

## Unit A1.5, Lesson 1: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Determine the value of the variable that makes each equation true.

$$2.5 + (-3) = a$$

$$12 + b = -9$$

$$2c + 3 = 15$$

$$3d + 2 = 35$$

## Practice

Here is a shape puzzle. The sum of each row and each column is shown.

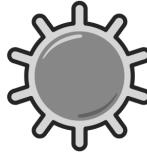
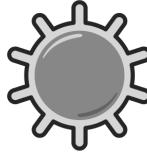
- 2.1 Select **all** of the true statements.

 +  = 18

 +  = 14

 = 14

 +  = 18

		= 16
		= 16
= 18	= 14	

- 2.2 Show or explain why this statement is **false**:

$$\text{drop} = 8$$

3. Determine the solution for this puzzle.

			= 15	
			= 15	
= -2	= 10	= 22		

Shape	Value
	
	
	

**Unit A1.5, Lesson 1: Practice Problems**

Here are two equations:

$$x + x + y = 14$$

$$y + y + y = 12$$

4.1 Draw a shape puzzle to represent these equations.

4.2 Determine the values of  $x$  and  $y$ .

			$= 14$
			$= 12$

**Looking Back**

Use this piecewise-defined function to determine each value.

5.1  $f(10)$

5.2  $f(5)$

$$f(x) = \begin{cases} 0 & x \leq -3 \\ 2x & -3 < x \leq 5 \\ x - 2 & x > 5 \end{cases}$$

5.3  $f(1)$

5.4  $f(-3)$

6. Determine the vertex of the graph of  $y = |x + 2| + 3$ .

**Explore**

7. Determine the missing shape from the center.

Show or explain your reasoning.

			$= 4$
	?		$= 3$
			$= 2$
$= 2$	$= 11$	$= -4$	

## Unit A1.5, Lesson 2: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Rewrite each expression using fewer terms.

$$5a + 3b - 2a$$

$$3(c - 2) + 2c$$

$$5d - 2(7d + 3g)$$

## Practice

2. Solve this system of equations. Use the shape puzzle if it helps with your thinking.

$$2x + y = 10$$

$$x + y = 6$$



Mateo made a mistake as he started to solve this system of equations.

- 3.1 Describe one thing Mateo did **correctly**.

$$\begin{aligned} 2x + y &= 19 \\ x - y &= 11 \end{aligned}$$

$$\begin{aligned} 2x + y &= 19 \\ - (x - y = 11) \\ \hline x + 0 &= 8 \\ x &= 8 \end{aligned}$$

- 3.2 Describe one thing Mateo did **incorrectly**.

Determine the solution for these systems of equations.

4.1  $3x + 4y = 6$   
 $3x + 2y = 18$

4.2  $5x + 6y = 26$   
 $-5x + 2y = -18$

$$x = \underline{\hspace{2cm}} \quad y = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} \quad y = \underline{\hspace{2cm}}$$

**Looking Back**

5. The function  $f(t)$  gives a hiker's elevation above or below sea level, in meters,  $t$  hours after noon. Which equation represents this statement?

*At 7 PM, the hiker was 3 meters below sea level.*

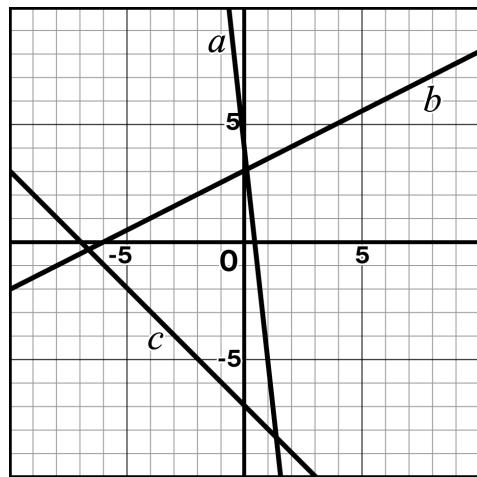
- A.  $f(7) = 3$       B.  $f(19) = -3$       C.  $f(7) = -3$       D.  $f(-3) = 7$

6. Which line represents  $x - 2y = -6$ ?

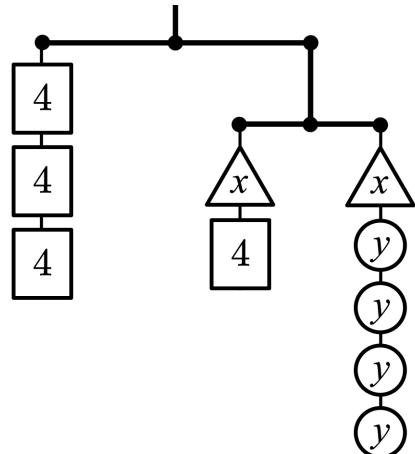
Line  $a$

Line  $b$

Line  $c$

**Explore**

- 7.1 Find values for  $x$  and  $y$  so that both hangers balance.



- 7.2 Find values for  $x$  and  $y$  so that:

- Only the **large hanger** balances.
- Only the **small hanger** balances.

**Reflect**

1. Star the problem you spent the most time on.
2. Use the space below to ask a question or share something you are proud of.



# Science Mom Lesson 47

## Unit A1.5, Lesson 4: Practice Problems

Name \_\_\_\_\_

### Warm-Up

1.1 Solve for  $k$ .

$$2t + k = 6$$

1.2 Solve for  $x$ .

$$4x + 3y = 12$$

1.3 Solve for  $y$ .

$$4x + 3y = 12$$

### Practice

Show or explain what your **first step** would be for solving each system of equations.

2.1  $4x - y = 20$

$$x + y = 5$$

2.2  $6x - 12y = 24$

$$y = 2x - 1$$

3. Determine the solution to this system of equations:

$$7x - y = -3$$

$$y = x - 3$$

Alma made a mistake as she started to solve this system of equations.

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

$$4x - 2y = 11$$

4.1 Identify the error in Alma's work.

4.2 Solve the system correctly.

Alma's Work:

$$4x - 2\left(\frac{1}{2}x - 1\right) = 11$$

$$4x - x - 2 = 11$$

$$3x - 2 = 11$$

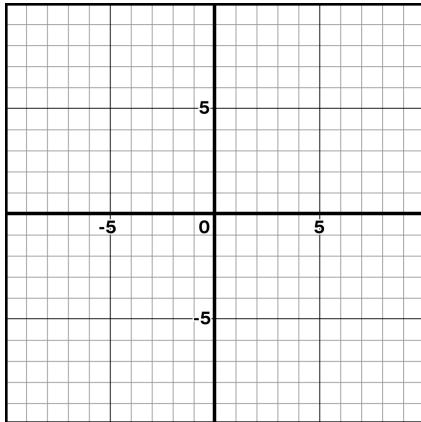
$$3x = 13$$

$$x = \frac{13}{3}$$

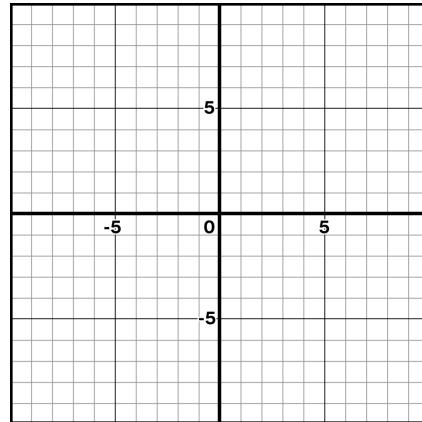
**Unit A1.5, Lesson 4: Practice Problems****Looking Back**

Graph each equation.

5.1  $y = 2x - 6$



5.2  $4x - 6y = 24$



Kadeem made a mistake as he started to solve this system of equations.

6.1 Show or explain one thing Kadeem did correctly.

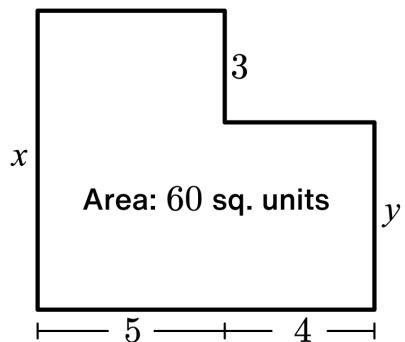
Kadeem's Work:

$$\begin{array}{rcl}
 5x - 4y = 6 & 5x - 4y = 6 \\
 5(x + y = 25) & 5x + 5y = 125 \\
 & \hline
 & -1y = 131 \\
 & y = -131
 \end{array}$$

6.2 Show or explain Kadeem's mistake.

**Explore**

7. Determine the value of  $x$  and  $y$ .



## Unit A1.5, Lesson 5: Practice Problems

Name \_\_\_\_\_

**Warm-Up**

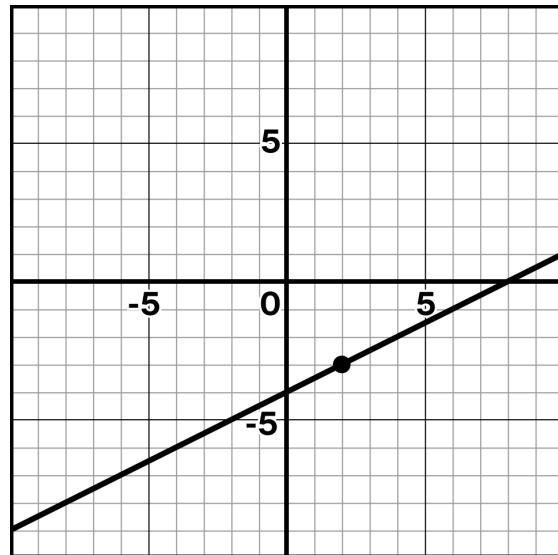
1. Select **all** of the coordinates that are solutions to the equation  $2x + 3y = 6$ .

 (0, 2) (0, 6) (3, 2) (6, -2) (3, 0)**Practice**

Here is a graph of  $y = \frac{1}{2}x - 4$ , one equation in a system of equations.

Graph a second line so the system of equations has:

- 2.1 No solutions.  
2.2 One solution at (2, -3).  
  
2.3 Write a second equation so that the system of equations has infinite solutions.



3. Match each system of equations to its number of solutions.

A.  $y = -2x + 1$       B.  $y = -2x + 1$       C.  $y = -2x + 1$       \_\_\_\_\_ No solutions  
 $2y = -4x + 2$        $y = -2x + 4$        $y = 2x + 1$       \_\_\_\_\_ One solution

\_\_\_\_\_ Infinite solutions

4. Solve this system of equations. Write the solution as a coordinate pair.  $y = 3x + 6$

Use a graph if it helps with your thinking.

$$y = -\frac{1}{2}x - 8$$

**Unit A1.5, Lesson 5: Practice Problems**

5. The point  $(-2, 2)$  is on the line  $y = x + 4$ .

Explain how you can determine if this point is the solution to this system of equations:

$$y = x + 4$$

$$y = 2x - 1$$

**Looking Back**

6. Here is a shape puzzle. What is the value of each shape?

		$= -2$
		$= 13$
		$= 20$
$= 23$	$= 8$	

Shape	Value
	
	
	

7. Solve this inequality:

$$3(x - 3) > 2x - 6$$

**Explore**

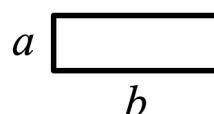
8. Here are two arrangements of identical rectangles. Determine the dimensions,  $a$  and  $b$ , of one rectangle.



Perimeter: 64 units



Perimeter: 56 units



**Warm-Up**

1. Decide whether each equation has no solutions, one solution, or infinite solutions.

$$2x + 6 = 2$$

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

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

**Practice**

Show or explain what your **first step** would be to solving each system of equations.

2.1  $6x + 21y = 103$   
 $-6x + 23y = 51$

2.2  $2x + y = 10$   
 $y = 6$

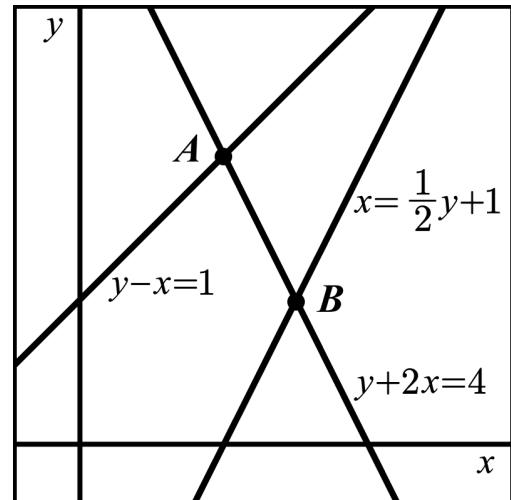
2.3  $y = \frac{2}{3}x + 7$   
 $y = \frac{2}{3}x - 3$

Solve these systems of equations. Write the solution as a coordinate pair.

3.1  $5x + 2y = 29$   
 $5x - 2y = 41$

3.2  $2x + 3y = 2$   
 $x = 4y + 12$

4. Determine the coordinates of points *A* and *B*:  
the intersections of the lines in the graph.





## Unit A1.5, Lesson 8: Practice Problems

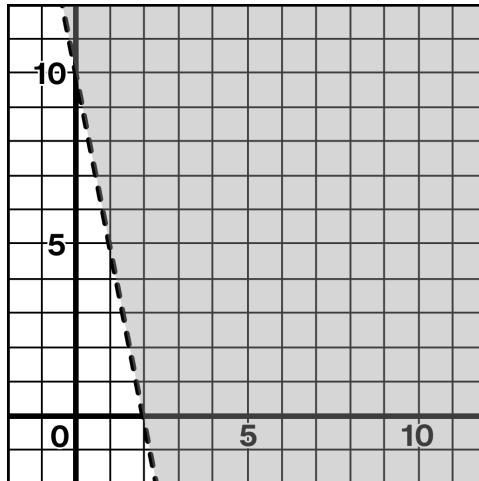
### Looking Back

5. Select **all** the coordinate pairs that are solutions to the inequality  $6y < 30 - 5x$ .

(0, 0)       (6, 3)       (0, 5)       (4, 1)       (-5, 0)

6. Which inequality represents this graph?

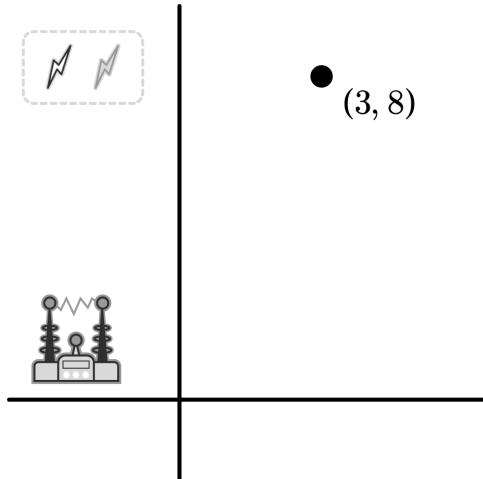
- A.  $5x + y < 10$
- B.  $5x + y \leq 10$
- C.  $5x + y > 10$
- D.  $5x + y \geq 10$



### Explore

7. Zapping the point (3, 8) will light up two lines.

Write a system of equations where (3, 8) is the solution.



### Reflect

- Star the problem that you spent the most time on.
- Use the space below to ask a question or share something you are proud of.

**Warm-Up**

Consider the inequality  $4x - 2y < 22$ .

- 1.1 List **three** coordinate pairs that make the inequality **true**.

- 1.2 List **three** coordinate pairs that make the inequality **false**.

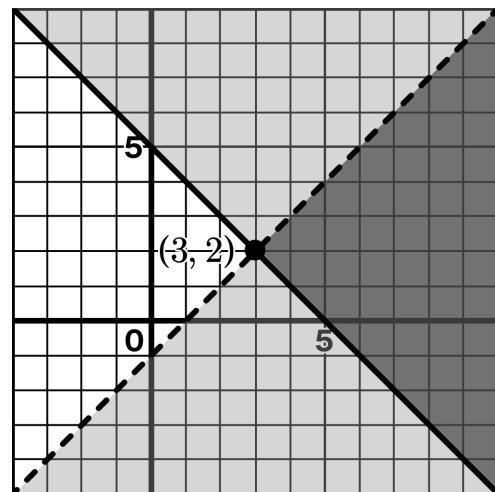
**Practice**

2. The graph shows this system of inequalities:

$$x + y \geq 5$$

$$x - y > 1$$

Is the point  $(3, 2)$  a solution to the system? Explain your thinking.



It costs Lukas \$5.00 to mail a package. Lukas has **postcard stamps**,  $p$ , that are worth \$0.34 each and **first-class stamps**,  $f$ , that are worth \$0.49 each.

- 3.1 Lukas wrote the inequality  $0.34p + 0.49f \geq 5$ . What does this inequality represent?

- 3.2 Lukas wrote another inequality:  $p + f \leq 12$ . What does this inequality represent?

- 3.3 If Lukas uses 1 postcard stamp and 9 first-class stamps, will this satisfy both constraints? Explain your thinking.

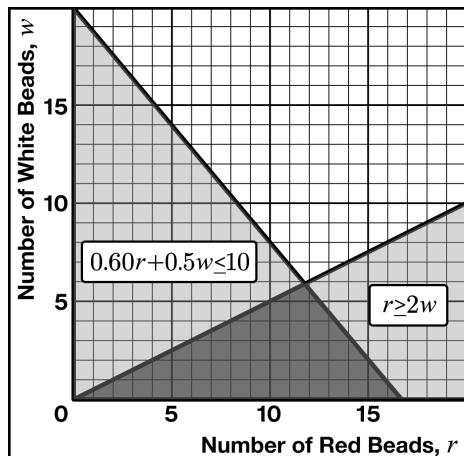
**Unit A1.5, Lesson 9: Practice Problems**

Arjun is making a bracelet. He has \$10 to spend on beads. Red beads cost \$0.60 each and white beads cost \$0.50 each. His bracelet design needs at least twice as many red beads as white beads.

The graph shows the system of inequalities that represents this situation.

- 4.1 What is a combination of red and white beads that meets both constraints?

- 4.2 What is a combination of red and white beads that meets **only one** constraint?

**Looking Back**

5. Solve this system of equations. Write your solution as a coordinate pair.  $2x + y = 8$   
 $y = 2x + 4$
6. Jayla is at the market with \$14 to buy fruit. She decides to buy apples and grapes. Apples,  $a$ , cost \$1.67 per pound and grapes,  $g$ , cost \$1.87 per pound.  
 Write an inequality to represent this situation.

**Explore**

7. Using the digits 0 – 9 without repeating, fill in each blank such that each statement below is true.

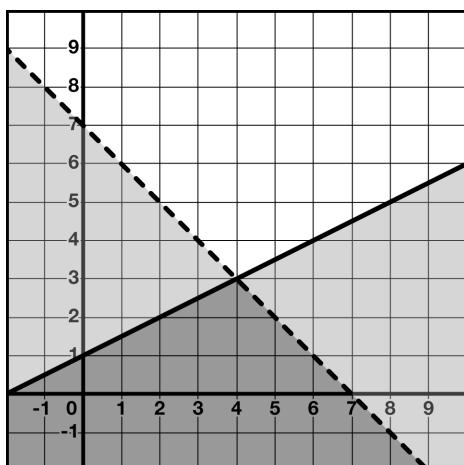
$$A(\square, \square)$$

$$B(\square, \square)$$

$$C(\square, \square)$$

$$D(\square, \square)$$

- Point  $A$  is a solution to both inequalities.
- Point  $B$  is a solution to only one inequality.
- Point  $C$  is a solution to only the other inequality.
- Point  $D$  is not a solution to either inequality.



**Warm-Up**

1. Find the value of  $y$  when  $x = 5$ .

$$y = 3x - 4$$

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

$$y = 4x - (x + 1)$$

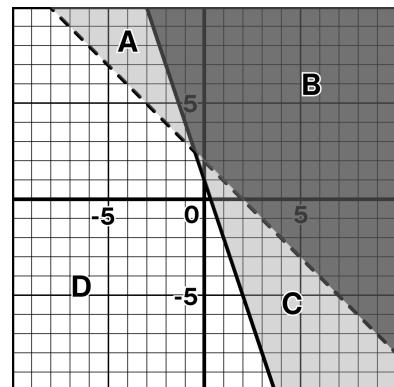
**Practice**

Here is the graph of this system of inequalities:

$$y > -x + 2$$

$$3x + y \geq 1$$

- 2.1 Which letter represents the solution region to the system of inequalities?
- 2.2 Is the point  $(5, -4)$  a solution to the system?

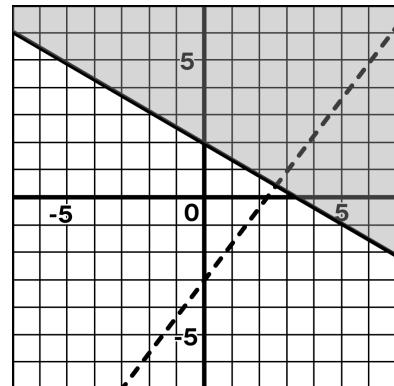


Javier graphed the first inequality and the boundary line of the second inequality.

$$3x + 5y \geq 10$$

$$4x - 3y < 9$$

- 3.1 Complete the graph of the second inequality.
- 3.2 Explain how you knew where to shade the second inequality.

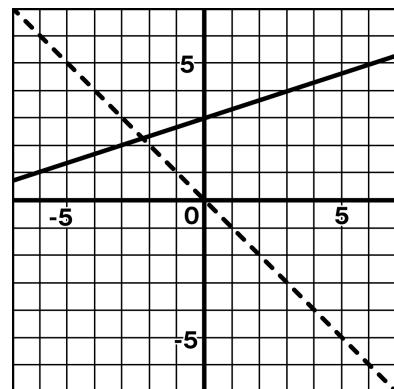


Nyanna started graphing this system of inequalities.

$$x + y > 0$$

$$-x + 3y \leq 9$$

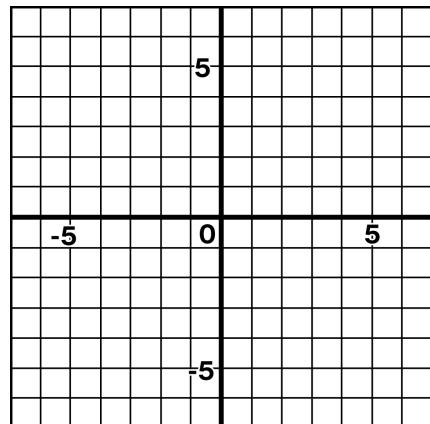
- 4.1 Complete the graph of the system of inequalities.
- 4.2 Identify a coordinate pair that is in the solution region.



## Unit A1.5, Lesson 10: Practice Problems

5. Make a graph of a system of inequalities that has no solutions.

Explain how you know it has no solutions.



## Looking Back

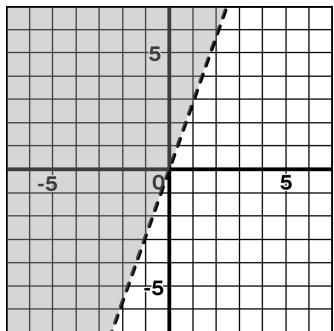
Match each inequality to its graph.

A.  $y > 3$

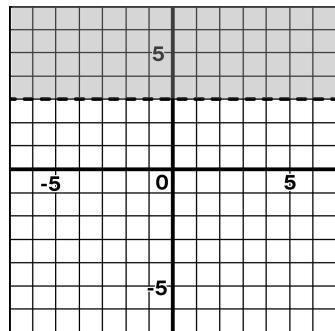
B.  $x < 3$

C.  $y > 3x$

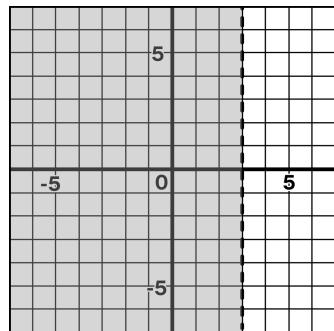
6.1



6.2



6.3



## Explore

7. Fill in each blank with an inequality symbol such that:

The system has no solutions.

$$x - y \boxed{\phantom{0}} 0$$

$$x - y \boxed{\phantom{0}} 0$$

Only points with matching  $x$ - and  $y$ -coordinates are a solution.

$$x - y \boxed{\phantom{0}} 0$$

$$x - y \boxed{\phantom{0}} 0$$

**Unit A1.6, Lesson 1: Practice Problems**

Name \_\_\_\_\_

**Warm-Up**

Determine the next two numbers in each sequence.

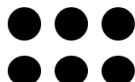
1.1 4, 9, 14, \_\_\_\_\_, \_\_\_\_\_

1.2 4, 8, 16, \_\_\_\_\_, \_\_\_\_\_

1.3 36, 18, 9, \_\_\_\_\_, \_\_\_\_\_

**Practice**

- 2.1 Make your own linear **or** exponential pattern by creating stages 1 and 3. Then complete the table for your pattern.

**Stage 1****Stage 2****Stage 3**

<b>Stage</b>	<b>Dots</b>
1	
2	6
3	

- 2.2 Is your pattern linear or exponential? Explain your thinking.

Match each statement to the table(s) it describes.

3.1 The constant rate of change is 6. \_\_\_\_\_

3.2 The constant growth factor is 4. \_\_\_\_\_

3.3 Shows an exponential relationship. \_\_\_\_\_

3.4 Is not linear or exponential. \_\_\_\_\_

**Table A**

<i>x</i>	<i>y</i>
1	2
2	8
3	32
4	128

**Table B**

<i>x</i>	<i>y</i>
1	2
2	8
3	18
4	32

**Table C**

<i>x</i>	<i>y</i>
1	2
2	8
3	14
4	20

**Table D**

<i>x</i>	<i>y</i>
1	2
2	6
3	18
4	54

**Unit A1.6, Lesson 1: Practice Problems**

Here are some of the values in the function  $f(x)$ .

- 4.1 Is  $f(x)$  linear, exponential, or something else?

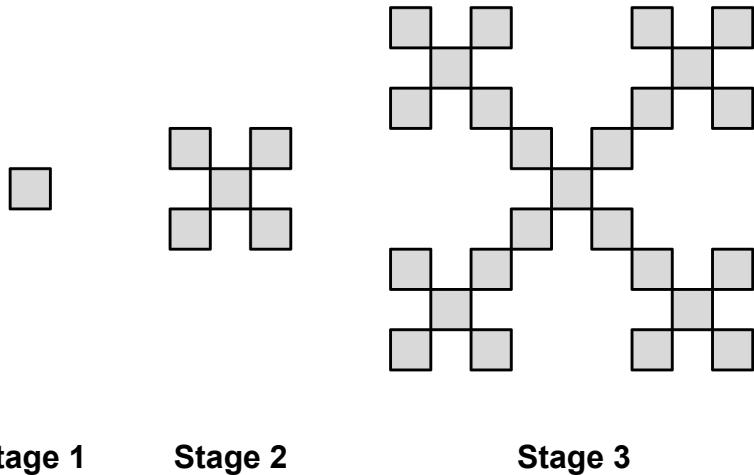
Explain how you know.

- 4.2 Complete the table.

$x$	$f(x)$
1	4
2	6
3	9
4	13.5
5	
6	

**Explore**

5. Determine the number of squares in stage 4 of this pattern.

**Reflect**

1. Put a question mark next to a problem you would like to compare with a classmate.
2. Use the space below to ask a question or share something you're proud of.

## Unit A1.6, Lesson 2: Practice Problems

Name \_\_\_\_\_

**Warm-Up**

Calculate the value of each expression.

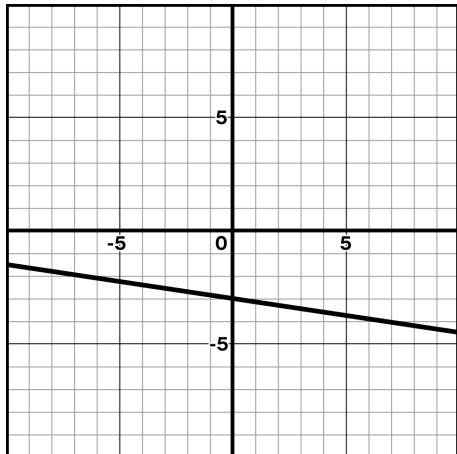
1.1  $4^3 + 3^2$

1.2  $(13 - 8)^3$

1.3  $6^2 + 11(7)$

**Practice**Circle **all** of the words that describe each function.

2.1

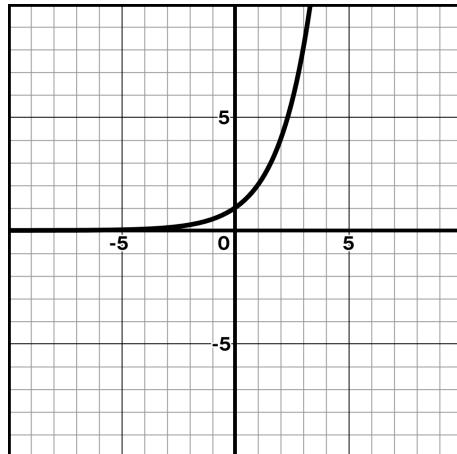


Positive / Negative

Increasing / Decreasing

Linear / Exponential

2.2

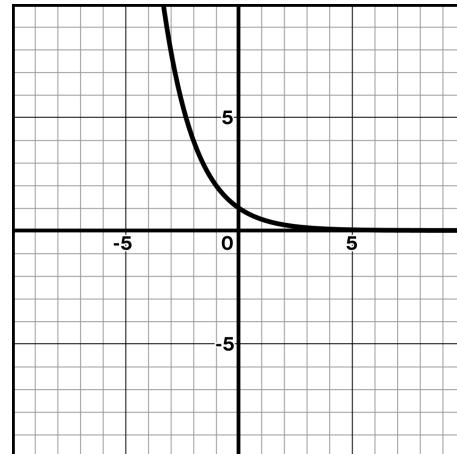


Positive / Negative

Increasing / Decreasing

Linear / Exponential

2.3



Positive / Negative

Increasing / Decreasing

Linear / Exponential

3. The trees in a forest are suffering from a disease. The equation  $p(t) = 80\left(\frac{3}{4}\right)^t$  represents the population of trees,  $p$ , in thousands, where  $t$  is the number of years since 2000.

Determine the value of  $p(2)$  and explain what it means in this situation.



## Unit A1.6, Lesson 2: Practice Problems

The first edition of a comic book has increased in value every year since it was printed in 1970.

The function  $c(t) = 0.35(1.1)^t$  represents the value of the comic over time.

Is the function  $c(t)$  linear, exponential, or something else? Explain your thinking.

4.1 Match each function statement to the sentence it describes.

A:  $c(0) = 0.35$  \_\_\_\_\_ The value of the comic book in the year 2020.

B:  $c(30) = 6.11$  \_\_\_\_\_ The comic book will be worth \$2.35 after  $t$  years.

C:  $c(50)$  \_\_\_\_\_ The comic book was worth \$0.35 when it was printed.

D:  $c(t) = 2.35$  \_\_\_\_\_ After 30 years, the comic book is worth \$6.11.

4.2 Do you think the value of the comic book can grow according to the function

$c(t) = 0.35(1.1)^t$  forever? Explain your thinking.

### Looking Back

Here is an equation:  $2x + 6y - 20 = 52$ .

5.1 Solve for  $x$ .

5.2 Solve for  $y$ .

### Reflect

1. Star the question you spent the most time on.
2. Use the space below to ask a question or share something you're proud of.



## Science Mom Lesson 54

## Unit A1.6, Lesson 4: Practice Problems

Name \_\_\_\_\_

## Warm-Up

Determine whether each function is linear, exponential, or something else. Circle your choice.

1.1  $f(x) = x^2 + 5$       Linear      Exponential      Something else

1.2  $g(x) = 2x + 5$       Linear      Exponential      Something else

1.3  $h(x) = 2^x + 5$       Linear      Exponential      Something else

## Practice

Determine if each equation or table represents **simple** or **compound** interest. Circle your choice.

2.1  $b(t) = 1000(1.03)^t$

**Simple / Compound**

2.2  $b(t) = 1000 + 30t$

**Simple / Compound**

2.3

Time (years)	Account Balance (dollars)
0	300
1	330
2	360

**Simple / Compound**

2.4

Time (years)	Account Balance (dollars)
0	200
1	230
2	264.50

**Simple / Compound**

Jin invests \$4000 in an account that earns 5% compound interest.

3.1 Complete the table.

3.2 Which function represents the amount of money in Jin's account after  $x$  years?

- A.  $f(x) = 4000 + 1.05x$
- B.  $f(x) = 4000(1.05)^x$
- C.  $f(x) = 4000(0.05)^x$
- D.  $f(x) = 4000 + (1.05)^x$

3.3 What will the balance of the account be after 10 years?

Time (years)	Account Balance (dollars)
0	
1	4200
2	4410
3	
4	

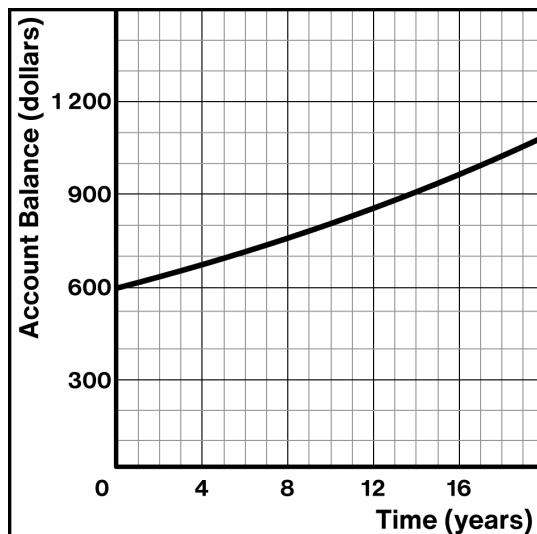
**Unit A1.6, Lesson 4: Practice Problems**

Keya invests \$600 in an account that earns 3% compound interest.

The graph shows the function  $f(t) = 600(1.03)^t$ , which gives Keya's account balance after  $t$  years..

- 4.1 About how many years will it take for her account balance to reach \$1 000?

- 4.2 Use the graph to determine the value of  $f(14)$ .  
What does that tell you about the situation?

**Looking Back**

5. Solve this system of equations.  
Write the solution as a coordinate pair.

$$5x + y = 18$$

$$x - 3y = 10$$

**Explore**

6. You just won a contest and have two prize options.
- **Option A:** One payment of \$20 million.
  - **Option B:** 2 cents on day one, 4 cents on day two, 8 cents on day three, and so on, for 30 days.

Which option would you choose? Explain your choice.

**Reflect**

1. Put a star next to one question you are still wondering about.
2. Use the space below to ask a question or share something you're proud of.

**Warm-Up**

1. Determine the value of  $f(2)$  for each function.

$$f(x) = 7^x$$

$$f(x) = \left(\frac{1}{6}\right)^x$$

$$f(x) = 3(9^x)$$

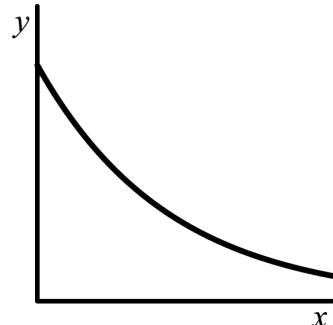
**Practice**

Here is the graph of  $f(x) = a \cdot b^x$ .

- 2.1 Select **all** possible values of  $b$ .

- $\frac{18}{5}$       $\frac{1}{10}$       $\frac{9}{10}$      1.3     0.3

- 2.2 Explain how you decided.

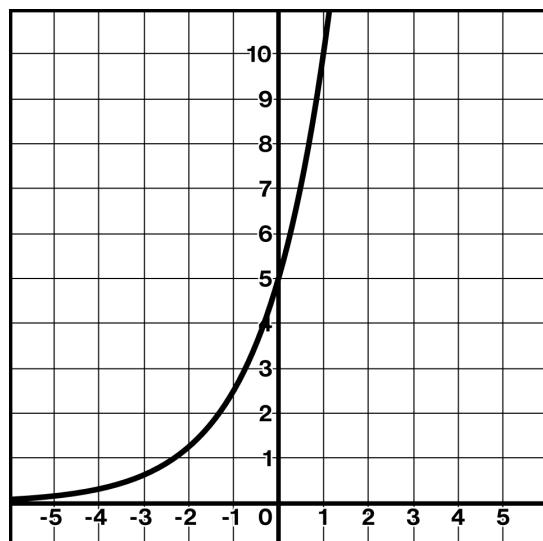


Here is the graph of  $y = 5 \cdot 2^x$ .

- 3.1 Sketch what you think  $y = 3 \cdot 2^x$  would look like.

- 3.2 How are the graphs alike?

- 3.3 How are the graphs different?

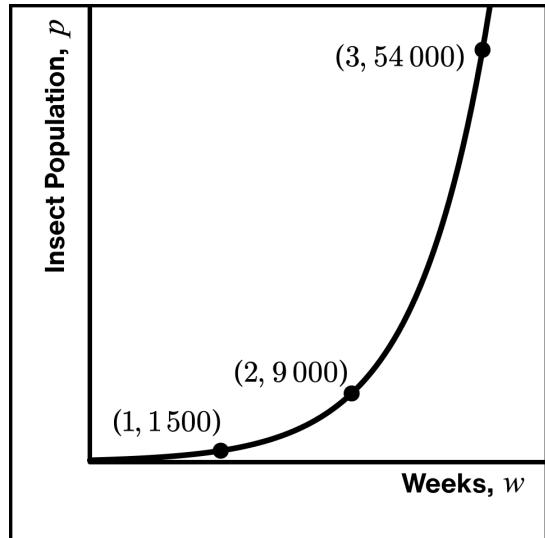


**Unit A1.6, Lesson 6: Practice Problems**

The graph models an insect population,  $p$ , over  $w$  weeks. Three data points are graphed.

- 4.1 What is the weekly growth factor?

- 4.2 Write an equation relating  $p$  and  $w$ .

**Looking Back**

5. Solve this system of equations:

$$3x + 2y = 26$$

Write the solution as a coordinate pair.

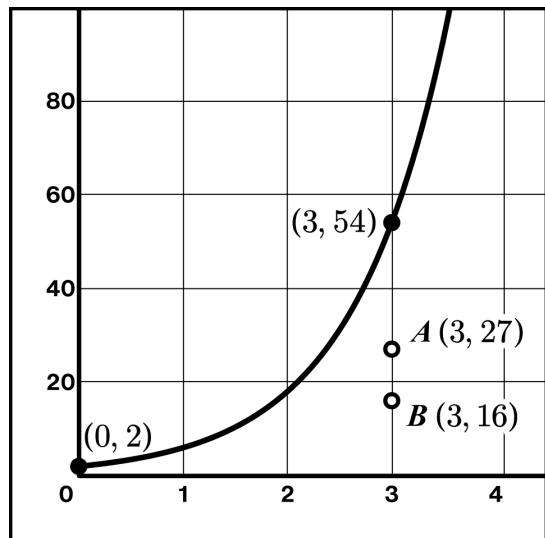
$$y = 2x - 8$$

**Explore**

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

- 6.1 Change **one** value in  $f(x)$  so that the graph passes through  $A$ .

- 6.2 Change **one** value in  $f(x)$  so that the graph passes through  $B$ .





# Science Mom Lesson 56

## Unit A1.6, Lesson 7: Practice Problems

Name \_\_\_\_\_

### Warm-Up

1. Order these values from least to greatest.

A. 75% of 12

B. 25% of 32

C. 50% of 20

D. 10% of 95

Least \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ Greatest

### Practice

A group of biologists tracked the number of deer in a forest over several years.

There were 600 deer when they first counted. The population has **increased** by 15% each year.

- 2.1 How many deer are in the forest 1 year after the biologists first counted?

- 2.2 Write an expression that represents the deer population after 3 years.

- 2.3 Write an expression that represents the deer population after  $t$  years.

3. Sothy's family paid \$1 300 in property tax last year.

This year, the county will increase the property tax by 2. 1%.

Select **all** the expressions that represent Sothy's family's property taxes this year.

$1300 + (1.021)$

$1300(1.21)$

$1300(1.021)$

$1300(1.0021)$

$1300 + 1300(0.021)$

**Unit A1.6, Lesson 7: Practice Problems**

Sai gets a \$500 loan from their bank with an annual interest rate of 6%.

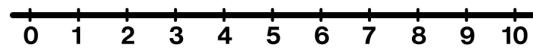
- 4.1 Write a function,  $f(t)$ , to represent the amount Sai will owe, in dollars, after  $t$  years.

- 4.2 Complete the table to determine how much money Sai will owe over time if they do not make any payments.

Years	Amount Owed (\$)
0	500
1	
2	
3	
4	

**Looking Back**

5. Create a dot plot that has:
- At least 5 data points.
  - A median of 7.
  - A mean that is less than the median.

**Explore**

- 6.1 Using the digits 1 to 9, without repeating, fill in the blanks to create a system of equations that intersect at  $x = 1$ .

$$y = \boxed{\phantom{0}} \cdot \boxed{\phantom{0}}^x$$

$$y = \boxed{\phantom{0}} \cdot \boxed{\phantom{0}}^x$$

- 6.2 Using the digits 1 to 9, without repeating, fill in the blanks to create a system of equations that intersect at  $x = 2$ .

$$y = \boxed{\phantom{0}} \cdot \boxed{\phantom{0}}^x$$

$$y = \boxed{\phantom{0}} \cdot \boxed{\phantom{0}}^x$$



# Science Mom Lesson 57

## Unit A1.6, Lesson 10: Practice Problems

Name \_\_\_\_\_

### Warm-Up

Determine the value of each function when  $n = 2$ .

1.1  $f(n) = 4 \cdot 2^n$

1.2  $g(n) = 2 \cdot 4^n$

1.3  $h(n) = 8 + 2^n$

### Practice

Alina takes out a \$1000 loan with a monthly interest rate of 3%. She makes no additional payments, deposits, or withdrawals.

- 2.1 Select **all** the expressions that can be used to calculate her balance after  $t$  years.

$1000 \cdot 1.03^t$

$1000 \cdot 1.03^{12t}$

$1000(1.03^{12})^t$

$1000 \cdot 1.4258^t$

$1000(1.4258)$

- 2.2 What is the interest rate **per year** for this loan?

Alejandro invests money into a college savings account. He writes the expression  $750(1.025^{12})^3$  to help him calculate what the account balance will be in 3 years.

- 3.1 Explain what each part of the equation represents.

750 represents . . .

1.025 represents . . .

12 represents . . .

3 represents . . .

- 3.2 Write an equivalent expression that could represent Alejandro's account balance in 3 years.

**Unit A1.6, Lesson 10: Practice Problems**

Rebecca is considering taking out a payday loan that has a 17% monthly interest rate.

- 4.1 Complete the table.

<b>Monthly Interest Rate</b>	17%
<b>Monthly Growth Factor</b>	
<b>Growth Factor per Year</b>	
<b>Interest Rate per year</b>	

- 4.2 If Rebecca takes out a \$300 payday loan, how much would she owe after 2 years if she made no additional payments?

**Looking Back**

Determine the following values of the piecewise-defined function  $g(x)$ .

5.1  $g(0)$

5.2  $g(3)$

5.3  $g(5)$

$$g(x) = \begin{cases} -17 & x < 3 \\ 5x & x \geq 3 \end{cases}$$

**Explore**

6. Using the digits 0 to 9, without repeating, fill in each blank to create four equivalent expressions.

$$7^{\square} = 7^{\square} \times 7^{\square} = 7^{\square} \times 7^{\square} \times 7^{\square} = (7^{\square})^{\square}$$

**Reflect**

1. Circle the question you feel most confident about.
2. Use the space below to ask one question you have or to share something you're proud of.



## Science Mom Lesson 58

### Unit A1.6, Lesson 11: Practice Problems

Name \_\_\_\_\_

#### Warm-Up

- Fill in the missing values to continue the series.

$$256, 64, 16, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$$

#### Practice

- Tyrone puts \$2500 into a savings account with a 1.2% annual interest rate, compounded semi-annually.

He makes no additional payments, deposits, or withdrawals.

Select **all** the expressions that can be used to calculate his balance after 3 years.

$2500\left(1 + \frac{0.012}{2}\right)^{3 \cdot 2}$

$2500\left(1 + \frac{0.012}{6}\right)^6$

$2500\left(1 + 0.012\right)^3$

$2500\left(1 + 0.006\right)^6$

$2500\left(1 + \frac{0.012}{3}\right)^{3 \cdot 2}$

Maneli wants to take out a \$5000 loan to help pay for a new washing machine and dryer.

The bank offers her the loan with an 18% annual interest rate, compounded quarterly.

Maneli wrote this expression to calculate the balance of the loan in 2 years, but she made an error.

- Find the error and explain why it is incorrect.

$$5000 \left(1 + \frac{0.18}{2}\right)^{(4 \cdot 2)}$$

- Write a correct expression to represent Maneli's balance after 2 years.

- What will her balance be in 2 years?

**Unit A1.6, Lesson 11: Practice Problems**

A payday loan company offers a \$1000 loan with a 25% annual interest rate.

- 4.1 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 (dollars)
Annually	
Monthly	
Daily	

- 4.2 Describe how changing the compounding period affects the balance of the loan.

**Looking Back**

Irene needs to make at least 25 dinners for a party, including chicken dinners and vegetarian dinners.

She has \$250 to spend. Chicken dinners cost \$8.75 each and vegetarian dinners cost \$5.50 each.

- $c$  represents the number of chicken dinners.
- $v$  represents the number of vegetarian dinners.

- 5.1 Write a system of inequalities that represents Irene's constraints.

- 5.2 Can Irene make 5 chicken dinners and 20 vegetarian dinners?  
Show or explain your thinking.

**Reflect**

1. Put a star next to the question you understood best.
2. Use the space below to ask one question you have or to share something you're proud of.

**Warm-Up**

Determine the value of  $f(x) = 10(2.5)^x$  for each value of  $x$ .

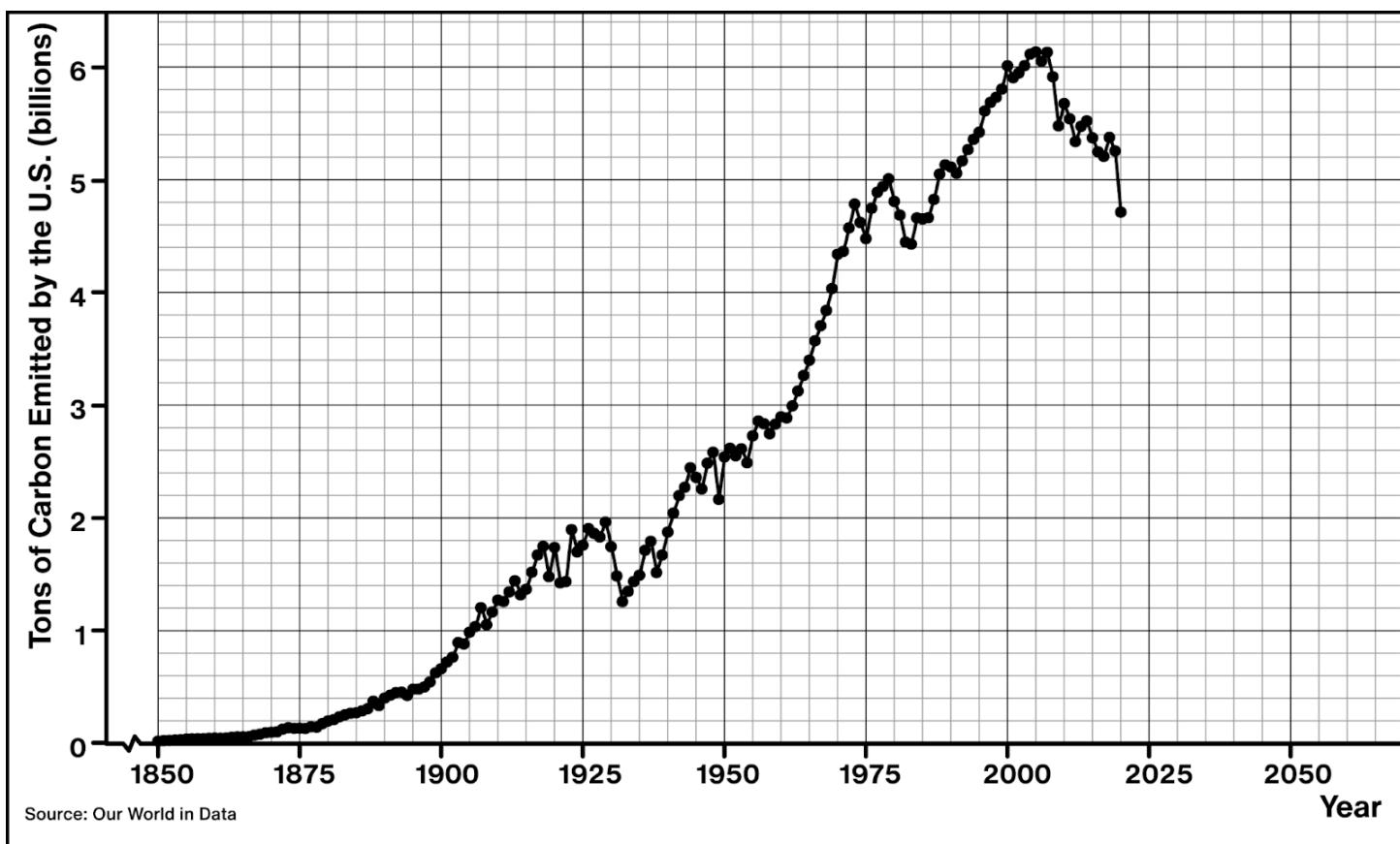
1.1  $x = 2$

1.2  $x = 3$

1.3  $x = -1$

**Practice**

The graph shows the number of tons of carbon, in billions, that the United States emitted from 1850 to 2020.



- 2.1 How would you describe the data in this graph?
- 2.2 What change occurs in the data around 2005? What do you think may have caused that change?
- 2.3 Sketch a line or exponential curve of best fit to model the data **from 1850 to 2005**.
- 2.4 Sketch a line or exponential curve of best fit to model the data **after 2005**.
- 2.5 Use your model to predict how many tons, in billions, the United States will emit in 2050.

**Unit A1.6, Lesson 13: Practice Problems****Looking Back**

3. The line of best fit  $y = 8.23x - 1.84$  was calculated for a data set.  
Which value could be the  $r$ -value of the data? (Circle your choice.)

$r = 0.72$

$r = -0.72$

Both are possible

Explain your thinking.

**Explore**

- 4.1 Match each liquid to a graph.

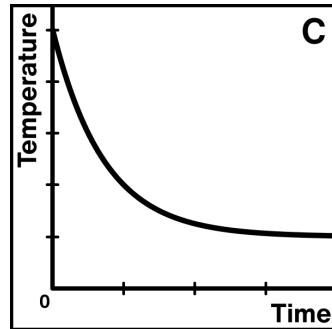
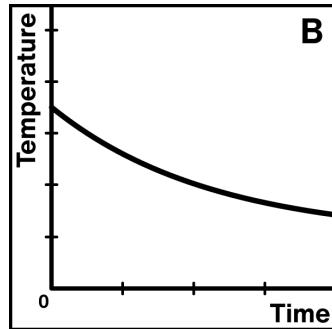
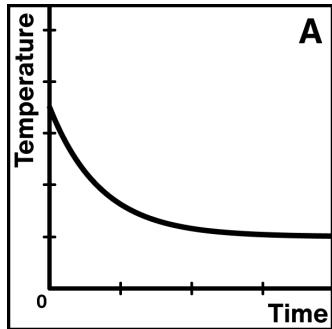
Coffee in a Travel Mug



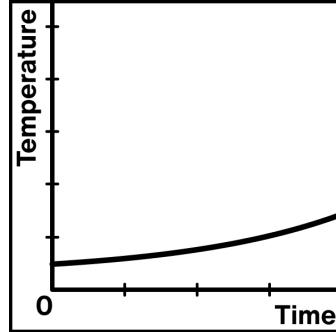
Boiling Water Resting in a Kettle



Black Tea in a Teacup



- 4.2 What liquid might this graph represent?

**Reflect**

1. Put a heart next to the answer you're most proud of.
2. Use the space below to ask one question you have or to share something you're proud of.

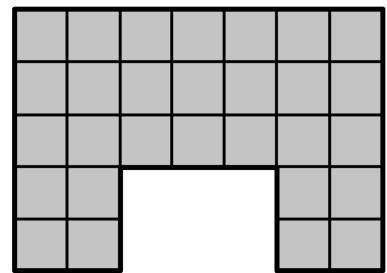
## Unit A1.7, Lesson 1: Practice Problems

Name \_\_\_\_\_

## Warm-Up

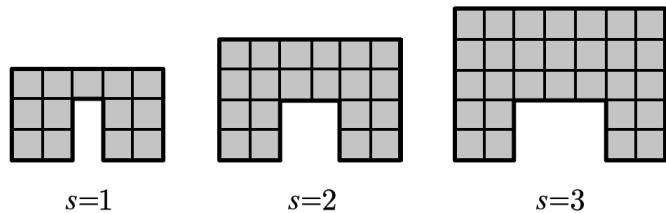
1. Select **all** of the expressions that could represent the area of this figure.

- $5 \cdot 7$
- $5 \cdot 7 - 6$
- $3 \cdot 7 + 2 \cdot 2$
- $5 \cdot 7 - 2 \cdot 3$
- $2 \cdot 5 + 3 \cdot 3 + 2 \cdot 5$

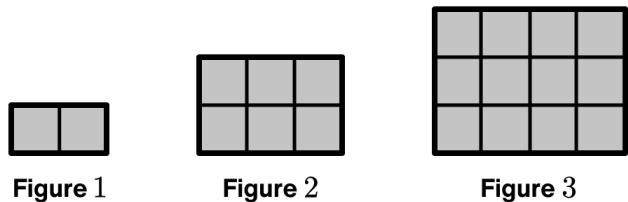


## Practice

2. Draw the pattern for  $s = 4$ .



3. How many tiles are in figure 10?



4. What type of relationship does the pattern in the table represent?  
(Circle one.)

Linear

Exponential

Neither

Explain your thinking.

$s$	Number of Tiles
1	3
2	9
3	27
4	81



## Unit A1.7, Lesson 1: Practice Problems

A teacher gives her class a table with only the first two rows in the pattern.

- 5.1 Rishi says the pattern is an exponential relationship.  
Ichiro says there is not enough information to be sure.

Who is correct? Explain your thinking.

$s$	Number of Tiles
1	5
2	25

- 5.2 How many tiles would be in the next step if the relationship were **linear**?      5.3 How many tiles would be in the next step if the relationship were **exponential**?

### Looking Back

6. Juana began hiking at 6: 00 AM. At noon, she had hiked 12 miles. At 4: 00 PM, Juana finished her hike with a total distance of 26 miles.

On average, during which time interval was Juana hiking faster? Circle one.

6: 00 AM to noon

Noon to 4: 00 PM

Explain your thinking.

### Reflect

- Star the problem you spent the most time on.
- Use the space below to ask a question or share something you are proud of.

## Unit A1.7, Lesson 2: Practice Problems

Name \_\_\_\_\_

**Warm-Up**

1. Select all the expressions that are equivalent to  $6m + 3q$ .

$4m + 2m + 5q - 2q$

$3(2m + q)$

$(6 + 3)(m + q)$

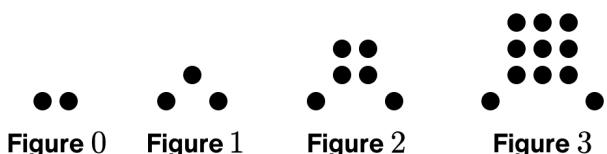
$3q + 2m + 3q + m$

$q + 15m + 2q - 9m$

**Practice**

- 2.1 Does this pattern show a quadratic relationship?

Explain your thinking.



- 2.2 Will this pattern ever have **exactly** 100 dots?

3. Karima says that she sees a square plus one more row in each pattern.

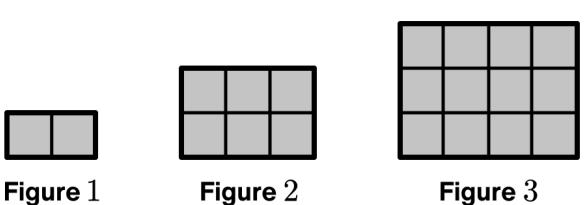
Which expression could Karima use to represent the number of tiles in this pattern?

Explain your thinking.

$n^2 + 1$

$n^2 + n$

$n(n + 1)$



4. Write an expression to represent the relationship between the figure number,  $n$ , and the total number of tiles.

Figure 1



Figure 2

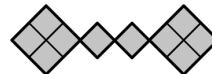
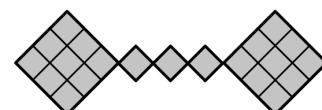


Figure 3



## Unit A1.7, Lesson 2: Practice Problems

5. Three students wrote different, but correct, expressions to represent this pattern. Choose a student and describe how they see the expression in the pattern.

Ethan	Ama	Annika
$n^2 + (n - 1)$	$n(n + 1) - 1$	$n^2 + n - 1$

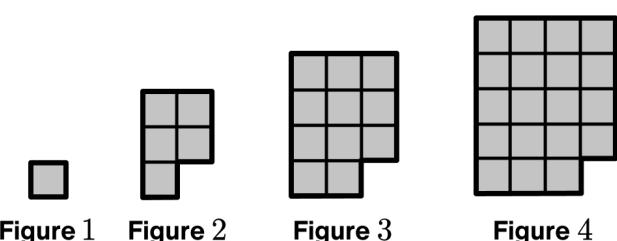


Figure 1   Figure 2

Figure 3

Figure 4

## Looking Back

6. Complete the table for the function  $h(x) = 5(2^x)$ .

$x$	-2	-1	0	1	2
$5(2^x)$					

## Explore

7. Here is an incomplete table that could represent several types of functions.

Select a function type and determine the number of tiles that would be in figure 2.

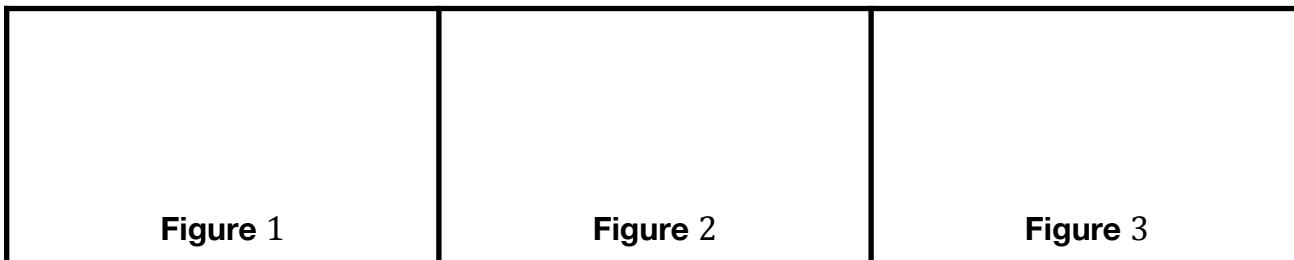
Linear

Quadratic

Exponential

Figure	Number of Tiles
1	1
2	
3	9

Draw three figures to match the pattern in the table.



## Reflect

- Put a heart next to the problem you feel most confident about.
- Use the space below to ask a question or share something you are proud of.

## Unit A1.7, Lesson 4: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Determine the number that is halfway between each pair of numbers.

0 and 13

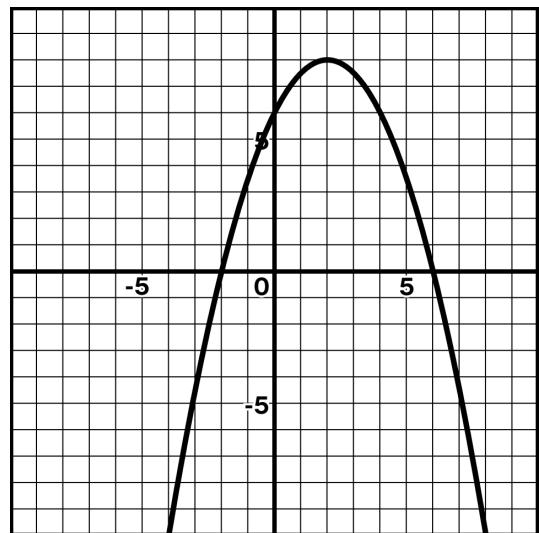
4 and 20

7 and 28

## Practice

- 2.1 Draw the *line of symmetry* where you think it is located on this parabola.
- 2.2 Write the equation for the line of symmetry.

$$x = \underline{\hspace{2cm}}$$



Here are a few points that belong to a function  $g(x)$ .

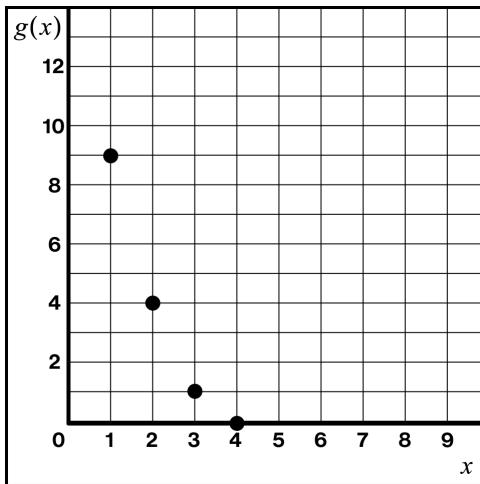
$x$	0	1	2	3	4	5	6	7	8
$g(x)$		9	4	1	0				

- 3.1 Does  $g(x)$  represent a quadratic relationship?  
**Circle** your response and **explain** your thinking.

Yes

No

Not enough information



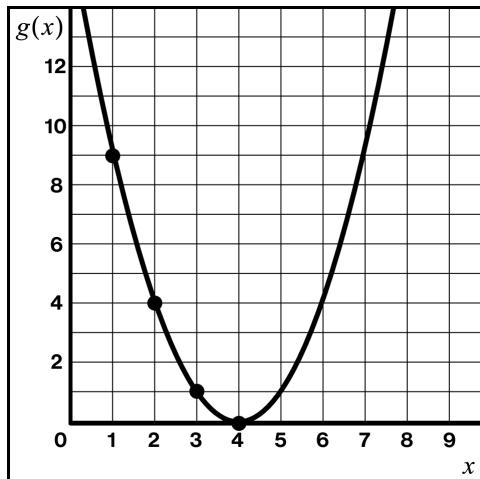
- 3.2 Complete the table to plot some more points that belong to the function  $g(x)$ .

**Unit A1.7, Lesson 4: Practice Problems**

Here is the graph of the function  $g(x)$ .

4. Write the equation for the line of symmetry of  $g(x)$ .

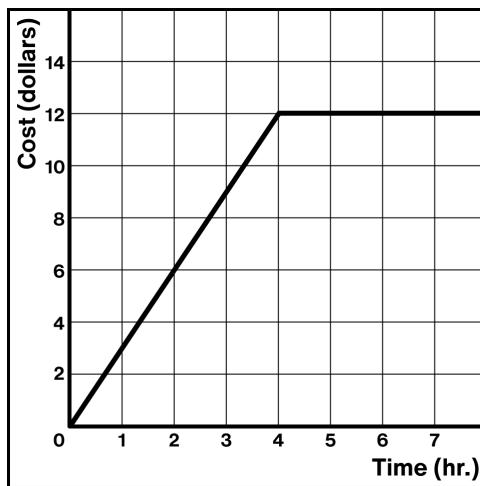
$$x = \underline{\hspace{2cm}}$$

**Looking Back**

The graph represents the relationship between the amount of time a car is parked, in hours, and the cost of parking, in dollars.

- 5.1 Is the relationship a function?

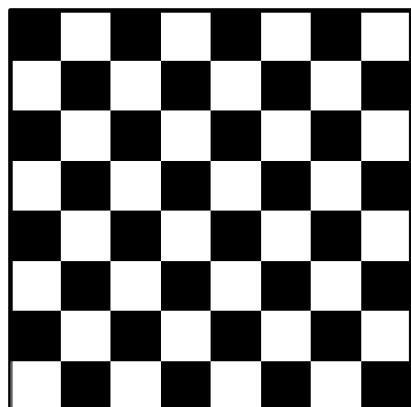
- 5.2 Describe the relationship between the amount of time a car is parked and the cost of parking.

**Explore**

Axel claims that there are 204 squares on a chessboard.

Use the table and the image of a chess board to help you investigate this claim.

Square Size	Total Squares
$1 \times 1$	64
$2 \times 2$	
$3 \times 3$	
$4 \times 4$	



## Unit A1.7, Lesson 5: Practice Problems

Name \_\_\_\_\_

**Warm-Up**

1. Use the pattern to fill in the missing values in the table.

$x$	0	1	2	3	4		10
$y$		8	11	14		26	

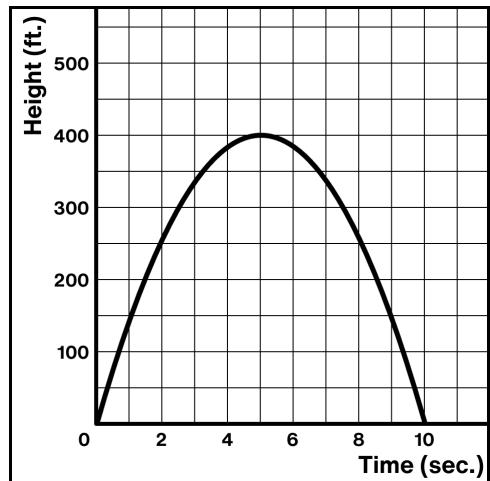
**Practice**

The table and graph on the right show the height of a stomp rocket at various times.

- 2.1 How high was the rocket after 4 seconds?

Time (sec.)	Height (ft.)
0	0
1	144
2	256
3	336

- 2.2 How long did it take for the rocket to land?



3. This table shows a quadratic relationship. Fill in the missing values in the table.

$x$	0	1	2	3	4	5	6
$y$	0	50	80	90			

4. A rock is thrown off a cliff.

The table shows its height at various times.

Is this relationship quadratic? Explain how you know.

Time (sec.)	Height (m)
0	200
1	184
2	136
3	56

**Unit A1.7, Lesson 5: Practice Problems**

5. Oliver jumps off a diving board into a swimming pool. The table shows his height over time.

<b>Time (sec.)</b>	0	0.2	0.4	0.6				
<b>Height (m)</b>	3	4.8	6.2	7.2				

After how many seconds will Oliver reach his maximum height?

6. The table shows the heights of a stomp rocket from the time it is launched.

How many seconds will it take for the rocket to land? (Circle one.)

8 seconds      9 seconds

Between 8  
and 9  
seconds

Between 9  
and 10  
seconds

Explain your thinking.

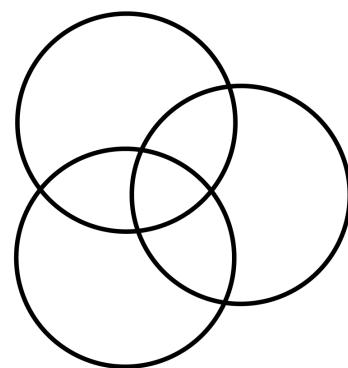
<b>Time (sec.)</b>	<b>Height (m)</b>
0	0
1	42
2	74
3	96

**Explore**

Rosettes are created by overlapping circles. This rosette has three circles.

7. Explore the number of sections in rosettes made from different numbers of circles.

<b>Number of Circles</b>	2	3	4	5	6
<b>Number of Sections</b>		7			

**Reflect**

- Put a heart next to a question that you understand well.
- Use the space below to ask a question or share something you are proud of.

**Warm-Up**

1. The key features of this parabola are labeled  $a$ ,  $b$ ,  $c$ ,  $d$ .

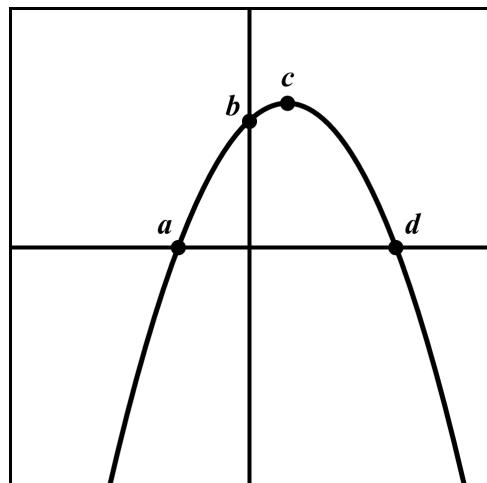
Name each key feature below.

$a$ :

$b$ :

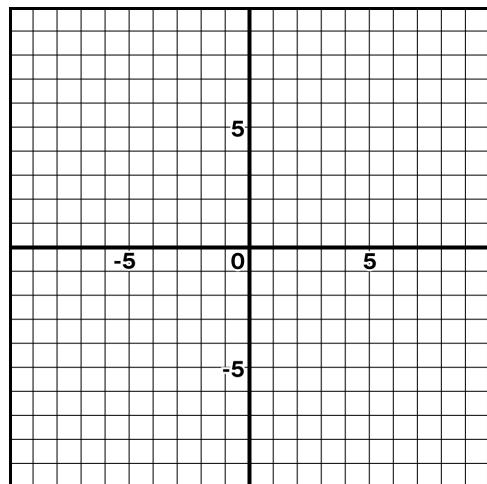
$c$ :

$d$ :

**Practice**

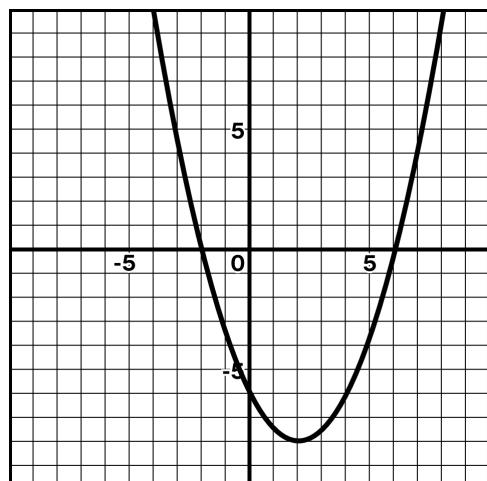
2. Sketch a parabola that:

- Is concave up.
- Has a vertex at  $(6, 1)$ .
- Has a  $y$ -intercept at  $(0, 5)$ .



3. Identify the key characteristics of this parabola.

<b>Vertex</b>	
<b><math>x</math>-intercept</b>	$(-2, 0)$
<b><math>x</math>-intercept</b>	
<b><math>y</math>-intercept</b>	
<b>Line of symmetry</b>	



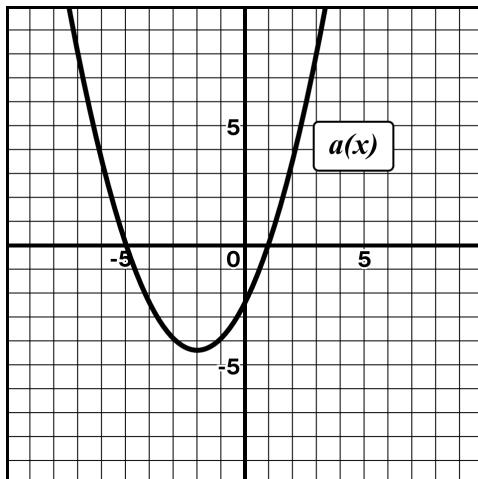
## Unit A1.7, Lesson 6: Practice Problems

4. Here are two different quadratics:  $a(x)$  and  $b(x)$ .

Which parabola is concave down?  
(Circle one.)

$a(x)$       $b(x)$      Both     Neither

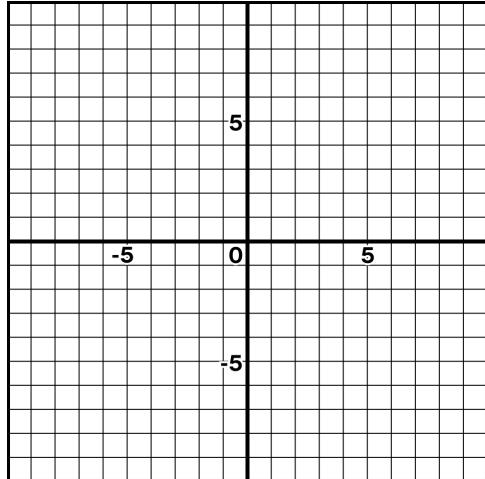
Explain your thinking.



$x$	$b(x)$
-2	0
-1	9
0	16
1	21
2	24

5. Is it possible to create two parabolas with the same  $y$ -intercept **and**  $x$ -intercepts but a different vertex?

Explain your thinking. Use the graph if it helps.



## Explore

6. Here's a function:  $f(x) = ax^2 + bx + c$ . Use graphing technology to explore what the graph of  $f(x)$  looks like when you change the values of  $a$ ,  $b$ , and  $c$ . For example, what does  $f(x)$  look like when  $a = 1$ ,  $b = 0$ , and  $c = -1$ ?

Write what you notice and wonder in the space below.

## Reflect

- Put a star next to one question you are still wondering about.
- Use the space below to ask one question you have or to share something you are proud of.

**Warm-Up**

1. Determine the value of each function when  $x = -3$ .

$$f(x) = 2x + 4$$

$$g(x) = 2x^2$$

$$h(x) = 2x^2 + 2x + 4$$

**Practice**

2. Here is a function:  $k(x) = (x + 4)(x - 2)$ .

Amoli says that  $k(-2) = -12$ .

Yasmine says that  $k(-2) = -8$ .

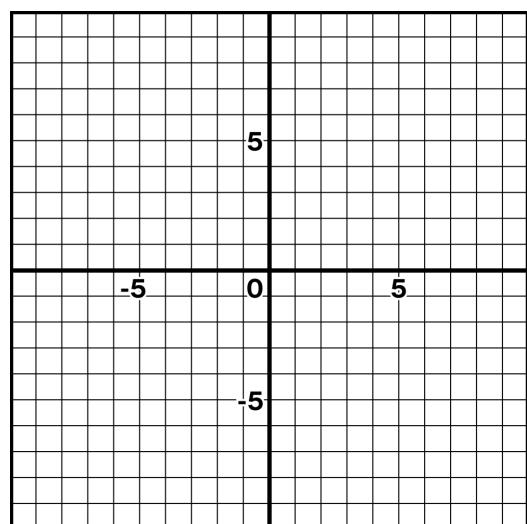
Who is correct? Explain your thinking.

Here is a function:  $g(x) = 2x^2 - 2x - 4$ .

- 3.1 Complete the table for  $g(x)$ .

$x$	$2x^2$	$-2x$	$-4$	$2x^2 - 2x - 4$
-2			-4	
		2	-4	
0				
1		-2		
	8			

- 3.2 Create a graph of  $g(x)$ .



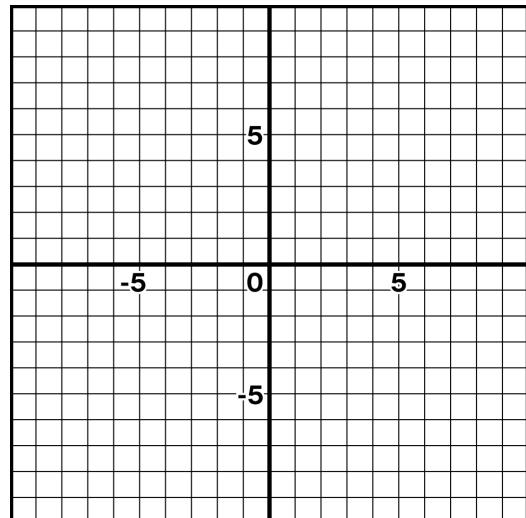
**Unit A1.7, Lesson 8: Practice Problems**

Here is a function:  $h(x) = 2x(x + 3)$ .

- 4.1 Complete the table for  $h(x)$ .

$x$	$2x$	$x + 3$	$2x(x + 3)$
-3			
-2			
	-2		
0			
1		4	

- 4.2 Create a graph of  $h(x)$ .



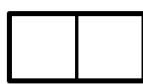
5. Here is the same function:  $h(x) = 2x(x + 3)$ .

Is this function linear, quadratic, exponential, or none? Explain your thinking.

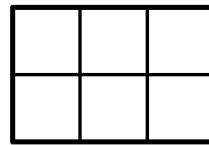
**Looking Back**

6. Select **all** the expressions that show the relationship between  $n$  and  $s$ , the total number of squares.

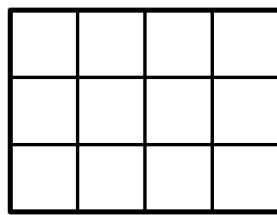
- $s = 2n$
- $s = n^2$
- $s = n^2 + n$
- $s = n^2 + 1$
- $s = (n)(n + 1)$



$$n=1$$



$$n=2$$



$$n=3$$

**Reflect**

- Put a smiley face next to a question you were stuck on and then figured out.
- Use the space below to ask a question or share something you are proud of.

## Unit A1.7, Lesson 10: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Complete each equation with a number that makes the equation true.

$$\underline{\quad} + 0 = 5 \quad \underline{\quad} - 10 = 5 \quad 5 \cdot \underline{\quad} = 0 \quad (\underline{\quad} + 3)(5) = 0 \quad 2 \cdot \underline{\quad} + 6 = 0$$

## Practice

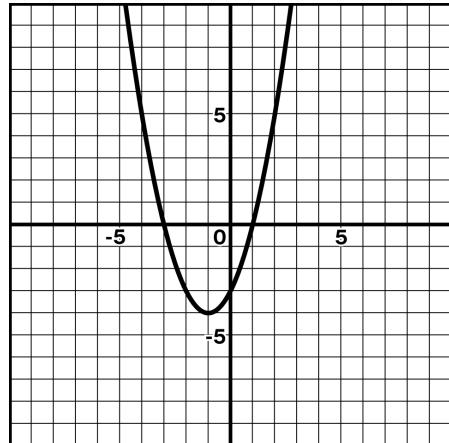
2. The function  $f(x) = (x + 5)(7x - 21)$ . Select **all** values of  $x$  that make  $f(x) = 0$ .

$x = 3$         $x = 5$         $x = -5$         $x = 7$         $x = 21$

3. Here is a graph of a quadratic function.

Which function could this be?

- A.  $y = (x - 3)(x + 1)$
- B.  $y = (x + 3)(x - 1)$
- C.  $y = (x - 3)(x - 1)$
- D.  $y = (x + 3)(x + 1)$



4. Here is the same function written in two forms.

**Factored form:**  $g(x) = (x + 5)(x - 2)$

**Standard form:**  $g(x) = x^2 + 3x - 10$

Write the intercepts of the function in the table.

$x$ -intercept	
$x$ -intercept	
$y$ -intercept	

5. Evan and Ariel were working on homework together.

Evan: The  $y$ -intercept of  $y = (x - 3)^2$  is  $(0, 3)$ .

Ariel: The  $x$ -intercept of  $y = (x - 3)^2$  is  $(3, 0)$ .

Who is correct? Explain your thinking.

**Unit A1.7, Lesson 10: Practice Problems**

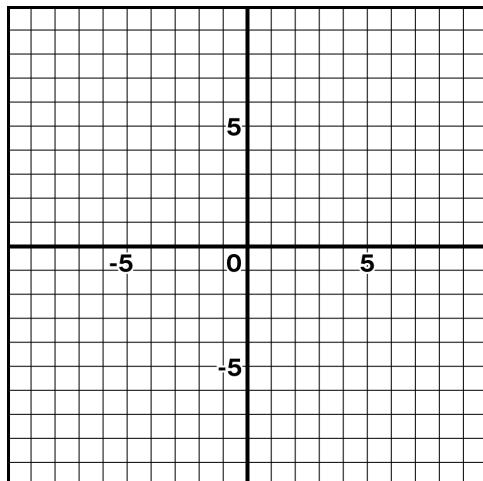
Here is a function:  $h(x) = x(x + 6)$ .

- 6.1 Determine the intercepts of the graph of  $h(x)$ .

$x$ -intercepts:

$y$ -intercept:

- 6.2 Sketch the graph of the function  $h(x)$ .

**Looking Back**

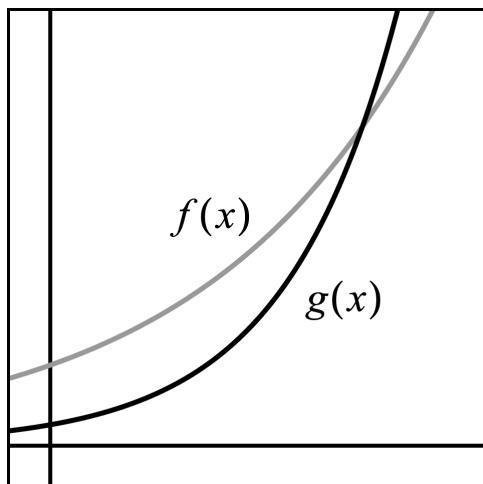
7. Here are the graphs of two functions,  $f(x)$  and  $g(x)$ .

$$f(x) = 100 \cdot 2^x$$

Which equation could represent  $g(x)$ ?

- A.  $g(x) = 25 \cdot 4^x$
- B.  $g(x) = 50 \cdot 1.5^x$
- C.  $g(x) = 100 \cdot 4^x$
- D.  $g(x) = 200 \cdot 1.5^x$

Explain your thinking.

**Explore**

8. Use graphing technology to graph  $f(x) = (x + 3)(x + 1)(x - 2)$ .

Change the numbers in the equation to determine an equation whose graph:

Has two  $x$ -intercepts.

Has one  $x$ -intercept.

Has an  $x$ -intercept at  $(7, 0)$ .

---

**Reflect**

- Circle a question you want to talk to a classmate about.
- Use the space below to ask a question or share something you are proud of.

## Unit A1.7, Lesson 11: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Determine the number that is halfway between each pair of numbers.

1 and 5

-1 and 5

-2 and 5

## Practice

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

Write three points that are on the graph of  $f$  in the table.

Point	Coordinates
A	
B	
C	

A parabola has  $x$ -intercepts at  $(3, 0)$  and  $(7, 0)$ .

Determine if each statement is true or false, or if there is not enough information.

3.1 The vertex of the parabola is at  $(5, -4)$ .      True      False      Not enough information

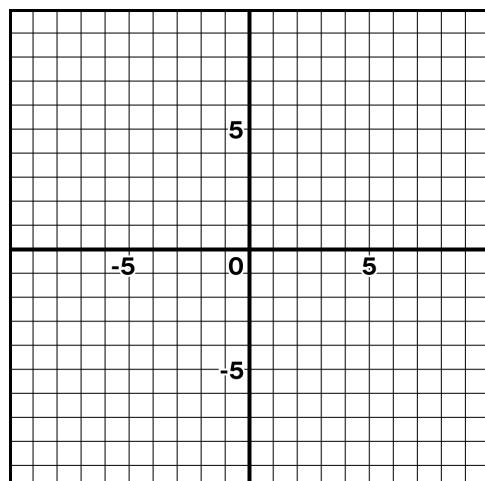
3.2 The line of symmetry is at  $x = 5$ .      True      False      Not enough information

3.3 The parabola is concave up.      True      False      Not enough information

4. The equation of a parabola is  $y = 3x(x - 4)$ .

Explain how you know its vertex is at  $(2, -12)$ .

Use the graph if it helps to show your thinking.

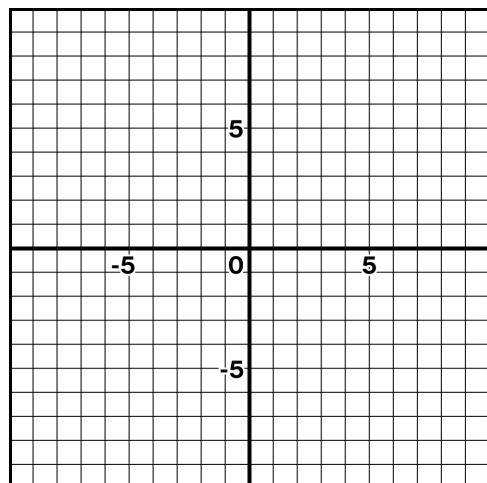


**Unit A1.7, Lesson 11: Practice Problems**

Here is a function:  $g(x) = (-2x + 4)(x - 6)$ .

- 5.1 Determine the  $x$ -intercepts and vertex of  $g(x)$ .

Key Feature	Coordinates
$x$ -intercept	
$x$ -intercept	
Vertex	



- 5.2 Sketch the graph of the function  $g(x)$ .

6. Zahra and Santino were graphing  $p(x) = (x + 3)^2$ .

Zahra: *This graph doesn't have a vertex because there's only one  $x$ -intercept.*

Santino: *The vertex is the same as the  $x$ -intercept.*

Who is correct? (Circle one.)

Zahra

Santino

Both

Neither

Explain your thinking.

**Looking Back**

Determine the  $x$ - and  $y$ -intercepts for each equation.

7.1  $y = 4x + 8$

$x$ -intercept:

$y$ -intercept:

7.2  $2x - 3y = 9$

$x$ -intercept:

$y$ -intercept:

**Reflect**

- Put a heart next to the question you are most proud of.
- Use the space below to ask a question or share something you are proud of.

## Unit A1.7, Lesson 12: Practice Problems

Name \_\_\_\_\_

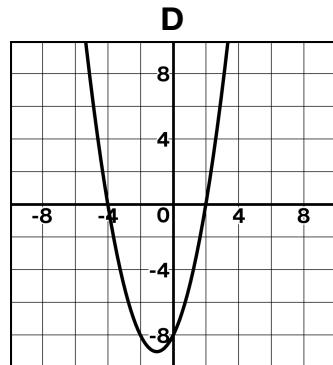
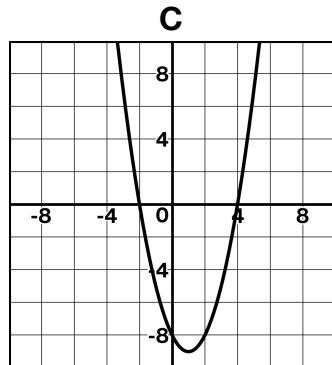
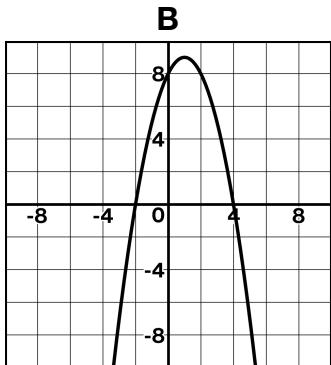
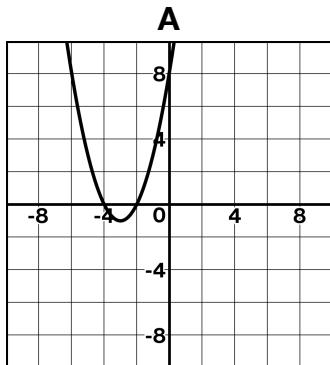
## Warm-Up

1. Here are three functions. Evaluate each function when  $x = 3$  and  $x = -1$ .

Function	Value When $x = 3$	Value When $x = -1$
$f(x) = (x - 3)(x + 4)$		
$g(x) = (-x + 3)(x + 4)$		
$h(x) = (2x - 6)(x + 4)$		

## Practice

2. Which graph shows the function  $y = (x - 4)(x + 2)$ ?



3. Match each graph to the quadratic equation it represents. You will have one equation left over.


**Equations**

$$y = -(x + 2)(x - 3)$$

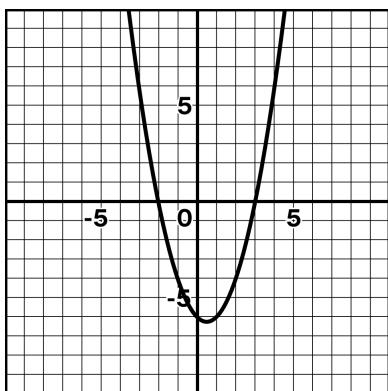
$$y = -2(x + 2)(x - 3)$$

$$y = 2(x + 3)(x - 2)$$

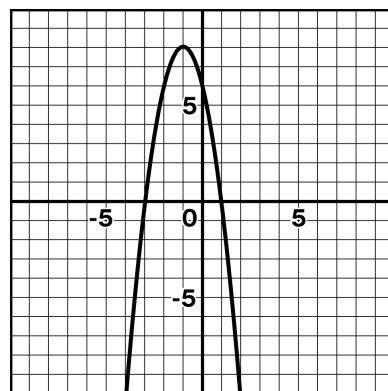
$$y = (x + 2)(x - 3)$$

## Unit A1.7, Lesson 12: Practice Problems

4. Write an equation of a quadratic function that is **concave down** with  $x$ -intercepts at  $(3, 0)$  and  $(-1, 0)$ .
5. Write an equation of a quadratic function that matches this graph. Use graphing technology to check your equation.
6. Write an equation of a quadratic function that matches this graph. Use graphing technology to check your equation.



Equation: \_\_\_\_\_



Equation: \_\_\_\_\_

**Looking Back**

A fancy new bicycle costs \$240 and loses 60% of its value every year.

$x$  is the number of years since the bicycle was bought.  $v(x)$  is the value of the bicycle.

- 7.1 Complete the table.

- 7.2 Write an equation for  $v(x)$ .

$x$	$v(x)$
0	
1	
2	
3	

**Reflect**

- Put a star next to a question that looked more difficult to solve than it really was.
- Use the space below to ask a question or share something you are proud of.

**Warm-Up**

1. Determine the value of each function when  $x = -4$ .

$$f(x) = x^2 + 3$$

$$g(x) = \frac{1}{2}x^2$$

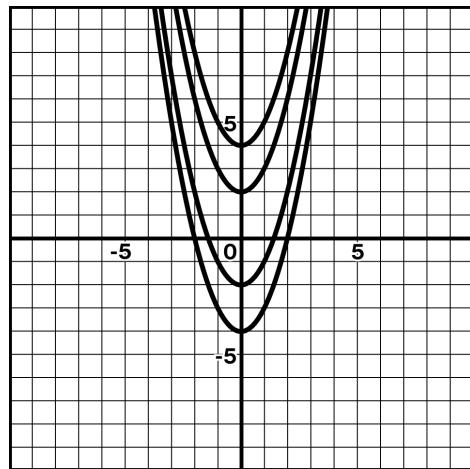
$$h(x) = 3 + \frac{1}{2}x^2$$

**Practice**

2. These parabolas are *translations* of  $y = x^2$ .

Select **all** of the equations shown in the graph.

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

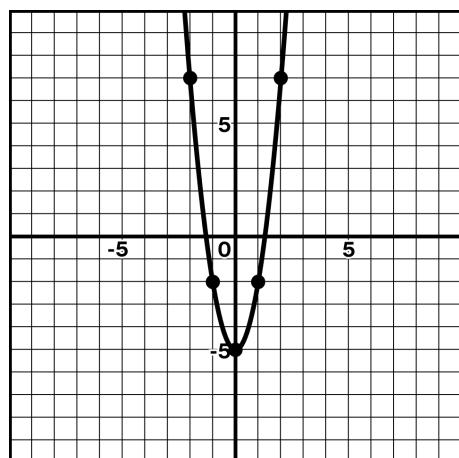


3. Terrance and Kayla are trying to graph  $f(x) = -3x^2$ . Terrance says this is a *translation* of  $f(x) = x^2$ . Kayla says this is a *vertical stretch* of  $f(x) = x^2$ . Who is correct?

Explain your thinking.

4. Write an equation for this transformation of  $y = x^2$ .

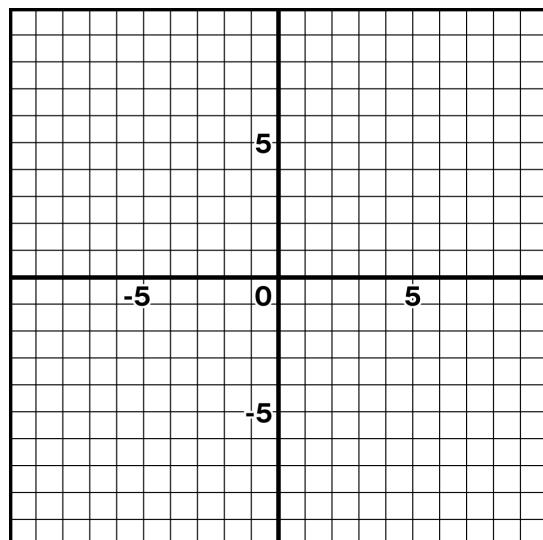
$x$	$x^2$		
-2	4	12	7
-1	1	3	-2
0	0	0	-5
1	1	3	-2
2	4	12	7



## Unit A1.7, Lesson 14: Practice Problems

5. Sketch the graph of  $y = -2x^2 + 5$ .

Use the table if it helps with your thinking.

### Looking Back

Nathan knocks a plant off his windowsill.  $h(t) = -10t^2 + 40$  is the plant's height above ground (in feet).  $t$  is the number of seconds it has been falling.

- 6.1 Calculate  $h(0)$ .

- 6.2 Explain what the features mean in this situation.

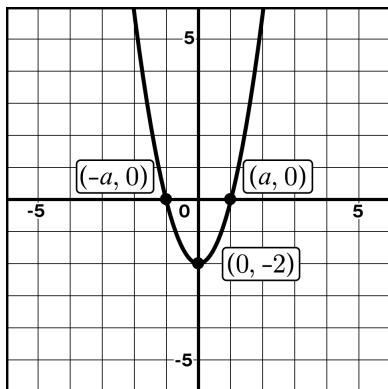
$h(0)$  means . . .

$h(t) = 0$  means . . .

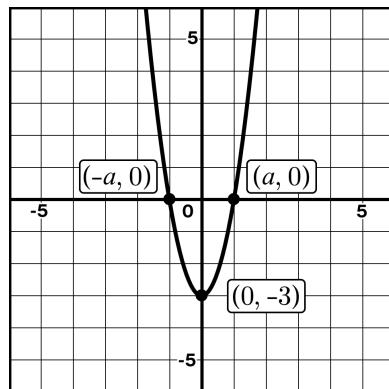
### Explore

7. Here are three graphs and their equations. What is the value of  $a$ ? Explain your thinking.

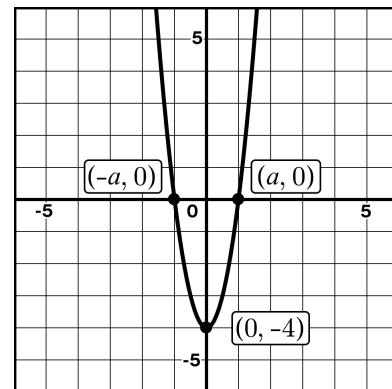
$$f(x) = 2x^2 - 2$$



$$g(x) = 3x^2 - 3$$



$$h(x) = 4x^2 - 4$$





## Science Mom Lesson 70

## Unit A1.7, Lesson 15: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Determine a value of  $x$  that makes each equation true.

$$0 = x - 7$$

$$0 = (x + 3)^2$$

$$0 = (2x - 2)^2$$

## Practice

2. Here are four equations in vertex form.

Which function has a graph with a vertex at (1, 3)?

A.  $y = (x - 1)^2 + 3$

B.  $y = (x + 1)^2 + 3$

C.  $y = (x - 3)^2 + 1$

D.  $y = (x + 3)^2 + 1$

3. Determine if each equation is written in standard form, factored form, or vertex form.

$$(4x - 4)(x - 3) = y$$

$$y = 3x^2 + 4x + 2$$

$$y = 2x(x + 4)$$

$$y = 4x^2 - 3x$$

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

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

Standard Form	Factored Form	Vertex Form

4. Here is a function:  $f(x) = 2(x + 3)^2 - 7$ .

Determine the vertex of  $f$ .

**Unit A1.7, Lesson 15: Practice Problems**

5. Select **all** the equations that represent this graph.

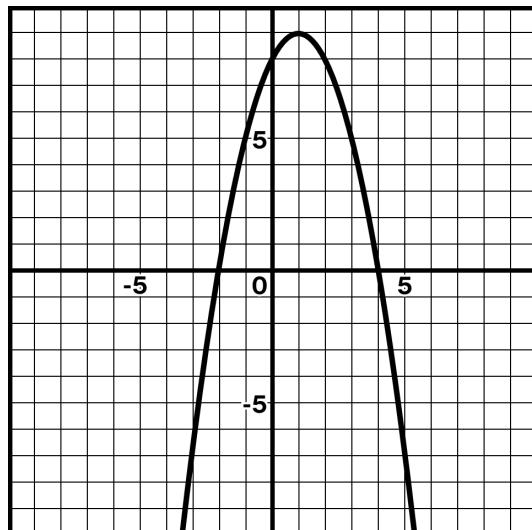
$y = -(x + 1)^2 + 9$

$y = -(x - 1)^2 + 9$

$y = x^2 + 2x + 8$

$y = -(x + 2)(x - 4)$

$y = -(x - 1)(x + 4)$



6. Write an equation of a parabola that has a vertex at (5, -3).  
Use graphing technology to check your equation.

**Looking Back**

7. Carlos threw a rock into a lake. The graph shows the rock's height above the water as a function of time.

Select **all** the true statements about this situation.

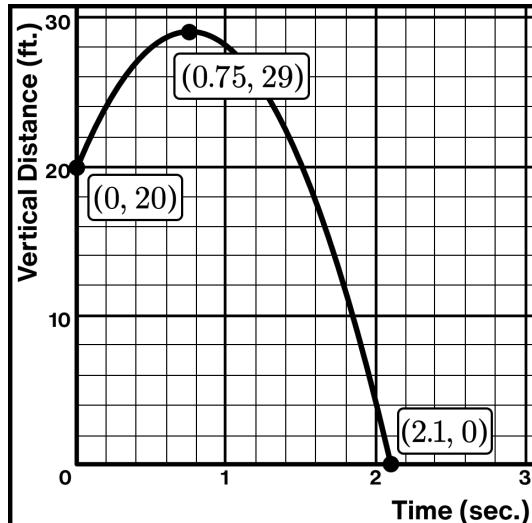
The vertex of the graph is (0.75, 29).

The  $y$ -intercept of the graph is (0.75, 29).

The maximum height of the rock was 20 feet.

The rock hit the water after 2.1 seconds.

The rock was thrown from a height of 20 feet.

**Reflect**

1. Circle the question you felt most confident in.
2. Use the space below to ask a question or share something you are proud of.

**Warm-Up**

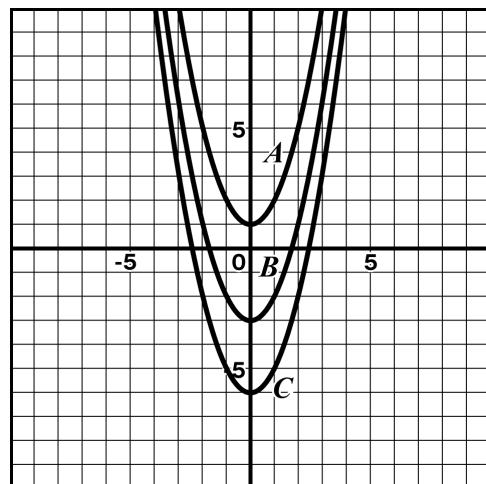
1. Parabolas  $A$ ,  $B$ , and  $C$  are translations of  $y = x^2$ .

Determine the equation of each parabola.

$A$ :

$B$ :

$C$ :

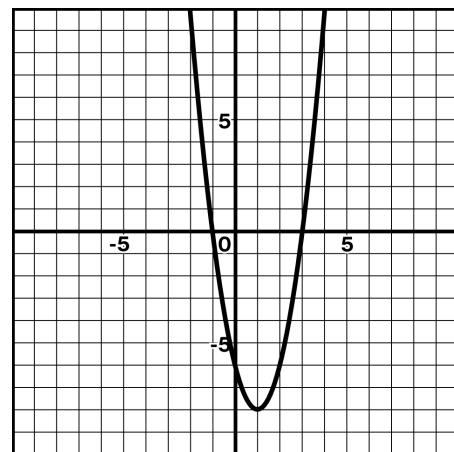
**Practice**

2. Which equation has a graph with a vertex at  $(1, 3)$ ? Explain your thinking.

- A.  $f(x) = (x - 1)^2 + 3$
- B.  $f(x) = (x + 1)^2 + 3$
- C.  $f(x) = (x - 3)^2 + 1$
- D.  $f(x) = (x + 3)^2 + 1$

3. Select **all** of the equations that match this graph.

- $y = 2(x - 1)^2 - 8$
- $y = (x - 1)^2 - 8$
- $y = (x + 1)(x - 3)$
- $y = (2x + 2)(x - 3)$
- $y = (x - 1)^2 - 3$



4. Write an equation of a quadratic function with  $x$ -intercepts at  $(-2, 0)$  and  $(6, 0)$ . Use graphing technology to check your work.

5. Write an equation of a quadratic function that is **concave down** with a vertex at  $(-2, 6)$ . Use graphing technology to check your work.

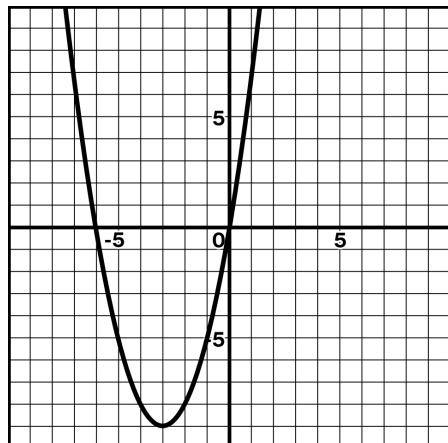
## Unit A1.7, Lesson 16: Practice Problems

6. Here are two equations:

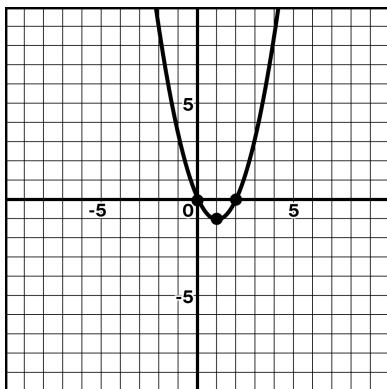
$$m(x) = x(x + 6)$$

$$p(x) = (x + 3)^2 - 9$$

Show or explain how you know that **both** equations describe this graph.

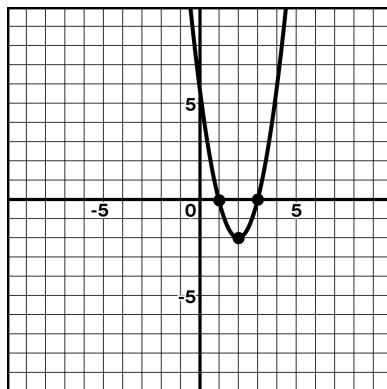
**Explore**

Compare the three graphs and their equations in vertex and factored form.



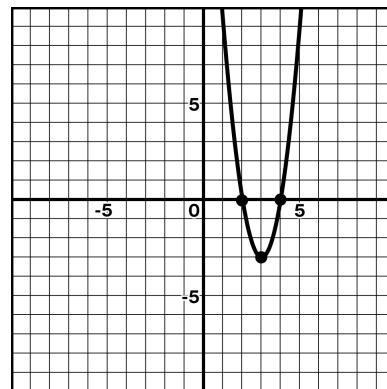
$$f(x) = (x - 1)^2 - 1$$

$$f(x) = x(x - 2)$$



$$g(x) = 2(x - 2)^2 - 2$$

$$g(x) = (x - 1) \cdot 2(x - 3)$$



$$h(x) = 3(x - 3)^2 - 3$$

$$h(x) = (x - 2) \cdot 3(x - 4)$$

- 7.1 What patterns do you notice?

- 7.2 What do you think the graph of  $j(x) = 6(x - 6)^2 - 6$  might look like?

**Reflect**

- Star the problem you spent the most time on.
- Use the space below to ask a question or share something you are proud of.



## Science Mom Lesson 72

## Unit A1.7, Lesson 17: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Determine the value of each function when  $x = -1$ .

$$g(x) = 3x^2 - 2x - 1$$

$$h(x) = (2x + 3)(x - 1)$$

## Practice

2. Here are four equations in vertex form.

Which function has a graph with a vertex at  $(-1, 4)$ ?

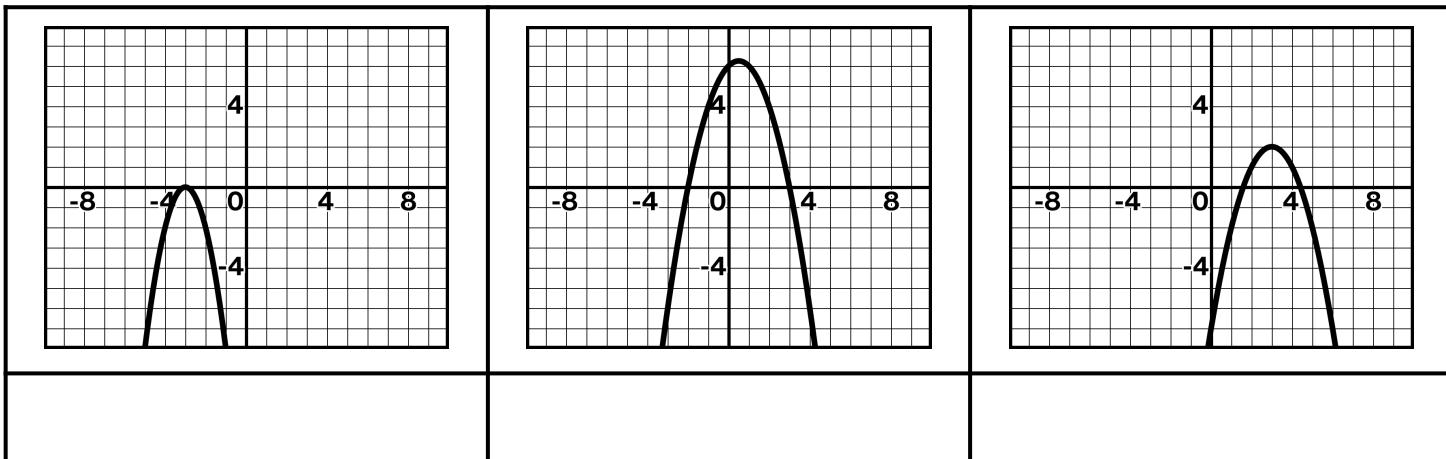
- A.  $y = (x - 1)^2 + 4$
- B.  $y = (x + 1)^2 + 4$
- C.  $y = (x - 4)^2 - 1$
- D.  $y = (x + 4)^2 - 1$

3. Select **all** the functions whose graphs have an  $x$ -intercept at  $(3, 0)$ .

- $a(x) = (x + 2)(x - 3)$
- $b(x) = (x + 3)(x - 2)$
- $c(x) = 3x(x - 2)$
- $d(x) = (2x - 6)(x + 2)$
- $e(x) = (2x - 3)(x + 3)$

4. Match each graph to the quadratic equation it represents. You will have one equation left over.

$y = -(x - 3)^2 + 2$	$y = -3x^2 + 2$	$y = -2(x + 3)^2$	$y = -(x + 2)(x - 3)$
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**Unit A1.7, Lesson 17: Practice Problems**

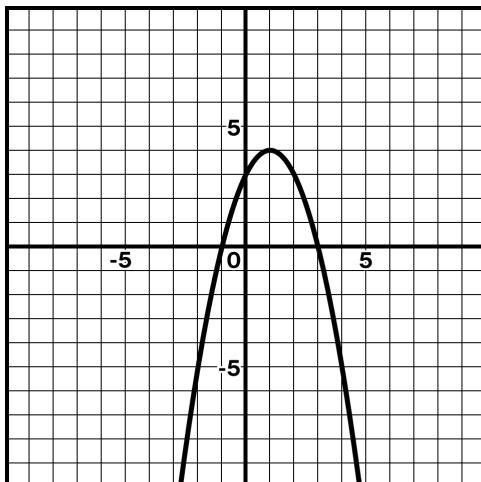
Eva says the equation of this graph is  $y = (x - 1)^2 + 4$ .  
 Latifa says the equation is  $y = -(x + 3)(x - 1)$ .

Each equation is incorrect in some way.

Eva

$$y = (x - 1)^2 + 4 \quad y = -(x + 3)(x - 1)$$

Latifa

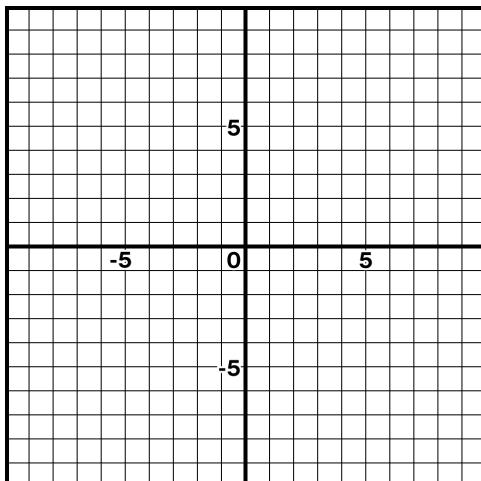


5. Choose one equation. Explain how you would change the equation so that it creates this graph.

Here is a function:  $m(x) = 2x(x - 3)$ .

- 6.1 Determine the  $x$ -intercepts and vertex of  $m(x)$ .

Key Feature	Coordinates
$x$ -intercept	
$x$ -intercept	
Vertex	



- 6.2 Sketch the graph of the function  $m(x)$ .

7. Write an equation of a parabola that has a vertex at  $(-2, 1)$ .  
 Use graphing technology to check your equation.

**Reflect**

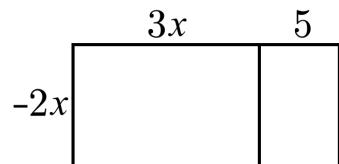
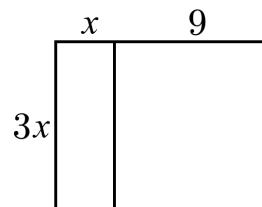
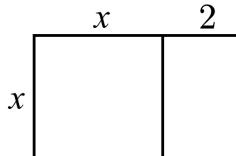
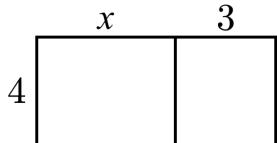
- Put a heart next to the problem you feel most confident about.
- Use the space below to ask a question or share something you are proud of.

## Unit A1.8, Lesson 1: Practice Problems

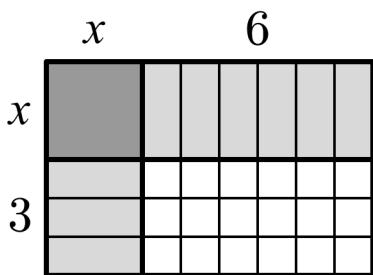
Name \_\_\_\_\_

**Warm-Up**

1. For each rectangle, write an expression for the total area.

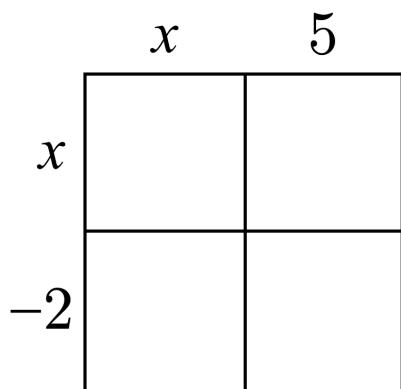
**Practice**

2. Here is an area model. Write two expressions that match the model, one in factored form and one in standard form.

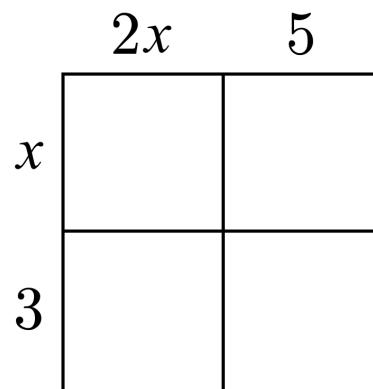
**Factored form:****Standard form:**

3. Complete the diagram to show that:

$$(x + 5)(x - 2) \text{ is equivalent to } x^2 + 3x - 10.$$



$$(2x + 5)(x + 3) \text{ is equivalent to } 2x^2 + 11x + 15.$$



**Unit A1.8, Lesson 1: Practice Problems**

4. Match each expression to its equivalent expression in standard form.

A.  $(x + 2)(x + 6)$  \_\_\_\_\_  $x^2 + 12x + 32$

B.  $(2x + 8)(x + 2)$  \_\_\_\_\_  $2x^2 + 18x + 16$

C.  $(x + 8)(x + 4)$  \_\_\_\_\_  $2x^2 + 12x + 16$

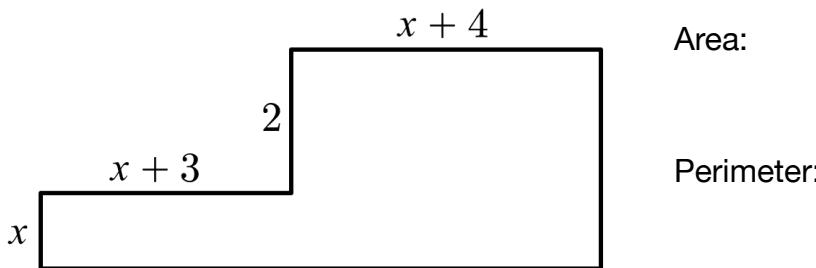
D.  $(x + 8)(2x + 2)$  \_\_\_\_\_  $x^2 + 8x + 12$

5. Complete the table by writing each expression in the missing form.

Factored Form	Standard Form
$(x + 7)(x + 3)$	
$(x - 2)(x - 12)$	
	$x^2 - 6x + 8$
$(2x - 1)(x + 7)$	

**Explore**

6. Write an expression for the area and an expression for the perimeter of this figure:



Area:

Perimeter:

**Reflect**

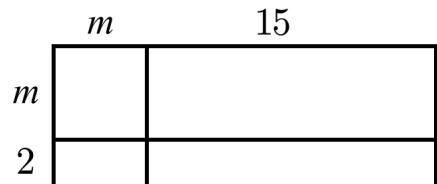
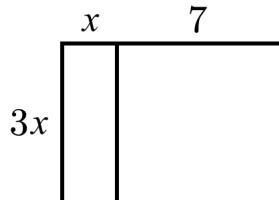
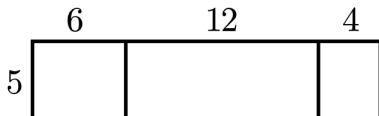
1. Put a heart next to a question that you understand well.
2. Use the space below to ask one question you have or to share something you're proud of.

## Unit A1.8, Lesson 2: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Write an expression for the total area of each rectangle.



## Practice

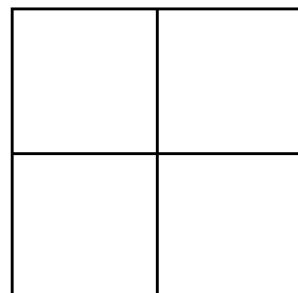
2. Select **all** expressions that are equivalent to  $x - 5$ .

$5 - x$         $x + (-5)$         $x - (-5)$         $-5 + x$         $-5 - (-x)$

Determine whether each expression is written in standard form, factored form, or neither.

3.1	$x(2x - 1)$	Standard	Factored	Neither
3.2	$x^2 + 9x - 1$	Standard	Factored	Neither
3.3	$3(x - 2)^2 + 1$	Standard	Factored	Neither
3.4	$4x^2 - 9$	Standard	Factored	Neither

4. Fill out the diagram to show that  $(x - 10)(x - 3)$  is equivalent to  $x^2 - 13x + 30$ .



5. For each expression in factored form, write an equivalent expression in standard form.

$$(x - 2)^2$$

$$(x + 1)(x - 1)$$

$$(2x + 4)(x - 3)$$

**Unit A1.8, Lesson 2: Practice Problems****Looking Back**

6. Which equation best models the data shown in the table?

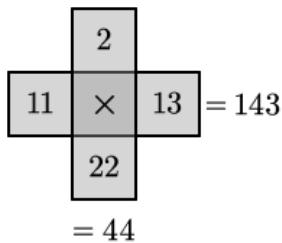
- A.  $y = 360(1.2)^x$
- B.  $y = 300(1.2)^x$
- C.  $y = 288 + 72x$
- D.  $y = 360 + 72x$

$x$	$y$
1	360
2	432
3	518.4
4	622.08

**Explore**

7. Select any number from the inner square.

- Multiply the number to the **left** of your selection by the number to the **right**.
- Multiply the number **above** your selection by the number **below**.
- Here's an example with the number 12 selected:



$$\begin{array}{|c|c|c|} \hline & 2 & \\ \hline 11 & \times & 13 \\ \hline & 22 & \\ \hline \end{array} = 143$$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The **difference** between the numbers will be 99 no matter your selection. Explain why.

**Reflect**

1. Star the question you spent the most time on.
2. Use the space below to ask one question you have or to share something you're proud of.

## Unit A1.8, Lesson 3: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. List all of the positive factors of each number. The first one is done for you.

15

12

20

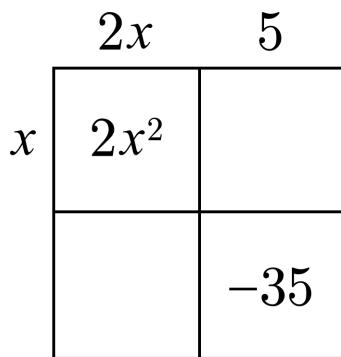
42

Factors: 1, 3, 5, 15

## Practice

Complete each area diagram. Then write the corresponding quadratic expression in standard form and factored form.

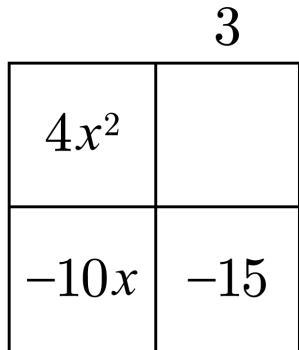
2.1



Standard form: \_\_\_\_\_

Factored form: \_\_\_\_\_

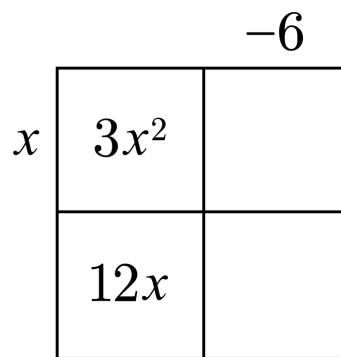
2.3



Standard form: \_\_\_\_\_

Factored form: \_\_\_\_\_

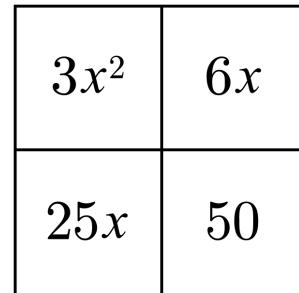
2.2



Standard form: \_\_\_\_\_

Factored form: \_\_\_\_\_

2.4



Standard form: \_\_\_\_\_

Factored form: \_\_\_\_\_



## Unit A1.8, Lesson 3: Practice Problems

3. Complete the table by writing each expression in the missing form.

Factored Form	Standard Form
	$x^2 + 9x + 18$
$(2x - 3)(2x - 7)$	
	$3x^2 + 10x - 8$
	$4x^2 - 17x - 15$

4. The quadratic expression in standard form below has an unknown  $c$ -value. Select **all** the factored form expressions that **could** be equivalent to this expression.

$$7x^2 + 10x - \boxed{?}$$

- $(7x - 8)(x + 2)$
- $(x - 2)(7x + 4)$
- $(7x - 4)(x + 2)$
- $(x - 1)(7x + 17)$
- $(3x + 4)(4x - 2)$

### Explore

5. This quadratic expression in standard form has an unknown  $b$ -value. If we know the expression can be factored, what are all the possibilities for the unknown value?

$$3x^2 + \boxed{?}x - 4$$

### Reflect

1. Circle a question you want to talk to a classmate about.
2. Use the space below to ask one question you have or to share something you're proud of.

**Warm-Up**

1. Rewrite each expression in standard form.

$$(x + 6)(x - 7)$$

$$(x - 5)^2$$

$$(x + 9)(x - 9)$$

**Practice**

2. Write a + or - sign in each box to make each equation true.

$$(x \boxed{\phantom{0}} 18)(x \boxed{\phantom{0}} 3) = x^2 - 15x - 54$$

$$(x \boxed{-} 18)(x \boxed{+} 3) = x^2 + 21x + 54$$

$$(x \boxed{+} 18)(x \boxed{-} 3) = x^2 + 15x - 54$$

$$(x \boxed{+} 18)(x \boxed{-} 3) = x^2 - 21x + 54$$

3. Fill in the blanks to make each equation each true. Draw area diagrams if they help your thinking.

$$x^2 - \boxed{\phantom{0}}x + \boxed{\phantom{0}} = (x - 9)(x - 3)$$

$$x^2 + 12x + \boxed{\phantom{0}} = (x + 4)(x + \boxed{\phantom{0}})$$

$$2x^2 + 11x + 15 = (2x + \boxed{\phantom{0}})(x + \boxed{\phantom{0}})$$

$$3x^2 - 11x - \boxed{\phantom{0}} = (3x + \boxed{\phantom{0}})(x - 6)$$

4. Match each expression to its equivalent expression in factored form.

A.  $2x^2 - 98$

\_\_\_  $2(x - 7)^2$

B.  $2x^2 - 28x + 98$

\_\_\_  $(2x - 7)(2x + 7)$

C.  $4x^2 - 49$

\_\_\_  $2(x - 7)(2x + 7)$

D.  $4x^2 - 28x + 49$

\_\_\_  $(2x - 7)^2$

E.  $4x^2 - 14x - 98$

\_\_\_  $2(x - 7)(x + 7)$

**Unit A1.8, Lesson 4: Practice Problems**

Factor each expression.

5.1 $x^2 + 15x + 56$	5.2 $9x^2 - 64$	5.3 $3x^2 - 17x + 10$
5.4 $x^2 - x - 30$	5.5 $4x^2 + 20x + 25$	5.6 $2x^2 + x - 15$

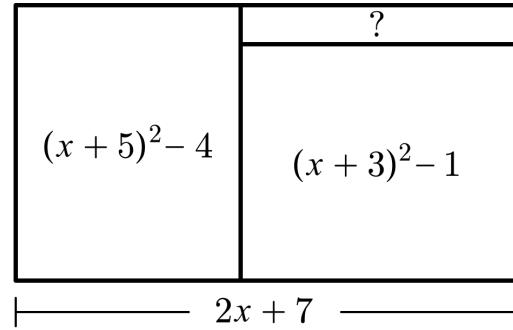
**Looking Back**

Solve each equation.

6.1 $6 + 2x = 0$	6.2 $2x - 5 = 0$	6.3 $\frac{1}{2}(x - 87) = 0$
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**Explore**

7. The diagram shows the expressions for two areas and one length. Determine an expression for the unknown area.

**Reflect**

- Put a smiley face next to a question you were stuck on and then figured out.
- Use the space below to ask one question you have or to share something you're proud of.

**Warm-Up**

1. Solve each equation.

$$6 + 2a = 0$$

$$7b = 0$$

$$7(c - 5) = 0$$

$$-4(d + 2) = 0$$

**Practice**

2. Determine the  $x$ -intercepts of the function  $f(x) = (x - 4)(x + 3)$ . Show or explain your reasoning.

3. Select **all** the functions that have 5 and -1 as their  $x$ -intercepts.

$f(x) = (x + 5)(x - 1)$

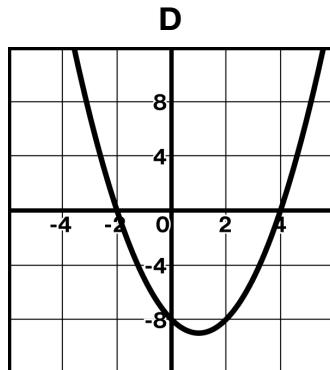
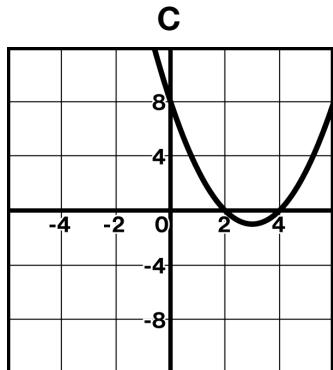
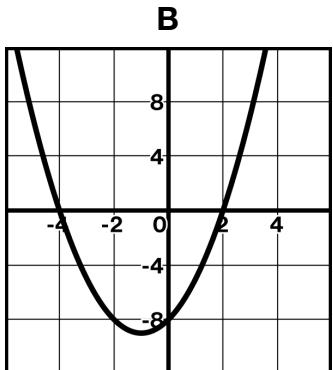
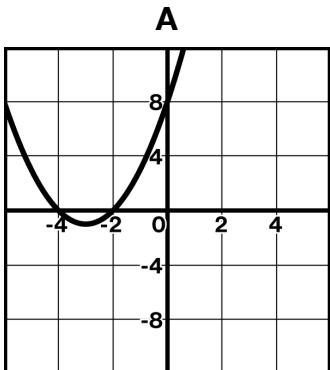
$g(x) = (x - 5)(x + 1)$

$h(x) = x^2 + 4x - 5$

$j(x) = 2x^2 - 8x - 10$

$k(x) = (4x + 4)(15 - 3x)$

4. Which graph represents the function  $f(x) = x^2 - 2x - 8$ ?



**Unit A1.8, Lesson 5: Practice Problems**

5.  $h(t)$  approximates the height of a water balloon, in meters,  $t$  seconds after launch. Here are two equivalent expressions for  $h(t)$ :

$$h(t) = -5t^2 + 27t + 18$$

$$h(t) = (-5t - 3)(t - 6)$$

Without graphing, determine at what time the water balloon reached the ground. Explain your reasoning.

**Looking Back**

6. Solve this system of equations.

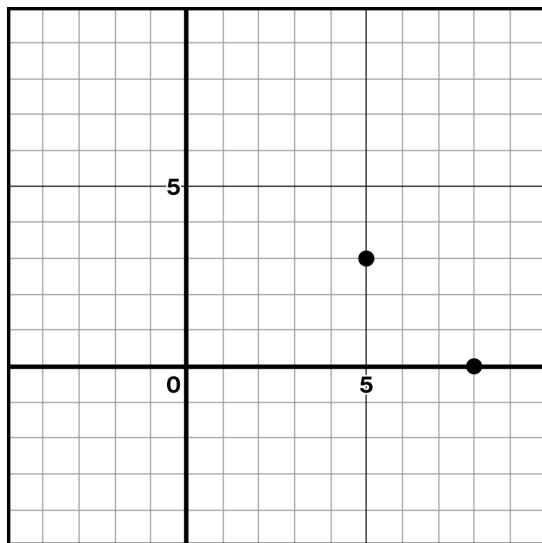
$$2a + 9b = 20$$

$$4a + 9b = 58$$

$$a = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}}$$

**Explore**

7. Write two different quadratic functions that go through the points  $(5, 3)$  and  $(8, 0)$ .

**Reflect**

1. Circle the question that was most challenging to you.
2. Use the space below to ask one question you have or to share something you're proud of.

## Unit A1.8, Lesson 6: Practice Problems

Name \_\_\_\_\_

**Warm-Up**

1. Rewrite each standard-form quadratic expression in factored form.

$$x^2 + 7x + 6$$

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

$$x^2 - 5x + 6$$

$$x^2 + 5x - 6$$

**Practice**

2. Rewrite the equation  $6 = x^2 - x$  so that one side is equal to 0. Then solve the equation.

Solve each equation.

$$3.1 \quad (4 - 5x)(x + 4) = 0$$

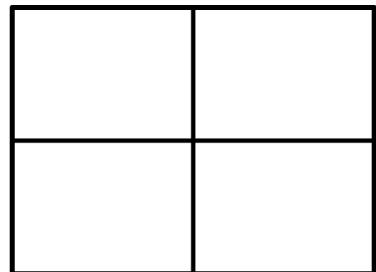
$$3.2 \quad x^2 - 5x - 12 = 5x + 12$$

$$3.3 \quad (x + 2)(x + 4) = 3$$

- 4.1 Fill out the diagram to show that the expressions

$(x - 4)(3x - 6)$  and  $3x^2 - 18x + 24$  are equivalent.

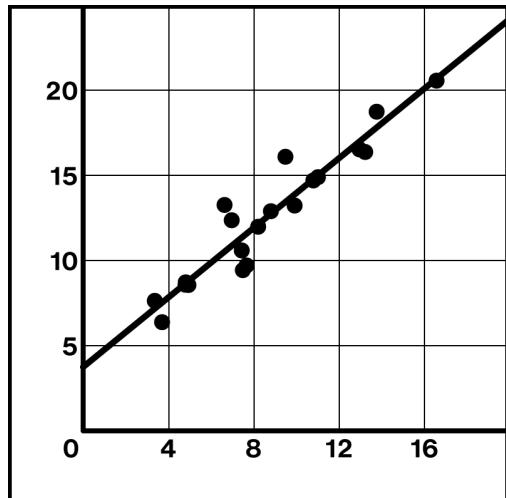
- 4.2 Solve the equation  $3x^2 - 18x + 24 = 0$ .



**Looking Back**

5. Which of these values is the best estimate of  $r$ , the correlation coefficient for the scatter plot data?

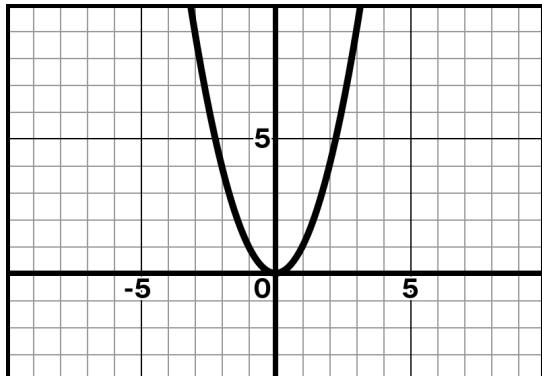
- A. -0.9
- B. -0.4
- C. 0.4
- D. 0.9



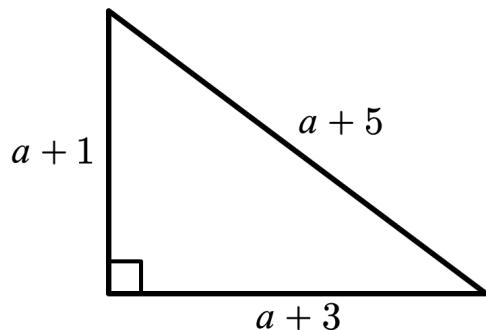
6. Select **all** the true statements about the function

$$f(x) = x^2$$

- The domain has no negative values.
- The range has no negative values.
- The function has no minimum.
- The function has no maximum.

**Explore**

7. Determine the value of  $a$  in the right triangle.  
Explain your thinking.

**Reflect**

1. Put a heart next to the problem you feel most confident about.
2. Use the space below to ask a question or share something you're proud of.



## Science Mom Lesson 79

## Unit A1.8, Lesson 7: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Order the expressions by value:
- $5^2$
- ,
- $\sqrt{90}$
- , 8,
- $3^3$
- ,
- $\sqrt{27}$

Least \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ Greatest

## Practice

2. Write a quadratic equation that has . . .

Two solutions

One solution

No solutions

For each equation, determine the number of solutions.

Equation	Number of Solutions
3.1 $x(x + 3) = 0$	
3.2 $(x + 3)(x + 1) = 0$	
3.3 $(x + 1)(x + 1) = 0$	
3.4 $x^2 - 10x = -9$	
3.5 $(x - 5)(x - 5) = -14$	
3.6 $x^2 - 3 = -3$	
3.7 $x^2 + 6 = 2$	

Determine the two solutions for each equation:

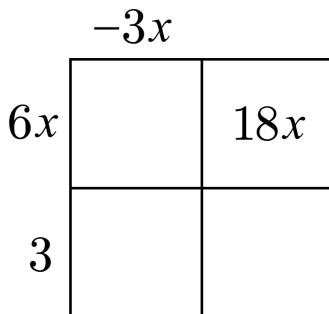
4.1  $100 + (x - 2)^2 = 149$

4.2  $x^2 + 4x = x + 18$

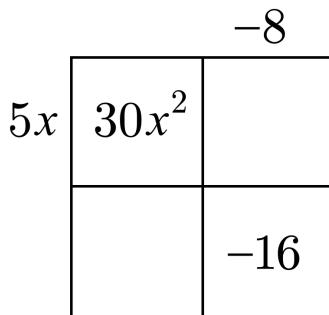
**Unit A1.8, Lesson 7: Practice Problems****Looking Back**

Complete each area diagram. Then write the corresponding quadratic expression in factored form and standard form.

5.1

**Factored form:****Standard form:**

5.2

**Factored form:****Standard form:****Explore**

6. Determine the **three** solutions to this equation.

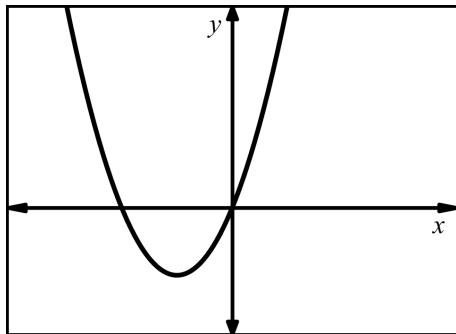
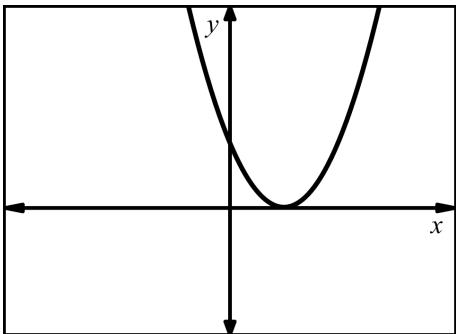
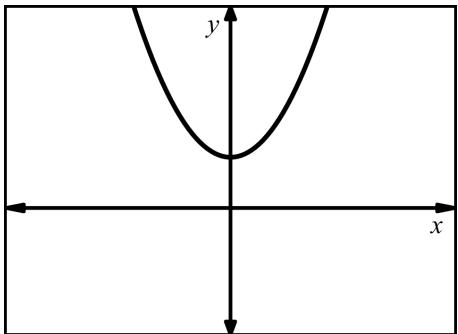
$$(x^2 + 2x - 8)(x^2 - 8x + 15) = (x^2 - x - 20)(x^2 + 5x - 14)$$

**Reflect**

1. Put a question mark next to an answer you would like to compare with a classmate.
2. Use the space below to ask one question you have or to share something you're proud of.

**Warm-Up**

1. Write a possible equation for each graph:

**Practice**

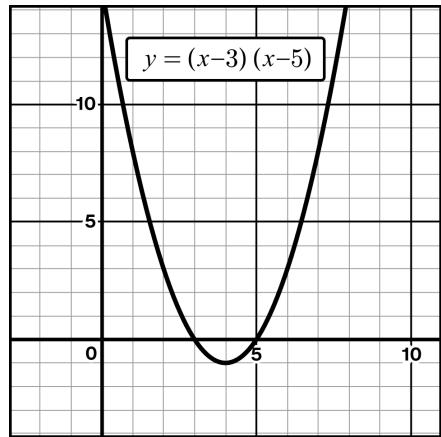
Solve each equation. Use the graph if it helps with your thinking.

2.1  $(x - 3)(x - 5) = 0$

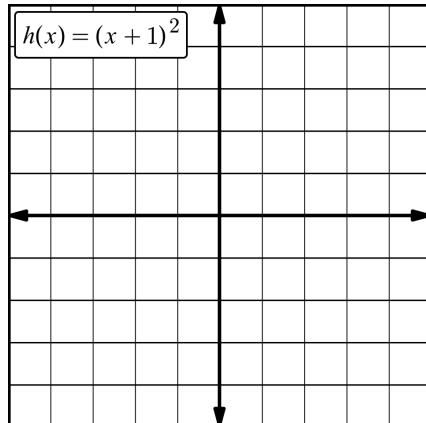
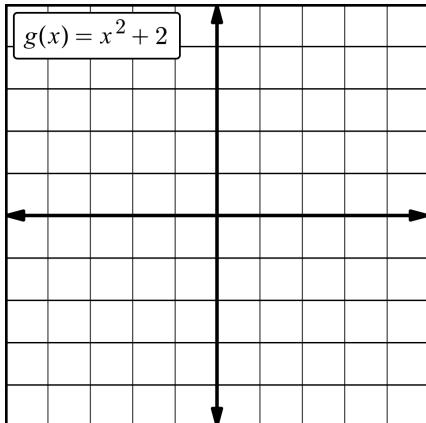
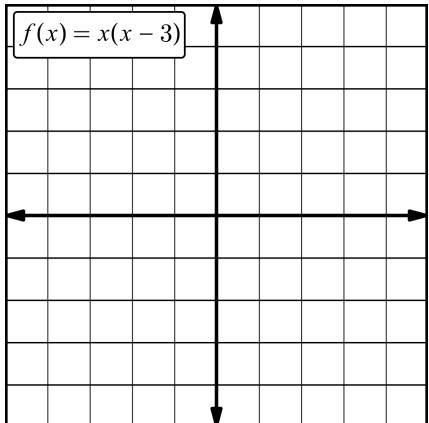
2.2  $(x - 3)(x - 5) = -1$

2.3  $(x - 3)(x - 5) = 8$

2.4  $(x - 3)(x - 5) = -2$



3. Sketch a graph for each function. Use graphing technology if it helps with your thinking. Then determine **how many** solutions each equation has.



$$x(x - 3) = 0$$

$$x^2 + 2 = 0$$

$$(x + 1)^2 = 0$$

**Unit A1.8, Lesson 8: Practice Problems**

Use graphing technology to solve each equation.

4.1  $(x - 5)(x + 2) = -6$

4.2  $x^2 + 4x + 4 = 25$

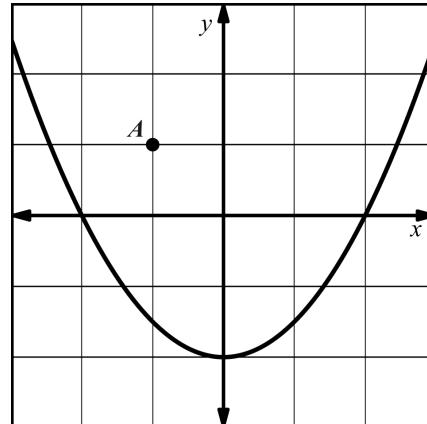
**Looking Back**

5. Match each expression to an equivalent expression. You will have one letter left over.
- |                      |                      |
|----------------------|----------------------|
| A. $1 - x^2$         | ___ $(y + x)(y - x)$ |
| B. $x^2 - y^2$       | ___ $(1 + x)(1 - x)$ |
| C. $y^2 - x^2$       | ___ $(1 + x)(x - 1)$ |
| D. $x^2 - 2xy + y^2$ | ___ $(x - y)(x - y)$ |
| E. $x^2 - 1$         |                      |
6. The point  $(4, 7)$  is on the graph of  $y = x^2 + c$ . What is the value of  $c$ ? Use graphing technology if it helps with your thinking.

**Explore**

7. Here is the graph of  $y = x^2 - 400$ .

Use the graph and the gridlines to determine the coordinates of point A.

**Reflect**

1. What is one concept from this unit that you've improved on since the unit started?
2. Explain what you did to help yourself improve.

**Warm-Up**

1. Determine the value of each expression.

$$6^2$$

$$(-6)^2$$

$$5 - 6^2$$

$$-6^2$$

**Practice**

2. Write each perfect square expression in factored form.

$$x^2 + 6x + 9$$

$$x^2 - 16x + 64$$

$$x^2 - 12x + 36$$

$$x^2 + 5x + \frac{25}{4}$$

3. Select **all** the expressions that are perfect squares.

$x^2 + 10x + 25$

$x^2 - 10x + 25$

$x^2 + 4$

$(x + 3.5)(3.5 + x)$

$(x - 10)(10 - x)$

$x^2 + \frac{1}{2}x + \frac{1}{16}$

4. Daniela says that if a perfect square quadratic expression is written in the form  $x^2 + bx + c$ , the value of  $c$  cannot be negative. Why is this true?

5. Fill in the blanks to complete each perfect square.

$$x^2 + 24x + \boxed{\phantom{00}}$$

$$x^2 - 2x + \boxed{\phantom{00}}$$

$$x^2 - \boxed{\phantom{00}} + 64$$

$$x^2 + \frac{2}{3}x + \boxed{\phantom{00}}$$



## Unit A1.8, Lesson 10: Practice Problems

6. The expressions  $(x - 4)^2$  and  $(4 - x)^2$  are both perfect squares. Are they equivalent to one another? Explain your thinking.

### Looking Back

The equations  $y = x^2 + 5x + 6$  and  $y = (x + 2)(x + 3)$  are equivalent.

- 7.1 Which equation would you use to determine the  $x$ -intercepts? Explain your thinking.

- 7.2 Which equation would you use to determine the  $y$ -intercept? Explain your thinking.

8. Without using a graphing calculator, select **all** the equations with a positive  $y$ -intercept.

- $y = x^2 + 3x - 2$
- $y = (x + 1)(x + 5)$
- $y = x^2 - 10x$
- $y = (x - 3)^2$
- $y = -5x^2 + 3x - 12$

### Reflect

1. Put a heart next to a question that you understand well.
2. Use the space below to ask one question you have or to share something you are proud of.



## Science Mom Lesson 82

## Unit A1.8, Lesson 11: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Select all the expressions that are perfect squares.

$(x + 5)(5 + x)$      $(x - 3)^2$      $x^2 - 3^2$      $x^2 + 8x + 64$      $x^2 + 10x + 25$

## Practice

2. Add the number that would make the expression a perfect square. Then write an equivalent expression in factored form.

$x^2 - 6x + \underline{\hspace{2cm}}$

$x^2 + 2x + \underline{\hspace{2cm}}$

$x^2 - 14x + \underline{\hspace{2cm}}$

Factored form: \_\_\_\_\_

Factored form: \_\_\_\_\_

Factored form: \_\_\_\_\_

3. Match each equation to an equivalent equation.

A.  $x^2 - 12x = 6$        $\underline{\hspace{2cm}} (x - 6)^2 = 30$

B.  $x^2 - 12x + 6 = 0$        $\underline{\hspace{2cm}} (x - 3)^2 = 42$

C.  $x^2 - 6x = 6$        $\underline{\hspace{2cm}} (x - 6)^2 = 42$

D.  $x^2 - 6x = 33$        $\underline{\hspace{2cm}} (x - 3)^2 = 15$

4. Alexis solved the equation
- $x^2 + 12x = 13$
- by completing the square, but some parts are blank. Fill in the blanks.

$x^2 + 12x = 13$

$$\boxed{\hspace{2cm}}$$

$$(x + 6)^2 = 49$$

$$x + 6 = \pm 7$$

$$x = \boxed{\hspace{1cm}} \text{ and } x = \boxed{\hspace{1cm}}$$



## Unit A1.8, Lesson 11: Practice Problems

5. Solve each equation by completing the square.

$$x^2 - 2x = 8$$

$$7 = x^2 + 4x - 1$$

$$x^2 - 18x + 60 = -11$$

### Looking Back

6. For each equation, determine the number of solutions.

Equation	Number of Solutions
$x^2 + 144 = 0$	
$x^2 - 144 = 0$	
$(x - 7)^2 = 0$	

7. The graph of  $y = (x - 1)^2 + 4$  is the same as the graph of  $y = x^2$ , but:

- A. It is shifted 1 unit to the right and 4 units up.
- B. It is shifted 1 unit to the left and 4 units up.
- C. It is shifted 1 unit to the right and 4 units down.
- D. It is shifted 1 unit to the left and 4 units down.

### Explore

8. Write a quadratic equation of the form  $ax^2 + bx + c = 0$  with solutions that are  $x = 5 - \sqrt{2}$  and  $x = 5 + \sqrt{2}$ .



## Science Mom Lesson 83

## Unit A1.8, Lesson 13: Practice Problems

Name \_\_\_\_\_

## Warm-Up

1. Rewrite each equation in the form  $(x + \underline{\hspace{1cm}})^2 = \underline{\hspace{1cm}}$ . The first one has been done for you.

$$x^2 + 10x = 4$$

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

$$x^2 + 12x + 3 = -7$$

$$x^2 - 32 = -20x$$

$$(x + 5)^2 = 29$$

## Practice

2. The quadratic formula is derived by solving  $ax^2 + bx + c = 0$  by . . .
- A. factoring      B. completing the square      C. graphing      D. elimination
3. Kiri is deriving the quadratic formula. Here are her first few steps.

Why did Kiri add  $\left(\frac{b}{2a}\right)^2$  in the bottom row?

$$ax^2 + bx + c = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = -\frac{c}{a} + \left(\frac{b}{2a}\right)^2$$

4. The quadratic formula can be used to find the solutions to any quadratic equation in the form  $ax^2 + bx + c = 0$ .

**Quadratic Formula**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Which equation represents the solutions to  $2x^2 - x + 13 = 0$ ?

A.

B.

C.

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(2)(13)}}{2(2)} \quad x = \frac{-2 \pm \sqrt{(2)^2 - 4(13)(-1)}}{2(13)} \quad x = \frac{-1 \pm \sqrt{(-1)^2 - 4(2)(13)}}{2(-1)}$$



## Unit A1.8, Lesson 13: Practice Problems

- 5.1 The quadratic equation  $x^2 + 7x + 10 = 0$  is in the form  $ax^2 + bx + c = 0$ . What are the values of  $a$ ,  $b$ , and  $c$ ?

$$a = \quad b = \quad c =$$

- 5.2 Substitute the values of  $a$ ,  $b$ , and  $c$  into the quadratic formula. (You do not need to perform any operations.)

- 5.3 Explain how the expression you wrote is related to solving  $x^2 + 7x + 10 = 0$  by completing the square.

### Looking Back

6. Solve each equation using any method.

$$x^2 + 7x + 9 = -1 \qquad (x + 4)(x + 4) = 3 \qquad x^2 - 6x = 18$$

### Explore

7. Solve each equation for  $x$ .

$$3x^2 - 5 = 0 \qquad -7x^2 + 2 = 0 \qquad ax^2 + c = 0$$

### Reflect

1. Circle the question that was the most challenging for you.
2. Use the space below to ask one question you have or to share something you're proud of.

**Warm-Up**

1. Each expression represents **two** numbers. Evaluate the expressions and find the two numbers.

$$1 \pm \sqrt{49}$$

$$\frac{8 \pm 2}{5}$$

$$\pm \sqrt{(-5)^2 - 4(4)(1)}$$

$$\frac{-18 \pm \sqrt{36}}{2 \cdot 3}$$

**Practice**

The quadratic formula can be used to find the solutions to any quadratic equation in the form  $ax^2 + bx + c = 0$ .

Determine the values of  $a$ ,  $b$ , and  $c$  for the following equations.

**Quadratic Formula**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

2.1  $x^2 - 5x + 9 = 0$

2.2  $-x^2 + 8 = 0$

2.3  $3x^2 - 6 = 2x$

Solve each equation using any method.

3.1  $2x^2 - 7x = 15$

3.2  $2x^2 + 5x - 1 = 0$

4. Santiago determined that the solutions to  $3x^2 - 6x - 9 = 0$  are  $x = 3$  and  $x = -1$ . Is he correct? Show how you know.

**Unit A1.8, Lesson 14: Practice Problems****Looking Back**

Consider the function  $f(x) = (x + 1)(x + 5)$ .

5.1 What are the coordinates of the  $x$ -intercepts?

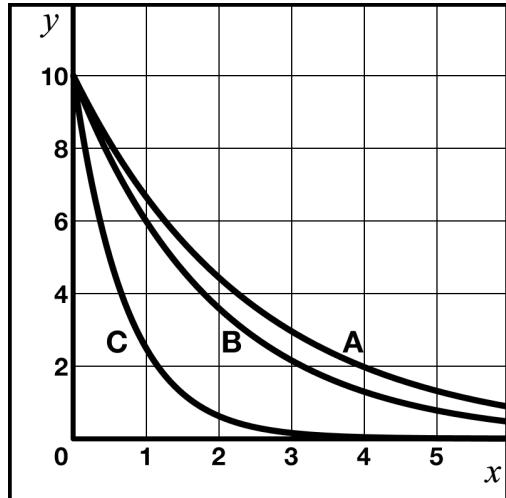
5.2 What are the coordinates of the vertex? Show or explain how you know.

6. Here are the graphs of three equations. Match each graph with its equation.

$y = 10 \left(\frac{2}{3}\right)^x$

$y = 10 \left(\frac{1}{4}\right)^x$

$y = 10 \left(\frac{3}{5}\right)^x$

**Explore**

7. Write a quadratic function with the following  $x$ -intercepts.

$$\left(\frac{2+\sqrt{40}}{6}, 0\right) \text{ and } \left(\frac{2-\sqrt{40}}{6}, 0\right)$$

**Warm-Up**

1. Select **all** the equations that have two solutions.

$(x + 3)^2 = 5$       $(x - 9)^2 + 25 = 0$       $5 = (x + 1)(x + 1)$       $x^2 + 4x = -4$

**Practice**

The function  $h(t) = 60t - 75t^2$  models the height, in inches, of a jumping frog, where  $t$  is the number of seconds after it jumped.



- 2.1 Solve the equation  $60t - 75t^2 = 0$ .

- 2.2 What do the solutions tell us about the jumping frog?

The function  $f(t) = 4 + 12t - 16t^2$  models the height of a tennis ball, in feet,  $t$  seconds after it was hit.

- 3.1 Select **all** of the solutions to the equation  $0 = 4 + 12t - 16t^2$ .

$-\frac{1}{4}$       $\frac{1}{4}$      4     1     -1

- 3.2 How many seconds until the tennis ball hits the ground? Explain how you know.

Katie is planning to go skydiving. She writes the function  $h(t) = -16t^2 + 13\,500$  to represent her height, in feet,  $t$  seconds after jumping out of the airplane.

- 4.1 According to Katie's function, how high is the airplane when she jumps?

## Unit A1.8, Lesson 15: Practice Problems

- 4.2 It's recommended that skydivers open their parachutes at 5 000 feet. Use  $h(t)$  to approximate how many seconds after jumping Katie should open her parachute.

- 4.3 When Katie actually jumps, do you think she will reach 5 000 feet in **less** time, **more** time, or **exactly** the amount of time you approximated? Explain your thinking.

## Looking Back

- 5.1 Match each equation to its number of solutions.

A. No solutions   $x^2 + 10x = -3$

B. One solution   $x^2 + 10x = -60$

C. Two solutions   $x^2 + 10x = -25$

- 5.2 Write **one** more equation of each type that starts with  $x^2 + 8x = \underline{\hspace{2cm}}$ .

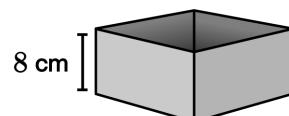
<b>No solutions</b>	$x^2 + 8x = \underline{\hspace{2cm}}$
<b>One solution</b>	$x^2 + 8x = \underline{\hspace{2cm}}$
<b>Two solutions</b>	$x^2 + 8x = \underline{\hspace{2cm}}$

## Explore

6. A company wants to make a square box with no top.

The requirements are:

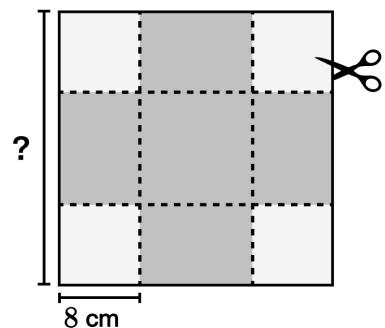
- It must be 8 cm tall.
- Its volume must be 1 000 cubic cm.



The boxes are made by cutting four corners from a square piece of cardboard and folding the flaps up.

What should the length of the starting square be?

Show or explain your thinking.



**Warm-Up**

1. Identify the slope for each equation.

$$y = -2x + 5$$

$$y = -4 + 3x$$

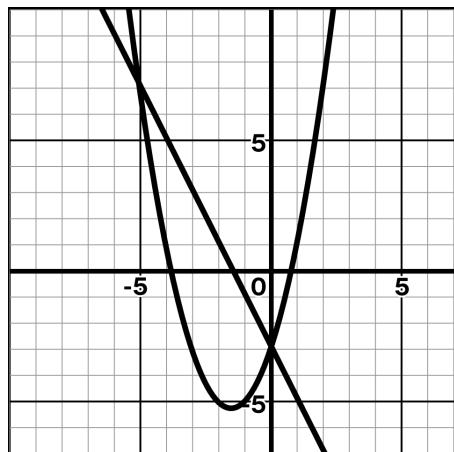
$$3x + 8y = 12$$

$$y = 6$$

**Practice**

2. Here are the graphs of  $y = x^2 + 3x - 3$  and  $y = -3 - 2x$ .

Determine the solution(s) to this system of equations.



Solve each system of equations without graphing.

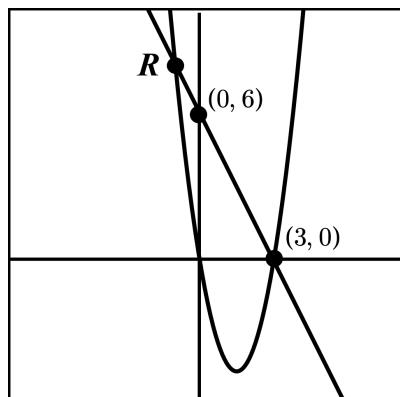
3.1  $y = x^2$   
 $y = 12 + x$

3.2  $y = -2x + 1$   
 $y = x^2 + 4x + 1$

Here are the graphs of a linear function and a quadratic function. The quadratic function is  $f(x) = 2x^2 - 6x$ .

- 4.1 Write an equation for the linear function.

- 4.2 Without using graphing technology, determine the coordinates of Point R. Show or explain your reasoning.



**Unit A1.8, Lesson 17: Practice Problems****Looking Back**

5. Complete the table with equivalent forms of each expression.

Expression	Vertex Form	Standard Form	Factored Form
A	$(x + 1)^2 - 4$		$(x + 3)(x - 1)$
B	$(x + 2)^2 - 16$	$x^2 + 4x - 12$	
C			$(x + 1)(x - 5)$

6. Solve each equation using any method.

$$(x - 3)(x + 1) = 0$$

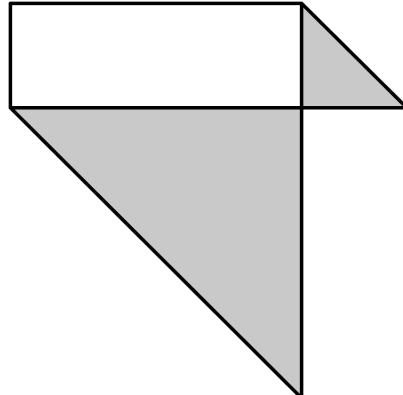
$$x^2 - 12x = 85$$

$$4(x - 3)^2 = 8$$

**Explore**

7. Here are two congruent rectangles. Each rectangle has an area of 176 square units and a perimeter of 60 units.

What is the combined area of the two shaded triangles?

**Reflect**

1. Put a star next to one question you're still wondering about.
2. Use the space below to ask one question you have or to share something you're proud of.