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

Warm-Up

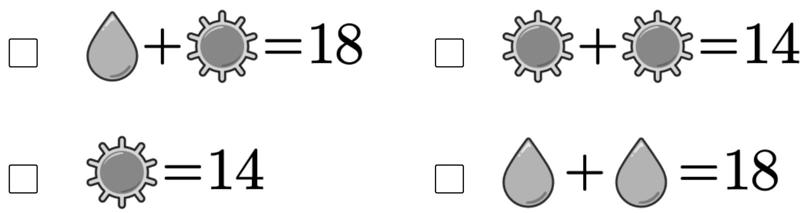
1. Determine the value of the variable that makes each equation true.

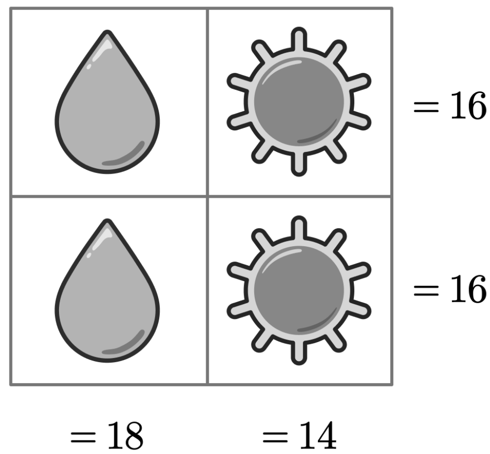
$2.5 + (-3) = a$ $12 + b = -9$ $2c + 3 = 15$ $3d + 2 = 35$

Practice

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

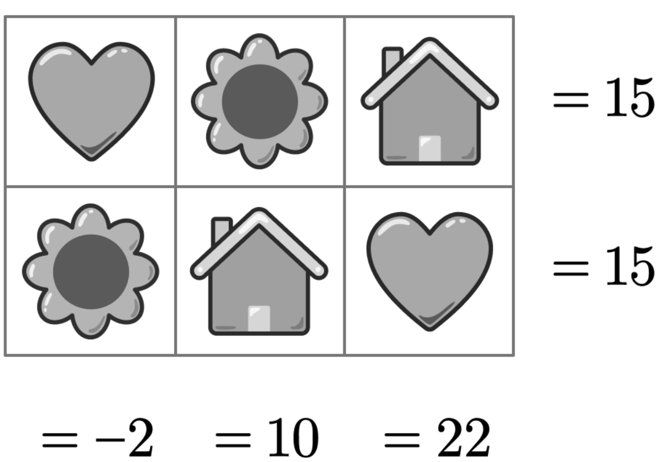
2.1 Select **all** of the true statements.





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

3. Determine the solution for this puzzle.



Shape	Value
	
	
	

Unit A1.5, Lesson 1: Practice Problems

Here are two equations:

$$x + x + y = 14$$
$$y + y + y = 12$$

4.1 Draw a shape puzzle to represent these equations.

4.2 Determine the values of x and y.

			$= 14$
			$= 12$

Looking Back

Use this piecewise-defined function to determine each value.

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

5.1 $f(10)$

5.2 $f(5)$

5.3 $f(1)$

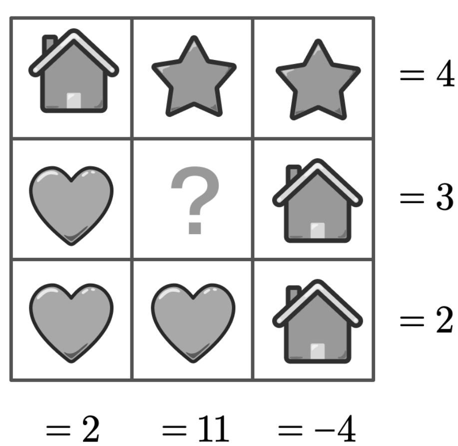
5.4 $f(-3)$

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.



desmos **Science Mom Lesson 46**

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

Warm-Up

1. Rewrite each expression using fewer terms.

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

Practice

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

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

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

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

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

$$2x + y = 19$$
$$-\ (x - y = 11)$$
$$x + 0 = 8$$
$$x = 8$$

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

$x =$_____ $y =$_____

Unit A1.5, Lesson 2: Practice Problems

Looking Back

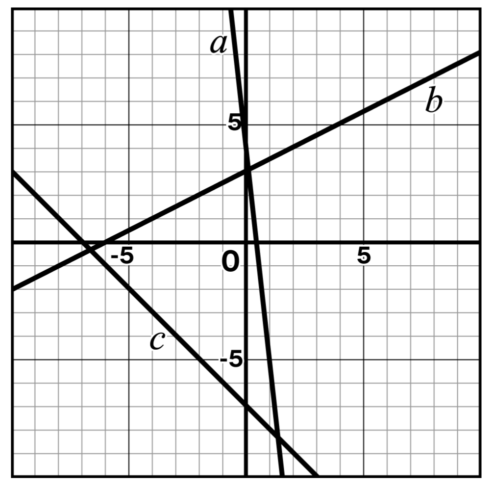
5. The function $f(t)$ gives a hiker's elevation above or below sea level, in meters, t hours after noon. Which equation represents this statement?

   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

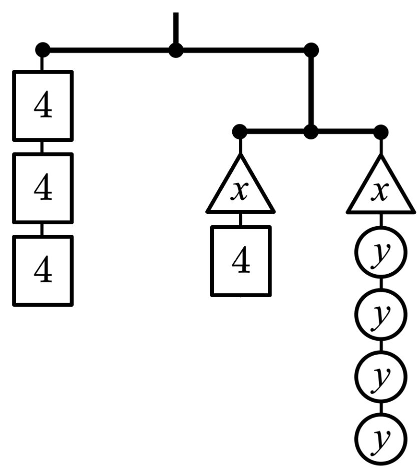


Explore

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.

desmos Science Mom Lesson 47

Unit A1.5, Lesson 3: Practice Problems Name ______________________________

Warm-Up

1. Solve each equation for x.

$x - 2 = 5$ $\quad$ $3(x - 2) = 3 \cdot 5$ $\quad$ $8x - 16 = 40$

Practice

Arnav and Omari are solving this system of equations:

$$4x + 2y = 62$$
$$-8x - y = 59$$

Decide if each strategy will work. Show or explain your thinking.

2.1 Arnav says to multiply $4x + 2y = 62$ by 2, then add $-8x - y = 59$.

2.2 Omari says to multiply $-8x - y = 59$ by 2, then subtract $4x + 2y = 62$.

Determine the solution to each system of equations.

3.1 $2x - 4y = 10$
$x + 5y = 40$

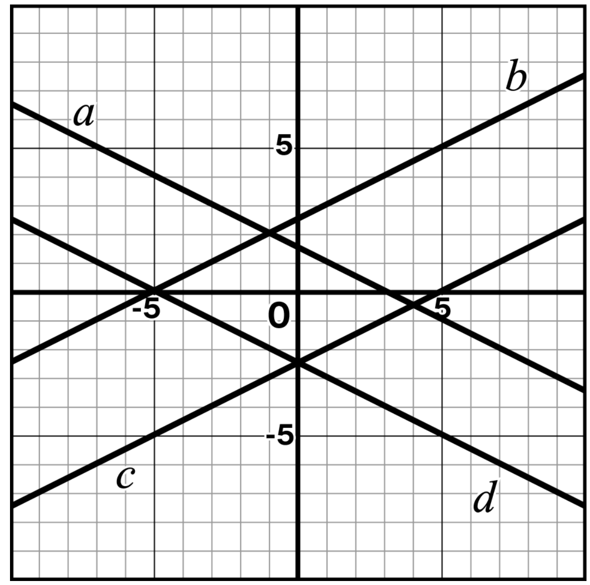
$x =$_____ $y =$_____

3.2 $5x + 2y = 20$
$2x - 3y = -11$

$x =$_____ $y =$_____

Unit A1.5, Lesson 3: Practice Problems

Looking Back



4. Which line represents $5x + 10y = 15$?

   A. Line a

   B. Line b

   C. Line c

   D. Line d

5. Solve for y: $3x - 9y = 72$.

Explore

6. Using the digits 0–9, without repeating, fill in each blank to create two equivalent equations.

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

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

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 are proud of.

desmos **Science Mom Lesson 48**

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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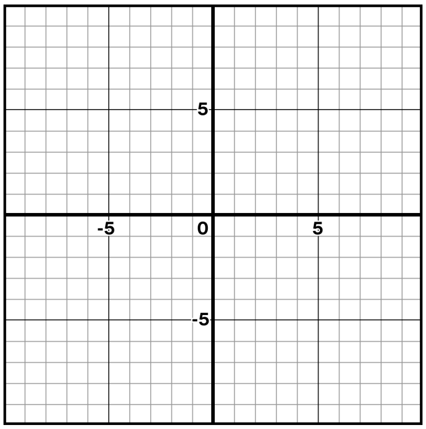
Unit A1.5, Lesson 4: Practice Problems

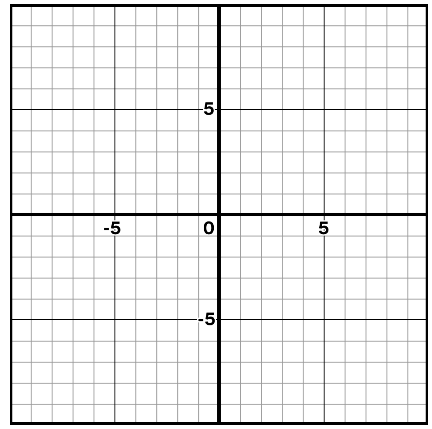
Looking Back

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:

$5x - 4y = 6$

$5(x + y = 25)$

$5x - 4y = 6$

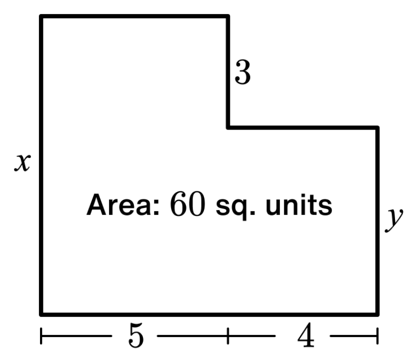
$5x + 5y = 125$

$-1y = 131$

$y = -131$

Explore

7. Determine the value of x and y.



desmos Science Mom Lesson 49

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

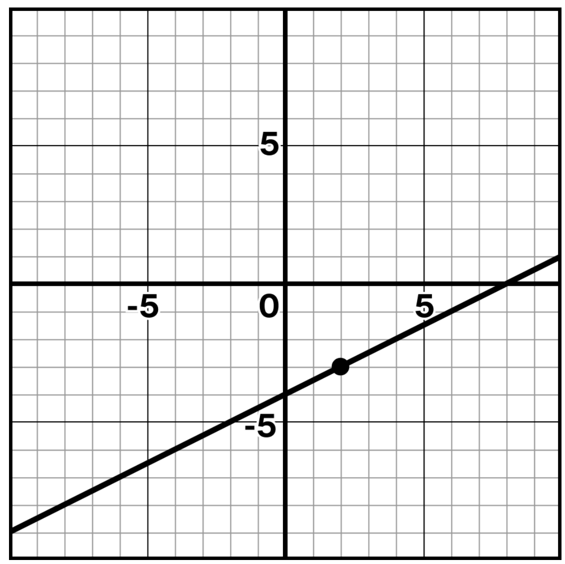
Here is a graph of $y = \frac{1}{2}x - 4$, one equation in a system of equations.

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.

$y = 3x + 6$

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

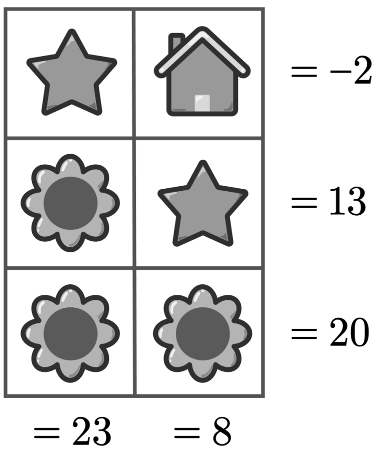
5. The point $(-2, 2)$ is on the line $y = x + 4$.

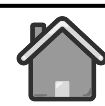
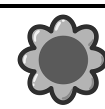
   Explain how you can determine if this point is the solution to this system of equations:

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

Looking Back

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



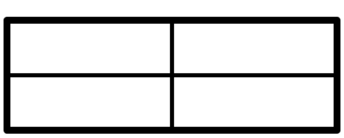
Shape	Value
	
	
	

7. Solve this inequality:

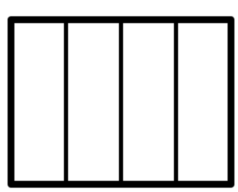
   $3(x - 3) > 2x - 6$

Explore

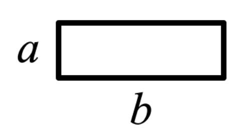
8. Here are two arrangements of identical rectangles. Determine the dimensions, a and b, of one rectangle.



Perimeter: 64 units



Perimeter: 56 units



Science Mom Lesson 50

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

Warm-Up

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

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

Practice

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

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

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

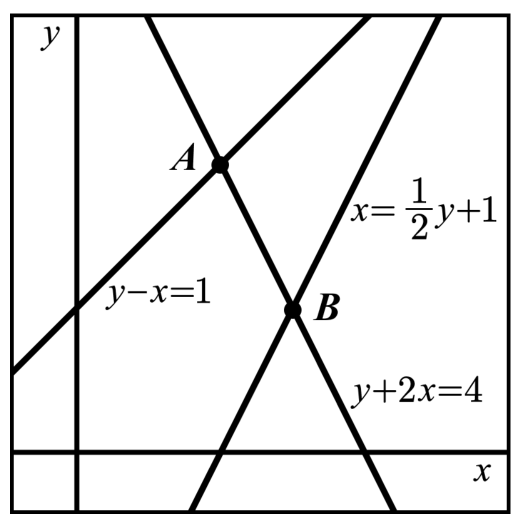
2.3 $y = \frac{2}{3}x + 7$
$y = \frac{2}{3}x - 3$

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

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

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

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



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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 $6y < 30 - 5x$.

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

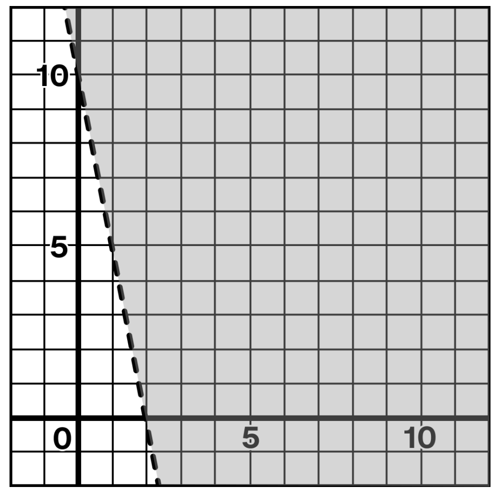
6. Which inequality represents this graph?

A. $5x + y < 10$

B. $5x + y \leq 10$

C. $5x + y > 10$

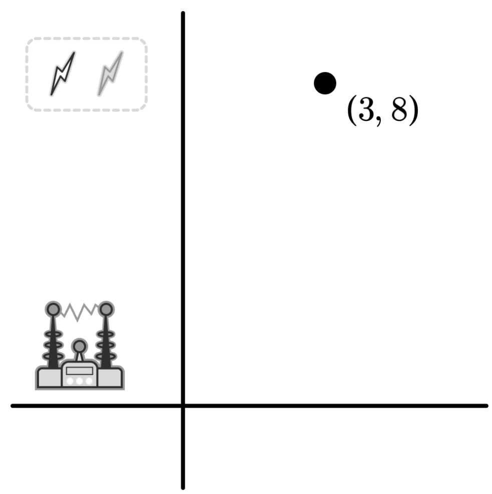
D. $5x + y \geq 10$



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.

desmos Science Mom Lesson 51

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**.

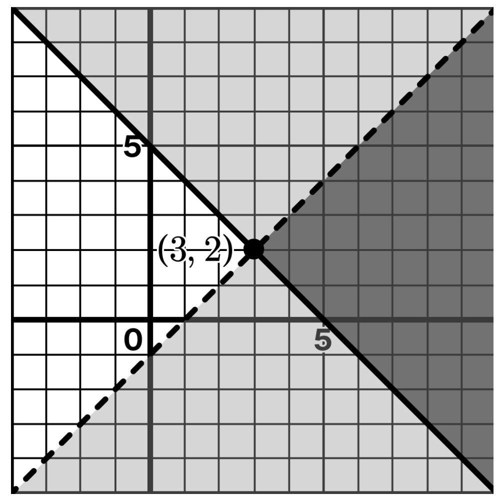
1.2 List **three** coordinate pairs that make the inequality **false**.

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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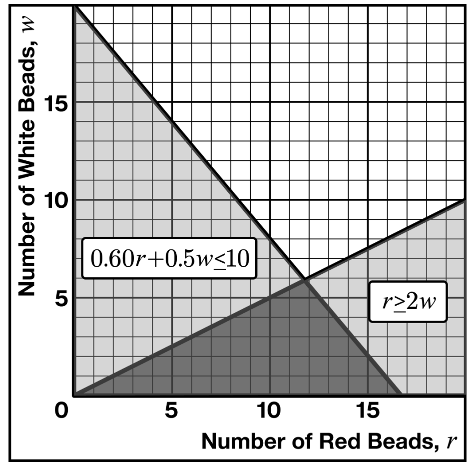
Unit A1.5, Lesson 9: Practice Problems

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.

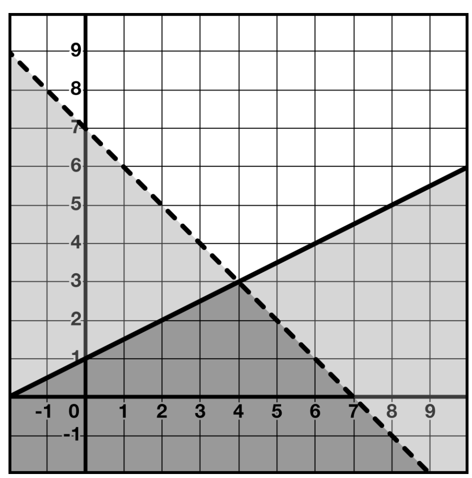
$$2x + y = 8$$
$$y = 2x + 4$$

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.

desmos Science Mom Lesson 52

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

Warm-Up

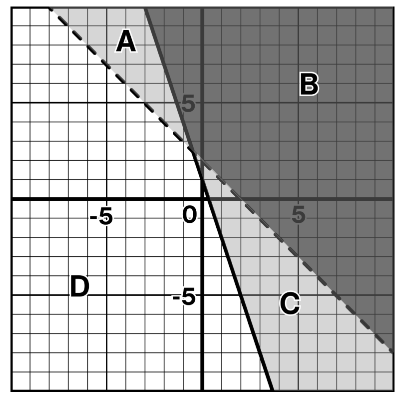
1. Find the value of y when $x = 5$.

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

Practice

Here is the graph of this system of inequalities:

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

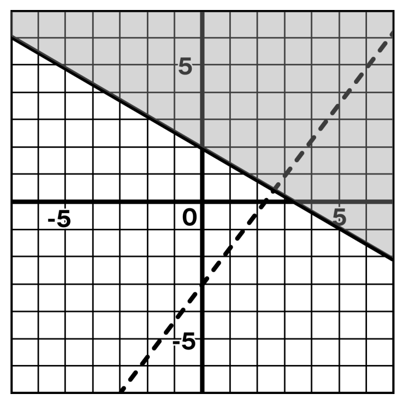


2.1 Which letter represents the solution region to the system of inequalities?

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.

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

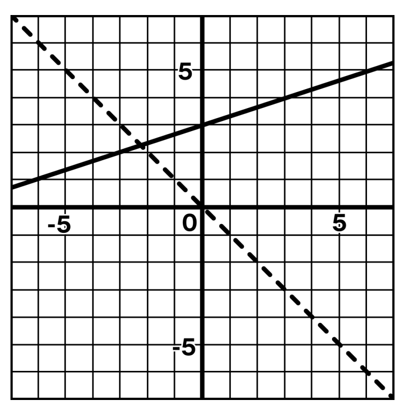


3.1 Complete the graph of the second inequality.

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.

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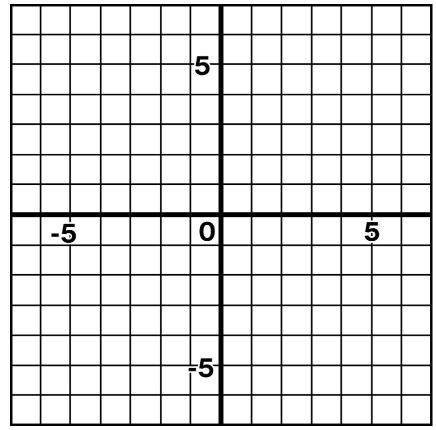
Unit A1.5, Lesson 10: Practice Problems

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

   Explain how you know it has no solutions.

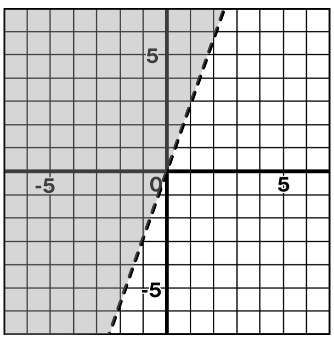


Looking Back

Match each inequality to its graph.

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

6.1



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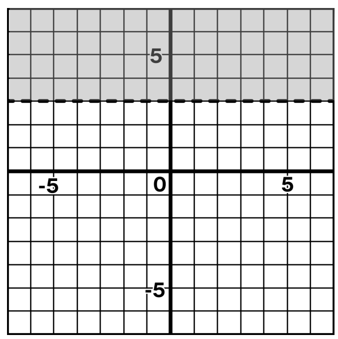
6.2



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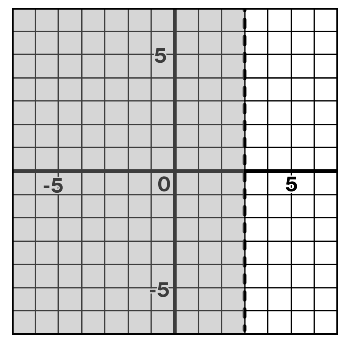
6.3



____

Explore

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

The system has no solutions.	Only points with matching x- and y-coordinates are a solution.
$x - y$ ☐ 0	$x - y$ ☐ 0
$x - y$ ☐ 0	$x - y$ ☐ 0

desmos Science Mom Lesson 53

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

Warm-Up

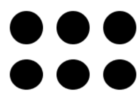
Determine the next two numbers in each sequence.

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 $f(x)$.

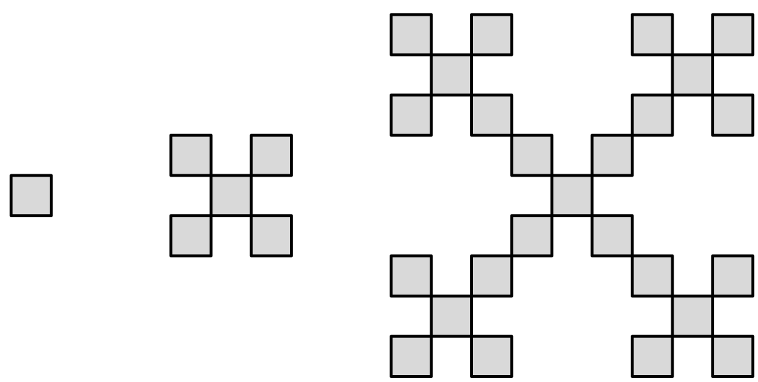
4.1 Is $f(x)$ linear, exponential, or something else? Explain how you know.

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.

desmos Science Mom Lesson 54

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

Warm-Up

Calculate the value of each expression.

1.1 $4^3 + 3^2$

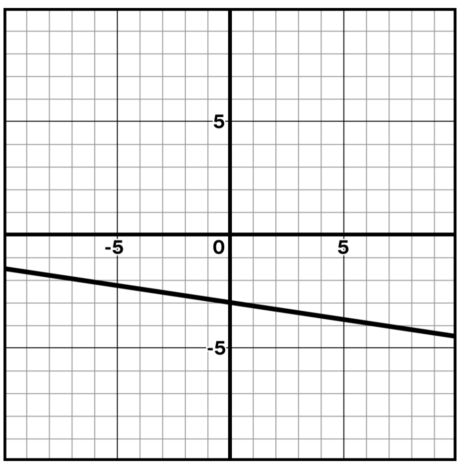
1.2 $(13 - 8)^3$

1.3 $6^2 + 11(7)$

Practice

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

2.1

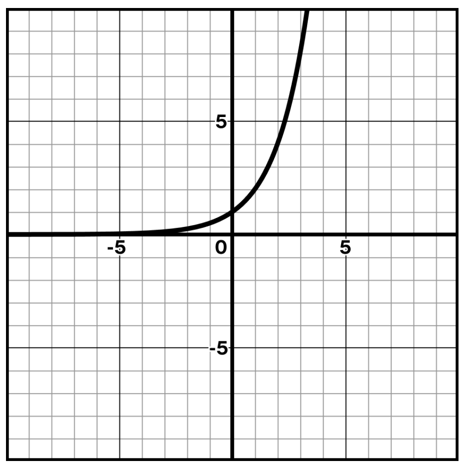


Positive / Negative

Increasing / Decreasing

Linear / Exponential

2.2

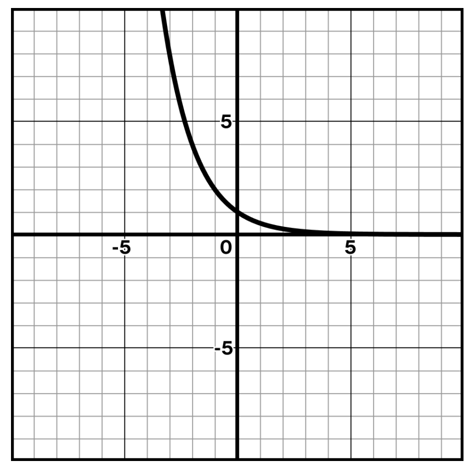


Positive / Negative

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 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. $f(x) = 4000(0.05)^x$

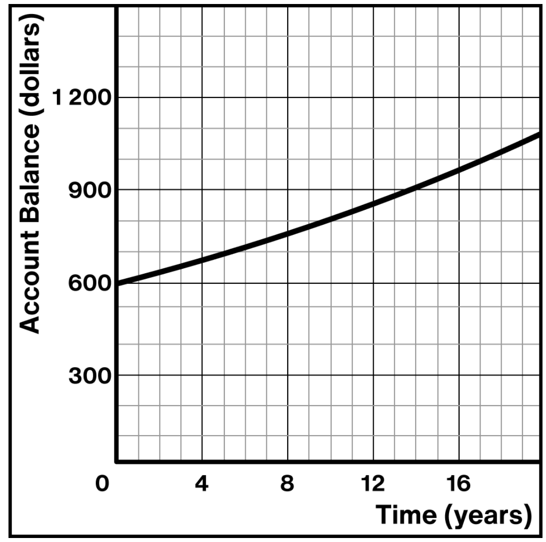
D. $f(x) = 4000 + (1.05)^x$

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

Unit A1.6, Lesson 4: Practice Problems

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

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



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

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

Looking Back

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

$$5x + y = 18$$
$$x - 3y = 10$$

Explore

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

   Which option would you choose? Explain your choice.

Reflect

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

Unit A1.6, Lesson 5: Practice Problems Name ______________________

Warm-Up

1. Determine the value of each expression.

2^4 -2^4 $(-2)^4$ $\left(\frac{1}{2}\right)^4$

Practice

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

A. $y = 80(1.25)^x$

B. $y = 64(1.25)^x$

C. $y = 64 + 1.25x$

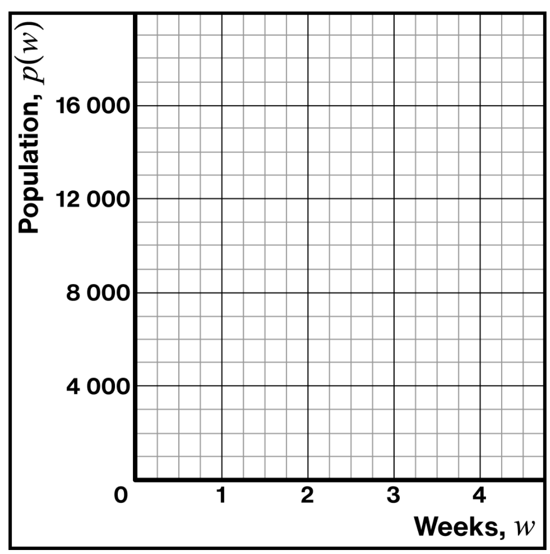
D. $y = 60 + 20x$

x	y
1	80
2	100
3	125
4	156.25

The equation $p(w) = 1\ 000 \cdot 2^w$ models a population of mosquitos, $p(w)$, where w is the number of weeks after the population was first measured.

3.1 Complete the table and plot the values on the graph.

Weeks, w	Population, $p(w)$
0	
1	
2	
3	
4	



3.2 Where on the graph do you see the $1\ 000$ from the equation?

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

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Unit A1.6, Lesson 5: Practice Problems

The equation $f(t) = 800 \cdot \left(\frac{1}{2}\right)^t$ models a fish population, $f(t)$, where t is time in years since the beginning of 2015.

4.1 What is the population of fish at the beginning of 2015?

4.2 What is the population of fish at the beginning of 2018?

4.3 What is the population of fish at the beginning of 2012?

Looking Back

Charlie's gaming club wants to make at least $\$300$ selling boxes of cookies and pies.
They make $\$9$ for each box of cookies and $\$15$ for each pie.

5.1 **Write an inequality** to represent the number of cookies, c, and pies, p, the team can sell to make at least $\$300$.

5.2 If the team sells 5 boxes of cookies, what is the minimum number of pies they need to sell in order to meet their goal?

Reflect

1. Put a question mark next to a question you felt stuck on.
2. Use the space below to ask a question or share something you're proud of.

Warm-Up

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

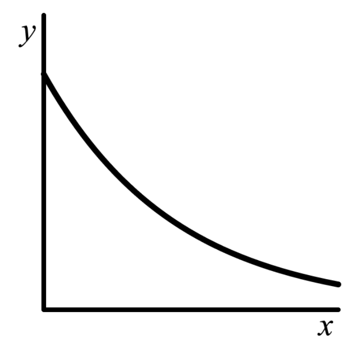
$f(x) = 7^x$

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

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

Practice

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

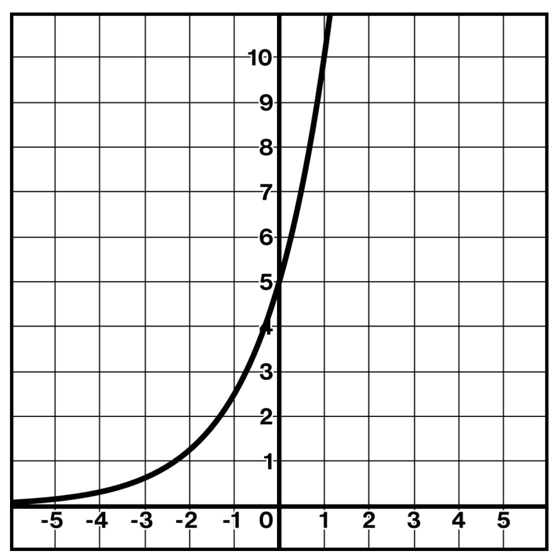


2.1 Select **all** possible values of b.

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

2.2 Explain how you decided.

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



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

3.2 How are the graphs alike?

3.3 How are the graphs different?

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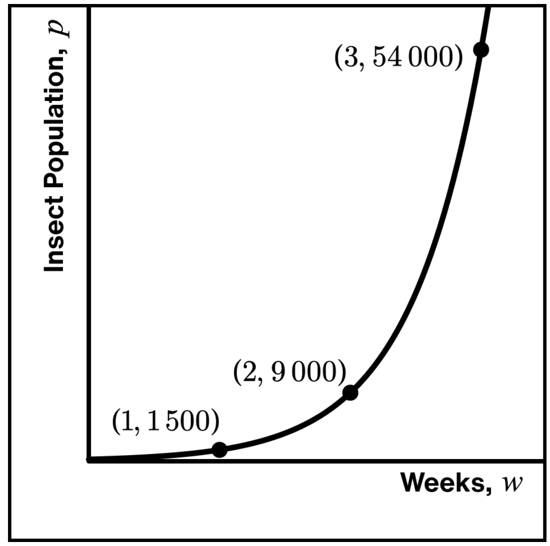
Unit A1.6, Lesson 6: Practice Problems

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:

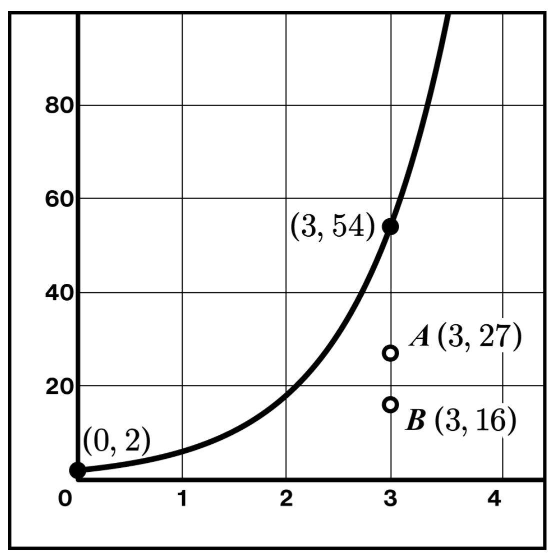
   Write the solution as a coordinate pair.

$$3x + 2y = 26$$
$$y = 2x - 8$$

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.

desmos Science Mom Lesson 58

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%.

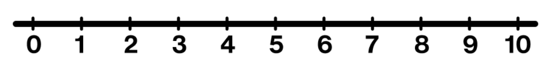
4.1 Write a function, $f(t)$, to represent the amount Sai will owe, in dollars, after t years.

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 $x = 2$.

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

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

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.

desmos Science Mom Lesson 60

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.

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

3.1 Find the error and explain why it is incorrect.

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

3.3 What will her balance be in 2 years?

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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.

desmos Science Mom Lesson 61

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

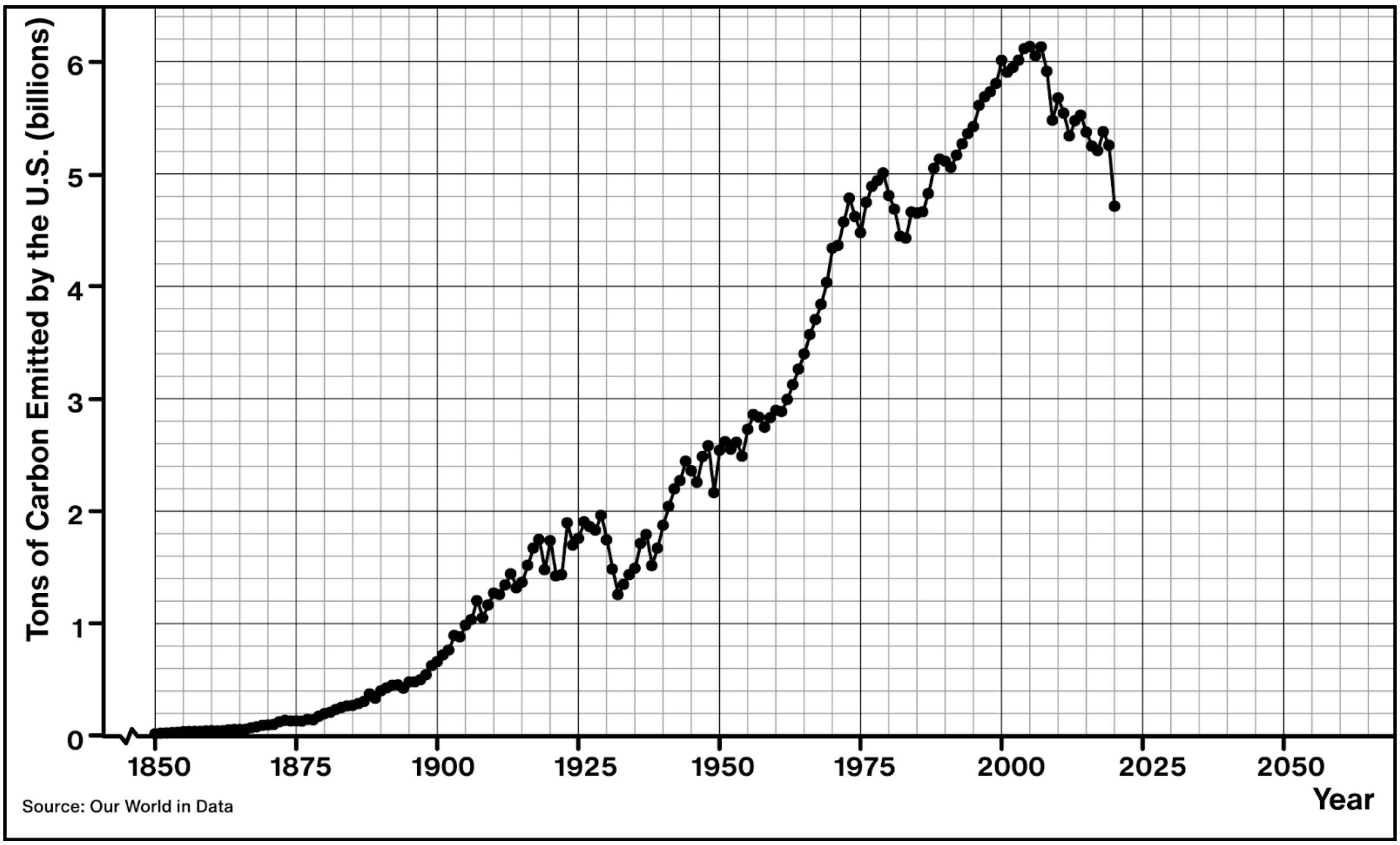
Warm-Up

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.

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Unit A1.6, Lesson 13: Practice Problems

Looking Back

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

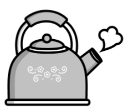
   $r = 0.72$ $r = -0.72$ Both are possible

   Explain your thinking.

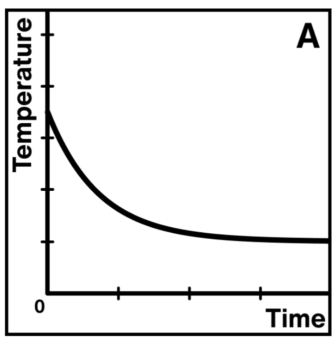
Explore

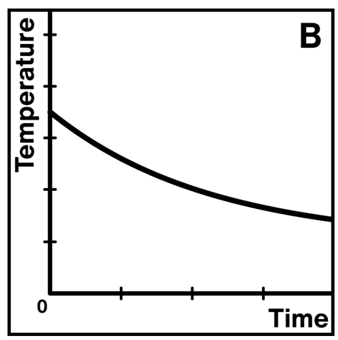
4.1 Match each liquid to a graph.

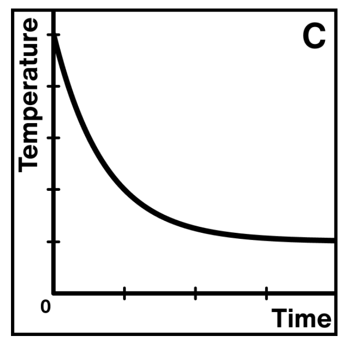
Coffee in a Travel Mug


Boiling Water Resting in a Kettle


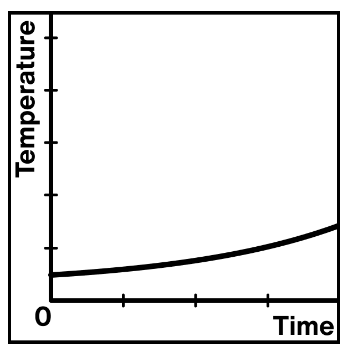
Black Tea in a Teacup





4.2 What liquid might this graph represent?



Reflect

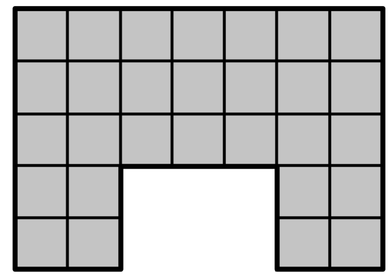
1. Put a heart next to the answer you're most proud of.
2. Use the space below to ask one question you have or to share something you're proud of.

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

Warm-Up

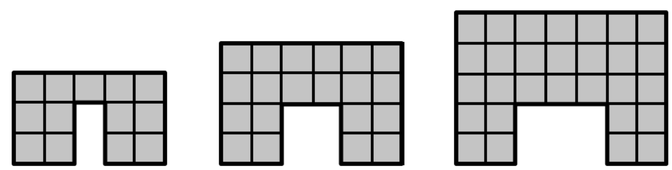
1. Select **all** of the expressions that could represent the area of this figure.

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



Practice

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



s=1 s=2 s=3

3. How many tiles are in figure 10?

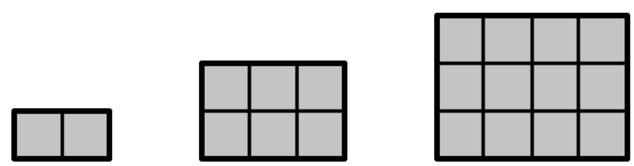


Figure 1 **Figure** 2 **Figure** 3

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

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.

desmos Science Mom Lesson 63

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.

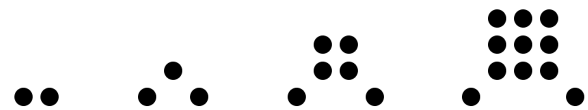


Figure 0 **Figure** 1 **Figure** 2 **Figure** 3

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.

▢ $n^2 + 1$

▢ $n^2 + n$

▢ $n(n + 1)$

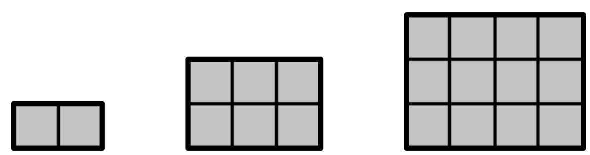


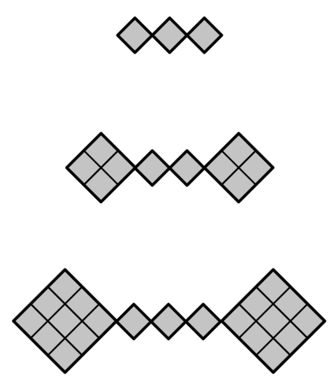
Figure 1 **Figure** 2 **Figure** 3

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

Figure 1

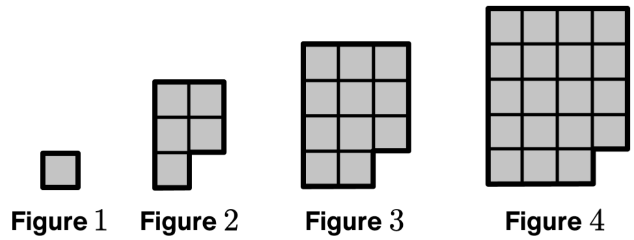
Figure 2

Figure 3



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



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.

desmos Science Mom Lesson 64

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

Warm-Up

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

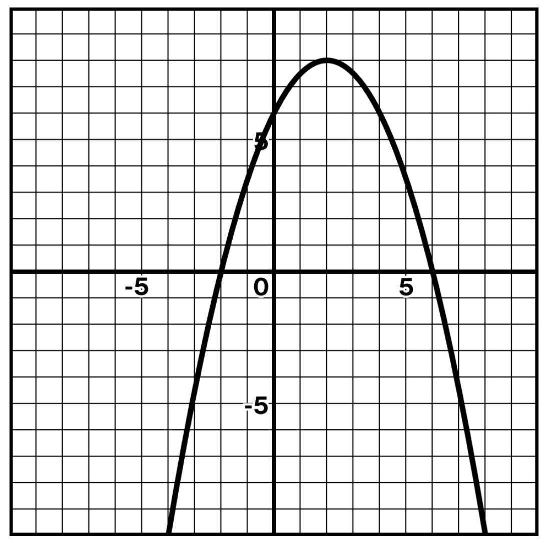
0 and 13	4 and 20	7 and 28

Practice

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

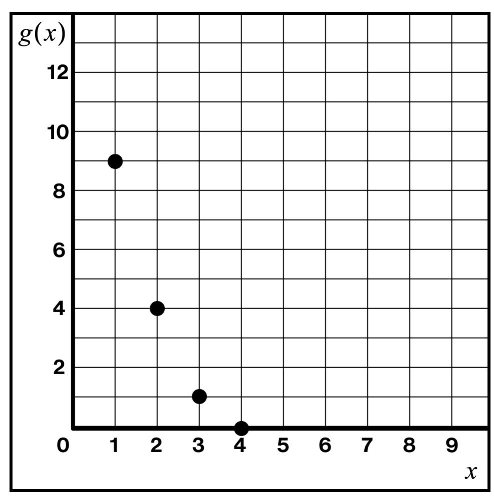
2.2 Write the equation for the line of symmetry.

$x =$ ______________



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 $g(x)$.

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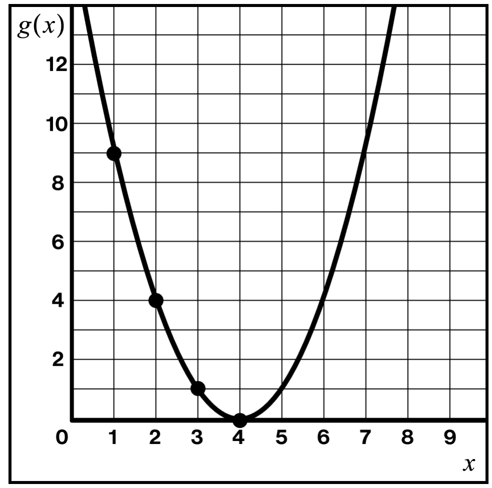
Unit A1.7, Lesson 4: Practice Problems

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

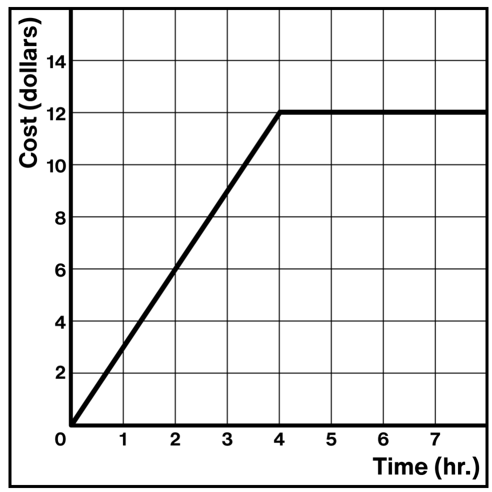


4. Write the equation for the line of symmetry of $g(x)$.

   $x =$ _______

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?

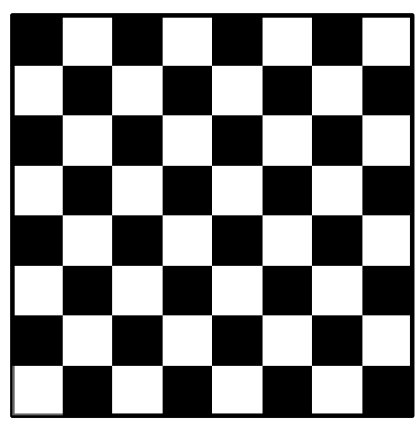
5.2 Describe the relationship between the amount of time a car is parked and the cost of parking.

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	



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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	

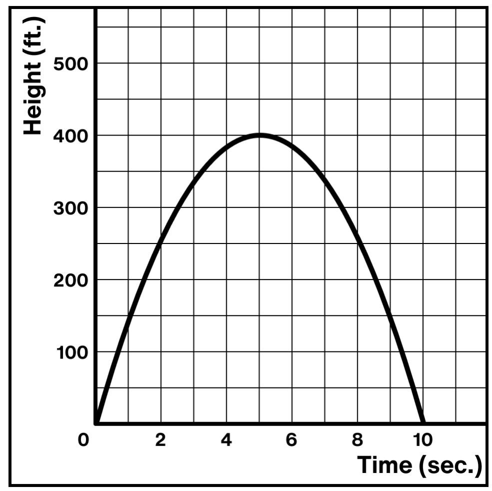
Practice

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

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Unit A1.7, Lesson 5: Practice Problems

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

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.

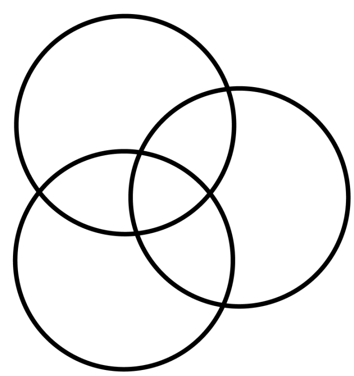
Time (sec.)	**Height (m)**
0	0
1	42
2	74
3	96

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.

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

Warm-Up

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

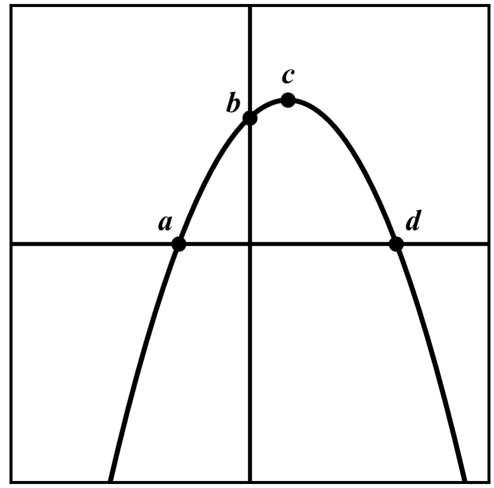
   Name each key feature below.

   a:

   b:

   c:

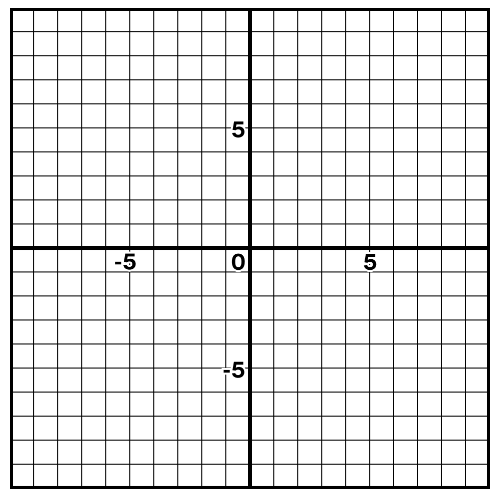
   d:



Practice

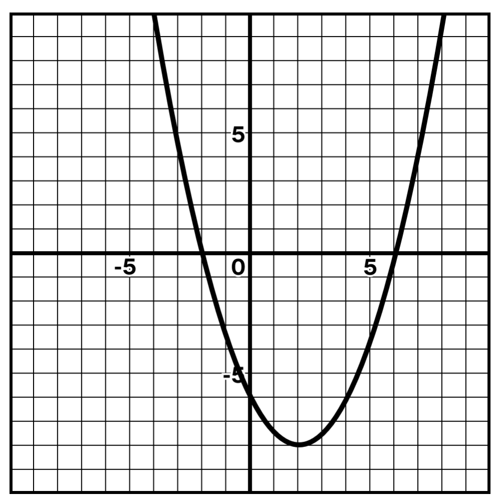
2. Sketch a parabola that:

   - 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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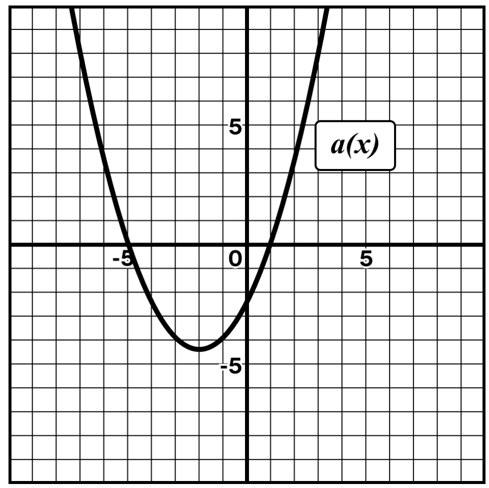
Unit A1.7, Lesson 6: Practice Problems

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

   Which parabola is concave down? (Circle one.)

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

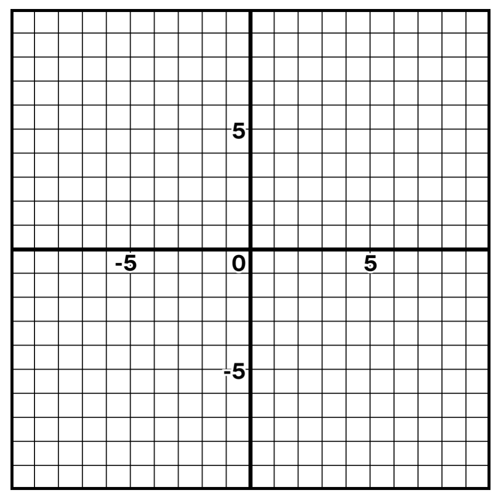
   Explain your thinking.



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.

desmos Science Mom Lesson 67

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

Warm-Up

1. Select all of the quadratic expressions.

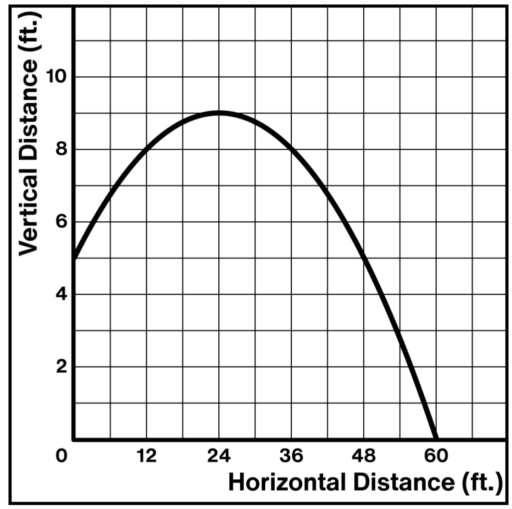
☐ x^2 ☐ 2^x ☐ $3x$ ☐ $4x^2$ ☐ x^3

Practice

2. Isaiah throws a ball. The graph shows its height as a function of the horizontal distance from where it was thrown.

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

   ☐ The maximum height the ball reaches is 9 feet.
   ☐ The maximum height the ball reaches is 24 feet.
   ☐ The ball lands 24 feet from where it is thrown.
   ☐ The ball lands 60 feet from where it is thrown.
   ☐ The ball is thrown from a height of 5 feet.

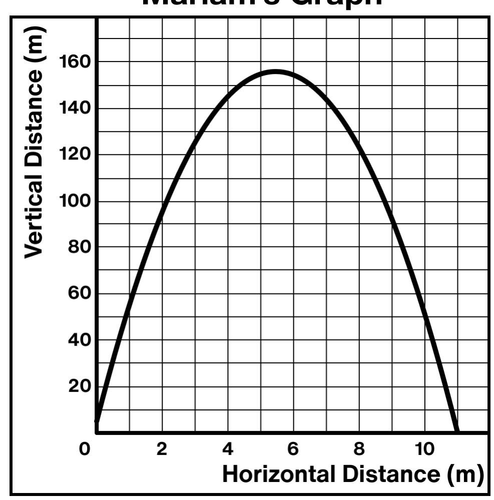


Ava and Mariam launch their stomp rockets at the same time.
Ava launches her rocket from the ground. Mariam launches her rocket from a small platform.

Ava's Table

Horizontal Distance (m)	Vertical Distance (m)
0	0
1	45
2	80
3	105

Mariam's Graph



3. Whose rocket goes higher? (Circle one.)

   Ava's   Mariam's   They go the same height.

   Describe the key feature that helped you decide.

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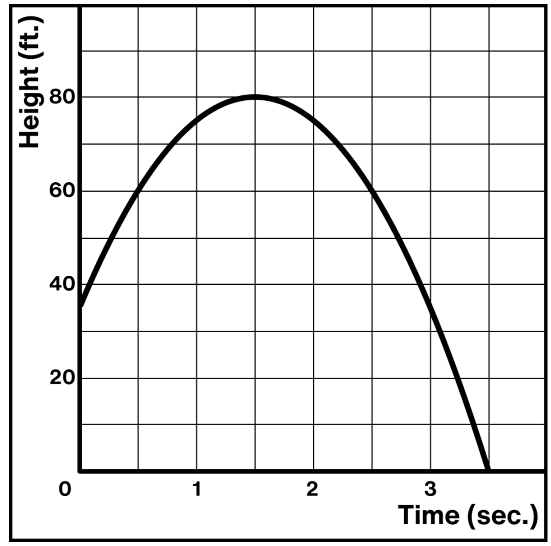
Unit A1.7, Lesson 7: Practice Problems

The graph shows the height of a ball over time.



4.1 Label the vertex and x-intercept.

4.2 What does each point tell you about the ball's movement?

Vertex:

x-intercept:

Explore

5. Here is a table of values for the function $f(x)$.
Change some values so that $f(x)$ represents a quadratic function.

Before

x	$f(x)$
−3	20
−2	12
−1	6
0	2
1	0
2	2
3	6

After

x	$f(x)$
−3	
−2	
−1	
0	
1	
2	
3	

Reflect

1. Put a question mark next to a question you were feeling stuck on.
2. Use the space below to ask a question or share something you are proud of.

desmos Science Mom Lesson 68

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

Warm-Up

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

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

Practice

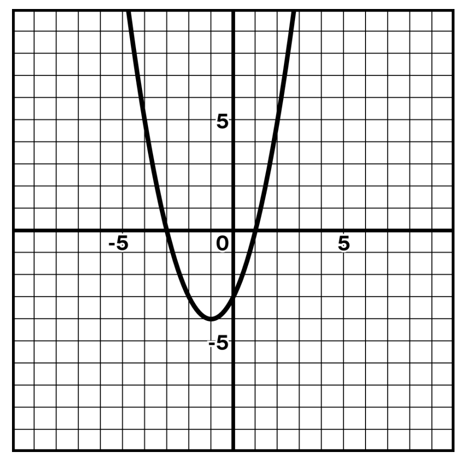
2. The function $f(x) = (x + 5)(7x - 21)$. Select **all** values of x that make $f(x) = 0$.

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

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	

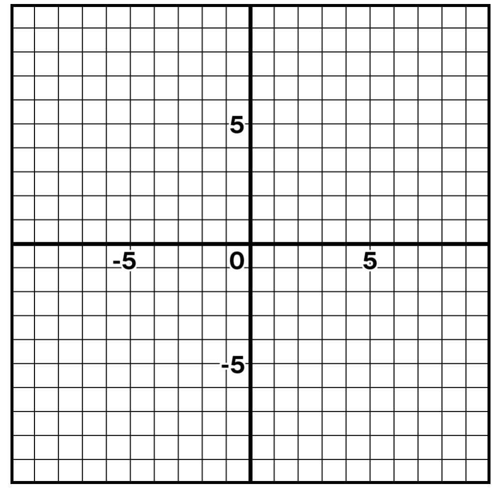
5. Evan and Ariel were working on homework together.

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.

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 $h(x)$.

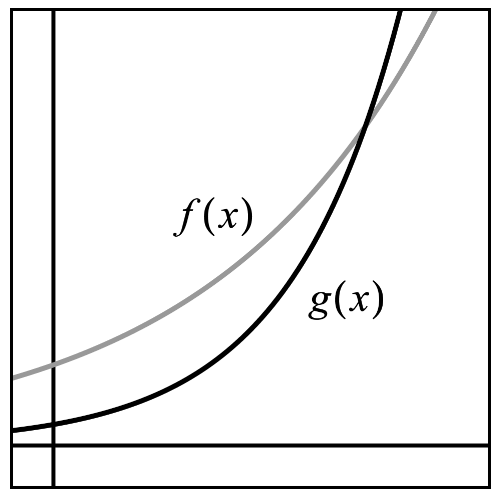
x-intercepts:

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 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

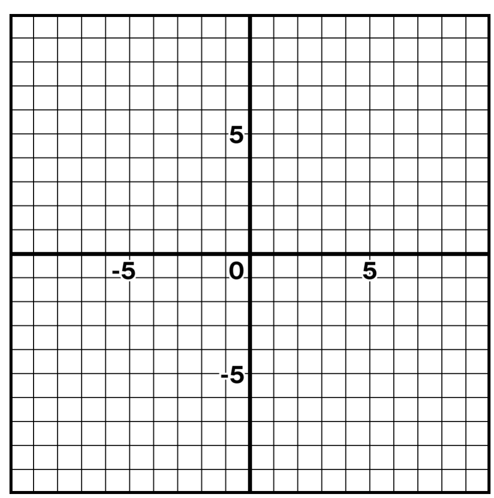
3.2 The line of symmetry is at $x = 5$. True False Not enough information

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.



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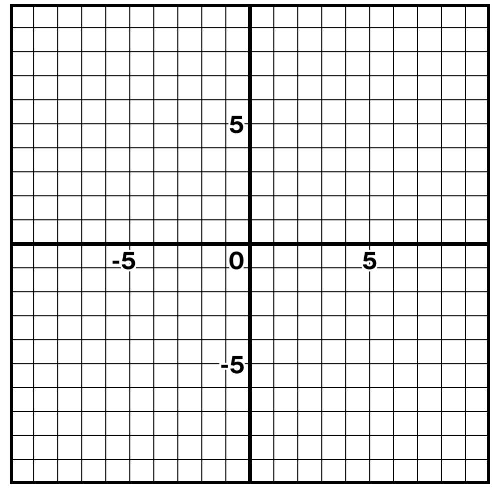
Unit A1.7, Lesson 11: Practice Problems

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.

desmos Science Mom Lesson 70

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

Warm-Up

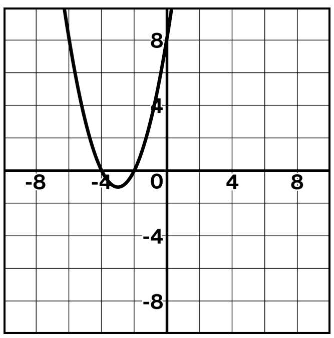
1. Here are three functions. Evaluate each function when $x = 3$ and $x = -1$.

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

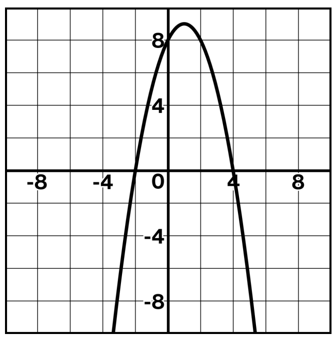
Practice

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

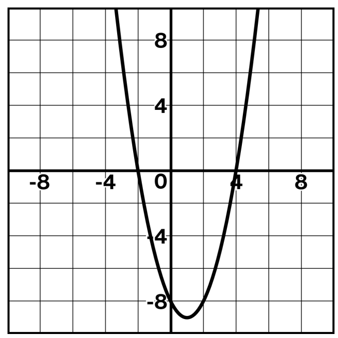
A



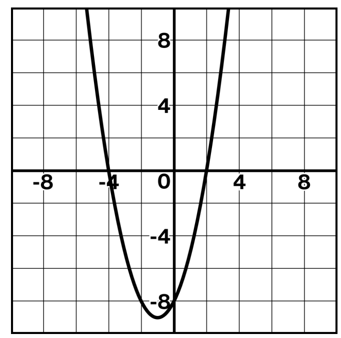
B



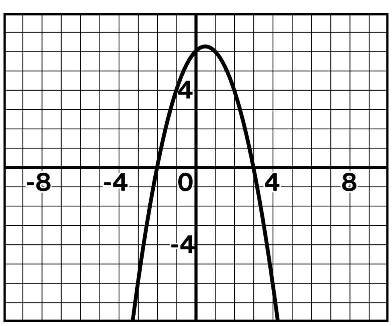
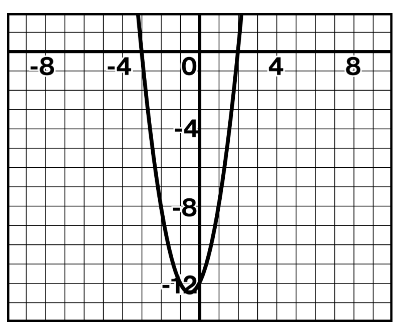
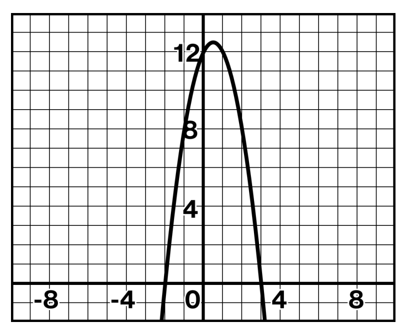
C



D



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

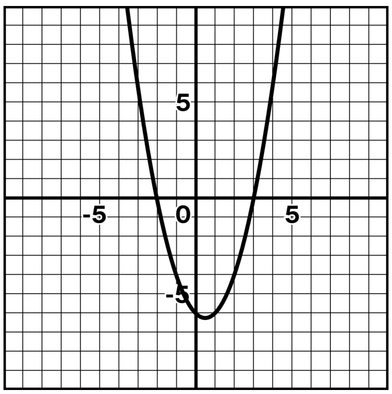
		

Equations	$y = -(x + 2)(x - 3)$	$y = 2(x + 3)(x - 2)$
	$y = -2(x + 2)(x - 3)$	$y = (x + 2)(x - 3)$

Unit A1.7, Lesson 12: Practice Problems

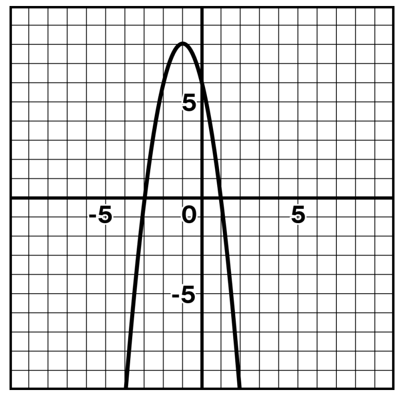
4. Write an equation of a quadratic function that is **concave down** with x-intercepts at $(3, 0)$ and $(-1, 0)$.

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.

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

Warm-Up

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

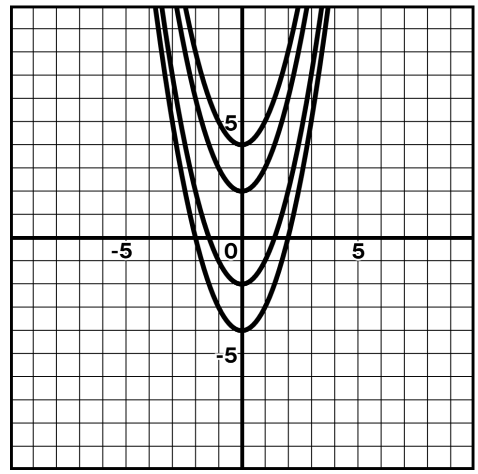
$f(x) = x^2 + 3$	$g(x) = \frac{1}{2}x^2$	$h(x) = 3 + \frac{1}{2}x^2$

Practice

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

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

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

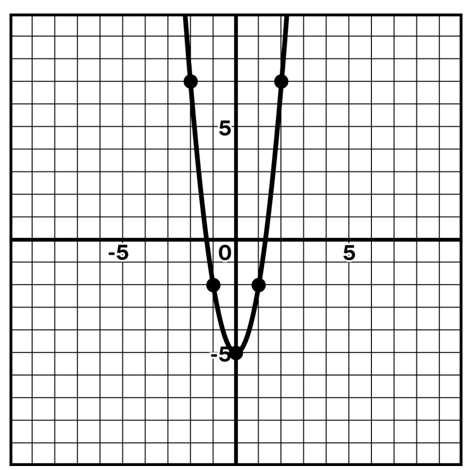


3. Terrance and Kayla are trying to graph $f(x) = -3x^2$. Terrance says this is a *translation* of $f(x) = x^2$. Kayla says this is a *vertical stretch* of $f(x) = x^2$. Who is correct?

   Explain your thinking.

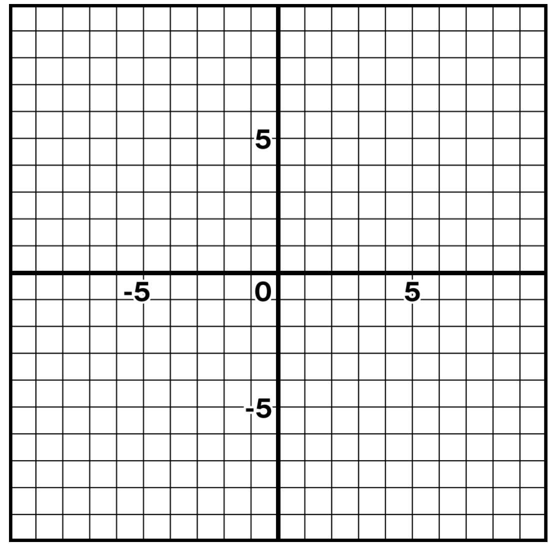
4. Write an equation for this transformation of $y = x^2$.

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.

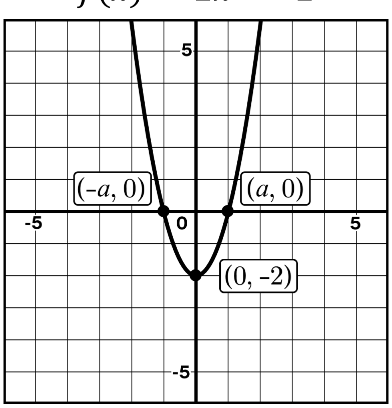
$h(0)$ means . . .

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

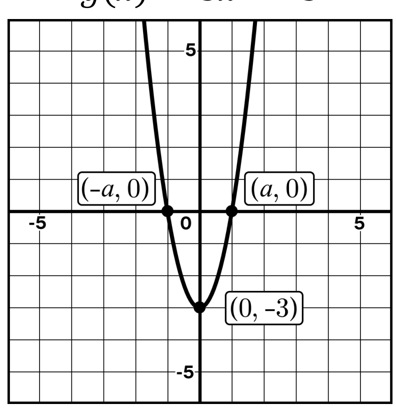
Explore

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

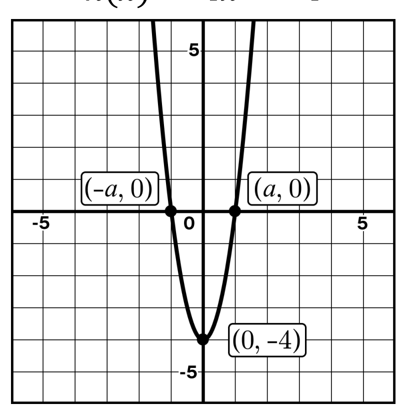
$f(x) = 2x^2 - 2$



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



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



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

Warm-Up

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

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

Practice

2. Here are four equations in vertex form.
Which function has a graph with a vertex at $(1, 3)$?

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

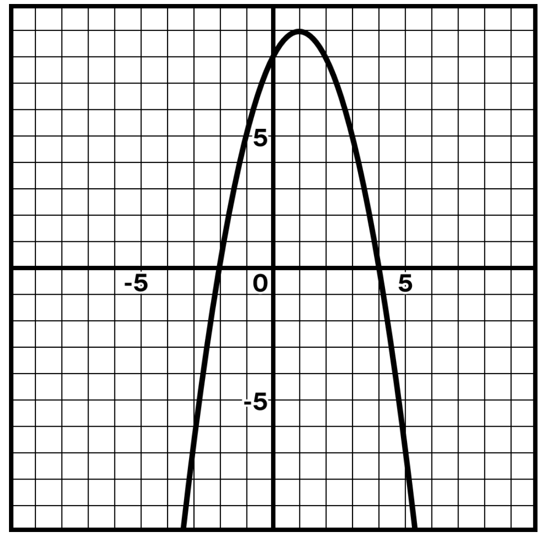
3. Determine if each equation is written in standard form, factored form, or vertex form.

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

Standard Form	Factored Form	Vertex Form

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

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



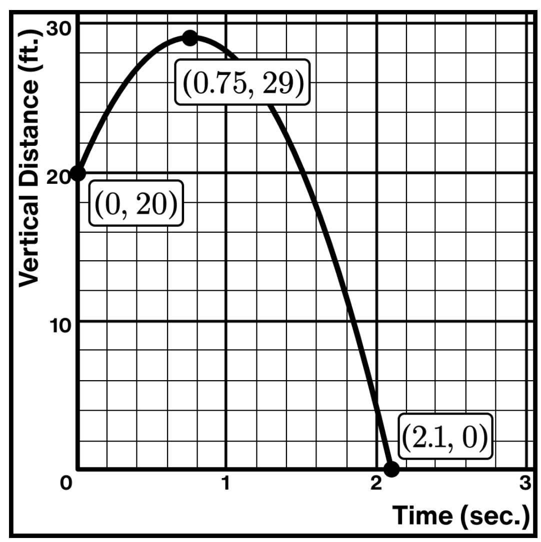
- ☐ $y = -(x + 1)^2 + 9$
- ☐ $y = -(x - 1)^2 + 9$
- ☐ $y = x^2 + 2x + 8$
- ☐ $y = -(x + 2)(x - 4)$
- ☐ $y = -(x - 1)(x + 4)$

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.



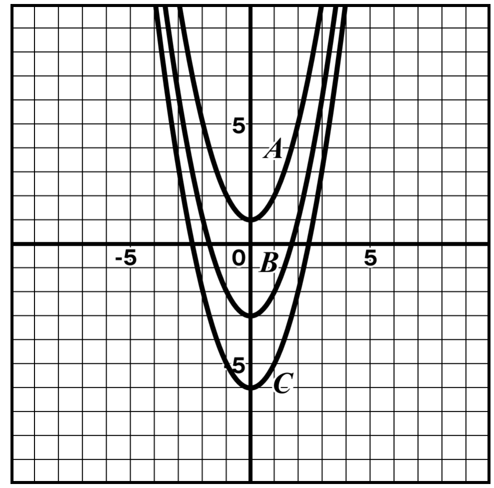
- ☐ The vertex of the graph is $(0.75, 29)$.
- ☐ The y-intercept of the graph is $(0.75, 29)$.
- ☐ The maximum height of the rock was 20 feet.
- ☐ The rock hit the water after 2.1 seconds.
- ☐ The rock was thrown from a height of 20 feet.

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.

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:

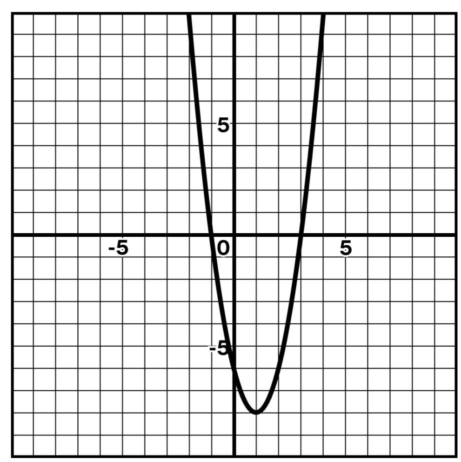
Practice

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.

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



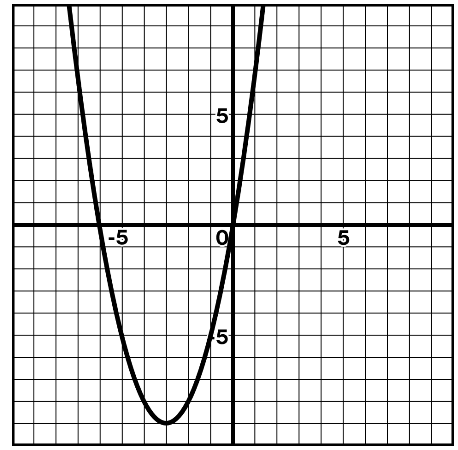
4. Write an equation of a quadratic function with x-intercepts at $(-2, 0)$ and $(6, 0)$.
   Use graphing technology to check your work.

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.

6. Here are two equations:

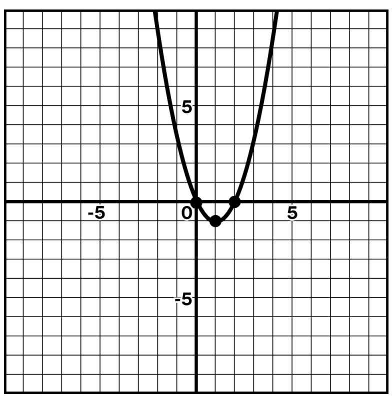
$$m(x) = x(x + 6)$$
$$p(x) = (x + 3)^2 - 9$$

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



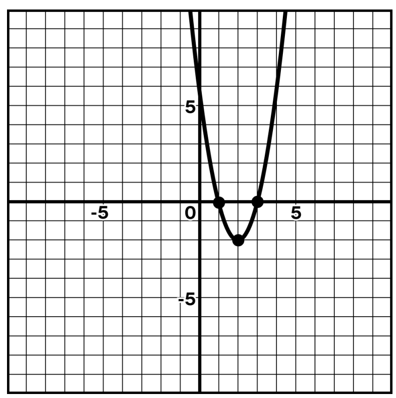
Explore

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



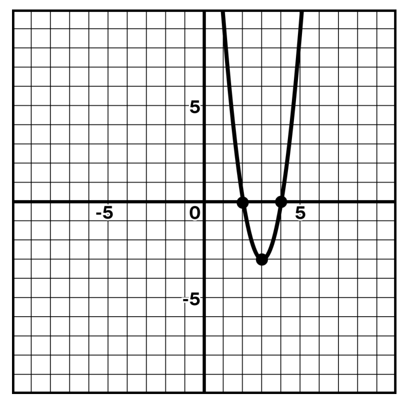
$f(x) = (x - 1)^2 - 1$

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



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

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



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

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

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.

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Unit A1.7, Lesson 17: Practice Problems Name ______________________

Warm-Up

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

   $g(x) = 3x^2 - 2x - 1$ $\qquad$ $h(x) = (2x + 3)(x - 1)$

Practice

2. Here are four equations in vertex form.
   Which function has a graph with a vertex at $(-1, 4)$?

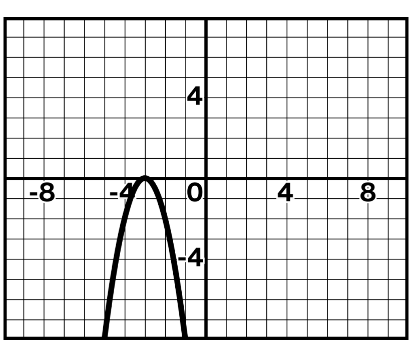
   A. $y = (x - 1)^2 + 4$
   B. $y = (x + 1)^2 + 4$
   C. $y = (x - 4)^2 - 1$
   D. $y = (x + 4)^2 - 1$

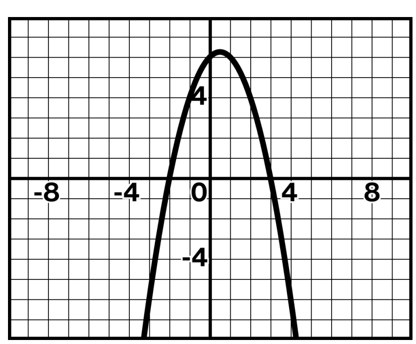
3. Select **all** the functions whose graphs have an x-intercept at $(3, 0)$.

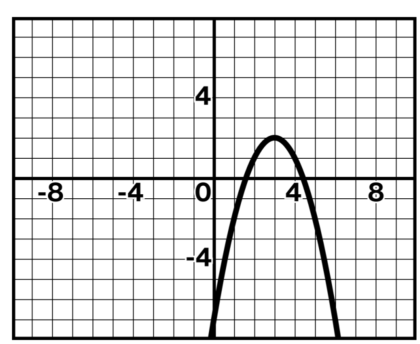
   ☐ $a(x) = (x + 2)(x - 3)$
   ☐ $b(x) = (x + 3)(x - 2)$
   ☐ $c(x) = 3x(x - 2)$
   ☐ $d(x) = (2x - 6)(x + 2)$
   ☐ $e(x) = (2x - 3)(x + 3)$

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

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







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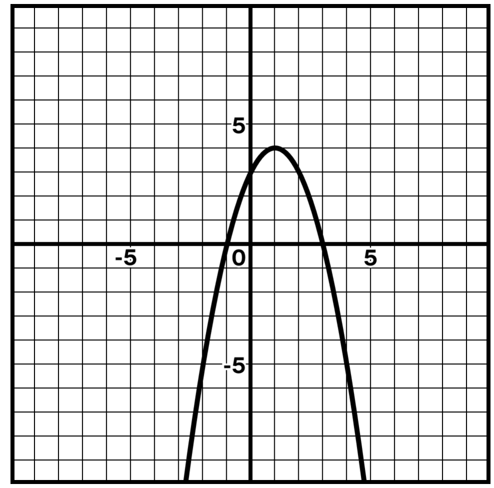
Unit A1.7, Lesson 17: Practice Problems

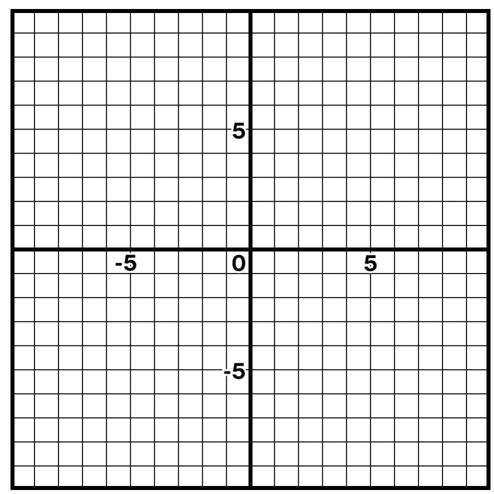


Eva says the equation of this graph is $y = (x - 1)^2 + 4$.
Latifa says the equation is $y = -(x + 3)(x - 1)$.

Each equation is incorrect in some way.

Eva	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

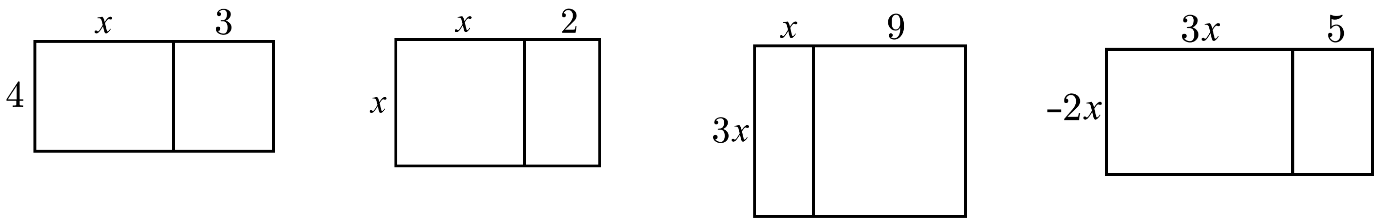
1. Put a heart next to the problem you feel most confident about.
2. Use the space below to ask a question or share something you are proud of.

desmos Science Mom Lesson 75

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

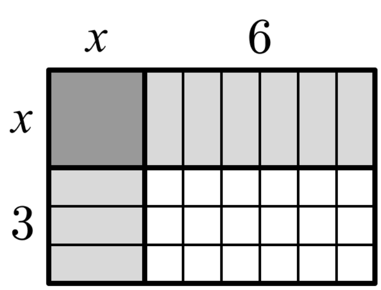
Warm-Up

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.

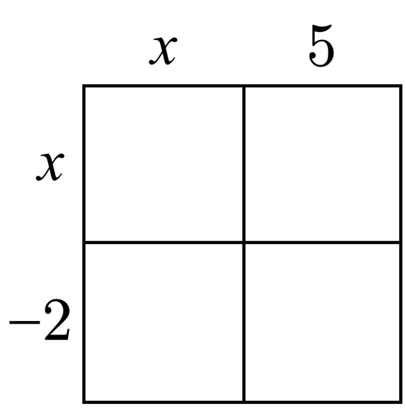


Factored form:

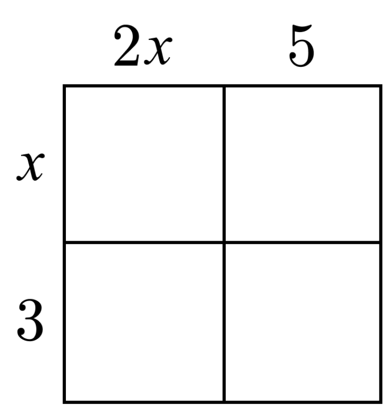
Standard form:

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 $2x^2 + 11x + 15$.



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Unit A1.8, Lesson 1: Practice Problems

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

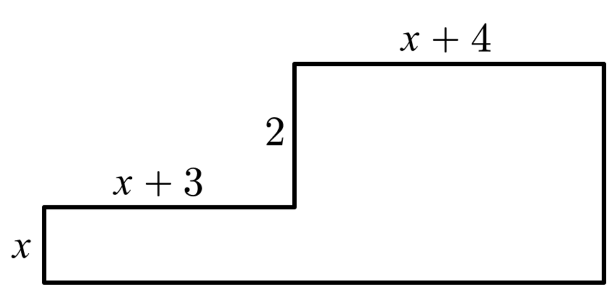
A. $(x + 2)(x + 6)$	____ $x^2 + 12x + 32$
B. $(2x + 8)(x + 2)$	____ $2x^2 + 18x + 16$
C. $(x + 8)(x + 4)$	____ $2x^2 + 12x + 16$
D. $(x + 8)(2x + 2)$	____ $x^2 + 8x + 12$

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

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

Explore

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



Area:

Perimeter:

Reflect

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

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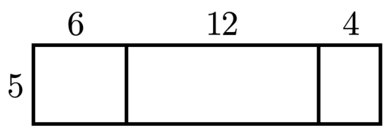
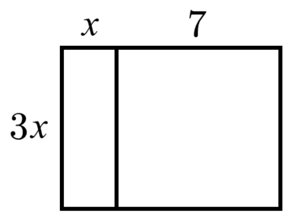
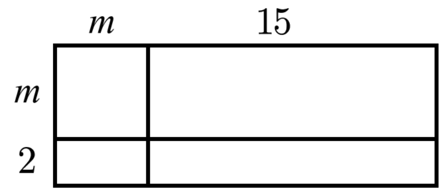
Unit A1.8, Lesson 2: Practice Problems Name ______________________________

Warm-Up

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







Practice

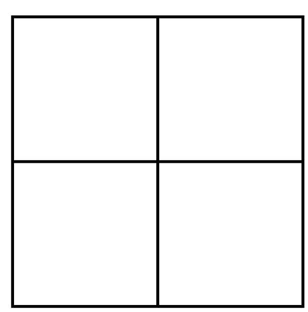
2. Select **all** expressions that are equivalent to $x - 5$.

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

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.

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

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Unit A1.8, Lesson 2: Practice Problems

Looking Back

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

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

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

C. $y = 288 + 72x$

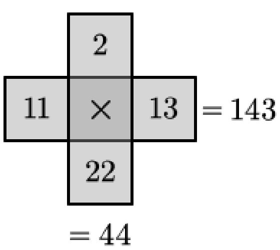
D. $y = 360 + 72x$

x	y
1	360
2	432
3	518.4
4	622.08

Explore

7. Select any number from the inner square.

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



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.

Science Mom Lesson 77

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: ______________

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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 4: Practice Problems Name ______________________

Warm-Up

1. Rewrite each expression in standard form.

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

Practice

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

   $(x \square 18)(x \square 3) = x^2 - 15x - 54$

   $(x \square 18)(x \square 3) = x^2 + 21x + 54$

   $(x \square 18)(x \square 3) = x^2 + 15x - 54$

   $(x \square 18)(x \square 3) = x^2 - 21x + 54$

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

   $x^2 - \square x + \square = (x - 9)(x - 3)$

   $x^2 + 12x + \square = (x + 4)(x + \square)$

   $2x^2 + 11x + 15 = (2x + \square)(x + \square)$

   $3x^2 - 11x - \square = (3x + \square)(x - 6)$

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

   ____ $2(x - 7)^2$

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

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

   ____ $(2x - 7)^2$

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

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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 $2x^2 + x - 15$

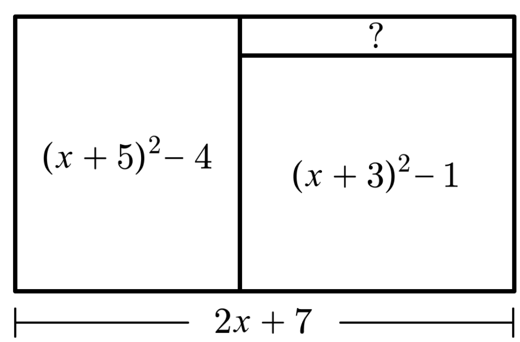
Looking Back

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 5: Practice Problems Name ______________________

Warm-Up

1. Solve each equation.

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

Practice

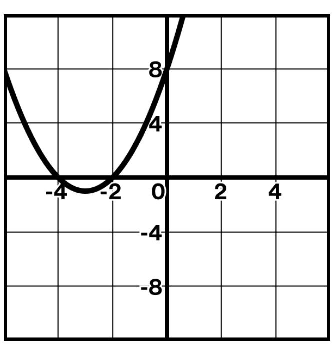
2. Determine the x-intercepts of the function $f(x) = (x - 4)(x + 3)$. Show or explain your reasoning.

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

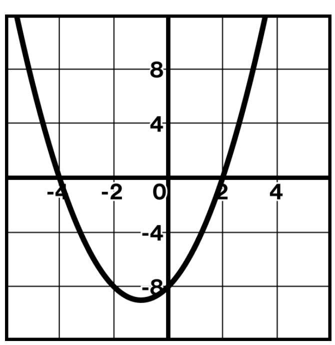
- ☐ $f(x) = (x + 5)(x - 1)$
- ☐ $g(x) = (x - 5)(x + 1)$
- ☐ $h(x) = x^2 + 4x - 5$
- ☐ $j(x) = 2x^2 - 8x - 10$
- ☐ $k(x) = (4x + 4)(15 - 3x)$

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

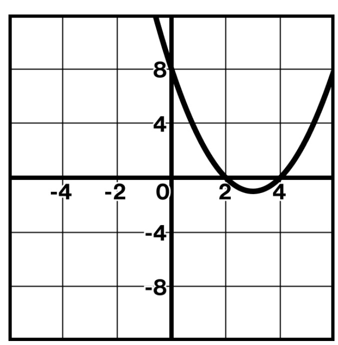
A



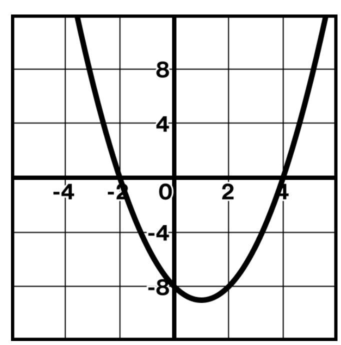
B



C



D



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Unit A1.8, Lesson 5: Practice Problems

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

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

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

Looking Back

6. Solve this system of equations.

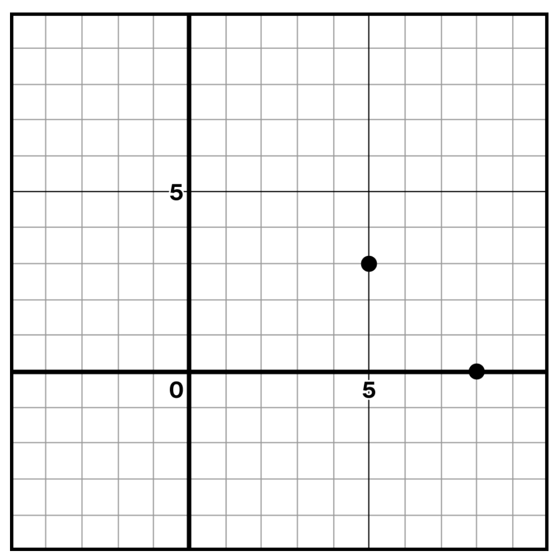
$2a + 9b = 20$

$4a + 9b = 58$

$a =$ _____ $b =$ _____

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.

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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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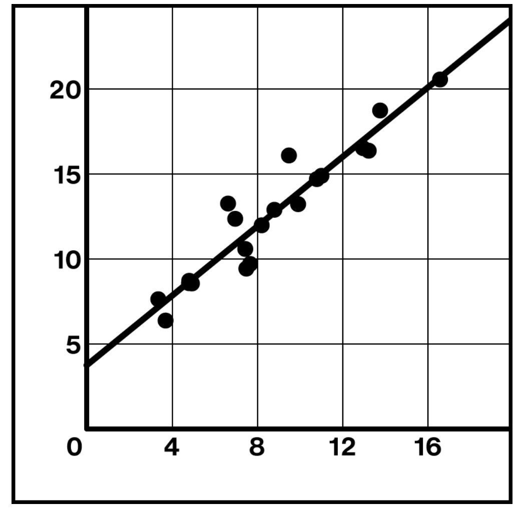
Unit A1.8, Lesson 6: Practice Problems

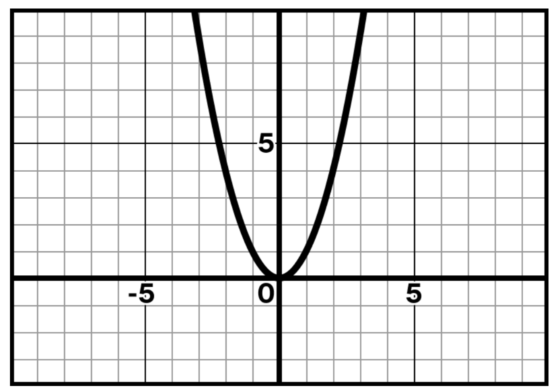
Looking Back

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

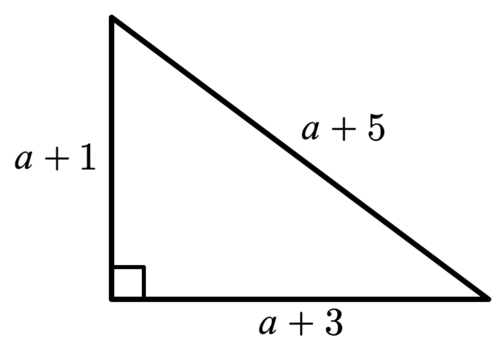
6. Select **all** the true statements about the function $f(x) = x^2$.



- ☐ 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.

desmos Science Mom Lesson 81

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

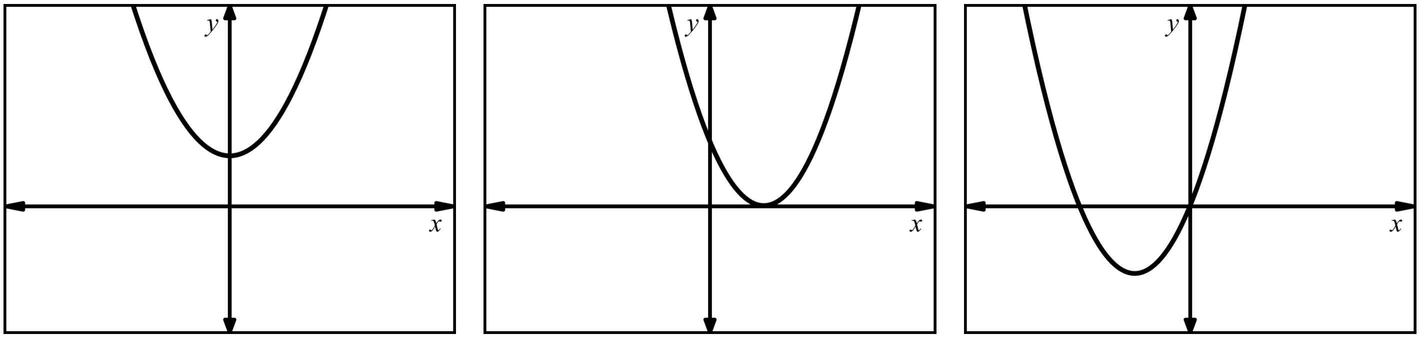
1. Put a question mark next to an answer you would like to compare with a classmate.
2. Use the space below to ask one question you have or to share something you're proud of.

desmos Science Mom Lesson 82

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

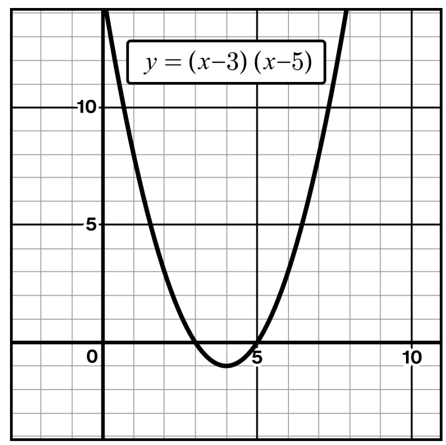
Warm-Up

1. Write a possible equation for each graph:



Practice

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



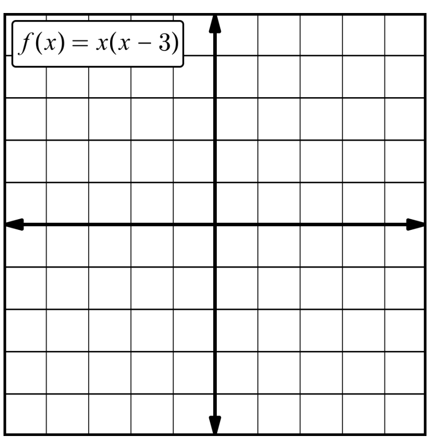
2.1 $(x - 3)(x - 5) = 0$

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

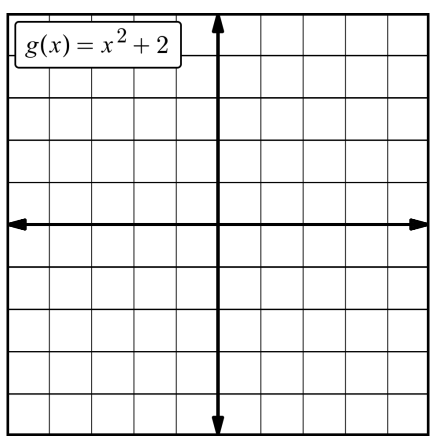
2.3 $(x - 3)(x - 5) = 8$

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

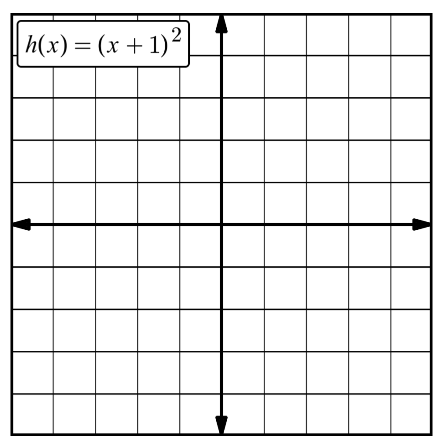
3. Sketch a graph for each function. Use graphing technology if it helps with your thinking. Then determine **how many** solutions each equation has.



$x(x - 3) = 0$



$x^2 + 2 = 0$



$(x + 1)^2 = 0$

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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. $x^2 - 1$

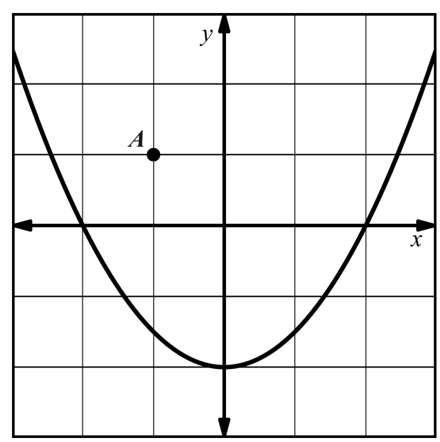
____ $(y + x)(y - x)$
____ $(1 + x)(1 - x)$
____ $(1 + x)(x - 1)$
____ $(x - y)(x - y)$

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.

desmos **Science Mom Lesson 83**

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.

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

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

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

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

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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.

desmos Science Mom Lesson 84

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.

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

[ ]

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

$$x + 6 = \pm 7$$

$x =$ [ ] and $x =$ [ ]

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

desmos **Science Mom Lesson 85**

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

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

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

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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.

desmos Science Mom Lesson 86

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

Warm-Up

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

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

Practice

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

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

Quadratic Formula

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

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

2.2 $-x^2 + 8 = 0$

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

Solve each equation using any method.

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

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

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

Unit A1.8, Lesson 14: Practice Problems

Looking Back

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

5.1 What are the coordinates of the x-intercepts?

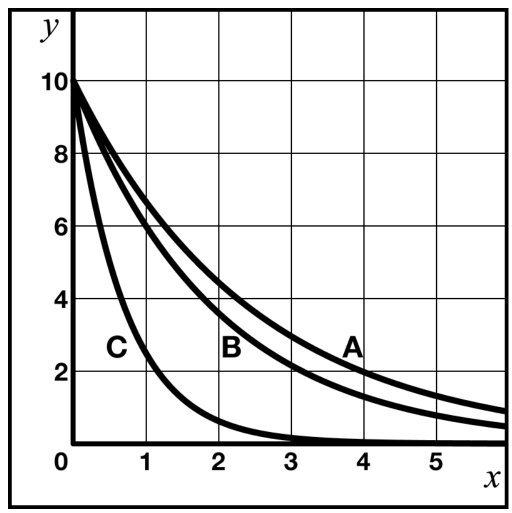
5.2 What are the coordinates of the vertex? Show or explain how you know.

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

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

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

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



Explore

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

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

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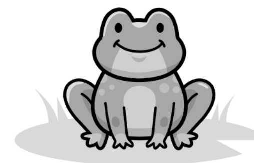
Unit A1.8, Lesson 15: Practice Problems Name ______________________________

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?

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Unit A1.8, Lesson 15: Practice Problems

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

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

Looking Back

5.1 Match each equation to its number of solutions.

A. No solutions

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	$x^2 + 8x =$ ________

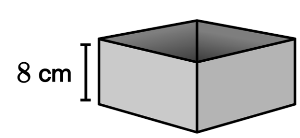
Explore

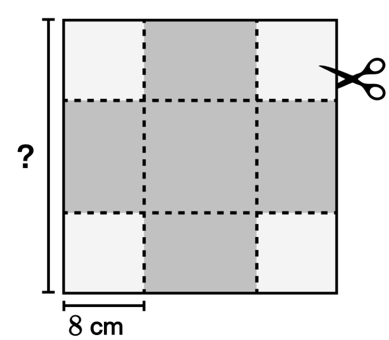
6. A company wants to make a square box with no top. The requirements are:

- 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.





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

Warm-Up

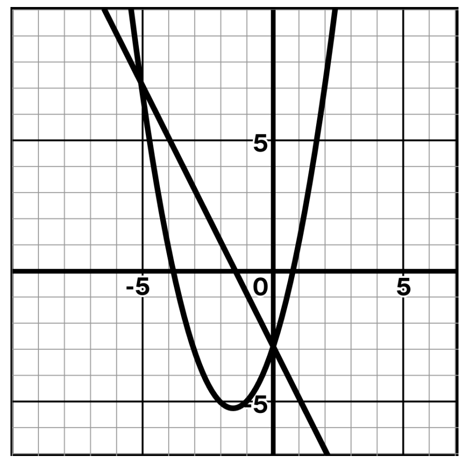
1. Identify the slope for each equation.

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

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.

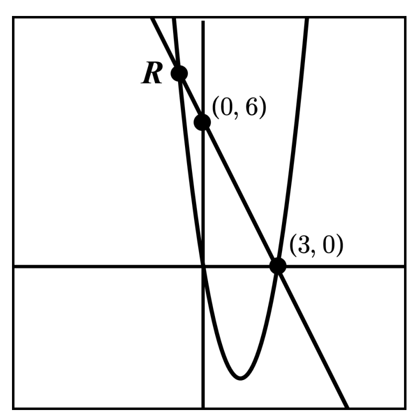
3.1 $y = x^2$
$y = 12 + x$

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

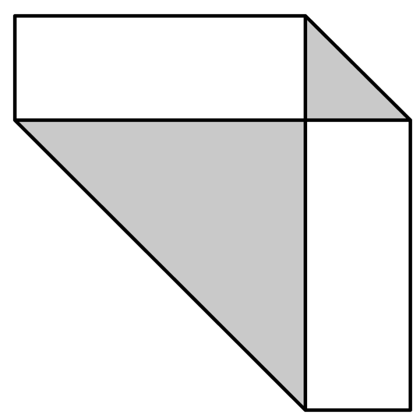
6. Solve each equation using any method.

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

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.