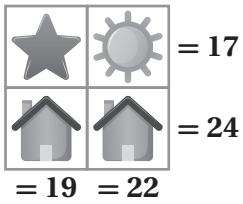
Name: ..... Date: ..... Period: .....

Additional Practice 5.01

Problems 1–2: Here is a shape puzzle. The sum of each row and column is shown.



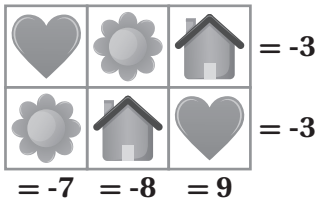
1. Select *all* the true statements.

- ☐ **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.

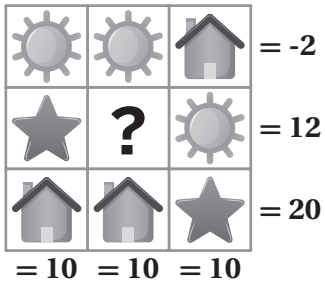
$x =$ ..... $y =$ .....

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.

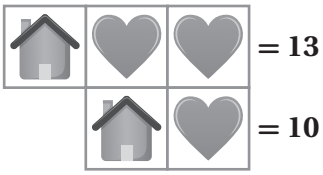


9. If the missing shape has a value of 8, what are the values of the other two shapes?

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. $(4, 7)$

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.** $20y = 56$

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

$$\begin{cases} 2x - 3y = 9 \\ 5x - 4y = 11 \end{cases}$$

System B

$$\begin{cases} y = 4x - 3 \\ -3x + y = 7 \end{cases}$$

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: .....

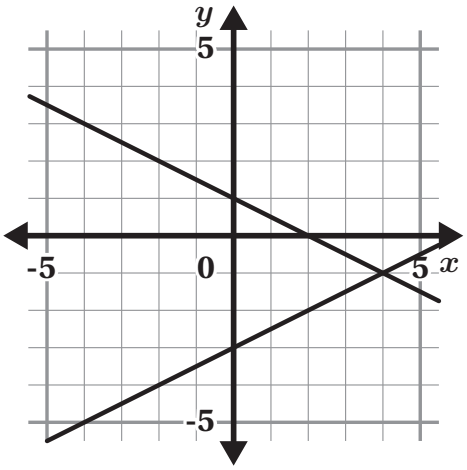
Additional Practice 5.05

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:

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



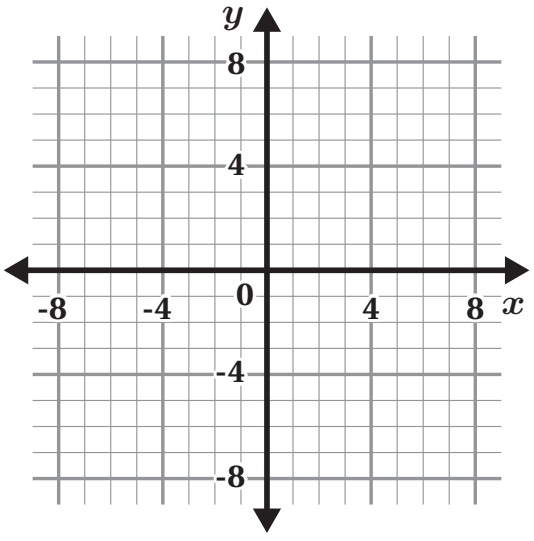
Which is the solution to the system of equations?

- **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.

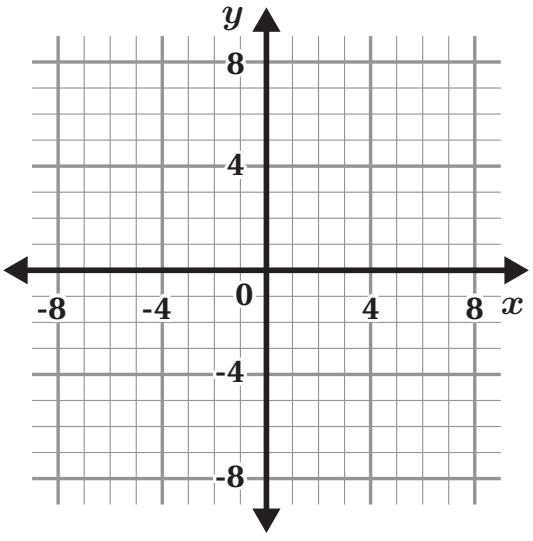
$$y = -3x - 4$$
$$y = \frac{1}{3}x + 5$$



Solution: .....

4.

$$y = 2x - 4$$
$$y = -x + 5$$

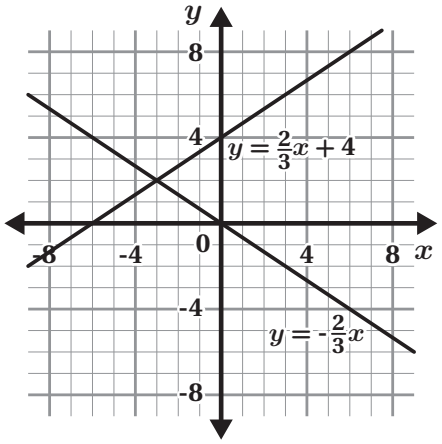


Solution: .....

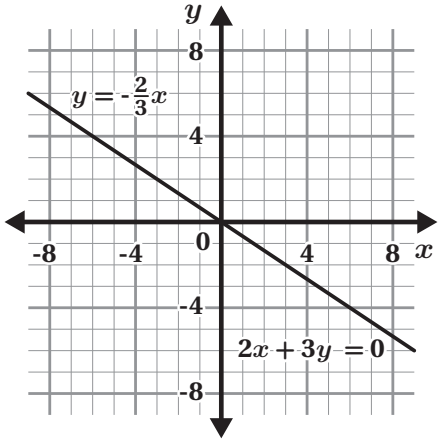
Name: ..... Date: ..... Period: .....

5. Which graph shows a system of equations that has no solutions?

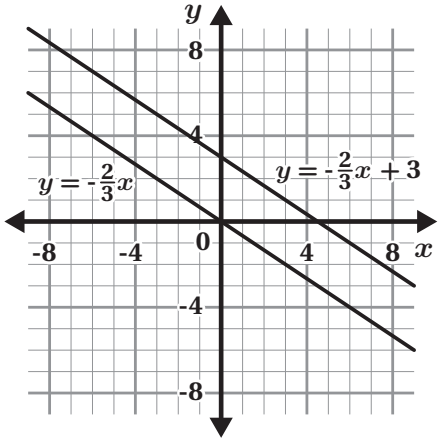
A.



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 5.08

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. $5x - 9y = 21$
$x = -6$

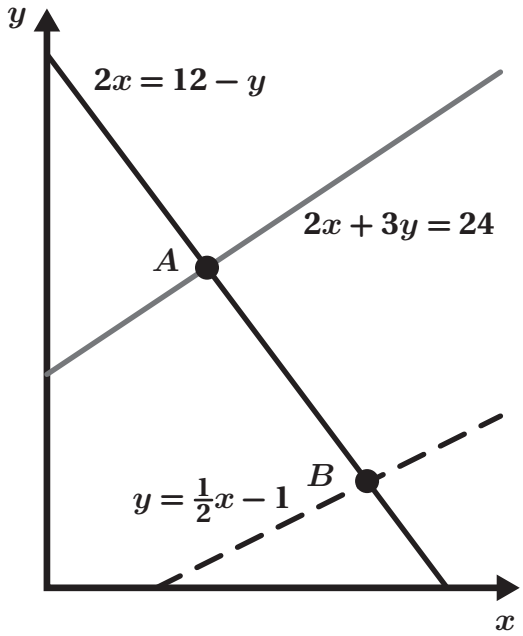
Problems 4–5: Solve each system of equations. Write the solution as a coordinate pair. Show your thinking.

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.

$A =$ ..... $B =$ .....

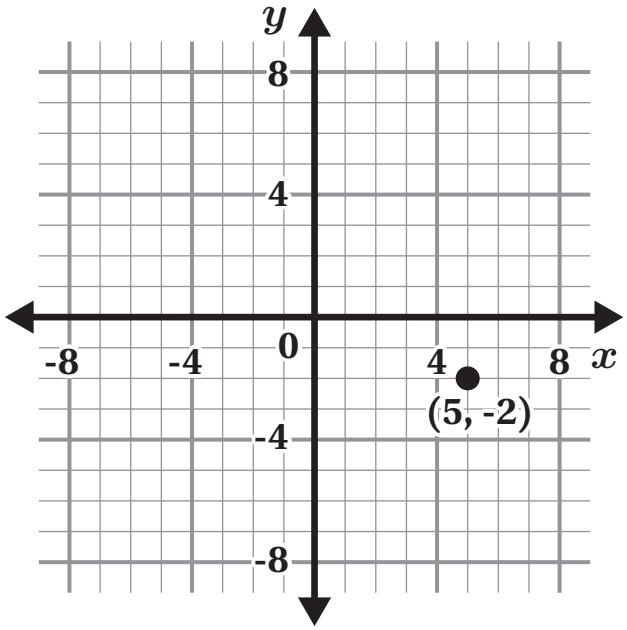


Name: ..... Date: ..... Period: .....

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.

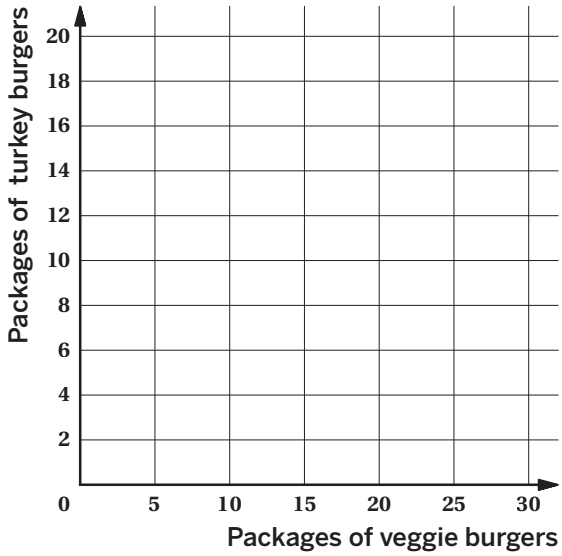
$$\begin{cases} 10x + 18y \geq 270 \\ 11x + 23y \leq 330 \end{cases}$$

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

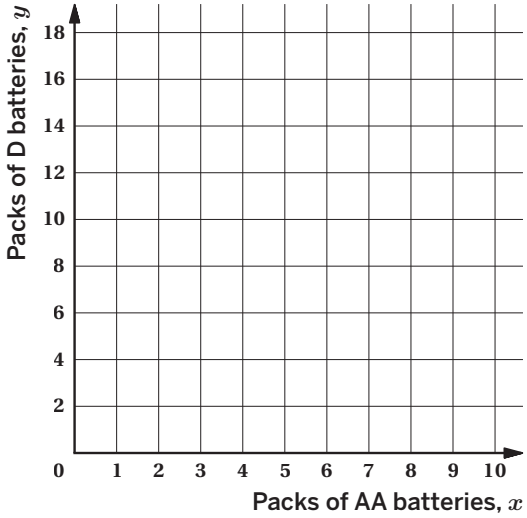
Name: ..... Date: ..... Period: .....

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.

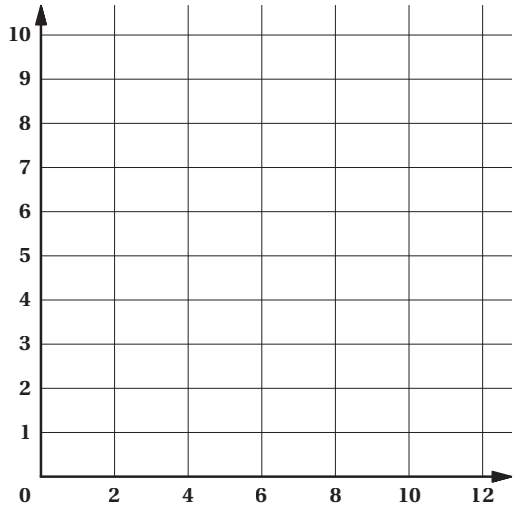
a Create a system of inequalities that describes the constraints in this situation, where x represents the number of small dog baths that she gives and y represents the number of large dog baths that she gives.

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.** $(9, 2)$



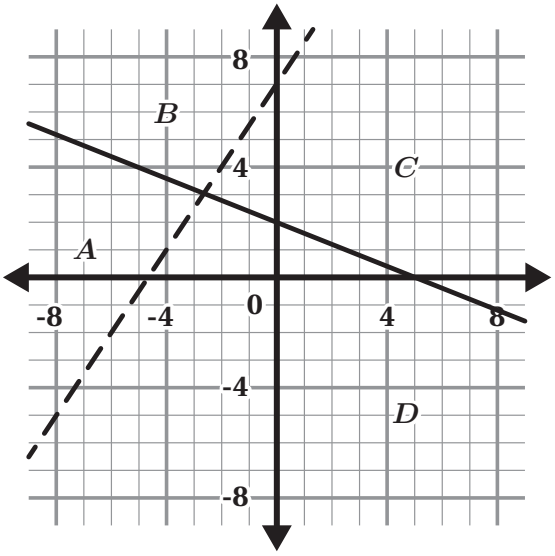
d Identify which point is a solution to the system but is not possible or not likely in the situation: $(4, 3)$, $(7, 1)$, or $(8, 1.5)$. Explain your thinking.

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:

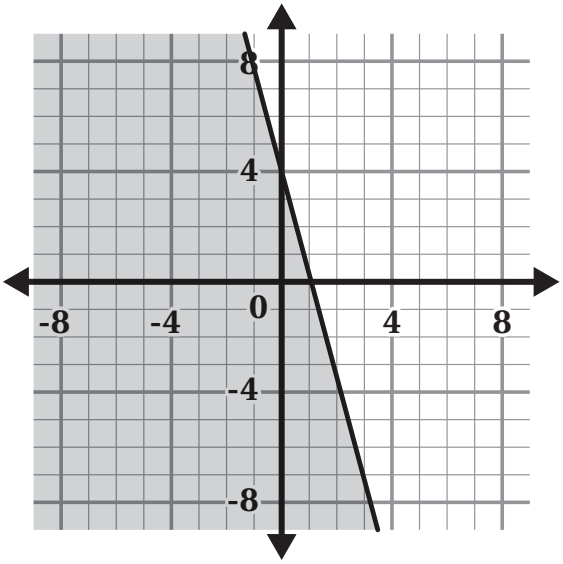
A *B* *C* *D*

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.

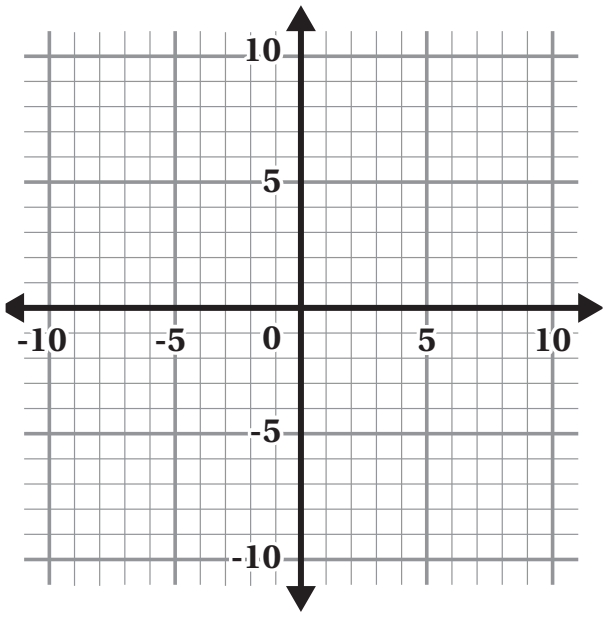
5. Explain how you knew where to shade the second inequality.

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.

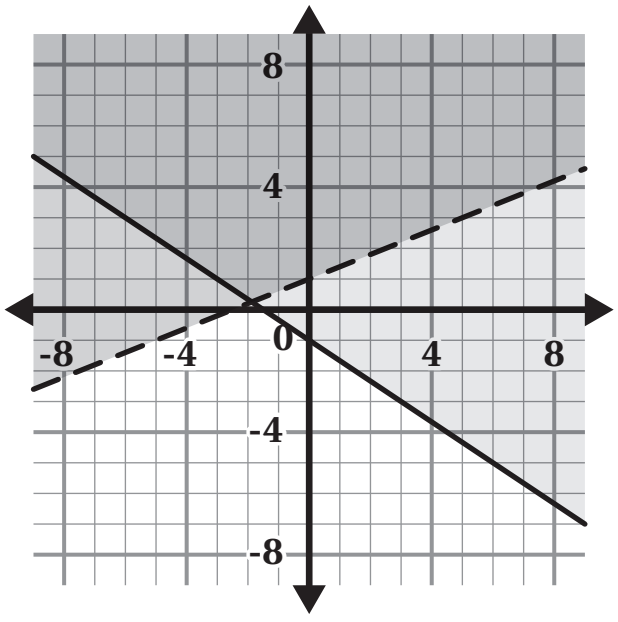
Problems 9–10: Randall graphed the boundary lines of this system of inequalities:

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 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.

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	

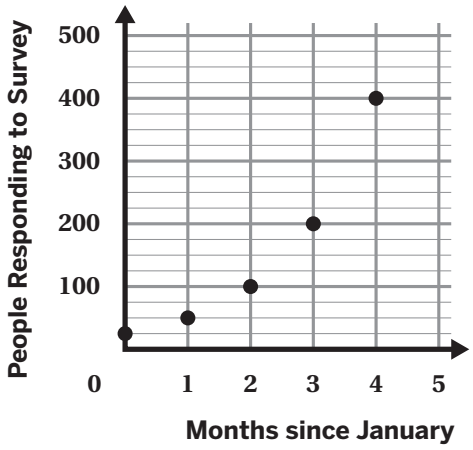
Day	0	1	2	3	4
Green Globs	12	24	36	48	

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.



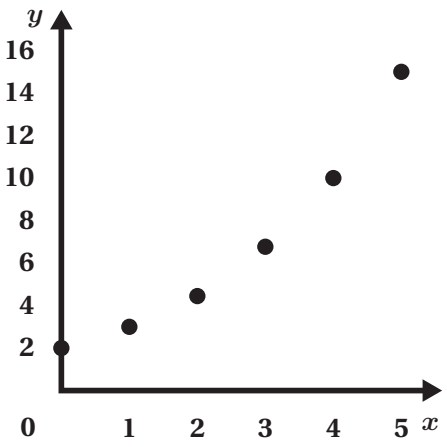
4. How many people completed the survey in January?

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.

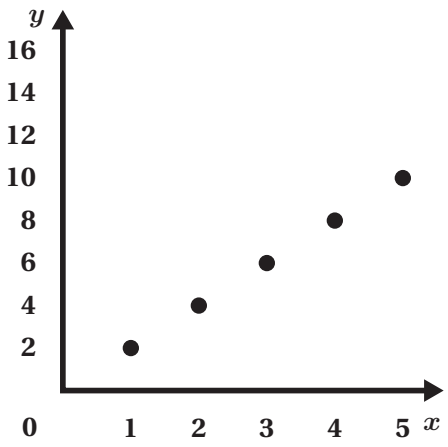
6.



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

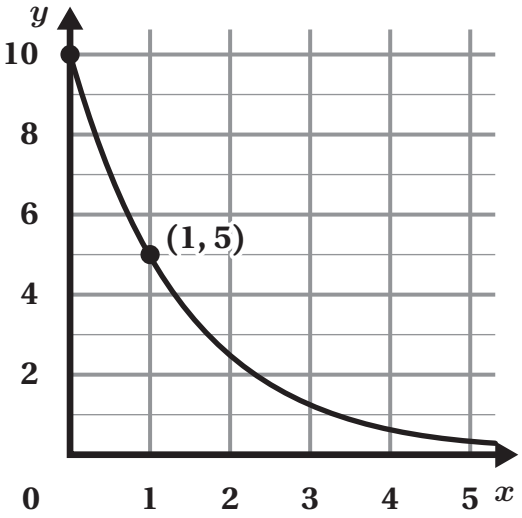
Problems 1–3: Determine the value of each expression when $x = 3$.

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

$y = 12\left(\frac{1}{3}\right)^x$

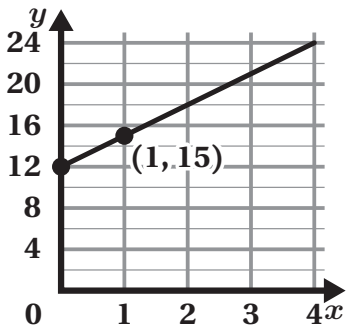
Equation B

$y = 12(3)^x$

Equation C

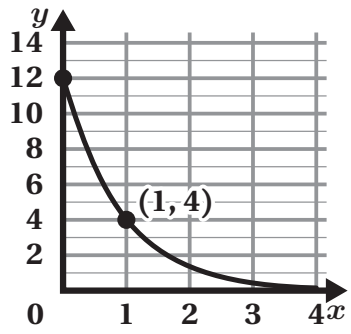
$y = 12 + 3x$

5.



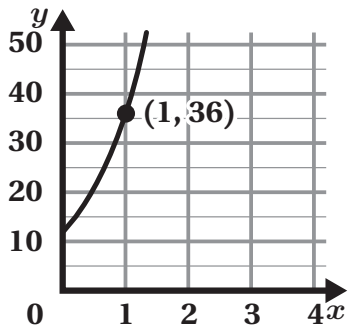
Equation .....

6.



Equation .....

7.

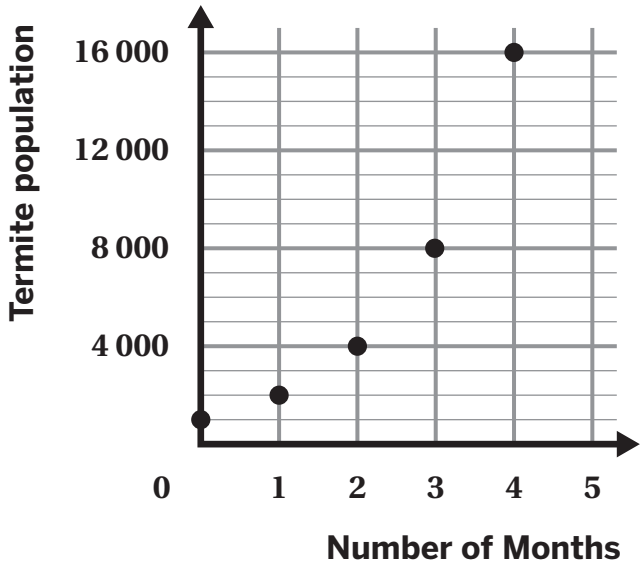


Equation .....

8. Explain how you determined which equation to match with the graph in Problem 7.

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 6.05

1. Which equation best models the data in the table?

A. $f(x) = 50(1.25)^x$

B. $f(x) = 32 + 1.25$

C. $f(x) = 32(1.25)^x$

D. $f(x) = 40(1.25)^x$

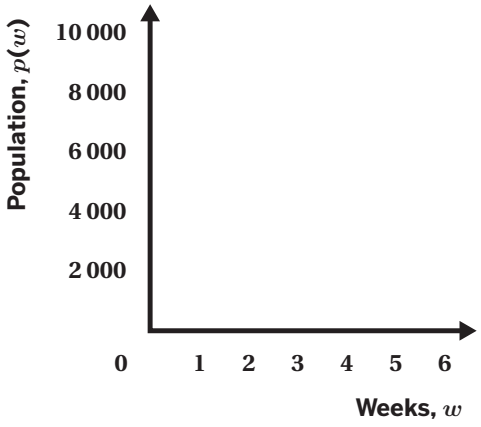
x	$f(x)$
1	40
2	50
3	62.5
4	78.125

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 6.07

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.** $825{,}000 + 0.07(825{,}000)$

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.

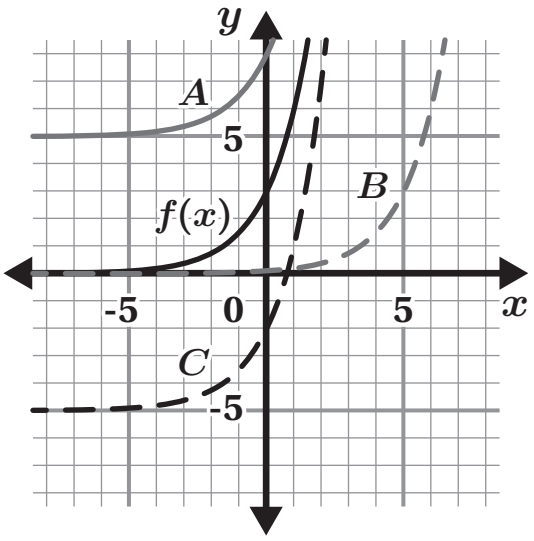
Name: ..... Date: ..... Period: .....

Additional Practice 6.10

1. Here is a graph of $f(x) = 3 \cdot 2^x$.

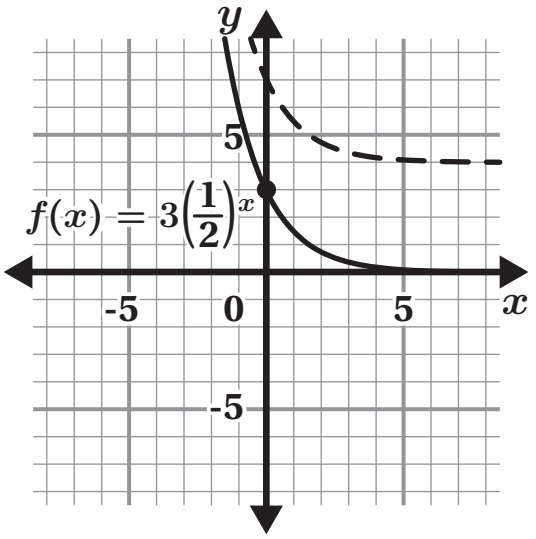
Match each function with its graph.

Equation	Solution
$f(x) = 3 \cdot 2^x - 5$	.....
$f(x) = 3 \cdot 2^x + 5$	.....
$f(x) = 3 \cdot 2^{x-5}$	.....



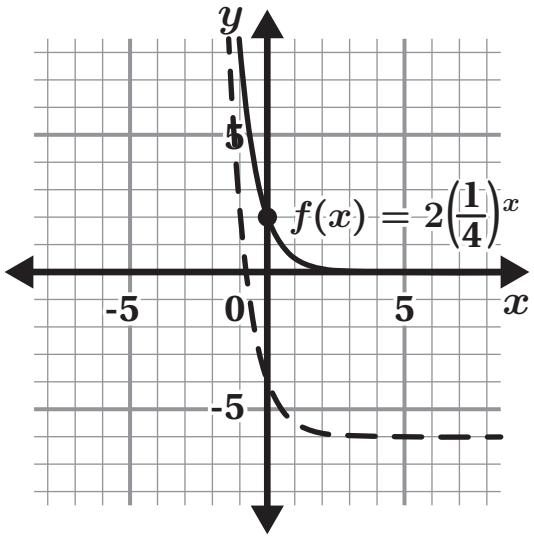
Problems 2–3: For each set of graphs shown, write an equation for the dotted curve, $g(x)$.

2. $f(x) = 3\left(\frac{1}{2}\right)^x$



$g(x) =$ .....

3. $f(x) = 2\left(\frac{1}{4}\right)^x$

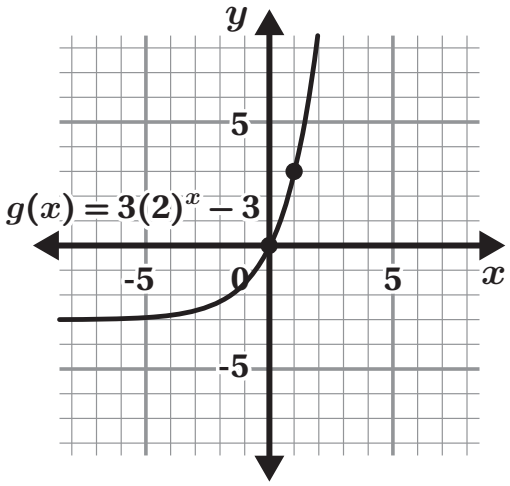


$g(x) =$ .....

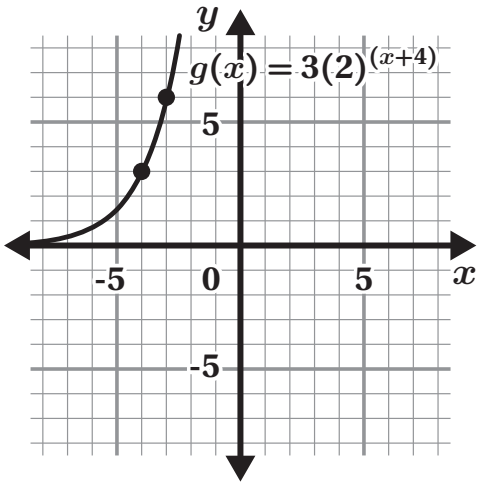
Name: Date: Period:

Problems 4–5: The function $g(x)$ is a transformation of $f(x) = 3 \cdot 2^x$.

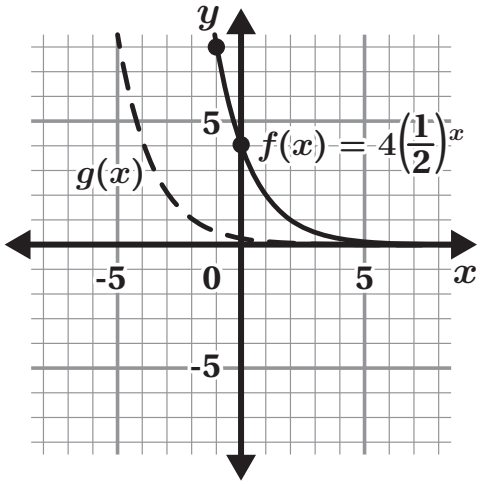
4. Graph $g(x) = 3(2)^x - 3$



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 6.13

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.

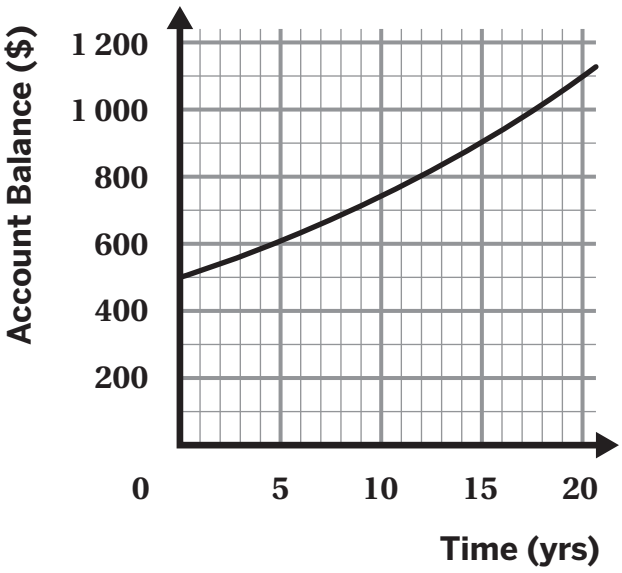
Name: Date: Period:

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.

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.

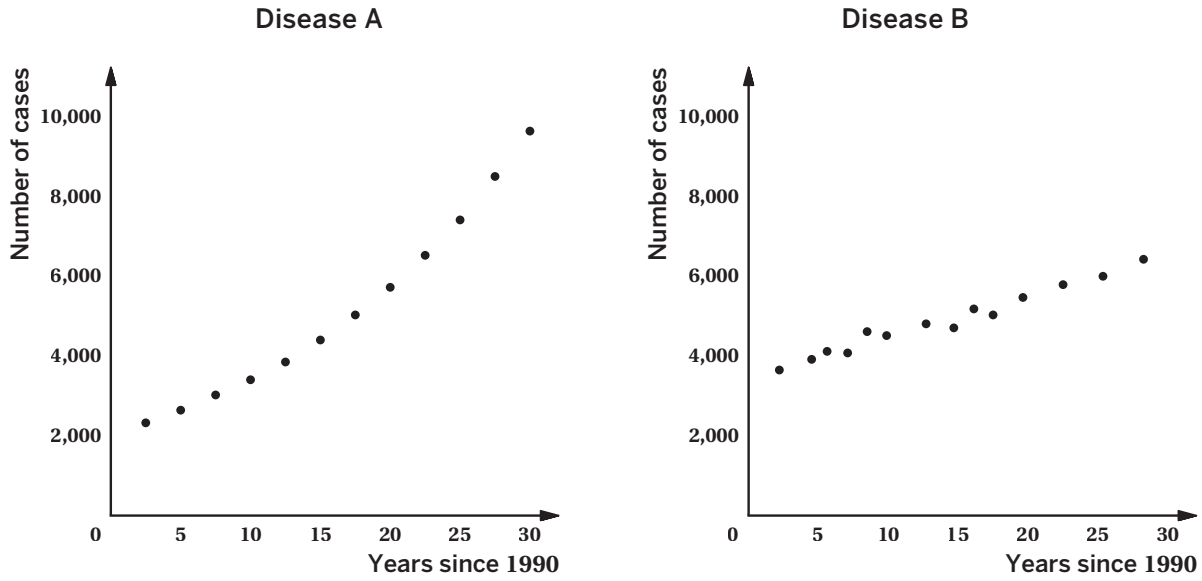
7. Express each of the options as a function of the money earned in terms of t time.

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.

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.

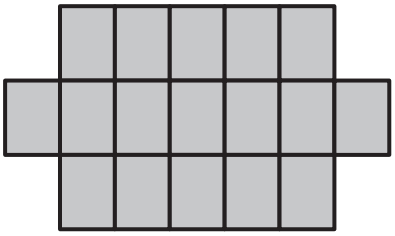
5. The table shows the number of virus infections for different dates in one year.Which time period had the greatest average rate of change: January 15 to 22nd, January 15 to 28, or January 15 to 29? Explain your thinking.

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: .....

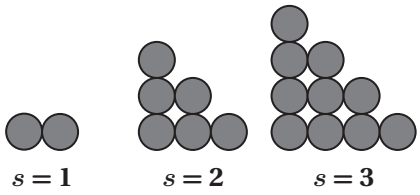
Additional Practice 7.01

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.

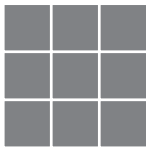
☐ **A.** 

☐ **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.

Figure 0 Figure 1 Figure 2 Figure 3

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?

Figure 0 Figure 1 Figure 2 Figure 3

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 7.04

Problems 1–3: For each pair of symmetrical points on a parabola, determine the equation for the line of symmetry.

1. $(0, 0)$ and $(-12, 0)$

$x =$ .....

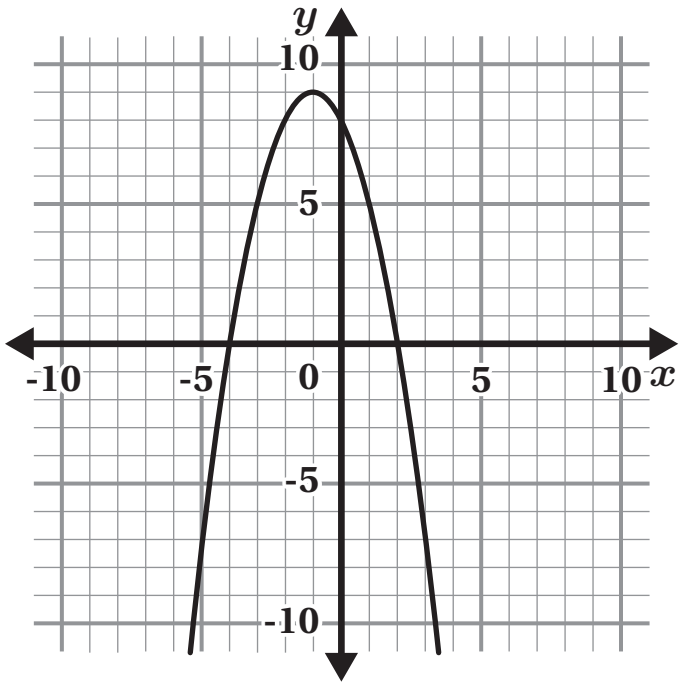
2. $(5, 8)$ and $(21, 8)$

$x =$ .....

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.

Figure	Number of Tiles
1	1
2	
3	11

6. Select a function type and determine the number of tiles that would be in Figure 2. Circle one.

Linear Quadratic Exponential

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 $f(x)$.

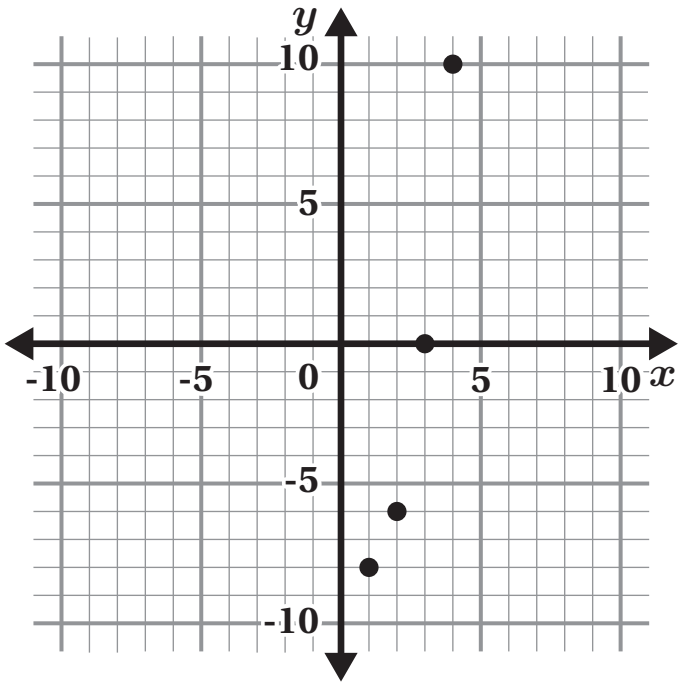
x	$f(x)$
-1	
0	
1	-8
2	-6
3	0
4	10
5	
6	
7	

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.



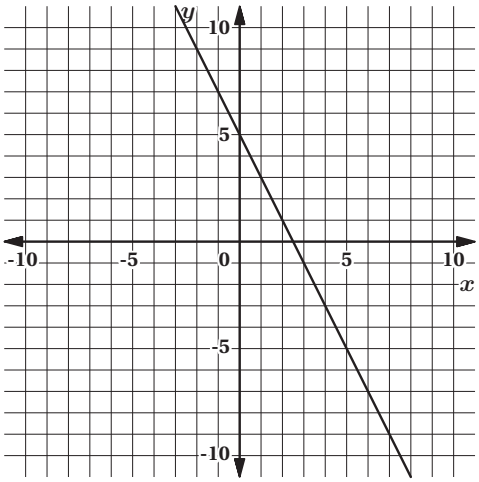
10. Write the equation for the line of symmetry.

$x =$ .....

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

Additional Practice 7.05

1. The graph represents the equation $y = -2x + 5$.



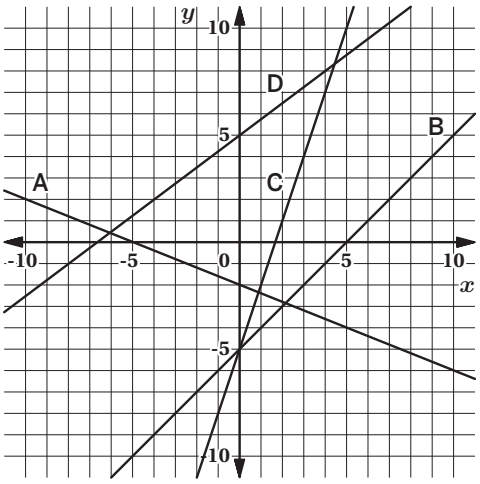
a What is the y-intercept of the graph? How is it related to the equation?

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?

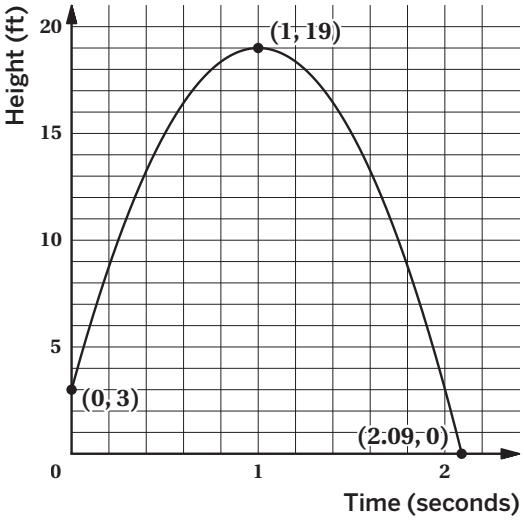
A. A straight line that goes up.

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.

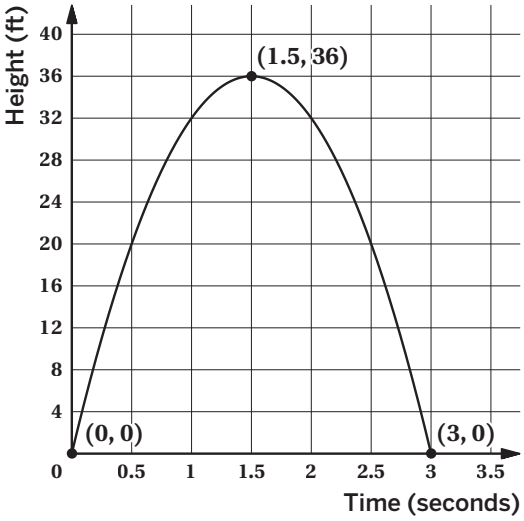


a How high above the ground was the ball when Shawn threw it?

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.

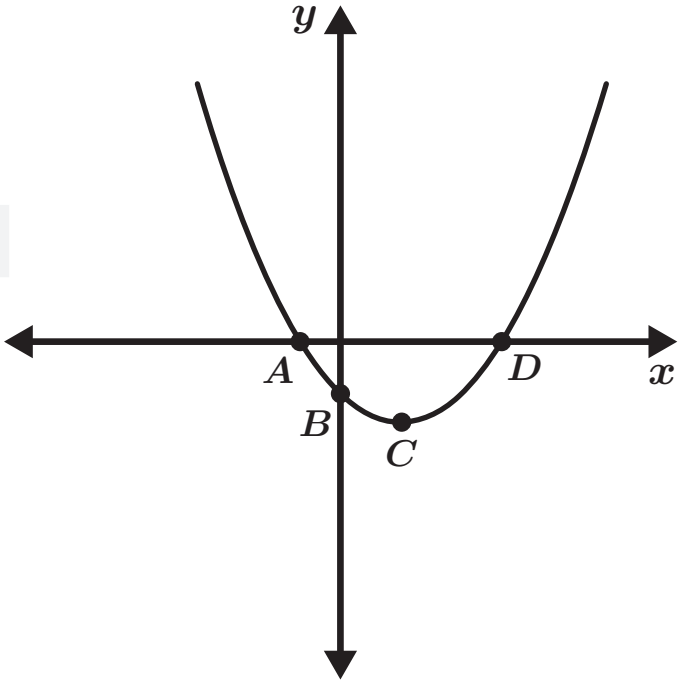
Name: ..... Date: ..... Period: .....

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



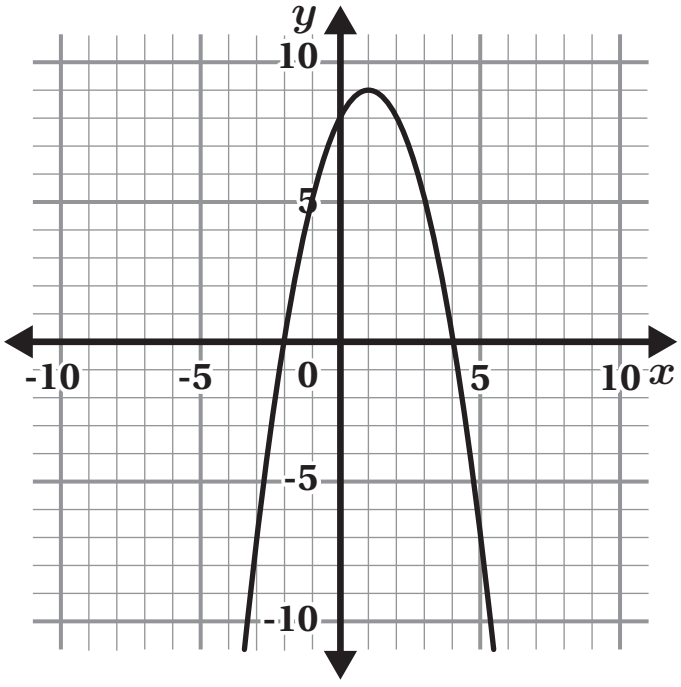
A. .....

B. .....

C. .....

D. .....

Problems 2–4: Use the graph to determine the coordinates of each key feature.



2. vertex: .....

3. x-intercepts: ..... and .....

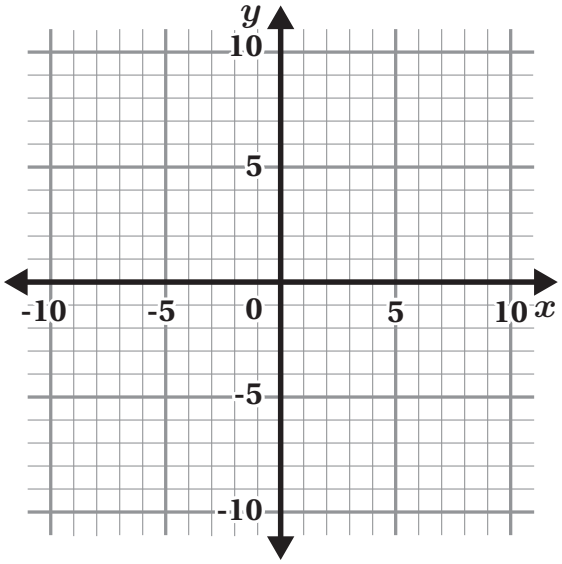
4. y-intercept: .....

5. A parabola has a vertex at $(-6,-2)$. Give two possible coordinates for its x-intercepts.

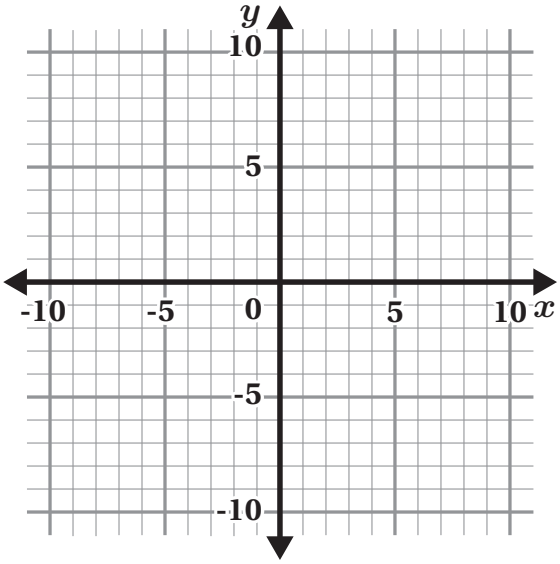
Name: Date: Period:

Problems 6–9: Graph a parabola that fits each description.

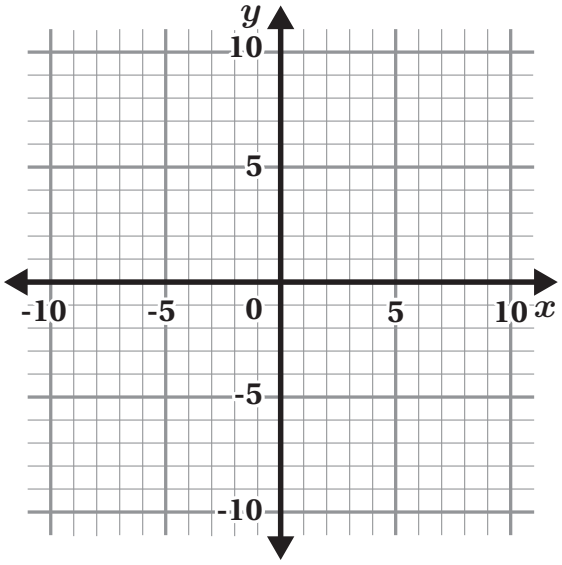
6. Concave up with a negative y-intercept



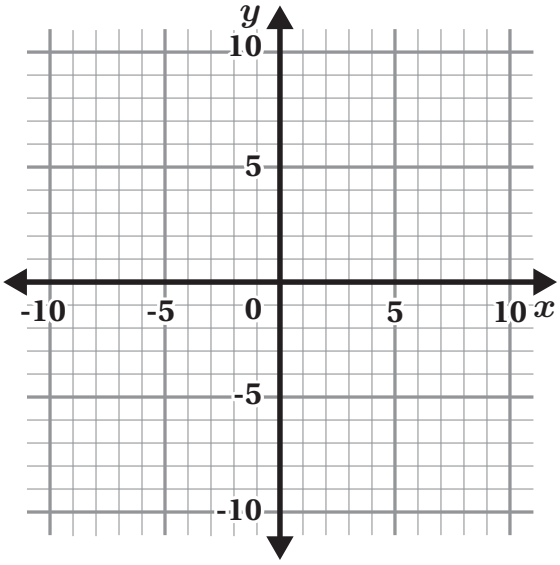
7. Concave down with a vertex at $(-3, 4)$



8 . Concave down with line of symmetry of $x = 2$



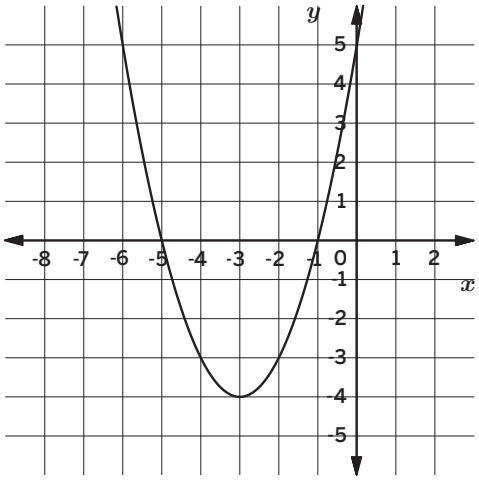
9. Concave up with no x-intercepts



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

Additional Practice 7.10

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 $f(x) = (x + 3)(x - 1)$?

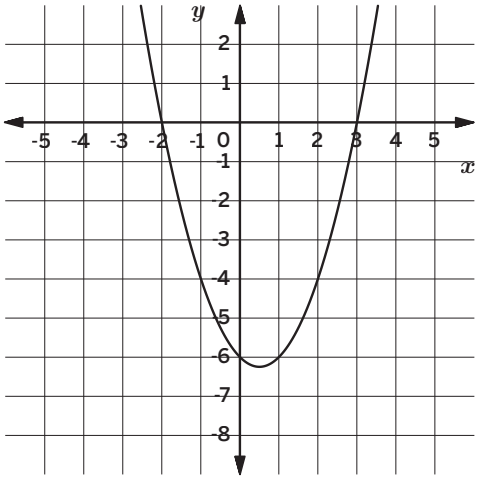
A. $(3, 0)$ and $(1, 0)$

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. $g(x) = (x + 2)(x + 3)$

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.

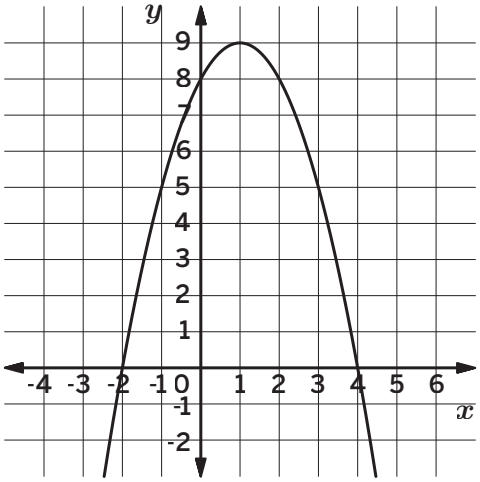
8. Consider the quadratic function $r(x) = x(6 - x)$. The table shows where Jada and Elena think the x- and y-intercepts of the graph of the function are located. Is either person correct? Explain your thinking.

	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.** $g(x) = x(x + 6)$

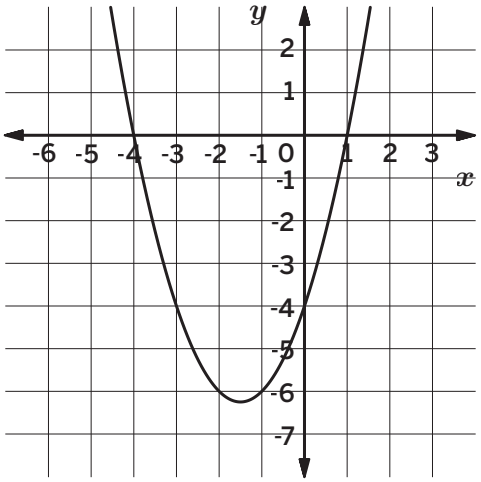
☐ **E.** $g(x) = x(x - 6)$

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.

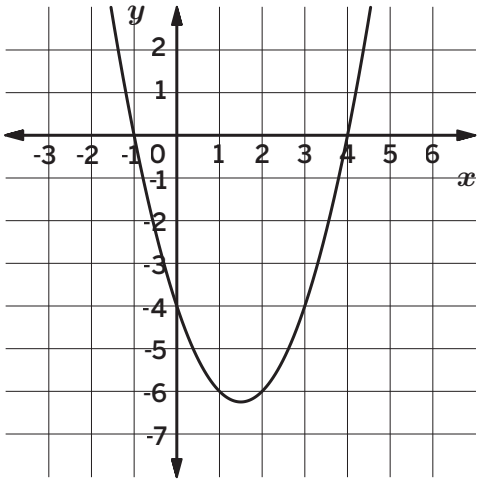
Function	x-intercepts	x-coordinate of the vertex	Line of symmetry
$j(x) = (x + 6)(x + 2)$			
$k(x) = 2x(x - 4)$			
$m(x) = (x + 7)(x - 7)$			

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:
$f(x) = (x + 3)(x - 11)$ $g(x) = 2x(x - 8)$

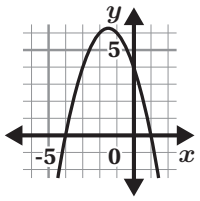
Kiran claims that the axis of symmetry for the graphs of both functions is $x = 4$. Do you agree with Kiran? Explain your thinking.

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

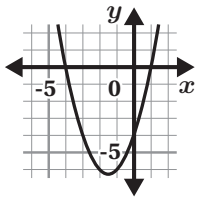
Additional Practice 7.12

1. Which graph shows the function $y = -(x - 4)(x + 1)$?

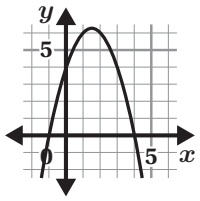
A.



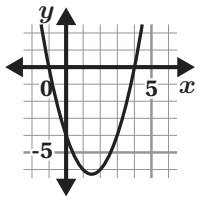
B.



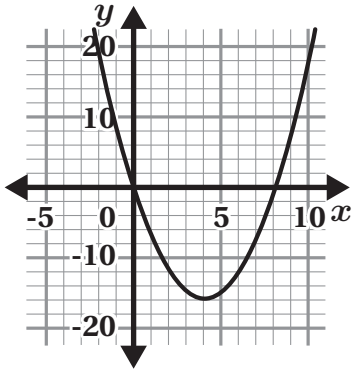
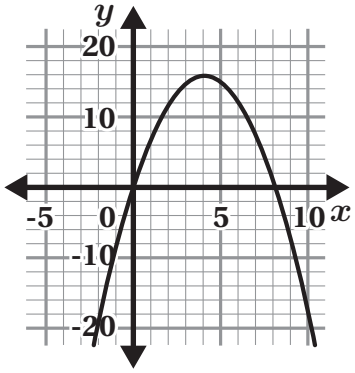
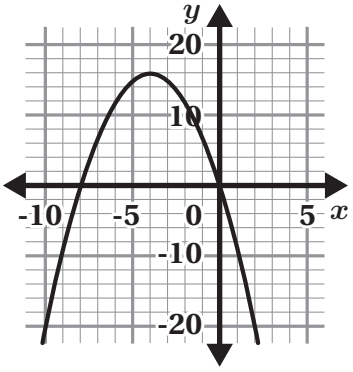
C.



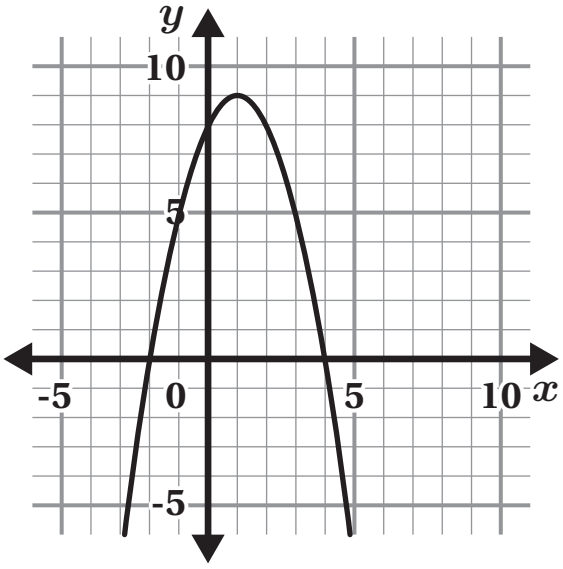
D.



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:



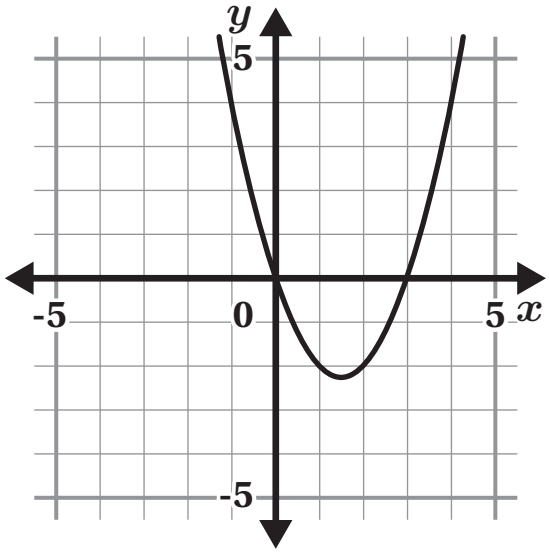
3. $(1, -9)$

4. $(1, 4)$

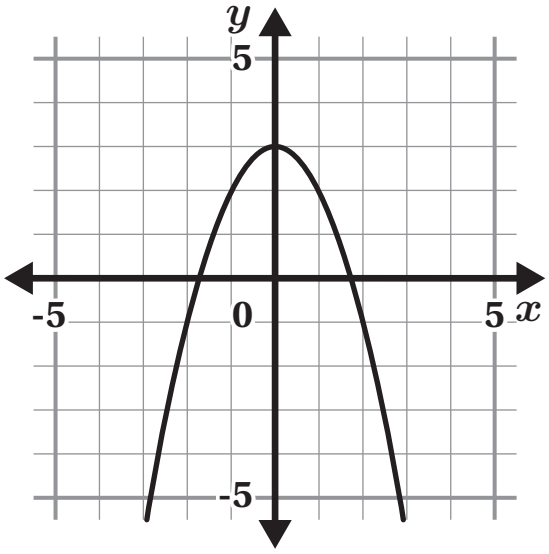
Name: Date: Period:

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 7.14

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.

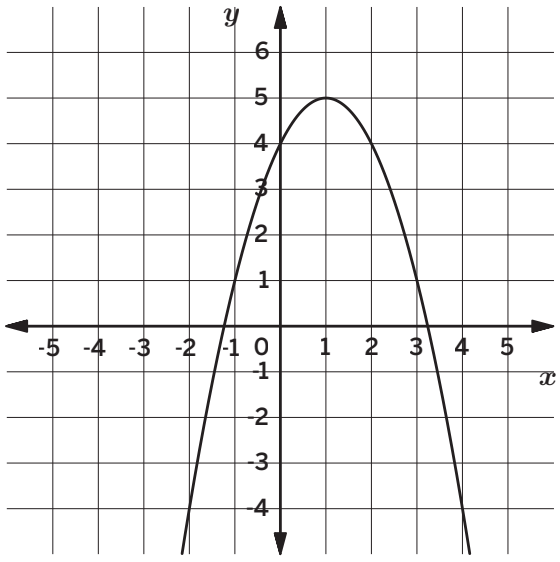
4. Which function is represented by the graph?

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 $(-9, -2)$?

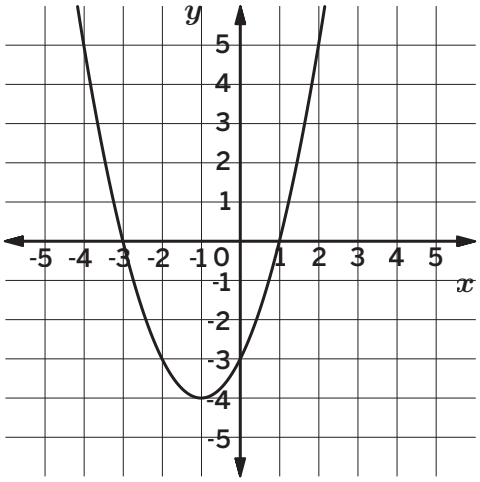
A. $h(x) = (x + 9)^2 - 2$

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.

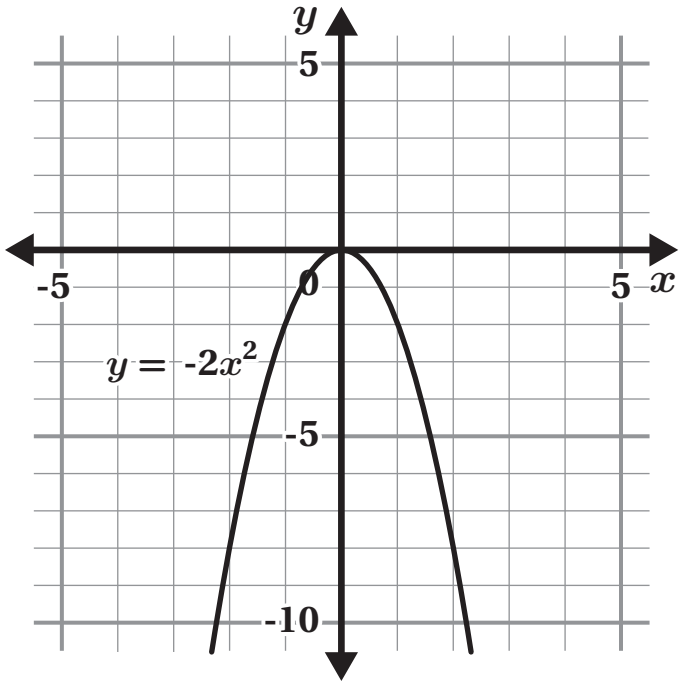
b What are the x-intercepts of the graph of $g(x)$? Explain your thinking.

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:



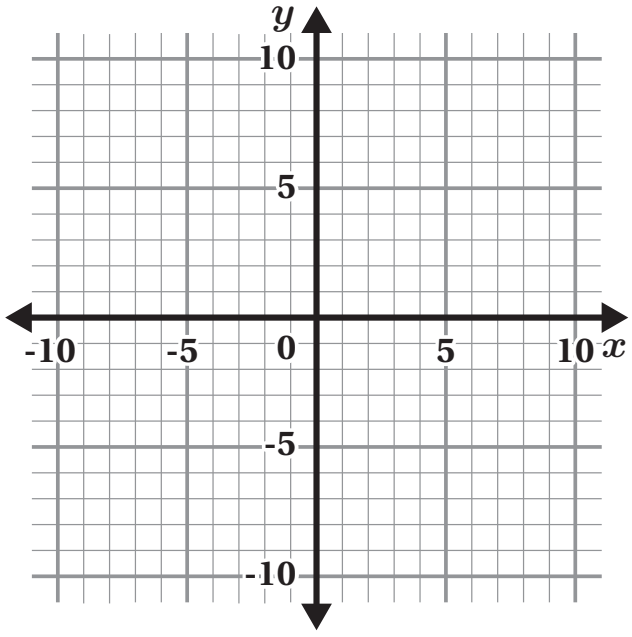
1. Wider:

2. Narrower:

3. Open up:

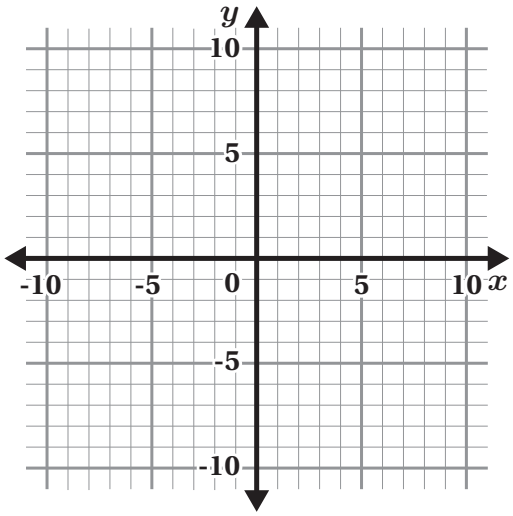
4. Describe how the graph of $f(x) = x^2$ compares to the graph of $g(x) = 3(x + 1)^2 - 4$.

5. Draw the graph of a parabola that has a vertex at $(-1, 6)$ and is vertically stretched by a factor of $-\frac{1}{2}$.

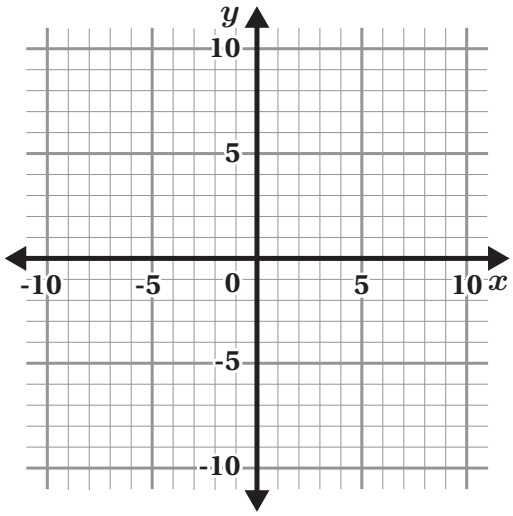


Problems 6–7: Draw a graph for each situation.

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 $j(x) = (x - 2)^2 - 8$

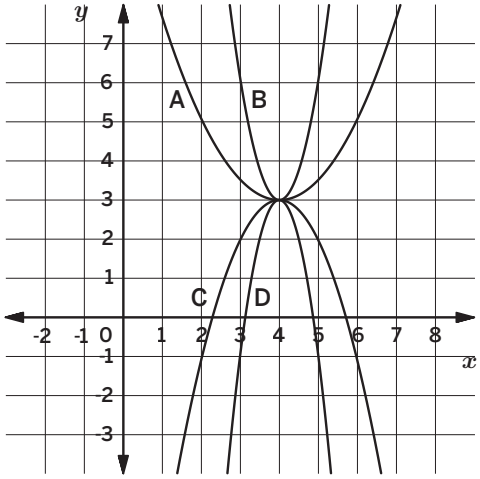
3. Match each graph with the equation that represents it.

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

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

..... $y = \frac{1}{2}(x - 4)^2 + 3$

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



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 $(-2, -9)$.

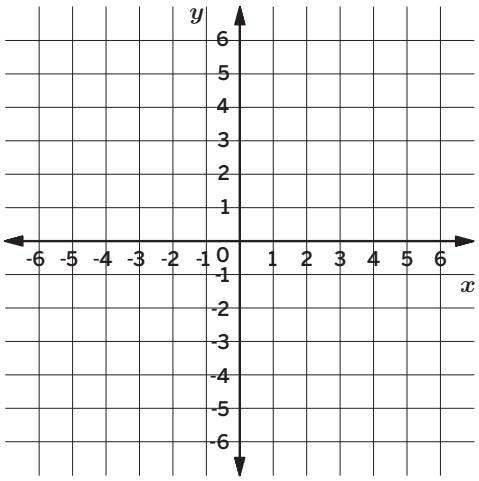
☐ **C.** The y-intercept is located at $(0, -13)$.

☐ **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?

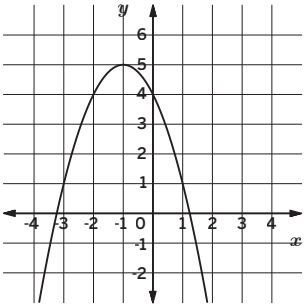
b Is the vertex a maximum or a minimum? Explain your thinking.

c Sketch a graph of the function.

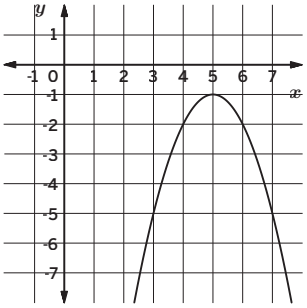
6. Match each graph with the equation that it represents.

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

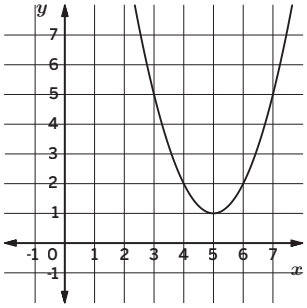
a



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.** $b(x) = (x + 2)(x + 4)$

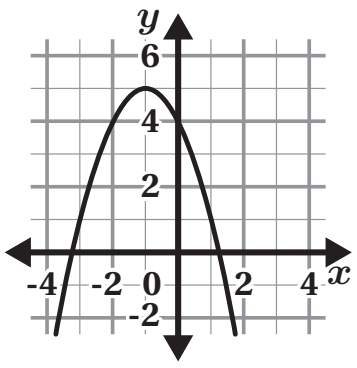
☐ **C.** $c(x) = 2x(x + 6)$

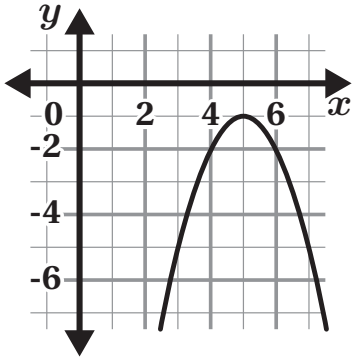
☐ **D.** $d(x) = (2x + 4)(x + 3)$

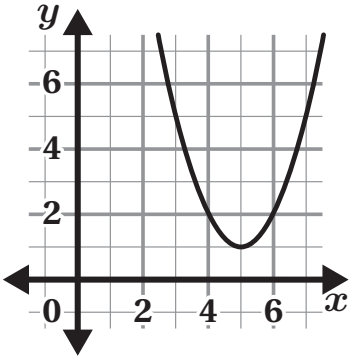
☐ **E.** $e(x) = (3x - 6)(x + 5)$

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





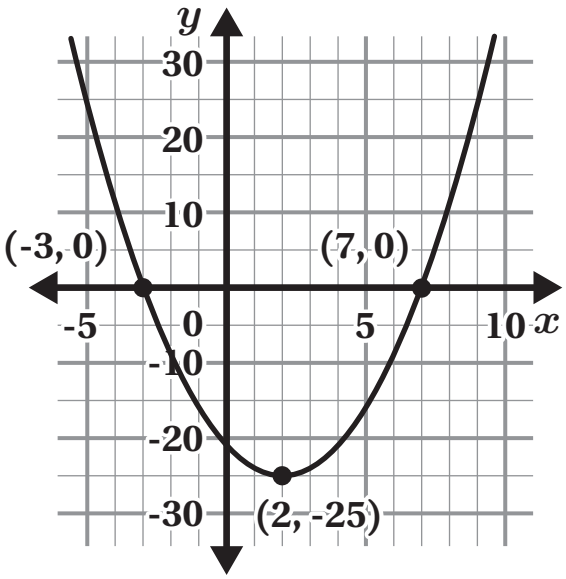


Name: ..... Date: ..... Period: .....

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: $r(x) = -x(x + 4)$.

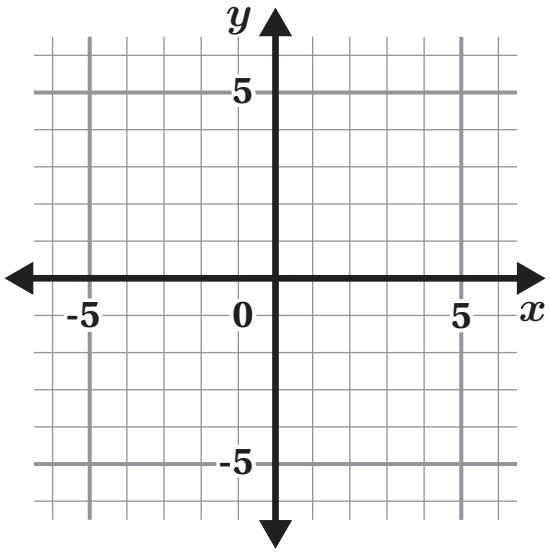
7. Determine the x-intercepts and vertex of $r(x)$.

x-intercept: .....

x-intercept: .....

vertex: .....

8. Draw the graph of the function $r(x)$.



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

Additional Practice 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. $2x^2 - 2x - 6$

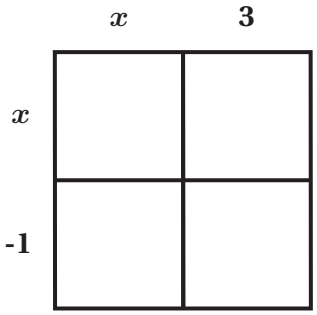
b. $2x^2 - x - 3$

c. $3x^2 - 2x - 6$

d. $3x^2 - x - 3$

Problems 4–6: Write an expression in factored form and standard form that represents each area model.

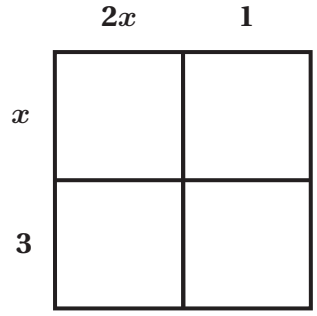
4.



Factored form:

Standard form:

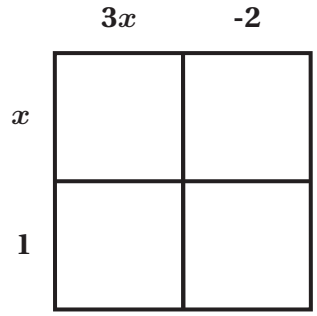
5.



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. $(x - 2)(x - 6)$	..... $2x^2 + 14x + 24$

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

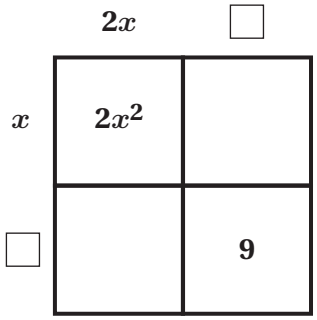
1. Determine values that make the equation true.

$4x^2 + 4x - \_\_\_\_\_ = (\_\_\_\_\_x - 1)(2x + \_\_\_\_\_)$

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 $(x + 8)(x + 1)$

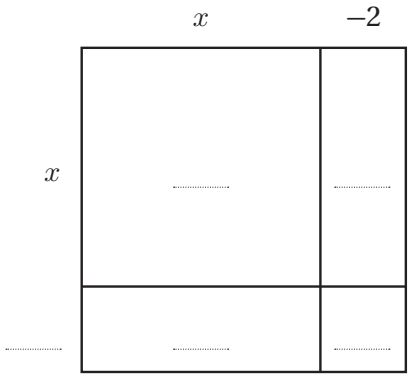
b $x^2 + 5x + 6$ and $(x + 2)(x$ .....$)$

c $x^2 - 16x + 63$ and $(x$ .....$)(x - 7)$

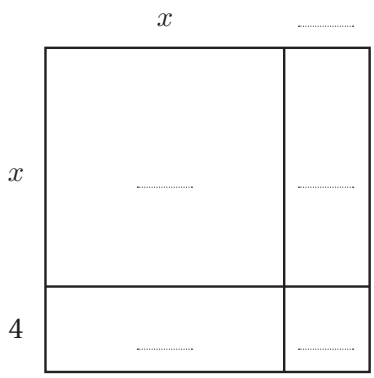
d $x^2 - 9x + 20$ and $(x - 5)(x$ .....$)$

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 $(x - 1)(x - 3)$

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.

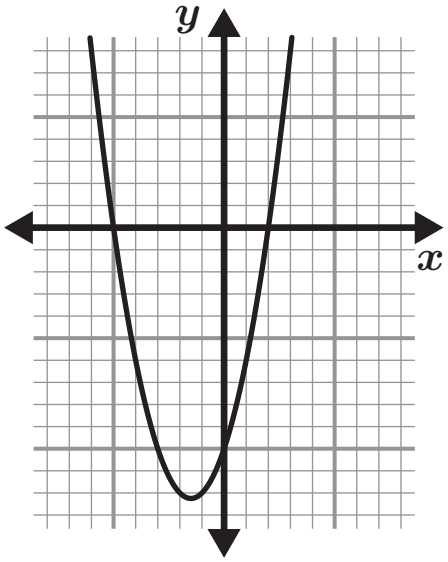
Name: ..... Date: ..... Period: .....

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

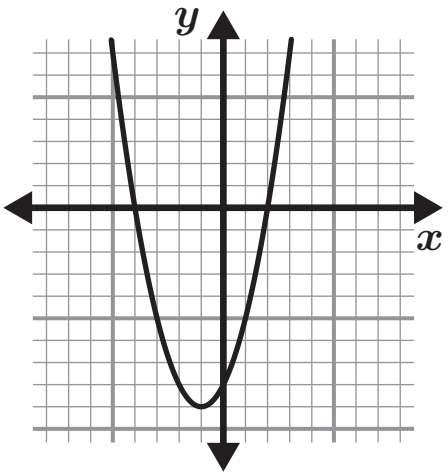
D. More information is needed.

Explain your thinking.

Name: Date: Period:

Problems 4–5: What are the x-intercepts of the function?

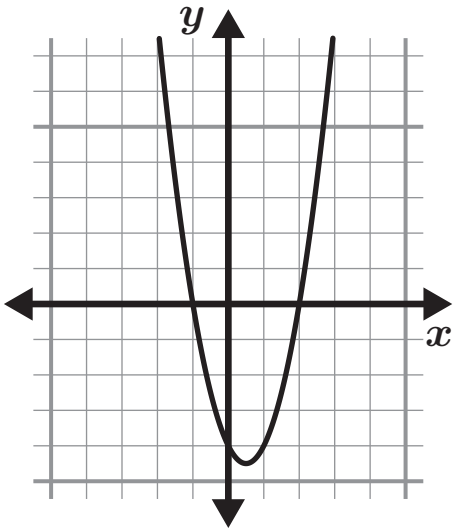
4. $f(x) = x^2 + 2x - 8$



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?

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
$x^2 + 2 = 2$	
$(x - 3)^2 = 1$	
$(x + 8)^2 = -16$	
$(x + 3)^2 = 0$	
$x^2 - 8 = -4$	

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. $x^2 - 20 = -4$

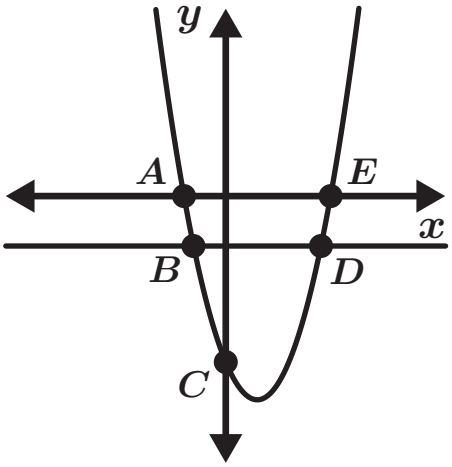
8. $100 + (x - 3)^2 = 136$

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

$(x + 3)(x -$ .....$) = -7$

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

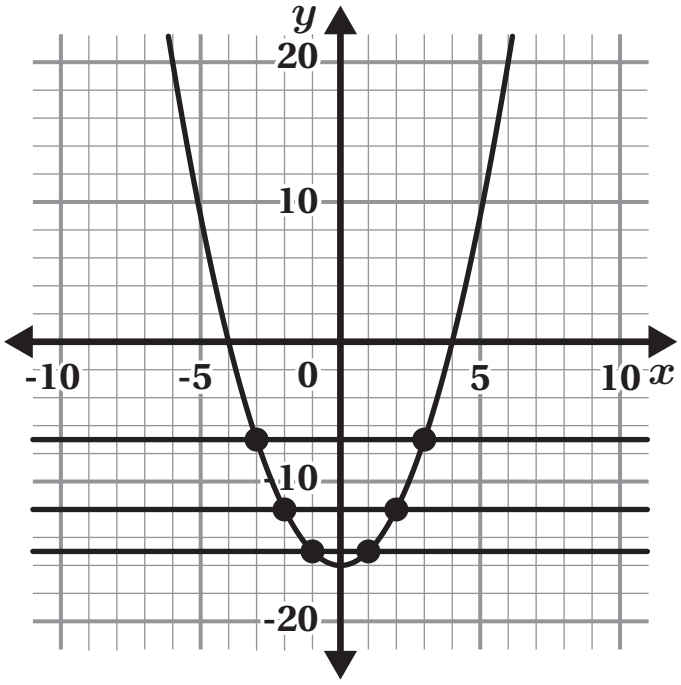
Problems 8–9: The graphs of $y = -16x^2$, $y = -15$, $y = -12$, and $y = -7$ all intersect at integer values.

8. Write the equations of three more lines that follow this property.

$y =$ .....

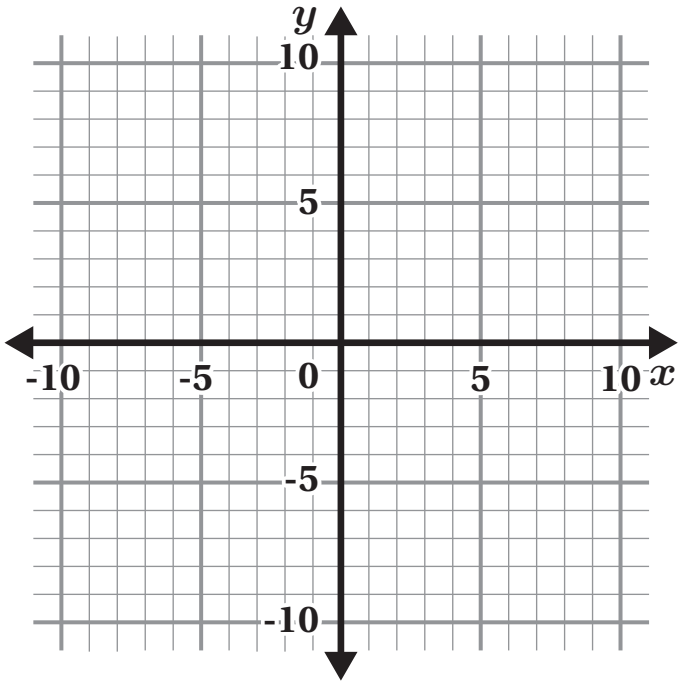
$y =$ .....

$y =$ .....



9. What pattern do you notice?

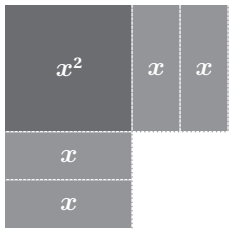
10. Solve $(x - 3)(x + 2) = 6$. Show and explain your thinking.



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

Additional Practice 8.11

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?

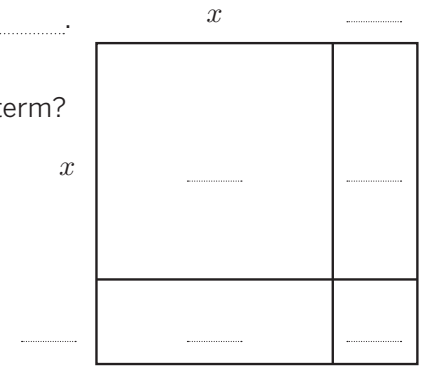
b Write the perfect square expression in factored form.

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 $7 = x^2 + 6x - 20$

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 8.14

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.)

10. Show or explain how the expression you wrote is related to solving $x^2 - 8x = -7$ by completing the square.

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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.

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.** $\sqrt{8}$

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. $\sqrt{7} \cdot \sqrt{7} = 7$

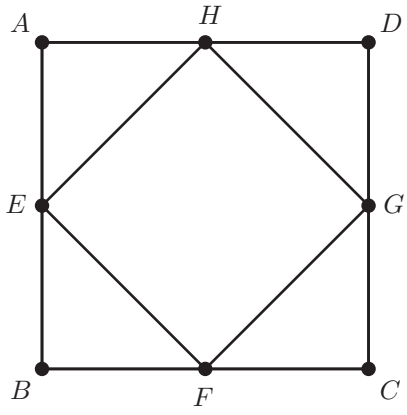
B. $2 \cdot \sqrt{2} = 2\sqrt{2}$

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. $-10 + \sqrt{2}$