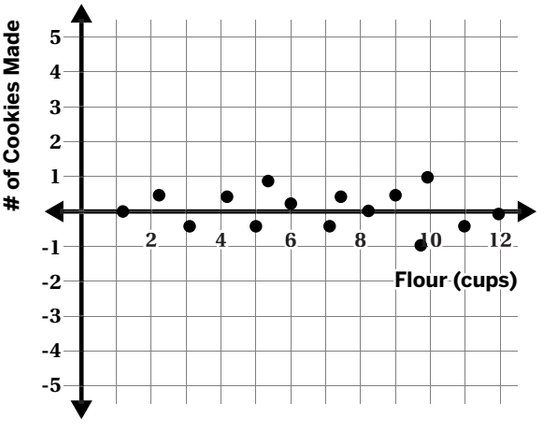


1. Predict the number of visitors at the beach when it is 70°F.

2. How can you tell that the graphed line is a good fit for the data? Use the residual plot if it helps your thinking.

3. Here is a scatter plot and its corresponding residual plot.
Draw a line of fit on the scatter plot that corresponds to the residual plot.

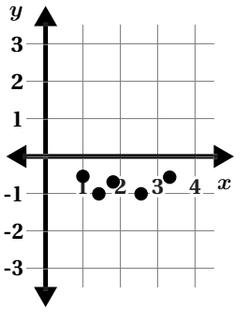




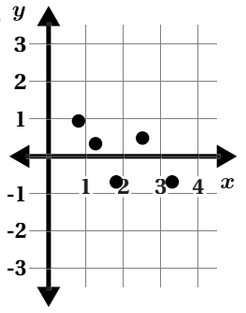
Name: Date: Period:

4. These residual plots are from the same set of data, but each one represents a different line of fit. Which residual plot shows the best line of fit?

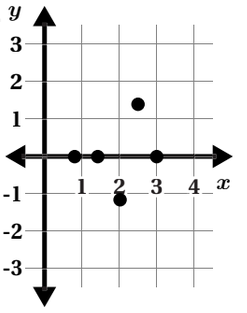
A.



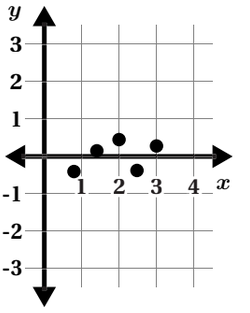
B.



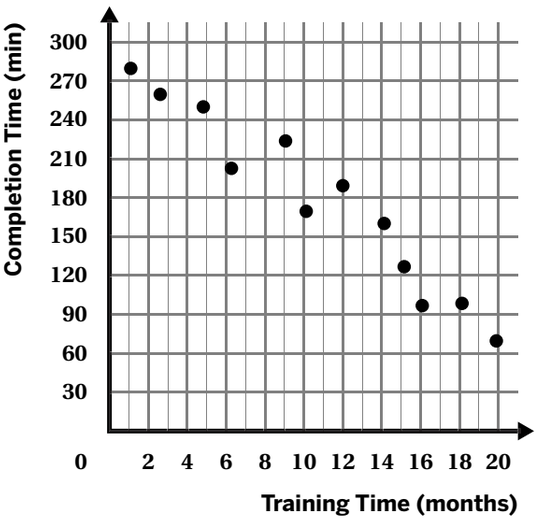
C.



D.



Problems 5–6: This scatter plot shows the relationship between the number of months training for a marathon to the completion time (in minutes).



5. Which r-value could represent the correlation coefficient for this data?

A. 0.82 **B.** -0.82

C. 0.26 **D.** -0.26

6. Which equation could represent the line of best fit?

A. $y = 290x + 12$ **B.** $y = 12x + 290$

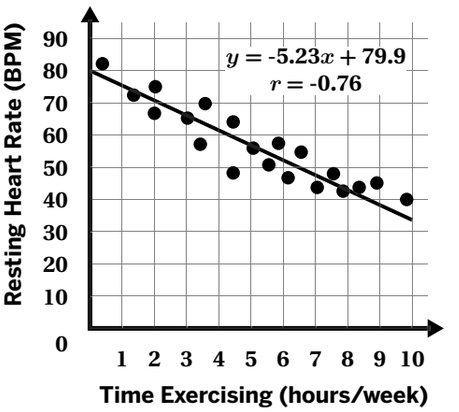
C. $y = -290x + 12$ **D.** $y = -12x + 290$

Explain your thinking.

Name: Date: Period:

Additional Practice 3.17

Problems 1–3: This scatter plot shows the relationship between the number of hours a person exercises each week and their resting heart rate, in beats per minute.



1. The equation for the line of best fit is $y = -5.23x + 79.9$.

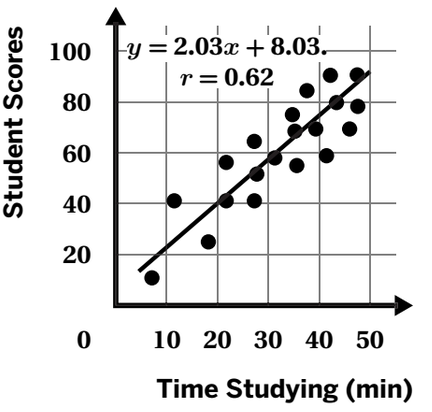
a What does the 79.9 mean in this situation?

b What does the -5.23 mean in this situation?

2. Nina exercised for 4 hours this week.
Use the equation of line of best fit to predict her resting heart rate.

3. Do you think the prediction is accurate? Use the r-value to explain your thinking.

Problems 4–6: The scatter plot shows the relationship between the amount of time spent studying for a recent math test (in minutes) and the scores the students earned on the test.



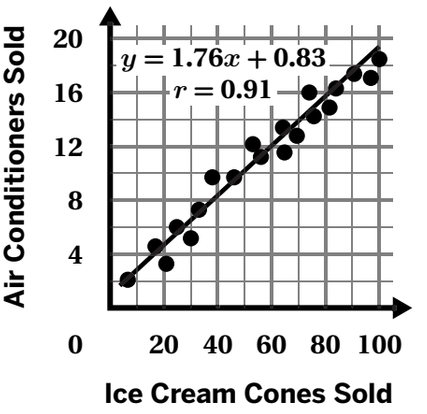
4. The equation for the best fit line is $y = 2.03x + 8.03$.
What does the 2.03 mean in this situation?

5. Rajah studied for this test for 40 minutes.
Use the equation of line of best fit to predict his score on the test.

6. Do you think the prediction is accurate? Use the r-value to explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 7–9: The scatter plot shows the relationship between the number of ice cream cones and the number of air conditioners sold in a month.



7. Describe the relationship between the number of ice cream cones sold and the number of air conditioners sold in a month.

8. Do you think one variable causes the other? Explain your thinking.

9. What else might affect this relationship? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.18

1. Which of the following relationships is most likely to be related by causation?

A. Being right-handed or left-handed and having a pet.

B. Number of songs on a playlist and number of hats owned.

C. Melting glaciers and greenhouse gas emissions.

D. Reading blogs and an increase in hurricane strength.

2. Which of the following statements shows a relationship that is correlated and related by causation? Select *all* that apply.

- ☐ **A.** The amount of rainfall received and level of water in the lake.
- ☐ **B.** The number of lights left on each day and the amount of the electric bill.
- ☐ **C.** The increase of warm sunny days and the number of ice cream vendors visible.
- ☐ **D.** The number of hours worked and how much money is made.
- ☐ **E.** As a child's weight increases, so does their vocabulary.

3. Priya tosses a coin twice. She repeats this three times. Her results are tails, tails, and then heads, heads, and then tails, tails. She claims that the first toss determines what the second toss will be. Is she correct? Explain your thinking.

4. A recent research study compared the number of devices per person in a given country and the average life expectancy in the same country. They calculated the correlation coefficient of this association to be $r = 0.83$.

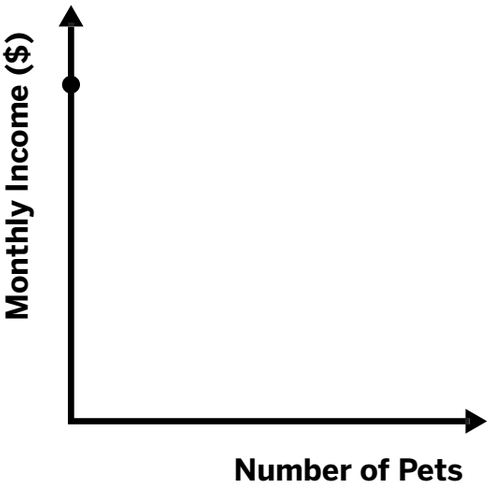
a Describe the association between the variables.

b Is this an example of causation or correlation but not causation? Explain your thinking.

Name: Date: Period:

5. A news website shows a scatter plot with a positive linear relationship between the number of dreams people have and the number of store purchases they make. The headline read, "Dreaming causes an increase in shopping!" Is this a valid claim? Explain your thinking.

Problems 6–7: A group of scientists researched the number of pets people own and their monthly income. Their research data shows a fairly strong positive linear correlation with a correlation coefficient of $r = 0.68$



6. Make a scatter plot that fits this description.

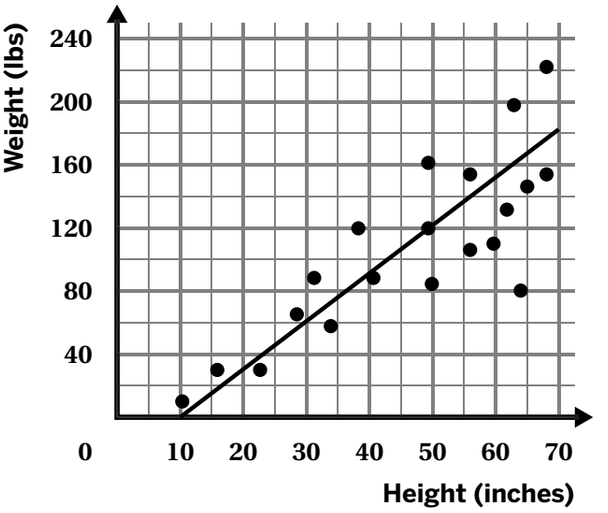
7. A news website presents the research with the headline.
The More Pets You Own, the More Money You Will Make!

Is this an accurate claim? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.19

Problems 1–4: The scatterplot shows the weights of people of different heights.



1. Which of the following could be the equation of the line of best fit?

A. $y = -2.7x - 15$

B. $y = 2.7x - 15$

C. $y = 2.7x + 15$

D. $y = -2.7x - 15$

2. **a** Which of the following is likely the correlation coefficient (r-value) for this data?

A. $r = -0.95$

B. $r = -0.64$

C. $r = 0.64$

D. $r = 0.95$

b Explain your choice.

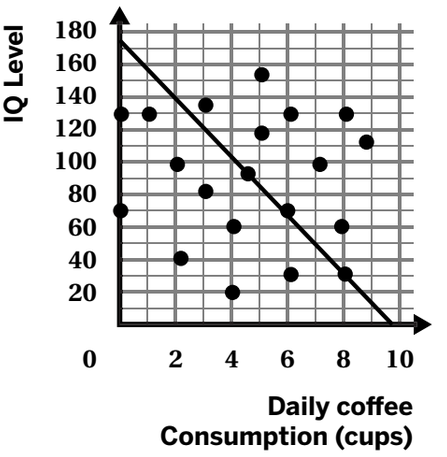
3. Describe the relationship shown between the height of a person and their weight.

4. **a** Terence is 55 inches tall. Use the equation for the line of best fit to predict how much he should weigh.

b Do you think the prediction is accurate? Use the r-value to explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 5–7: A study gathered data about the effect of daily coffee consumption and IQ. This scatter plot shows the average cups of coffee a person consumes daily and their IQ level.



5. Which of the following could be the equation of the line of best fit?

A. $y = -0.12x - 10$

B. $y = -0.88x + 176$

C. $y = -0.12x + 176$

D. $y = -0.88x - 10$

6. What does the slope of the line represent in this situation?

7. Do you think one of the variables causes the other? Explain your thinking.

Algebra 1 | Unit 4

Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 4.01

1. Here is Rule A. Rule A takes a number and assigns the number a letter as output.

Rule A

Input	2	3	2	6
Output	A	C	B	F

Is Rule A a function? Explain your thinking.

Problems 2–3: Here is Rule B. Rule B takes a number and assigns a number as output.

Rule B

Input	3	6	9	12
Output	2	4	6	?

2. Is Rule B a function? Explain your thinking.

3. Predict what the output could be when the input is 12.

Name: Date: Period:

Problems 4–5: Here is Rule C. A machine uses Rule C to turn inputs into outputs. Rule C adds 3 to the input and then multiplies by 2 to get the output.

Rule C

Input	1	9	11	20
Output	8	?	28	46

4. Is Rule C a function? Explain your thinking.

5. Predict what the output could be when the input is 9.

6. Here is Rule D. Rule D takes a number and assigns a random number that is greater as the output.

Rule D

Input	2	2	3	4
Output	3	4	4	6

Is Rule D a function? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 4.02

1. The function notation statement $C(3) = 21$ means, "The cost of 3 tickets is \$21." What is the input value? The output value?

2. The table shows the distance in meters that Elena walks her dog for different times. Which equation represents her walking the dog 280 m in 4 minutes?

Time (minutes)	Distance (m)
2	140
4	280

A. $f(2) = 140$

B. $f(4) = 280$

C. $f(140) = 2$

D. $f(280) = 4$

3. The function R represents the number of feet above the loading platform that a roller coaster is n, as a function of time t, in seconds. Match each verbal statement with its corresponding function notation. Not all of the function notation equations will be used.

Verbal statement

a. At the start, the roller coaster is at the loading platform.

b. The roller coaster is n ft above the loading platform after t seconds.

c. After 75 seconds, the roller coaster is 130 ft above the loading platform.

d. The roller coaster is 75 ft above the loading platform after 130 seconds.

e. After 110 seconds, the roller coaster is at the same height as the loading platform.

Function notation

..... $R(110) = 0$

..... $R(0) = 0$

..... $R(75) = 130$

..... $R(0) = 110$

..... $R(130) = 75$

..... $R(t) = n$

..... $R(n) = t$

Name: ..... Date: ..... Period: .....

4. Suppose a function D takes a date in October as its input and tells whether a student has a soccer game as its output.

a Complete the following to use function notation to represent the statement, "A student has a soccer game on October 12."

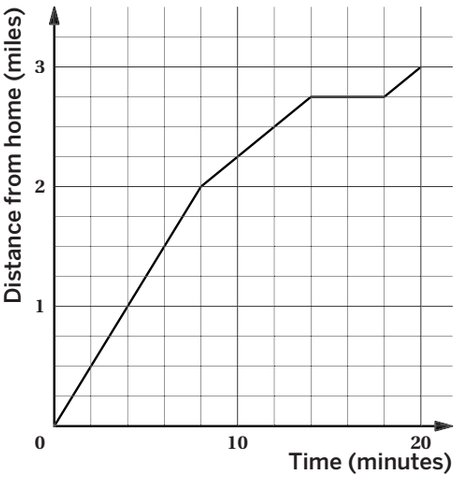
$D($.....$) =$ .....

b Write a statement to describe the meaning of $D(25) =$ *No soccer game*.

5. The function C gives the cost, in dollars, of buying n packs of gum. Which of the following statements are true? Select *all* that apply.

- ☐ **A.** $C(4) = 6$ means 6 packs of gum cost \$4.
- ☐ **B.** $C(4) = 6$ means 4 packs of gum cost \$6.
- ☐ **C.** $C(3)$ represents the cost of 3 packs of gum.
- ☐ **D.** $C(3)$ represents the packs of gum that cost \$3.
- ☐ **E.** The equation $C(5) = 7.5$ means that five packs of gum cost \$7.50.

6. Shawn is riding a bike to a friend's house. The graph represents the function D, Shawn's distance from home, in miles, after t minutes.



a How far away from home is Shawn after 10 minutes?

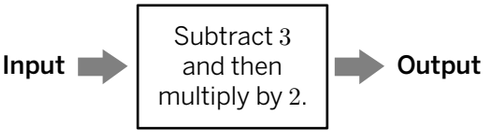
b After 20 minutes, Shawn is 3 miles from home. Lin writes this verbal statement in function notation as $D(3) = 20$. Is she correct? Explain your thinking.

c Kiran claims that distance is a function of time, and time is a function of distance. Do you agree? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 4.03

1. Use the function machine to complete the table.



Input	Output
-2	
4	
1.5	
6	

2. Match each statement with a description of the function it represents.

Statement	Description
a. $f(x) = 5x - 3$	..... To get the output value, subtract 3 from the input value, and then multiply the result by 5.
b. $g(x) = 3(x - 5)$	..... To get the output value, subtract 5 from the input value, and then multiply the result by 3.
c. $h(x) = 5(x - 3)$	..... To get the output value, multiply the input value by 5, and then subtract 3 from the result.
d. $j(x) = 3x - 5$	..... To get the output value, multiply the input value by 3, and then subtract 5 from the result.

3. One tomato plant costs \$6. The function C represents the cost, in dollars, of x tomato plants, where the cost of 1 tomato plant is \$6.

a Complete the table.

x	0	1	2	3	4	5	6
C							

b Write a function notation statement to represent the function C.

Name: _____ Date: _____ Period: _____

4. Consider the function $B(x) = 7.5x + 30$. What is the value of $B(4)$?

A. 30

B. 40.5

C. 41.5

D. 60

5. A local swimming pool offers membership Plans Q and R as described in the table. The function representing each plan gives the total cost, in dollars, for m months of membership.

Plan Q	Plan R
\$50 per month, plus a \$25 application fee $Q(m) = 50m + 25$	\$400 per year $R(m) = 400$

a Complete the following to describe the meaning of the statement $Q(3) = 175$.

The total cost of Plan _____ is \$ _____ after _____ months.

b Which is greater, $Q(6)$ or $R(6)$?

c Which is less, $Q(10)$ or $R(10)$?

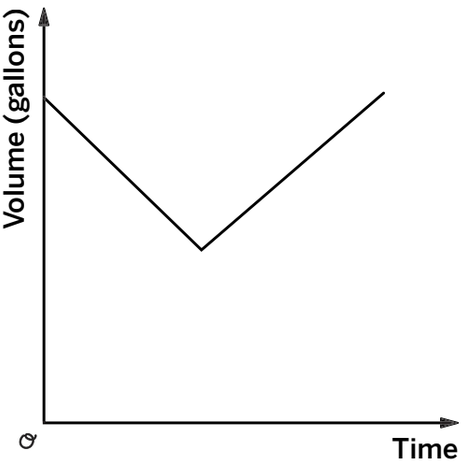
6. A dolphin is swimming at a constant speed of 3 mph. The total distance the dolphin has traveled in t hours can be represented by the function $D(t) = 3t$.

Determine the value of $D(2.5)$ and explain what it means is in this situation.

Name: ..... Date: ..... Period: .....

Additional Practice 4.04

1. The graph represents the volume of water in a tank as a function of time. Which of the descriptions matches the graph?



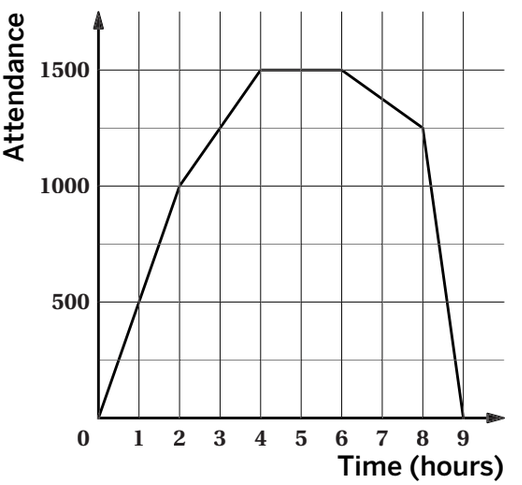
A. A $2{,}000$-gallon water tank starts out empty. It is filled for 5 hours, slowly at first, and faster later.

B. A full 10-gallon water tank is drained for 30 seconds until it is half full. Afterwards, it gets refilled.

C. An empty 20-gallon water tank is filled at a constant rate for 3 minutes until it is half full. Then it is emptied at a constant rate for 3 minutes.

D. An empty 100-gallon water tank is filled in 50 minutes. Then a dog jumps in and splashes around for 10 minutes, letting 7 gallons of water out. The tank is refilled afterwards.

2. The graph shows the attendance at an arts festival as a function of time in hours. Which of the following statements about the graph are true? Select *all* that apply.



☐ **A.** The number of people increases the first 4 hours, then stays the same for 2 hours, and then decreases the last 3 hours.

☐ **B.** The number of people decreases the first 4 hours, then stays the same for 2 hours, and then increases the last 3 hours.

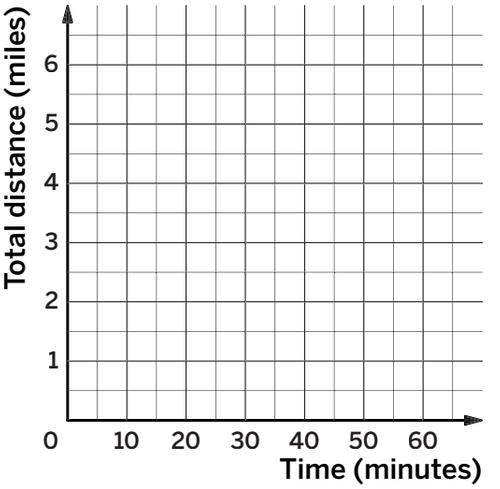
☐ **C.** The average rate of change of the function for the interval $[0, 5]$ is 375 people per hour.

☐ **D.** The interval $[0, 9]$ represents the hours during which the festival attendance varied.

☐ **E.** The average rate of change of the function for the interval $[6, 9]$ is -500 people per hour.

Name: ..... Date: ..... Period: .....

3. Lin runs for 30 minutes at a constant rate and goes a total distance of 3 miles. She stops and rests for 10 minutes. She then runs for 25 more minutes at a constant rate and during that time goes 2 more miles.

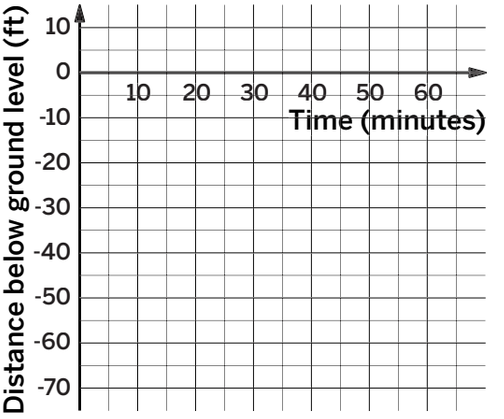


a Sketch a graph to represent this scenario.

b What is the domain of this scenario and what does it represent?

c What is the range of this scenario and what does it represent?

4. Priya goes on a tour of a cave. The tour starts at ground level and then descends for 20 minutes to a depth of 65 ft below ground level. The tour stays at this level for 15 minutes, and then ascends for 15 minutes to a depth of 25 ft below ground level. The tour stays at this level for 10 minutes, and then spends the last 5 minutes ascending to ground level.



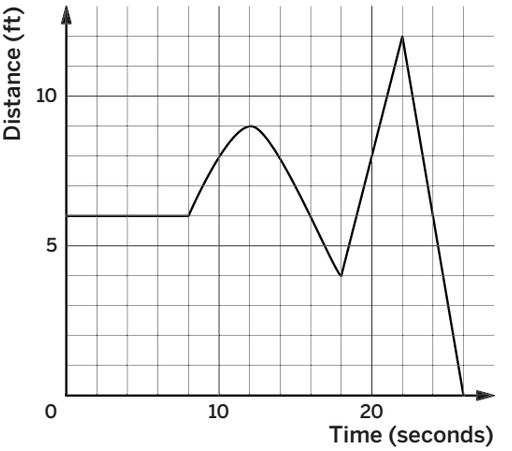
a Sketch a possible graph describing Priya's distance relative to ground level as a function of time.

b Kiran and Mai are arguing about which time interval represents the "fastest" ascent or descent of the tour. Kiran says that the descent on the interval $[0, 20]$ was the fastest. Mai claims that the ascent on the interval $[60, 65]$ was the fastest. Who is correct? Explain your thinking.

Name: ..... Date: ..... Period: .....

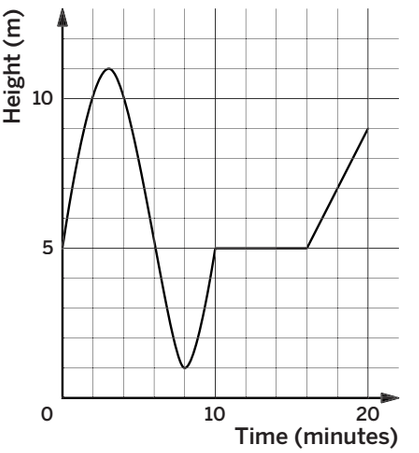
Additional Practice 4.05

1. The graph represents Clare's distance from her front door as she gets ready to go to school. Determine which of the following statements are true. Select *all* that apply.



- ☐ **A.** The minimum of the graph is located at $(18, 4)$.
- ☐ **B.** The graph has one horizontal intercept.
- ☐ **C.** From 12 seconds to 18 seconds, Clare is moving closer to her front door.
- ☐ **D.** The graph has two local maximums.
- ☐ **E.** Clare was farthest from her front door after about 26 seconds.

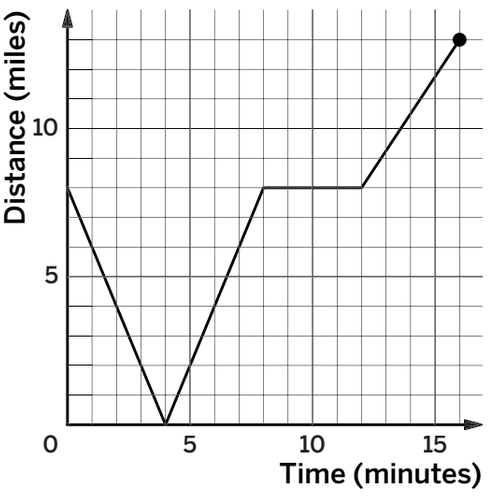
2. Consider the graph of the function shown. Match each feature of the graph with a corresponding statement in function notation.



Feature	Statement
a. Starting height	..... $h(8) = 1$
b. Minimum height	..... $h(0) = 5$
c. Maximum height	..... $h(t) = 5$, between $t = 10$ and $t = 16$
d. Height remains constant	..... $h(3) = 11$

Name: ..... Date: ..... Period: .....

3. The graph represents the function D, which gives the distance that Kiran is away from home as a function of time t. For what time interval does Kiran's distance from home decrease?



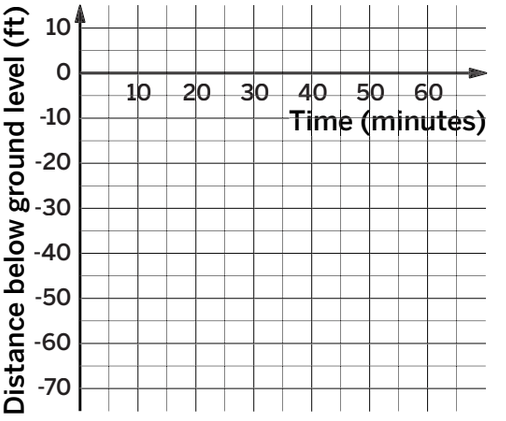
A. $[0, 4]$

B. $[4, 7]$

C. $[7, 12]$

D. $[12, 15]$

4. Priya goes on a tour of a cave. The tour starts at ground level and then descends for 20 minutes to a depth of 65 ft below ground level. The tour stays at this level for 15 minutes, and then ascends for 15 minutes to a depth of 25 ft below ground level. The tour stays at this level for 10 minutes, and then spends the last 5 minutes ascending to ground level.



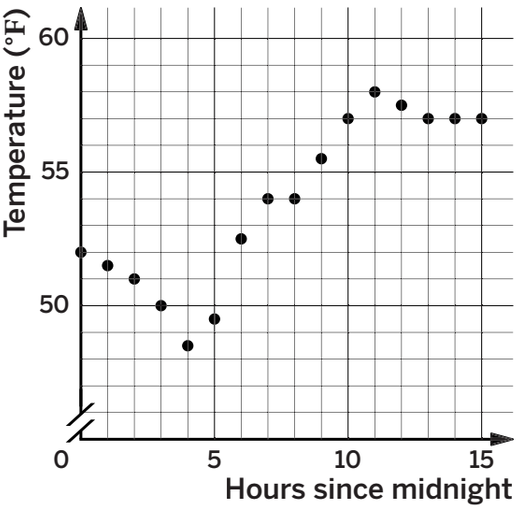
a Sketch a possible graph describing Priya's distance relative to ground level as a function of time.

b Kiran and Mai are arguing about which time interval represents the "fastest" ascent or descent of the tour. Kiran says that the descent on the interval $[0, 20]$ was the fastest. Mai claims that the ascent on the interval $[60, 65]$ was the fastest. Who is correct? Explain your thinking.

Name: Date: Period:

Additional Practice 4.06

1. The temperature was recorded at several times during the day. The function T represents the temperature in degrees Fahrenheit given the number of hours since midnight n. Use the graph to determine if the average rate of change for each interval is *positive*, *negative*, or *zero*.



a $n = 0$ to $n = 4$

b $n = 7$ to $n = 8$

c $n = 11$ to $n = 13$

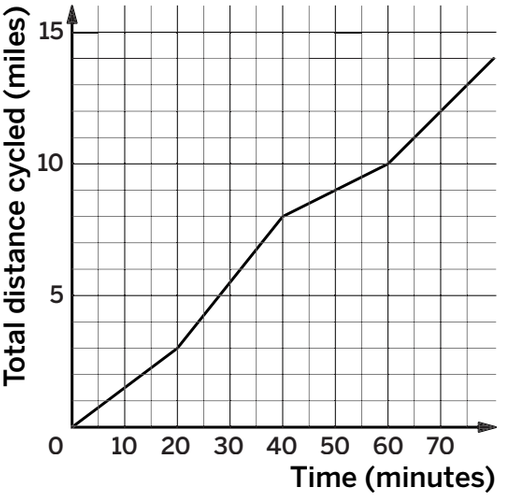
d $n = 13$ to $n = 15$

e $n = 4$ to $n = 7$

2. Refer to the graph in Problem 1. Determine each value.

a $f(3)$ **b** $f(6)$ **c** $f(11)$

3. The graph shows the total distance, in miles, that Kiran cycled as a function of time, in minutes.



a Was Kiran cycling faster between 20 and 35 minutes or between 50 and 65 minutes? Explain your thinking.

b Was Kiran cycling faster between 30 and 50 minutes or between 50 and 80 minutes? Explain your thinking.

Name: Date: Period:

4. The heights of a tree from when it was first planted through Year 21 are shown in the table. The function H gives the height of the tree in Year t.

Year	0	3	6	9	12	15	18	21
Height (ft)	2	4.5	8.1	11.4	15.6	19.2	23.1	26.4

a Determine the average rate of change for H between Years 3 and 9.

b Is the average rate of change for H between Years 12 and 21 *greater than*, *less than*, or *equal to* the rate of change between Years 3 and 9? Explain your thinking.

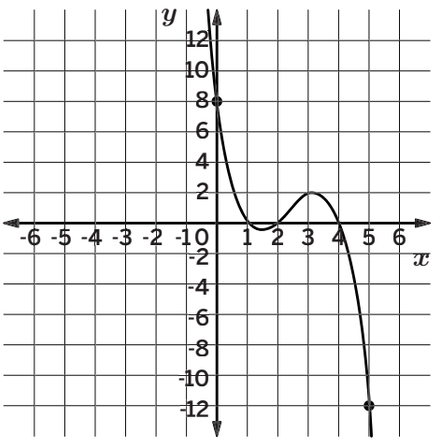
5. Use the graph to determine the average rate of change between $x = 0$ and $x = 5$.

A. -4

B. 4

C. -5

D. 5



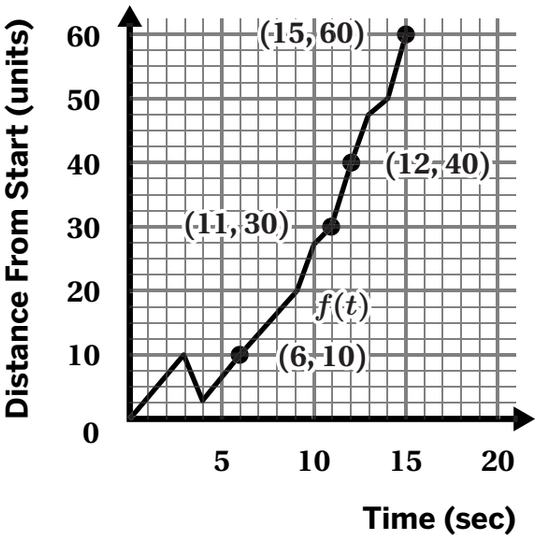
6. The number of people who visited an aquarium each day for a week is shown in the table. The function N gives the number of visitors on Day d. Shawn claims that the average rate of change between Days 1 and 3 is greater than the average rate of change between Days 3 and 6. Do you agree? Explain your thinking.

Day	1	2	3	4	5	6	7
Visitors (thousands)	4.5	4.8	5.2	3.9	4.4	5.6	6.1

Name: ..... Date: ..... Period: .....

Additional Practice 4.07

Problems 1–2: Fatima built a model train for a competition in her technology class. $f(t)$ represents the distance of Fatima's model train, in meters, after t seconds.



1. Use the graph to determine the missing value in each function statement.

$f(11) =$ .....

$f($.....$) = 10$

$f(12) =$ .....

$f($.....$) = 60$

2. Over what interval did Fatima's model train travel the slowest?

a. 0 to 3 seconds

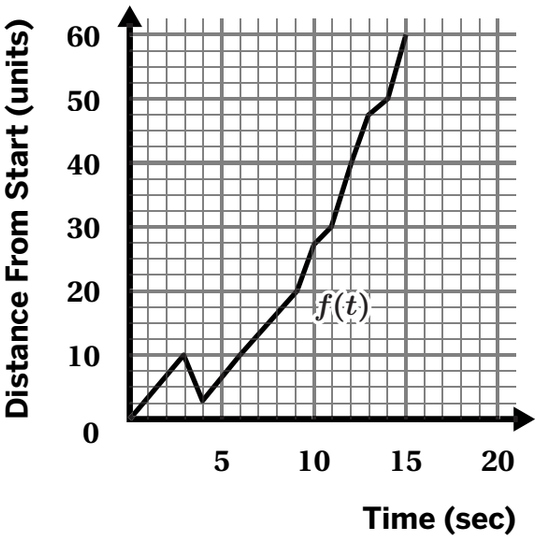
b. 4 to 6 seconds

c. 11 to 12 seconds

d. 12 to 15 seconds

3. Kyler built a model train to race against Fatima. Use this information to make a graph that could represent the distance of Kyler's model train, $k(t)$, after t seconds:

- $k(5) < f(5)$
- $k(10) = f(10)$
- The average rate of change of $k(t)$ and $f(t)$ is the same from $t = 10$ to $t = 11$.
- $f(t)$ has a greater maximum than $k(t)$.



Name: ..... Date: ..... Period: .....

Additional Practice 4.08

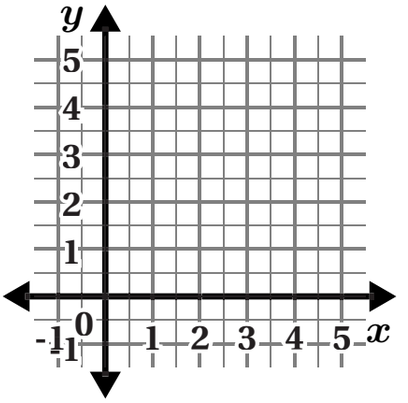
Problems 1–2: Maeve has a wood crafting business. She earns $\$6$ for every wood jewelry box she makes. The function $f(x) = 6x$ represents Maeve's daily earnings for x number of jewelry boxes crafted.

1. Are the values -1, 0.5, and 1.5 possible inputs for this situation? Explain your thinking.

2. Why is $\$18.50$ an impossible daily earning amount for Maeve?

3. Sketch a graph of $f(x)$ that meets the following conditions:

- Domain: All numbers from 1 to 4.
- Range: All whole numbers from 0 to 2.



Name: Date: Period:

Problems 4–7: A play is being held at a school theatre. The tickets for the play are $\$15$ per person. The school theatre has a maximum capacity of 250 people. The function $f(t) = 15t$ represents the amount of money raised for t tickets sold.

4. Select *all* the possible values in the domain of $f(t)$.

- ☐ **A.** -0.5
- ☐ **B.** 2.7
- ☐ **C.** 30
- ☐ **D.** 225
- ☐ **E.** 275

5. Describe the domain of $f(t)$.

6. Select *all* the possible values in the range of $f(t)$.

- ☐ **A.** -5
- ☐ **B.** 0
- ☐ **C.** $1,500$
- ☐ **D.** $3,500$
- ☐ **D.** $9,250$

7. Describe the range of $f(t)$.

Name: ..... Date: ..... Period: .....

Additional Practice 4.09

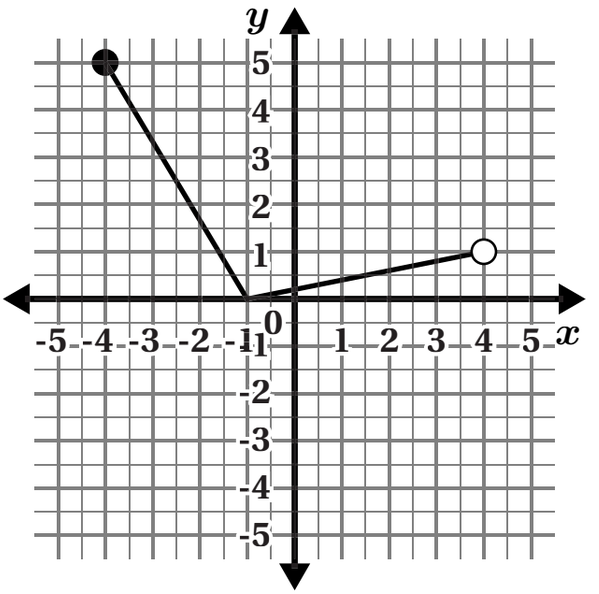
Problems 1–2: Carlos and Madeline disagree about the domain of $f(x)$.

- Carlos says the domain is $0 \leq x \leq 5$
- Madeline says the domain is $-4 < x \leq 4$

1. Whose answer is correct? Circle one.

Carlos Madeline Neither

2. Explain why either (or both) of the students are incorrect.



Problems 3–4: You are given the graph of a function.

3. What is the domain of the function shown?

A. $-3 < x \leq 2$

B. $-3 \leq x < 2$

C. $-2 \leq x < 4$

D. $-2 < x \leq 4$

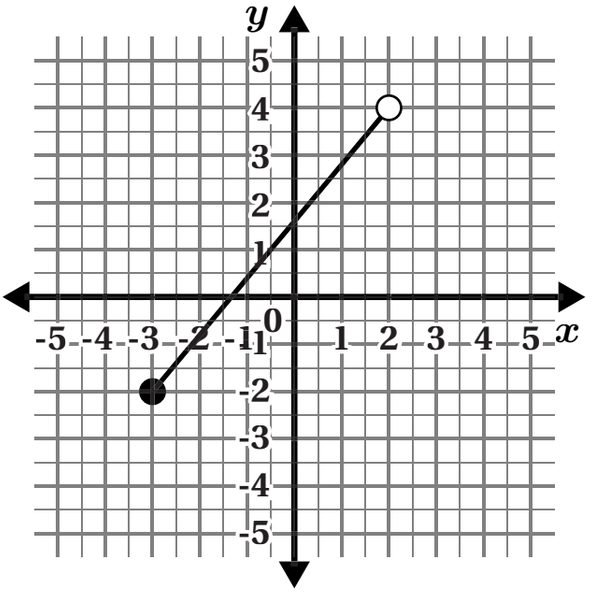
4. What is the range of the function shown?

A. $-3 < x \leq 2$

B. $-3 \leq x < 2$

C. $-2 \leq x < 4$

D. $-2 < x \leq 4$



Name: ..... Date: ..... Period: .....

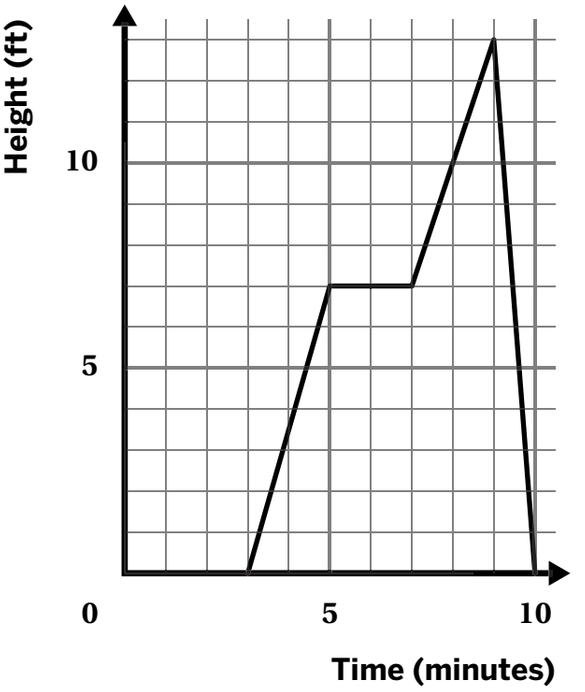
Problems 5–8: A squirrel is searching for food on the ground and in trees. The graph represents the function, $h(t)$, which represents the height of the squirrel as a function of time t.

5. Write a compound inequality to describe the domain of $h(t)$.

6. What does the domain represent in this situation?

7. Write a compound inequality to describe the range of $h(t)$.

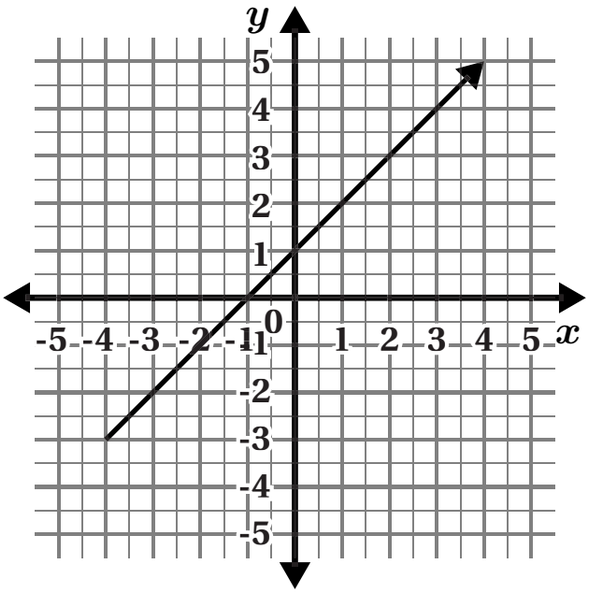
8. What does the range represent in this situation?



Name: Date: Period:

Additional Practice 4.10

Problems 1–2: See the graph of $f(x)$.



1. What is the domain of $f(x)$?

a. $x \geq 0$

b. $x \geq -4$

c. $x \leq 0$

d. $x \leq -4$

2. What is the range of $f(x)$?

a. $f(x) \geq -3$

b. $f(x) \geq 0$

c. $f(x) \leq 3$

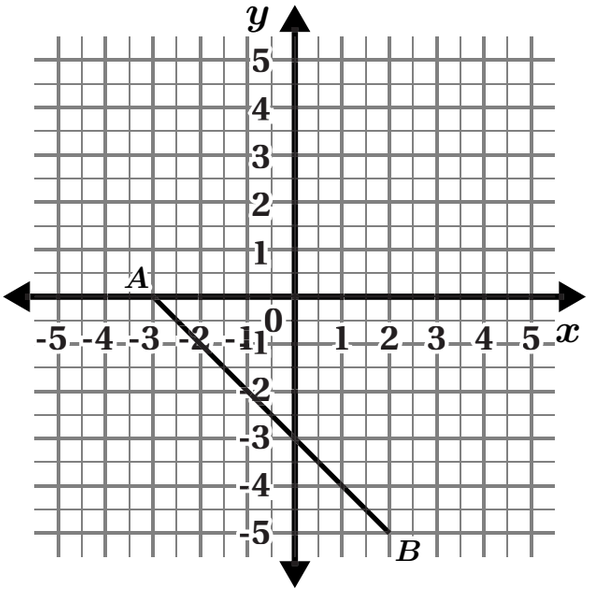
d. $f(x) \leq 0$

Name: ..... Date: ..... Period: .....

3. Fill in the blanks for the domain and range of $y = -x - 3$ from point A to point B.

..... $\leq x \leq$ .....

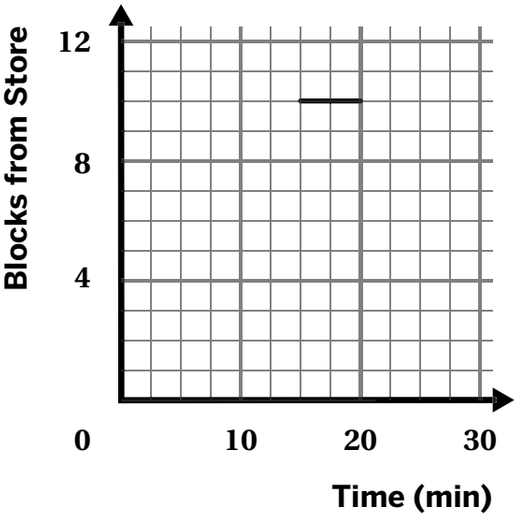
..... $\leq y \leq$ .....



4. Lia leaves her home to go to the grocery store. This is her path:

- She walks to the store, which is 10 blocks away, at a speed of half a block per minute.
- She is in the store for 5 minutes.
- She runs back home at a speed of 2 blocks per minute.

The graph shows part of her path. Sketch the graph of the missing pieces of Lia's path.



Name: Date: Period:

Additional Practice 4.11

Problems 1–3: Determine the value of each piecewise-defined function, $f(x)$.

1. $f(0) =$

2. $f(4) =$

3. $f(6) =$

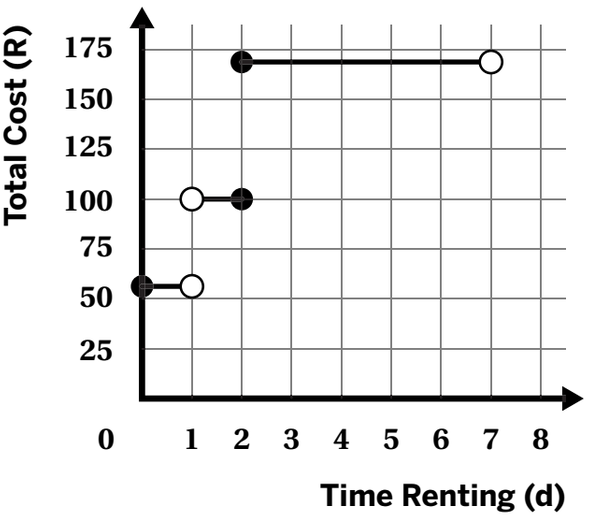
$$f(x) = \begin{cases} 2x + 1, & 0 \le x < 4 \\ 9, & x \ge 4 \end{cases}$$

Problems 4–5: A car rental company charges $\$55$ to rent a car for the first day, $\$110$ for up to two days, and $\$170$ for more than two days but less than a week. Let R represent the dollar price of renting a car for d days. Complete the table.

4. Complete the table.

Time renting (d)	0	0.75	1	1.25	2.5
Total cost (R)					

5. The rental company tried to represent their pricing with this graph. What is correct and what should change to make the graph more accurate?



Name: ..... Date: ..... Period: .....

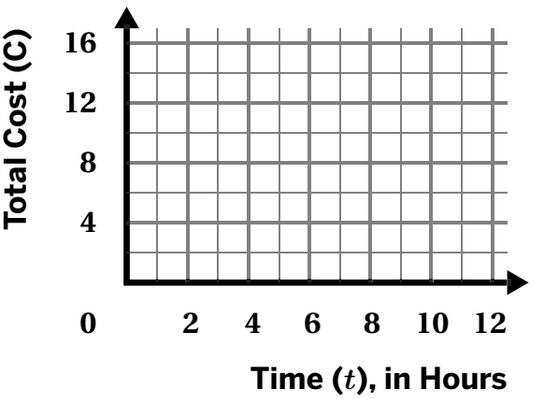
Problems 6–7: The cost of parking at the beach is $\$4$ for the first hour, $\$8$ for up to two hours, $\$12$ for up to three hours, and $\$16$ for more than three hours.

Let C represent the dollar price of parking for t hours.

6. Complete the table.

Hours parking (t)	Total cost (C)
0	
0.75	
1	
1.25	
2	
2.5	
4	

7. Graph the function C for $0 \le t \le 12$



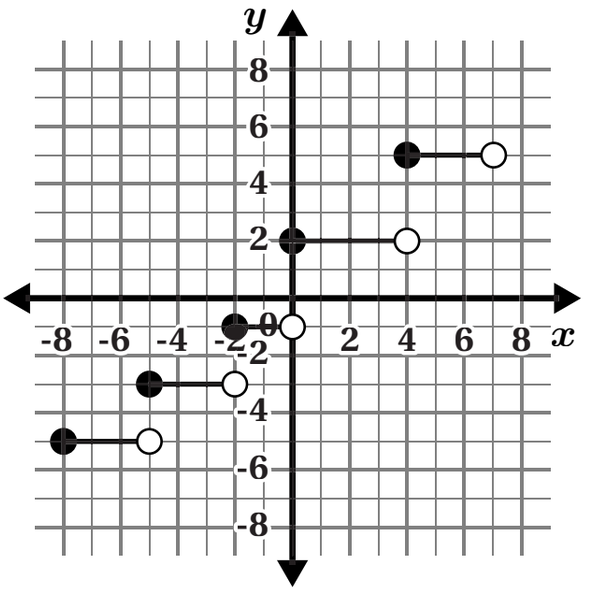
Problems 8–9: A graph of a piecewise-defined function is given.

8. Determine the following values:

a. $r(-5) =$ .....

b. $r(0) =$ .....

c. $r(8) =$ .....



9. Complete $r(x)$ so that it matches the graph

$$r(x) \begin{cases} -5, & -8 \le x < -5 \\ -3, & \text{.....} \le x < -2 \\ \text{.....}, & -2 \le x < 0 \\ 2, & \text{.....} \le x < \text{.....} \\ \text{.....}, & 4 \le x < 7 \end{cases}$$

Name: Date: Period:

Additional Practice 4.12

Problems 1–2: UPS charges shipping fees depending on the weight of the package.

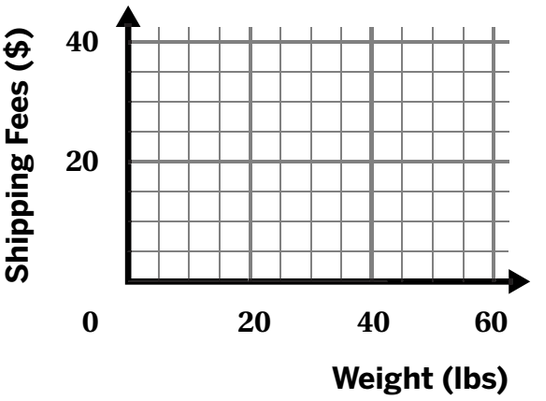
- Packages weighing more than 0 to 5 pounds cost $8.
- Packages weighing from more than 5 pounds to 10 pounds cost $15.
- Packages weighing more than 10 pounds to 20 pounds cost $20.
- Packages weighing more than 20 to 50 pounds cost $30.

Let $c(x)$ represent the shipping fee for an order that weighs x pounds.

1. Complete the table.

Weight in lbs (x)	Shipping Fee ($)
0	
3	
5	
10	
19	
20	
30	
40	
50	

2. Make a graph that represents the function $T(x)$.



3. Sandra is an electrician who charges the following for her services:

- $75 for coming to the property
- $50 for more than 0 minutes to 1 hour
- $60 for the second hour, or any part of it
- $75 an hour for any time over 2 hours

$$f(x) = \begin{cases} 75 & x = 0 \\ 125 & 0 < x < 1 \\ 185 & 1 < x < 2 \\ 75x & x \geq 1 \end{cases}$$

Sandra wrote this piecewise-defined function to represent her charges. Identify at least two things that are incorrect in Sandra's function. Explain your thinking.

Name: Date: Period:

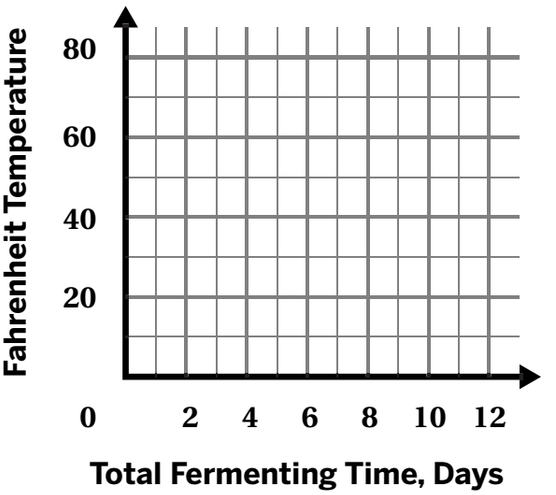
Problems 4–7: Bethany is making kimchi, a tangy cabbage dish, with her grandmother. The directions for making kimchi are:

- Ferment the cabbage for the first 3 days at a temperature of $70°F$
- Store the dish at a temperature of $50°$ F for the next 3 days
- Store the dish in a $35°F$ refrigerator for the next 6 days

4. Here is part of the piecewise function, F, and the graph that models this situation. Fill in the missing numbers and symbols.

$$F(t) = \begin{cases} & 0 \leq t \quad 3 \\ 50 & \quad < t \leq 6 \\ 35 & \end{cases}$$

5. Complete the graph to represent this situation.



6. What does $F(9)$ represent in this situation?

7. What is the value of $F(9)$?

Name: ..... Date: ..... Period: .....

Additional Practice 4.13

Problems 1–3: Let $p(n)$ represent the value of term n in this sequence: 3, 8, 13, 18, 23, ... Write the number that makes each equation true.

1. $p(1) =$ .....

2. $p(9-1) =$ .....

3. $p(n) = p(n-1) +$ .....

4. Match each sequence with one of the definitions.

Sequence		Definition
a. 2, 6, 18, 54, ...	.....	$f(1) = 2$ $f(n) = f(n-1) + 15$
b. 2, 17, 32, 47, ...	.....	$f(1) = 2$ $f(n) = \frac{3}{2} \cdot f(n-1)$
c. $2, 3, \frac{9}{2}, \frac{27}{4}, \ldots$	.....	$f(1) = 2$ $f(n) = 3 \cdot f(n-1)$

Problems 5–6: Write the first four terms of each sequence.

5. $a(1) = \frac{1}{4}$
$a(n) = 2 \cdot a(n-1)$

....., ..., ..., ...

6. $c(1) = \frac{1}{4}$
$c(n) = c(n-1) + 2$

....., ..., ..., ...

Problems 7–8: Here are the first five terms of some sequences. Write a recursive definition for each one.

7. 30, 25, 20, 15, 10

$f(1) = 30$
$f(n) = f(n-1) - 5$

8. 4, 12, 36, 108, 324

$g(1) = 4$
$g(n) = 3 \cdot g(n-1)$

Name: ..... Date: ..... Period: .....

9. An arithmetic sequence $a(n)$ and geometric sequence $g(n)$ both have the same first and third term. Determine a recursive definition for each.

Arithmetic Sequence **Geometric Sequence**

10. Write a recursive definition that will make the values of the table shown.

$f(1) =$ .....

$f(n) =$ .....

Terms, n	Value
1	500
2	250
3	125
4	62.5
5	31.25

Name: _____ Date: _____ Period: _____

Additional Practice 4.14

1. Match each sequence with one of the definitions.

	Sequence	Definition	
a.	5, 8, 11, 14, 17, ...	_____	$f(n) = 3n - 2$
b.	6, 12, 24, 48, 96, ...	_____	$f(n) = 3 \cdot 2n$
c.	1, 4, 7, 10, 13, ...	_____	$f(n) = 3n + 2$

Problems 2–7: Fill in the blank and write an explicit definition to make each sequence arithmetic or geometric.

2. $m =$ _____, 5, 9, ...

$m(n) =$ _____

3. $p = 12,$ _____, 3, ...

$p(n) =$ _____

4. $r = 4, 16,$ _____

$r(n) =$ _____

5.

Term n,	$g(n)$
1	90
2	
3	10

$g(n) =$ _____

6.

Term n,	$f(n)$
1	
2	20
3	26

$f(n) =$ _____

7.

Term n,	$h(n)$
1	25
2	20
3	

$h(n) =$ _____

Name: ..... Date: ..... Period: .....

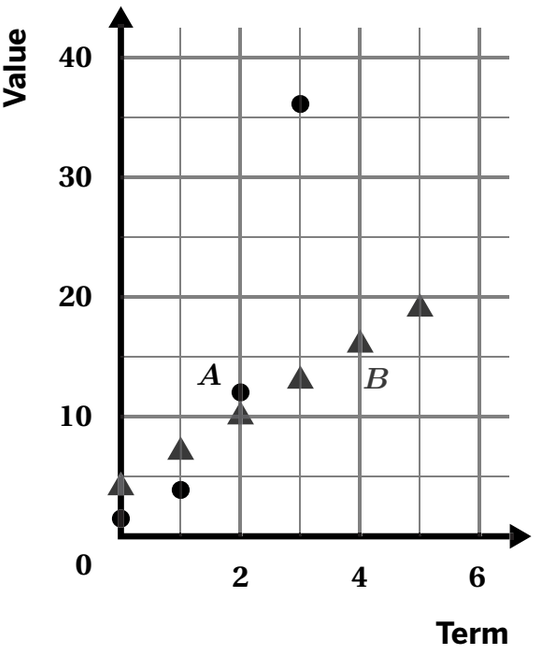
Problems 8–9: Write an explicit formula for each graphed sequence.

8. Sequence A

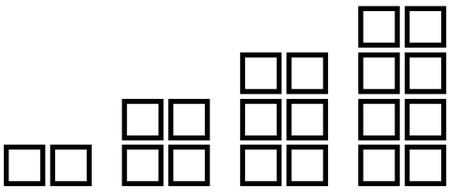
$A(n) =$ .....

9. Sequence B

$B(n) =$ .....



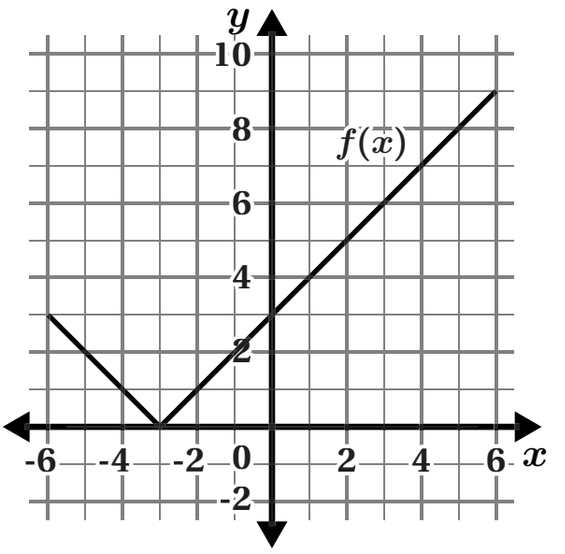
10. Write the recursive and explicit formula for the tile pattern below.

Sequence	Recursive Definition	Explicit Definition
Figure 1 **Figure 2** **Figure 3** **Figure 4** 	$t(1) =$ ..... $t(n) =$	$t(n) =$ .....

Name: ..... Date: ..... Period: .....

Additional Practice 4.15

Problems 1–3: Use the graph of $f(x)$ to determine each value.



1. $f(0) =$ .....
2. $f(2) =$ .....
3. $f(-3) =$ .....

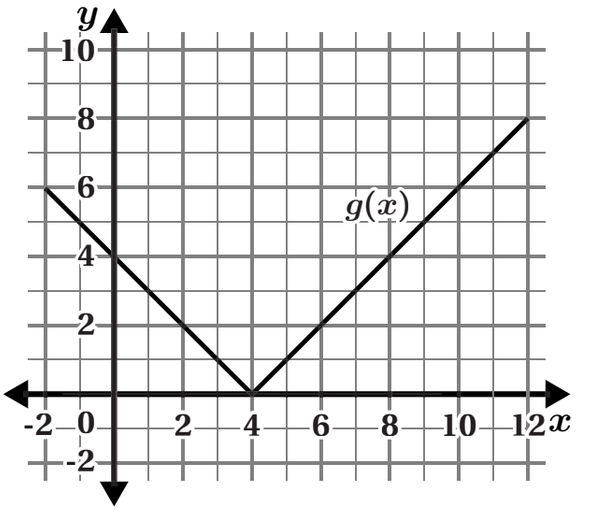
4. Which equation represents the graph of $g(x)$? Circle your choice.

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

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

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

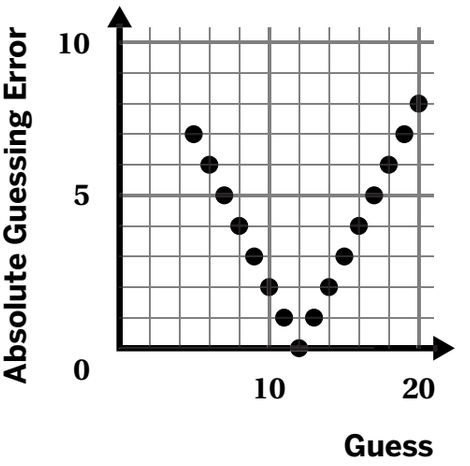
   D. $g(x) = |x| + 4$



Name: ..... Date: ..... Period: .....

5. A group of 8 friends played a number guessing game. They were asked to select a number between 1 and 15.
The graph shows the guesses made by each of the 8 friends.
The actual number was 11.

Which is the greatest absolute guessing error?

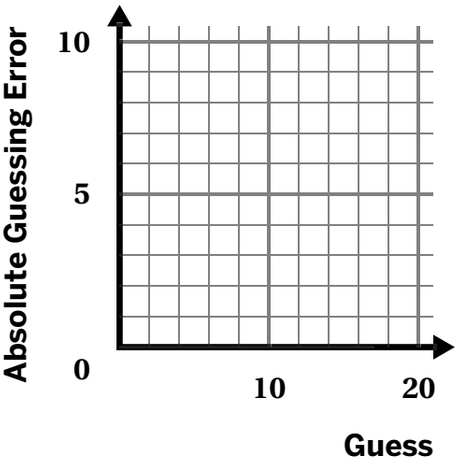


Problems 6–8: A group of 10 friends played a number guessing game. They were asked to select a number between 1 and 20. The person closest to the target number wins. The table below shows the guesses made by each of the 10 friends.

6. The actual number was 8. Complete the table with the absolute guessing errors.

Guess	15	3	10	14	16	12	1	7	6	11
Absolute Guessing Error										

7. Graph each guess, x, and its corresponding absolute guessing error, $g(x)$ on the coordinate plane.



8. Nadine writes $g(20) = 12$.

What does her equation mean?

Name: Date: Period:

Additional Practice 4.16

Problems 1–3: Write each expression as a single integer.

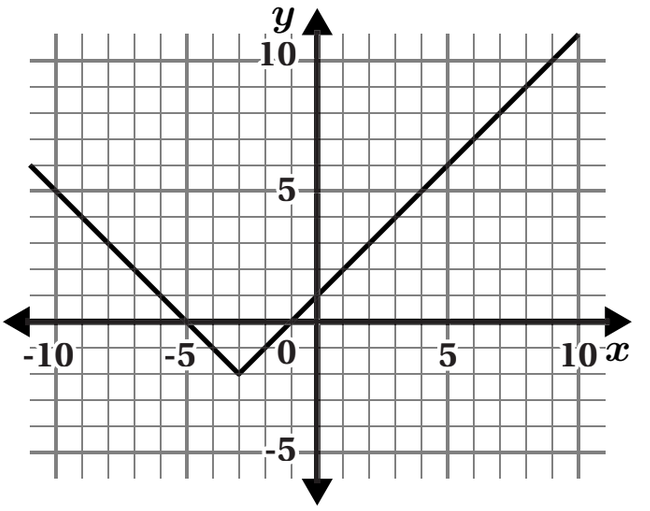
1. $|-5|$

2. $|12| - 4$

3. $|-6| + 3$

4. Graph $f(x) = |x + 3| - 2$. Use the table if it helps your thinking.

x	$f(x)$
-5	
-3	
0	

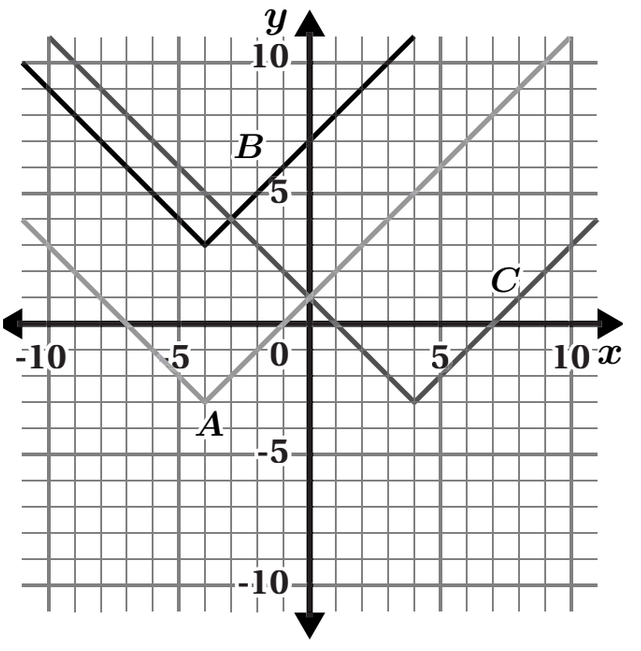


5. Match each function with its graph.

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

$f(x) = |x + 4| + 3$

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

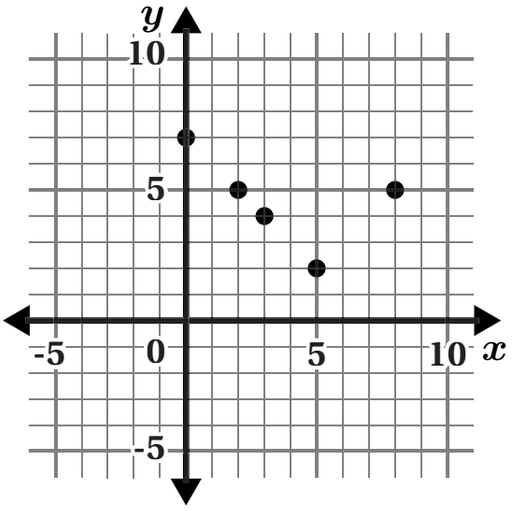


Name: ..... Date: ..... Period: .....

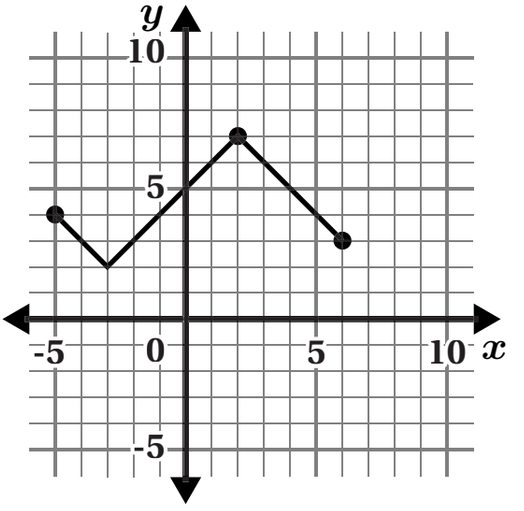
6. Here are some points on the graph of $g(x) = |x - 5| + 2$.

- Sketch a graph of $g(x)$.
- Describe the graph using some of these terms:

positive	maximum	increasing	domain
negative	minimum	decreasing	range
symmetry	piecewise-defined function		



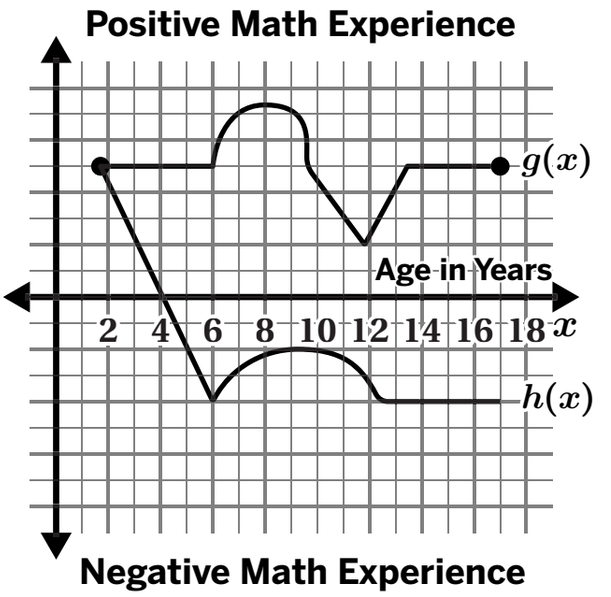
7. Determine two different piecewise-defined functions that could represent this graph.



Name: Date: Period:

Additional Practice 4.17

Problems 1–5: Tomas and Alexandria are friends. This graph represents their experiences with using math over the years. $g(x)$ represents Tomas' math experience as a function of age and $h(x)$ represents Alexandria's math experience as a function of age.



1. What does $g(16) > g(12)$ say about Tomas' math experience?

2. What does $h(6) = h(14)$ say about Alexandria's math experience?

3. True or false: The domain for Tomas' graph is the same as the domain for Alexandria's graph.

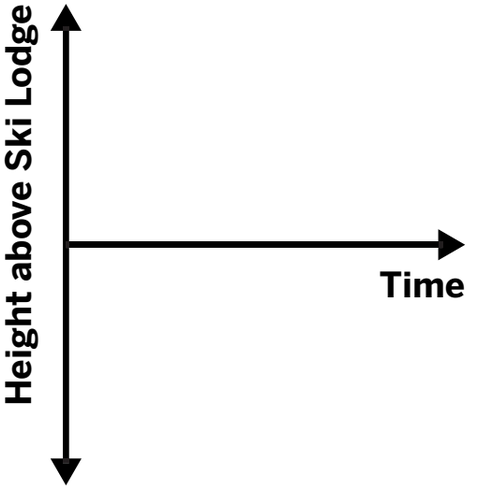
4. True or false: The range for Tomas' graph is the same as the range for Alexandria's graph.

5. Who had a greater average rate of change between ages 2 and 16: Tomas or Alexandria? Explain how you know.

Name: ..... Date: ..... Period: .....

6. Sketch a graph to represent this scenario:

Georgia went skiing on a mountain at a ski resort. When she first arrived at the ski lodge entrance, she walked to the ski lift, which was a few feet higher than the ski lodge. At the ski lift, she quickly went up to the top of the mountain. Once she was at the top of the mountain, she skied at a moderate pace down to the bottom. Once she was at the bottom of the mountain, she walked back down to the ski lodge.



Name: ..... Date: ..... Period: .....

Additional Practice 4.18

1. The graph of function $k(x)$ passes through the point at $(-9, 4)$. The graph of the inverse of $k(x)$ must pass through which of the following points?

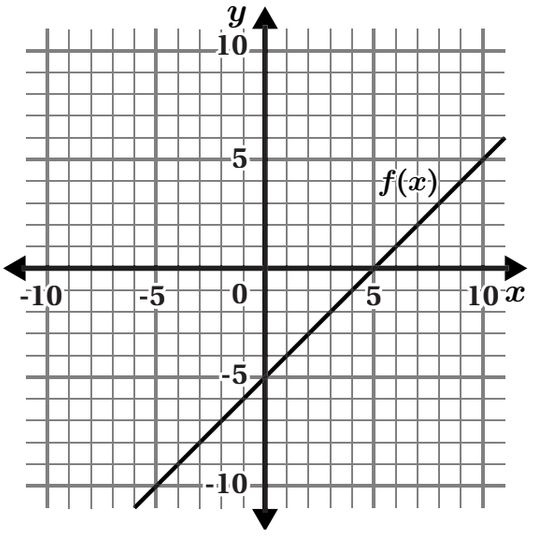
A. $(-9, 4)$

B. $(9, -4)$

C. $(4, -9)$

D. $(-4, 9)$

2. Use the graph of $f(x) = x - 5$ to determine the equation for the inverse function.



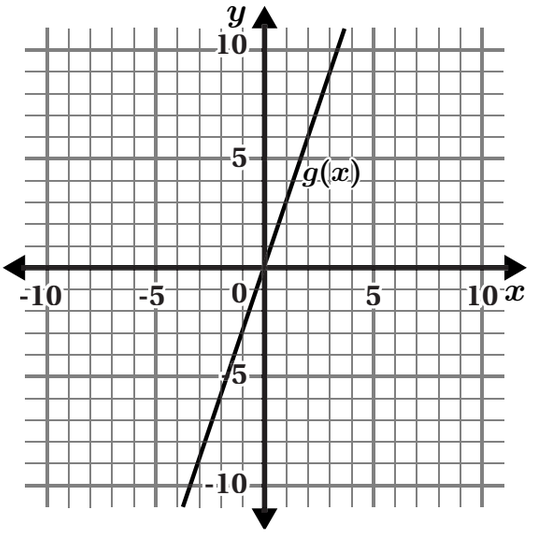
A. $a(x) = -5x$

B. $b(x) = x + 5$

C. $c(x) = -x + 5$

D. $d(x) = 5 - x$

3. Use the graph of $g(x) = 3x$ to determine the equation for the inverse function.



A. $a(x) = -3x$

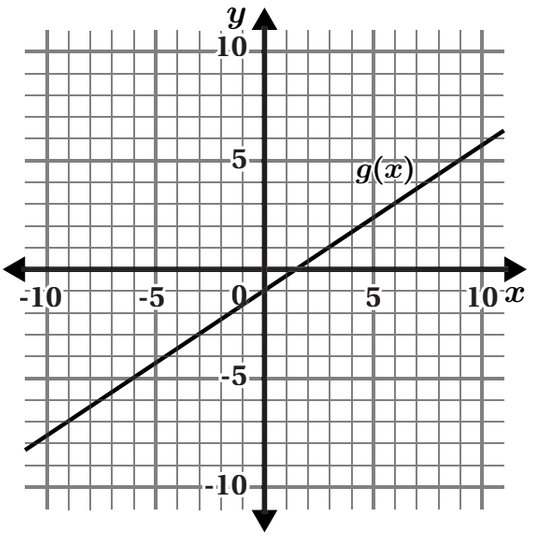
B. $b(x) = x - 3$

C. $c(x) = -x + 3$

D. $d(x) = \frac{1}{3}x$

Name: Date: Period:

Problems 4–6: Here is the graph of $g(x) = \frac{2}{3}x - 1$.



4. List two points that the inverse function $n(x)$ will pass through.

5. Write an equation for the inverse function $n(x)$.

6. Which of the functions will pass through point $(-3, -3)$? Circle your choice.

$g(x)$ $n(x)$ Both Neither

Explain your reasoning.

7. Kendra attempts to determine the inverse of the function $h(x) = -4x + 12$. She graphs the inverse of $h(x)$ and determines the graph of the inverse is a line with a slope of 4 and a vertical intercept of -12, because the inverse is found by reversing the operations of the original function. Do you agree? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 4.19

1. Functions $f(x)$ and $g(x)$ are inverses. If $f(-8) = 7$, what is the value if $g(7)$?

Explain your thinking.

2. Match each function with its inverse.

	Function	Inverse	
a.	$a(x) = 2x$	.....	$f(x) = x - 4$
b.	$b(x) = x + 4$	.....	$g(x) = \frac{x}{2}$
c.	$c(x) = x - 4$	.....	$h(x) = \frac{x}{2} + 2$
d.	$d(x) = 2x - 4$	.....	$j(x) = \frac{x}{3} + 2$
e.	$e(x) = 3x - 6$	.....	$k(x) = x + 4$

Problems 3–5: Write the inverse for each function. Show your thinking.

3. $f(x) = \frac{(x + 5)}{3}$ $g(x) =$

4. $f(x) = 18 + 3x$ $g(x) =$

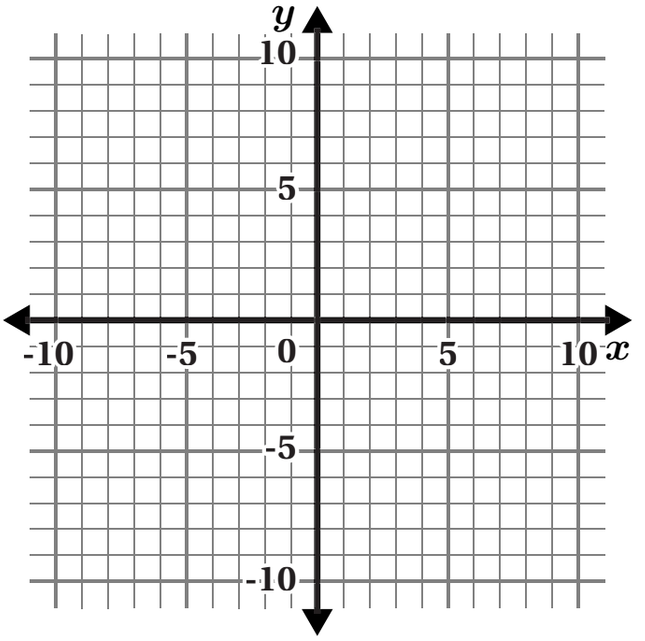
5. $f(x) = \frac{x}{4} + 5.6$ $g(x) =$

Name: ..... Date: ..... Period: .....

Problems 6–7: Consider the function $h(x) = -2x + 10$ and its inverse $g(x)$.

6. Write the inverse of $h(x)$. Show your thinking.

7. Verify $h(x)$ and $g(x)$ are inverses by graphing them on the same coordinate plane.



Algebra 1 | Unit 5

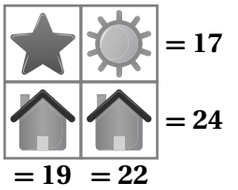
Additional Practice

Practice Problems

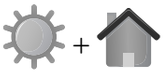
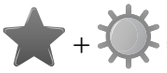
Name: ..... Date: ..... Period: .....

Additional Practice 5.01

Problems 1–2: Here is a shape puzzle. The sum of each row and column is shown.

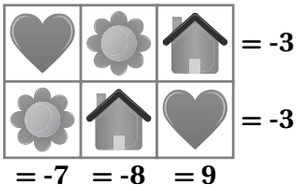


1. Select *all* the true statements.

- ☐ **A.**  $= 22$
- ☐ **B.**  $= 14$
- ☐ **C.**  $= 15$
- ☐ **D.**  $= 12$
- ☐ **E.**  $= 19$

2. Show or explain why this statement is *false*:  $= 8$

Problems 3–4: Here is a shape puzzle.



3. Determine the solution for this puzzle.

Shape	Value
Heart	
Flower	
House	

4. Explain or show your thinking.

Name: ..... Date: ..... Period: .....

Problems 5–6: Use these two equations:

$$x + y + y = 25$$

$$x + x + y = 20$$

5. Draw a shape puzzle to represent these equations.

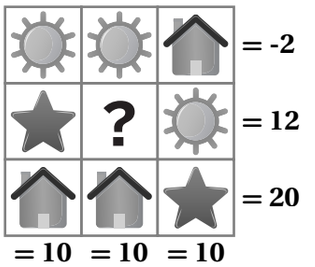
6. Determine the values of x and y.

$x =$ ..... $y =$ .....

Problems 7–9: Here is a shape puzzle.

7. Determine the missing shape in the center of this puzzle. Circle your choice.

Sun Star House



8. Show or explain your thinking.

9. If the missing shape has a value of 8, what are the values of the other two shapes?

Name: ..... Date: ..... Period: .....

Additional Practice 5.02

1. Solve this system of equations. Use the shape puzzle if it helps with your thinking.

$$2x + y = 13$$
$$x + y = 10$$

$x =$ ..... $y =$ .....

2. Which equation is the result of adding these two equations?

$$-3x + 2y = 1$$
$$3x + 5y = -15$$

A. $7y = -14$

B. $7y = 16$

C. $-6x + 7y = 16$

D. $6x + 7y = -14$

3. Which system(s) of equations is most efficiently solved using elimination by addition?

A. $-x + 4y = 5$
$4x - y = 12$

B. $-4x + 3y = -16$
$-2x + 3y = 12$

C. $5x - y = 7$
$5x - 2y = 14$

D. $-6x + 2y = 12$
$6x + 7y = 3$

4. Which ordered pair is the solution to this system of equations?

$$-2x + y = 11$$
$$2x - 3y = -25$$

A. $(-3, 8)$

B. $(-2, 7)$

C. $(2, -7)$

D. $(4, 7)$

Name: ..... Date: ..... Period: .....

Problems 5–8: Determine the solution for each system of equations. Show your thinking.

5. $4x - 7y = -3$
$4x + 7y = 67$

$x =$ ..... $y =$ .....

6. $5x - y = 4$
$-5x + 3y = -3$

$x =$ ..... $y =$ .....

7. $-x + 8y = 18$
$-3x + 8y = 6$

$x =$ ..... $y =$ .....

8. $5x - 3y = -26$
$5x + 4y = -12$

$x =$ ..... $y =$ .....

Name: Date: Period:

Additional Practice 5.03

1. Select *all* expressions that are equivalent to $2x - 9y = -5$.

- ☐ **A.** $-2x + 9y = 5$
- ☐ **B.** $4x + 18y = 10$
- ☐ **C.** $-6x + 27y = 15$
- ☐ **D.** $6x + 27y = -15$
- ☐ **E.** $4x - 18y = -10$

2. Diondre and Gia are solving this system of equations.They disagree about what the first step should be to eliminate a variable.

$$5x - 3y = -13$$
$$-10x + y = -21$$

Diondre's strategy: Multiply $5x - 3y = -13$ by -2 and then add the equations.

Gia's strategy: Multiply $-10x + y = -21$ by 3 and then add the equations.

Whose strategy will eliminate a variable once the equations are added?
Circle your choice.

A. Diondre's **B.** Gia's **C.** Both **D.** Neither

Explain your thinking.

3. Select *all* of the following equations that would result from multiplying one of the equations by a constant term and then adding them together.

$$6x - 4y = 40$$
$$-2x + 12y = 8$$

- ☐ **A.** $4x + 8y = 48$
- ☐ **B.** $20x = 112$
- ☐ **C.** $16x = 128$
- ☐ **D.** $12y = 24$
- ☐ **E.** $20y = 56$

Name: ..... Date: ..... Period: .....

Problems 4–5: Determine the solution for each system of equations. Show your thinking.

4. $-2x + 9y = 24$
$8x - 3y = -30$

5. $-x + 4y = -30$
$3x - 2y = 20$

$x =$ ..... $y =$ .....

$x =$ ..... $y =$ .....

6. Solve the system of equations using the methods below.

$$-x + 6y = 21$$
$$4x - y = 31$$

Eliminate the x *-term* first.

Eliminate the y *-term* first.

$-x + 6y = 21$

The solution is (....., ...).

The solution is (....., ...).

Name: ..... Date: ..... Period: .....

Additional Practice 5.04

1. Identify the solution to this system of equations.

$$\begin{cases} y = x + 5 \\ y = -x + 9 \end{cases}$$

A. $(-2, 3)$

B. $(0, 9)$

C. $(2, 7)$

D. $(4, 5)$

2. Identify the solution to this system of equations.

$$\begin{cases} x - y = -6 \\ -3x - 2y = 8 \end{cases}$$

A. $(-4, 2)$

B. $(-3, 3)$

C. $(-1, 5)$

D. $(4, -2)$

3. Solve each system of equations. Show your thinking.

a $\begin{cases} 3x - 2y = -13 \\ y = 5 \end{cases}$

b $\begin{cases} y = -4x + 12 \\ 6x + 5y = 11 \end{cases}$

4. Which system of equations is most efficiently solved by substitution? Explain or show your thinking.

System A	System B
$\begin{cases} 2x - 3y = 9 \\ 5x - 4y = 11 \end{cases}$	$\begin{cases} y = 4x - 3 \\ -3x + y = 7 \end{cases}$

Name: ..... Date: ..... Period: .....

5. Solve each system of equations. Show your thinking.

a $\begin{cases} 3x - 5y = 18 \\ 3x = 4y + 15 \end{cases}$

b $\begin{cases} 4x + 2y = 21 \\ 2y = 25 - 5x \end{cases}$

6. Match each system of equations with its solution.

System of equations	Solution
a. $\begin{cases} 3f - 2g = 11 \\ g = 3f - 13 \end{cases}$	..... $(5, 2)$
b. $\begin{cases} m + 8n = -1 \\ 2m - 6n = -13 \end{cases}$	..... $\left(2, -\frac{2}{3}\right)$
c. $\begin{cases} 4s = -12t \\ 10 + 6t = 3s \end{cases}$	..... $\left(-5, \frac{1}{2}\right)$

7. Bard is solving this system of equations: $\begin{cases} -3x + 2y = 16 \\ 5x - 3y = -18 \end{cases}$

Bard begins by rearranging the first equation to isolate the y variable: $y = 8 + 1.5x$. Then Bard substitutes the expression $8 + 1.5x$ for y in the second equation, as shown:

$$\begin{aligned} 5x - 3(8 + 1.5x) &= -18 \\ 5x - 24 - 4.5x &= -18 \\ 0.5x - 24 &= -18 \\ 0.5x &= -42 \\ x &= -84 \end{aligned}$$

$$\begin{aligned} y &= 8 + 1.5x \\ y &= 8 + 1.5(-84) \\ y &= -118 \end{aligned}$$

a Does Bard's solution of $(-84, -118)$ make both equations in the system true? Explain your thinking.

b If your answer to part a was "no," find and explain Bard's mistake. If your answer was "yes," graph the equations to verify the solution to the system.

Name: ..... Date: ..... Period: .....

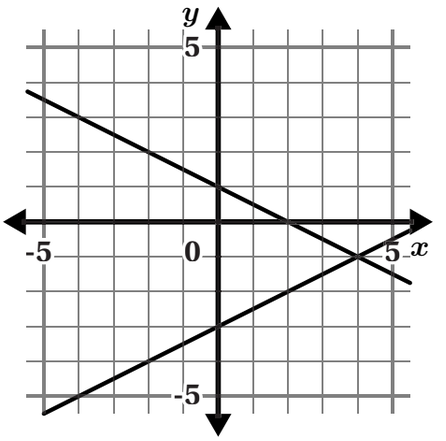
Additional Practice 5.05

1. Select *all* of the equations that have $(2, 1)$ as a solution.

- ☐ **A.** $y = -x + 4$
- ☐ **B.** $y = -2x + 3$
- ☐ **C.** $y = \frac{1}{2}x - \frac{1}{2}$
- ☐ **D.** $y = x - 1$
- ☐ **E.** $y = 3x - 5$

2. The graph represent the system of equations:

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



Which is the solution to the system of equations?

A. $(0, -3)$

B. $(0, 1)$

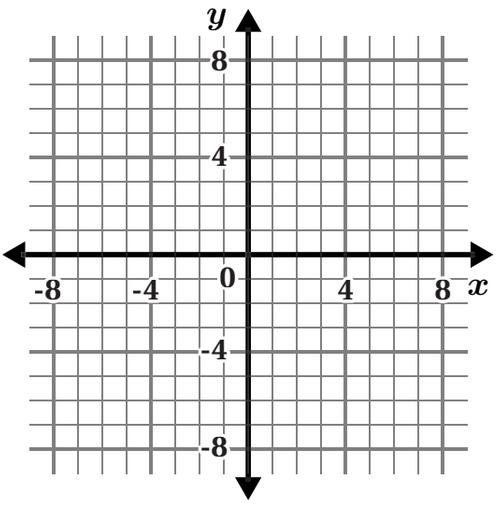
C. $(2, 0)$

D. $(4, -1)$

Problems 3–4: Solve this system of equations. Write the solution as a coordinate pair.

3.

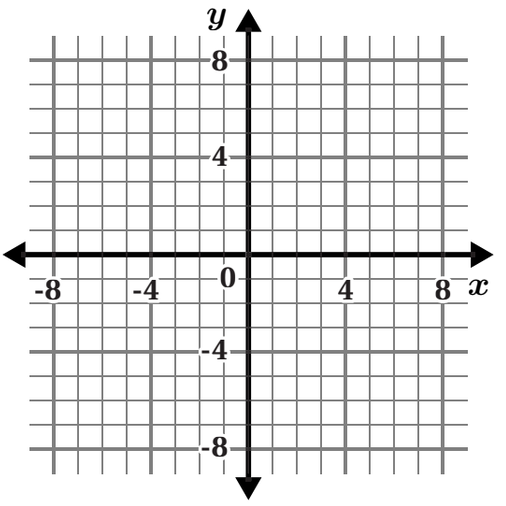
$$y = -3x - 4$$
$$y = \frac{1}{3}x + 5$$



Solution: .....

4.

$$y = 2x - 4$$
$$y = -x + 5$$

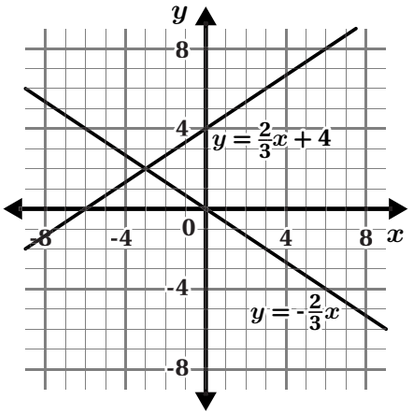


Solution: .....

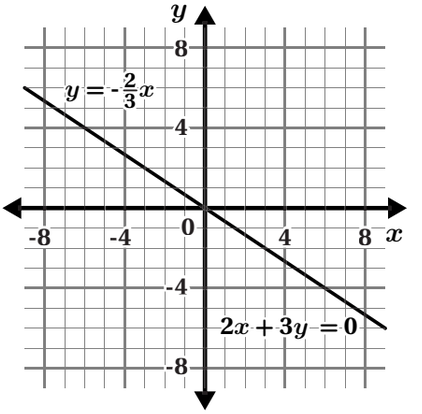
Name: ..... Date: ..... Period: .....

5. Which graph shows a system of equations that has no solutions?

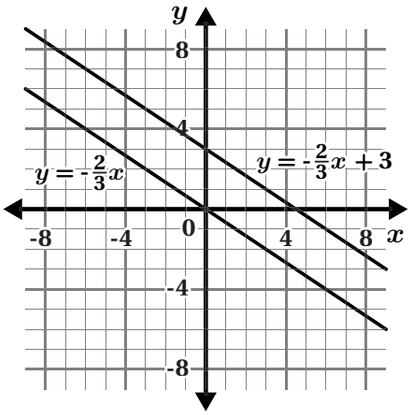
A.



B.



C.



6. Match each system of equations to the number of solutions it has.

Equation	Solution
a. $y = -3x + 4$ $y = 3x + 4$	..... no solutions
b. $3x + y = 4$ $y = -3x - 4$	..... one solution
c. $3x + y = 4$ $y = -3x + 4$	..... infinitely many solutions

7. A system of equations has infinitely many solutions. Select *all* of the statements that must be true about the equations in this system.

- ☐ **A.** The equations have different slopes.
- ☐ **B.** The equations have the same slope.
- ☐ **C.** The equations have different y-intercepts.
- ☐ **D.** The equations have the same y-intercept.

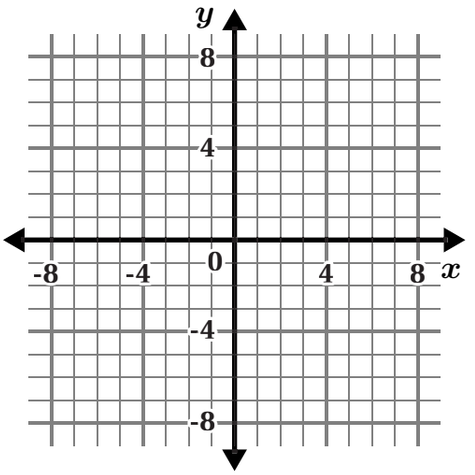
Name: Date: Period:

Additional Practice 5.06

Problems 1–2: Here is a system of equations: $y = -x + 1$

$x - 3y = 9$

1. Graph the systems of equations.



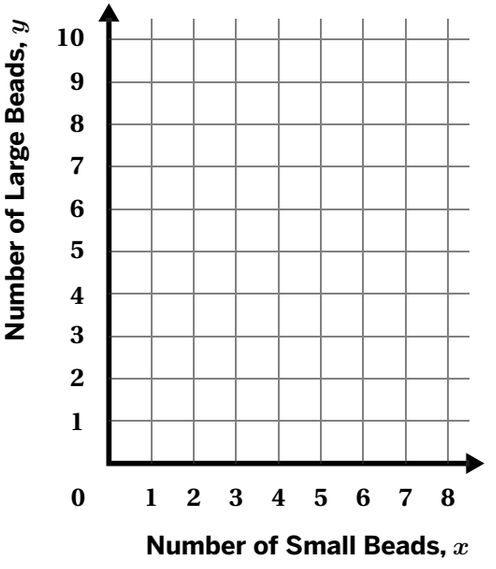
2. Determine the solution to the system of equations.

Problems 3–5: Carla has $\$48$ to purchase some beads for her jewelry project. Small beads, x, cost $\$4$ each and large beads, y, cost $\$6$ each. She needs 10 beads for her project. Carla wrote this system of equations:

$x + y = 10$

$4x + 6y = 48$

3. Graph the systems of equations.



4. Determine the solution to the system of equations.

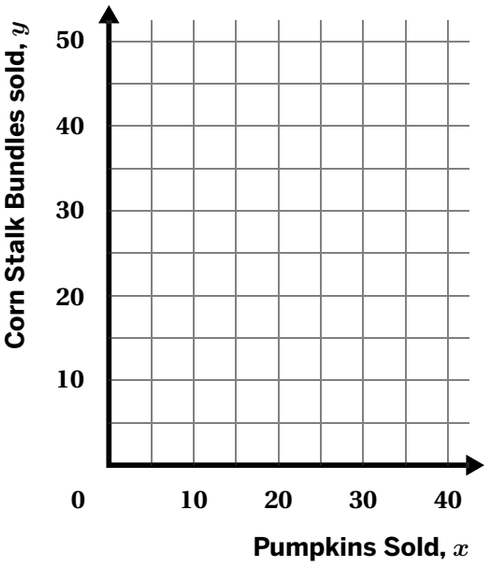
5. What does this solution mean in context?

Name: Date: Period:

Problems 6–7: A pumpkin stand sells pumpkins for $\$5$ each and bundles of corn stalks for $\$8$ each. On Saturday, the stand sold 50 pumpkins and bundles of corn stalks all together, totaling $\$288$. This situation is represented by this system of equations:

$$x + y = 50$$
$$5x + 8y = 295$$

6. Graph the systems of equations.



7. Determine the solution to the system of equations.

8. What does this solution mean in context?

Name: ..... Date: ..... Period: .....

Additional Practice 5.07

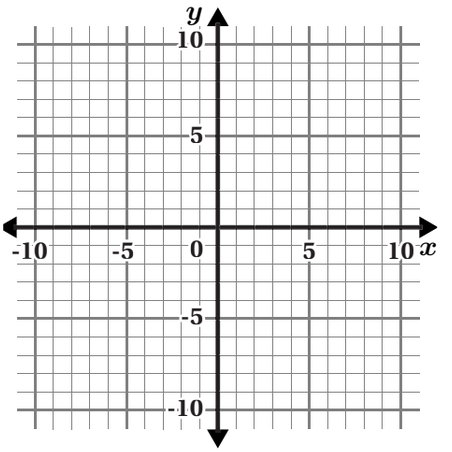
1. Match the system of equations to the situation.

Equation	Solution
a. $x + y = 20$ $x - y = 4$	..... A rectangle has a perimeter of 20 units. The length of the rectangle is 4 units more than the width.
b. $x + y = 20$ $x = 4$	..... The sum of two numbers is 20. The difference between the numbers is 4.
c. $2x + 2y = 20$ $x = y + 4$	..... The sum of two numbers is 20. One of the numbers is 4.

Problems 2–3: Solve these systems. Show your thinking. A graph is provided if it helps with your thinking.

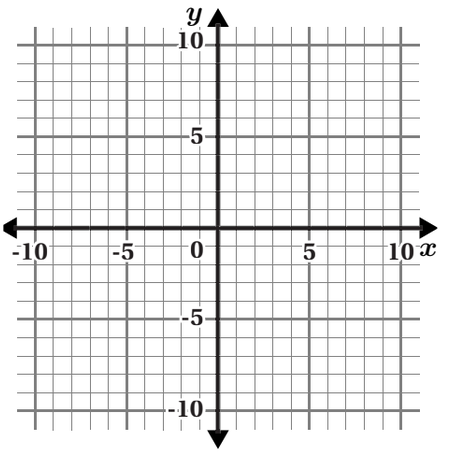
2. $2x + 3y = 24$

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



3. $-3x + 2y = -10$

$-2x + y = -5$



Name: ..... Date: ..... Period: .....

Problems 4–6: Emily is planning a party and needs to seat guests using square and round tables.

- Each square table seats 4 people, and each round table seats 6 people.
- She rents a total of 12 tables and needs to seat 58 guests.
- How many square tables, s, and how many round tables, r, did she rent?

4. Write a system of equations that represents this situation.

5. Solve the system. Show your thinking.

6. Explain the solution in context.

7. Determine values for A and B so that the system has infinitely many solutions.

$$8x + Ay = 36$$
$$Ax + By = 18$$

A: .....

B: .....

Name: ..... Date: ..... Period: .....

Additional Practice 5.08

Problems 1–3: Show or Explain what your *first* step would be to solve each system of equations.

1. $7x - 12y = 20$
$15x + 12y = -9$

2. $y = \frac{1}{2}x - 8$
$y = -\frac{2}{3}x + 6$

3. $5x - 9y = 21$
$x = -6$

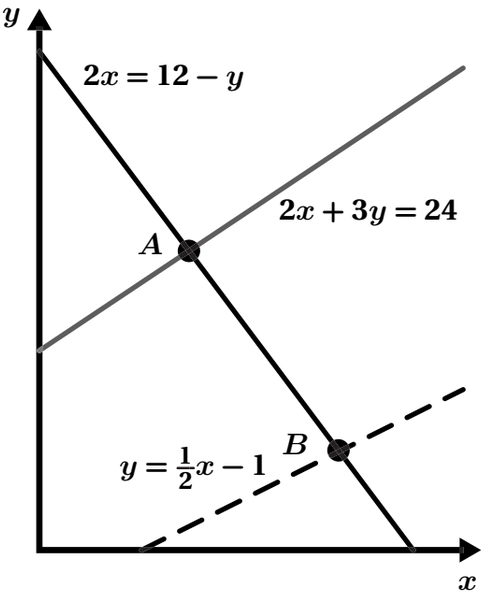
Problems 4–5: Solve each system of equations. Write the solution as a coordinate pair. Show your thinking.

4. $5x - 10y = 40$
$3x + 10y = 8$

5. $8x + 2y = 18$
$x = 2y + 9$

6. Determine the coordinates of points A and B, the intersections of the lines on the graph. Show your thinking.

$A =$ ..... $B =$ .....

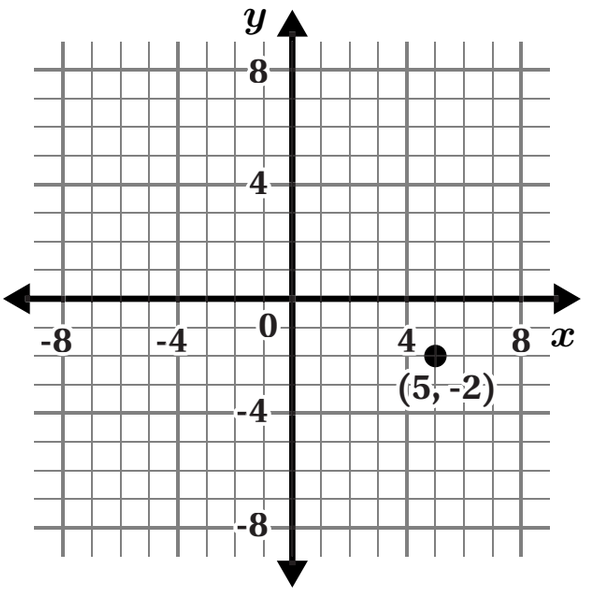


Name: ..... Date: ..... Period: .....

7. Consider the equation $4x - 3y = 12$. Match each description with an equation that would make a system of equations with the given number of solutions. Show your thinking.

Description		Equation
a.	One solution	..... $4x - 3y = 6$
b.	No solution	..... $y = \frac{4}{3}x - 4$
c.	Infinitely many solutions	..... $4x + y = 20$

8. Write a system of equations where $(5, -2)$ is the solution. Use the graph if it helps your thinking. Show your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 5.09

1. A party planner needs at least 18 flower centerpieces for an event. A vase of flowers x costs $\$90$ and a bowl of flowers y costs $\$120$. She wants to have both types of centerpieces for the event, and to spend no more than $\$1{,}800$. Which inequalities represent these constraints? Select *all* that apply.

- ☐ **A.** $x > 0$
- ☐ **B.** $y > 0$
- ☐ **C.** $x + y < 18$
- ☐ **D.** $x + y \geq 18$
- ☐ **E.** $90x + 120y < 1800$
- ☐ **F.** $90x + 120y \leq 1800$

Refer to the following information for Problems 2 and 3.

Festival organizers are planning to grill at least 270 veggie burgers and turkey burgers during the festival. Veggie burgers are sold in packages of 10 and turkey burgers are sold in packages of 18. Organizers have a budget of $\$330$ for these two items. The following system of inequalities represents these constraints.

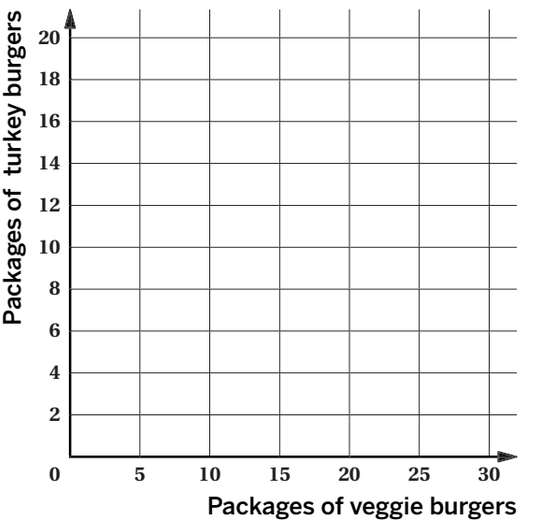
$$\begin{cases} 10x + 18y \geq 270 \\ 11x + 23y \leq 330 \end{cases}$$

2. What does the second inequality in the system tell you about the situation?

- **A.** Veggie burgers cost $\$11$ per package and turkey burgers cost $\$23$ per package.
- **B.** Veggie burgers cost $\$23$ per package and turkey burgers cost $\$11$ per package.
- **C.** Organizers are buying 11 packages of veggie burgers and 23 packages of turkey burgers.
- **D.** Organizers are buying 23 packages of veggie burgers and 11 packages of turkey burgers.

3. Refer to Problem 2.

a Graph the solution set to the system of inequalities.



b Which of the following combinations of veggie burgers and turkey burgers could the organizers buy?

- **A.** 0 veggie burgers, 15 turkey burgers
- **B.** 10 veggie burgers, 12 turkey burgers
- **C.** 15 veggie burgers, 8 turkey burgers
- **D.** 25 veggie burgers, 2 turkey burgers

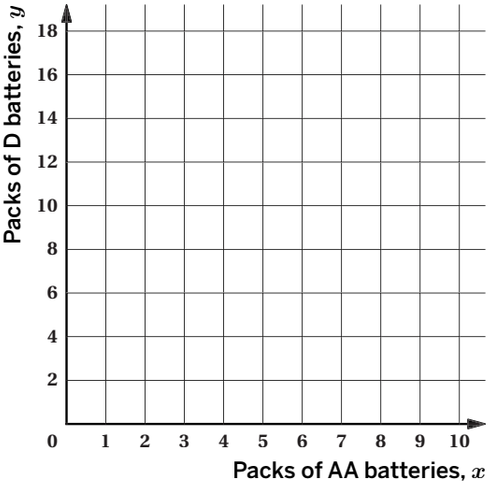
Name: Date: Period:

4. Andre needs to buy batteries for his business. AA batteries come in packs of 24 and cost $\$15$ per pack. D batteries come in packs of 12 and cost $\$15$ per pack. Andre wants to buy at least 180 batteries and spend no more than $\$150$.

a Create a system of inequalities that describes the constraints in this situation. Let x represent the number of packages AA batteries and let y represent the number of packages D batteries.

b Graph the solution set to the system of inequalities.

c Is $(7, 2)$ a solution? If yes, explain what it means. If no, explain why it is not a solution.



5. A dog groomer charges $\$24$ to give a small dog a bath and $\$30$ to give a large dog a bath. A bath takes 30 minutes for a small dog and 1.25 hours for a large dog. The groomer works up to 6 hours each day, and she needs to earn at least $\$180$ a day.

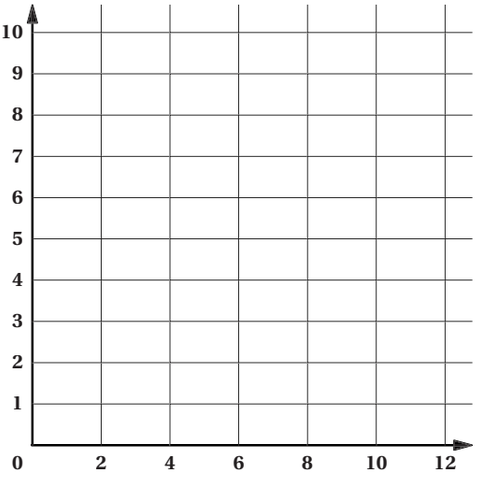
a Create a system of inequalities that describes the constraints in this situation, where x represents the number of small dog baths that she gives and y represents the number of large dog baths that she gives.

b Graph the inequalities and show the solution set.

c Identify which of the following points meets the groomer's requirements. Explain your thinking.

A. $(4, 4)$ **B.** $(6, 2)$

C. $(7, 3)$ **D.** $(9, 2)$



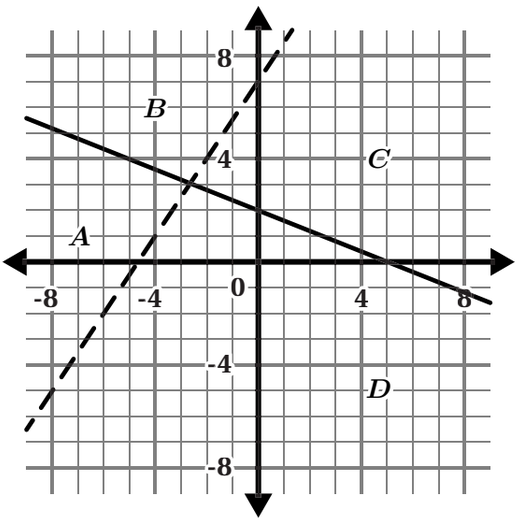
d Identify which point is a solution to the system but is not possible or not likely in the situation: $(4, 3)$, $(7, 1)$, or $(8, 1.5)$. Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 5.10

Problems 1–4: Here is the graph of a system of inequalities.

$$2x + 5y \leq 10$$
$$2y > 3x + 14$$



1. Complete the graph of the inequalities by shading in the solution region.

2. Which letter represents the solution region to the system of inequalities? Circle one:

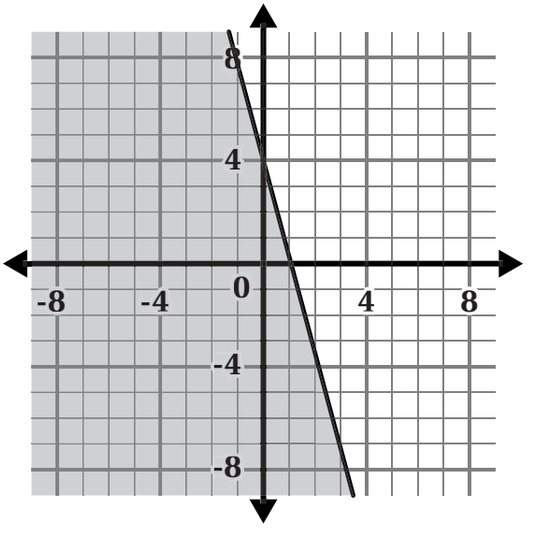
A ***B*** ***C*** ***D***

3. Is the point $(4, -5)$ a solution to this system? Circle one:

Yes No

Problems 4–6: Taryn graphed the first inequality and the boundary line of the second inequality.

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



4. Complete the graph of the second inequality.

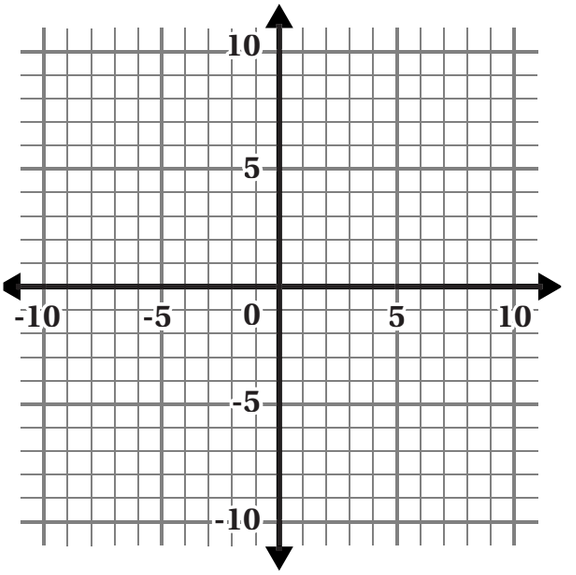
5. Explain how you knew where to shade the second inequality.

6. Is $(0, -3)$ a solution to this system? Explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 7–8: A coordinate plane is provided.

7. Make a graph of a system of inequalities that has no solutions.



8. Explain how you know it has no solution.

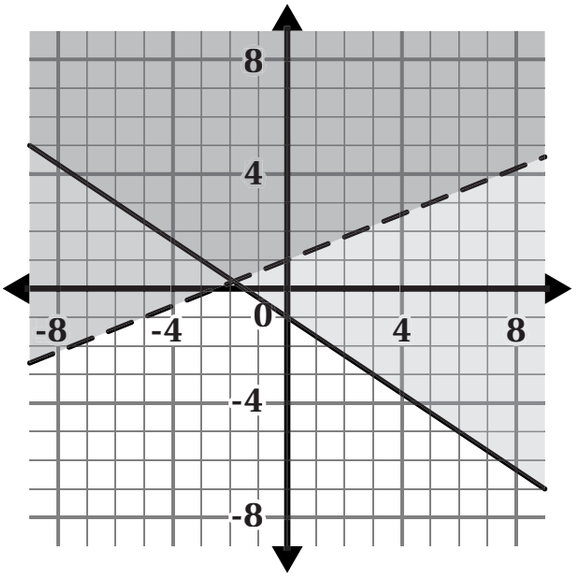
Problems 9–10: Randall graphed the boundary lines of this system of inequalities:

9. Complete the graph of the system of inequalities.

$$y > \frac{2}{5}x + 1$$

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

10. Identify a coordinate pair that is in the solution region.



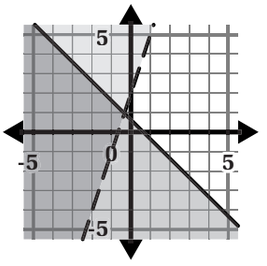
Name: Date: Period:

Additional Practice 5.11

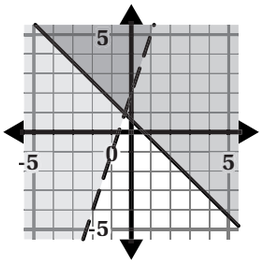
1. Which graph matches the system of inequalities?

$$-3x + y > 2$$
$$x + y \leq 1$$

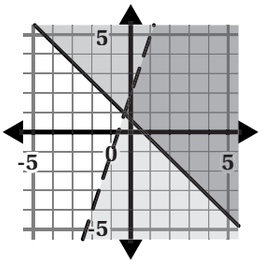
A.



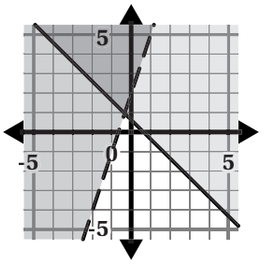
B.



C.

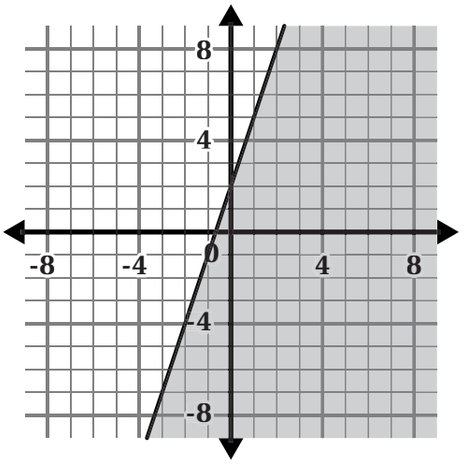


D.



Problems 2–4: The first inequality of this system of inequalities is graphed below.

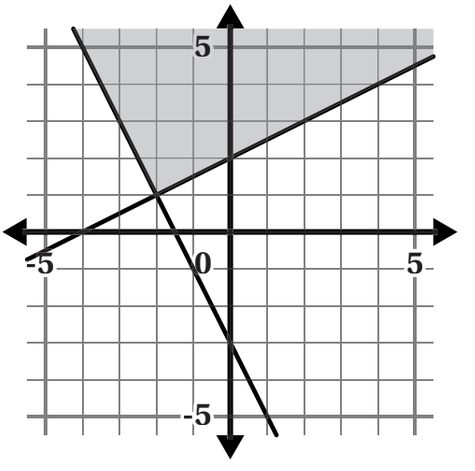
$$-3x + y \geq -2$$
$$2x + y < -2$$



2. Graph the second inequality.

3. Write a point that is *not* a solution to this system.

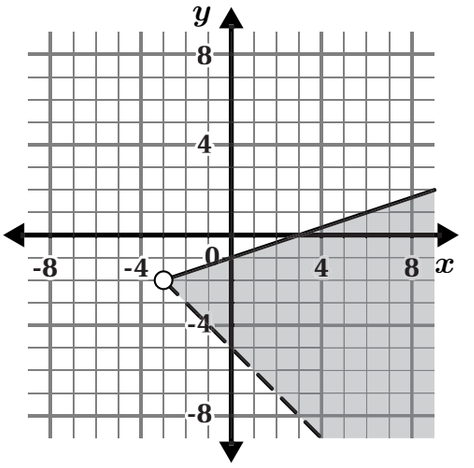
4. Write a point that is a solution to this system.



5. Write a system of inequalities to represent this graph.

Name: ..... Date: ..... Period: .....

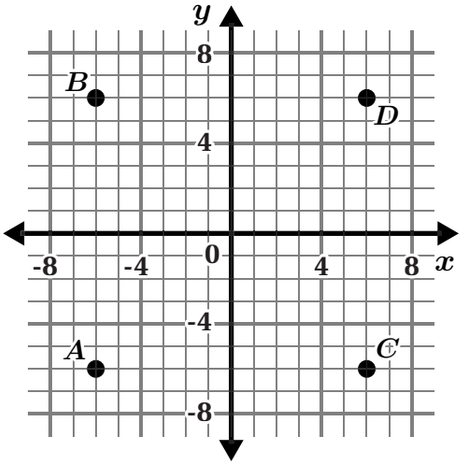
6. Here is the graph of a solution region. Write a system of inequalities that has this solution region.



Problems 7–8. Points on a coordinate plane are given.

7. Write two inequalities such that all of the following statements are true:

- A is a solution to only one inequality.
- B is a solution to both inequalities.
- C is not a solution to either inequality.
- D is a solution to only the other inequality.



8. Graph your inequalities and solution region.

Name: Date: Period:

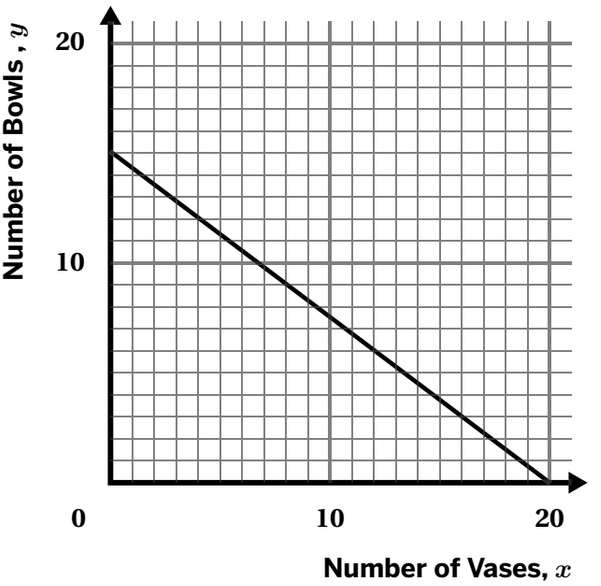
Additional Practice 5.12

Problems 1–4: A party planner needs at least 12 flower centerpieces for an event. A vase of flowers x costs $\$90$ and a bowl of flowers y costs $\$120$. She wants to have both types of centerpieces for the event, and to spend no more than $\$1{,}800$.

1. Which inequalities represent these constraints? Select *all* that apply.

- ☐ **A.** $x + y < 12$
- ☐ **B.** $x + y \geq 12$
- ☐ **C.** $x + y > 12$
- ☐ **D.** $90x + 120y \leq 1800$
- ☐ **E.** $90x + 120y \leq 18$
- ☐ **F.** $90x + 120y \geq 1800$

2. Lelani created a graph using inequalities. What is a combination of vases and bowls of flowers that meets the constraints?



3. What is a combination of vases and bowls of flowers that does *not* meet the constraints?

4. Lelani wants to get the most vases possible while still meeting the constraints. How many vases and bowls should she get?

Explain your thinking.

Name: Date: Period:

Problems 5–7: A teacher plans to buy notebooks and journals for his students. He has $\$60$ to spend and needs to buy a total of at least 30 items. Notebooks cost $\$1.50$ each and journals cost $\$2.40$ each.

- n represents the cost of one notebook
- j represents the cost of one journal

5. Write a system of inequalities to represent the teacher's constraints.

6. Can the teacher buy 18 notebooks and 12 journals?

Circle your choice.

Yes No

Show or Explain your reasoning.

7. The teacher wants to get the most journals possible while still meeting the constraints. How many notebooks and journals should he buy? Show or Explain your thinking.

Show or Explain your reasoning.

Algebra 1 | Unit 6

Additional Practice

Practice Problems

Name: Date: Period:

Additional Practice 6.01

Problems 1–3: Wendy is observing a colony of mice in which its population doubles every week. The table shows the population of mice over time, in weeks.

Time (weeks)	Population
0	?
1	12
2	24
3	48
4	96
...	...
6	?

1. What was the population of the mice at the beginning of the experiment?

2. What will the population of mice be after 6 weeks?

3. Ricardo observed a different colony of mice that he believes populates at a rate slower than Wendy's mice. He wrote this equation: $p = 12 \cdot 1.5^t$. He used p to represent the population of mice in his colony and t for time, in weeks. Explain what the 12 and 1.5 mean in this situation.

4. In the table, x represents the number of minutes and y represents the number of bacteria cells in a sample.

x	0	8	16	24	32	40	48	56
y	4	8	16	32	64	128	256	512

Select *all* the statements that describe the growth.

- ☐ **A.** Every 8 minutes, the number of bacteria cells doubles.
- ☐ **B.** Every 4 minutes, the number of bacteria cells increases by 8.
- ☐ **C.** At the end of the experiment, there are 56 bacteria cells in the sample.
- ☐ **D.** At the beginning of the experiment, there are 4 bacteria cells in the sample.
- ☐ **E.** At the beginning of the experiment, there are 8 bacteria cells in the sample.

Name: ..... Date: ..... Period: .....

Problems 5–7: Caroline has a new toy fish whose mass quadruples every hour when you add water. The fish's weight was initially 2 grams.

5. Select *all* the expressions that represent the weight of Caroline's toy fish, in grams, after 3 hours?

- ☐ **A.** $2 \cdot 4 \cdot 4 \cdot 4$
- ☐ **B.** $2 \cdot 2 \cdot 2$
- ☐ **C.** $2 \cdot 4^3$
- ☐ **D.** $2 + 4 \cdot 4 \cdot 4$
- ☐ **E.** $2 \cdot 3^4$
- ☐ **F.** $2 + 4^3$

6. Complete the table.

Time (hrs)	0	1	2	3	4
Weight (grams)					

Problems 7–8: Dion is reading a book about a zombie apocalypse.The story begins when 10 zombies enter a convention center where people are attending a concert. The total number of infected people is increasing by 25% each minute.

7. Write an equation that represents this situation where n represents the total number of people infected by the zombies and t represents the number of hours that have passed since the apocalypse began.

8. Approximately, how many people will be infected after 4 minutes have passed? Show or explain your thinking.

Name: Date: Period:

Additional Practice 6.02

Problems 1–3: These tables show the number of blue and green globs each day.

Day	0	1	2	3	4
Blue Globs	4	8	16	32	

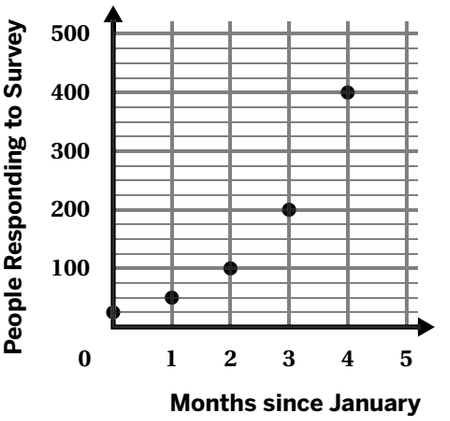
Day	0	1	2	3	4
Green Globs	12	24	36	48	

1. How many of each type of glob will there be on Day 4?

2. Will there be more blue or green globs on day 10? Show or explain your thinking.

3. Which group of globs changes by a constant rate of change? Show or explain how you know.

Problems 4–5: This graph shows the number of people who responded to an online survey about a new neighborhood park since January.



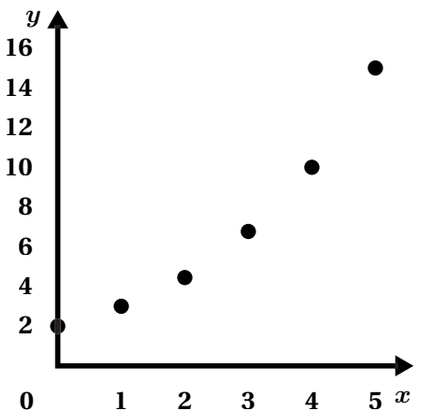
4. How many people completed the survey in January?

5. Does the number of people responding to the survey grow by a constant difference? Show or explain how you know.

Name: ..... Date: ..... Period: .....

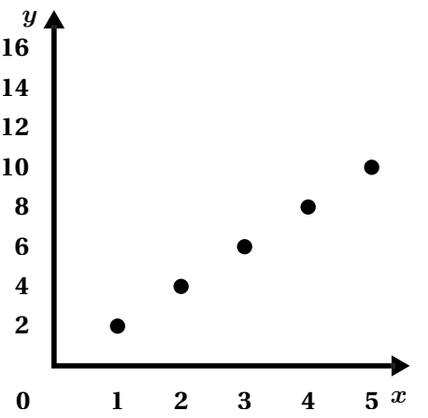
Problems 6–7: Determine whether each graph shows a constant rate of change or a constant growth rate. Circle your choice.

6.



Constant rate of change Constant growth rate

7.



Constant rate of change Constant growth rate

Problems 8–9: Determine whether each table shows a linear or exponential function. Circle your choice.

8.

x	1	2	3	4
y	1	8	15	22

Linear Exponential

9.

x	1	2	3	4
y	9	18	36	72

Linear Exponential

Name: Date: Period:

Additional Practice 6.03

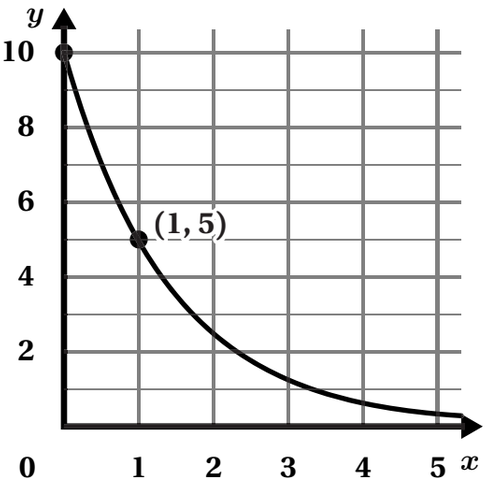
Problems 1–3: Determine the value of each expression when $x = 3$.

1. 4^x

2. $\left(\frac{1}{2}\right)^x$

3. $4\,(2)^x$

4. Here is a graph of $y = 10\left(\frac{1}{2}\right)^x$. Explain where you can see the 10 and the $\frac{1}{2}$ in the graph.

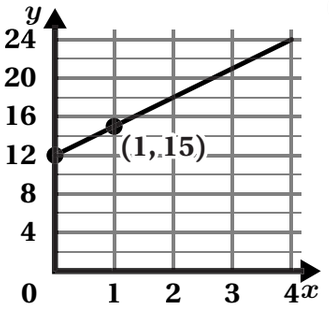


Problems 5–7: Match each equation to the graph that represents it.

Equation A

$y = 12\left(\frac{1}{3}\right)^x$

5.

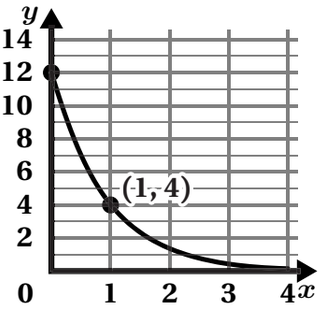


Equation

Equation B

$y = 12(3)^x$

6.

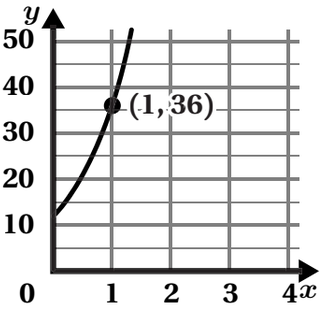


Equation

Equation C

$y = 12 + 3x$

7.



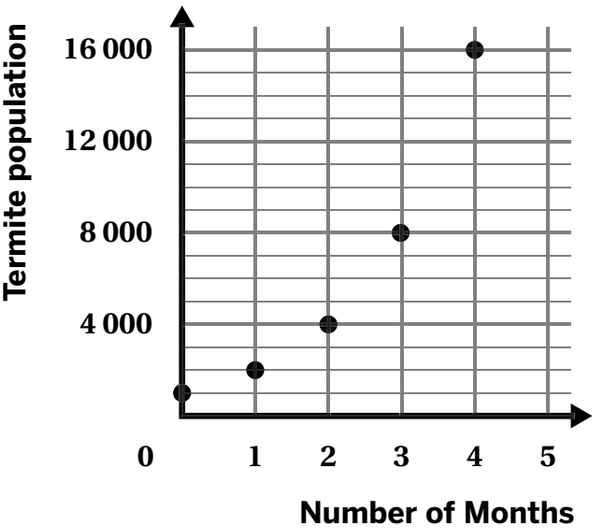
Equation

8. Explain how you determined which equation to match with the graph in Problem 7.

Name: ..... Date: ..... Period: .....

Problems 9–10: The number of termites in a colony is measured each month and the results are plotted on the graph.

9. What was the termite population when it was first measured?



10. What equation represents the termite population, t, for m months after it was first measured?

Name: Date: Period:

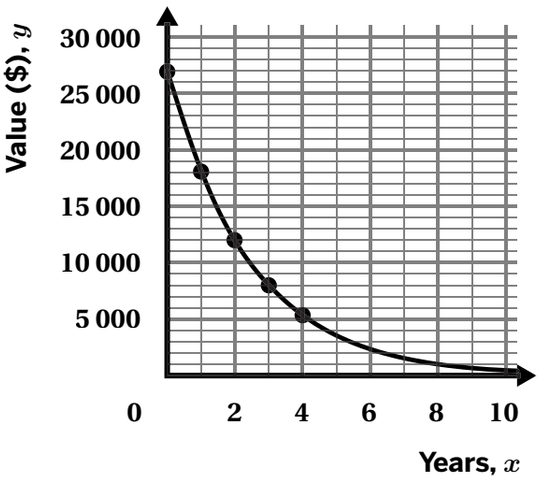
Additional Practice 6.04

Problems 1–3: A pontoon boat costs \$27,000. It loses $\frac{1}{3}$ of its value every year after it is purchased. The equation $p(x) = 27000\left(\frac{2}{3}\right)^x$ models the value of the pontoon boat after x years.

1. Complete the table.

Years, x	Value (\$)
0	27,000
1	18,000
2	
3	
4	

2. Graph the situation.



Problems 3–4: In meiosis, 1 cell divides to produce 4 cells.

3. Complete the table to show the number of cells produced by meiosis from a sample of 9 cells.

Division number, d	0	1	2	3	4
Number of cells, c	9				

4. Write an equation relating the number of cells c to the division number d.

5. There are 32 sq. mm of bacteria in a Petri dish. The bacteria grow exponentially. One hour later, there are 60 sq. mm of bacteria in the Petri dish.

What is the growth factor that models the hourly growth of this bacteria?

Name: Date: Period:

Problems 6–9: Mai shares a meme with 5 friends. The next hour, each friend shares the meme with 5 people. This continues for the next 4 hours.

6. Complete the table to show the number of friends, f, who have seen Mia's meme over h, hours.

Hours, h	0	1	2	3	4
Number of friends, f	1				

7. What is the growth factor of this relationship?

8. Write an equation relating the number of friends, f, who have seen Mia's meme over h, hours.

9. In theory, how many friends would have seen Mia's meme in 8 hours? Show or explain your reasoning.

Name: Date: Period:

Additional Practice 6.05

1. Which equation best models the data in the table?

x	$f(x)$
1	40
2	50
3	62.5
4	78.125

A. $f(x) = 50(1.25)^x$

B. $f(x) = 32 + 1.25$

C. $f(x) = 32(1.25)^x$

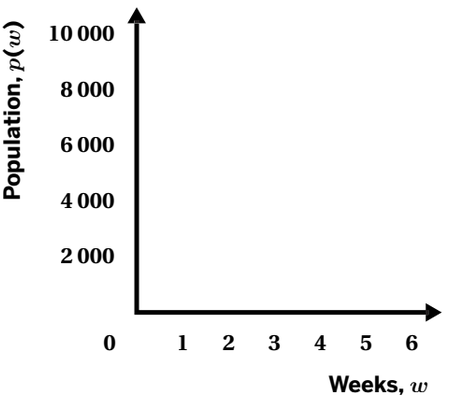
D. $f(x) = 40(1.25)^x$

Problems 2–4: The equation $p(w) = 100 \cdot 3^w$ models the butterfly population, $p(w)$, where w is the number of weeks after the population was first measured.

2. Complete the table.

Weeks, w	Population $p(w)$
0	
1	
2	
3	
4	

3. Graph the situation.



4. Where on the graph do you see the 100 from the equation?

5. Determine the value of $p(-3)$ and explain what it means in this situation.

Name: Date: Period:

Problems 6–8: A walrus population, $p(t)$, is modeled by the equation $p(t) = 300 \cdot \left(\frac{4}{3}\right)^t$ where t is the time, in years, since the population was first measured in 2018.

6. How many walrus were in the population in 2018? Explain your thinking.

7. How many walrus were in the population in 2022? Show or explain your thinking.

8. How many walruses were in the population in 2016? Show or explain your thinking.

Name: Date: Period:

Additional Practice 6.06

Problems 1–2: Here are two functions. $f(x)$ is an exponential function and $g(x)$ is a linear function.

	$f(x) = 3 \cdot 2^x$					
x	0	1	2	3	4	5
$f(x)$	3	6	12	24	48	96

	$g(x) = 3x + 2$					
x	0	1	2	3	4	5
$g(x)$	2	5	8	11	14	17

1. How does $f(x)$ change when x grows by 1?

2. How does $g(x)$ change when x grows by 1?

Problems 3–4: Here is a function $h(x) = 2^x$. Show your thinking.

3. Calculate $\frac{h(x+1)}{h(x)}$.

4. Calculate $\frac{h(x+2)}{h(x)}$.

5. Here is a function: $h(x) = 4x$. Select *all* of the true statements.

- ☐ **A.** When the input x is increased by 1, the value of $h(x)$ increases by 4.
- ☐ **B.** When the input x is increased by 1, the value of $h(x)$ multiplies by 4.
- ☐ **C.** When the input x is increased by 2, the value of $h(x)$ increases by 8.
- ☐ **D.** When the input x is increased by 2, the value of $h(x)$ multiplies by 8.
- ☐ **E.** When the input x is increased by 3, the value of $h(x)$ increases by 12.

Name: ..... Date: ..... Period: .....

6. Whenever the x-value increases by 1, the value of $g(x)$ multiplies by 10. Which of these functions could be $g(x)$?

A. $g(x) = 10x + 6$

B. $g(x) = 10^x$

C. $g(x) = 6x + 10$

D. $g(x) = x^{10}$

7. Whenever the x-value increases by 2, the value of $p(x)$ increases by 10. Which of these functions could be $p(x)$?

A. $p(x) = 10x + 2$

B. $p(x) = 2x + 10$

C. $p(x) = 5^x$

D. $p(x) = 5x$

8. Match each description to its function.

	Equation	Solution
a.	Increases by 12% when x increases by 1.	..... $f(x) = 0.12^x$
b.	Decreases by 88% when x increases by 1.	..... $g(x) = 0.88^x$
c.	Decreases by 12% when x increases by 1.	..... $h(x) = 1.88^x$
d.	Increases by 88% when x increases by 1.	..... $j(x) = 1.12^x$

Name: Date: Period:

Additional Practice 6.07

Problems 1–3: A group of ornithologists were researching the hummingbird population in Ohio over several weeks. There were 500 hummingbirds when they first started keeping track. The population has increased by 20% each week.

1. How many hummingbirds are in Ohio 1 week after the ornithologists first counted? Show or explain your thinking.

2. Write an expression that represents the hummingbird population after 3 weeks.

3. Write an expression that represents the hummingbird population after n weeks.

4. In one year, the attendance at a waterpark was $825{,}000$ people. In the second year, attendance increased by 7%. Select *all* the expressions that represent the attendance at the waterpark in the second year.

- ☐ **A.** $825{,}000 + 0.07$
- ☐ **B.** $825{,}000(1.07)$
- ☐ **C.** $825{,}000\,(1 + 0.07)$
- ☐ **D.** $825{,}000\,(1 - 0.07)$
- ☐ **E.** $825{,}000 + 0.07(825{,}000)$

Name: ..... Date: ..... Period: .....

Problems 5–6: Kendra deposited $\$1200$ in her savings account with an annual interest rate of 3.5%.

5. Write a function, $f(t)$, to represent the amount Kendra will have in her account after t years.

6. Complete the table to determine how much money Kendra will have in her savings account over time, if no further deposits or withdrawals are made.

Time $(yr)^t$	Amount in Account ($), $f(t)$
0	1200
1	
2	
3	
4	

Problems 7–9: Three cities have the same initial population and different percent increases each year. Match each function $p(t)$, representing the population after t years, with its correct description.

$p(t) = 12{,}000(1.45)^t$ $p(t) = 12{,}000(1.045)^t$ $p(t) = 12{,}000(1.0045)^t$

7. City A has a 4.5% annual increase in population.

.....

8. City B has a 0.45% annual increase in population.

.....

9. City C has a 45% annual increase in population.

.....

Name: Date: Period:

Additional Practice 6.08

Problems 1–3: Determine the percent decrease for each function.

1. $f(x) = 50(1 - 0.35)^x$ **2.** $g(x) = 36(0.75)^x$ **3.** $h(t) = 100\left(1 - \frac{78}{100}\right)^t$

4. Select *all* the functions with a 24% decrease.

- ☐ **A.** $g(t) = 18(0.76)^t$
- ☐ **B.** $h(x) = 200(1 - 0.76)^x$
- ☐ **C.** $v(t) = 76(0.24)^t$
- ☐ **D.** $f(x) = 900(1 - 0.24)^x$
- ☐ **E.** $r(x) = 100\left(1 - \frac{0.76}{100}\right)^x$

Problems 5–7: A beach was littered with $6{,}000$ lb of trash.

5. The amount of trash decreased by 30% after volunteers cleaned the beach for 1 hour. Determine the pounds of trash that remained on the beach after 1 hour of cleanup. Show or explain your thinking.

6. After another hour of cleanup, the amount of trash that remained on the beach again decreased by 30%. Determine the pounds of trash that remained on the beach after 1 hour of cleanup. Show or explain your thinking.

7. The amount of trash remaining on the beach continues to decrease by 30% of the previous amount each hour. Write a function, $p(n)$, for the pounds of trash that remained on the beach after n hours of cleanup.

Name: Date: Period:

Problems 8–10: A piece of paper is folded multiple times. The area, A, in square centimeters, of the piece of paper after n folds is $A(n) = 150 \cdot (0.75)^n$.

8. Select *all* the statements that are true about the what the values 150 and 0.75 mean in this context.

- ☐ **A.** The piece of paper has an area of 150 cm^2 before it is folded.
- ☐ **B.** With each fold, the area of the square decreases by 75%.
- ☐ **C.** The piece of paper has an area of 150 cm^2 after it is folded.
- ☐ **D.** With each fold, the area of the square decreases by 25%.

9. What is the approximate area of the square after 4 folds? Show or explain your thinking.

10. What are the least number of folds needed so that the area is less than 5 cm^2? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 6.09

Problems 1–4: Determine if each scenario represents exponential growth or exponential decay. Circle your choice.

1. $f(x) = 75\left(\frac{4}{3}\right)^x$

Exponential growth Exponential decay

2. $f(x) = 75\left(\frac{3}{4}\right)^x$

Exponential growth Exponential decay

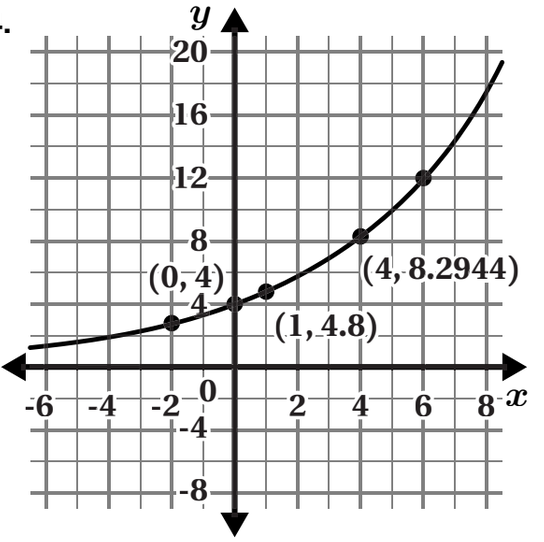
3. A turtle nest has 110 eggs. For every day after the hatching period has begun, 10% of the eggs do not hatch from the remaining unhatched eggs.

The function $h(t)$ represents the amount of hatched eggs in the turtle after t days in the hatching period.

$h(t) = 110(0.90)^t$

Exponential growth Exponential decay

4.



Exponential growth Exponential decay

Problems 5–6: The Springfield City Council members determined the number of attendees at the annual Homecoming parade every 5 years since the first parade in the year 2000.

5. Write a function of the form $f(x) = a \cdot b^x$ to represent the number of parade attendees x years after the year 2000.

Time (years since 2000), x	Number of Attendees, $f(x)$
0	20,000
5	15,000
10	11,250
15	8,438
20	6,328

6. What is the percent decrease and what does it mean in this context?

Problems 7–10: Match each equation to the description of its graph.

7. $f(x) = 20(1.5)^x$

.....

8. $f(x) = 20(0.5)^x$

.....

9. $f(x) = 12(0.5)^x + 8$

.....

10. $f(x) = 12(1.5)^x + 8$

.....

Description A

- An initial value of 20
- Exponential growth
- The y-values will eventually get very close to 8 as the x-values get smaller.

Description B

- An initial value of 20
- Exponential decay
- The y-values will eventually reach 8 as the x-values get smaller.

Description C

- An initial value of 20
- Exponential growth
- The y-values will eventually get very close to 0 as the x-values get smaller.

Description D

- An initial value of 20
- Exponential decay
- The y-values will eventually reach 0 as the x-values get smaller.

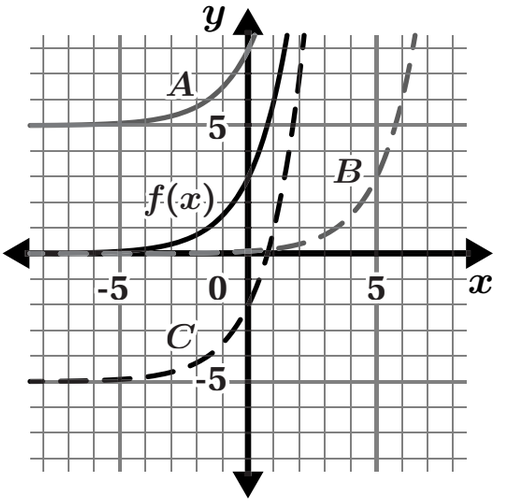
Name: ..... Date: ..... Period: .....

Additional Practice 6.10

1. Here is a graph of $f(x) = 3 \cdot 2^x$.

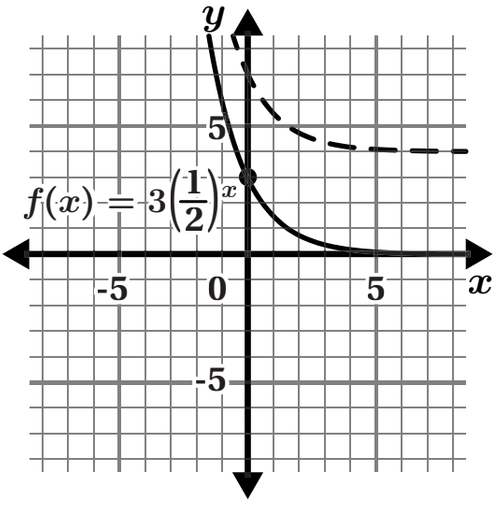
Match each function with its graph.

Equation	Solution
$f(x) = 3 \cdot 2^x - 5$	.....
$f(x) = 3 \cdot 2^x + 5$	.....
$f(x) = 3 \cdot 2^{x-5}$	.....



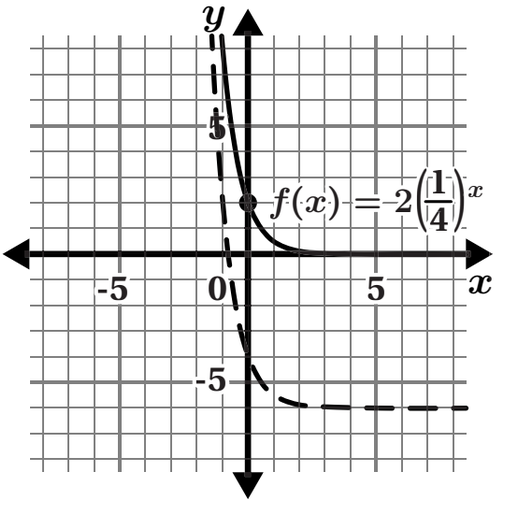
Problems 2–3: For each set of graphs shown, write an equation for the dotted curve, $g(x)$.

2. $f(x) = 3\left(\frac{1}{2}\right)^x$



$g(x) =$ .....

3. $f(x) = 2\left(\frac{1}{4}\right)^x$

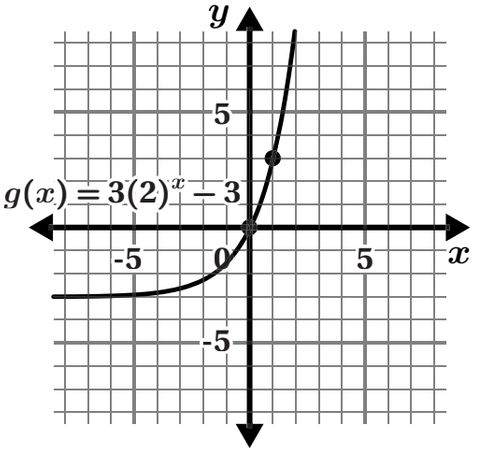


$g(x) =$ .....

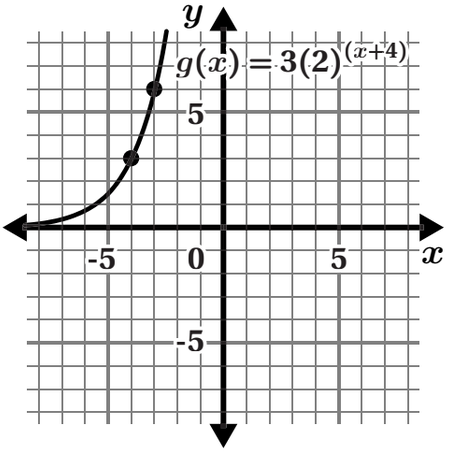
Name: Date: Period:

Problems 4–5: The function $g(x)$ is a transformation of $f(x) = 3 \cdot 2^x$.

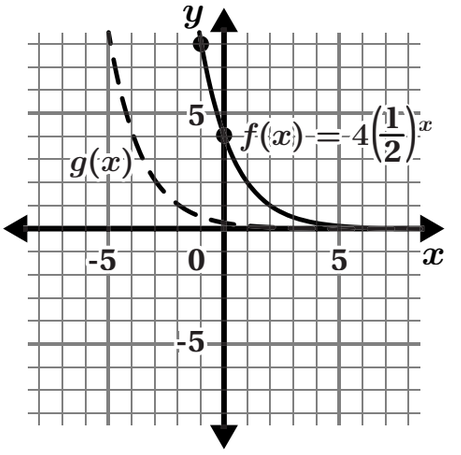
4. Graph $g(x) = 3(2)^x - 3$



5. Graph $g(x) = 3(2)^{(x+4)}$



Problems 6–8: The function $g(x)$ is a transformation of $f(x) = 4\left(\frac{1}{2}\right)^x$.



6. Melanie says $g(x) = 4\left(\frac{1}{2}\right)^{x-4}$ because it is a horizontal translation 4 units to the left. Explain why Melanie's thinking is incorrect.

7. Yousef says $f(x)$ is a vertical transformation because the y-intercept shifted down about 3.5 units. Explain why Yousef's thinking is incorrect.

8. Write the correct equation for $g(x)$.

Name: Date: Period:

Additional Practice 6.11

1. Rewrite each exponential expression as a radical expression.

$6^{\frac{1}{4}}$	$7^{\frac{1}{3}}$	$10^{\frac{1}{2}}$

2. Rewrite each radical expression as an exponential expression.

$\sqrt[5]{3}$	$\sqrt[3]{12}$	$\sqrt{5}$

Problems 3–5: Determine a value for b that would make each equation true.

3. $7^{\frac{1}{b}} \cdot 7^{\frac{1}{b}} \cdot 7^{\frac{1}{b}} \cdot 7^{\frac{1}{b}} \cdot 7^{\frac{1}{b}} = 7$

4. $\sqrt[b]{9} \cdot \sqrt[b]{9} \cdot \sqrt[b]{9} \cdot \sqrt[b]{9} = 9$

5. Select *all* the equations that are true.

- ☐ **A.** $\sqrt[4]{10} = 1\,0^4$
- ☐ **B.** $3^{\frac{1}{2}} \cdot 3^{\frac{1}{2}} = 3$
- ☐ **C.** $8^{\frac{1}{8}} = \sqrt[8]{5}$
- ☐ **D.** $14 = \sqrt[3]{14} \cdot \sqrt[3]{14} \cdot \sqrt[3]{14}$
- ☐ **E.** $7^{\frac{1}{6}} = \sqrt[6]{7}$

6. Create three equivalent expressions for 6 using rational exponents or radicals.

Name: Date: Period:

7. What is a value for f that would make the statement $f^{\frac{1}{7}} \cdot f^{\frac{1}{7}} \cdot f^{\frac{1}{7}} \cdot f^{\frac{1}{7}} = f$ true? Show or explain your thinking.

8. Determine the value of each expression.

Expression	Value
$9^{\frac{1}{2}}$	
$\sqrt[3]{8}$	
$64^{\frac{1}{2}}$	
$\sqrt{100}$	
$1^{\frac{1}{5}}$	

Name: ..... Date: ..... Period: .....

Additional Practice 6.12

Problems 1–3: Write an equivalent expression for each problem.

1. $64^{\frac{2}{3}}$ **2.** $\sqrt[4]{7^5}$ **3.** $\sqrt{4^6}$

4. Match each expression with an equivalent term.

Equation	Solution
a. $4^{\frac{3}{2}}$	..... $\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$
b. $4^{\frac{2}{5}}$	..... $\sqrt[5]{8}$
c. $2^{\frac{3}{5}}$	..... $\sqrt[3]{4^2}$
d. $2^{\frac{5}{3}}$	..... $\sqrt{4} \cdot \sqrt{4} \cdot \sqrt{4}$

5. Write two different expressions that are equivalent to $3^{\frac{3}{2}}$.

6. Write a problem that has $\sqrt[3]{5^4}$ as an answer.

7. Your classmate gets confused about whether $\sqrt[n]{a^m}$ is equivalent to $a^{\frac{m}{n}}$ or $a^{\frac{n}{m}}$. How would you help them to understand which form is correct?

Name: Date: Period:

8. Determine the value of each expression. Show your thinking.

Expression	Value
$100^{\frac{5}{2}}$	
$\sqrt[4]{4^2}$	
$25^{\frac{3}{2}}$	
$\sqrt[3]{2^6}$	
$9^{\frac{4}{2}}$	

Name: Date: Period:

Additional Practice 6.13

Problems 1–4: Determine if each equation or table represents simple or compound interest. Circle your choice.

1. $b(t) = 500 + 25t$

Simple Compound

2. $b(t) = 500\,(1.05)^t$

Simple Compound

3.

Time (yr)	Account Balance ($)
0	100
1	125
2	156.25

Simple Compound

4.

Time (yr)	Account Balance ($)
0	100
1	125
2	150

Simple Compound

Problems 5–7: Helen invests $\$2000$ in an account that earns 3.5% compound interest per year.

5. Complete the table.

Time (yr)	Account Balance ($)
0	
1	2070
2	2142.45
3	
4	

6. Which function represents the amount of money in Helen's account after x years?

A. $f(x) = 2000 + 1.035x$

B. $f(x) = 2000(1.035x)$

C. $f(x) = 2000 + 1.035^x$

D. $f(x) = 2000(1.035)^x$

7. What will the balance of the account be after 8 years? Show or explain your thinking.

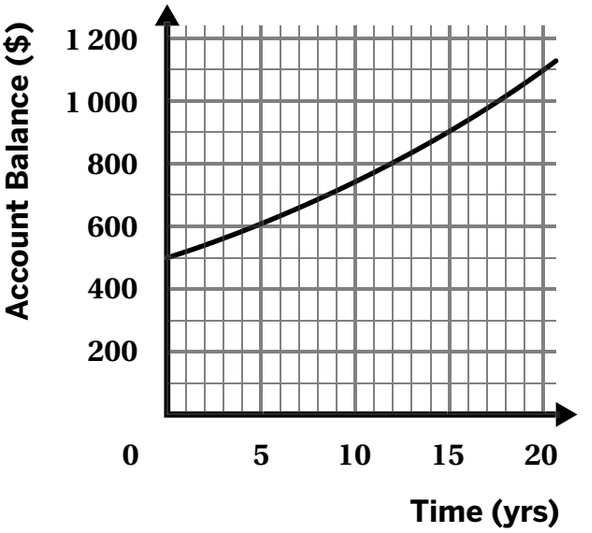
Name: ..... Date: ..... Period: .....

Problems 8–9: Samuel invests $\$500$ in an account that earns 4% compound interest per year. The graph shows the function $f(t) = 500(1.04)^t$, which gives Samuel's account balance after t years.

8. About how many years will it take for his account balance to reach $\$1000$?

9. Use the graph to determine the value of $f(12)$.

What does that tell you about the situation?



10. You have won a contest and have two prize options:

Option A: Getting a penny that doubles every day for a month (30 days)

Option B: $\$10$ million dollars

Which option would you choose? Explain your choice.

Name: Date: Period:

Additional Practice 6.14

Problems 1–2: Sree takes out a $\$2500$ loan with a monthly interest rate of 4.5%. She makes no additional payments, deposits, or withdrawals.

1. Select *all* the expressions that can be used to calculate her balance after t years.

- ☐ **A.** $2500 \cdot 1.045^t$
- ☐ **B.** $2500 \cdot (1.045^{12})^t$
- ☐ **C.** $2500 \cdot 1.045^{12t}$
- ☐ **D.** $2500(1.6959)$
- ☐ **E.** $2500 \cdot 1.6959^t$

2. What was the annual interest rate for this loan?

Problems 3–7: Aki invests money into a savings account to purchase a car in the future. He writes the expression $2000(1.055^{12})^4$ to help him calculate what the account balance will be in 4 years.

3. Explain what 2000 represents in the expression.

4. Explain what 1.055 represents in the expression.

5. Explain what 12 represents in the expression.

6. Explain what 4 represents in the expression.

7. Write an equivalent expression that could represent Aki's account balance in 4 years.

Name: Date: Period:

Problems 8–9: Jaxson is considering taking out a $\$100$ credit card loan that has a 24% monthly interest rate.

8. Complete the table.

Monthly Interest Rate (%)	24
Monthly Growth Factor	
Growth Factor per Year	
Interest Rate per Year (%)	

9. If Jaxson takes out a $\$100$ credit card loan, how much will he owe after 3 years, if he made no additional payments? Show your thinking.

10. Varsha needs $\$10{,}000$ for tuition and supplies for college this year. She has the choice between two different loan options.

Option A: A federal student loan with a monthly interest rate of 6.53% that she can start paying off in 4 years.

Option B: A loan through her bank with a monthly interest rate of 4.5% that she can start paying off in 6 years.

Which option would you recommend she choose? Show or explain your reasoning.

Name: Date: Period:

Additional Practice 6.15

1. Meegan put $\$3000$ into a savings account with a 3.25% annual interest rate, compounded quarterly. She made no additional payments, deposits, or withdrawals.

Select *all* the expressions that can be used to calculate his balance after 5 years.

- ☐ **A.** $3000\,(1 + 0.0325)^5$
- ☐ **B.** $3000\,(1 + 0.0325)^{20}$
- ☐ **C.** $3000\left(1 + \frac{0.0325}{4}\right)^{20}$
- ☐ **D.** $3000\,(1.0008)^{4 \cdot 5}$
- ☐ **E.** $3000\left(1 + \frac{0.0325}{4}\right)^{4}$

Problems 2–4: Amir wants to take out a $\$1200$ loan to pay for a new bike. The bank offers him the loan with a 12.5% annual interest rate, compounded daily.

Amir wrote this expression to calculate the balance of the loan in 3 years, but he made an error.

$$1200\left(1 + \frac{0.125}{365}\right)^{3}$$

2. Find the error and explain why it is incorrect.

3. Write a correct expression to represent Amir's balance after 3 years.

4. What will his balance be in 3 years?

Problems 5–6: A credit card company load offers a $\$2500$ loan with a 28.8% annual interest rate.

5. If no other charges or payments are made, what will the balance of the loan be after 1 year at each compounding period?

Compounding Period	Balance ($)
Annually	
Semiannually	
Quarterly	

6. Describe how changing the compounding period affects the balance of the loan.

Problems 7–8: Hannah has $\$3{,}000$ to invest and is choosing between three investment options:

Option A: 11.5% annual interest rate, compounded quarterly.

Option B: 11.25% annual interest rate, compounded monthly.

Option C: 10.5% annual interest rate, compounded daily.

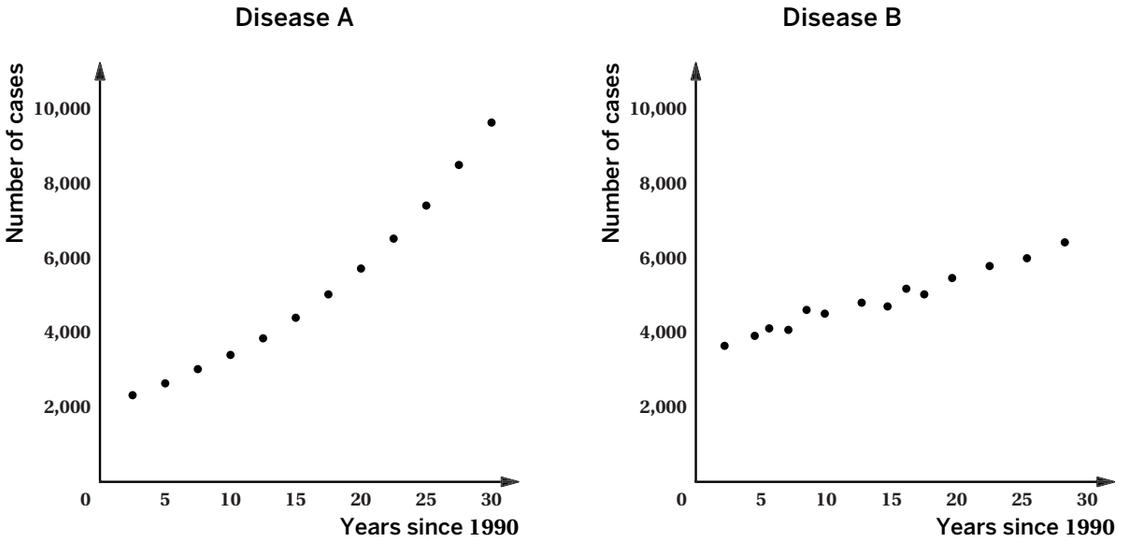
7. Express each of the options as a function of the money earned in terms of t time.

8. If she makes no deposits and no withdrawals for 6 years, which option will give her the largest balance after 6 years? Show or explain your thinking.

Name: Date: Period:

Additional Practice 6.16

1. Each graph models the spread of a disease.



a What kind of function would best model the data for Disease A — *linear, exponential*, or *neither*? Disease B? Explain your thinking.

b Which function would be a better model for Disease A: $f(x) = 2000 + 200x$ or $g(x) = 2000 \cdot (1.05)^x$?

2. The table shows the population of a city each year for 6 years.

Year	2015	2016	2017	2018	2019	2020
Number of people	9,000	9,720	10,498	11,337	12,244	13,324

a Does the population appear to be increasing by a common difference or by a common factor? Explain your thinking.

b Would a *linear* or *exponential* function be more appropriate for modeling the growth? Explain your thinking.

Name: Date: Period:

3. The number of people infected by a virus is modeled by the function $f(x) = 240 \cdot (1.29)^x$, where x represents the number of days since the virus outbreak was identified.

a At what rate is the virus spreading per day?

b How many infections were there four days before the virus outbreak was identified, based on the model? Explain your thinking.

4. The table shows the population of jellyfish in a certain area of the ocean each year for several years.

Year	2014	2015	2016	2017	2018	2019	2020
Number of jellyfish	700	784	878	983	1,102	1,234	1,382

a What kind of function would best model the data for jellyfish population — *linear, exponential,* or *neither*? Explain your thinking.

b Write a function that models the number of jellyfish $f(x)$, x years after 2014.

c Approximately how many years did it take for the jellyfish population to double?

d Use your function to predict the number of jellyfish that will be in that area of the ocean in 2025.

5. The table shows the number of virus infections for different dates in one year.Which time period had the greatest average rate of change: January 15 to 22nd, January 15 to 28, or January 15 to 29? Explain your thinking.

Date	Jan. 6	Jan. 15	Jan. 22	Jan. 26	Jan. 28	Jan. 30
Number of infections	50	850	7,700	27,126	50,912	95,557

Name: Date: Period:

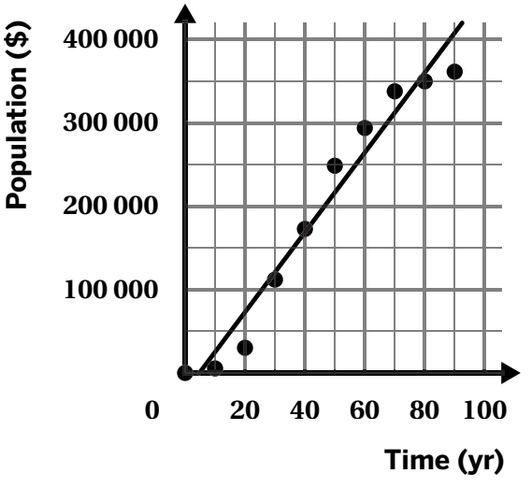
Additional Practice 6.17

Problems 1–6: Emelia looked at data on the population of Miami, Florida for a history project. She graphed the population each decade from 1900 to 1990, then generated the line and exponential curve of best fit.

$y_1 \sim mx_1 + b$

$m = 4696$

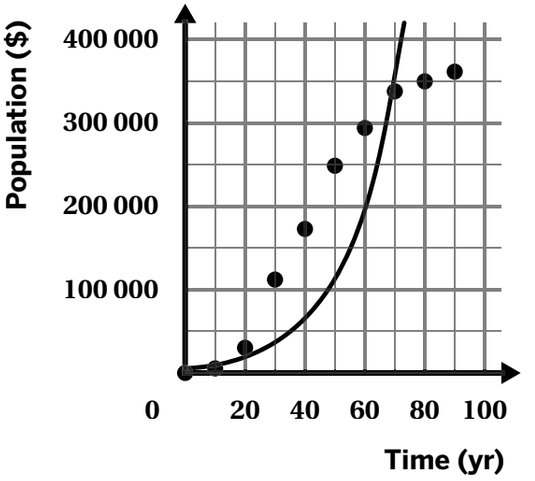
$b = -21239$



$y_1 \sim a \cdot b^x$

$a = 6627$

$b = 1.0578$



1. Describe the data using vocabulary from this unit.

2. Identify the slope for the line of best fit. Describe what the slope means in this situation.

3. Identify the growth factor for the exponential curve of best fit. Describe what the growth factor means in this situation.

4. Use the linear model to predict the population of Miami in 2030.

5. Use the exponential model to predict the population of Miami in 2030.

6. Which model do you think fits the data better? Explain your thinking.

Problems 7–9: The function $f(x) = 3200(1.0125)^x$ models the population of a city x-years after 1950.

7. What is the growth rate of this population?

A. 0.0125%

B. 1.25%

C. 12.5%

D. 125%

8. What is the meaning of the value 3200 in the equation?

A. The rate by which the population is growing.

B. The factor by which the population is growing.

C. The maximum population of the city.

D. The population of the city in 1950.

9. Calculate the population of the city in the year 2030. Show your thinking.

Algebra 1 | Unit 7

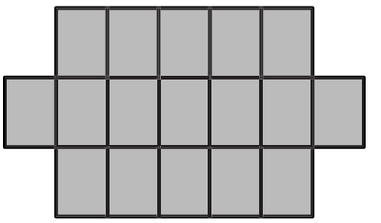
Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

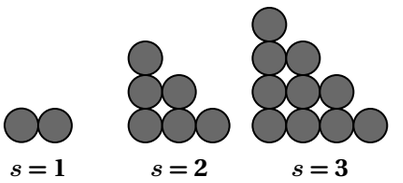
Additional Practice 7.01

1. Select *all* of the expressions that could represent the number of tiles in this diagram.



- ☐ **A.** $7 \cdot 3$
- ☐ **B.** $7 \cdot 3 - 4$
- ☐ **C.** $5 \cdot 3 + 4$
- ☐ **D.** $5 \cdot 3 + 2$
- ☐ **E.** $2(5) + 1(7)$

2. Here are the first three steps in a pattern. How many dots will there be when $s = 8$?



Explain your thinking.

3. What type of relationship does the pattern in the table represent? Circle one.

s	Number of tiles
1	5
2	20
3	45
4	80

Linear Exponential Neither

Explain your thinking.

Name: Date: Period:

Problems 4–6: A teacher gives her class a table with only the first two rows in a tile pattern.

s	Number of tiles
1	1
2	8

4. Momo says the pattern is a linear relationship. Gerald says there is not enough information to be sure. Whose thinking is correct? Explain your thinking.

5. How many tiles would there be in the next step if the relationship were linear?

6. How many tiles would there be in the next step if the relationship were exponential?

Problems 7–8: The table shows the relationship between the figure number, s, and number of tiles in a pattern.

s	Number of tiles
1	1
2	4
3	9
4	16
5	25

Heather notices that the number of tiles is increasing in an interesting pattern - the number of tiles increase by 3, then 5, then 7, and then 9.

Aaron notices that the number of tiles in each row is the square of the figure number.

7. Based on these observations, is this pattern linear, exponential or neither? Explain your thinking.

8. Use both Aaron and Heather's observations to predict the next number in this pattern. Is it the same value? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.02

1. Refer to the pattern of dots. By how many dots does the pattern grow in each successive figure?

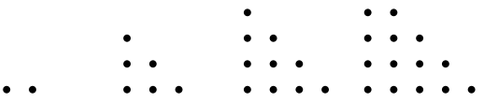


Figure 0 Figure 1 Figure 2 Figure 3

2. The table shows the relationship between the figure number and number of dots in a pattern.

Figure number	1	2	3	4	5
Number of dots	1	4	9	16	25

a What is the difference between the number of dots in each figure?

b What is the difference between the differences in part a?

3. In a pattern, the number of squares in each figure is the square of the figure number n. Which could be figures in the pattern? Select *all* that apply.

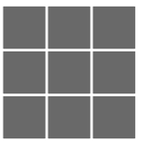
☐ **A.** 

☐ **B.** 

☐ **C.** 

☐ **D.** 

☐ **E.** 

☐ **F.** 

4. Refer to the pattern of dots. If the pattern continues, how many dots will be in Figure 5?

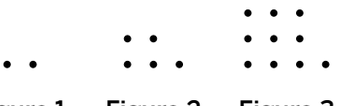


Figure 1 Figure 2 Figure 3

A. 17

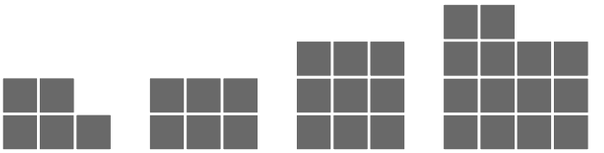
B. 25

C. 26

D. 28

Name: ..... Date: ..... Period: .....

5. Refer to the pattern of squares.



a Complete the table.

Figure	Number of squares
0	
1	
2	
3	

b How many squares will there be in Figure 4?

6. In a pattern, the number of squares in each figure equals the figure number n squared plus 3. Which could represent Figure 2?

A.

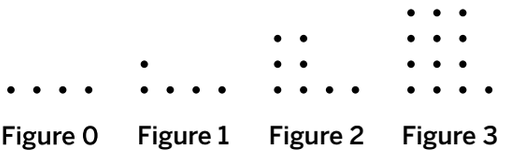
C.

B.

D.

7. Examine the pattern.

a How many dots will there be in Figure 8 of the pattern?



b Does the pattern show a *linear*, *quadratic*, or *exponential* relationship between the figure number and the number of dots? Explain your thinking.

c How many dots will there be in Figure n?

Name: Date: Period:

Additional Practice 7.03

Problems 1–3: Here are two functions: $g(x) = 4x^2$ and $f(x) = 4^x$. Determine which function is greater for each value of x. Circle your choice.

1. $g(1)$ $f(1)$

2. $g(2)$ $f(2)$

3. $g(3)$ They are the same.

Problems 4–5: Use the table for $h(x)$.

x	1	2	3	4	5	6	7
$h(x)$	8	16	32	64			

4. What type of relationship does this table represent? Circle one.

Linear Exponential Quadratic Something Else

Explain your thinking.

5. Complete the table.

6. The function $n(x)$ represents a quadratic relationship. Complete the missing values in the table of $n(x)$.

x	0	1	2	3	4	5
$h(x)$	3	5	11			

Name: Date: Period:

Problems 7–9: Use the pattern shown.

7. Explain how you see the pattern growing.

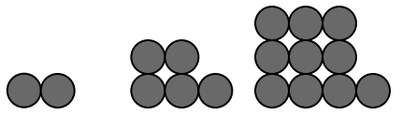


Figure 1 Figure 2 Figure 3

8. How many tiles will there be in Figure 10?

9. Write an expression for the number of tiles in Figure n.

10. Complete the table for each type of function that can be represented with the first figure in the pattern shown. For each function type, determine the number of tiles when $s = 3$ and $s = 4$.

s	Linear	Quadratic	Exponential
1	2	2	2
2	6	6	6
3			
4			

$s = 2$

Name: ..... Date: ..... Period: .....

Additional Practice 7.04

Problems 1–3: For each pair of symmetrical points on a parabola, determine the equation for the line of symmetry.

1. $(0, 0)$ and $(-12, 0)$

$x =$ .....

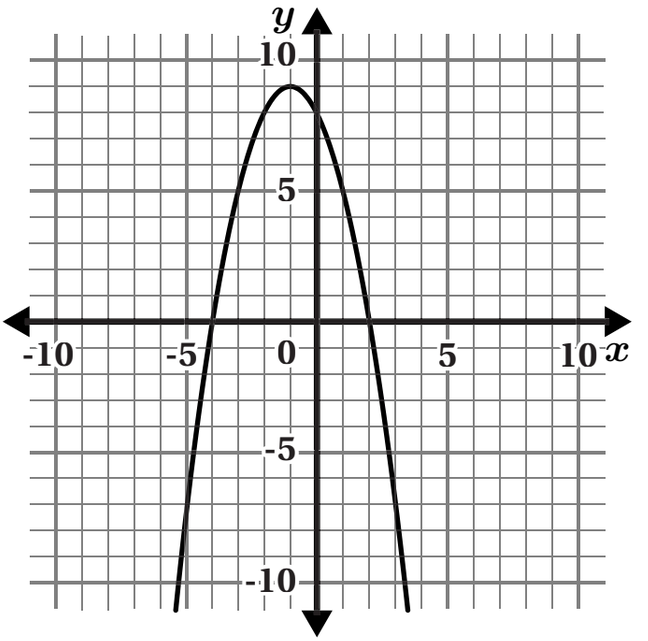
2. $(5, 8)$ and $(21, 8)$

$x =$ .....

3. $(10, -3)$ and $(-13, -3)$

$x =$ .....

Problems 4–5: Here is a graph of a parabola.



4. Draw the *line of symmetry* where you think it is located on this parabola.

5. Write the equation for the line of symmetry.

$x =$ .....

Problems 6–7: Here is an incomplete table that could represent several types of functions.

6. Select a function type and determine the number of tiles that would be in Figure 2. Circle one.

Linear Quadratic Exponential

Figure	Number of Tiles
1	1
2	
3	11

7. Draw three figures to match the pattern in the table.

Name: ..... Date: ..... Period: .....

Problems 6–8: Here are a few points that belong to a function $f(x)$.

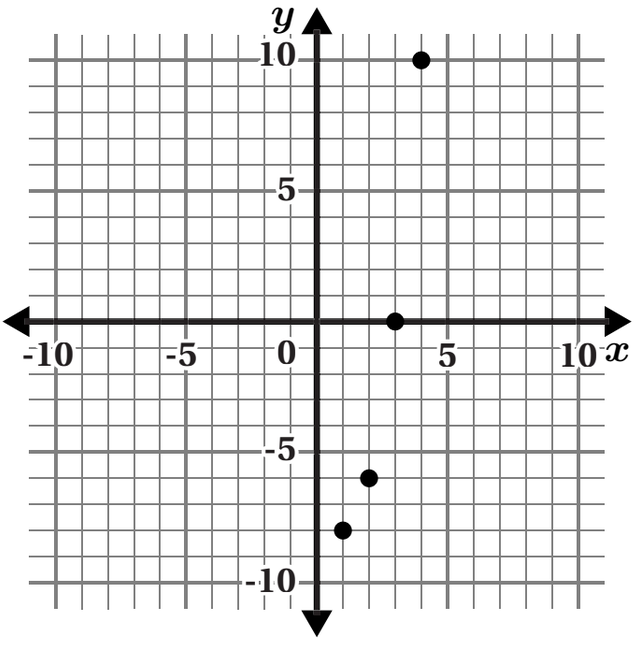
x	$f(x)$
-1	
0	
1	-8
2	-6
3	0
4	10
5	
6	
7	

8. Does $f(x)$ represent a quadratic relationship? Circle your choice.

Yes No Not enough information

Explain your thinking.

9. Complete the table for $f(x)$ and plot the new points on the graph, if possible.



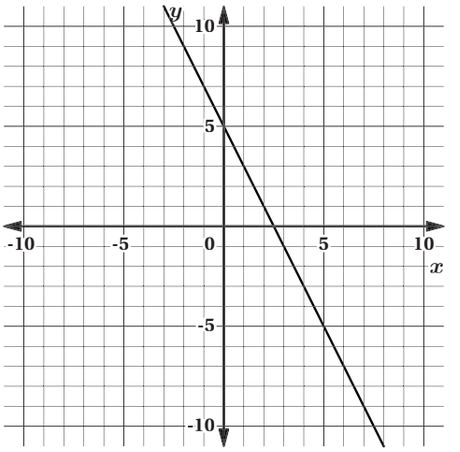
10. Write the equation for the line of symmetry.

$x =$ .....

Name: ..... Date: ..... Period: .....

Additional Practice 7.05

1. The graph represents the equation $y = -2x + 5$.



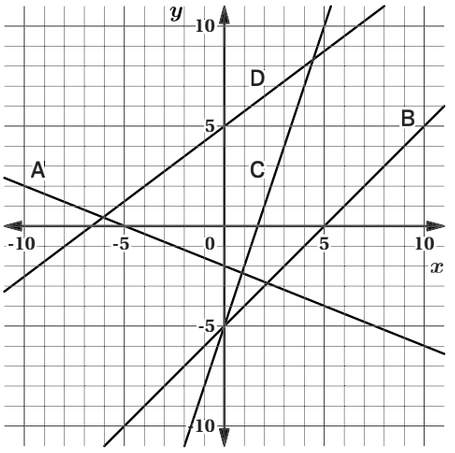
a What is the y-intercept of the graph? How is it related to the equation?

b What is the x-intercept of the graph? How is it related to the equation?

2. Which of the following is true concerning the x-intercept of the linear equation $y = 0.5x - 8$? Select *all* that apply.

- ☐ **A.** It is the value of y when $x = 0$.
- ☐ **B.** It is the value of x when $y = 0$.
- ☐ **C.** It is the point at which the graph of the equation crosses the x-axis.
- ☐ **D.** It is the point at which the graph of the equation crosses the y-axis.

3. Which graph has a y-intercept of 5?



Name: ..... Date: ..... Period: .....

4. In a game, Diego tosses a bean bag up in the air toward a board lying on the ground 30 ft away. Which of the following best describes the path of the bean bag when it is in the air?

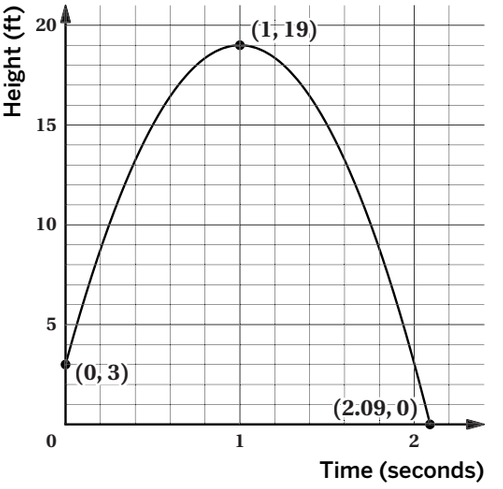
A. A straight line that goes up.

B. A straight horizontal line.

C. A curved line that goes up and then down.

D. A curved line that goes down and then up.

5. Shawn throws a ball up in the air. The graph shows the height of the ball, in feet, above the ground as a function of time, in seconds.

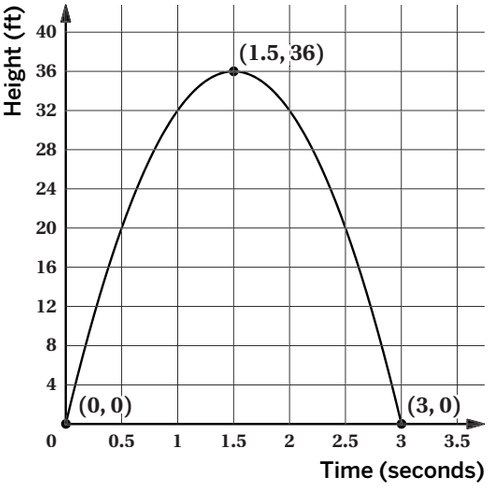


a How high above the ground was the ball when Shawn threw it?

b When did the ball reach its maximum height? How high was it?

c When did the ball hit the ground?

6. A disc is launched into the air. The graph shows the height of the disc, in feet, above the ground as a function of time, in seconds. Select *all* the true statements about the situation.



☐ **A.** The disc was launched from the ground.

☐ **B.** The disc was launched 4 ft from the ground.

☐ **C.** The maximum height of the disc was 36 ft.

☐ **D.** The disc was in the air for 3 seconds.

☐ **E.** The disc was in the air for 36 seconds.

☐ **F.** The disc reached its maximum height 1.5 seconds after it was launched.

Name: ..... Date: ..... Period: .....

Additional Practice 7.06

1. The key features of this parabola are labeled A,B,C, and D.

Match each key feature with a term from the word bank.

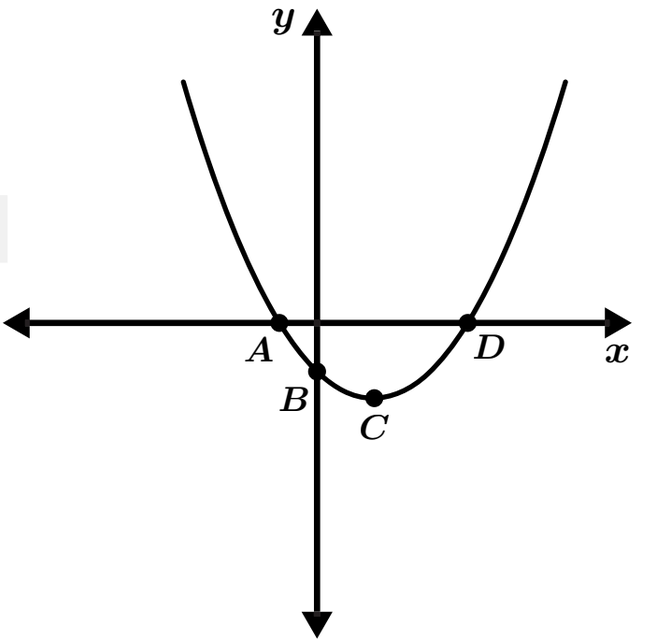
vertex	x-intercept	y-intercept

A. .....

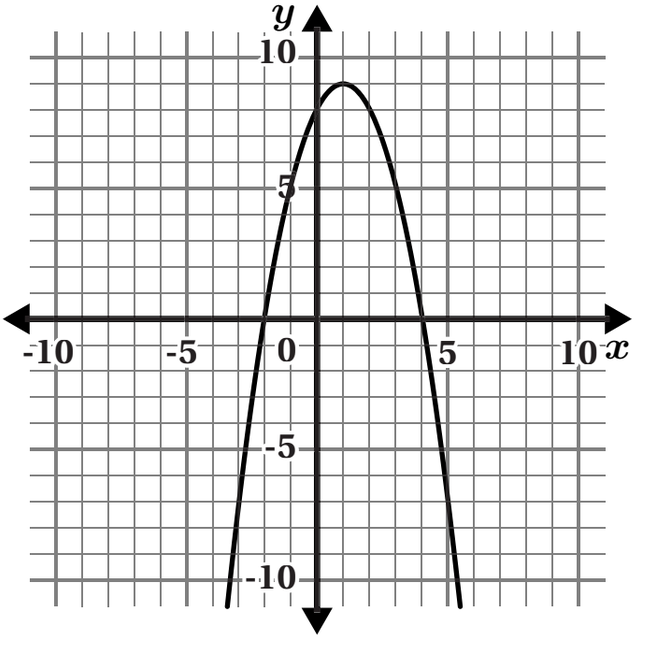
B. .....

C. .....

D. .....



Problems 2–4: Use the graph to determine the coordinates of each key feature.



2. vertex: .....

3. x-intercepts: ..... and .....

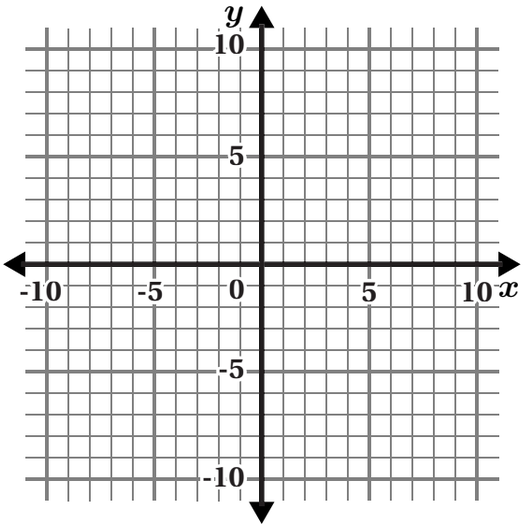
4. y-intercept: .....

5. A parabola has a vertex at $(-6,-2)$. Give two possible coordinates for its x-intercepts.

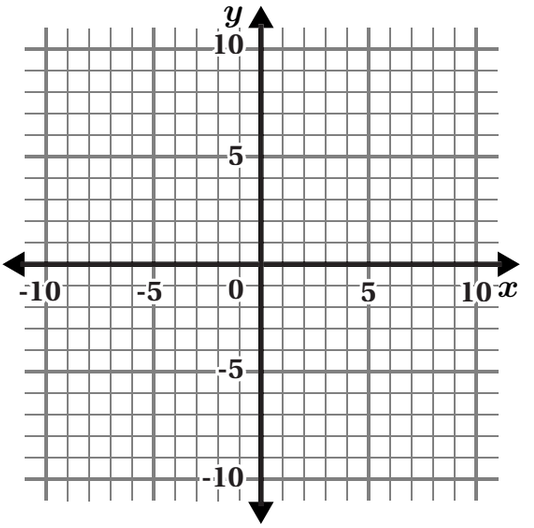
Name: ..... Date: ..... Period: .....

Problems 6–9: Graph a parabola that fits each description.

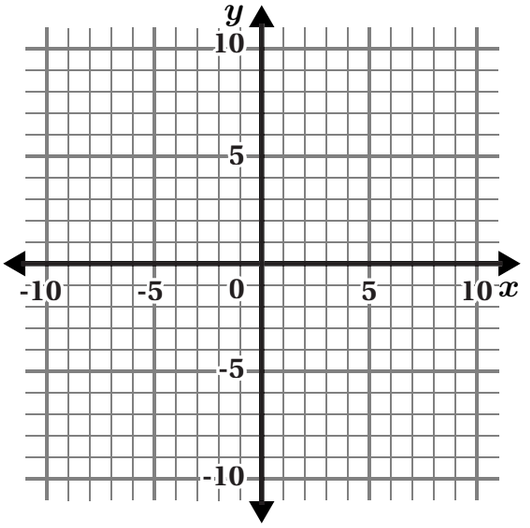
6. Concave up with a negative y-intercept



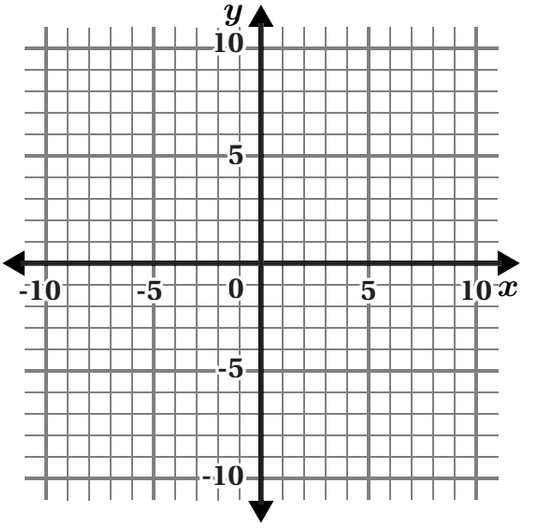
7. Concave down with a vertex at $(-3, 4)$



8 . Concave down with line of symmetry of $x = 2$



9. Concave up with no x-intercepts



Name: ..... Date: ..... Period: .....

Additional Practice 7.07

1. A pebble has traveled d meters, t seconds after being dropped from the top of a building. The distance traveled by the pebble can be modeled by the equation $d = 5 \cdot t^2$. Complete the table.

t (seconds)	d (m)
1	
2	
3	
4	

2. A ball is launched in the air and its height, in feet, is modeled by h as a function of time, in seconds. Here is a graph representing h. Approximately when does the ball reach its maximum height?

A. 0 seconds

B. 2.4 seconds

C. 4.9 seconds

D. 98 seconds

3. Mai accidentally drops her keys from the top of a lighthouse that is 148 ft tall. Which equation best represents y, the distance fallen in feet, as a function of time t, in seconds?

A. $y = 16t^2$

B. $y = 148 - 16t^2$

C. $y = 16t$

D. $y = 148 - 16t$

Name: Date: Period:

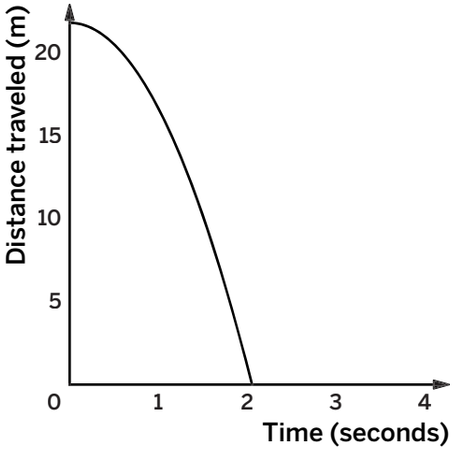
4. Tyler drops a stone from a scenic overlook 422 ft high.

a The stone falls $16 \cdot 2^2$ ft after 2 seconds and it falls $16 \cdot 4^2$ ft after 4 seconds. How far does the stone fall after 5 seconds?

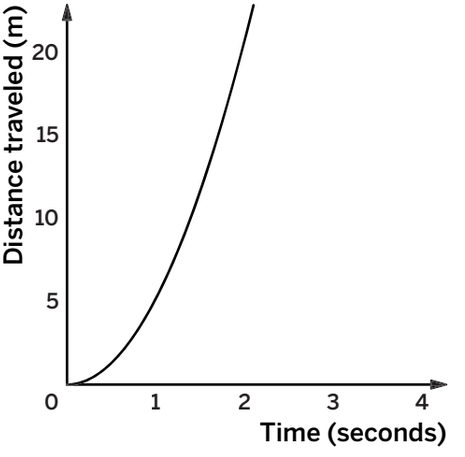
b How far from the ground is the stone after 5 seconds?

5. An object traveled d meters t seconds after being dropped from the top of a building. The distance traveled by the object can be modeled by the function $d(t) = 22 - 16t^2$. Which graph best represents this situation? Explain your thinking.

Graph A



Graph B



6. A rock is dropped from a bridge 540 ft over a ravine. Shawn claims that Column B of data could represent the height, in feet, as a function of time, in seconds. Elena claims that Column C could represent the height. Who is correct? Explain your thinking.

Time (seconds), t	A	B	C	D
0	0	0	540	540
1	16	16	524	524
2	36	64	508	476
3	48	144	492	396

Name: Date: Period:

Additional Practice 7.08

1. Here are three statements about the graph of $p(x) = (x-4)(x-6)$. Two are true and one is false. Circle the statement that is false.

A. The point is $(6, 0)$ on the graph.

B. The point is $(4, 0)$ on the graph.

C. The point is $(0, 6)$ on the graph.

2. Here is a function $m(x) = (x + 5)(x-7)$.

Joe says that $m(-1) = -32$.

Marco says that $m(-1) = 32$.

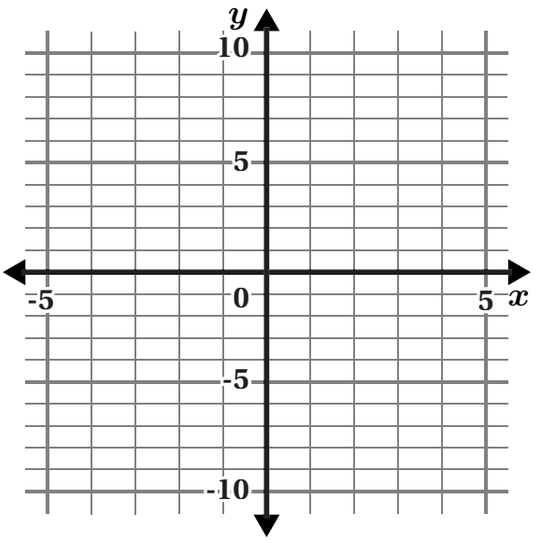
Whose thinking is correct? Explain your thinking.

Problems 3–4: Here is a function: $h(x) = 2x^2 + 7x-4$.

3. Complete the table for $h(x)$.

x	$2x^2$	$7x$	-4	$2x^2 + 7x - 4$
-2			-4	
		-7	-4	
0				
1		7		
	8			

4. Create a graph of $h(x)$.



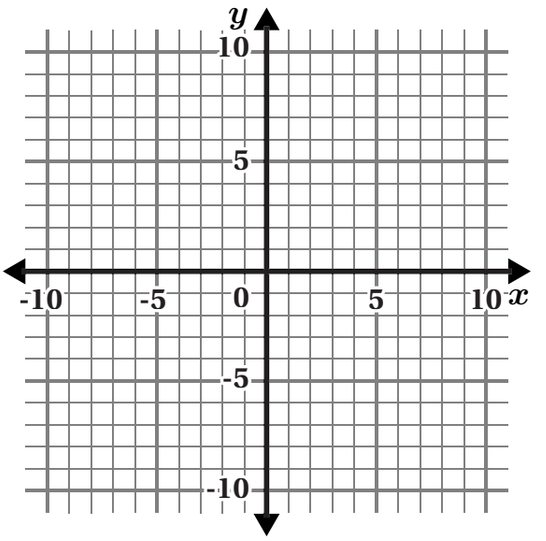
Name: Date: Period:

Problems 5–6: Here is a function $f(x) = -x(x-6)$

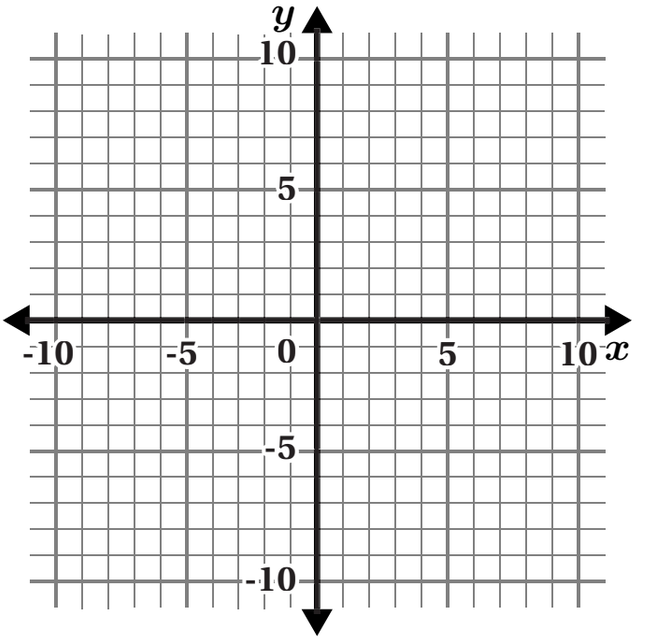
5. Complete the table for $f(x)$.

x	$-x$	$x-6$	$x(x-6)$
			0
1			
2			
	-3		
4			
5			

6. Create a graph of $f(x)$.



7. Plot a point in each quadrant that is on the graph of $g(x) = -x^2 + 6$



Name: Date: Period:

Additional Practice 7.09

1. Determine whether each equation is written in standard form, factored form, or neither.

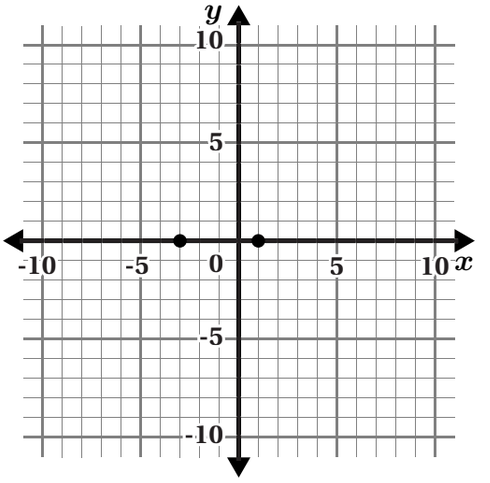
$a(x) = (x - 1)^2 + 7$	$b(x) = 3x(x - 4)$	$c(x) = (x - 2)(x + 5)$
$d(x) = 2x^2 + 8x$	$(4 - x)(3 + x) = e(x)$	$f(x) = -3x^2 + 9x + 6$

Factored Form	Standard Form	Neither

2. Gia is graphing the function $h(x) = (x + 3)(x - 1)$.
Which x-value should she evaluate to best complete her graph? Circle one.

$x = -2$ $x = -1$ $x = 0$

Explain your thinking.

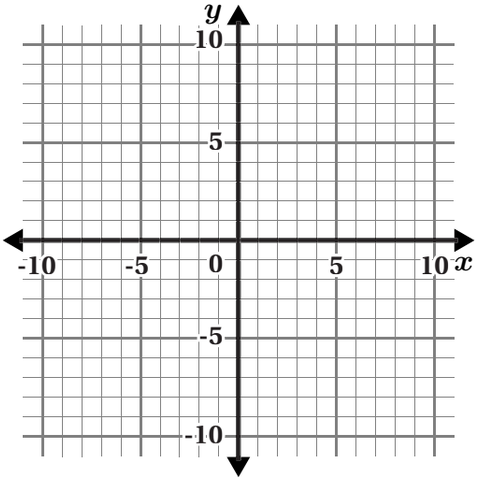


Problems 3–4: Here is a function $g(x) = x^2 - 6x + 5$.

3. Complete the table for $g(x)$.

x		$g(x)$
1		
2		
3		
4		
5		

4. Create a graph of $g(x)$.



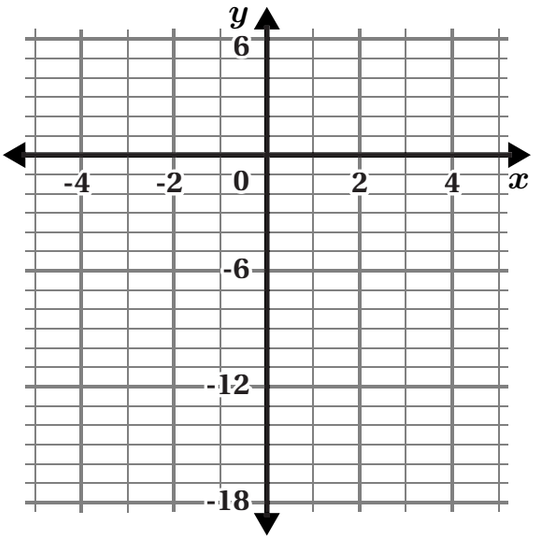
Name: Date: Period:

Problems 5–6: Here is a function $k(x) = (4x + 4)(x - 3)$.

5. Complete the table for $k(x)$.

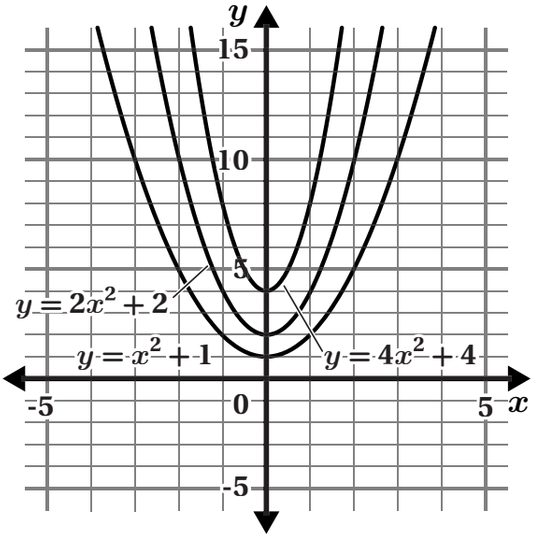
x		$k(x)$
-1		
-2		
-3		
-4		
-5		

6. Create a graph of $k(x)$.



Problems 7–8: Here are some quadratic functions.

7. Graph the next parabola that follows this pattern.



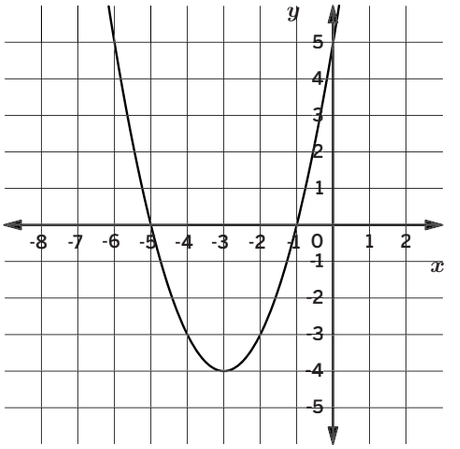
8. Create a table for the next parabola that follows this pattern.

x	y

Name: ..... Date: ..... Period: .....

Additional Practice 7.10

1. The graph of $k(x) = (x + 1)(x + 5)$ is shown.



a What are the x-intercepts?

b What is the y-intercept?

2. What is the y-intercept of the graph of the function $j(x) = x^2 + 4$?

A. $(0, -4)$

B. $(0, 0)$

C. $(0, 1)$

D. $(0, 4)$

3. Where are the x-intercepts located on the graph of the function $f(x) = (x + 3)(x - 1)$?

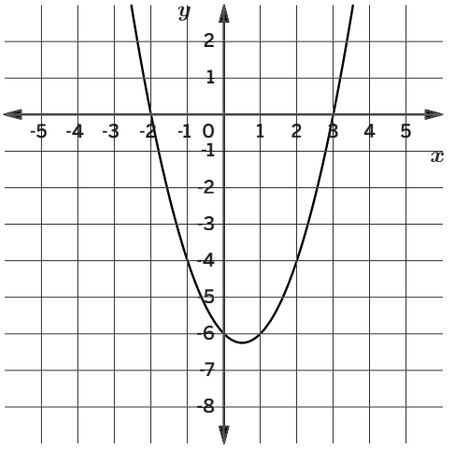
A. $(3, 0)$ and $(1, 0)$

B. $(-3, 0)$ and $(1, 0)$

C. $(3, 0)$ and $(-1, 0)$

D. $(-3, 0)$ and $(-1, 0)$

4. The graph of a quadratic function is shown. Which of the following could define this function?



A. $g(x) = (x - 2)(x - 3)$

B. $g(x) = (x - 2)(x + 3)$

C. $g(x) = (x + 2)(x - 3)$

D. $g(x) = (x + 2)(x + 3)$

Name: Date: Period:

5. Which quadratic functions have a y-intercept located at $(0, -9)$? Select *all* that apply.

- ☐ **A.** $f(x) = x(x - 9)$
- ☐ **B.** $f(x) = x^2 + 6x + 9$
- ☐ **C.** $f(x) = x^2 - 5x - 9$
- ☐ **D.** $f(x) = (x - 3)(x + 3)$
- ☐ **E.** $f(x) = (x - 1)(x + 9)$

6. Consider the function $f(x) = x^2 - 2x - 24$.

a What is the y-intercept of the graph of the function?

b An equivalent way of writing this function is $f(x) = (x - 6)(x + 4)$. What are the x-intercepts of this function's graph?

7. Without graphing, determine the x- and y-intercepts of the graph of the quadratic function $p(x) = (x - 5)(x + 5)$. Explain your thinking.

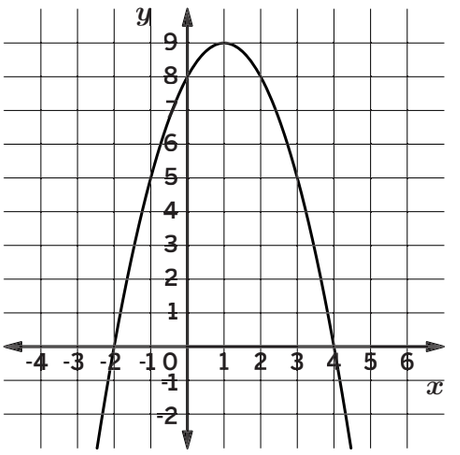
8. Consider the quadratic function $r(x) = x(6 - x)$. The table shows where Jada and Elena think the x- and y-intercepts of the graph of the function are located. Is either person correct? Explain your thinking.

	x-intercepts	y-intercept
Jada	$(-6, 0)$ and $(6, 0)$	$(0, 0)$
Elena	$(0, 0)$ and $(6, 0)$	$(0, -6)$

Name: ..... Date: ..... Period: .....

Additional Practice 7.11

1. Consider the function shown in the graph.



a What are the coordinates of the vertex?

b What is the equation of the line of symmetry?

2. The graph of a quadratic function has its vertex at $(-2, -8)$. What is the equation of the line of symmetry?

A. $x = -2$

B. $x = -8$

C. $x = 2$

D. $x = 8$

3. Select *all* the true statements about the graph that represents the function $f(x) = x(x + 10)$.

☐ **A.** The x-coordinate of its vertex is -5.

☐ **B.** The x-coordinate of its vertex is 5.

☐ **C.** The x-coordinate of its vertex is 10.

☐ **D.** It has exactly two x-intercepts.

☐ **E.** The x-intercepts are located at $(-1, 0)$ and $(-10, 0)$.

☐ **F.** The x-intercepts are located at $(0, 0)$ and $(-10, 0)$.

☐ **G.** The x-intercept is located at $(10, 0)$.

4. Select *all* the functions whose graphs have a vertex with an x-coordinate of -3.

☐ **A.** $g(x) = (x - 3)(x + 3)$

☐ **B.** $g(x) = (x + 2)(x + 4)$

☐ **C.** $g(x) = (x - 1)(x - 5)$

☐ **D.** $g(x) = x(x + 6)$

☐ **E.** $g(x) = x(x - 6)$

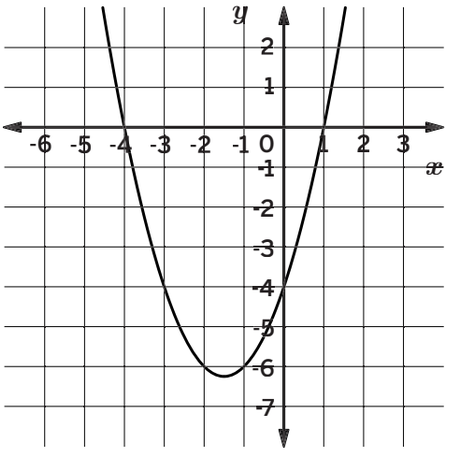
Name: ..... Date: ..... Period: .....

5. The functions $j(x)$, $k(x)$, and $m(x)$ are defined in the following table. Without graphing, determine the x-intercepts, the x-coordinate of the vertex, and the equation of the axis of symmetry for each function.

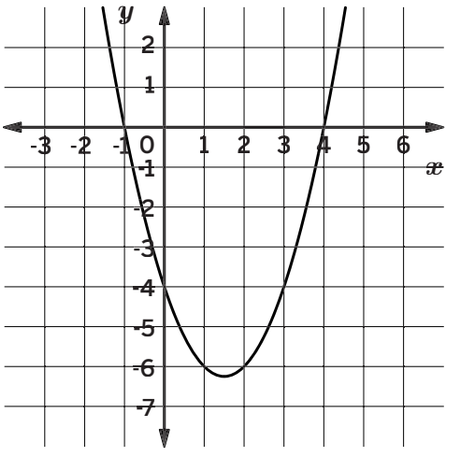
Function	x-intercepts	x-coordinate of the vertex	Line of symmetry
$j(x) = (x + 6)(x + 2)$			
$k(x) = 2x(x - 4)$			
$m(x) = (x + 7)(x - 7)$			

6. Which is the graph of the quadratic function $w(x) = (x + 4)(x - 1)$? Explain your thinking.

Graph A



Graph B



7. The quadratic function $r(x)$ has x-intercepts at $(-6, 0)$ and $(1, 0)$. What is the equation for the axis of symmetry? Explain your thinking.

8. Consider the two quadratic functions:
$f(x) = (x + 3)(x - 11)$ $\quad$ $g(x) = 2x(x - 8)$

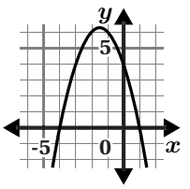
Kiran claims that the axis of symmetry for the graphs of both functions is $x = 4$. Do you agree with Kiran? Explain your thinking.

Name: Date: Period:

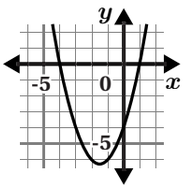
Additional Practice 7.12

1. Which graph shows the function $y = -(x - 4)(x + 1)$?

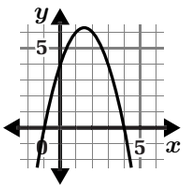
A.



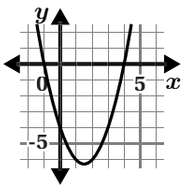
B.



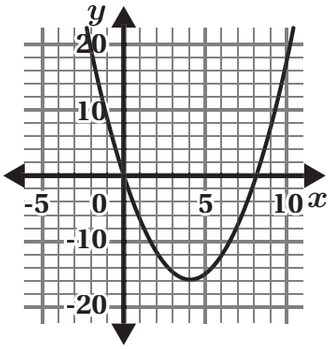
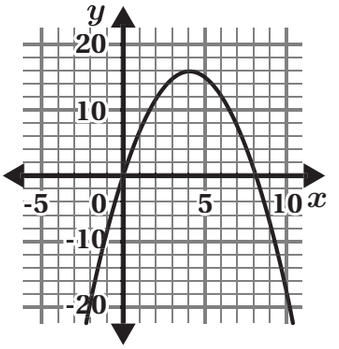
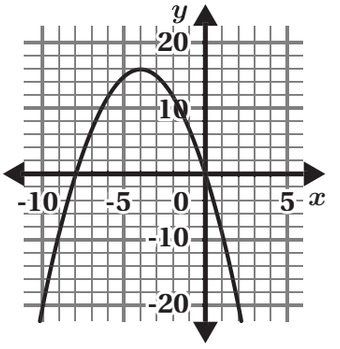
C.



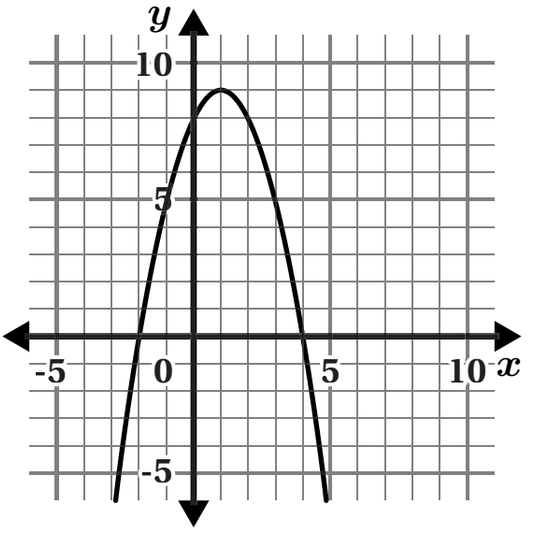
D.



2. Match each equation to the graph it represents. One equation will have no match.

$y = -x(x - 8)$	$y = x(x - 8)$	
$y = x(x + 8)$	$y = -x(x + 8)$	
		

Problems 3–4: Here is a graph of $y = -1\ (x + 2)(x - 4)$. Change the equation so the vertex goes through:



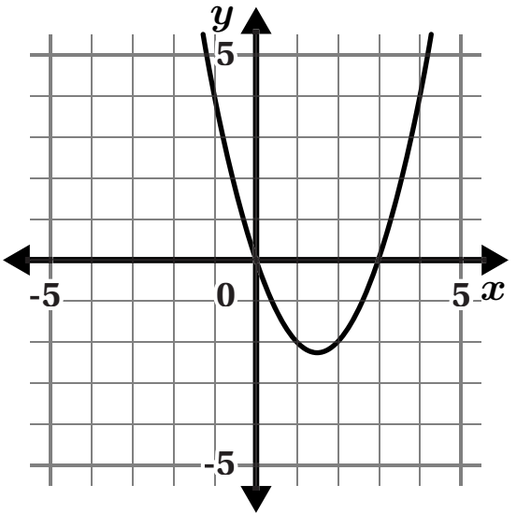
3. $(1, -9)$

4. $(1, 4)$

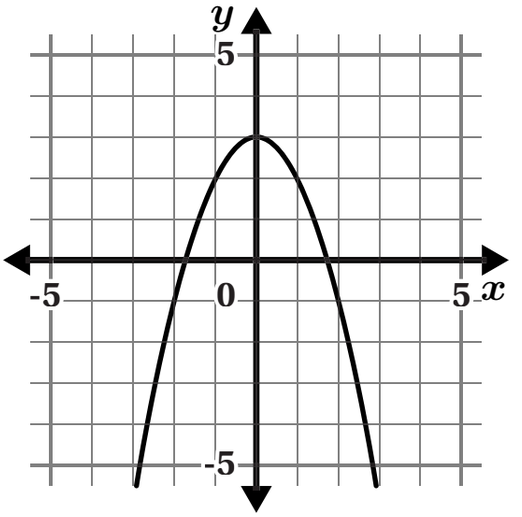
Name: ..... Date: ..... Period: .....

Problems 5–6: Write an equation to match each graph.

5. Equation: .....



6. Equation: .....



7. Write the equations of three different quadratic functions that have the same x-intercepts but different y-intercepts.

Equation 1	Equation 2	Equation 3

Name: Date: Period:

Additional Practice 7.13

1. Match each function with its y-intercept. There will be one function with no match.

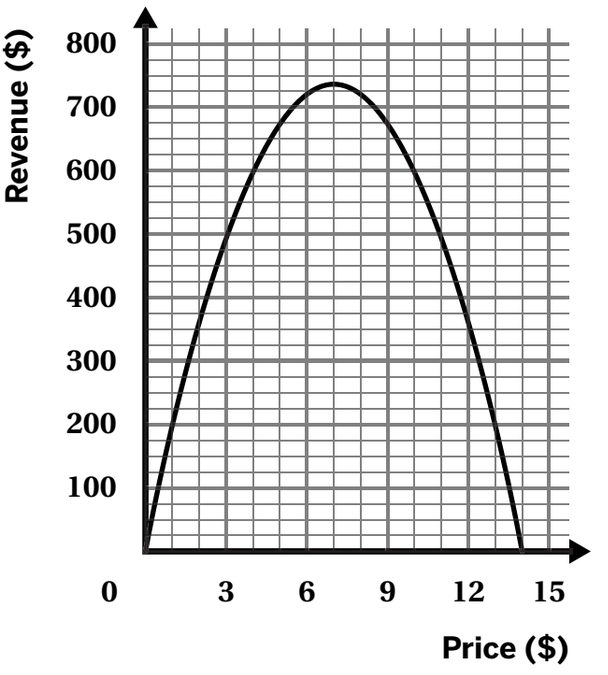
$f(x) = 5x^2 - 12x + 6$	$h(x) = 6x^2 - 5x + 12$
$g(x) = -6 + 12x^2 + 5x$	$j(x) = 5 - 12x^2 - 6x$

$(0, 12)$	**$(0, 5)$**	$(0, -6)$

2. Here is a function: $a(x) = (x + 4)^2$. Determine if each statement is true or false, or if there is not enough information.

The vertex of a is at $(-4, 0)$.		False	Not enough information
The y-intercept of a is at $(0, -4)$.	True		Not enough information
An x-intercept of a is at $(-4, 0)$.		False	Not enough information

3. The function f represents the revenue, in dollars, a school can expect to receive it it sells $210-5x$ cookie tubs for x-dollars each. The graph of the function is shown. Select *all* the statements that describe this situation.



- ☐ **A.** At $4 per cookie tub, the revenue will be $600.
- ☐ **B.** The school expects to sell 600 cookie tubs if the price is $10.
- ☐ **C.** The school will earn about $500 if it sells the cookie tubs for $11 each.
- ☐ **D.** If the school sells the cookie tubs for $7 each, it will earn about $720.
- ☐ **E.** The revenue will be at least $700 if the price is between $5 and $10.

Name: Date: Period:

Problems 4–8: Venue A is selling tickets to an upcoming popular performance. The company asked their patrons how much they would pay for a ticket to this event.

4. Complete the table.

Price per ticket ($)	Number of Customers	Revenue ($)
20	140	
30	70	

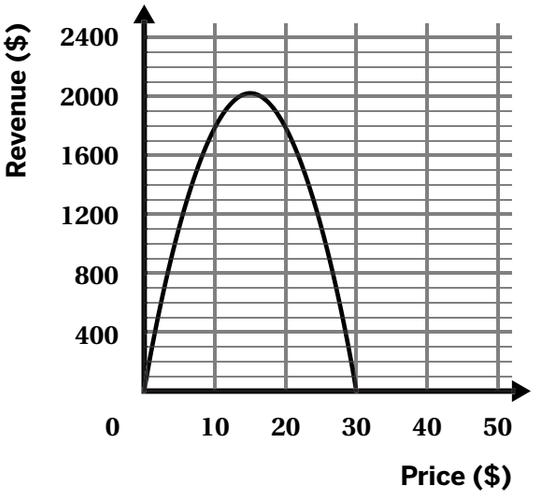
Venue A used your table to create a revenue model: $r(p) = p(280 - 7p)$, where p represents the price of one ticket.

5. At what price will Venue A make $\$0$ in their revenue?

6. At what price will Venue A maximize their revenue?

7. Venue B has a similar upcoming performance. This graph models their revenue with a vertex at about the point $(15, 2000)$.

What is the price that will maximize Venue B's revenue?



8. Which venue has a higher maximum revenue? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.14

1. Select *all* the quadratic expressions written in vertex form.

- ☐ **A.** $x(x-2)$
- ☐ **B.** $(x+3)^2+7$
- ☐ **C.** $(x-1)^2+2$
- ☐ **D.** $(x+6)(x-6)$
- ☐ **E.** $(x-4)^2$
- ☐ **F.** x^2+5

2. For which function are the coordinates of the vertex $(7, -3)$?

A. $f(x)=(x+7)^2-3$

B. $f(x)=(x-7)^2+3$

C. $f(x)=(x+7)^2+3$

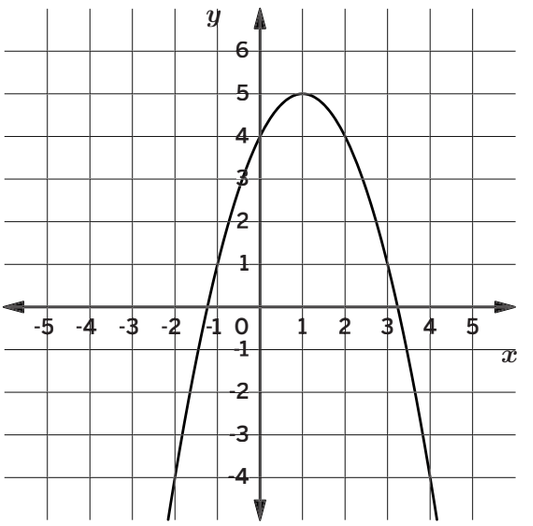
D. $f(x)=(x-7)^2-3$

3. Consider the function $f(x)=(x-2)^2+5$.

a What are the coordinates of the vertex of the graph of $f(x)$?

b Is the graph concave up or concave down? Explain your thinking.

4. Which function is represented by the graph?



A. $f(x)=-(x+1)^2-5$

B. $f(x)=-(x-1)^2+5$

C. $f(x)=(x+1)^2-5$

D. $f(x)=(x-1)^2+5$

Name: ..... Date: ..... Period: .....

5. Which function has a graph that opens upward and has a vertex at $(-9, -2)$?

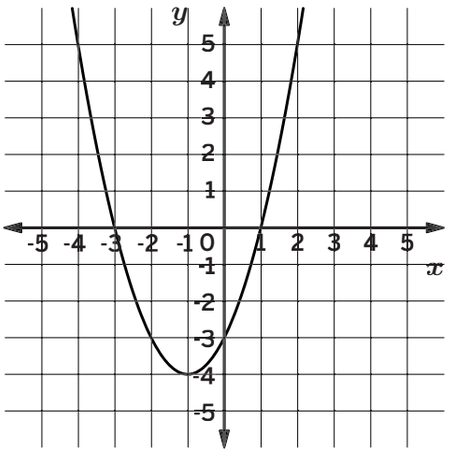
A. $h(x) = (x + 9)^2 - 2$

B. $h(x) = (x - 9)^2 + 2$

C. $h(x) = (x - 9)^2 - 2$

D. $h(x) = -(x + 9)^2 - 2$

6. The graph of function $h(x)$ is shown. Which of the following functions have a graph with a higher vertex than the graph of $h(x)$?



A. $m(x) = (x + 1)^2 - 4$

B. $m(x) = (x + 2)^2 - 4$

C. $m(x) = (x + 3)^2 - 2$

D. $m(x) = (x + 4)^2 - 5$

7. Function $p(x)$ opens upward and its vertex is located at $(2, 8)$. Write an equation that represents the function.

8. Consider the two quadratic functions:

$f(x) = (x + 6)(x + 4)$ $\qquad$ $g(x) = (x + 5)^2 - 1$

a Are the functions equivalent? Explain your thinking.

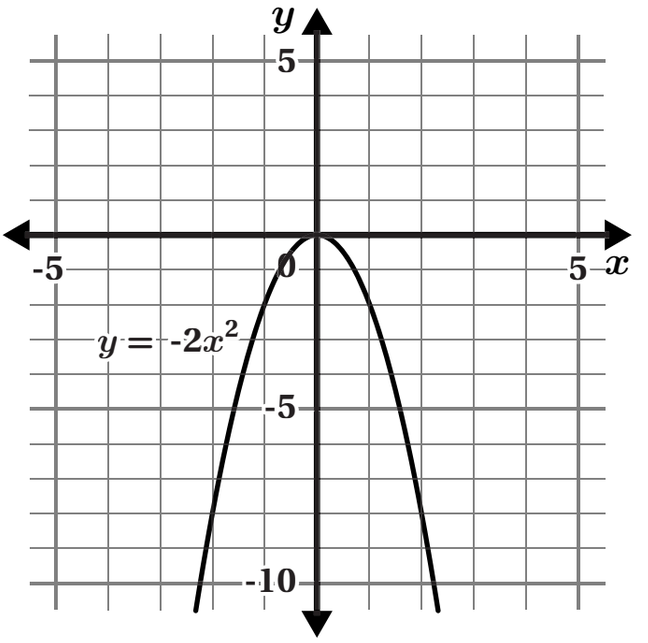
b What are the x-intercepts of the graph of $g(x)$? Explain your thinking.

c What is the vertex of the graph of $f(x)$? Explain your thinking.

Name: Date: Period:

Additional Practice 7.15

Problems 1–3: Here's the graph of $y = -2x^2$. Change one number to make the graph:



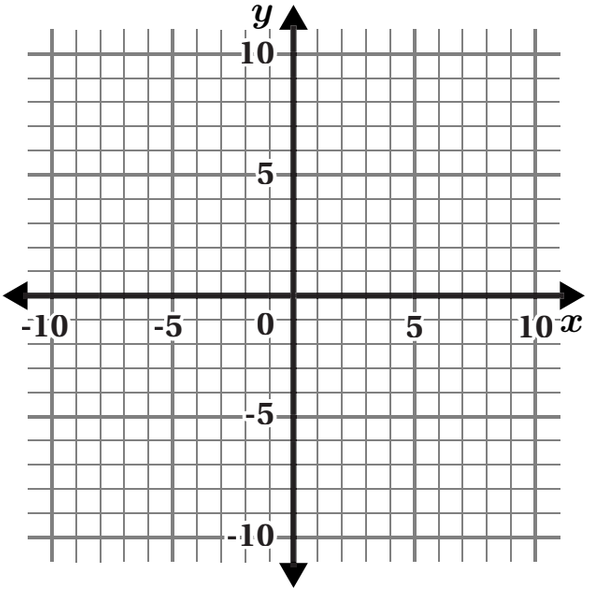
1. Wider:

2. Narrower:

3. Open up:

4. Describe how the graph of $f(x) = x^2$ compares to the graph of $g(x) = 3(x + 1)^2 - 4$.

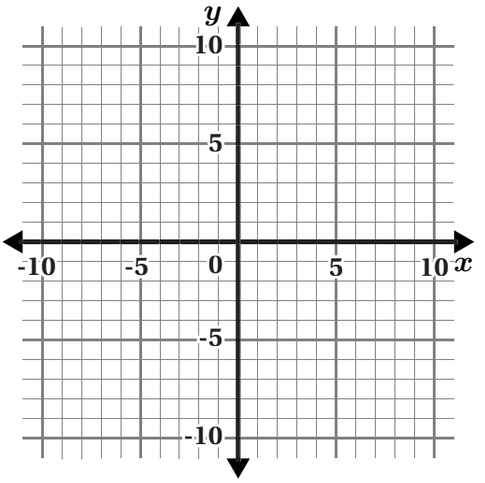
5. Draw the graph of a parabola that has a vertex at $(-1, 6)$ and is vertically stretched by a factor of $-\frac{1}{2}$.



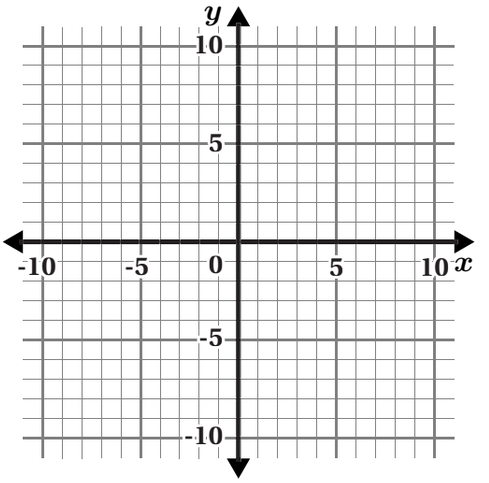
Name: ..... Date: ..... Period: .....

Problems 6–7: Draw a graph for each situation.

6. $c(x) = 0.5(x - 1)^2 + 3$



7. $d(x) = -3(x + 2)^2 + 4$



8. The graph of $h(x) = x^2$ is modified so that its new equation is $j(x) = -2(x - 9)^2 + 6$. Select *all* of the following statements that are true.

- ☐ **A.** The graph of $j(x)$ is concave up.
- ☐ **B.** The graph of $j(x)$ is concave down.
- ☐ **C.** The graph of $j(x)$ is narrower than $h(x)$.
- ☐ **D.** The graph of $j(x)$ is wider than $h(x)$.
- ☐ **E.** The vertex of $j(x)$ is translated 9 units to the right and 6 units down from the location of the vertex of $h(x)$.
- ☐ **F.** The vertex of $j(x)$ is translated 9 units to the left and 6 units down from the location of the vertex of $h(x)$.

Name: ..... Date: ..... Period: .....

Additional Practice 7.16

1. Which equation can be represented by a graph with a vertex at $(5, 8)$?

A. $y = (x + 5)^2 + 8$

B. $y = (x - 5)^2 + 8$

C. $y = (x + 8)^2 + 5$

D. $y = (x - 8)^2 + 5$

2. What is the value of each function at $x = 0$?

a $f(x) = (x + 3)^2$

b $h(x) = (x + 6)^2 - 1$

c $j(x) = (x - 2)^2 - 8$

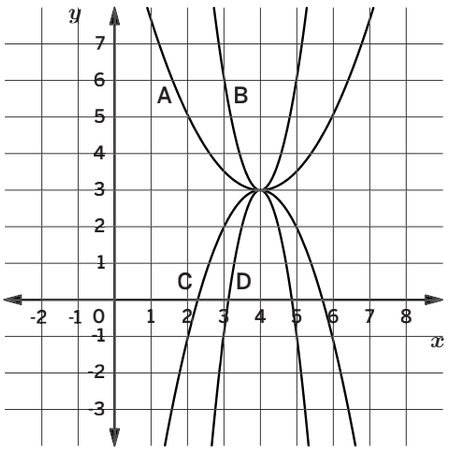
3. Match each graph with the equation that represents it.

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

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

..... $y = \frac{1}{2}(x - 4)^2 + 3$

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



4. Select *all* the true statements about the function $f(x) = -(x + 2)^2 - 9$.

☐ **A.** The vertex of the graph is located at $(2, -9)$.

☐ **B.** The vertex of the graph is located at $(-2, -9)$.

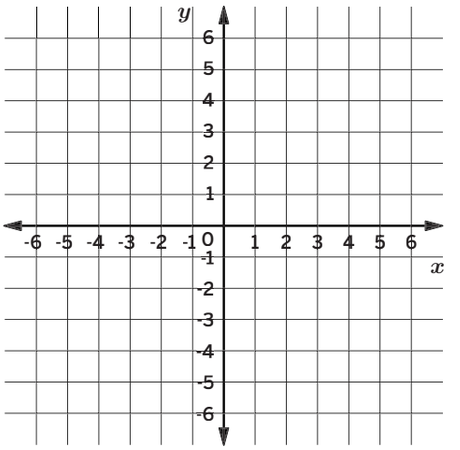
☐ **C.** The y-intercept is located at $(0, -13)$.

☐ **D.** The y-intercept is located at $(0, -9)$.

☐ **E.** The graph opens downward.

Name: ..... Date: ..... Period: .....

5. Consider the function $g(x) = (x + 3)^2 - 4$.



a What are the coordinates of the vertex of the graph of the function?

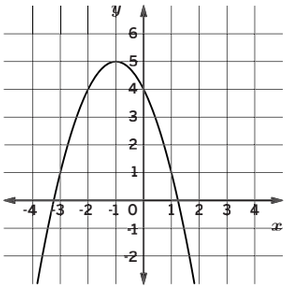
b Is the vertex a maximum or a minimum? Explain your thinking.

c Sketch a graph of the function.

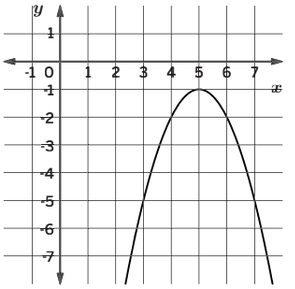
6. Match each graph with the equation that it represents.

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

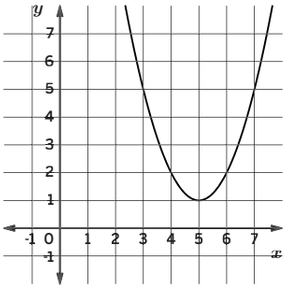
a



b



c



7. Consider the quadratic function $r(x) = (x + 2)^2 - 7$.

a What are the coordinates of the vertex of the graph of the function?

b What is the equation of the axis of symmetry?

c The graph of $r(x)$ passes through $(0, -3)$. What is the point on the graph that is on the other side of the axis of symmetry? Explain or show your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.17

1. Which function has a vertex at $(-3, 7)$?

A. $y = (x - 3)^2 + 7$

B. $y = (x - 3)^2 - 7$

C. $y = (x + 3)^2 + 7$

D. $y = (x + 3)^2 - 7$

2. Select *all* the functions whose graphs have an x-intercept at $(-2, 0)$.

☐ **A.** $a(x) = (x - 2)(x - 4)$

☐ **B.** $b(x) = (x + 2)(x + 4)$

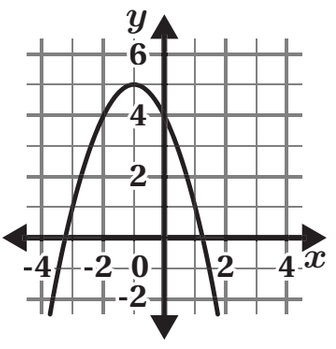
☐ **C.** $c(x) = 2x(x + 6)$

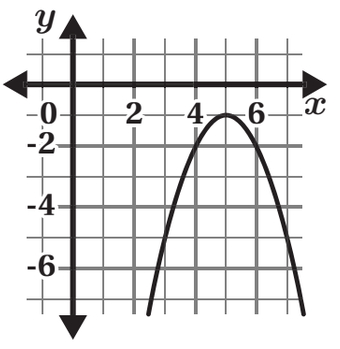
☐ **D.** $d(x) = (2x + 4)(x + 3)$

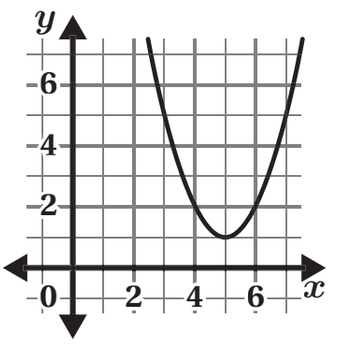
☐ **E.** $e(x) = (3x - 6)(x + 5)$

3. Match each equation to the graph it represents. One equation will have no match.

A. $y = -(x - 1)^2 + 5$	**B.** $y = -x^2 - 2x + 4$
C. $y = -(x - 5)^2 - 1$	**D.** $y = (x - 5)^2 + 1$





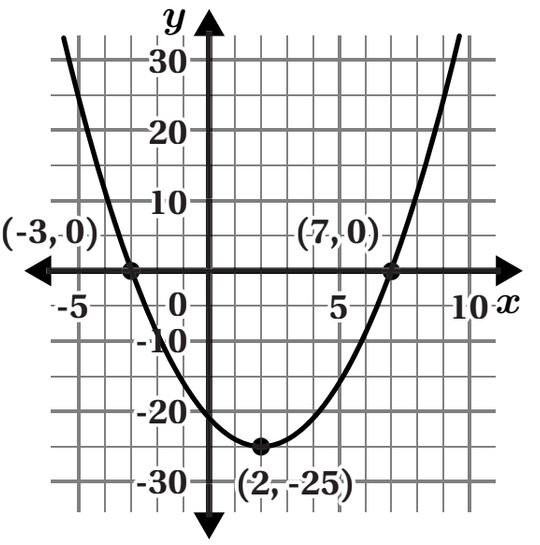


Name: ..... Date: ..... Period: .....

4. Write an equation of a parabola that opens downward and has x-intercepts at $(-4,0)$ and $(6,0)$.

Problems 5–6: Terrence and Raj write the equation to describe this graph. At least one equation is incorrect.

Terrence	Raj
$y = (x + 2)^2 - 25$	$y = -(x + 3)(x - 7)$



5. Whose equation is correct? Circle your choice.

Terrence Raj Neither

6. Explain what you would change about the incorrect equation(s) so that it creates this graph.

Problems 7–8: Here is a function: $r(x) = -x(x + 4)$.

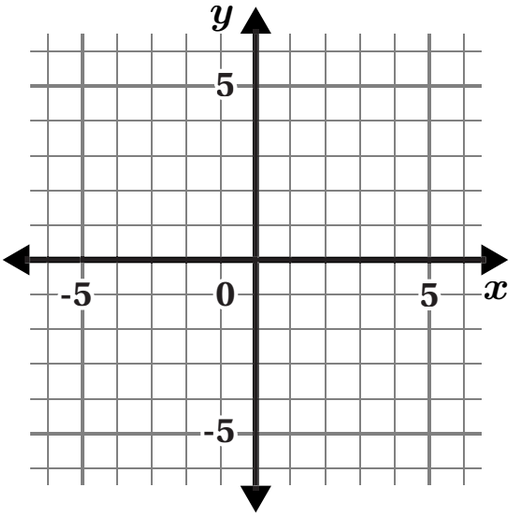
7. Determine the x-intercepts and vertex of $r(x)$.

x-intercept: .....

x-intercept: .....

vertex: .....

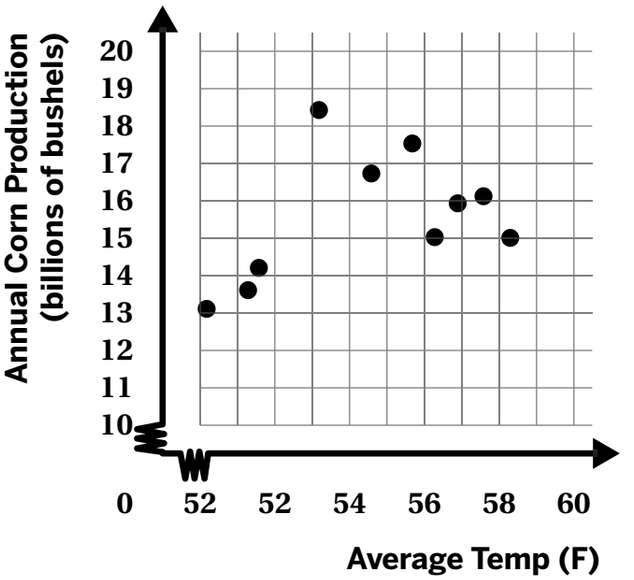
8. Draw the graph of the function $r(x)$.



Name: Date: Period:

Additional Practice 7.18

Problems 1–3: The graph shows the relationship between the annual U.S. corn production (in billions of bushels) and the average Midwest temperature, in degrees Fahrenheit, from 2014 to 2024.



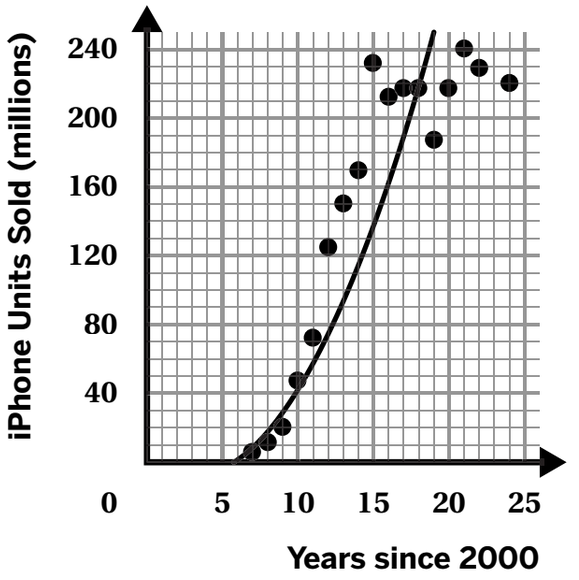
1. Graph two different quadratic functions that could be useful for modeling different domains of this data.

2. Use your model to predict the annual corn production, in billions of bushels, in 2030, based on average temperatures in the Midwest states.

3. Do you think your model is useful for making predictions about annual corn production based on temperatures in the Midwest states, after 2030? Explain your thinking.

Name: Date: Period:

Problems 4–6: The graph shows the number of Apple iPhones sold (in millions) from 2007 to 2024. Max modeled the data with a quadratic function.



4. Describe an advantage of using Max's model.

5. Describe a disadvantage of using Max's model.

6. How might Max improve his model?

Algebra 1 | Unit 8

Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 8.01

Problems 1–4: Fill in the blanks to make each equation true.

1. $(5x^2 + 4x - 6) + (\_\_\_\_\_ x^2 + \_\_\_\_\_ x + \_\_\_\_\_) = 6x^2 + 8x$

2. $(6x^2 + 4x - 3) - (\_\_\_\_\_ x^2 + \_\_\_\_\_ x + \_\_\_\_\_) = 3x^2 - 4$

3. $(6x^2 + 4x - 6) - (\_\_\_\_\_ x^2 + \_\_\_\_\_ x + \_\_\_\_\_) = 4x^2 + 3x - 7$

4. $(x^2 + 2x - 6) + (\_\_\_\_\_ x^2 + \_\_\_\_\_ x + \_\_\_\_\_) = 5x^2 + 4x + 4$

5. Here is a function: $c(x) = (3x^2 + 4x + 2) + (-3x^2 + 1)$.

What will the graph of c(x) look like?

a. Parabola that is concave up

b. Parabola that is concave down

c. Line with a positive slope

d. Line with a negative slope

e. Line with a slope of 0

Name: ..... Date: ..... Period: .....

Problems 6–9: Write an equivalent function using the least number of terms with $f(x) = 6x^2 + 4x - 6$ and $g(x) = -4x^2 - 2x + 6$.

6. $f(x)+g(x)$

7. $g(x)+f(x)$

8. $f(x)-g(x)$

9. $g(x)-f(x)$

10. Leo wants to subtract $(5x^2 + 4x - 3) - (2x^2 + 8x - 3)$. What expression should Leo get when finding the difference?

a. $3x^2 - 4x - 6$

b. $3x^2 - 4x$

c. $7x^2 + 12x - 6$

d. $7x^2 + 12x$

Show your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 8.02

1. Match each expression to its equivalent expression in standard form.

a. $(2x + 3)(x + 4)$ ..... $x^2 + 10x + 16$

b. $(x + 3)(x + 2)$ ..... $2x^2 + 11x + 12$

c. $(x + 8)(x + 2)$ ..... $x^2 + 5x + 6$

d. $(x + 3)(2x + 1)$ ..... $2x^2 + 7x + 3$

2. Complete the table by writing each expression in standard form.

Factored Form	Standard Form
$(x - 2)(x - 4)$	
$(x + 5)(x + 2)$	

3. Chelsea wants to multiply $(x + 1)$ $(2x - 3)$ and rewrite it in standard form. What is the equivalent expression in standard form?

a. $2x^2 - 2x - 6$

b. $2x^2 - x - 3$

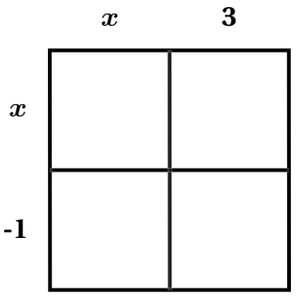
c. $3x^2 - 2x - 6$

d. $3x^2 - x - 3$

Name: ..... Date: ..... Period: .....

Problems 4–6: Write an expression in factored form and standard form that represents each area model.

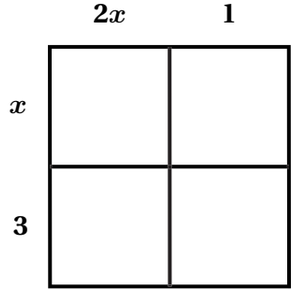
4.



Factored form: .....

Standard form: .....

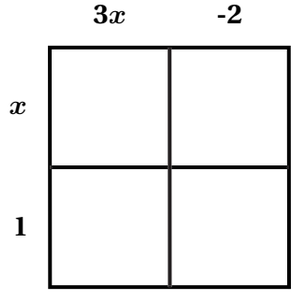
5.



Factored form: .....

Standard form: .....

6.



Factored form: .....

Standard form: .....

Name: ..... Date: ..... Period: .....

Additional Practice 8.03

1. Is the quadratic expression $2x(x-1)$ in standard form or in factored form?

2. Which quadratic expression is written in standard form?

A. $(x+3)^2-2$

B. $(x-8)3x$

C. $4x^2+7(x-1)$

D. $-2x^2+7x+4$

3. Consider the quadratic expression $3x^2-x$.

a Is the expression in standard form? Explain your thinking.

b Is the expression equivalent to $x(3x-1)$? Explain your thinking.

4. Which expression is equivalent to $(4x-2)(2x+3)$?

A. $8x^2-4x+6$

B. $8x^2+12x+6$

C. $8x^2+8x-6$

D. $8x^2+10x-6$

5. Match each quadratic expression in factored form with an equivalent expanded expression in standard form.

Factored form	Standard form
a. $(x+3)(x+8)$	..... $x^2-8x+12$
b. $(2x+4)(x-3)$	..... $x^2+11x+24$
c. $(2x+6)(x+4)$	..... $2x^2-2x-12$
d. $(x-2)(x-6)$	..... $2x^2+14x+24$

Name: Date: Period:

6. Write each quadratic expression in standard form. Draw a diagram to explain your thinking.

a $(x - 2)(x + 7)$

b $(3x + 1)(x - 1)$

c $(x - 6)^2$

d $(2x + 4)(3x + 5)$

7. Consider the two quadratic expressions:

$(x + 3)^2 - 1$ $(x + 4)(x + 2)$

Are the expressions equivalent? Explain your thinking.

8. Consider the quadratic expression (2x - 6)(-x + 5). Mai claims that when the expression is written in standard form, it has two negative terms. Han claims that when the expression is written in standard form, it has three negative terms. Who is correct? Explain or show your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 8.04

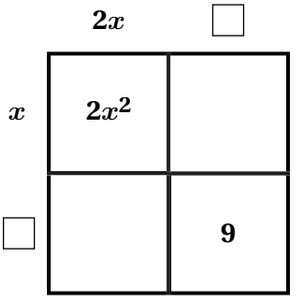
1. Determine values that make the equation true.

$4x^2 + 4x - \_\_\_\_\_ = (\_\_\_\_\_x - 1)(2x + \_\_\_\_\_)$

2. Rewrite each expression in factored or standard form.

Factored form	Standard form
$(3x + 1)(3x - 1)$	
	$4x^2 - 7x - 2$
$(2x + 3)(x - 6)$	
	$x^2 + 6x + 9$

3. Write two possible constants that could complete the outside of the diagram.



Name: _____ Date: _____ Period: _____

Problems 4–5: Complete the diagram puzzles and expressions.

4.

	$3x$	2
x	$3x^2$	
-4		-8

Factored form: _____

Standard form: _____

5.

	$4x$	-3
x	$4x^2$	
$\square$	$8x$	

Factored form: _____

Standard form: _____

6. This quadratic expression in standard form has an unknown c-value. If we know the expression can be factored, fill in the c-value.

$3x^2 - 7x +$ _____

Name: ..... Date: ..... Period: .....

Additional Practice 8.05

1. Select *all* expressions that are equivalent to the expression $x + (-7)$.

- ☐ **A.** $7 + x$
- ☐ **B.** $x - 7$
- ☐ **C.** $7 - x$
- ☐ **D.** $-7 + x$
- ☐ **E.** $7 + (-x)$
- ☐ **F.** $-7 - (-x)$
- ☐ **G.** $-x - (-7)$

2. Determine the missing values for each pair of equivalent expressions.

a x^2 ..... x ..... and $(x + 8)(x + 1)$

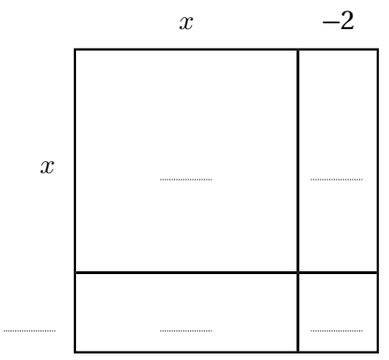
b $x^2 + 5x + 6$ and $(x + 2)(x$ .....$)$

c $x^2 - 16x + 63$ and $(x$ .....$)(x - 7)$

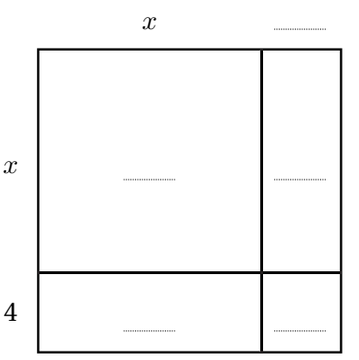
d $x^2 - 9x + 20$ and $(x - 5)(x$ .....$)$

3. Complete the diagrams to show that each pair of expressions are equivalent.

a $(x - 2)(x - 5)$ and $x^2 - 7x + 10$



b $(x + 9)(x + 4)$ and $x^2 + 13x + 36$



4. Rewrite each quadratic expression in standard form.

a $(x + 6)(x + 8)$

b $(x - 1)(x - 3)$

Name: Date: Period:

5. Rewrite each quadratic expression in factored form. Use a diagram, if helpful.

a $x^2 - 12x + 20$

b $x^2 + 14x + 49$

c $x^2 - 17x + 72$

d $x^2 + 9x + 20$

6. Each row in the table contains a pair of equivalent expressions. Complete the table by writing the missing equivalent expression. Consider drawing a diagram, if helpful.

Factored form	Standard form
$x(x + 4)$	
	$x^2 - 7x$
	$x^2 + 13x + 22$
$(x - 5)(x - 5)$	
	$x^2 - 12x + 27$

7. Consider the expressions $(x + c)(x + c)$ and $x^2 + cx + c^2$. Tyler claims the expressions are equivalent. Shawn claims the expressions are not equivalent. Who is correct? Explain your thinking.

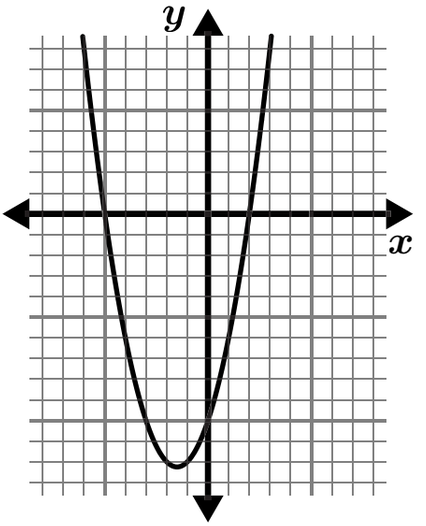
Name: ..... Date: ..... Period: .....

Additional Practice 8.06

1. Select *all* the functions that have 3 and −2 as their x-intercepts.

- ☐ **A.** $f(x) = (x + 3)(x - 2)$
- ☐ **B.** $g(x) = (x - 3)(x + 2)$
- ☐ **C.** $h(x) = x^2 - x - 6$
- ☐ **D.** $j(x) = 2x^2 - x - 6$
- ☐ **E.** $k(x) = (2x + 3)(2x - 2)$

2. What are the x-intercepts of the function $f(x) = (x + 5)(x - 2)$?



A. $(-5, 0)$ and $(2, 0)$

B. $(5, 0)$ and $(-2, 0)$

C. $(0, 5)$ and $(0, 2)$

D. $(2, 5)$ and $(0, 0)$

3. How many zeros does the function $g(x) = x^2 + 6x + 9$ have?

A. 0

B. 1

C. 2

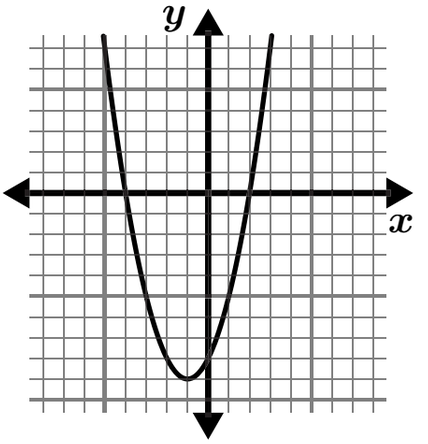
D. More information is needed.

Explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 4–5: What are the x-intercepts of the function?

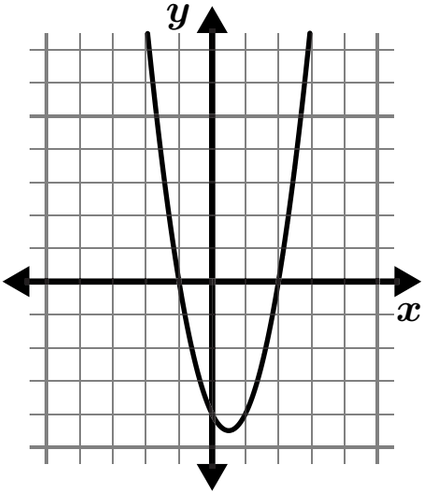
4. $f(x) = x^2 + 2x - 8$



x-intercept 1: .....

x-intercept 2: .....

5. $g(x) = 2x^2 - 2x - 4$



x-intercept 1: .....

x-intercept 2: .....

Name: Date: Period:

Additional Practice 8.07

1. Bard is solving the equation $x^2 - 8x = 20$. What should be Bard's first step?

A. Factor $x^2 - 8x$.

B. Divide each side by x.

C. Add 20 to both sides of the equation.

D. Subtract 20 from both sides of the equation.

2. Determine the number of solutions to each equation.

a $(3x - 2)(x + 4) = 0$

b $(10 + t)(10 + t) = 0$

3. Find *all* the solutions to each equation.

a $n(n + 9) = 0$

b $(6 + y)(6 - y) = 0$

c $(3x - 1)(x + 11) = 0$

d $(4p + 8)(4p + 8) = 0$

e $(b + 7)(10 - b) = 0$

4. Rewrite each equation in factored form, if possible, and solve the equation using the Zero Product Property.

a $x^2 - 11x + 10 = 0$

b $t^2 + 24t + 144 = 0$

c $c^2 - c - 72 = 0$

d $h^2 - 0.4h + 0.04 = 0$

5. $x = 3$ is one of the solutions to the equation $x^2 - x - 6 = 0$. What is the other solution?

Name: Date: Period:

6. *Graphing technology required.* Consider the function $f(x) = x^2 + 8x + 16$.

a Use graphing technology to graph $f(x)$. How many x-intercepts does the graph have? If there are x-intercept(s), what are the coordinates?

b Solve the equation $x^2 + 8x + 16 = 0$ by writing it in factored form and using the Zero Product Property. Explain or show your thinking.

c Which of the following functions has a graph with only one x-intercept?

A. $f(x) = x^2 - 1$

B. $f(x) = x^2 - 3x$

C. $f(x) = x^2 + 10x + 25$

D. $f(x) = x^2 + 3x - 4$

7. A square pool has a walkway surrounding it. The total area of the pool and walkway is given by the equation $y = (x + 4)(x + 6)$, where y represents the area in square feet and x represents the side length of the pool in feet. The total area is 360 ft^2.

a Write an equation to represent the total area of the pool and walkway.

b What is the side length of the pool? Explain or show your thinking.

8. Lin is solving the quadratic equation $x^2 + 8x - 48 = 0$. Her work is shown.
Do you agree or disagree with her work? If you disagree, explain the error and correct it. Otherwise, check Lin's solutions by substituting them into the original equation and showing that the equation is true.

Lin's work:

$x^2 + 8x - 48 = 0$

$(x - 12)(x + 4) = 0$

$x - 12 = 0$ or $x + 4 = 0$

$x = 12$ or $x = -4$

Name: Date: Period:

Additional Practice 8.08

1. How many solutions does the quadratic equation have?

$(x + 10)^2 = -25$

A. No Solutions

B. One Solution

C. Two Solutions

D. More information is needed.

2. For each equation, determine the number of solutions.

Equation	Number of Solutions
$x^2 + 2 = 2$	
$(x - 3)^2 = 1$	
$(x + 8)^2 = \text{-}16$	
$(x + 3)^2 = 0$	
$x^2 - 8 = -4$	

3. What is the solution for the equation?

$(x - 2)^2 + 27 = 27$

A. $x = -2$

B. $x = 0$

C. $x = 2$

D. $x = -27$

Problems 4–5: Determine the solution for each equation.

4. $(x + 2)^2 = 0$

5. $(x + 3)(x + 3) = 0$

6. Which value for x is a solution to the equation $x^2 + 7x = x - 9$?

A. $x = -9$

B. $x = -3$

C. $x = 0$

D. $x = 3$

Explain your thinking.

Problems 7–8: Determine the two solutions for each equation.

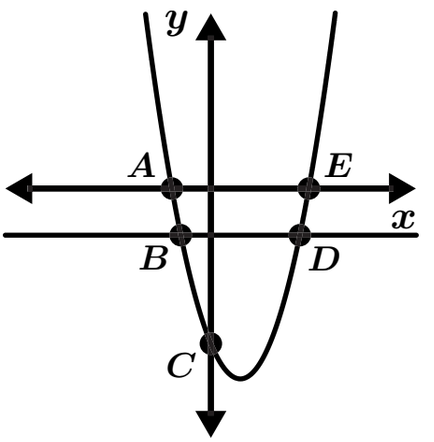
7. $x^2 - 20 = -4$

8. $100 + (x - 3)^2 = 136$

Name: ..... Date: ..... Period: .....

Additional Practice 8.09

1. Here is a graph of $y = x^2 - 3x - 10$ and $y = -4$.
Select *all* points that are solutions to $x^2 - 3x - 10 = -4$.



- ☐ **A.** Point A
- ☐ **B.** Point B
- ☐ **C.** Point C
- ☐ **D.** Point D
- ☐ **E.** Point E

Problems 2–5: Circle how many solutions each equation has. Record any solutions.

2. $3x^2 + 6 = 18$ No Solution One Solution Two Solutions $x =$ .....

$x =$ .....

3. $x(x - 5) = -6$ No Solution One Solution Two Solutions $x =$ .....

$x =$ .....

4. $0 = -(x - 3)(x + 2) - 10$ No Solution One Solution Two Solutions $x =$ .....

$x =$ .....

5. $x(x + 4) = -16$ No Solution One Solution Two Solutions $x =$ .....

$x =$ .....

Problems 6–7: Fill in the blank so the equation has:

6. One solution

$x(x - 2) =$ .....

7. No solutions

$(x + 3)(x -$ .....$) = -7$

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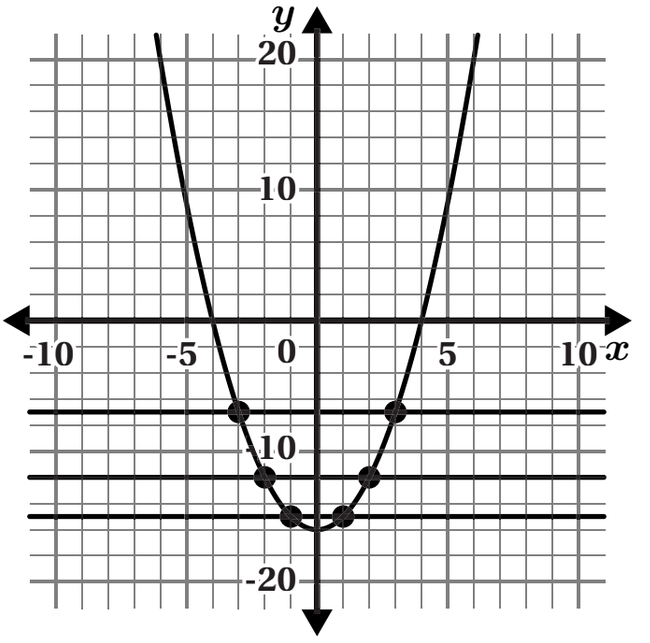
Problems 8–9: The graphs of $y = -16x^2$, $y = -15$, $y = -12$, and $y = -7$ all intersect at integer values.



8. Write the equations of three more lines that follow this property.

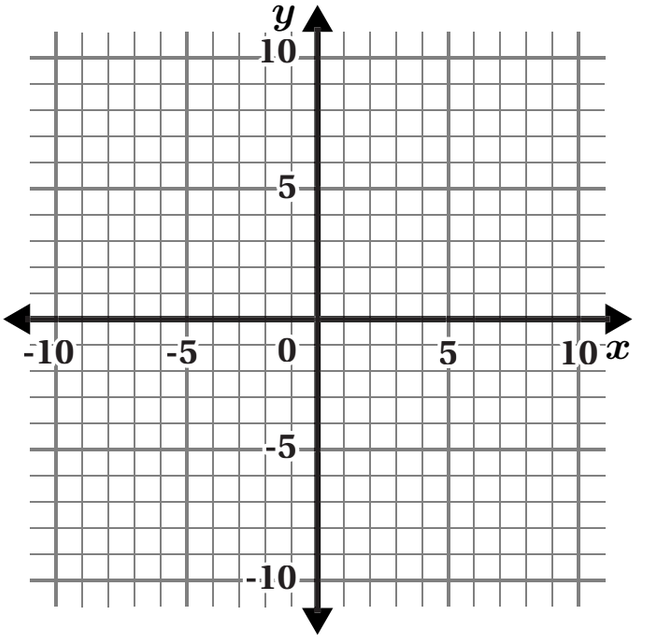
$y =$ .....

$y =$ .....

$y =$ .....

9. What pattern do you notice?

10. Solve $(x - 3)(x + 2) = 6$. Show and explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 8.10

1. Match each expression to an equivalent expression.

Equation	Solution
a. -2 ± 4	..... 2 and 12
b. $7 \pm \sqrt{25}$	..... $3 + \sqrt{8}$ and $3 - \sqrt{8}$
c. -5 ± 8	..... $4 + \sqrt{2}$ and $4 - \sqrt{2}$
d. $\sqrt{9} \pm \sqrt{8}$	..... 2 and -6
e. $\sqrt{16} \pm \sqrt{2}$	..... -13 and 3

Problems 2–5: Determine the exact solutions to each equation. Write the solutions using $\pm$ notation.

2. $x^2 = 100$ **3.** $x^2 = 12$ **4.** $4x^2 = 28$ **5.** $9x^2 - 49 = 0$

6. The steps for solving $(x-6)^2 + 11=60$ are shown. Complete the description of each step.

$(x - 6)^2 + 11 = 60$	**Step 1:** Write the original equation.
$(x - 6)^2 = 49$	**Step 2:** Subtract ..... from both sides of the equation.
$\sqrt{(x - 6)^2} = \sqrt{49}$	**Step 3:** Take the ..... of both sides of the equation.
$x - 6 = \pm 7$	**Step 4:** Simplify ..... sides of the equation.
$x = 6 \pm 7$	**Step 5:** Add ..... to both sides of the equation.
$x = -1$ and $x = 13$	**Step 6:** ..... and ..... values to get final solutions for x

Name: Date: Period:

Problems 7–9: Determine the exact solutions to each equation. Write the solutions using ± notation. Show your thinking.

7. $(x - 2)^2 = 8$

8. $3(x + 5)^2 = 18$

9. $7 + (3 + x)^2 = 16$

10. Determine the exact and approximate solutions to $5(x - 3)^2 - 6 = 24$. Write the solutions using ± notation. Show your thinking.

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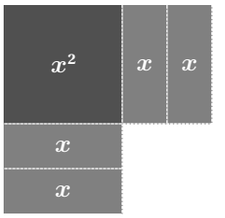
Additional Practice 8.11

1. The algebra tiles in the figure represent the expression $x^2 + 4x$. How many 1-tiles are needed to make the figure a square?



1-tile = 1

A. 1 tile

B. 2 tiles

C. 4 tiles

D. 8 tiles

2. Which expression is a perfect square expression?

A. $x(x-4)$

B. $(x+6)^2$

C. $x - 5^2$

D. $x^2 + 1$

3. Consider the incomplete quadratic expression $x^2 - 14x +$ _____.

a What value can be added to make the expression a perfect square expression?

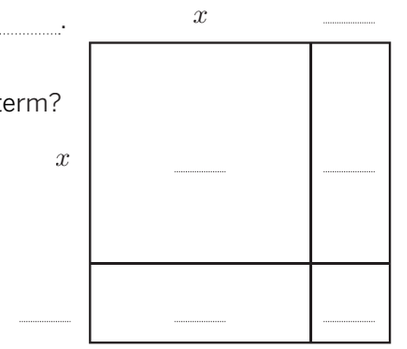
b Write the perfect square expression in factored form.

4. For each expression, determine the value that, when added to the expression, makes it a perfect square expression. Write the perfect square expression in both standard form and factored form.

Expression	Perfect square expression in standard form	Perfect square expression in factored form
$x^2 + 12x$		
$x^2 - 18x$		
$x^2 + 22x$		
$x^2 - 5x$		

Name: _____ Date: _____ Period: _____

5. Consider the incomplete quadratic expression $x^2 + 9x +$ _____.



a Complete the area diagram to turn the expression into a perfect square expression. What is the value of the missing term?

b Write the perfect square expression in factored form.

6. Each of the following expressions written in standard form is a perfect square expression that is missing either a coefficient or a constant term. Determine the missing value. Then match each expression in standard form with an equivalent perfect square expression in factored form.

	Standard Form	Factored Form
a	$x^2 + 14x +$ _____	_____ $(x - 3)^2$
b	$x^2 +$ _____ $x + 4$	_____ $(x + 7)^2$
c	$x^2 - 6x +$ _____	_____ $(x + 2)^2$
d	$x^2 -$ _____ $x + 16$	_____ $(x - 4)^2$

7. Lin is changing the expression $x^2 + 16x$ so that it will be a perfect square expression. Her work is shown. Andre studies Lin's work, but does not understand exactly what Lin did to change the expression. Complete Lin's missing step to help Andre see how Lin changed the expression.

Lin's work:

$x^2 + 16x =$ _____

$= (x + 8)^2$

8. Consider the quadratic expression $x^2 - 30x$. Elena claims that 900 can be added to the expression to make it a perfect square expression. Shawn argues that the number 225 must be added to the expression to make it a perfect square expression. Who is correct? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 8.12

1. What number can you add to each expression to make it a perfect square expression?

a $x^2 + 10x + 14$

b $x^2 - 8x - 3$

2. Which value(s) of x make the equation $(x + 1)^2 = 4$ true? Select *all* that apply.

- ☐ **A.** -3
- ☐ **B.** -1
- ☐ **C.** 0
- ☐ **D.** 1
- ☐ **E.** 2
- ☐ **F.** 3

3. Jada wants to solve the quadratic equation $x^2 - 10x + 21 = 0$ by completing the square. Her work is shown. She says that there is one solution, $x = 5$. Do you agree with Jada? Explain your thinking.

Jada's work:

$$x^2 - 10x + 21 = 0$$
$$x^2 - 10x + 21 + 4 = 0$$
$$x^2 - 10x + 25 = 0$$
$$(x - 5)^2 = 0$$

4. Solve each equation by completing the square.

a $x^2 - 4x - 3 = 2$

b $x^2 + 8x + 3 = -9$

c $x^2 - 14x + 54 = 5$

d $7 = x^2 + 6x - 20$

Name: Date: Period:

5. Which of the following could be the first step in solving the quadratic equation $x^2 + 8x - 20 = 0$ by completing the square?

A. $x^2 + 8x - 16 = 20$

B. $x^2 + 8x - 20 + 36 = 36$

C. $x^2 + 8x - 20 = -20$

D. $x^2 + 8x - 20 + 16 = 0$

6. Solve each equation by completing the square.

a $x^2 - 1.4x = 0.51$

b $x^2 + 3x = \frac{7}{4}$

c $(5 - x)(1 - x) + 3 = 0$

7. Priya wants to solve the quadratic equation $x^2 + 12x + 11 = 0$ by completing the square. Her work is shown. She says that the solutions are $x = 19$ or $x = -31$. Which of the following statements is true?

Priya's work:

$$x^2 + 12x + 11 = 0$$
$$x^2 + 12x + 36 = 25$$
$$(x + 6)^2 = 25$$
$$x + 6 = 25 \text{ or } x + 6 = -25$$
$$x = 19 \text{ or } x = -31$$

A. Priya's work and solutions are correct.

B. Priya made an error in the second line by adding 25 to each side of the equation.

C. Priya made an error in the third line by incorrectly writing the expression in factored form.

D. Priya made an error in the fourth line by not taking the square root of 25.

8. Consider the quadratic equation $x^2 + 16x + 38 = 23$. Bard claims that when solving the equation by completing the square, the equation has one solution, $x = -1$. Do you agree? Explain your thinking.

Name: Date: Period:

Additional Practice 8.13

1. Select *all* the expressions that are equivalent to $x^2 - 36x$.

- ☐ **A.** $(x - 6)^2$
- ☐ **B.** $(x - 6)(x + 6)$
- ☐ **C.** $x(x - 36)$
- ☐ **D.** $(x - 18)^2 - 324$
- ☐ **E.** $x^2 - 36x + 324 - 324$

Problems 2–4: Each of these equations represents the same function in an equivalent form. Complete the table with which feature of the function's graph (vertex, y-intercept, x-intercepts) can easily be determined and the coordinates.

	Function form	Feature of function's form	Coordinates
2.	$g(x) = (x + 6)(x - 4)$		
3.	$g(x) = x^2 + 2x - 24$		
4.	$g(x) = (x + 1)^2 - 25$		

5. Ming and Violet are changing the expression $x^2 + 10x + 14$ into vertex form. Their work is shown below. They each made an error.

Ming's Work

$$x^2 + 10x + 14$$
$$x^2 + 10x + 25 - 25 + 14$$
$$(x + 10)^2 - 9$$

The vertex is $(-10, 9)$.

Violet's Work

$$x^2 + 10x + 14$$
$$x^2 + 10x + 25 + 14$$
$$(x + 5)^2 + 39$$

The vertex is $(-5, 39)$.

Choose one of the students above and explain the error they made in their work.

Name: Date: Period:

Problems 6–9: Complete the table by writing each expression in the missing form.

	Vertex Form	Standard Form	Factored Form
6.	$(x+1)^2-9$		$(x+4)(x-2)$
7.		x^2+12x	
8.		x^2-8x-9	
9.		$3x^2+30x+63$	

Name: ..... Date: ..... Period: .....

Additional Practice 8.14

1. Which of the following is the correct form of the quadratic formula?

A. $x = \frac{b \pm \sqrt{b - 4ac}}{2a}$ **B.** $x = \frac{-b \pm \sqrt{b^2 - ac}}{2a}$ **C.** $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{a}$

D. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ **E.** $y = \frac{b \pm \sqrt{b^2 - 4ac}}{2a}$

Problems 2–5: Identify the values for a,b, and c in each of the quadratic equations below.

	Equation	a-term	b-term	c-term
2.	$-2x^2 - 7x + 5 = 0$			
3.	$8x^2 = 2x + 4$			
4.	$4x^2 = 12$			
5.	$2x(x - 5) = 0$			

6. Janie used the quadratic formula to solve the equation $x^2 + 6x + 10 = 0$. Her work is shown below. How many solutions are there for x? Explain or show how you know.

$$x^2 + 6x + 10 = 0$$
$$a = 1 \quad b = 6 \quad c = 10$$

Problems 7–10: Here is the equation $x^2 - 8x = -7$.

7. Write the equation in standard form.

8. Identify the values for a,b, and c.

$a =$ ..... $b =$ ..... $c =$ .....

9. Substitute the values for a,b, and c into the quadratic formula. (You don't need to perform any operations.)

Name: Date: Period:

10. Show or explain how the expression you wrote is related to solving $x^2 - 8x = -7$ by completing the square.

Name: ..... Date: ..... Period: .....

Additional Practice 8.15

1. For each equation, identify the values of a, b, and c.

a $2x^2 + 5x + 1 = 0$

b $-4x^2 + 3x + 6 = 0$

c $x^2 - 7x + 4 = 0$

d $-x^2 + 10x - 8 = 0$

2. What are the values of x if $x = \frac{7 \pm \sqrt{49 - (-72)}}{4}$?

A. 0 and $-\frac{9}{2}$

B. 0 and 1

C. -1 and $\frac{9}{2}$

D. $-\frac{9}{2}$ and 1

3. Determine whether the solutions for each quadratic equation are correct. Use the quadratic formula to verify that the solutions are correct or to show that they are not correct.

a Equation: $x^2 - x - 56 = 0$ Solutions: $x = -7$ or $x = 8$

b Equation: $x^2 + 4x - 45 = 0$ Solutions: $x = -9$ or $x = 58$

c Equation: $2x^2 - 8x + 3 = 0$ Solutions: $x = \frac{4 + \sqrt{10}}{2}$ or $x = \frac{4 - \sqrt{10}}{2}$

4. For each equation, identify the values of a, b, and c.

a $24 + 2x - x^2 = 0$

b $\frac{3}{4}x^2 - 8x = \frac{1}{4}$

c $x^2 = 100$

d $5x - 2x^2 = -19$

Name: ..... Date: ..... Period: .....

5. Solve each quadratic equation using the quadratic formula. Show your thinking.

a $x^2 + 5x - 36 = 0$

b $2x^2 + 9x - 35 = 0$

c $2x^2 - 16x + 30 = 0$

d $x^2 + 8x + 4 = 0$

6. Solve each quadratic equation using any strategy.

a $x^2 - 2x - 63 = 0$

b $2x^2 + 18x + 40 = 0$

c $4x^2 - 45x + 11 = 0$

d $3x^2 + 15x - 2 = 0$

7. Diego is solving $5x^2 - x - 8 = 0$ using the quadratic formula. His work is shown. Are his solutions correct? Explain your thinking.

Diego's work:

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(5)(-8)}}{2(5)}$$

$$x = \frac{1 \pm \sqrt{-1 + 160}}{10}$$

$$x = \frac{1 + \sqrt{159}}{10} \text{ or } x = \frac{1 - \sqrt{159}}{10}$$

Name: Date: Period:

Additional Practice 8.16

1. Select *all* the equations that have two solutions.

- ☐ **A.** $(x+2)^2 = -4$
- ☐ **B.** $(x-7)^2 = 9$
- ☐ **C.** $(x-8)^2 - 16 = 0$
- ☐ **D.** $(x+5)^2 = 0$
- ☐ **E.** $(x-3)^2 = 1$
- ☐ **F.** $10 = (x+6)(x+6)$

2. Evaluate the expression $2x^2 - 3x + c$ when $c = 4$ and $x = 2$.

A. 0

B. 2

C. 4

D. 6

3. An apple is launched into the air from a toy cannon. The function $g(t) = -4.9t^2 + 40t + 6$ models the height, in meters, of the apple t seconds after it has been launched.

a Write an equation to determine when the apple will hit the ground.

b Use the quadratic formula to determine when the apple hits the ground. Round to the nearest thousandths.

4. Two objects are launched into the air. The function $h(t) = 45 + 130t - 16t^2$ models the height, in feet, of Object A t seconds after it has been launched. The function $f(t) = 18 + 70t - 16t^2$ models the height, in feet, of Object B t seconds after it has been launched.

a After 5 seconds have passed, which object is still in the air?

b Write equations for each object to determine when each object will hit the ground.

c Use the quadratic formula to determine when each object hits the ground. Round to the nearest thousandths.

Name: Date: Period:

5. A picture is 10 in. wide, 15 in. long, and has a frame x in. thick surrounding it. The equation $(10 + 2x)(15 + 2x) = 336$ represents the total area, in square inches, of a picture and its frame.

a Rewrite the equation $(10 + 2x)(15 + 2x) = 336$ in standard form.

b Use the quadratic formula to solve your equation and determine the thickness of the frame.

6. A picture is 8 in. wide and 10 in. long. It has a frame around it that is of equal thickness all the way around. The equation $(8 + 2x)(10 + 2x) = 195$ represents the total area, in square inches, of the picture and the frame.

a Rewrite the equation $(8 + 2x)(10 + 2x) = 195$ in standard form.

b Solve your equation using the quadratic formula. What do the solutions represent?

7. A ball is thrown up into the air. Its height in inches is modeled by the function $h(t) = -16t^2 + 28t + 3$, where t is the time after the ball is thrown, measured in seconds. Solve the equation $-16t^2 + 28t + 3 = 0$. What do the solutions tell you about the ball?

8. A projectile is launched into the air and its height above the ground, in feet, is modeled by the function $f(t) = 6 + 32t - 16t^2$, where t is the number of seconds since the projectile was launched.

a What are the solutions to the equation $0 = 6 + 32t - 16t^2$?

b Do both of the solutions have meaning in this context? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 8.17

1. Here are sums and products of rational and irrational numbers. Select *all* solutions that are rational numbers.

- ☐ **A.** $\frac{1}{4} \cdot \sqrt{9}$
- ☐ **B.** $\sqrt{5} + \sqrt{9}$
- ☐ **C.** $2.6 + 5.3$
- ☐ **D.** $-\sqrt{7} + \sqrt{7}$
- ☐ **E.** $\sqrt{16} \cdot \sqrt{4}$
- ☐ **F.** $6 + \sqrt{6}$

2. Determine which of the following statements are *always true*, *true for some numbers*, or *never true*. Explain your thinking.

a An irrational number multiplied by a rational number is always rational.

b Two rational numbers added together will always be rational.

c Multiplying an irrational number by another non-zero irrational number will result in an irrational number.

d The sum or a rational number and an irrational number is sometimes rational.

3. Which of the following numbers will result in a rational number when multiplied by $\sqrt{2}$. Select *all* that apply.

- ☐ **A.** 2
- ☐ **B.** 8
- ☐ **C.** $\frac{1}{2}$
- ☐ **D.** $\sqrt{2}$
- ☐ **E.** $\sqrt{4}$
- ☐ **F.** $\sqrt{8}$

Name: Date: Period:

4. Which of the following examples show that the statement "The product of a rational number and an irrational number is irrational" is false?

A. $\sqrt{7} \cdot \sqrt{7} = 7$

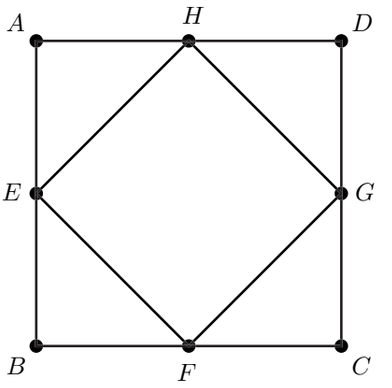
B. $2 \cdot \sqrt{2} = 2\sqrt{2}$

C. $\sqrt{4} \cdot \sqrt{16} = 8$

D. $\sqrt{7} \cdot 0 = 0$

5. Consider the sum $\sqrt{2 + a}$ and the product $b\sqrt{2}$. Determine a value of a and b so both will result in a rational number.

6. Here are two squares $ABCD$ and $EFGH$. If the length of side AB is 4 units, will the length of the diagonals of $ABCD$ and $EFGH$ be rational or irrational numbers? Explain your thinking.



7. Here are two quadratic equations, $f(x) = x^2 + 6x + 8$ and $g(x) = x^2 + 4x + 3$ Which of the following represents the sum of the zeros of $f(x)$ and $g(x)$?

A. -6

B. -10

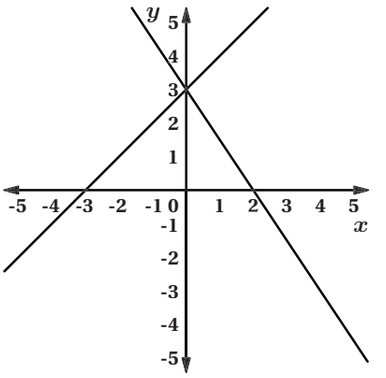
C. $-6 + \sqrt{2}$

D. $-10 + \sqrt{2}$

Name: ..... Date: ..... Period: .....

Additional Practice 8.18

1. What is the solution to the system of equations shown in the graph?



A. $(0, 2)$

B. $(0, 3)$

C. $(3, 0)$

D. $(2, 2)$

2. What are the solutions of the equation $x^2 + 4x - 12 = 3x$?

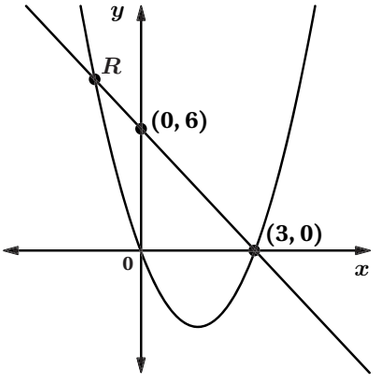
A. -6 and 2

B. 6 and -2

C. -4 and 3

D. 4 and -3

3. The graph shows the quadratic function $f(x) = 2x^2 - 6x$, as well as the line passing through the points $(0, 6)$ and $(3, 0)$.



a What is the equation of the line? Explain your thinking.

b Determine the coordinates of the point R without using graphing technology. Show or explain your thinking.

Name: Date: Period:

4. In this problem, you will write a system of linear and quadratic equations.

a Write an equation representing the line that passes through the points $(0, 1)$ and $\left(-\frac{1}{2}, 0\right)$.

b Write an equation representing a quadratic function that passes through the points $(-6, 0)$ and $(4, 0)$ and the a-term is equal to 1.

c Without using graphing technology, determine the points of intersection of these two graphs. Show your thinking.

5. The graphs of $y = 2x + 8$ and $y = x^2 + 9x - 10$ intersect at two points. Without using graphing technology, determine the points of intersection of these two graphs.

A. $(-9, -10)$ and $(2, 12)$

B. $(9, 10)$ and $(-2, -12)$

C. $(-11, 12)$ and $(0, -10)$

D. $(11, 12)$ and $(0, -10)$

6. Consider the graph of the function $p(x) = -x^2 + 11x - 24$ and Rectangle $ABCD$. Points A and B are the x-intercepts of the graph and line segment CD touches the vertex of the parabola. Determine the area of Rectangle $ABCD$. Show or explain your thinking.