desmos **Science Mom Lesson 45**

Unit A1.5, Lesson 1: Practice Problems Name ______________________________

Warm-Up

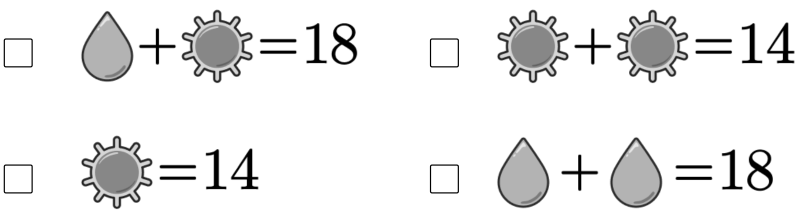
1. Determine the value of the variable that makes each equation true.

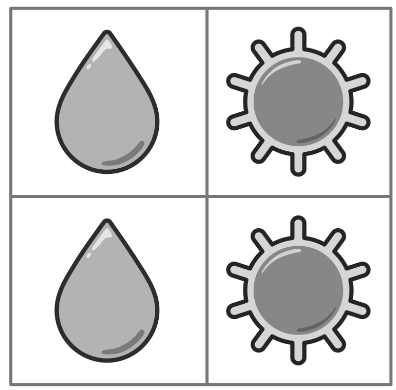
$2.5 + (-3) = a$ $\qquad$ $12 + b = -9$ $\qquad$ $2c + 3 = 15$ $\qquad$ $3d + 2 = 35$

Practice

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

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





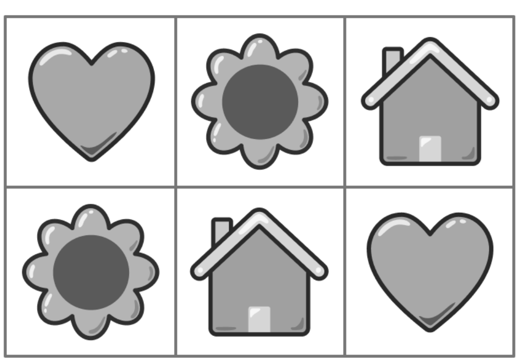
$= 16$

$= 16$

$= 18$ $\qquad$ $= 14$

2.2 Show or explain why this statement is **false**:  $= 8$

3. Determine the solution for this puzzle.



$= 15$

$= 15$

$= -2$ $\qquad$ $= 10$ $\qquad$ $= 22$

Shape	Value
	
	
	

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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.

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

5.1 $f(10)$

5.2 $f(5)$

5.3 $f(1)$

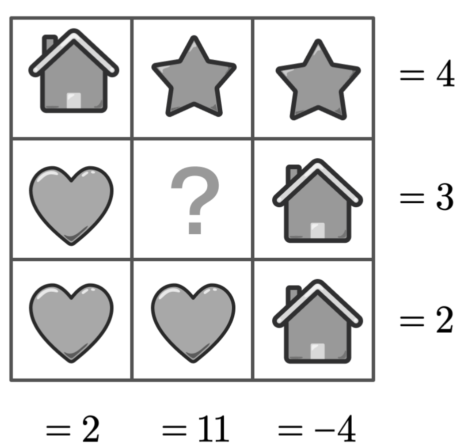
5.4 $f(-3)$

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.



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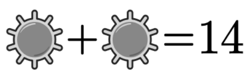
Unit A1.5, Lesson 1: Practice Problems **Answer Key**

Warm-Up

1. $a = -0.5$ $b = -21$ $c = 6$ $d = 11$

Practice

2.1

✓ 

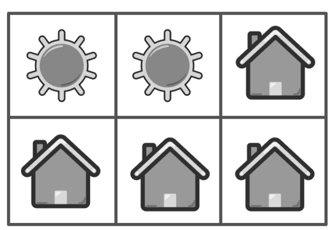
✓ 

2.2 *Responses vary*. If one water drop were 8, then the left column would add up to 16, not 18.

3.

	5
	–7
	17

4.1 *Responses vary*.



= 14

= 12

4.2 $x = 5; y = 4$

Looking Back

5.1 $f(10) = 8$ 5.2 $f(5) = 10$ 5.3 $f(1) = 2$ 5.4 $f(-3) = 0$

6. $(-2, 3)$

Explore

7. Star.

   Explanations vary. Based on the middle and lower rows, the missing shape is one greater than the heart. Comparing the top row to the left column shows that the star is the shape that is one greater than the heart.

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Unit A1.5, Lesson 2: Practice Problems Name ______________________

Warm-Up

1. Rewrite each expression using fewer terms.

$5a + 3b - 2a$ $\qquad$ $3(c - 2) + 2c$ $\qquad$ $5d - 2(7d + 3g)$

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**.

$$2x + y = 19$$
$$x - y = 11$$

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

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

Determine the solution for these systems of equations.

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

$x =$_____ $y =$_____

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

$x =$_____ $y =$_____

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Unit A1.5, Lesson 2: Practice Problems

Looking Back

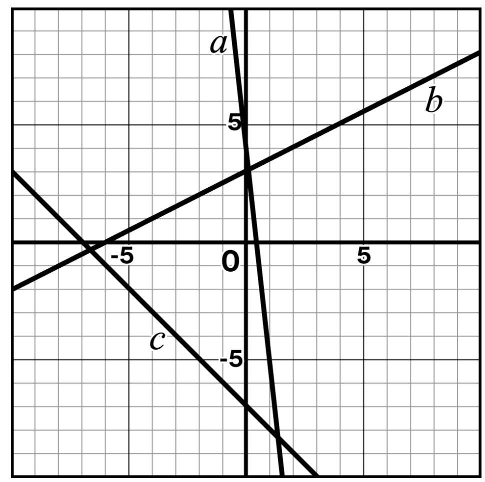
5. The function $f(t)$ gives a hiker's elevation above or below sea level, in meters, t hours after noon. Which equation represents this statement?

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

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

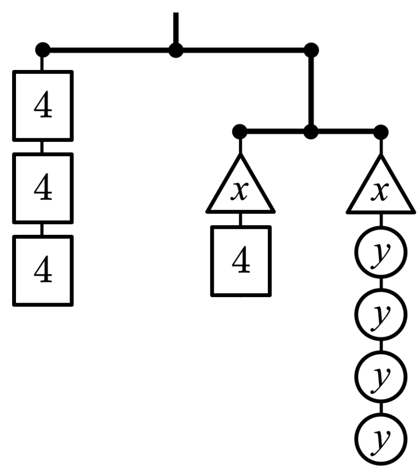
6. Which line represents $x - 2y = -6$?

   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.

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Unit A1.5, Lesson 2: Practice Problems **Answer Key**

Warm-Up

1. $3a + 3b$ $5c - 6$ $-9d - 6g$

Practice

2. $x = 4$, $y = 2$

3.1 *Responses vary*. Mateo correctly subtracted $2x - x$ and $19 - 11$. Also, his instinct to eliminate y is a good way to solve this system of equations.

3.2 *Responses vary*. Mateo did not subtract correctly. And subtracting one equation from the other won't eliminate y; adding the equations will.

4.1 $x = 10$, $y = -6$

4.2 $x = 4$, $y = 1$

Looking Back

5. **C.** $f(7) = -3$

6. Line b

Explore

7.1 $x = 2$, $y = 1$

7.2 *Responses vary.*
- $x = 1$, $y = 1.5$
- $x = 5$, $y = 1$

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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:

$$4x - 2\left(\frac{1}{2}x - 1\right) = 11$$
$$4x - x - 2 = 11$$
$$3x - 2 = 11$$
$$3x = 13$$
$$x = \frac{13}{3}$$

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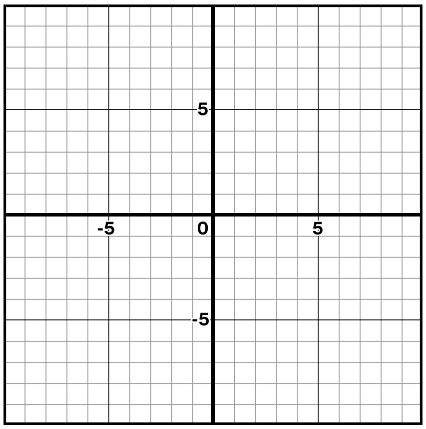
Unit A1.5, Lesson 4: Practice Problems

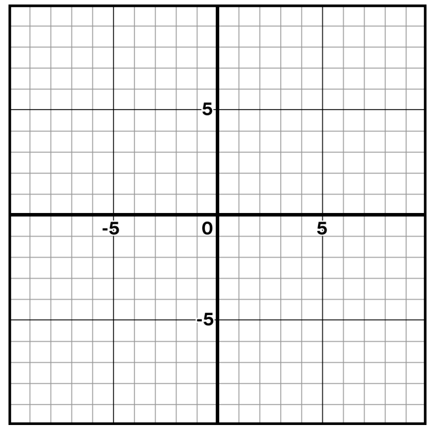
Looking Back

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.

6.2 Show or explain Kadeem's mistake.

Kadeem's Work:

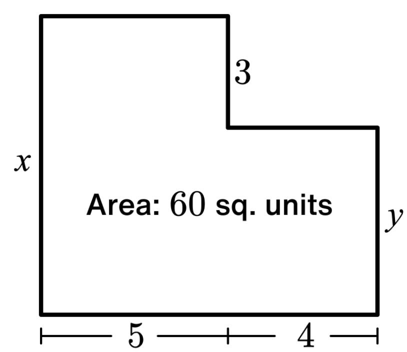
$5x - 4y = 6$

$5(x + y = 25)$

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

Explore

7. Determine the value of x and y.



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Unit A1.5, Lesson 4: Practice Problems

Answer Key

Warm-Up

1.1 $k = 6 - 2t$
(or equivalent)

1.2 $x = 3 - \frac{3}{4}y$
(or equivalent)

1.3 $y = -\frac{4}{3}x + 4$
(or equivalent)

Practice

2.1 *Responses vary*. I would add the equations to eliminate y: $5x = 25$.

2.2 *Responses vary*. I would use the second equation to substitute into the first equation: $6x - 12(2x - 1) = 24$.

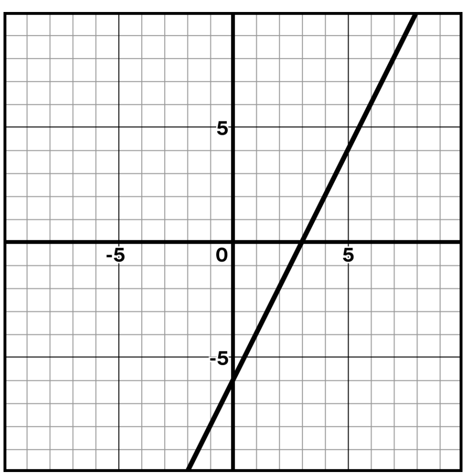
3. $x = -1, y = -4$

4.1 *Responses vary*. The error is in the second line of Alma's work, where she is distributing the -2. The operation in front of the 2 should be $+$ instead of $-$.

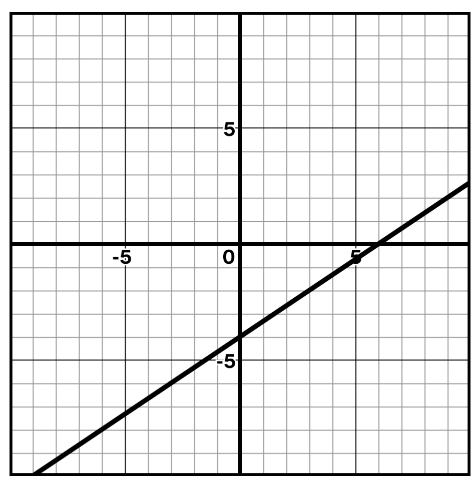
4.2 $x = 3, y = 0.5$

Looking Back

5.1



5.2



6.1 *Responses vary*. He decided to multiply the second equation by 5, which set up elimination on the next step.

6.2 *Responses vary*. It isn't clear whether Kadeem is adding or subtracting the two equations. He subtracted some terms but added others.

Explore

7. $x = 8, y = 5$

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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

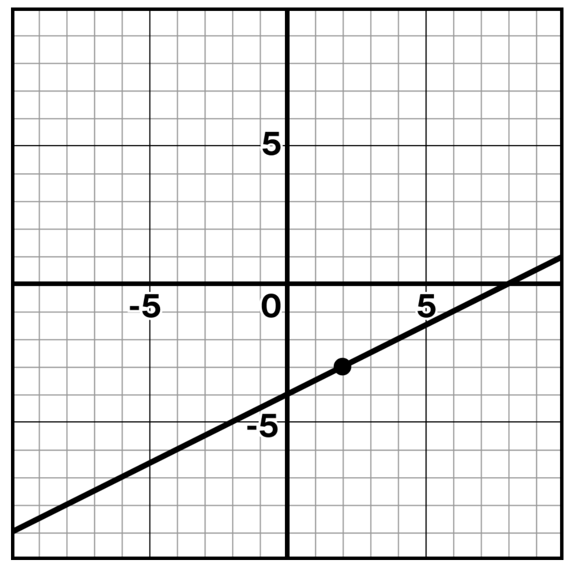
Here is a graph of $y = \frac{1}{2}x - 4$, one equation in a system of equations.

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. $y = -2x + 1$, $2y = -4x + 2$

B. $y = -2x + 1$, $y = -2x + 4$

C. $y = -2x + 1$, $y = 2x + 1$

____ No solutions

____ One solution

____ Infinite solutions

4. Solve this system of equations. Write the solution as a coordinate pair. Use a graph if it helps with your thinking.

$$y = 3x + 6$$
$$y = -\frac{1}{2}x - 8$$

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Unit A1.5, Lesson 5: Practice Problems

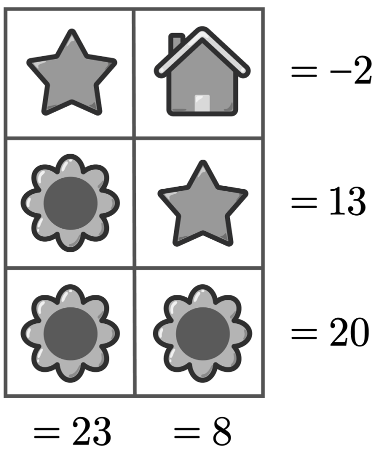
5. The point $(-2, 2)$ is on the line $y = x + 4$.

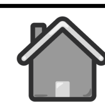
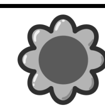
   Explain how you can determine if this point is the solution to this system of equations:

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

Looking Back

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



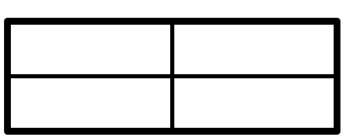
Shape	Value
	
	
	

7. Solve this inequality:

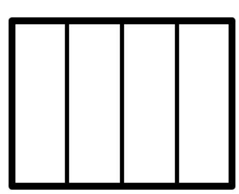
   $3(x - 3) > 2x - 6$

Explore

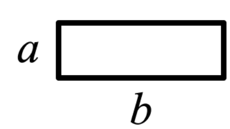
8. Here are two arrangements of identical rectangles. Determine the dimensions, a and b, of one rectangle.



Perimeter: 64 units



Perimeter: 56 units



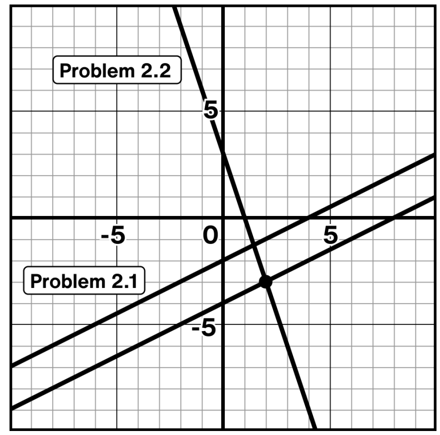
Unit A1.5, Lesson 5: Practice Problems **Answer Key**

Warm-Up

✓ $(0,\ 2)$ ✓ $(6,\ -2)$ ✓ $(3,\ 0)$

Practice

2.1 *Lines vary. Slope of $\frac{1}{2}$ and y-intercept is different than -4.*



2.2 *Lines vary. Line should include the point $(2,\ -3)$.*

2.3 *Equations vary. Slope of $\frac{1}{2}$ and y-intercept of -4.*

- $x - 2y = 8$
- $2y = x - 8$
- $y = \frac{1}{2}x - 4$

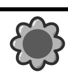
3. **B.** No solutions
   C. One solution
   A. Infinite solutions

4. $(-4,\ -6)$

5. *Responses vary*. If the point $(-2, 2)$ is also on the line $y = 2x - 1$, then it is the solution to the system.

Looking Back

6.

Shape	Value
	3
	-5
	10

7. $x > 3$

Explore

8. $a = 4, b = 12$

Science Mom Lesson 49

Unit A1.5, Lesson 8: Practice Problems Name ____________________

Warm-Up

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

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

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

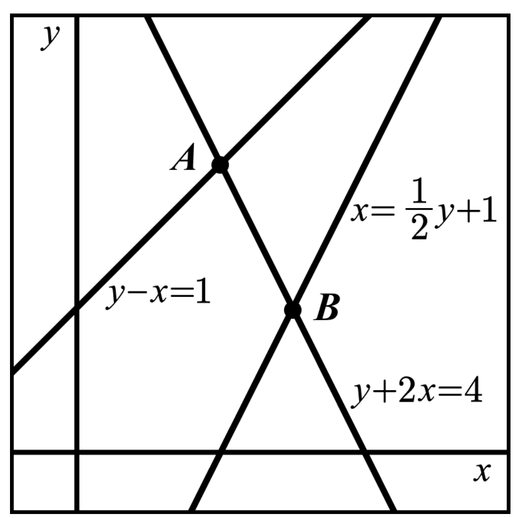
2.3 $y = \frac{2}{3}x + 7$
$y = \frac{2}{3}x - 3$

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.



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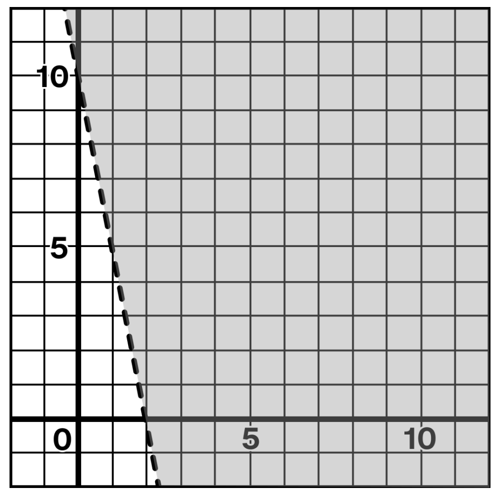
Unit A1.5, Lesson 8: Practice Problems

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. $5x + y \leq 10$

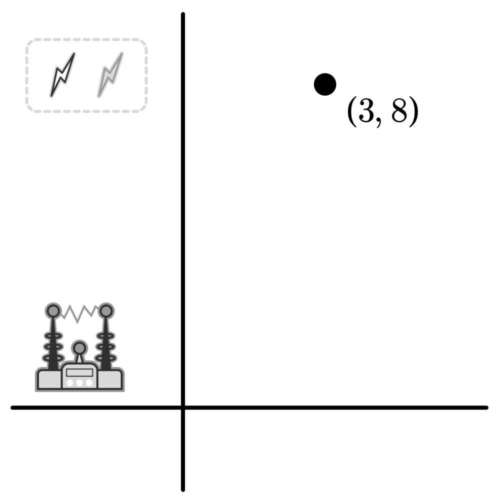
C. $5x + y > 10$

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

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

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

Warm-Up

1. One solution Infinite solutions No solutions

Practice

2.1 *Responses vary*. Add the equations together to eliminate x.

2.2 *Responses vary*. Substitute 6 for y in the first equation.

2.3 *Responses vary*. Notice that the lines are parallel, which means they won't intersect and there will be no solution.

3.1 $(7,\ -3)$

3.2 $(4,\ -2)$

4. $A = (1,\ 2)$
$B = (1.5,\ 1)$

Looking Back

5. ✓ $(0, 0)$ ✓ $(4, 1)$ ✓ $(-5, 0)$

6. **C.** $5x + y > 10$

Explore

7. *Responses vary.*

$y = x + 5$
$y = 2x + 2$

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Unit A1.5, Lesson 9: Practice Problems Name ________________

Warm-Up

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

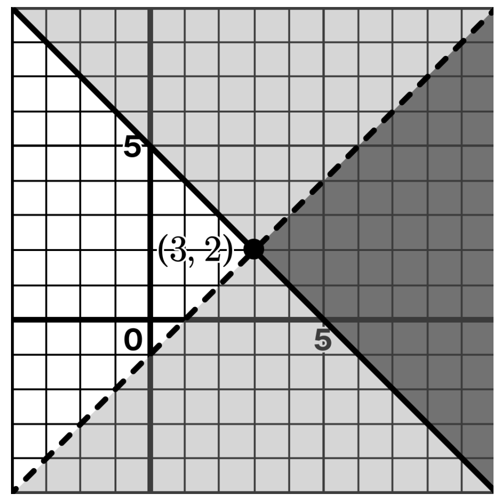
1.1 List **three** coordinate pairs that make the inequality **true**.

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.

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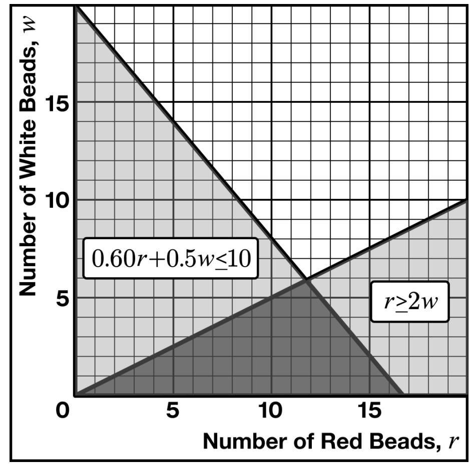
Unit A1.5, Lesson 9: Practice Problems

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.

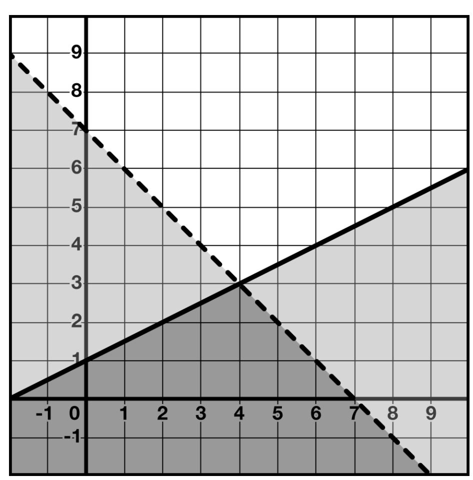
Write an inequality to represent this situation.

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.

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

Warm-Up

1.1 *Responses vary*. $(3,\ 5)$, $(0,\ 0)$, $(10,\ 10)$

1.2 *Responses vary*. $(10,\ 0)$, $(20,\ 10)$, $(0,\ -11)$

Practice

2. No. *Explanations vary*. The point $(3,\ 2)$ satisfies the first inequality, but not the second one.

3.1 *Responses vary.* This inequality represents that the total value of the stamps add up to $\$5$ or more.

3.2 *Responses vary.* This inequality represents that the total number of stamps must be no greater than 12.

3.3 No. *Explanations vary*. 1 postcard stamp and 9 first-class stamps would satisfy the second constraint about having 12 or fewer stamps. But $0.34(1) + 0.49(9) = 4.75$, which is less than $\$5$.

4.1 *Responses vary.* 10 red beads and 4 white beads.

4.2 *Responses vary.* 5 red beads and 5 white beads.

Looking Back

5. $(1,\ 6)$

6. $1.67a + 1.87g \leq 14$ (or equivalent)

Explore

7. *Responses vary.* $A(4,\ 2)$, $B(0,\ 3)$, $C(9,\ 5)$, $D(8,\ 6)$

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Unit A1.5, Lesson 10: Practice Problems Name ____________________

Warm-Up

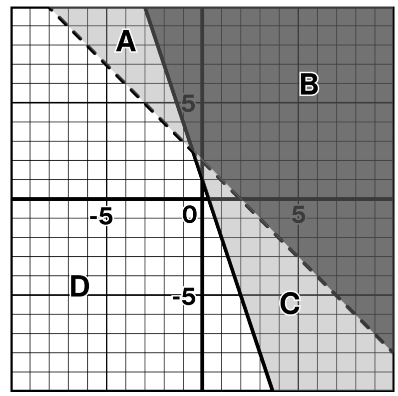
1. Find the value of y when $x = 5$.

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

Practice

Here is the graph of this system of inequalities:

$$y > -x + 2$$
$$3x + y \geq 1$$

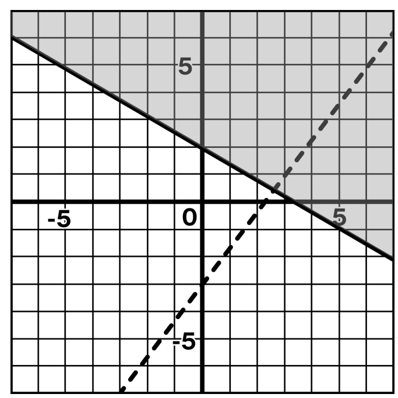


2.1 Which letter represents the solution region to the system of inequalities?

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.

$$3x + 5y \geq 10$$
$$4x - 3y < 9$$

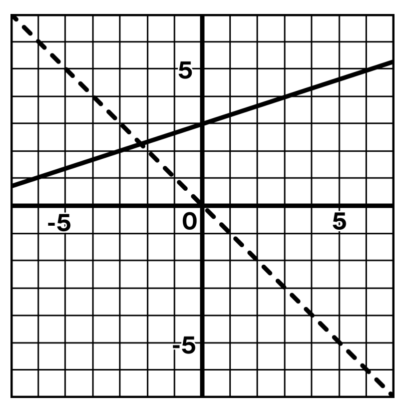


3.1 Complete the graph of the second inequality.

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

Nyanna started graphing this system of inequalities.

$$x + y > 0$$
$$-x + 3y \leq 9$$

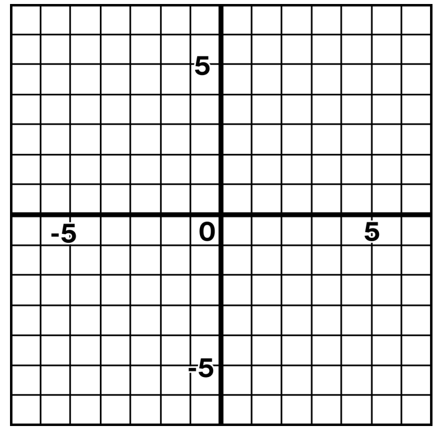


4.1 Complete the graph of the system of inequalities.

4.2 Identify a coordinate pair that is in the solution region.

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

   Explain how you know it has no solutions.

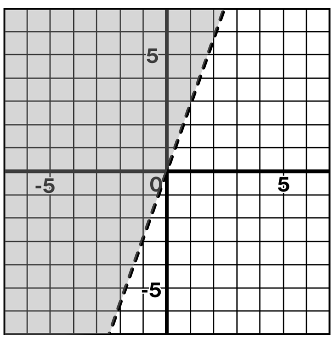


Looking Back

Match each inequality to its graph.

A. $y > 3$	B. $x < 3$	C. $y > 3x$

6.1



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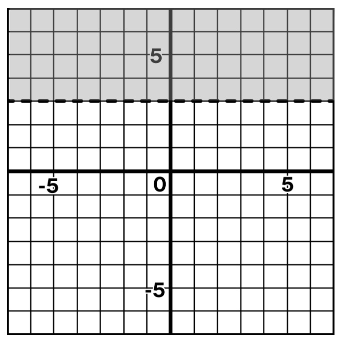
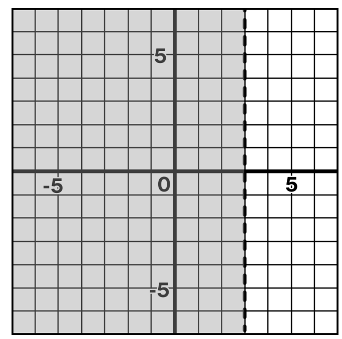
6.2



____

6.3



____

Explore

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

The system has no solutions.

$x - y \ \square\ 0$

$x - y \ \square\ 0$

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

$x - y \ \square\ 0$

$x - y \ \square\ 0$

Warm-Up

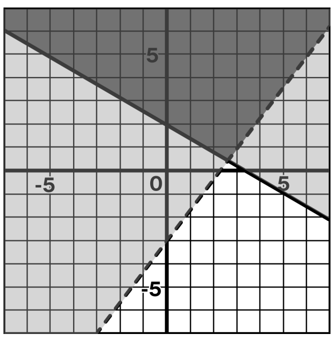
11 6 14

Practice

2.1 B

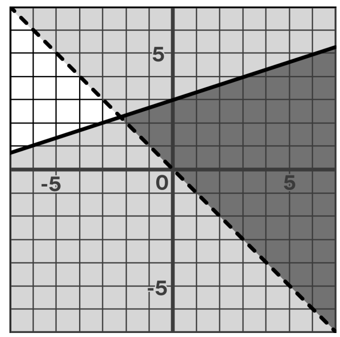
2.2 No

3.1



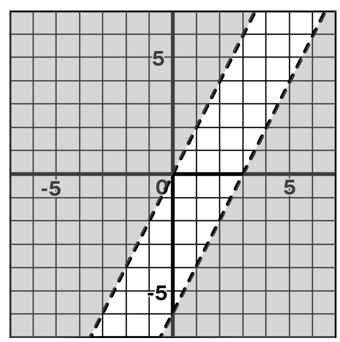
3.2 *Responses vary.* I plugged $(0, 0)$ into the $4x - 3y < 9$ inequality. Since $(0, 0)$ makes the inequality true, that side of the boundary line should be shaded.

4.1



4.2 *Responses vary*. $(2, 1)$

5.1 *Responses and explanations vary*.



The system has no solutions because the regions of each inequality do not overlap. Since the boundary lines are parallel, they won't intersect.

Looking Back

6.1 C 6.2 A 6.3 B

Explore

7. *Responses vary*.

$x - y < 0$ $x - y \leq 0$

$x - y > 0$ $x - y \geq 0$

desmos Science Mom Lesson 52

Unit A1.6, Lesson 1: Practice Problems Name ______________________

Warm-Up

Determine the next two numbers in each sequence.

1.1 4, 9, 14, ______, ______

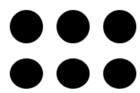
1.2 4, 8, 16, ______, ______

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	Dots
1	
2	6
3	



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

x	y
1	2
2	8
3	32
4	128

Table B

x	y
1	2
2	8
3	18
4	32

Table C

x	y
1	2
2	8
3	14
4	20

Table D

x	y
1	2
2	6
3	18
4	54

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Unit A1.6, Lesson 1: Practice Problems

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

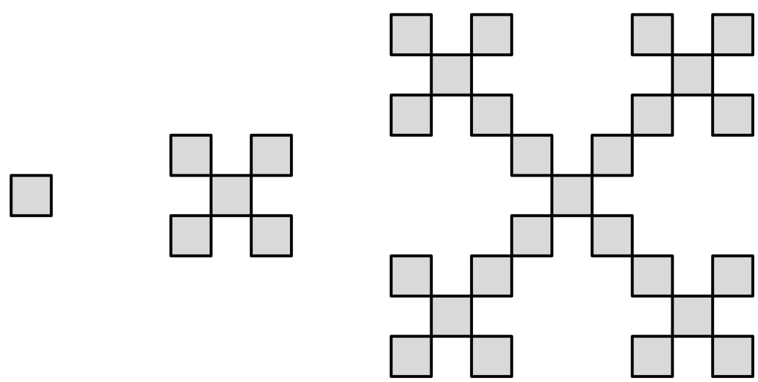
4.1 Is $f(x)$ linear, exponential, or something else? Explain how you know.

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.



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

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.

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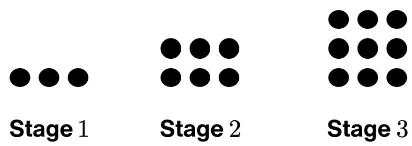
Unit A1.6, Lesson 1: Practice Problems **Answer Key**

Warm-Up

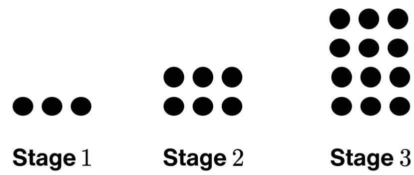
1.1 $19, 24$ | 1.2 $32, 64$ | 1.3 $4.5, 2.25$

Practice

2.1 *Responses vary.*



Stage	Dots
1	3
2	6
3	9



Stage	Dots
1	3
2	6
3	12

2.2 *Responses vary.* My pattern is linear because it grows by a constant rate of change, 3.

My pattern is exponential because it grows by a constant growth factor, 2.

3.1 Table C
3.2 Table A
3.3 Tables A and D
3.4 Table B

4.1 $f(x)$ is exponential because it grows by a constant growth factor of 1.5.

4.2

x	$f(x)$
1	4
2	6
3	9
4	13.5
5	20.25
6	30.375

Explore

125 squares

desmos **Science Mom Lesson 53**

Unit A1.6, Lesson 2: Practice Problems Name ____________________

Warm-Up

Calculate the value of each expression.

1.1 $4^3 + 3^2$

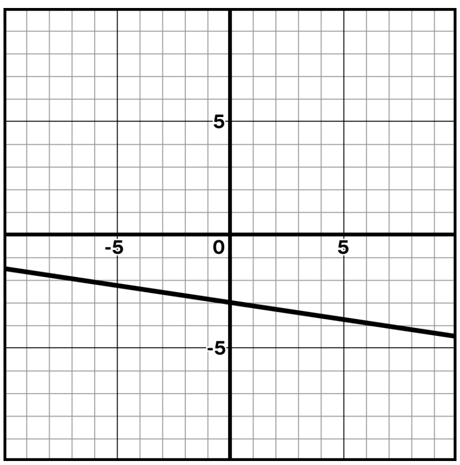
1.2 $(13 - 8)^3$

1.3 $6^2 + 11(7)$

Practice

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

2.1

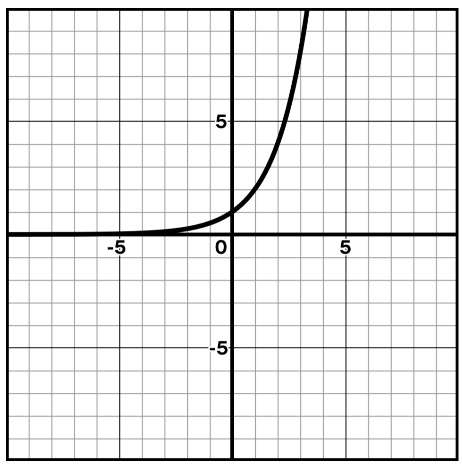


Positive / Negative

Increasing / Decreasing

Linear / Exponential

2.2

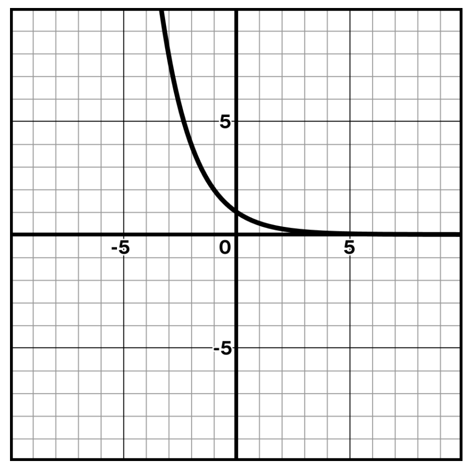


Positive / Negative

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.

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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.

Unit A1.6, Lesson 2: Practice Problems **Answer Key**

Warm-Up

1.1 73 1.2 125 1.3 113

Practice

2.1 Positive / ==Negative==	2. ==Positive== / Negative	2.3 ==Positive== / Negative
Increasing / ==Decreasing==	==Increasing== / Decreasing	Increasing / ==Decreasing==
==Linear== / Exponential	Linear / ==Exponential==	Linear / ==Exponential==

3. $p(2) = 45$. This means that there are 45 thousand trees in the forest in 2002, or 2 years after 2000.

4.1 Exponential.
Explanations vary. I think that $c(t)$ is exponential because the equation shows a growth factor of 1.1.

4.2 **C** The value of the comic book in the year 2020.
D The comic book will be worth $\$2.35$ after t years.
A The comic book was worth $\$0.35$ when it was printed.
B After 30 years, the comic book is worth $\$6.11$.

4.3 *Responses vary.*
- No, the comic book might stop being popular at a certain time and the value might even decrease.
- Yes, 1.1 is a small growth factor, so it is possible to keep growing like this forever.
- No, $c(t)$ is exponential and eventually exponential functions will get too large.

Looking Back

5.1 $x = 36 - 3y$ (or equivalent)

5.2 $y = 12 - \frac{1}{3}x$ (or equivalent)

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.

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

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?

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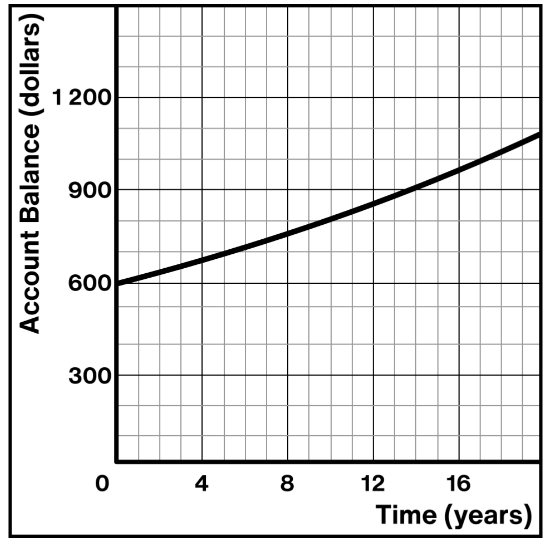
Unit A1.6, Lesson 4: Practice Problems

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.

$$\begin{aligned} 5x + y &= 18 \\ x - 3y &= 10 \end{aligned}$$

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

1.1 Something else
1.2 Linear
1.3 Exponential

Practice

2.1 Compound
2.2 Simple
2.3 Simple
2.4 Compound

3.1

Time (years)	Account Balance (dollars)
0	4000
1	4200
2	4410
3	4630.50
4	4862.03

3.2 **B.** $f(x) = 4000(1.05)^x$
3.3 $\$6515.58$

4.1 About 17 years.
4.2 $f(14)$ is equal to about 900. This tells me that after 14 years, Keya's account balance will be about $\$900$.

Looking Back

5. $(4, -2)$

Explore

6. *Responses vary.*
   - I would choose Option B. I calculated the value after 30 days and it was $\$21\,474\,836.46$.
   - I would choose Option A because I would want the money all at once.

Unit A1.6, Lesson 6: Practice Problems Name ____________________

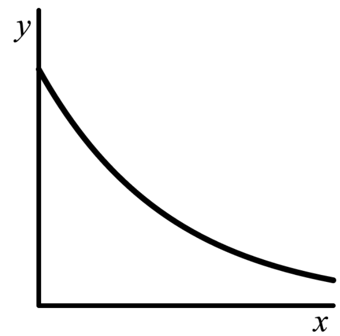
Warm-Up

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 $f(x) = a \cdot b^x$.

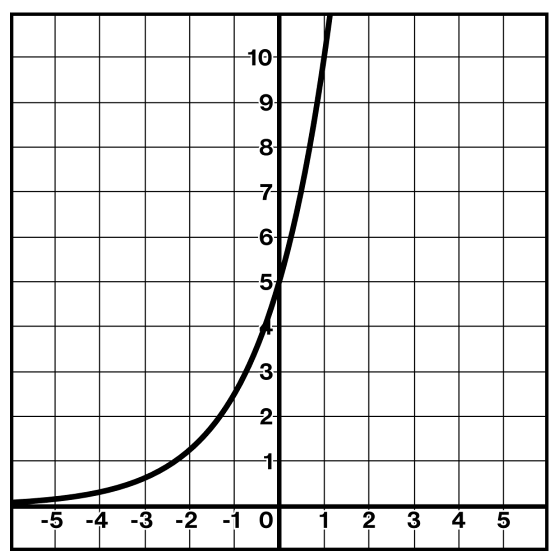


2.1 Select **all** possible values of b.

☐ $\frac{18}{5}$ ☐ $\frac{1}{10}$ ☐ $\frac{9}{10}$ ☐ 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?

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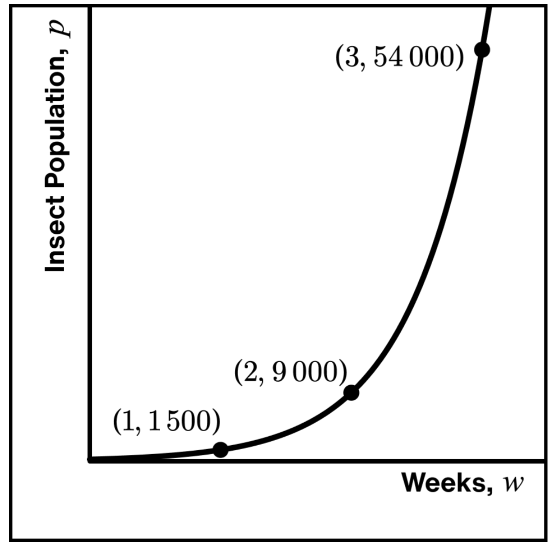
Unit A1.6, Lesson 6: Practice Problems

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:

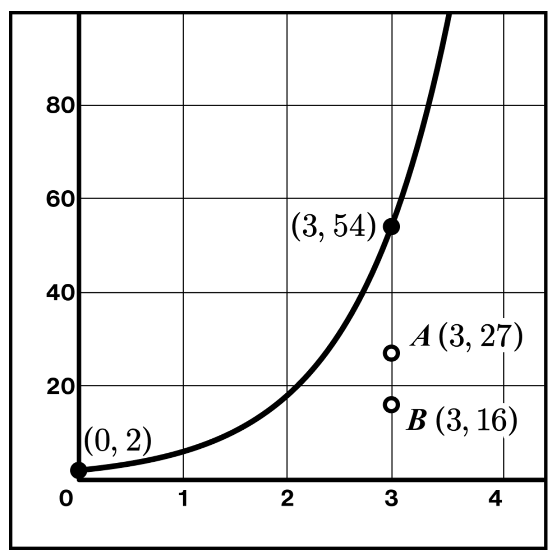
   Write the solution as a coordinate pair.

$$3x + 2y = 26$$

$$y = 2x - 8$$

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.

Warm-Up

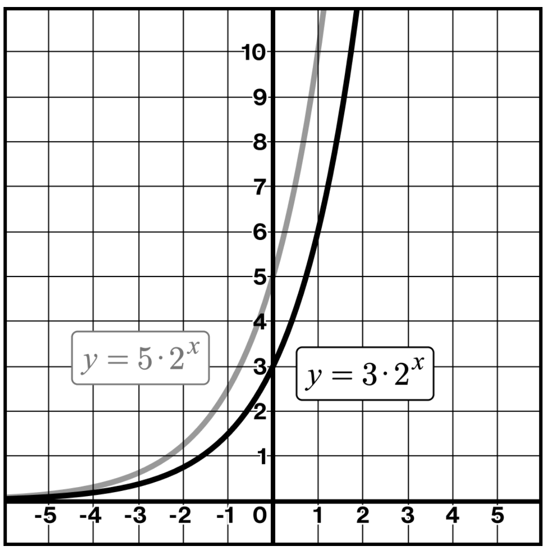
1. 49 $\frac{1}{36}$ 243

Practice

2.1 ✓ $\frac{1}{10}$ ✓ $\frac{9}{10}$ ✓ 0.3

2.2 *Explanations vary.* Since the graph is decreasing, I know that b has to be less than 1.

3.1



3.2 *Responses vary.*

- Both graphs have the same shape because they have the same growth factor.
- Both graphs are positive and increasing.
- Both graphs are exponential.

3.3 *Responses vary.*

- The graphs have different y-intercepts.
- The graph of $y = 5 \cdot 2^x$ is higher than the graph of $y = 3 \cdot 2^x$.

4.1 6

4.2 $p = 250 \cdot 6^w$ (or equivalent)

Looking Back

5. $(6, 4)$

Explore

Responses vary.

6.1 $f(x) = 1 \cdot 3^x$

6.2 $f(x) = 2 \cdot 2^x$

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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.

- ☐ $1300 + (1.021)$
- ☐ $1300(1.21)$
- ☐ $1300(1.021)$
- ☐ $1300(1.0021)$
- ☐ $1300 + 1300(0.021)$

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Unit A1.6, Lesson 7: Practice Problems

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

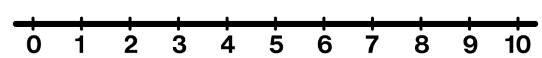
4.1 Write a function, $f(t)$, to represent the amount Sai will owe, in dollars, after t years.

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 $x = 1$.

$$y = \square \cdot \square^{x}$$

$$y = \square \cdot \square^{x}$$

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

$$y = \square \cdot \square^{x}$$

$$y = \square \cdot \square^{x}$$

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

Warm-Up

1. Least **B**, **A**, **D**, **C** Greatest

Practice

2.1 690

2.2 $600 \bullet 1.15^3$

2.3 $600 \bullet 1.15^t$

3. ✓ $1300(1.021)$
   ✓ $1300 + 1300(0.021)$

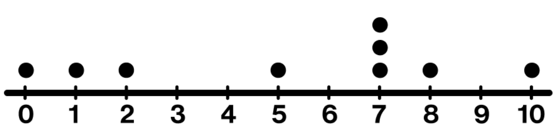
4.1 $f(t) = 500 \bullet 1.06^t$

4.2

Years	Amount Owed ($)
0	500
1	530
2	561.80
3	595.51
4	631.24

Looking Back

5. *Responses vary.*



Explore

Responses vary.

6.1 $y = 2 \cdot 3^x$
$y = 1 \cdot 6^x$

6.2 $y = 4 \cdot 3^x$
$y = 9 \cdot 2^x$

desmos 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.

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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.

Monthly Interest Rate	17%
Monthly Growth Factor	
Growth Factor per Year	
Interest Rate per year	

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.

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

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.

Warm-Up

1.1 $f(2) = 16$ 1.2 $g(2) = 32$ 1.3 $h(2) = 12$

Practice

2.1 ✓ $1000(1.03^{12})^{t}$ ✓ $1000 \cdot 1.03^{12t}$ ✓ $1000 \cdot 1.4258^{t}$

2.2 42.58%

3.1 750 represents the initial amount Alejandro invested.
1.025 represents the growth rate of the investment, or 2.5% interest earned on the investment.
12 represents that this is a monthly interest rate.
3 represents the number of years.

3.2 $750 \cdot 1.025^{36}$ or $750(1.3449)^{3}$ (or equivalent)

4.1

Monthly Interest Rate	17%
Monthly Growth Factor	1.17
Growth Factor per Year	6.58
Interest Rate per year	558%

4.2 $\$12\,989.19$

Looking Back

5.1 $g(0) = -17$
5.2 $g(3) = 15$
5.3 $g(5) = 25$

Explore

6. *Responses vary.* $7^{8} = 7^{7} \times 7^{1} = 7^{5} \times 7^{3} \times 7^{0} = (7^{4})^{2}$

Unit A1.6, Lesson 11: Practice Problems Name ______________________________

Warm-Up

1. Fill in the missing values to continue the series.

$$256,\ 64,\ 16,\ \_\_\_\_,\ \_\_\_\_,\ \_\_\_\_,\ \_\_\_\_$$

Practice

2. 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.

   - ☐ $2500(1 + \frac{0.012}{2})^{3 \cdot 2}$
   - ☐ $2500(1 + \frac{0.012}{6})^{6}$
   - ☐ $2500(1 + 0.012)^{3}$
   - ☐ $2500(1 + 0.006)^{6}$
   - ☐ $2500(1 + \frac{0.012}{3})^{3 \cdot 2}$

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.

3.1 Find the error and explain why it is incorrect.

$$5\,000\left(1 + \frac{0.18}{2}\right)^{(4 \cdot 2)}$$

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

3.3 What will her balance be in 2 years?

desmos

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.

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

Warm-Up

1. $4,\ 1,\ 0.25$ (or equivalent) , 0.0625 (or equivalent)

Practice

2. ✓ $2500(1 + \frac{0.012}{2})^{3\cdot 2}$

   ✓ $2500(1 + 0.006)^{6}$

3.1 The error is that Maneli divided the interest rate by 2.
Explanations vary. Since the interest is compounded quarterly, it should be divided by 4.

3.2 $5000(1 + \frac{0.18}{4})^{4\cdot 2}$ (or equivalent)

3.3 $\$7\,110.50$

4.1

Compounding Period	Balance (dollars)
Annually	$\$1250$
Monthly	$\$1280.73$
Daily	$\$1283.92$

4.2 *Responses vary.* The more compounding periods a loan has, the higher the balance will be.

Looking Back

5.1 $c + v \geq 25$
$8.75c + 5.50v \leq 250$

5.2 Yes.
Explanations vary.
- 5 chicken dinners and 20 vegetarian dinners cost $\$153.75$, which is less than $\$250$.
- When $c = 5$ and $v = 20$, the inequality $8.75(5) + 5.50(20) \leq 250$ is true.

Unit A1.6, Lesson 13: Practice Problems Name ______________________

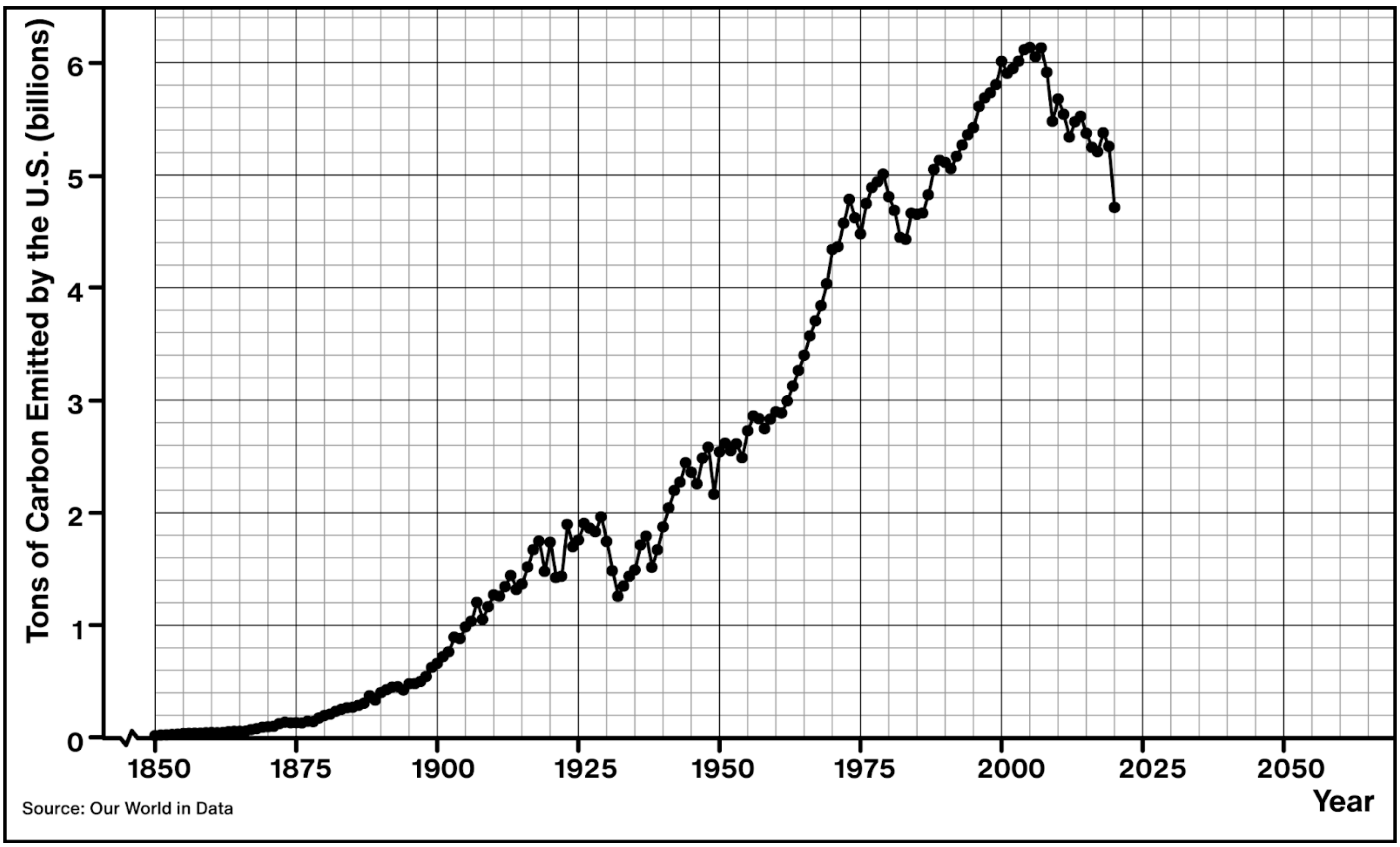
Warm-Up

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

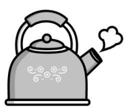
   Explain your thinking.

Explore

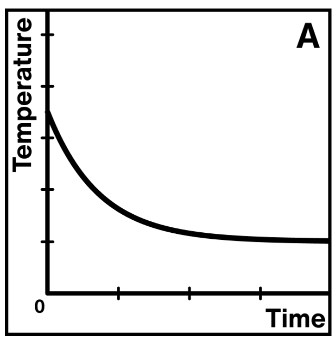
4.1 Match each liquid to a graph.

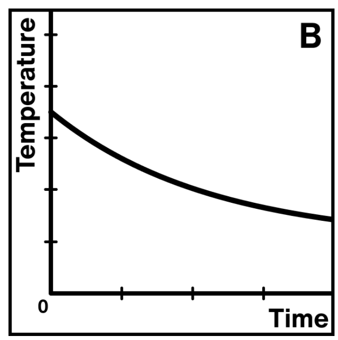
Coffee in a Travel Mug

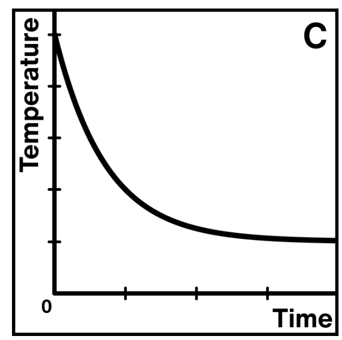
Boiling Water Resting in a Kettle



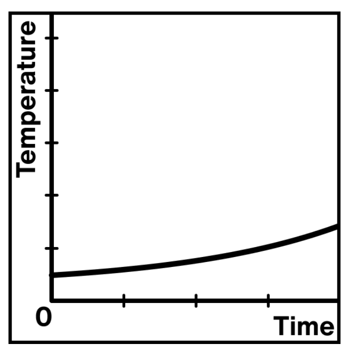
Black Tea in a Teacup







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.

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Unit A1.6, Lesson 13: Practice Problems **Answer Key**

Warm-Up

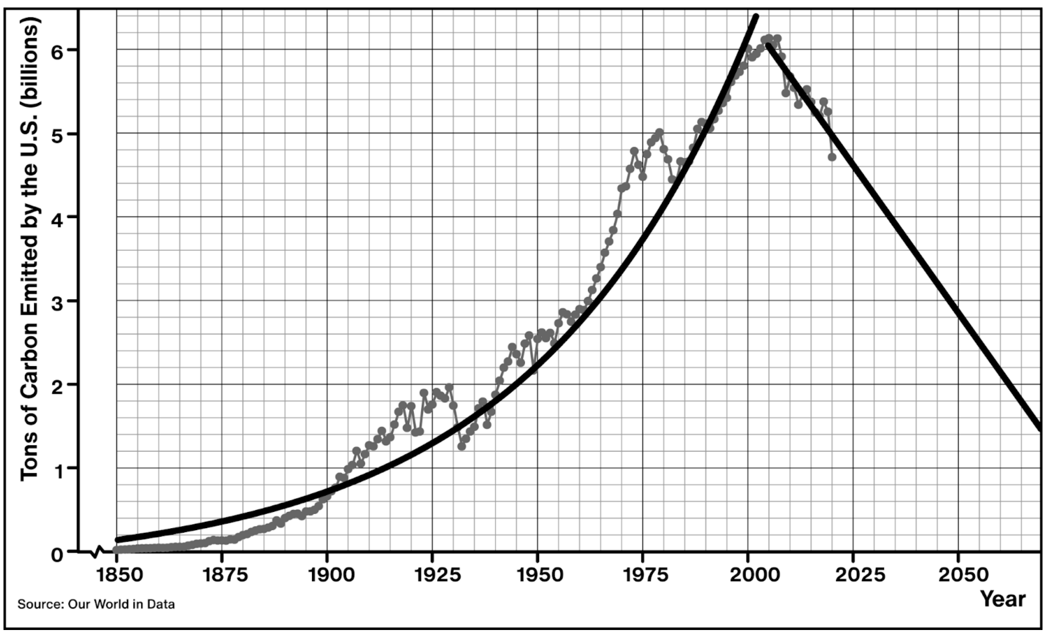
1.1 $f(2) = 62.5$ 1.2 $f(3) = 156.25$ 1.3 $f(-1) = 4$

Practice

2.1 *Responses vary.* The amount of carbon emitted seems to increase exponentially from 1850 until about 2005. After 2005, the amount of carbon emitted seems to decrease significantly.

2.2 *Responses vary.*
- The data has a negative trend; there is less carbon emitted. Maybe there was a new law passed that made companies and factories change their practices.
- The amount of carbon emitted starts to decrease after 2005. Maybe new kinds of cars came out that emit less carbon, like electric cars.

2.3
2.4 *Responses vary.*



2.5 *Responses vary.* Linear model: About 2.5 billion tons of carbon
Exponential model: About 4 billion tons of carbon

Looking Back

3. $r = 0.72$

Explanations vary. Since the slope of the line, 8.23, is positive, I know that the correlation must be positive, too. A positive correlation is represented by a positive r-value.

Explore

4.1 Coffee in a Travel Mug **B**
Boiling Water Resting in a Kettle **C**
Black Tea in a Teacup **A**

4.2 *Responses vary.*
- Iced coffee sitting on a counter, warming up
- A milkshake melting
- A slushy sitting in a warm car

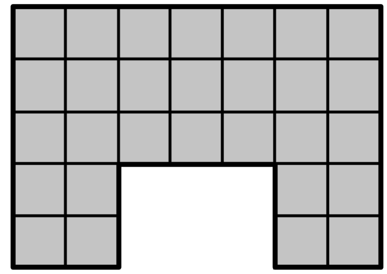
Science Mom Lesson 60

Unit A1.7, Lesson 1: Practice Problems Name ____________________

Warm-Up

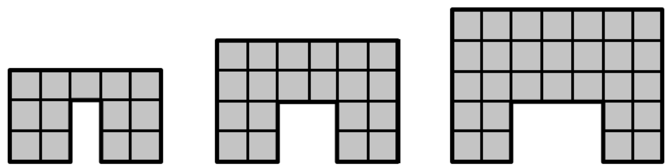
1. Select **all** of the expressions that could represent the area of this figure.

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



Practice

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



s=1 s=2 s=3

3. How many tiles are in figure 10?

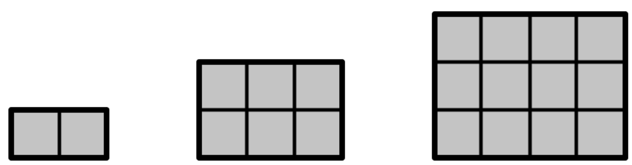


Figure 1 **Figure** 2 **Figure** 3

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

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Unit A1.7, Lesson 1: Practice Problems

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

s	**Number of Tiles**
1	5
2	25

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.

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

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.

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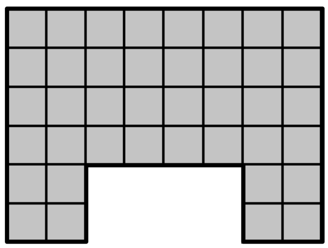
Unit A1.7, Lesson 1: Practice Problems **Answer Key**

Warm-Up

1. ✓ $5 \cdot 7 - 6$ ✓ $5 \cdot 7 - 2 \cdot 3$ ✓ $2 \cdot 5 + 3 \cdot 3 + 2 \cdot 5$

Practice

2.



3. 110 tiles.
Explanations vary. I saw that each figure is a square with the side length of the figure number and an extra column. So figure 10 would be a 10-by-10 square with an extra column of 10. $10 \cdot 10 + 10 = 110$ tiles.

4. Exponential.
Explanations vary. As s increases by 1, the number of tiles changes by a constant multiplier of 3.

5.1 Ichiro.
Explanations vary. If the number of tiles is increasing by 20, then the pattern is linear. If the number of tiles is being multiplied by 5, then the pattern is exponential.

5.2 45 tiles

5.3 125 tiles

Looking Back

6. Noon to 4:00 PM.
Explanations vary. From 6:00 AM to noon, Juana hiked 12 miles in 6 hours, so her average speed was 2 miles per hour. From noon to 4:00 PM, Juana hiked another 14 miles in 4 hours. I knew that because $26 - 12 = 14$. That means her average speed was 3.25 miles per hour.

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.

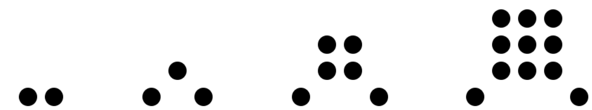


Figure 0 Figure 1 Figure 2 Figure 3

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.

   ▢ $n^2 + 1$

   ▢ $n^2 + n$

   ▢ $n(n + 1)$

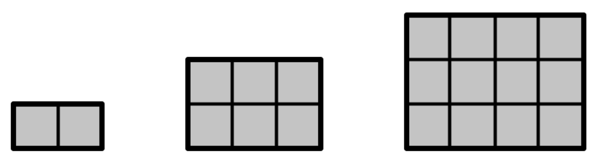


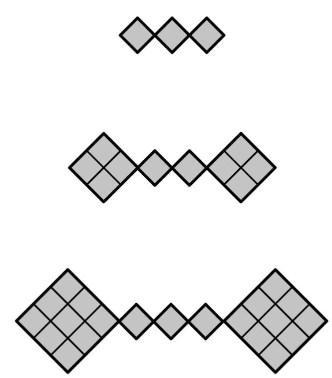
Figure 1 Figure 2 Figure 3

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



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

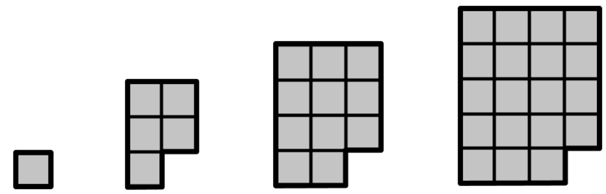


Figure 1 Figure 2 Figure 3 Figure 4

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.

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

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 are proud of.

Unit A1.7, Lesson 2: Practice Problems **Answer Key**

Warm-Up

1. ✓ $4m + 2m + 5q - 2q$ ✓ $3(2m + q)$ ✓ $q + 15m + 2q - 9m$

Practice

2.1 Yes. *Explanations vary.* This pattern is quadratic because each figure contains a square that is related to the figure number (0^2, 1^2, 2^2, 3^2, 4^2).

2.2 No.

3. $n^2 + n$ or $n(n + 1)$

Explanations vary. $n^2 + n$ shows Karima's thinking because it has a square, n^2, and a row that is the same length as the square, n.

4. $2n^2 + n$ or $n^2 + n + n^2$ or $n(2n + 1)$

5. Explanations vary.
- Ethan sees a square, n^2, and an extra row that is 1 tile shorter than the square, $n - 1$.
- Ama sees a rectangle that is n units on one side and 1 tile longer on the other side, $n + 1$, but the corner piece is removed, $- 1$.
- Annika sees a square, n^2, and an extra row, n, but a piece is removed from the bottom row, $- 1$.

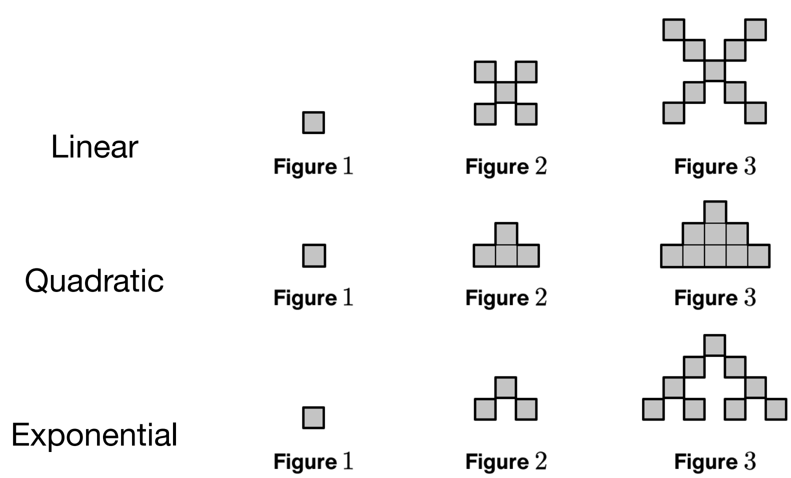
Looking Back

6.

x	$5(2^x)$
-2	1.25
-1	2.5
0	5
1	10
2	20

Explore

7. *Responses vary*.



Science Mom Lesson 62

Unit A1.7, Lesson 4: Practice Problems Name ____________________

Warm-Up

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

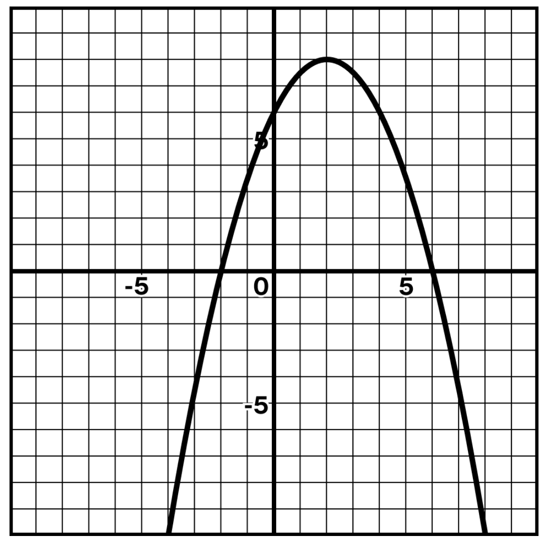
0 and 13	4 and 20	7 and 28

Practice

2.1 Draw the *line of symmetry* where you think it is located on this parabola.

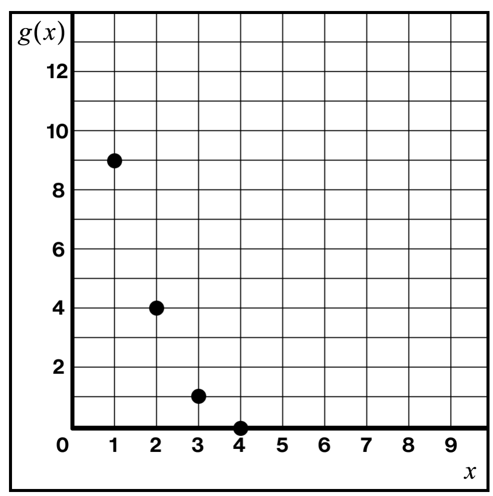
2.2 Write the equation for the line of symmetry.

$x =$ ____________



Here 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				



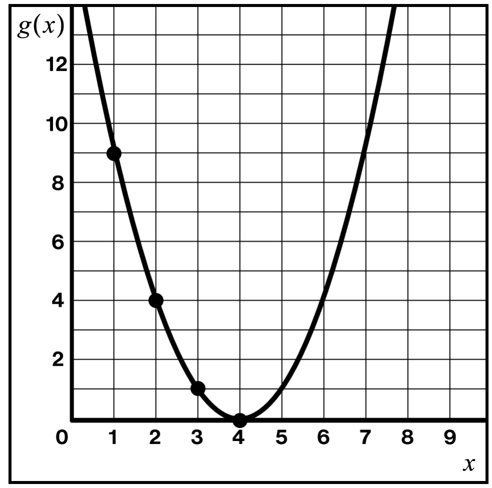
3.1 Does $g(x)$ represent a quadratic relationship? **Circle** your response and **explain** your thinking.

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 $g(x)$.

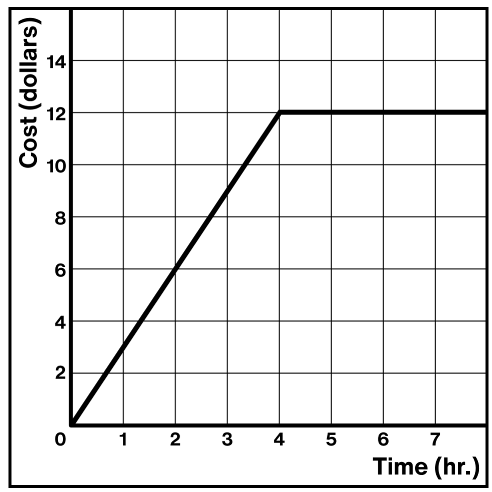


4. Write the equation for the line of symmetry of $g(x)$.

   $x =$ _______

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?

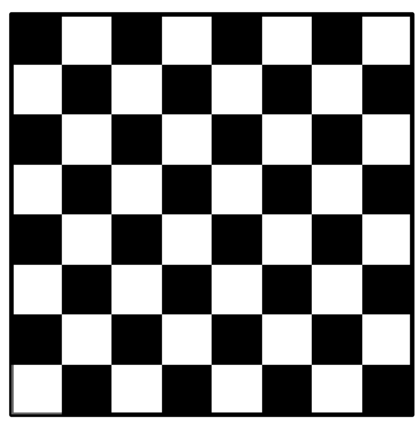
5.2 Describe the relationship between the amount of time a car is parked and the cost of parking.

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**
1×1	64
2×2	
3×3	
4×4	



Unit A1.7, Lesson 4: Practice Problems

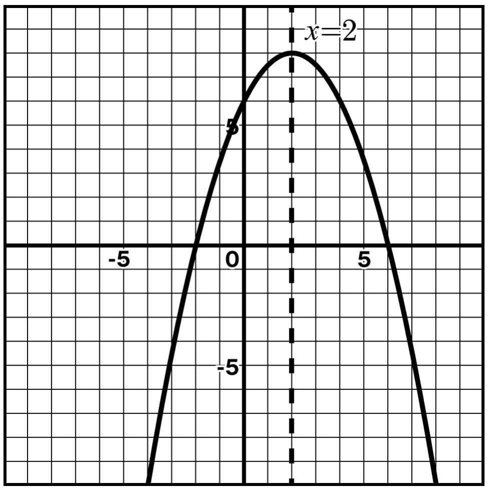
Answer Key

Warm-Up

1. 6.5 $\quad$ 12 $\quad$ 17.5

Practice

2.1



2.2 $x = 2$

3.1 Yes. *Explanations vary.* I know that $g(x)$ is quadratic because the second differences of the values in the table are all 2. Quadratic relationships have constant second differences.

3.2

x	0	1	2	3	4	5	6	7	8
$g(x)$	16	9	4	1	0	1	4	9	16

4. $x = 4$

Looking Back

5.1 Yes.

5.2 *Explanations vary.* The cost of parking is $3 per hour, until 4 hours. Any additional time after 4 hours, and you will pay $12 total.

Explore

Explanations vary. Axel's claim is correct. I counted the total squares for square sizes 1-by-1 2-by-2, 3-by-3, and 4-by-4 and noticed a quadratic pattern. When I completed the table up until 8-by-8, the sum of the totals was 204.

Square Size	Total Squares
1×1	64
2×2	49
3×3	36
4×4	25
5×5	16
6×6	9
7×7	4
8×8	1

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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	

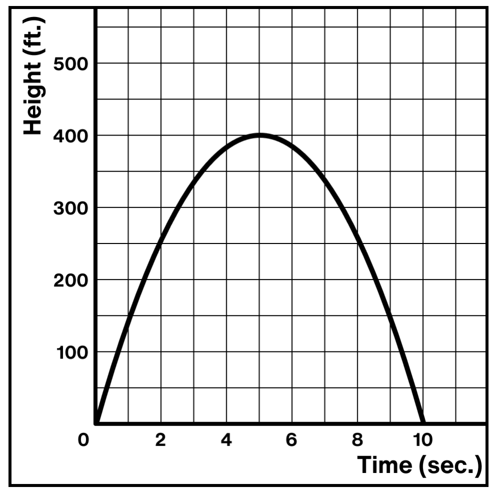
Practice

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?

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

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



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

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

Time (sec.)	0	0.2	0.4	0.6				
Height (m)	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.

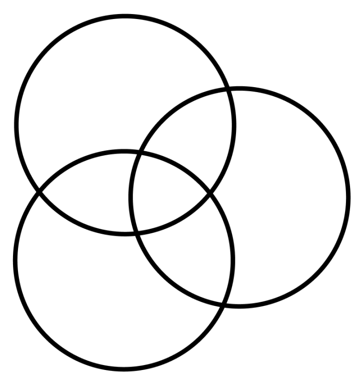
Time (sec.)	**Height (m)**
0	0
1	42
2	74
3	96

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.

Number of Circles	2	3	4	5	6
Number of Sections		7			



Reflect

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

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

Warm-Up

1.

x	0	1	2	3	4	7	10
y	5	8	11	14	17	26	35

Practice

2.1 384 feet

2.2 10 seconds

3.

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

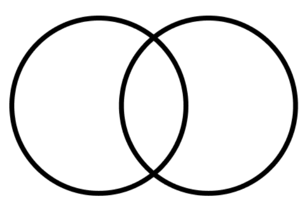
4. Yes.
Explanations vary. There is a constant second difference of -32, so the relationship is quadratic. $184 - 200 = -16$ $136 - 184 = -48$, and $56 - 136 = -80$.

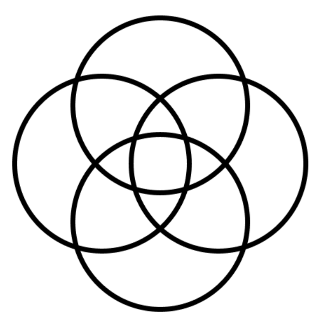
5. 1 second

6. Between 9 and 10 seconds.
Explanations vary. There is a constant second difference of -10. If you continue the pattern using the constant second differences, then you get heights of $108,\ 110,\ 100,\ 80,\ 50,\ 10,$ and -40 meters . The rocket will land when the height is 0 meters, which is between 10 and -40. That is between 9 and 10 seconds.

Explore

Number of Circles	2	3	4	5	6
Number of Sections	3	7	13	21	31





Unit A1.7, Lesson 6: Practice Problems Name ______________________________

Warm-Up

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

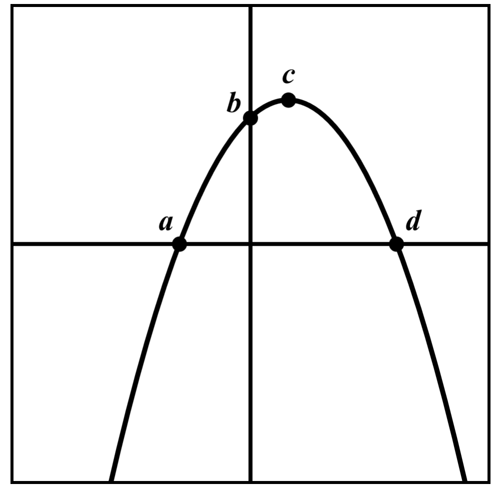
   Name each key feature below.

   a:

   b:

   c:

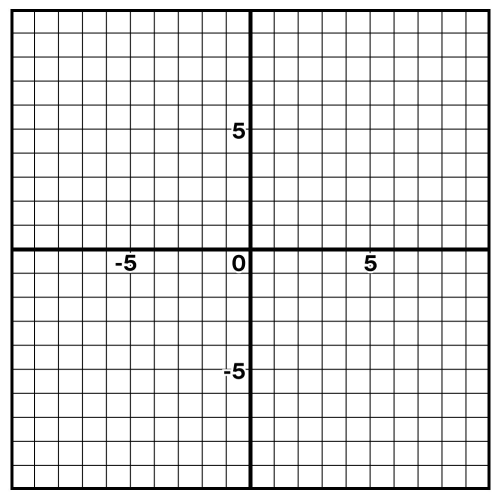
   d:



Practice

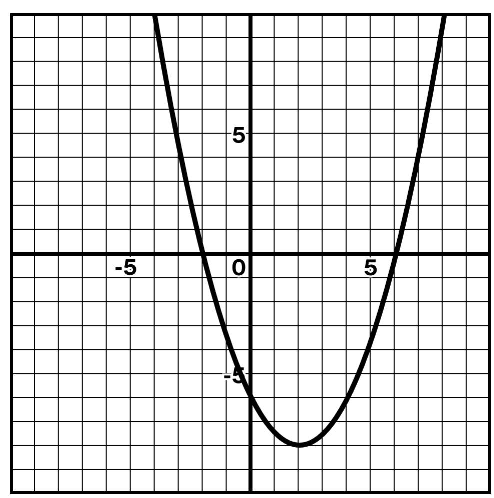
2. Sketch a parabola that:

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



3. Identify the key characteristics of this parabola.

Vertex	
x-intercept	$(-2,\ 0)$
x-intercept	
y-intercept	
Line of symmetry	



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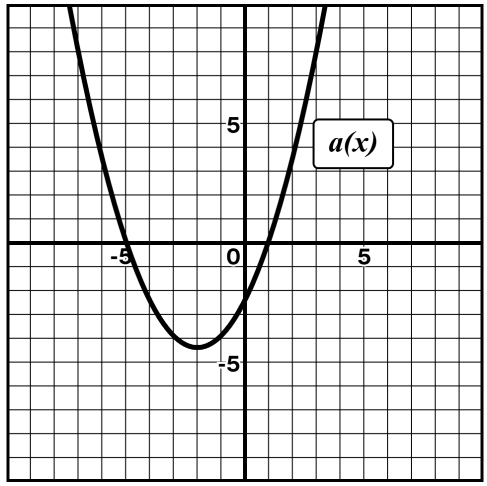
Unit A1.7, Lesson 6: Practice Problems

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

Which parabola is concave down? (Circle one.)

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

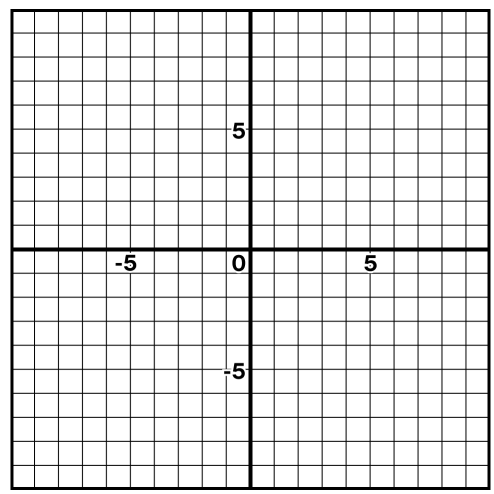
Explain your thinking.



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

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

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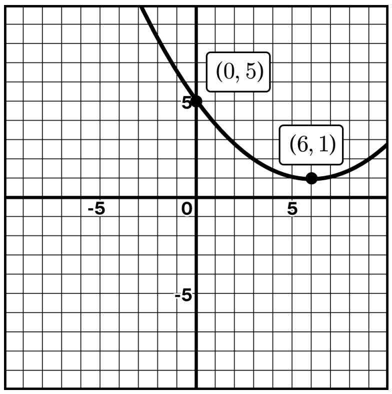
Unit A1.7, Lesson 6: Practice Problems **Answer Key**

Warm-Up

1. a: x-intercept, b: y-intercept, c: vertex, d: x-intercept

Practice

2.



3.

Vertex	$(2, -8)$
x-intercept	$(-2,\ 0)$
x-intercept	$(6,\ 0)$
y-intercept	$(0, -6)$
Axis of Symmetry	$x = 2$

4. $b(x)$. *Explanations vary*. The graph of $a(x)$ is concave up because it looks like a smile. I continued the table for $b(x)$ and found that the parabola has a maximum at $(4,\ 24)$. Because it has a maximum, it must be concave down.

5. Yes.
   Explanations vary.
   - Two parabolas with the same intercepts can only have a different vertex if one of their x-intercepts is $(0,\ 0)$.
   - If one of the x-intercepts is at $(0,\ 0)$, the y-intercept will always be the same, so as long as the parabolas have a second matching x-intercept, they can have a different vertex.

Explore

6. *Responses vary.* I notice that if you make $a = 0$, the graph is a line. I notice that when you change the value of c, the graph goes up and down. I wonder what happens when $b = 2$.

desmos **Science Mom Lesson 65**

Unit A1.7, Lesson 8: Practice Problems Name ______________________________

Warm-Up

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

$f(x) = 2x + 4$ $\qquad$ $g(x) = 2x^2$ $\qquad$ $h(x) = 2x^2 + 2x + 4$

Practice

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

Amoli says that $k(-2) = -12$. $\qquad$ Yasmine says that $k(-2) = -8$.

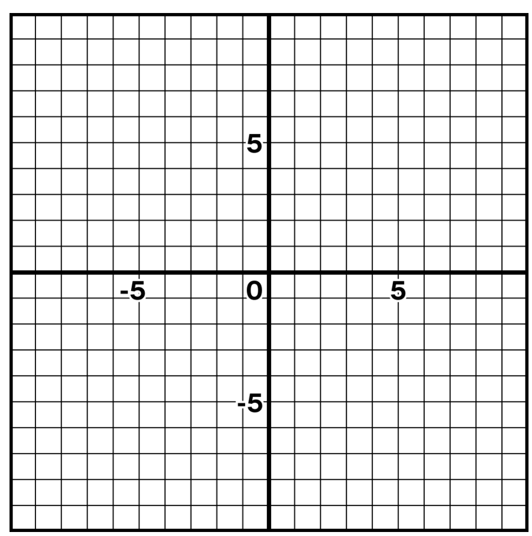
Who is correct? Explain your thinking.

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 $g(x)$.



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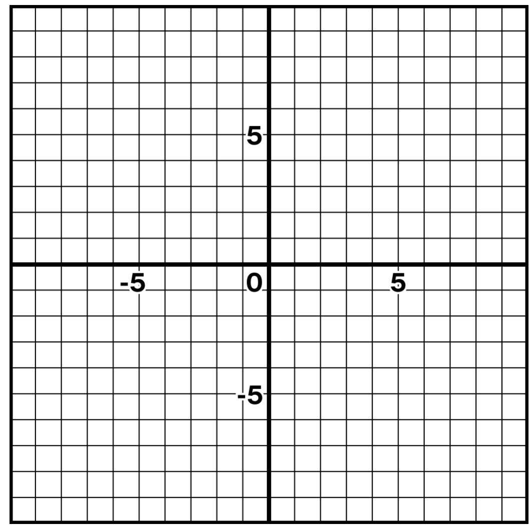
Unit A1.7, Lesson 8: Practice Problems

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 $h(x)$.



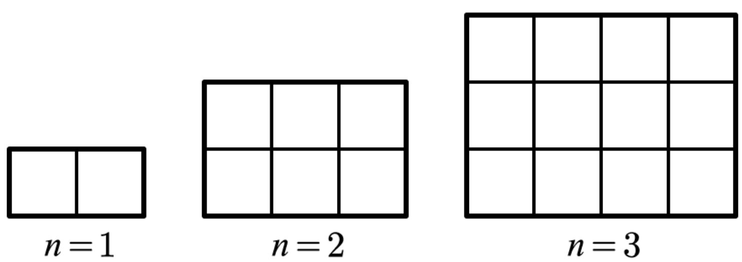
5. Here is the same function: $h(x) = 2x(x + 3)$.

   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.

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



Reflect

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

Warm-Up

1. $f(-3) = -2$ $g(-3) = 18$ $h(-3) = 16$

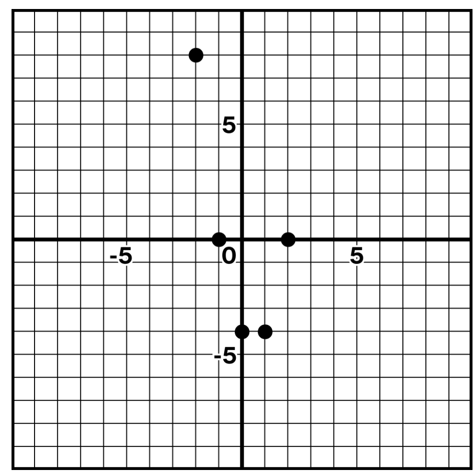
Practice

2. Yasmine.
Explanations vary. Yasmine is correct because $k(-2)$ means that -2 is the value of x.
$-2 + 4 = 2$ and $-2 - 2 = -4$ and $2 \cdot -4 = -8$.

3.1

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

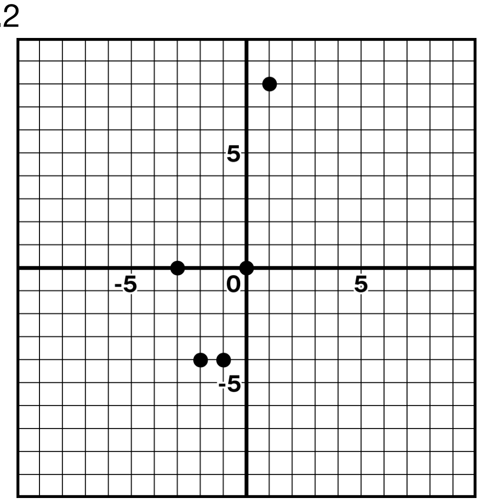
3.2



4.1

x	$2x$	$x + 3$	$2x(x + 3)$
-3	-6	0	0
-2	-4	1	-4
-1	-2	2	-4
0	0	3	0
1	2	4	8

4.2



5. Quadratic. *Explanations vary.* The graph makes a parabola and the table shows a constant second difference.

Looking Back

6. ✓ $s = n^2 + n$ ✓ $s = (n)(n + 1)$

desmos Science Mom Lesson 66

Unit A1.7, Lesson 10: Practice Problems Name ____________________

Warm-Up

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

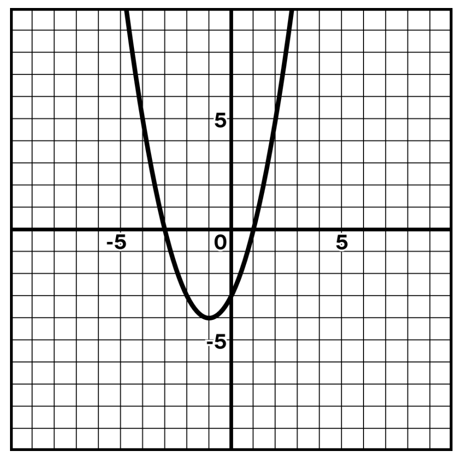
$\_\_\_\_ + 0 = 5$ $\quad \_\_\_\_ - 10 = 5$ $\quad 5 \cdot \_\_\_\_ = 0$ $\quad (\_\_\_\_ + 3)(5) = 0$ $\quad 2 \cdot \_\_\_\_ + 6 = 0$

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.

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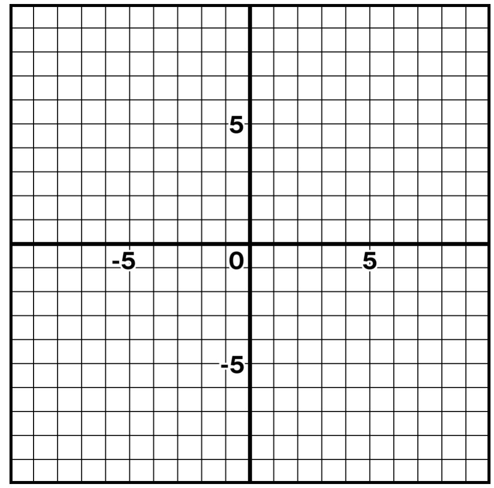
Unit A1.7, Lesson 10: Practice Problems

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



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

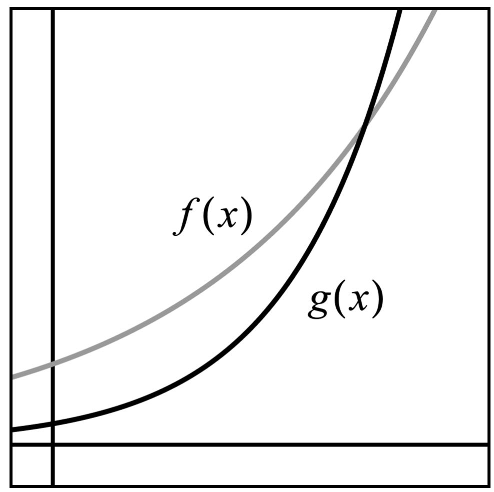
x-intercepts:

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

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

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

Warm-Up

1. $5, 15, 0, -3, -3$

Practice

2. ✓ $x = 3$ ✓ $x = -5$

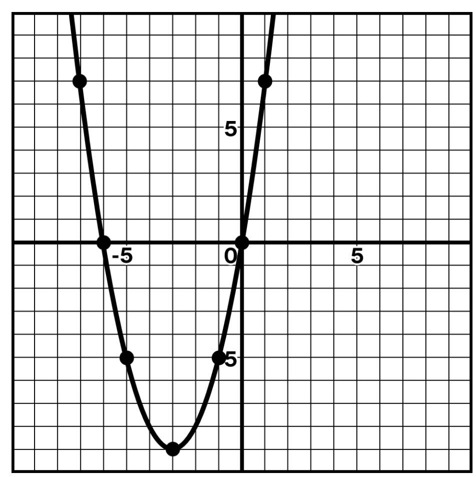
3. $y = (x + 3)(x - 1)$

4. x-intercepts: $(-5, 0)$ and $(2, 0)$
   y-intercept: $(0, -10)$

5. Ariel. *Explanations vary.* If you make $x = 0$, then $(0 - 3)^2 = 9$, not 3. If you make $x = 3$, then $(3 - 3)^2 = 0$, so Ariel is correct.

6.1 x-intercepts: $(0, 0)$ and $(-6, 0)$
y-intercept: $(0, 0)$

6.2



Looking Back

7. $g(x) = 25 \cdot 4^x$

   Explanations vary. $g(x)$ has a smaller initial value because it has a smaller y-intercept. Also, $g(x)$ grows faster than $f(x)$.

Explore

8. *Responses vary*.

   Has two x-intercepts: $f(x) = (x - 1)(x - 2)^2$
   Has one x-intercept: $f(x) = (x - 2)^3$
   Has an x-intercept at $(7, 0)$: $f(x) = (x - 1)(x - 3)(x - 7)$

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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

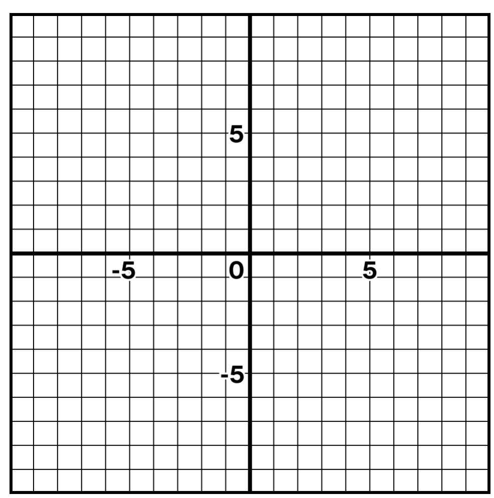
3.2 The line of symmetry is at $x = 5$. True False Not enough information

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.

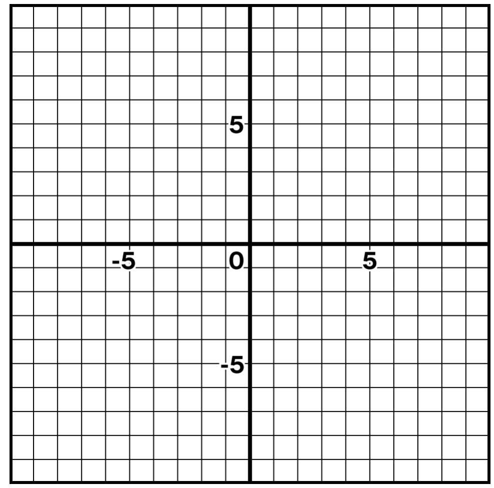


Unit A1.7, Lesson 11: Practice Problems

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

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

Warm-Up

1. $3, 2, 1.5$

Practice

2. *Responses vary.* $(-2, 0)$, $(-1, -5)$, $(0, -8)$, $(1, -9)$, $(2, -8)$, $(3, -5)$, $(4, 0)$.

3.1 Not enough information.

3.2 True

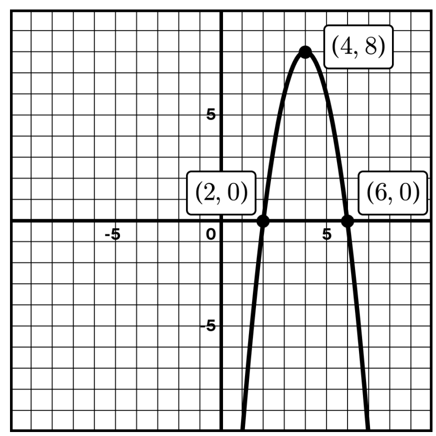
3.3 Not enough information.

4. *Responses vary.* The two x-intercepts are $(0, 0)$ and $(4, 0)$. The x-value of the vertex is halfway in between those, which is 2. $3(2)(2 - 4) = 6(-2) = -12$. This means the vertex has to be at $(2, -12)$.

5.1

Key Feature	Coordinates
x-intercept	$(2, 0)$
x-intercept	$(6, 0)$
Vertex	$(4, 8)$

5.2



6. Santino.
Explanations vary. There is only one x-intercept at $(-3, 0)$. The points on either side of that are $(-2, 1)$ and $(-4, 1)$. This means that $(-3, 0)$ is also the vertex because the points on either side of it are symmetrical.

Looking Back

7.1 x-intercept: $(-2, 0)$ y-intercept: $(0, 8)$

7.2 x-intercept: $(4.5, 0)$ y-intercept: $(0, -3)$

Unit A1.7, Lesson 12: Practice Problems Name ____________________

Warm-Up

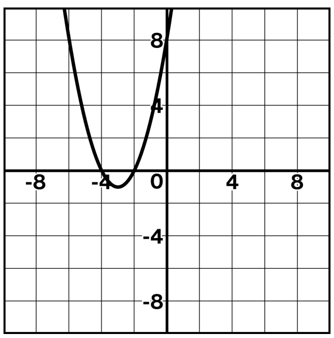
1. Here are three functions. Evaluate each function when $x = 3$ and $x = -1$.

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

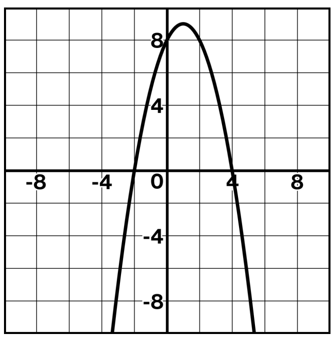
Practice

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

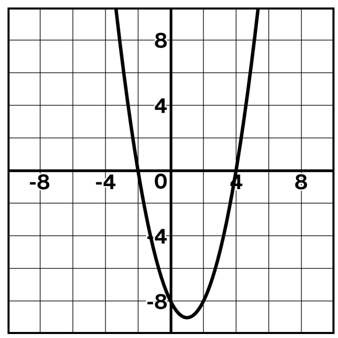
A



B



C



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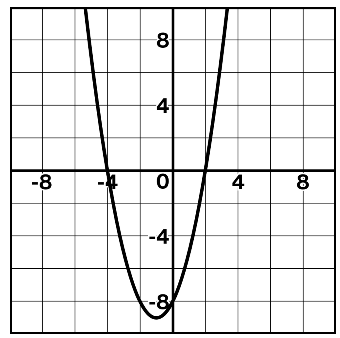
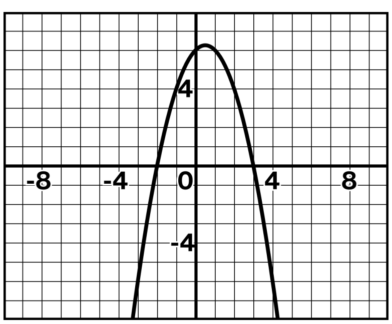
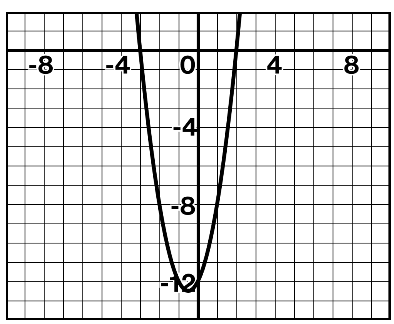
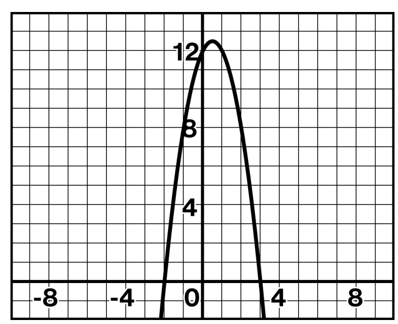


3. Match each graph to the quadratic equation it represents. You will have one equation left over.

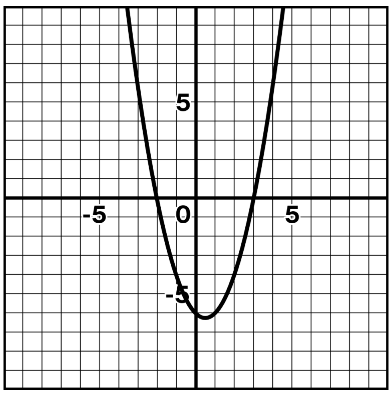
		

Equations	$y = -(x + 2)(x - 3)$	$y = 2(x + 3)(x - 2)$
	$y = -2(x + 2)(x - 3)$	$y = (x + 2)(x - 3)$

Unit A1.7, Lesson 12: Practice Problems

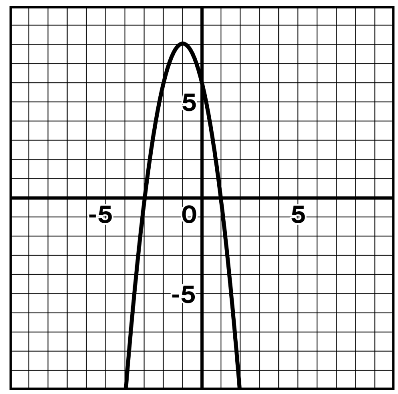
4. Write an equation of a quadratic function that is **concave down** with x-intercepts at $(3, 0)$ and $(-1, 0)$.

5. Write an equation of a quadratic function that matches this graph. Use graphing technology to check your equation.



Equation: ______________________

6. Write an equation of a quadratic function that matches this graph. Use graphing technology to check your 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.

x	$v(x)$
0	
1	
2	
3	

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

Reflect

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

Unit A1.7, Lesson 12: Practice Problems **Answer Key**

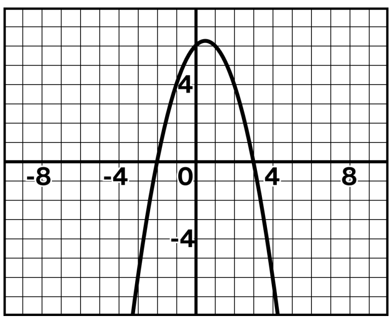
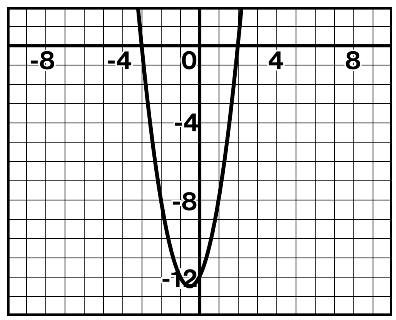
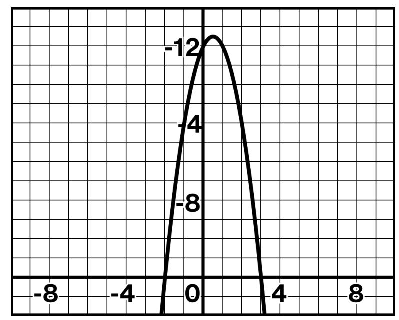
Warm-Up

1. $f(3) = 0,\ f(-1) = -12$
   $g(3) = 0,\ g(-1) = 12$
   $h(3) = 0,\ h(-1) = -24$

Practice

2. C

3.

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

4. *Responses vary*. $y = -(x+1)(x-3)$

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

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

Looking Back

7.1

x	$v(x)$
0	240
1	96
2	38.4
3	15.36

7.2 $v(x) = 240 \cdot 0.4^{x}$

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Unit A1.7, Lesson 14: Practice Problems Name ______________________

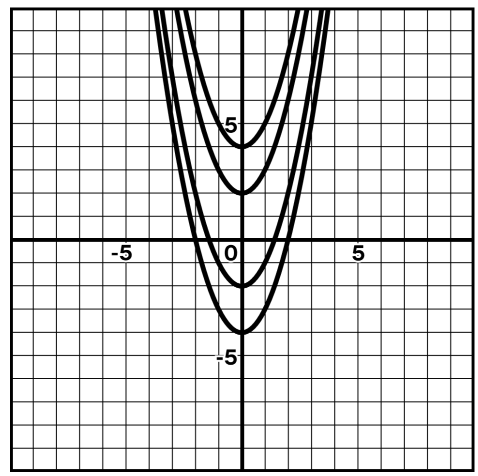
Warm-Up

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.

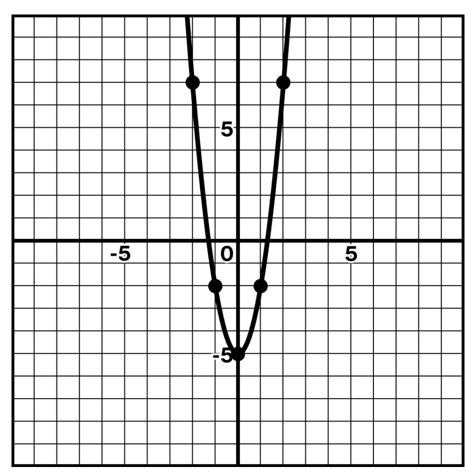
- ☐ $y = x^2 + 2$
- ☐ $y = -2x^2$
- ☐ $y = x^2 - 2$
- ☐ $y = x^2 - 4$
- ☐ $y = 4x^2$

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.

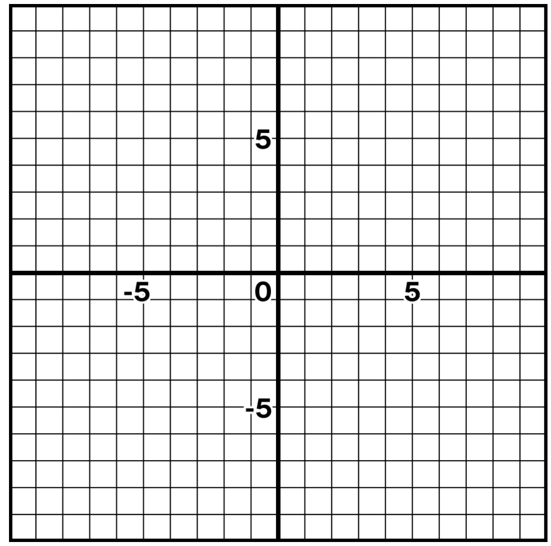
4. Write an equation for this transformation of $y = x^2$.

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



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.

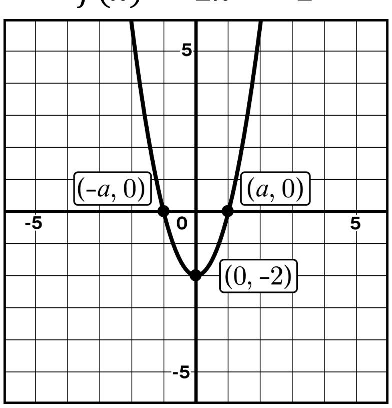
$h(0)$ means . . .

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

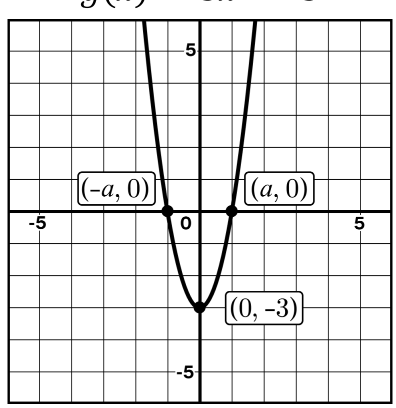
Explore

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

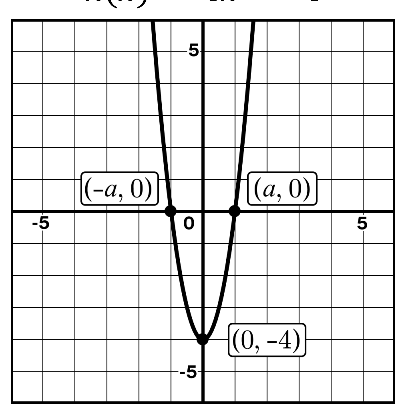
$f(x) = 2x^2 - 2$



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



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



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Unit A1.7, Lesson 14: Practice Problems **Answer Key**

Warm-Up

1. $f(-4) = 19$
   $g(-4) = 8$
   $h(-4) = 11$

Practice

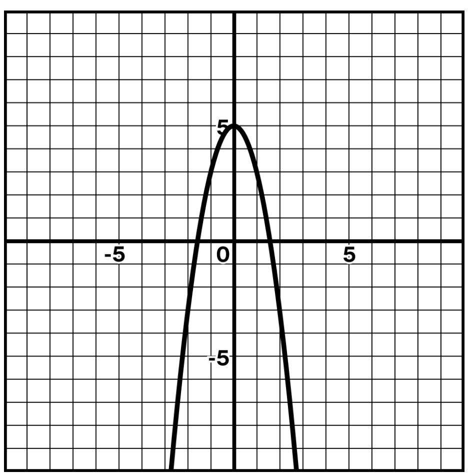
2. ✓ $y = x^2 + 2$ ✓ $y = x^2 - 2$ ✓ $y = x^2 - 4$

3. Kayla.

   Explanations vary. $y = -3x^2$ is a vertical stretch because each point on $y = x^2$ is being multiplied by -3. For example, $(0, 0)$ will still be at $(0, 0)$, but $(1, 1)$ will now be at $(1, -3)$.

4. $y = 3x^2 - 5$

5.



Looking Back

6.1 $h(0) = 40$

6.2 *Explanations vary.*
- $h(0)$: This represents the height of the windowsill.
- $h(t) = 0$: This represents the time it will take for the plant to reach the ground.

Explore

7. $a = 1$

   Explanations vary. Each of these equations has the same x-intercepts, which means they use the same input to get an output of 0. $2(1)^2 - 2 = 0$ and $3(1)^2 - 3 = 0$, so when $a = 1$, each of the functions equals 0.

Unit A1.7, Lesson 15: Practice Problems Name ______________________

Warm-Up

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

$0 = x - 7$ $\qquad$ $0 = (x + 3)^2$ $\qquad$ $0 = (2x - 2)^2$

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

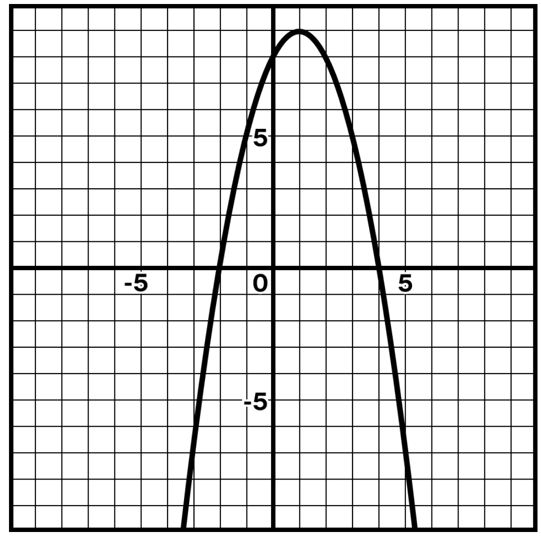
3. Determine if each equation is written in standard form, factored form, or vertex form.

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

Standard Form	Factored Form	Vertex Form

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

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



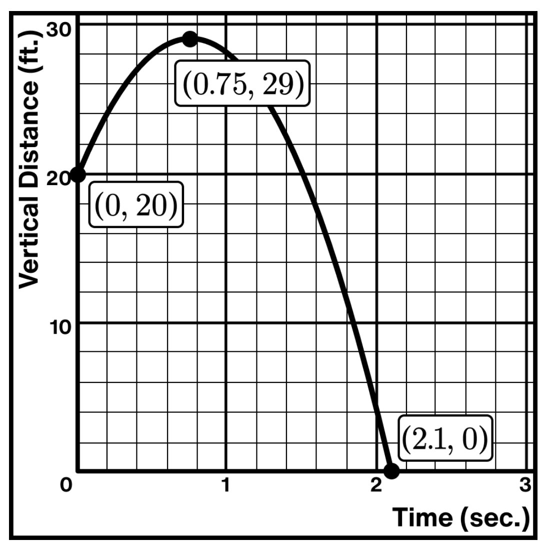
- ☐ $y = -(x+1)^2 + 9$
- ☐ $y = -(x-1)^2 + 9$
- ☐ $y = x^2 + 2x + 8$
- ☐ $y = -(x+2)(x-4)$
- ☐ $y = -(x-1)(x+4)$

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.

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

Warm-Up

1. $x = 7$, $x = -3$, $x = 1$

Practice

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

3. **Standard form:** $y = 3x^2 + 4x + 2$, $y = 4x^2 - 3x$
   Factored form: $(4x - 4)(x - 3) = y$, $y = 2x(x + 4)$
   Vertex form: $y = 4(x + 3)^2 - 2$, $y = (x + 3)^2 + 4$

4. $(-3, -7)$

5. ✓ $y = -(x + 2)(x - 4)$ ✓ $y = -(x - 1)^2 + 9$

6. *Responses vary.*
   - $y = (x - 5)^2 - 3$
   - $y = 2(x - 5)^2 - 3$
   - $y = x^2 - 10x + 22$

Looking Back

7. ✓ The vertex of the graph is $(0.75, 29)$
   ✓ The rock hit the surface of the water after about 2.1 seconds.
   ✓ The rock was thrown from a height of 20 feet.

desmos **Science Mom Lesson 71**

Unit A1.7, Lesson 16: Practice Problems Name ____________________

Warm-Up

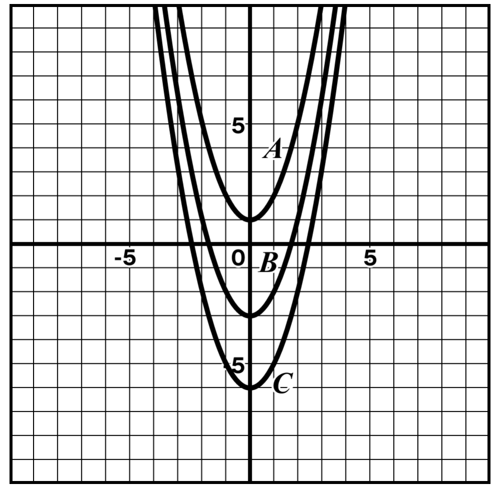
1. Parabolas A, B, and C are translations of $y = x^2$.

   Determine the equation of each parabola.

   A:

   B:

   C:



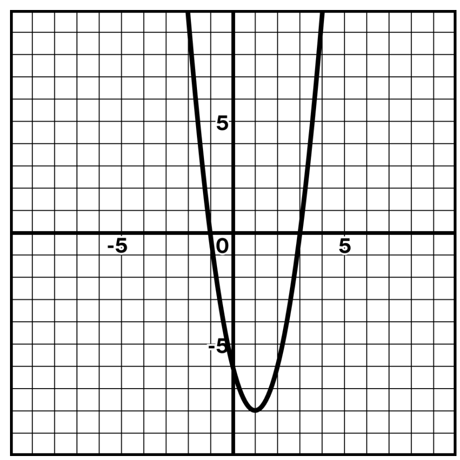
Practice

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.

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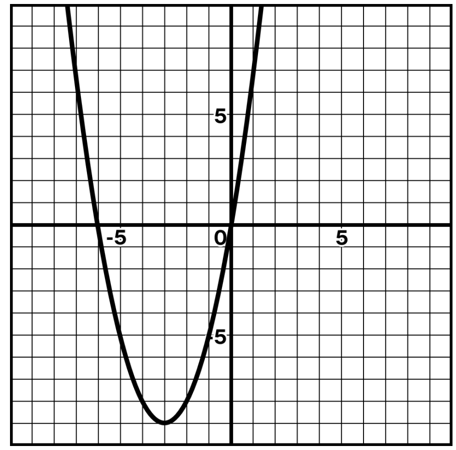
Unit A1.7, Lesson 16: Practice Problems

6. Here are two equations:

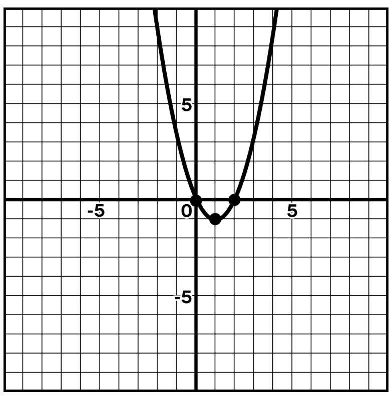


$$m(x) = x(x + 6)$$
$$p(x) = (x + 3)^2 - 9$$

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

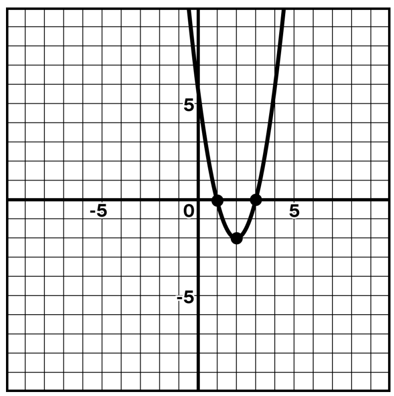
Explore

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



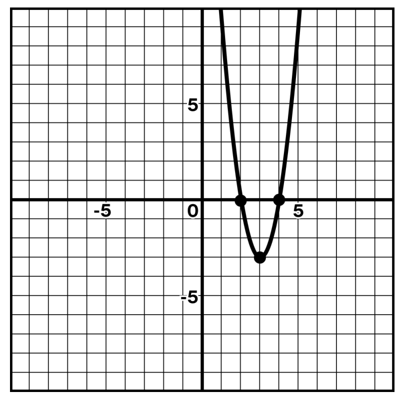
$f(x) = (x - 1)^2 - 1$

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



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

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



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

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

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

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.

Unit A1.7, Lesson 16: Practice Problems **Answer Key**

Warm-Up

1. A: $y = x^2 + 1$
   B: $y = x^2 - 3$
   C: $y = x^2 - 6$

Practice

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

   Explanations vary. When you substitute 1 for x, then $(1 - 1)^2 = 0$. Any other number squared would be larger, so this is the minimum. $(1 - 1)^2 + 3 = 3$, so the vertex is $(1, 3)$.

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

4. *Responses vary*. $y = (x + 2)(x - 6)$

5. *Responses vary.* $y = -(x + 2)^2 + 6$

6. *Responses vary.* $m(x)$ is written in factored form, so I know the x-intercepts are at 0 and -6. The vertex is exactly between the x-intercepts, so I plugged in $x = -3$. I found the vertex was at $(-3, -9)$. $p(x)$ is written in vertex form and shows the vertex is at $(-3, -9)$.

Explore

7.1 *Responses vary.*
- I notice that the x-intercepts are always 2 units apart from each other.
- I notice that the y-value of the vertex is the same as the last number in vertex form.
- I notice a lot of the same numbers in each equation.

7.2 *Responses vary*. I know $f(x)$ would have a vertex at $(6, -6)$ because the equation is written in vertex form. I think the x-intercepts would follow the pattern I noticed and be 1 away from the vertex, so they would be at $(5, 0)$ and $(7, 0)$.

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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 $(-1,\ 4)$?

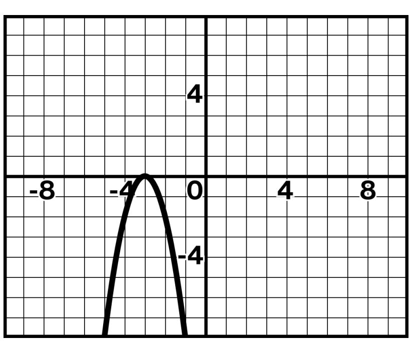
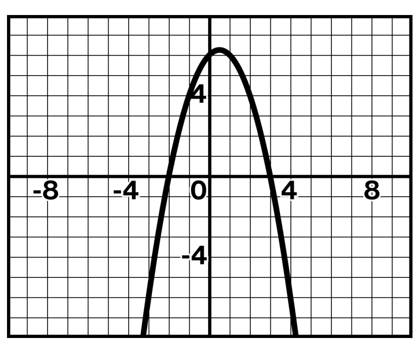
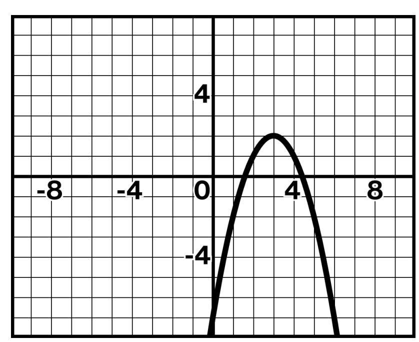
   A. $y = (x - 1)^2 + 4$
   B. $y = (x + 1)^2 + 4$
   C. $y = (x - 4)^2 - 1$
   D. $y = (x + 4)^2 - 1$

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.

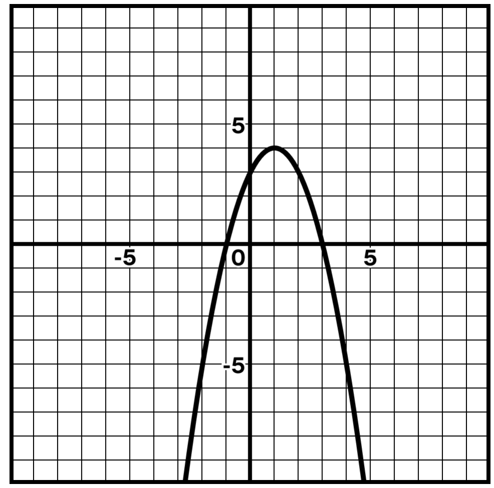
$y = -(x - 3)^2 + 2$	$y = -3x^2 + 2$	$y = -2(x + 3)^2$	$y = -(x + 2)(x - 3)$

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.



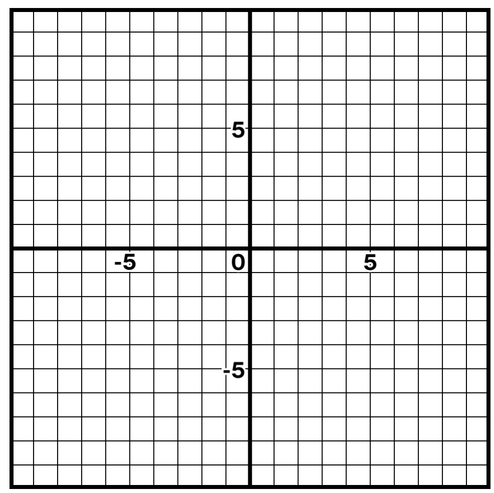
Eva	Latifa
$y = (x - 1)^2 + 4$	$y = -(x + 3)(x - 1)$

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

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 are proud of.

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Unit A1.7, Lesson 17: Practice Problems **Answer Key**

Warm-Up

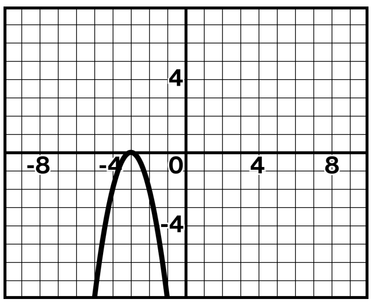
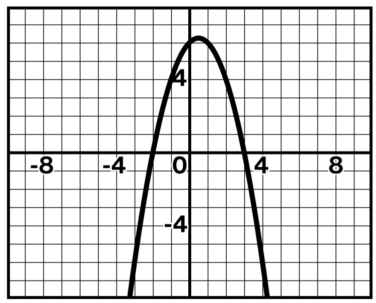
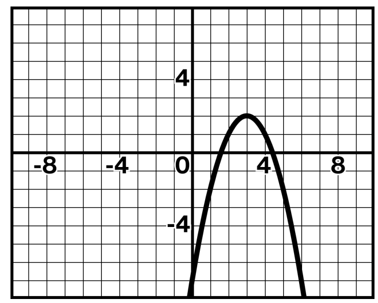
1. $g(-1) = 4, h(-1) = -2$

Practice

2. **B.** $y = (x + 1)^2 + 4$

3. ✓ $a(x) = (x + 2)(x - 3)$ ✓ $d(x) = (2x - 6)(x + 2)$

4.

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

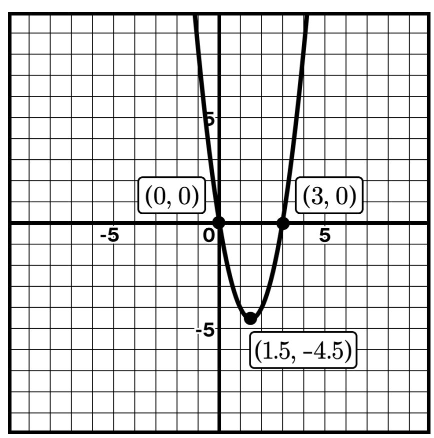
5. **Eva:** The graph of Eva's equation will be concave up. To make the graph concave down, I would multiply $(x - 1)^2$ by -1. Her new equation would be $y = -(x - 1)^2 + 4$.

   Latifa: The x-intercepts of Latifa's graph are $(-3, 0)$ and $(1, 0)$. Changing Latifa's equation to $y = -(x - 3)(x + 1)$ will make the x-intercepts $(3, 0)$ and $(-1, 0)$.

6.1

Key Feature	Coordinates
x-intercept	$(0, 0)$
x-intercept	$(3, 0)$
Vertex	$(1.5, -4.5)$

6.2



7. *Responses vary.*
   - $y = (x + 2)^2 + 1$
   - $y = -2(x + 2)^2 + 1$
   - $y = -(x + 1)(x + 3)$

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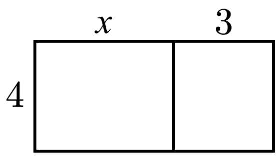
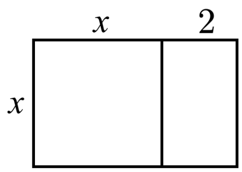
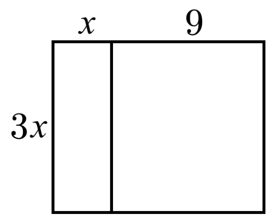
Unit A1.8, Lesson 1: Practice Problems Name ______________________

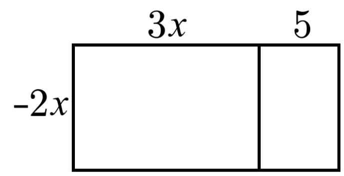
Warm-Up

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



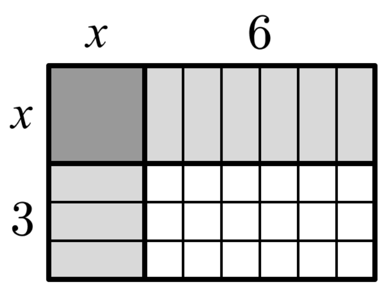






Practice

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

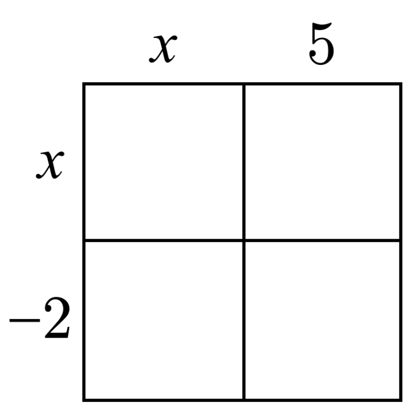


Factored form:

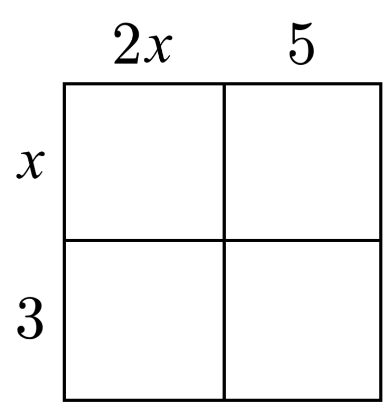
Standard form:

3. Complete the diagram to show that:

$(x + 5)(x - 2)$ is equivalent to $x^2 + 3x - 10$.



$(2x + 5)(x + 3)$ is equivalent to $2x^2 + 11x + 15$.



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. $(x + 8)(x + 4)$ ____ $2x^2 + 12x + 16$

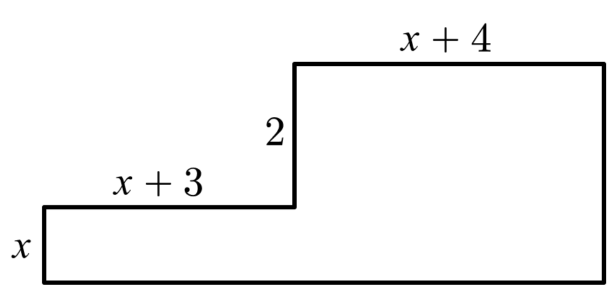
D. $(x + 8)(2x + 2)$ ____ $x^2 + 8x + 12$

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.

Warm-Up

1. $4x + 12$ (or equivalent) $x^2 + 2x$ (or equivalent) $3x^2 + 27x$ (or equivalent) $-6x^2 - 10x$ (or equivalent)

Practice

2. **Factored form:** $(x + 3)(x + 6)$

   Standard form: $x^2 + 9x + 18$

3.

	x	5
x	x^2	$5x$
-2	$-2x$	-10

	$2x$	5
x	$2x^2$	$5x$
3	$6x$	15

4. **C.** $x^2 + 12x + 32$

   D. $2x^2 + 18x + 16$

   B. $2x^2 + 12x + 16$

   A. $x^2 + 8x + 12$

5.

Factored Form	Standard Form
$(x + 7)(x + 3)$	$x^2 + 10x + 21$
$(x - 2)(x - 12)$	$x^2 - 14x + 24$
$(x - 4)(x - 2)$	$x^2 - 6x + 8$
$(2x - 1)(x + 7)$	$2x^2 + 13x - 7$

Explore

6. Area: $2x^2 + 9x + 8$ (or equivalent)

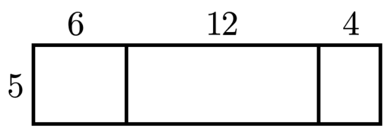
   Perimeter: $6x + 18$ (or equivalent)

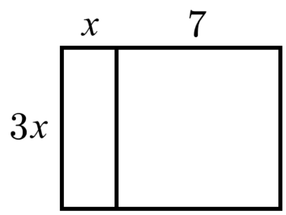
Science Mom Lesson 74

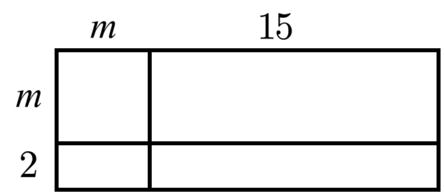
Unit A1.8, Lesson 2: Practice Problems Name ______________________

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.

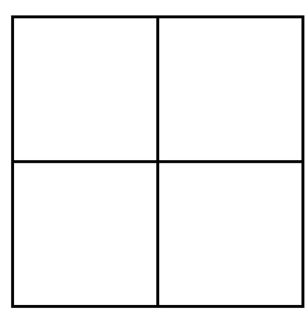
3.1 $x(2x - 1)$ Standard Factored Neither

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?

x	y
1	360
2	432
3	518.4
4	622.08

A. $y = 360(1.2)^x$

B. $y = 300(1.2)^x$

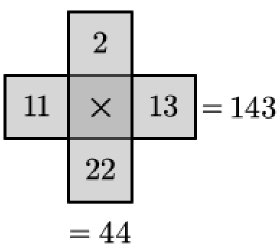
C. $y = 288 + 72x$

D. $y = 360 + 72x$

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:



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.

Warm-Up

1. 110 (or equivalent) $3x^2 + 21x$ (or equivalent) $m^2 + 17m + 30$ (or equivalent)

Practice

2. ✓ $x + (-5)$
✓ $-5 + x$
✓ $-5 - (-x)$

3.1 Factored 3.2 Standard 3.3 Neither 3.4 Standard

4.

	x	-10
x	x^2	$-10x$
-3	$-3x$	30

(or equivalent)

5. $x^2 - 4x + 4$ $x^2 - 1$ $2x^2 - 2x - 12$

Looking Back

6. B. $y = 300(1.2)^x$

Explore

7. *Responses vary*. If my selection is x, then the numbers on both sides are $x - 1$ and $x + 1$. Similarly, the numbers above and below are $x - 10$ and $x + 10$. Using algebra to multiply each pair and subtract:

$(x - 1)(x + 1) - (x - 10)(x + 10)$
$= (x^2 - 1) - (x^2 - 100)$
$= x^2 - x^2 - 1 + 100$
$= 99$

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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

	$2x$	5
x	$2x^2$	
		-35

Standard form: ______________

Factored form: ______________

2.2

		-6
x	$3x^2$	
	$12x$	

Standard form: ______________

Factored form: ______________

2.3

		3
	$4x^2$	
	$-10x$	-15

Standard form: ______________

Factored form: ______________

2.4

$3x^2$	$6x$
$25x$	50

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.

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Unit A1.8, Lesson 3: Practice Problems

Answer Key

Warm-Up

1. $1, 2, 3, 4, 6, 12$ $1, 2, 4, 5, 10, 20$ $1, 2, 3, 6, 7, 14, 21, 42$

Practice

2.1

	$2x$	5
x	$2x^2$	$5x$
-7	$-14x$	-35

Standard form: $2x^2 - 9x - 35$

Factored form: $(2x + 5)(x - 7)$

2.2

	$3x$	-6
x	$3x^2$	$-6x$
4	$12x$	-24

Standard form: $3x^2 + 6x - 24$

Factored form: $(3x - 6)(x + 4)$

2.3

	$2x$	3
$2x$	$4x^2$	$6x$
-5	$-10x$	-15

Standard form: $4x^2 - 4x - 15$

Factored form: $(2x + 3)(2x - 5)$

2.4

	x	2
$3x$	$3x^2$	$6x$
25	$25x$	50

Standard form: $3x^2 + 31x + 50$

Factored form: $(x + 2)(3x + 25)$

3.

Factored Form	Standard Form
$(x + 3)(x + 6)$	$x^2 + 9x + 18$
$(2x - 3)(2x - 7)$	$4x^2 - 20x + 21$
$(3x - 2)(x + 4)$	$3x^2 + 10x - 8$
$(4x + 3)(x - 5)$	$4x^2 - 17x - 15$

4. ✓ $(7x - 4)(x + 2)$ ✓ $(x - 1)(7x + 17)$

Explore

5. $-11, 11, -1, 1, -4, 4$

Unit A1.8, Lesson 4: Practice Problems Name ______________________

Warm-Up

1. Rewrite each expression in standard form.

$(x+6)(x-7)$ $\qquad$ $(x-5)^2$ $\qquad$ $(x+9)(x-9)$

Practice

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

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

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

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

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

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

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

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

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

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

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

A. $2x^2 - 98$
B. $2x^2 - 28x + 98$
C. $4x^2 - 49$
D. $4x^2 - 28x + 49$
E. $4x^2 - 14x - 98$

____ $2(x-7)^2$
____ $(2x-7)(2x+7)$
____ $2(x-7)(2x+7)$
____ $(2x-7)^2$
____ $2(x-7)(x+7)$

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 $2x^2 + x - 15$

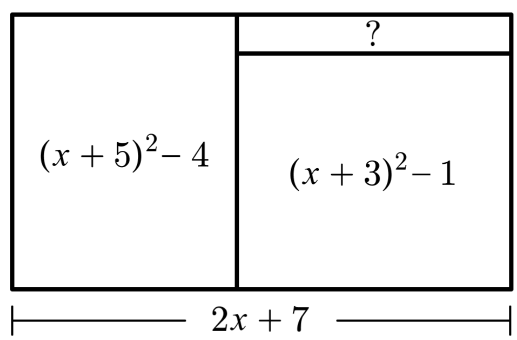
Looking Back

Solve each equation.

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

Explore

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



Reflect

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

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

Warm-Up

1. $x^2 - x - 42$ $x^2 - 10x + 25$ $x^2 - 81$

Practice

2.

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

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

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

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

3.

$x^2 - \boxed{12}x + \boxed{27} = (x - 9)(x - 3)$

$x^2 + 12x + \boxed{32} = (x + 4)(x + \boxed{8})$

$2x^2 + 11x + 15 = (2x + \boxed{5})(x + \boxed{3})$

$3x^2 - 11x - \boxed{42} = (3x + \boxed{7})(x - 6)$

4. **B.** $2(x - 7)^2$
   C. $(2x - 7)(2x + 7)$
   E. $2(x - 7)(2x + 7)$
   D. $(2x - 7)^2$
   A. $2(x - 7)(x + 7)$

5.1 $(x + 7)(x + 8)$

5.2 $(3x - 8)(3x + 8)$

5.3 $(3x - 2)(x - 5)$

5.4 $(x - 6)(x + 5)$

5.5 $(2x + 5)^2$ or equivalent

5.6 $(2x - 5)(x + 3)$

Looking Back

6.1 $x = -3$

6.2 $x = \frac{5}{2}$ or equivalent

6.3 $x = 87$

Explore

7. $5(x + 4)$ or equivalent

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Unit A1.8, Lesson 5: Practice Problems Name ____________________

Warm-Up

1. Solve each equation.

$6 + 2a = 0$ $7b = 0$ $7(c - 5) = 0$ $-4(d + 2) = 0$

Practice

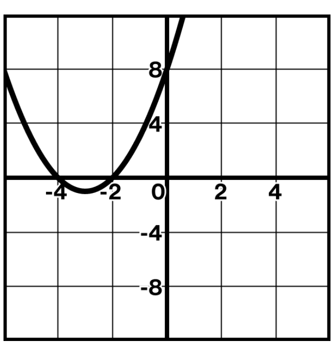
2. Determine the x-intercepts of the function $f(x) = (x - 4)(x + 3)$. Show or explain your reasoning.

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

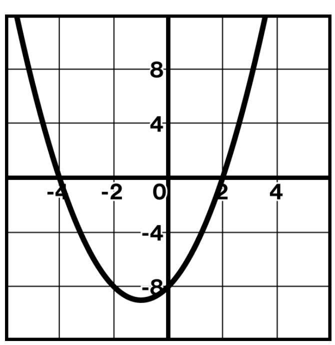
- ☐ $f(x) = (x + 5)(x - 1)$
- ☐ $g(x) = (x - 5)(x + 1)$
- ☐ $h(x) = x^2 + 4x - 5$
- ☐ $j(x) = 2x^2 - 8x - 10$
- ☐ $k(x) = (4x + 4)(15 - 3x)$

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

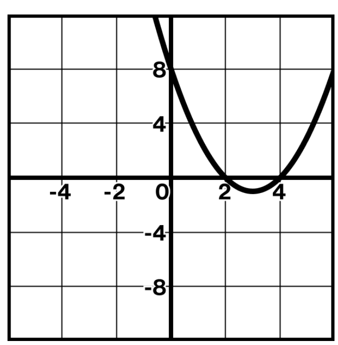
A



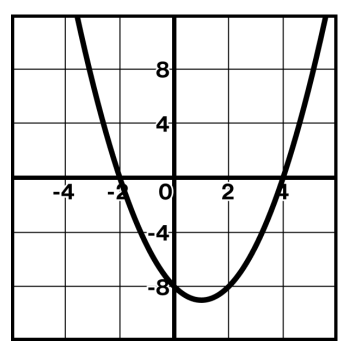
B



C



D



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

$$h(t) = -5t^2 + 27t + 18 \qquad h(t) = (-5t - 3)(t - 6)$$

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

Looking Back

6. Solve this system of equations.

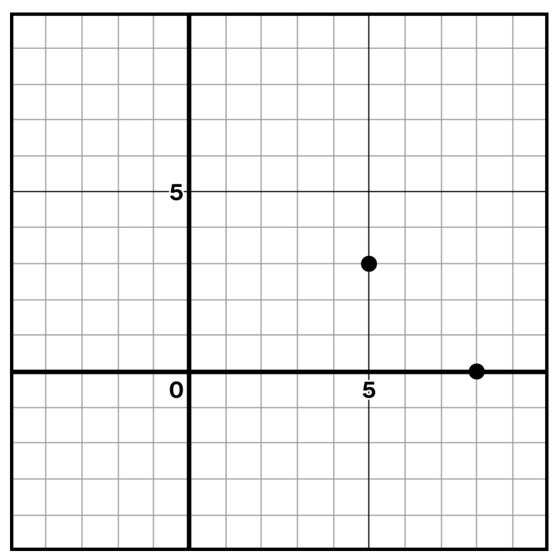
$2a + 9b = 20$

$4a + 9b = 58$

$a =$ _____ $b =$ _____

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.

Warm-Up

1.

$a = -3$ $b = 0$ $c = 5$ $d = -2$

Practice

2. $(4, 0)$ and $(-3, 0)$

   Explanations vary.
   x-intercepts are where the function outputs zero. Using the zero-product property, I can tell that this happens when $x - 4 = 0$ or when $x + 3 = 0$.

3. ✓ $g(x) = (x - 5)(x + 1)$
   ✓ $j(x) = 2x^2 - 8x - 10$
   ✓ $k(x) = (4x + 4)(15 - 3x)$

4. D

5. 6 seconds.

   Explanations vary. The factored form of the function reveals that there are two horizontal intercepts: $-\frac{3}{5}$ and 6. $-\frac{3}{5}$ doesn't make sense in context, since negative t refers to the time before the balloon is launched. That means 6 must be the intercept that represents the landing.

Looking Back

6. $a = 19$, $b = -2$

Explore

7. *Functions vary.*

   - $f(x) = \frac{1}{3}(x - 8)^2$
   - $f(x) = -\frac{1}{3}(x - 8)(x - 2)$

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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 $(4 - 5x)(x + 4) = 0$	3.2 $x^2 - 5x - 12 = 5x + 12$	3.3 $(x + 2)(x + 4) = 3$

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 $3x^2 - 18x + 24 = 0$.

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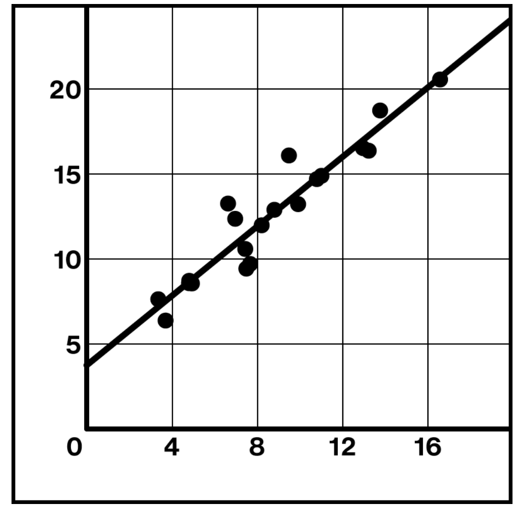
Unit A1.8, Lesson 6: Practice Problems

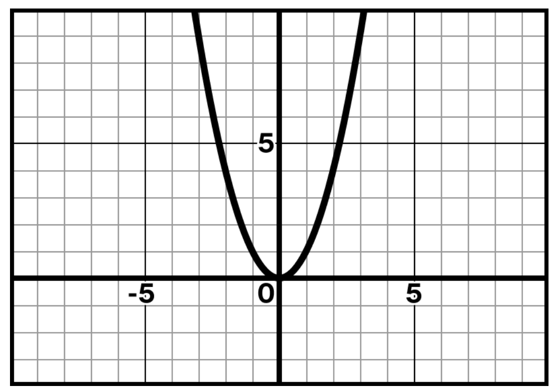
Looking Back

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

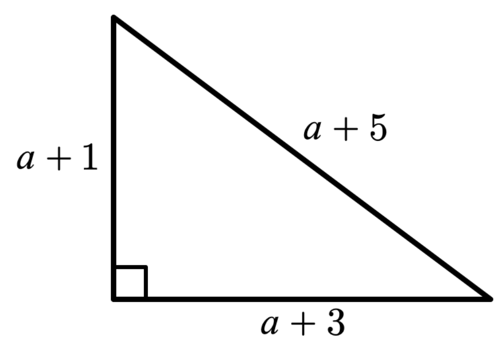
6. Select **all** the true statements about the function $f(x) = x^2$.



   - ☐ 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.

Unit A1.8, Lesson 6: Practice Problems **Answer Key**

Warm-Up

1. $(x+6)(x+1)$	$(x-6)(x-1)$	$(x-3)(x-2)$	$(x+6)(x-1)$

Practice

2. $0 = x^2 - x - 6$ (or equivalent)
   $x = 3$ and $x = -2$

3.1 $x = \frac{4}{5}$ and $x = -4$

3.2 $x = -2$ and $x = 12$

3.3 $x = -5$ and $x = -1$

4.1

	x	-4
$3x$	$3x^2$	$-12x$
-6	$-6x$	24

(or equivalent)

4.2 $x = 4$ and $x = 2$

Looking Back

5. **D.** 0.9

6. ✓ The range has no negative values.
   ✓ The function has no maximum.

Explore

7. $a = 5$
   Explanations vary. I used the Pythagorean theorem to set up the equation $(a+1)^2 + (a+3)^2 = (a+5)^2$. The solutions to this equation are 5 and −3, but −3 isn't a valid solution since it would cause some of the triangle's side lengths to be nonpositive.

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

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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

	$-3x$	
$6x$		$18x$
3		

Factored form:

Standard form:

5.2

		-8
$5x$	$30x^2$	
		-16

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.

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

Warm-Up

1. Least $\sqrt{27}$, 8, $\sqrt{90}$, 5^2, 3^3 Greatest

Practice

2. *Responses vary*.

Two solutions	One solution	No solutions
$x^2 = 16$	$x^2 + 5 = 5$	$x^2 + 10 = 9$

3.1 Two solutions

3.2 Two solutions

3.3 One solution

3.4 Two solutions

3.5 No solutions

3.6 One solution

3.7 No solutions

4.1 $x = 9, -5$

4.2 $x = -6, 3$

Looking Back

5.1

	$-3x$	3
$6x$	$-18x^2$	$18x$
3	$-9x$	9

Factored form: $(6x + 3)(-3x + 3)$

Standard form: $-18x^2 + 9x + 9$

5.2

	$6x$	-8
$5x$	$30x^2$	$-40x$
2	$12x$	-16

Factored form: $(5x + 2)(6x - 8)$

Standard form: $30x^2 - 28x - 16$

Explore

6. $x = -4, 2, 5$

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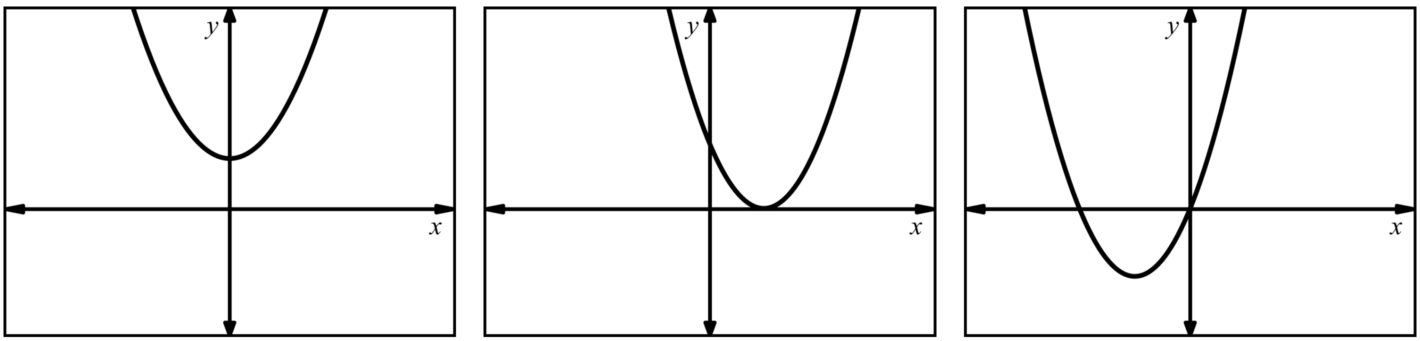
Unit A1.8, Lesson 8: Practice Problems Name ______________________________

Warm-Up

1. Write a possible equation for each graph:



Practice

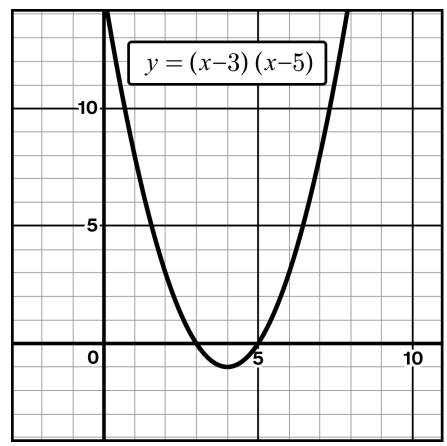
Solve each equation. Use the graph if it helps with your thinking.

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

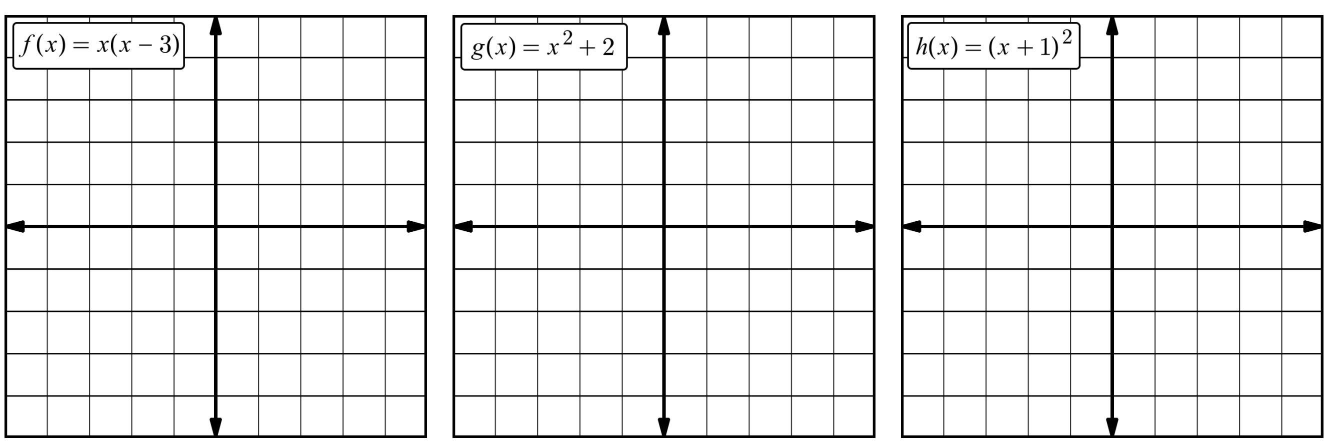
2.2 $(x - 3)(x - 5) = -1$

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.



$x(x - 3) = 0$

$x^2 + 2 = 0$

$(x + 1)^2 = 0$

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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. $1 - x^2$
B. $x^2 - y^2$
C. $y^2 - x^2$
D. $x^2 - 2xy + y^2$
E. $x^2 - 1$

____ $(y + x)(y - x)$

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

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

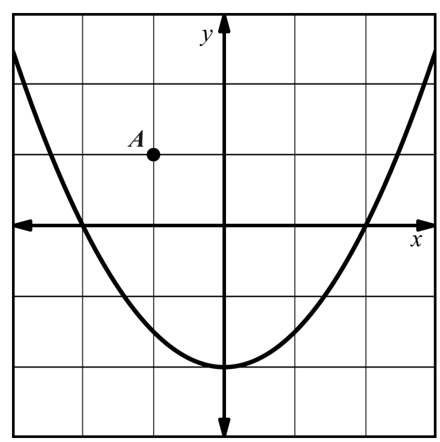
____ $(x - y)(x - y)$

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.

Answer Key

Warm-Up

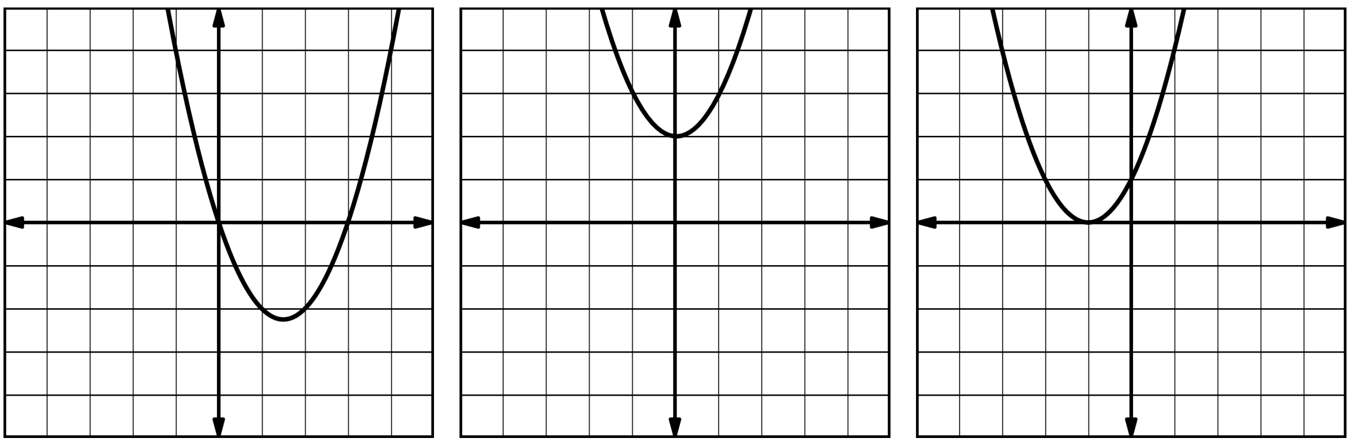
1. *Responses vary*.

   $y = x^2 + 5$ $y = (x - 3)^2$ $y = x(x + 4)$

Practice

2.1 $x = 3, x = 5$ 2.2 $x = 4$ 2.3 $x = 1, x = 7$ 2.4 No solutions

3.



Two solutions No solutions One solution

4.1 $x = -1, x = 4$

4.2 $x = 3, x = -7$

Looking Back

5. **C.** $(y + x)(y - x)$

   A. $(1 + x)(1 - x)$

   E. $(1 + x)(x - 1)$

   D. $(x - y)(x - y)$

6. $c = -9$

Explore

7. $(-10,\ 200)$

desmos **Science Mom Lesson 81**

Unit A1.8, Lesson 10: Practice Problems Name ______________________

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.

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

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

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

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

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.

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Unit A1.8, Lesson 10: Practice Problems **Answer Key**

Warm-Up

1. 36 36 -31 -36

Practice

2.

$(x+3)^2$ $(x-8)^2$ $(x-6)^2$ $(x+\frac{5}{2})^2$

3. ✓ $x^2+10x+25$ ✓ $x^2-10x+25$ ✓ $(x+3.5)(3.5+x)$ ✓ $x^2+\frac{1}{2}x+\frac{1}{16}$

4. *Responses vary*. If the quadratic expression is a perfect square, it can be written like $(x+h)^2$ or $(x-h)^2$. The c-value in x^2+bx+c is equal to h^2. Any number squared is either positive or 0.

5.
$x^2+24x+\boxed{144}$

$x^2-2x+\boxed{1}$

$x^2-\boxed{16x}+64$

$x^2+\frac{2}{3}x+\boxed{\frac{1}{9}}$

6. Yes, they are equivalent. *Explanations vary*.
   - I converted both expressions to standard form, and they both resulted in $x^2-8x+16$.
   - I graphed both expressions and noticed they were the same parabola.

Looking Back

7.1 *Responses and explanations vary*. I would use $y=(x+2)(x+3)$. To find the x-intercepts, I would set $y=0$. Factored form equations equal to 0 are easy for me to solve.

7.2 *Responses and explanations vary*. I would use $y=x^2+5x+6$. To find the y-intercept, I would set $x=0$. When I do that in a standard form equation like this one, the c-term is the y -intercept.

8. ✓ $y=(x+1)(x+5)$
✓ $y=(x-3)^2$

desmos **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.

$x^2 - 6x +$ ____ $x^2 + 2x +$ ____ $x^2 - 14x +$ ____

Factored form: ____________ Factored form: ____________ Factored form: ____________

3. Match each equation to an equivalent equation.

A. $x^2 - 12x = 6$	____ $(x - 6)^2 = 30$
B. $x^2 - 12x + 6 = 0$	____ $(x - 3)^2 = 42$
C. $x^2 - 6x = 6$	____ $(x - 6)^2 = 42$
D. $x^2 - 6x = 33$	____ $(x - 3)^2 = 15$

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

$$x^2 + 12x = 13$$

$$\boxed{}$$

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

$$x + 6 = \pm 7$$

$$x = \boxed{} \text{ and } x = \boxed{}$$

Unit A1.8, Lesson 11: Practice Problems

5. Solve each equation by completing the square.

$x^2 - 2x = 8$ $\qquad$ $7 = x^2 + 4x - 1$ $\qquad$ $x^2 - 18x + 60 = -11$

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 $x = 5 + \sqrt{2}$.

Warm-Up

1. $(x + 5)(5 + x)$ $(x - 3)^2$ $x^2 + 10x + 25$

Practice

2. $x^2 - 6x + 9 = (x - 3)^2$
   $x^2 + 2x + 1 = (x + 1)^2$
   $x^2 - 14x + 49 = (x - 7)^2$

3. **B.** $(x - 6)^2 = 30$
   D. $(x - 3)^2 = 42$
   A. $(x - 6)^2 = 42$
   C. $(x - 3)^2 = 15$

4. *Responses vary*.

$$x^2 + 12x = 13$$
$$\boxed{x^2 + 12x + 36 = 13 + 36}$$
$$(x + 6)^2 = 49$$
$$x + 6 = \pm 7$$
$$x = \boxed{-13} \text{ and } x = \boxed{1}$$

5. $x = -2$ and $x = 4$
   $x = -2 \pm \sqrt{12}$
   $x = 9 \pm \sqrt{10}$

Looking Back

6. $x^2 + 144 = 0$: No solutions
   $x^2 - 144 = 0$: Two solutions
   $(x - 7)^2 = 0$: One solution

7. **A.** It is shifted 1 unit to the right and 4 units up.

Explore

8. *Responses vary*. $x^2 - 10x + 23 = 0$

desmos **Science Mom Lesson 83**

Unit A1.8, Lesson 13: Practice Problems Name ______________________

Warm-Up

1. Rewrite each equation in the form $(x + \_\_\_)^2 = \_\_\_$. 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. $x = \dfrac{1 \pm \sqrt{(-1)^2 - 4(2)(13)}}{2(2)}$

B. $x = \dfrac{-2 \pm \sqrt{(2)^2 - 4(13)(-1)}}{2(13)}$

C. $x = \dfrac{-1 \pm \sqrt{(-1)^2 - 4(2)(13)}}{2(-1)}$

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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?

$a =$ $b =$ $c =$

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.

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

Explore

7. Solve each equation for x.

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

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.

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Unit A1.8, Lesson 13: Practice Problems

Answer Key

Warm-Up

1. $(x + 3)^2 = 7$ $(x + 6)^2 = 26$ $(x + 10)^2 = 132$

Practice

2. **B.** completing the square

3. *Responses vary*. The quadratic formula involves completing the square. To find the value that completes the square, you divide the coefficient of x by 2 and square it. The coefficient of x here is $\frac{b}{a}$, so Kiri divides and squares it to get $\left(\frac{b}{2a}\right)^2$, then adds that to both sides of the equation.

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

5.1 $a = 1$ $b = 7$ $c = 10$

5.2 $x = \frac{-7 \pm \sqrt{(7)^2 - 4(1)(10)}}{2(1)}$

5.3 *Responses vary*. The expression takes all the steps for solving by completing the square and bundles them up into a single expression. Rather than evaluating at each step, the calculation is done all at once.

Looking Back

6. $x = -5$ and $x = -2$ $x = -4 \pm \sqrt{3}$ $x = 3 \pm \sqrt{27}$ (or equivalent)

Explore

7. $x = \pm\sqrt{\frac{5}{3}}$ $x = \pm\sqrt{\frac{2}{7}}$ $x = \pm\sqrt{-\frac{c}{a}}$

desmos Science Mom Lesson 84

Unit A1.8, Lesson 14: Practice Problems Name ______________________

Warm-Up

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

$1 \pm \sqrt{49}$ $\qquad \dfrac{8 \pm 2}{5}$ $\qquad \pm\sqrt{(-5)^2 - 4(4)(1)}$ $\qquad \dfrac{-18 \pm \sqrt{36}}{2 \cdot 3}$

Practice

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

Quadratic Formula

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

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

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?

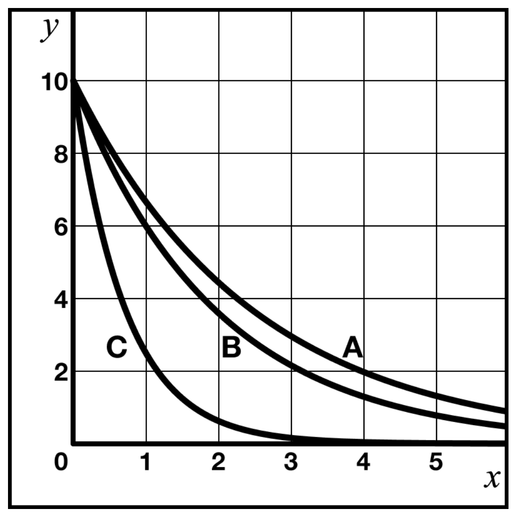
5.2 What are the coordinates of the vertex? Show or explain how you know.

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. 8 and −6   2 and $\frac{6}{5}$ 3 and −3   −2 and −4

Practice

2.1 $a = 1, b = -5, c = 9$

2.2 $a = -1, b = 0, c = 8$

2.3 $a = 3, b = -2, c = -6$

3.1 $x = 5$ and $x = -1.5$ (or equivalent)

3.2 $x = \frac{-5 \pm \sqrt{33}}{4}$

4. Yes. *Explanations vary*.
   - I graphed $y = 3x^2 - 6x - 9$ and saw that the parabola's x-intercepts were $(3, 0)$ and $(-1, 0)$.
   - I substituted each solution into the original equation to see if it made the equation true.

$$3(3)^2 - 6(3) - 9 = 0$$
$$27 - 18 - 9 = 0$$
$$0 = 0$$

$$3(-1)^2 - 6(-1) - 9 = 0$$
$$3 + 6 - 9 = 0$$
$$0 = 0$$

Looking Back

5.1 $(-5, 0)$ and $(-1, 0)$

5.2 $(-3, -4)$. *Explanations vary*. The x-intercepts tell me that the line of symmetry is at $x = -3$. When I input −3 into the function, the output is −4.

6. **A.** $y = 10\left(\frac{2}{3}\right)^x$ **C.** $y = 10\left(\frac{1}{4}\right)^x$ **B.** $y = 10\left(\frac{3}{5}\right)^x$

Explore

7. *Responses vary*. $f(x) = 3x^2 - 2x - 3$

Science Mom Lesson 85

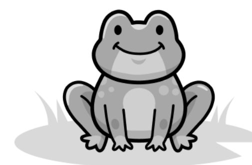
Unit A1.8, Lesson 15: Practice Problems Name ______________________________

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?

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

B. One solution

C. Two solutions

_____ $x^2 + 10x = -3$

_____ $x^2 + 10x = -60$

_____ $x^2 + 10x = -25$

5.2 Write **one** more equation of each type that starts with $x^2 + 8x = $ ___.

No solutions	$x^2 + 8x =$ _________
One solution	$x^2 + 8x =$ _________
Two solutions	$x^2 + 8x =$ _________

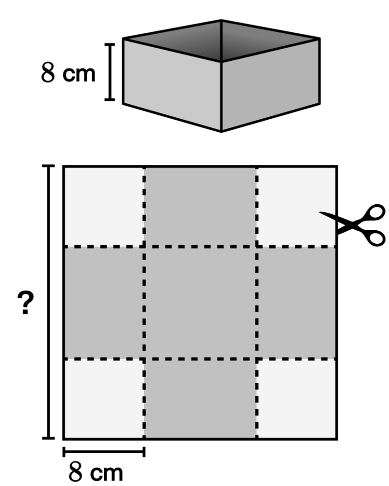
Explore

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.



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Unit A1.8, Lesson 15: Practice Problems **Answer Key**

Warm-Up

1. ✓ $(x + 3)^2 = 5$ ✓ $5 = (x + 1)(x + 1)$

Practice

2.1 $t = 0$ and $t = 0.8$

2.2 *Responses vary*. Each solution corresponds to a moment when the frog was on the ground. It was on the ground when it started jumping, and it returned to the ground after 0.8 seconds.

3.1 ✓$-\frac{1}{4}$ ✓1

3.2 1 second. *Explanations vary*. $f(1) = 0$, which means the ball is on the ground at 1 second. The other solution to the equation is a negative value of t, which means it's not relevant to the path of the ball described in the question.

4.1 $13\,500$ feet

4.2 About 23 seconds

4.3 *Responses and explanations vary*. I think it will take Katie *more* than 23 seconds because her body is working against a lot of wind, which might cause her to slow down.

Looking Back

5.1 **C.** $x^2 + 10x = -3$ **A.** $x^2 + 10x = -60$ **B.** $x^2 + 10x = -25$

5.2 *Equations vary.*

No solutions
- $x^2 + 8x = -50$
- $x^2 + 8x = -17$

One solution
- $x^2 + 8x = -16$
- $x^2 + 8x = 8x$

Two solutions
- $x^2 + 8x = 50$
- $x^2 + 8x = 0$

Explore

6. About 27.2 cm. *Explanations vary*. If x is the length and the width of the square box, I can write an equation for the volume: $8x^2 = 1\,000$. The positive solution to this equation is $\sqrt{125}$ cm, or about 11.2 cm. Since the length of the starting square is the height plus the height plus the width/length of the square box, that means the answer is approximately $8 + 8 + 11.2$ cm, or 27.2 cm.

Science Mom Lesson 86

Unit A1.8, Lesson 17: Practice Problems Name ____________________

Warm-Up

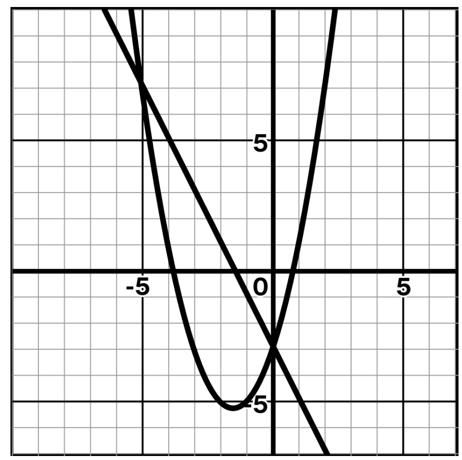
1. Identify the slope for each equation.

$y = -2x + 5$ $y = -4 + 3x$ $3x + 8y = 12$ $y = 6$

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.

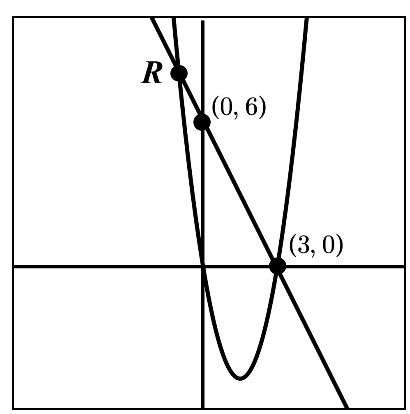
3.1 $y = x^2$
$y = 12 + x$

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.



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

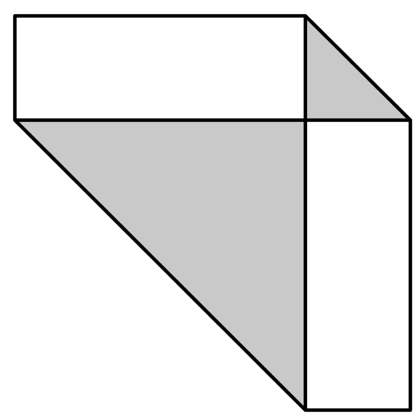
6. Solve each equation using any method.

$(x-3)(x+1)=0$ $\quad$ $x^2-12x=85$ $\quad$ $4(x-3)^2=8$

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.

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Unit A1.8, Lesson 17: Practice Problems **Answer Key**

Warm-Up

1. -2 3 $-\frac{3}{8}$ 0

Practice

2. $(-5, 7)$ and $(0, -3)$

3.1 $(4, 16)$ and $(-3, 9)$
3.2 $(0, 1)$ and $(-6, 13)$

4.1 $y = 6 - 2x$ (or equivalent)
4.2 $(-1, 8)$. *Explanations vary*. When I set the linear and quadratic expressions equal to one another, I got $0 = (x + 1)(x - 3)$. That tells me that the x-coordinate of point R is -1. Entering -1 into either equation gives me the y-coordinate.

Looking Back

5.

Expression	Vertex Form	Standard Form	Factored Form
A	$(x + 1)^2 - 4$	$x^2 + 2x - 3$	$(x + 3)(x - 1)$
B	$(x + 2)^2 - 16$	$x^2 + 4x - 12$	$(x + 6)(x - 2)$
C	$(x - 2)^2 - 9$	$x^2 - 4x - 5$	$(x + 1)(x - 5)$

6. $x = 3$ and $x = -1$ $x = -5$ and $x = 17$ $x = 3 \pm \sqrt{2}$

Explore

7. 274 square units