



Science Mom Lesson 1

Unit A1.1, Lesson 2: Practice Problems

Name _____

Warm-Up

- Share three numbers that describe you. The top row is an example.

Number	Explanation
4	I've lived in 4 different places in my life.

- Share a number that represents something that . . .

	Number	Explanation
. . . is important to you.		
. . . is important to your family, friends, or community.		
. . . makes you smile.		

Practice

Fill in the blanks to complete each pattern.

3.1 7, 18, 29, _____, _____, _____ ...

4.1 360, 180, 90, _____, _____, _____ ...

3.2 7, 14, 28, _____, _____, _____ ...

4.2 6, 18, _____, 162, _____, _____ ...

3.3 51, 47, 43, _____, _____, _____ ...

4.3 _____, 202, _____, 166, 148, ...

Unit A1.1, Lesson 2: Practice Problems

- 5.1 Here is a visual pattern. Sketch figure 4.

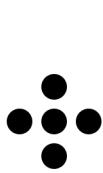


Figure 1

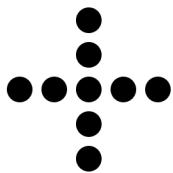


Figure 2

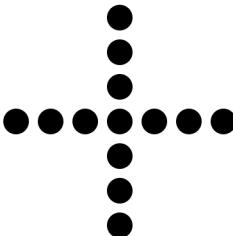


Figure 3

- 5.2 Complete the table with the number of dots in each figure.

Figure	1	2	3	4	6	10
Dots						

Explore

- 6.1 Make your own pattern by creating figures 1 and 3.



Figure 1



Figure 2



Figure 3

Figure	Dots
1	
2	3
3	

- 6.2 How many dots will figure 8 of your pattern have?

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.

Warm-Up

1. *Responses vary.*
 - 5, My number of siblings
 - 13, The day of the month I was born
 - 27, The number of roller coasters I've ridden in my life

2. *Responses vary.*
 - **Me:** 15, My lucky number
 - **My Family, Friends, Community:** 25, Our house number
 - **Makes Me Smile:** 2025, The year I will graduate high school

Practice

3.1 40, 51, 62

3.2 56, 112, 224

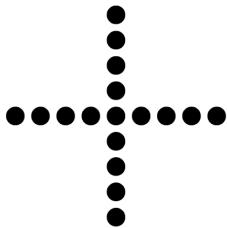
3.3 39, 35, 31

4.1 45, 22.5, 11.25

4.2 54, 486, 1458

4.3 220, 184

5.1



5.2

Figure	1	2	3	4	6	10
Dots	5	9	13	17	25	41

Explore6.1 *Patterns vary.*6.2 *Responses vary depending on the patterns students create.*

Unit A1.1, Lesson 3: Practice Problems

Name _____

Warm-Up

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

$7x - 8$

$5(x + 9)$

$\frac{x-6}{4x}$

Practice

Here is a visual pattern.

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

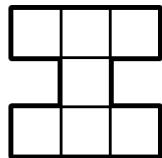


Figure 1

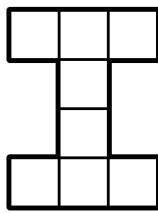


Figure 2

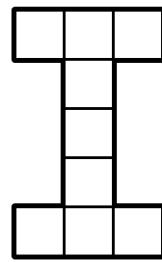


Figure 3

Figure	Tiles
1	
2	
3	
4	

3. Anushka wrote the following expressions for the number of tiles in figures 1, 2, and 3.

Figure 1

$3 + 1 + 3$

Figure 2

$3 + 2 + 3$

Figure 3

$3 + 3 + 3$

Show or explain where you see the $3 + 1 + 3$ in figure 1.

4. Use Anushka's expressions to determine the number of tiles in figures 7, 15, and n .

Figure	Tiles
7	
15	
n	

Unit A1.1, Lesson 3: Practice Problems

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

- $5 + n$
- $5n + 1$
- $6n - 1$
- $10n - 4$
- $5(n + 1) - 4$

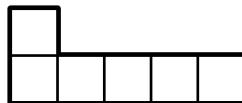


Figure 1

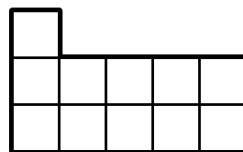


Figure 2

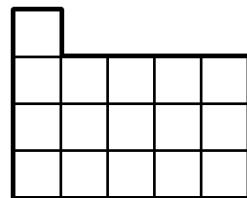


Figure 3

6. Select one of the expressions you chose above and use it to complete the table.

Expression: _____

Figure, n	1	2	3	4	8	10
Number of Tiles						

Looking Back

DesTunes is a new music streaming service.

Write an equation to represent each scenario, where x represents the number of months of DesTunes and y represents the total charge.

Scenario	Equation
7.1 DesTunes charges adults \$15 per month.	
7.2 DesTunes charges students a \$20 sign-up fee and then \$5 per month.	

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.

Warm-Up

1. 13, 60, -0.25 (or equivalent)

Practice

2.

Figure	Tiles
1	7
2	8
3	9
4	10

3. Responses vary. The two 3s are the number of tiles from the two horizontal lines and the 1 is the number of tiles in the middle.

4.

Figure	Tiles
7	13
15	21
n	$3 + n + 3$

5. ✓ $5n + 1$ ✓ $5(n + 1) - 4$

6. Responses vary depending on expression selected.

Figure, n	1	2	3	4	8	10
Number of Tiles	6	11	16	21	41	51

Looking Back

7.1 $y = 15x$

7.2 $y = 5x + 20$

Warm-Up

1. Calculate the value of each expression.

$$2^3 + 4^2$$

$$(10 - 7)^3$$

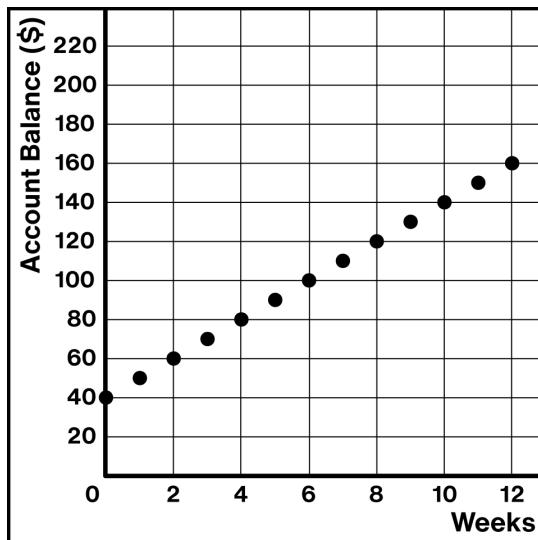
$$5^2 + 10(6)$$

Practice

Chloe starts with \$40 in her bank account and then deposits \$10 each week.

This graph shows her account balance (the amount of money in the account) over time.

- 2.1 Circle the point on the graph that represents Chloe's balance after 4 weeks.
- 2.2 What is her balance after 4 weeks?
- 2.3 How many weeks does it take Chloe to have \$140 in her bank account?



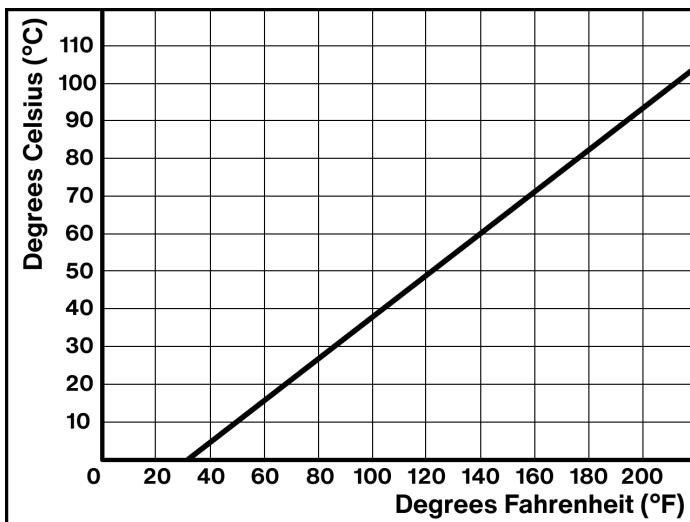
- 3.1 Complete the table.
- 3.2 Write an expression for Chloe's account balance after w weeks.

Weeks	Account Balance (\$)
0	
1	
3	
12	
20	

Unit A1.1, Lesson 4: Practice Problems

4. There are two common ways to measure temperature: degrees Celsius ($^{\circ}\text{C}$) and degrees Fahrenheit ($^{\circ}\text{F}$). Water boils at 100°C and freezes at 0°C .

Use the graph to determine each temperature in degrees Fahrenheit ($^{\circ}\text{F}$).



	Degrees Fahrenheit ($^{\circ}\text{F}$)
Boiling Water (100°C)	
Freezing Water (0°C)	

5. A thermometer shows the temperature outside is 90° . Which units is the thermometer more likely using? Explain your choice using information from the graph.

Explore

- 6.1 The thickness of a piece of paper is 0.001 cm . Imagine folding the paper in half many times. After 1 fold, the paper will be 0.002 cm thick. After 2 folds, the paper will be 0.004 cm thick. How thick will the paper be after 10 folds?
- 6.2 If it were physically possible, how many folds would it take to make the paper as tall as you are?

Reflect

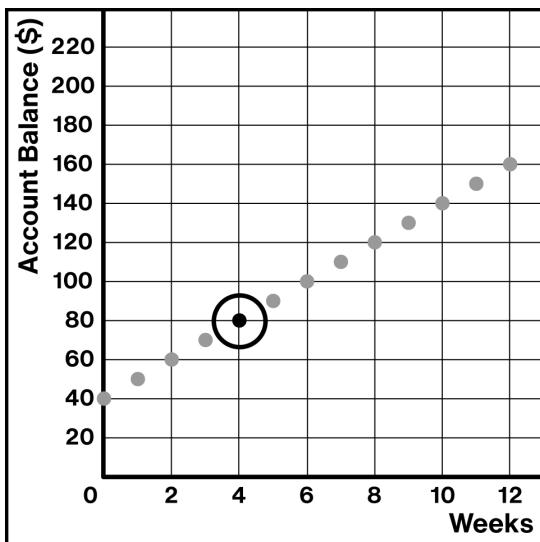
1. Put a heart next to a question that you understand well.
2. Use the space below to ask a question or share something you are proud of.

Warm-Up

1. 24, 27, 85

Practice

2.1



2.2 \$80

2.3 10 weeks

3.1

Weeks	Account Balance (\$)
0	40
1	50
3	70
12	160
20	240

3.2 $40 + 10w$ (or equivalent)

4. Acceptable responses: ± 5 degrees.

Degrees Fahrenheit ($^{\circ}\text{F}$)
Boiling Water (100°C)
Freezing Water (0°C)

5. Degrees Fahrenheit.

Explanations vary. If the temperature was 90°C , then it would be between 180°F and 200°F . This is way too hot for the temperature outside.

Explore

6.1 1.024 centimeters

6.2 Responses vary. (For reference, 17 folds is approximately 4 feet and 4 inches thick, and 18 folds is approximately 8 feet and 7 inches thick.)

Warm-Up

1. Determine the value of each expression when $n = 4$.

$$n^2 - 5$$

$$n(n + 6)$$

$$3n^2$$

Practice

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

2. How many of each type of glob will there be on day 4?

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

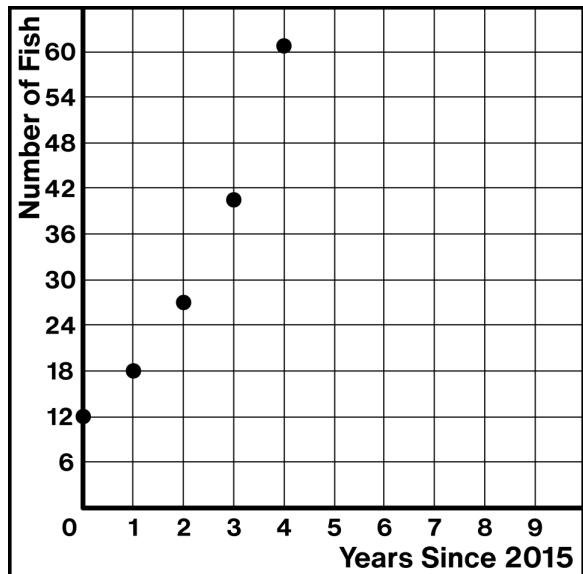
Day	0	1	2	3	4
Yellow Globs	5	10	20	40	

3. Will there be more red or yellow globs on day 10? Show or explain your thinking.
4. Which group of globs grows by a *constant ratio*? Show or explain how you know.

This graph shows the number of fish in a pond from 2015 to 2019.

- 5.1 How many fish are in the pond in 2015?

- 5.2 Does the number of fish grow by a *constant difference*? Show or explain how you know.



Unit A1.1, Lesson 5: Practice Problems

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

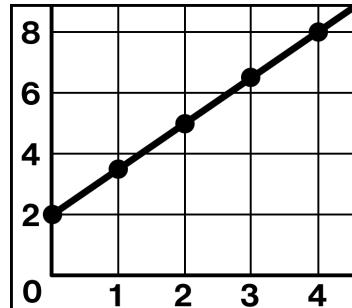
6.1

x	y
0	4
1	8
2	16
3	32

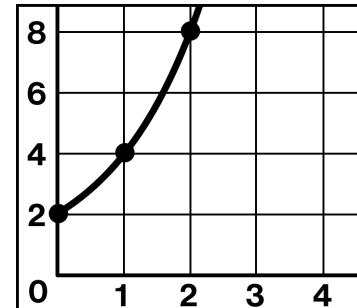
6.2

x	y
0	4
1	8
2	12
3	16

6.3



6.4



Constant difference

Constant ratio

Constant difference

Constant ratio

Constant difference

Constant ratio

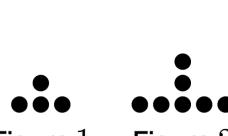
Constant difference

Constant ratio

Looking Back

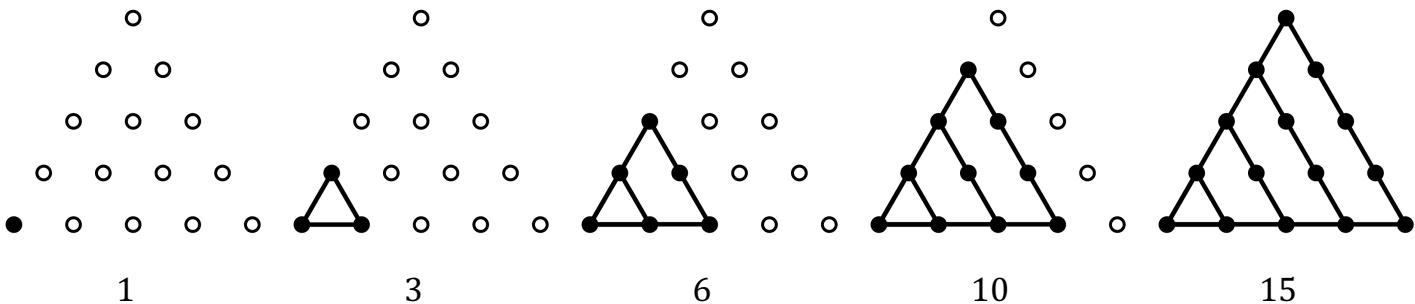
7. Here are the first four figures in a pattern.

Write an expression for the number of dots in figure n .



Explore

8. A triangular number is one that can be represented as all the dots in an equilateral triangle.



What patterns do you notice? What do you wonder?

Warm-Up

1. 11, 40, 48

Practice

2. 130 red globs
80 yellow globs

3. Yellow globs

Explanations vary. There will be more yellow globs on day 10. Even though there are fewer yellow globs in the beginning, they are growing faster.

4. Yellow globs

Explanations vary. The number of yellow globs is multiplied by 2 each day. $10 \div 5 = 2$ and $40 \div 20 = 2$, which shows a constant ratio. The red globs grow by adding 20 every day, which represents a constant difference.

- 5.1 12 fish

- 5.2 No. *Explanations vary.* A constant difference would mean that the same number of fish were added every year. There were 6 fish added the first year and more than 6 fish added the second year, so there is no constant difference.

- 6.1 Constant ratio

- 6.2 Constant difference

- 6.3 Constant difference

- 6.4 Constant ratio

Looking Back

7. $1 + 3n$ (or equivalent)

Explore

8. *Responses vary.*

- I notice that there is one more dot in each diagonal line.
- I notice that every time you increase the triangular number, it grows by one more than before.
- I wonder if every number could be a triangular number.
- I wonder if the next triangular number is 21 because $15 + 6 = 21$.



Science Mom Lesson 5

Unit A1.1, Lesson 7: Practice Problems

Name _____

Warm-Up

1. Write each expression using an exponent. An example is shown.

$$3 \cdot 3 \cdot 3 \cdot 3 = 3^4$$

$$\left(\frac{4}{5}\right) \cdot \left(\frac{4}{5}\right) \cdot \left(\frac{4}{5}\right) = \underline{\hspace{2cm}}$$

$$7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = \underline{\hspace{2cm}}$$

$$9.3 \cdot 9.3 \cdot 9.3 \cdot 9.3 \cdot 9.3 \cdot 9.3 \cdot 9.3 = \underline{\hspace{2cm}}$$

Practice

- 2.1 Circle the equation that matches the table.

$$y = 5 + 2x$$

$$y = 5^x$$

$$y = 5 \cdot 2^x$$

$$y = 5 + 2^x$$

x	0	1	2	3	4
y	5	10	20	40	80

- 2.2 Explain your choice.

3. The population of a city was 100 000 in 1970. The population has **doubled** 3 times since 1970. Select **all** the expressions that represent the population of the town today.

 300 000 800,000 $100,000 \cdot 2 \cdot 2 \cdot 2$ $100,000 \cdot 3^2$ $100,000 \cdot 2^3$

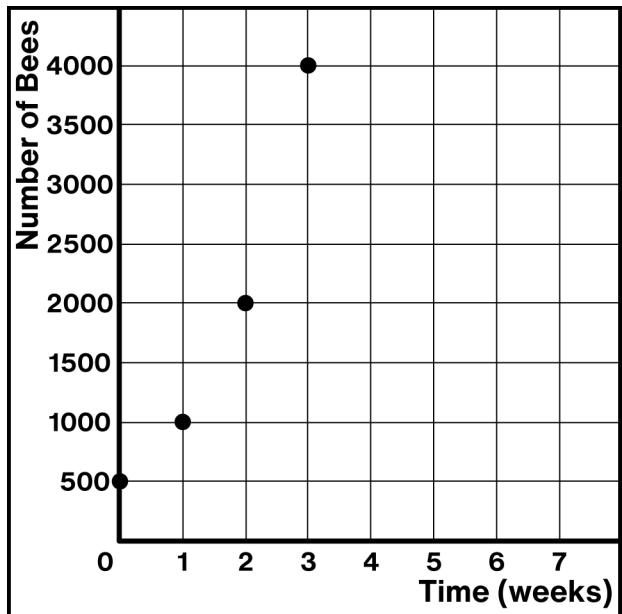
4. Complete the table.

Starting Value	Common Ratio	Equation
2		$y = 2 \cdot 3^x$
10	4	
		$y = 8 \cdot 5^x$
		$y = 2^x$

Unit A1.1, Lesson 7: Practice Problems

A group of scientists are tracking a population of bees. They count the number of bees each week in spring.

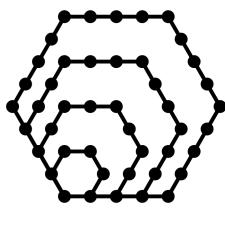
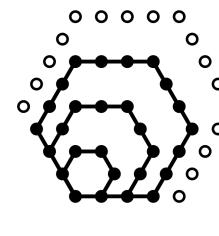
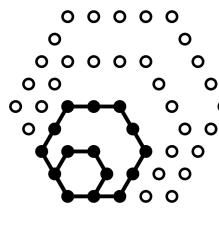
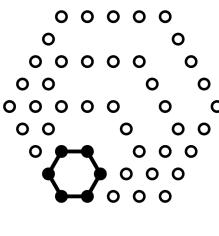
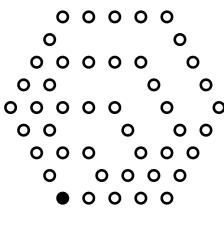
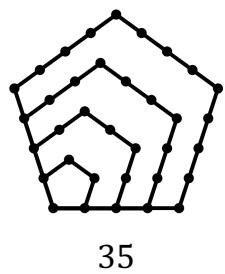
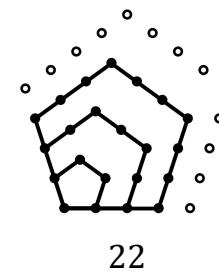
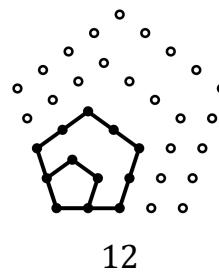
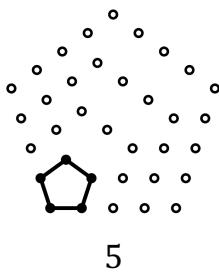
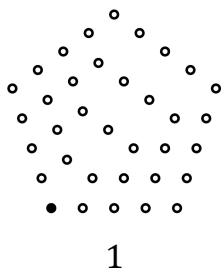
- 5.1 How many bees were there at the beginning of Spring?
- 5.2 How many weeks will it be until there are 4000 bees?



6. Does the number of bees represent a *linear relationship*, *exponential relationship*, or neither. Show or explain how you know.

Explore

7. Here are some examples of pentagonal and hexagonal numbers.



What patterns do you notice? What do you wonder?

Warm-Up

1. $7^5, \left(\frac{4}{5}\right)^3, 9 \cdot 3^7$

Practice

2.1 $y = 5 \cdot 2^x$

 2.2 *Explanations vary.* The starting value is 5 and the common ratio is 2.

3. ✓ 800,000 ✓ $100,000 \cdot 2 \cdot 2 \cdot 2$ ✓ $100,000 \cdot 2^3$

4.

Starting Value	Common Ratio	Equation
2	3	$y = 2 \cdot 3^x$
10	4	$y = 10 \cdot 4^x$
8	5	$y = 8 \cdot 5^x$
1	2	$y = 2^x$

5.1 500 bees

5.2 3 weeks

 6. Exponential relationship. *Explanations vary.* This is an exponential relationship because the number of bees doubles each week, which is a constant ratio of 2.
Explore
 7. *Responses vary.*

- I notice that the pentagonal numbers grow by 3 more each time. It first grows by 4, then 7, 10, and then 13.
- I notice that the hexagonal numbers grow by 4 more each time. It first grows by 5, then 9, 13, and then 17.
- I wonder if square numbers grow by 2 more each time and if triangular numbers grow by 1 each time.
- I wonder if there is a relationship between the number of sides the shape has and how many more it grows by each time.



Science Mom Lesson 6

Unit A1.1, Lesson 8: Practice Problems

Name _____

Warm-Up

1. Determine the value of each expression.

$$3^3$$

$$2(3^3)$$

$$3^3 + 4$$

$$2 \cdot 3^3 + 4$$

Practice

Carlos has a pack of toy fish whose mass **doubles** every hour when you add water.

This table shows the mass of a toy fish over time.

- 2.1. What was the mass of the toy fish before it was in water?

- 2.2. What will the mass of the toy fish be after 7 hours?

Time (hours)	Mass (grams)
0	
1	30
2	60
3	120
4	240

3. Wohali buys another brand of toy fish that claims to grow faster than Carlos's fish.

Wohali wrote this equation: $m = 10 \cdot 3^t$. He used m for mass and t for time.

Explain what the 10 and the 3 mean in this situation.

10 means . . .

3 means . . .

4. A baby octopus weighs 0.3 grams. Once it hatches, the octopus's mass
- doubles**
- each week for the first 12 weeks of its life.

Complete the table of the octopus's mass over time.

Time (weeks)	0	1	2	3	4	12
Mass (grams)						



Unit A1.1, Lesson 8: Practice Problems

A group of biologists tracked the number of squirrels in a town. They wrote $n = 40 \cdot 1.5^t$, where n is the total number of squirrels and t is the number of years since the biologists started counting.

5.1 Explain what the 40 and 1.5 mean in this situation.

5.2 How many squirrels do the biologists predict there will be 2 years after they started counting?

Jamar had 80 followers on social media. His number of followers **tripled** every month for 4 months.

6.1 Select **all** the expressions that represent Jamar's followers after 4 months.

- $80 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ $80 + 4^3$ $80 \cdot 4 \cdot 4 \cdot 4$ $80 + 3 + 3 + 3 + 3$ $80 \cdot 3^4$

6.2 Complete the table.

Time (months)	0	1	2	3	4
Followers					

Explore

7. Using the digits 1 to 9, without repeating, fill in each blank such that the two equations' graphs intersect.

$$y = \boxed{} \cdot \boxed{} x$$

$$y = \boxed{} \cdot \boxed{} x$$

Are you ready for more? Fill each blank such that they intersect at whole-number coordinates.

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.

Warm-Up

1. 27

54

31

58

Practice

2.1 15 grams

2.2 1920 grams

3.1 *Responses vary.* 10 means the mass of the toy fish is 10 grams before it goes in the water.3.2 *Responses vary.* 3 means that the fish's mass grows 3 times bigger every hour.

4.

Time (weeks)	0	1	2	3	4	12
Mass (grams)	0.3	0.6	1.2	2.4	4.8	1228.8

5.1 *Responses vary.* 40 means that there are 40 squirrels in the town when the biologists start counting. 1.5 means that the number of squirrels in town grows by 1.5 times every year.

5.2 90 squirrels

6.1 $\checkmark 80 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ $\checkmark 80 \cdot 3^4$

6.2

Time (months)	0	1	2	3	4
Followers	80	240	720	2160	6480

Explore*Responses vary.*

$$y = [1] \cdot [4]^x \quad \text{and} \quad y = [5] \cdot [2]^x$$

$$y = [4] \cdot [3]^x \quad \text{and} \quad y = [6] \cdot [2]^x \quad \text{This pair intersects at whole-number coordinates.}$$

Unit A1.1, Lesson 10: Practice Problems

Name _____

Warm-Up

1. Determine the value of each expression when $x = 2$.

4^x

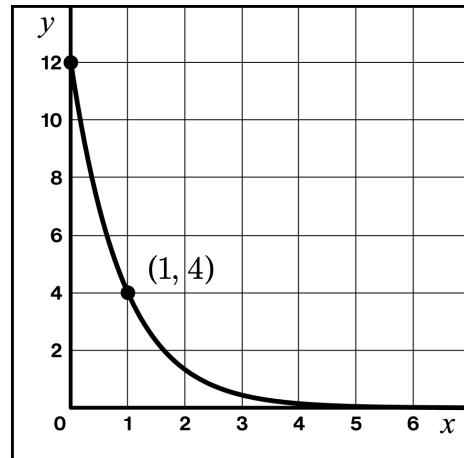
$\left(\frac{1}{3}\right)^x$

$5(6^x)$

Practice

2. Here is a graph of $y = 12 \cdot \left(\frac{1}{3}\right)^x$.

Explain where you can see the 12 and the $\frac{1}{3}$ in the graph.



Match each equation to a graph that represents it.

Equation A $y = 50 \cdot \left(\frac{1}{2}\right)^x$	Equation B $y = 50 \cdot 2^x$	Equation C $y = 50 - 25x$
3.1 Graph A	3.2 Graph B	3.3 Graph C
 Equation _____	 Equation _____	 Equation _____

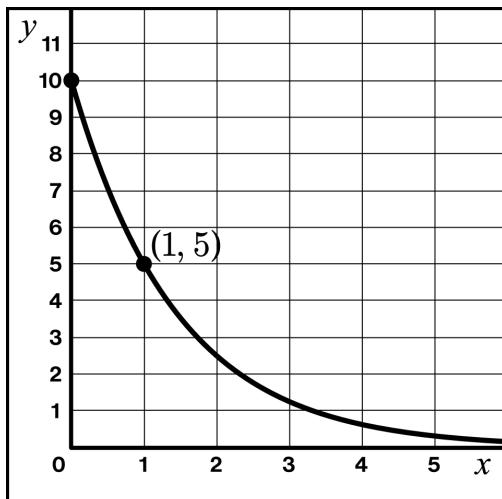
4. Explain how you determined which equation to match with Graph A.

Unit A1.1, Lesson 10: Practice Problems

Here are graphs of two different exponential relationships.

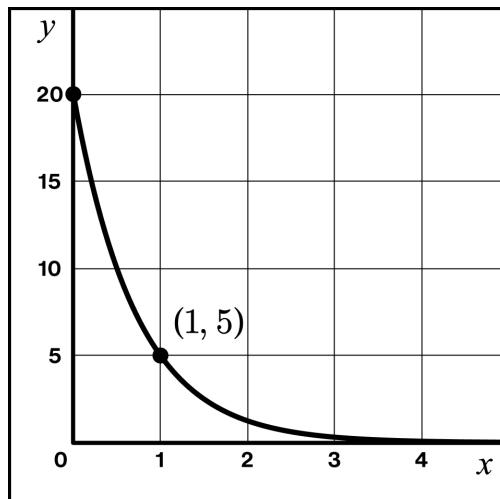
Write an equation to represent each graph.

5. Equation: _____



Graph A

6. Equation: _____



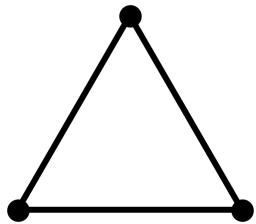
Graph B

7. Pick one of the graphs and explain how you determined the starting value and the constant ratio.

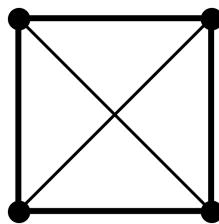
Graph _____ Equation: _____

Explore

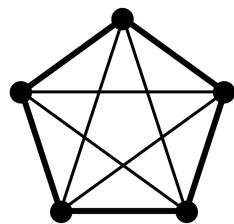
8. Explore the relationship between the number of diagonals in different polygons.



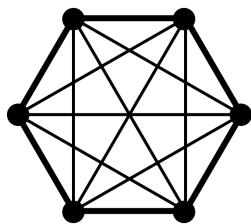
Sides: 3
Diagonals: 0



Sides: 4
Diagonals: _____



Sides: 5
Diagonals: _____



Sides: 6
Diagonals: _____

How many diagonals does an 8-sided polygon have? Explain your thinking.

Warm-Up

1. 16 $\frac{1}{9}$ (or equivalent) 180

Practice

2. Responses vary. The 12 is the starting value. You can see it in the point $(0, 12)$ in the graph.

The $\frac{1}{3}$ is the constant ratio. You can see that because 4 is $\frac{1}{3}$ of 12.

3.1 Graph A: **Equation C** 3.2 Graph B: **Equation A** 3.3 Graph C: **Equation B**

3.4 Responses vary.

- The graph starts at 50 and has a constant difference of 25. Equation C $y = 50 - 25x$ is the only equation with a constant difference.
- The graph shows a linear relationship, and I know that linear equations do not have exponents. Equation C $y = 50 - 25x$ is the only equation without an exponent.

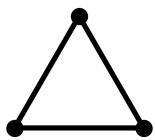
4.1 $y = 10 \cdot \left(\frac{1}{2}\right)^x$

4.2 $y = 20 \cdot \left(\frac{1}{4}\right)^x$

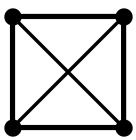
4.3 Responses vary.

- Graph A:** The point $(0, 10)$ shows a starting value of 10. I compared $(0, 10)$ to the point $(1, 5)$. Since 5 is $\frac{1}{2}$ of 10, I know that the constant ratio is $\frac{1}{2}$.
- Graph B:** The point $(0, 20)$ shows a starting value of 20. I compared $(0, 20)$ to the point $(1, 5)$. Since 5 is $\frac{1}{4}$ of 20, I know that the constant ratio is $\frac{1}{4}$.

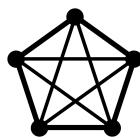
Explore



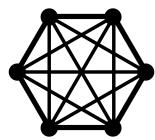
Diagonals: 0



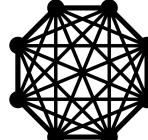
Diagonals: 2



Diagonals: 5



Diagonals: 9



Diagonals: 20

Explanations vary.

- I drew an 8-sided polygon and counted how many diagonals it had.
- There is pattern where $0 + 2 = 2$, $2 + 3 = 5$, $5 + 4 = 9$. If I continue the pattern, I get $9 + 5 = 14$ and $14 + 6 = 20$.

Unit A1.1, Lesson 11: Practice Problems

Name _____

Warm-Up

1. Order the expressions by value: 25^2 , $\left(\frac{1}{8}\right)^2$, 5^5 , 10^3 , $\left(\frac{1}{4}\right)^2$

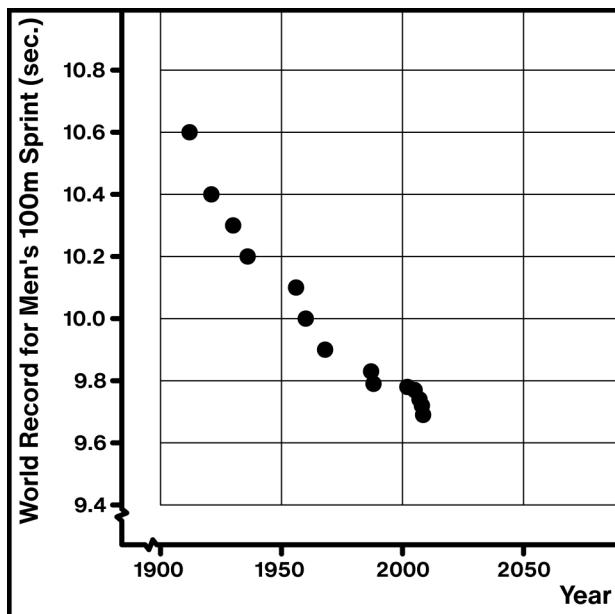
Least _____, _____, _____, _____, _____ Greatest

Practice

This graph shows the world record for the Men's 100m Sprint in the Olympics.

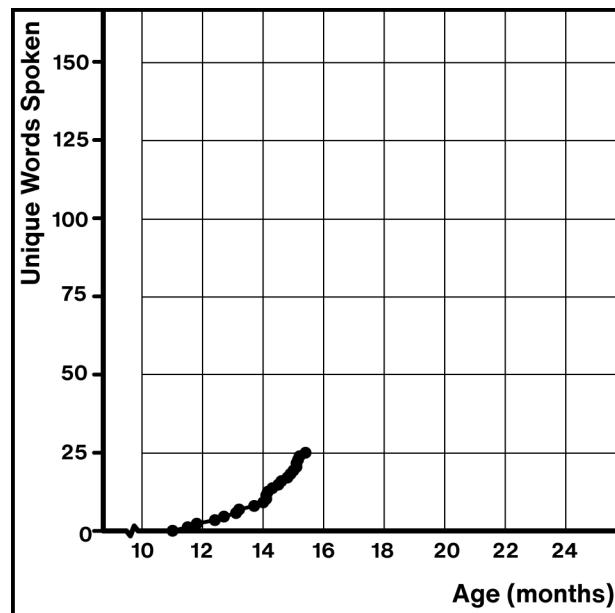
- 2.1 What does the point (1960, 10) mean?

- 2.2 Sketch a linear or exponential model to fit the data.
- 2.3 Use your model to predict what the Men's 100m record will be in 2040.



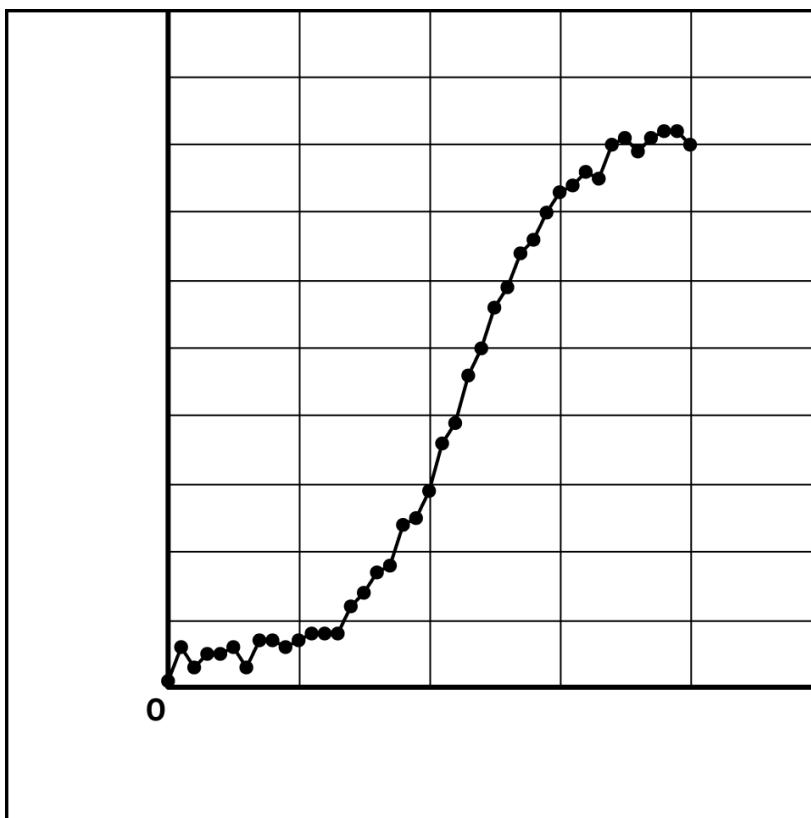
Ashley's sister spoke her first word at 11 months old. Ashley kept track of when she spoke new words and made this graph.

- 3.1 Sketch a linear or exponential model to fit the data.
- 3.2 How old do you think Ashley's sister will be when she speaks her 100th unique word?
- 3.3 Explain how the model you created is **wrong**.
- 3.4 Explain how the model you created is **useful**.



Explore

Here is a data set with missing labels.



4.1 Choose a situation that this data could represent. Label the axes accordingly.

4.2 Tell a story about the situation based on the data.

Reflect

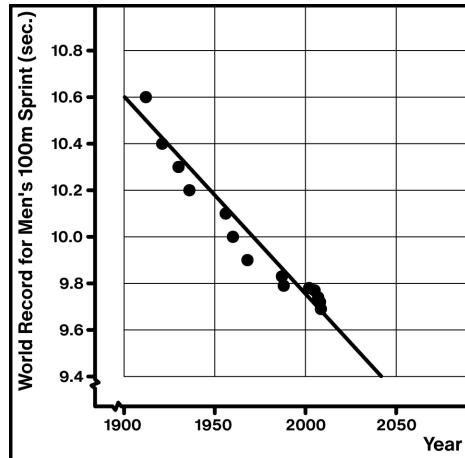
1. Put a star next to the question you understood best.
2. Use the space below to ask a question or share something you are proud of.

Warm-Up

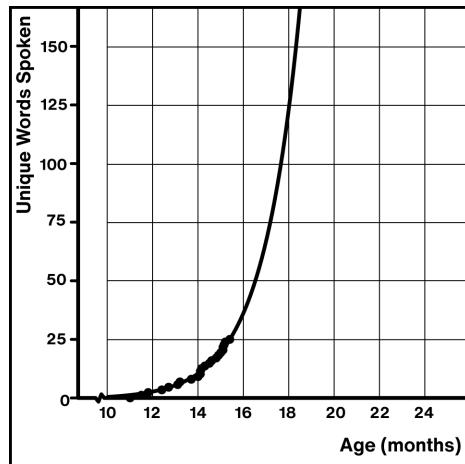
1. Least $\left(\frac{1}{8}\right)^2$, $\left(\frac{1}{4}\right)^2$, 25^2 , 10^3 , 5^5 Greatest

Practice

- 2.1 The point (1960, 10) tells us that in 1960 the world record for the Men's 100m Sprint was 10 seconds.
- 2.2 *Models vary. See the example on the right.*
- 2.3 *Responses vary based on the model created.*



- 3.1 *Models vary. See the example on the right.*
- 3.2 *Responses vary based on the model created.*
- 3.3 *Responses vary. The model is wrong because we can't know for sure that the number of words she speaks will continue to grow in the same way. Also, the data does not fit the model perfectly because it is real.*
- 3.4 *Responses vary. The model is useful because we can see the trend that she is starting to speak more words more frequently.*

**Explore**

- 4.1 *Situations vary. This could represent the number of people who watch cat videos over time. The x-axis represents the years since 2000 and the y-axis represents the number of views of cat videos in millions.*
- 4.2 *Stories vary based on the situation. In the early 2000s, people did not have good access to video technology so did not watch a lot of cat videos. In 2005, people started watching more cat videos and realized how great they are. This tapered off in 2015 as people started watching other kinds of videos, too.*



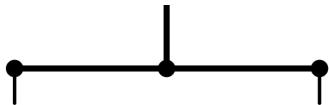
Science Mom Lesson 9

Unit A1.2, Lesson 1: Practice Problems

Name _____

Warm-Up

1. Draw a hanger that represents $3x + 5 = 4x + 1$.



Practice

2. Determine the solution to the equation from the warm-up: $3x + 5 = 4x + 1$.
3. Determine the solution to this equation: $5 = x + 1 + 3x$.
Draw a hanger if it helps with your thinking.

Solve each equation for x .

4.1 $3x + 19 = 40$

4.2 $4x + 18 = 6x$

4.3 $2x + 11 = 8x + 5$

4.4 $3(x + 1) = 30$

Unit A1.2, Lesson 1: Practice Problems**Looking Back**

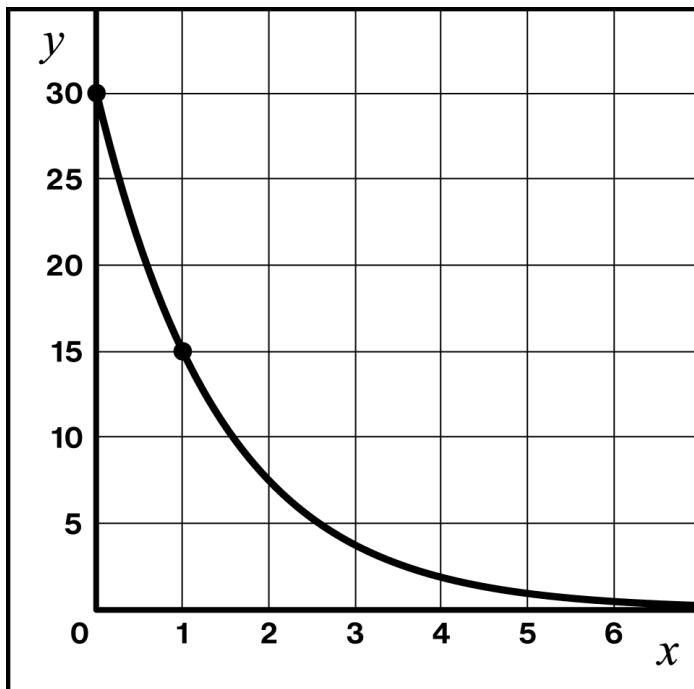
5. Which equation matches this graph?

A. $y = 30 - 15x$

B. $y = 30 \cdot \left(\frac{1}{2}\right)^x$

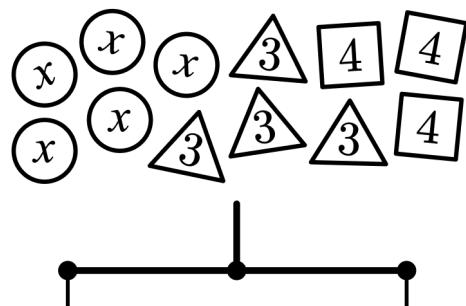
C. $y = 30 \cdot 2^x$

Explain how you decided which equation matched the graph.

**Explore**

- 6.1 Create a hanger using **all** of these shapes:

- 5 circles
- 4 triangles
- 3 squares



- 6.2 Determine the value of x that will balance it.

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.

Warm-Up

1. See the image on the right.

Practice

2. $x = 4$

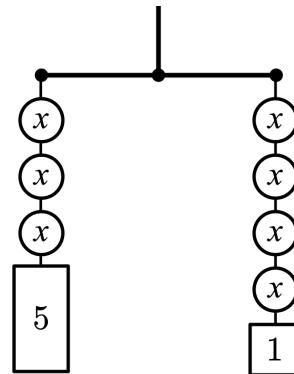
3. $x = 1$

4.1 $x = 7$

4.2 $x = 9$

4.3 $x = 1$

4.4 $x = 9$

**Looking Back**

5. $y = 30 \cdot \left(\frac{1}{2}\right)^x$

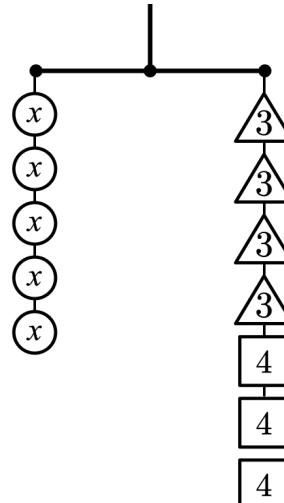
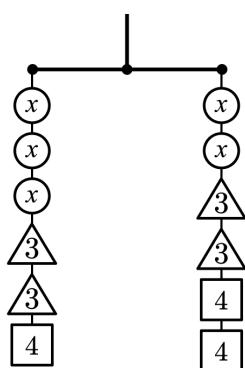
Explanations vary. The graph is not linear, so the equation can't be $y = 30 - 15x$. The outputs are decreasing, so $y = 30 \cdot 2^x$ doesn't make sense. The point $(1, 15)$ is on the graph and $30 \cdot \left(\frac{1}{2}\right)^1 = 15$.

Explore

6. Responses vary.

$$3x + 10 = 2x + 14, x = 4$$

$$5x = 24, x = \frac{24}{5} \text{ (or equivalent)}$$



Unit A1.2, Lesson 2: Practice Problems

Name _____

Warm-Up

1. Select all of the equations where $x = 0.5$ is a solution.

$8 = 10 + 4x$

$13 + 7x = 20 - 7x$

$3x + 8 = 9.5$

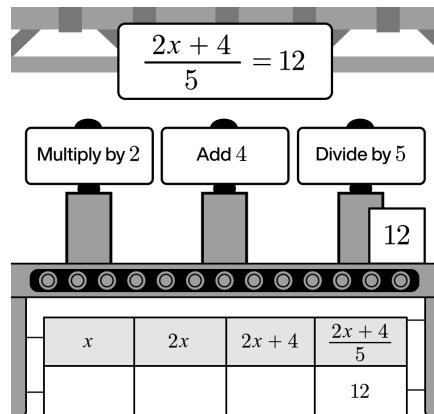
$4 = -2x + 6$

$5x = -2 + x$

Practice

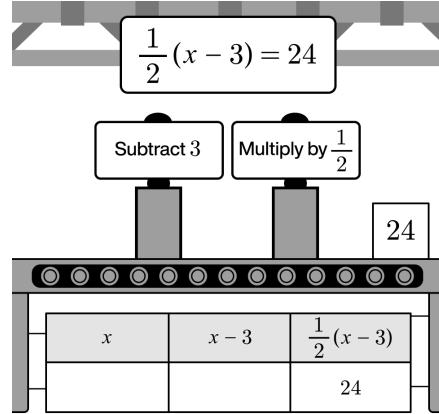
2. Here is a machine for the equation $\frac{2x+4}{5} = 12$.

Solve this equation for x .



3. Here is a machine for the equation $\frac{1}{2}(x - 3) = 24$.

Solve this equation for x .



4. Solve for x : $5(3x - 2) = -55$

5. Solve for x : $\frac{6x-2}{2} = x + 9$

Unit A1.2, Lesson 2: Practice Problems

Zwena made a mistake when solving $3(x - 4) = 5x$ for x .

6.1 Show or explain her mistake.

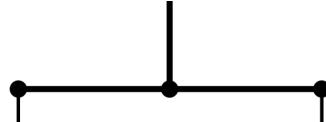
6.2 What is the correct solution to this equation?

Step 1:	$3(x - 4) = 5x$
Step 2:	$3x - 12 = 5x$
Step 3:	$8x - 12 = 0$
Step 4:	$8x = 12$
Step 5:	$x = 1.5$

Explore

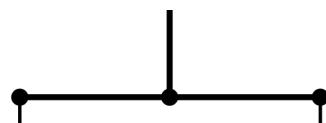
7.1 Create a hanger using all of these shapes so that the value of x is positive and **as small as possible**.

- 5 circles
- 4 triangles
- 3 squares



7.2 Create a hanger using all of these shapes so that the value of x is positive and **as large as possible**.

- 5 circles
- 4 triangles
- 3 squares

**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.

Warm-Up

1. $\checkmark 3x + 8 = 9.5 \quad \checkmark 13 + 7x = 20 - 7x$

Practice

2. $x = 28$

3. $x = 51$

4. $x = -3$

5. $x = 5$

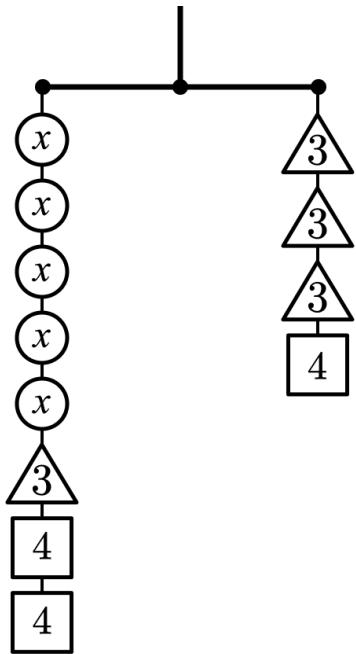
6.1 *Explanations vary.* Zwena added $5x$ to both sides of the equation, but $5x + 5x$ does not equal 0.

6.2 $x = -6$

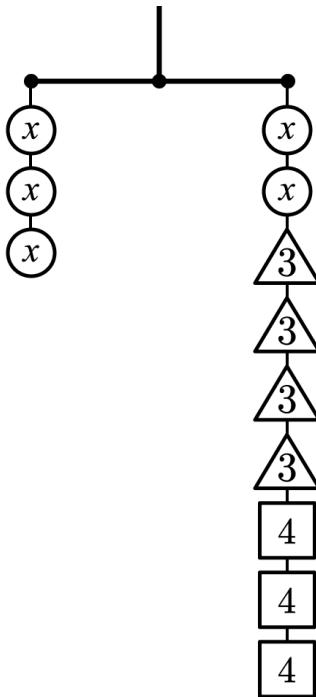
Explore

Responses vary

7.1 $5x + 11 = 13, x = 0.4$



7.2 $3x = 2x + 24, x = 24$



Unit A1.2, Lesson 5: Practice Problems

Name _____

Warm-Up

1. Select **all** the equations where $x = 2$ is a solution.

A. $\frac{x}{4} = 8$

B. $19 = 2(x + 6) + 3$

C. $2x + 10 = 2x + 8$

D. $5 - 3x = -1$

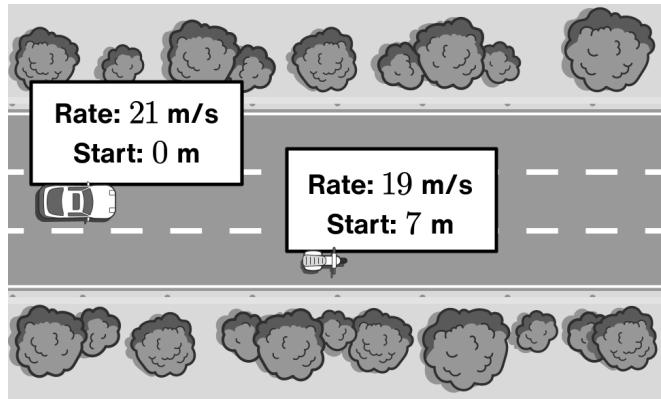
E. $4 - x = x$

Practice

2. The car and scooter are moving at constant speeds.

The time, t , when they will be in the same position is represented by $21t = 19t + 7$.

When will the car and scooter be in the same position?



3. The time, t , when two vehicles will be in the same position is represented by $10t = 2.5t$.

When will these two vehicles be in the same position?

A. Once

B. Never

C. Always

4. Here is Kaindra's work to solve $16x = 10x$.

She says there is no solution.

Is this correct? Show or explain your thinking.

$$\begin{array}{rcl} 16x & = & 10x \\ \hline x & & x \\ 16 & = & 10 \end{array}$$

There is no solution.



Unit A1.2, Lesson 5: Practice Problems

5. Sort the equations by their number of solutions by writing the letter of the equation in the appropriate column.

A. $5t = 3t$

B. $2t = 10 - 2t$

C. $15 - 3(t + 5) = -3t$

D. $4t + 7 = 4(t + 2)$

E. $6t + 2 = -3 + 6t$

One Solution	No Solution	Infinite Solutions

Looking Back

6. Select **all** the expressions that are equivalent to $2(x + 3)$.

$(x + 3) \cdot 2$

$2x + 6$

$2x + 3 \cdot 2$

$2x + 3$

$2x + 5$

Explore

7. Using the digits 0–9, fill in each blank to create two different equations where the solution is $x = 1$.

You may use the digits more than once.

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

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

Explain what you notice about your equations.

Reflect

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

Warm-Up

1. ✓ $5 - 3x = -1$ ✓ $19 = 2(x + 6) + 3$ ✓ $4 - x = x$

Practice

2. 3.5 seconds

3. Once.

Explanations vary. $t = 0$ makes the equation true because $10(0) = 2.5(0)$. No other values make the equation true, so the vehicles will be in the same position once.

4. No.

Explanations vary. If Kaindra subtracted $10t$ from each side of the equation, she would get $6t = 0$. Dividing by 6, we get a solution: $t = 0$.

5.	One Solution	No Solution	Infinite Solutions
	A. $5t = 3t$ B. $2t = 10 - 2t$	D. $4t + 7 = 4(t + 2)$ E. $6t + 2 = -3 + 6t$	C. $15 - 3(t + 5) = -3t$

6. ✓ $(x + 3) \cdot 2$
✓ $2x + 6$
✓ $2x = 3 \cdot 2$

Explore

7. Responses vary.

- $1x + 8 = 2x + 7$ and $3x + 6 = 4x + 5$
- $7x + 1 = 6x + 2$ and $5x + 3 = 8x + 0$

Explanations vary. The digits used on each side of each equation sum to the same total.



Science Mom Lesson 12

Unit A1.2, Lesson 6: Practice Problems

Name _____

Warm-Up

1. Select **all** the expressions that are equivalent to $8 - 12 - (6 + 4)$.

$(6 + 4) - 8 - 12$

$8 - 6 - 12 + 4$

$8 - 12 - 6 - 4$

$8 - (6 + 4) - 12$

Practice

Adriana spent \$24 on fruit punch and lemonade.

Fruit punch costs \$3 per bottle. Lemonade costs \$2 per bottle.

- 2.1 How many bottles of **fruit punch** could Adriana buy if she did not get any lemonade?

- 2.2 How many bottles of **lemonade** could Adriana buy if she did not get any fruit punch?

Adriana wrote this equation to represent the situation: $3F + 2L = 24$.

- 3.1 Use the equation to help you complete the table.

- 3.2 Which equation represents the same relationship?

A. $L = 12 - \frac{3}{2}F$ B. $L = 8 - \frac{3}{2}F$

C. $L = 8 - \frac{2}{3}F$ D. $L = 12 - \frac{2}{3}F$

F	L
2	
6	

Here is an equation: $2x + 4y = 80$.

- 4.1 Use the equation to help you complete the table.

- 4.2 Which equation represents the same relationship?

A. $y = 20 - 2x$ B. $y = 40 - 2x$

C. $y = 20 - \frac{1}{2}x$ D. $y = 40 - \frac{1}{2}x$

x	y
6	
12	



Unit A1.2, Lesson 6: Practice Problems

5. Nia is buying bananas and apples for her family. Bananas cost \$0.50 each. Apples cost \$1.00 each. Select **all** combinations of bananas and apples that Nia could buy for exactly \$3.50.

1 banana and 3 apples

5 bananas and 1 apple

3 bananas and 2 apples

1 banana and 2 apples

5 bananas and 2 apples

Looking Back

6. Here are two equations.

Equation A

$$48 - 5x = 13$$

Equation B

$$5x = 35$$

Explain how you know that these equations are equivalent.

Explore

7. Using the digits 0–9 without repeating, create two equivalent equations.

$$\boxed{}x + \boxed{}y = \boxed{}$$

$$y = \boxed{} - \boxed{}x$$

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 are proud of.

Warm-Up

1. $8 - 12 - 6 - 4$ and $8 - (6 + 4) = 12$

Practice

2.1 8 bottles of fruit punch

2.2 12 bottles of lemonade

3.1

F	L
2	9
6	3

3.2 $L = 12 - \frac{3}{2} F$

4.1

x	y
6	17
12	14

4.2 $y = 20 - \frac{1}{2}x$

5.

- ✓ 3 bananas and 2 apples ✓ 5 bananas and 1 apple ✓ 1 banana and 3 apples

Looking Back

6. *Responses vary.*

- The solution to each equation is $x = 7$.
- If you subtract 48 from both sides, the equation would be $-5x = -35$. This is equivalent to $5x = 35$ if you divide or multiply both sides by -1 .

Explore

7. *Responses vary.*

- $6x + 2y = 8$ and $y = 4 - 3x$
- $8x + 2y = 6$ and $y = 3 - 4x$

Unit A1.2, Lesson 8: Practice Problems

Name _____

Warm-Up

1. Select **all** the equations where $x = -2$ is a solution.

$4x = 4 + 2x$

$19 = 2(x - 6) + 3$

$2(x + 5) = x + 8$

$5 + 3x = -1$

$3x - 5 = 1$

Practice

- 2.1 A teacher bought packs of stickers and packs of pencils for her class. She spent \$21.

- Stickers cost \$1.50 per pack.
- Pencils cost \$3.50 per pack.

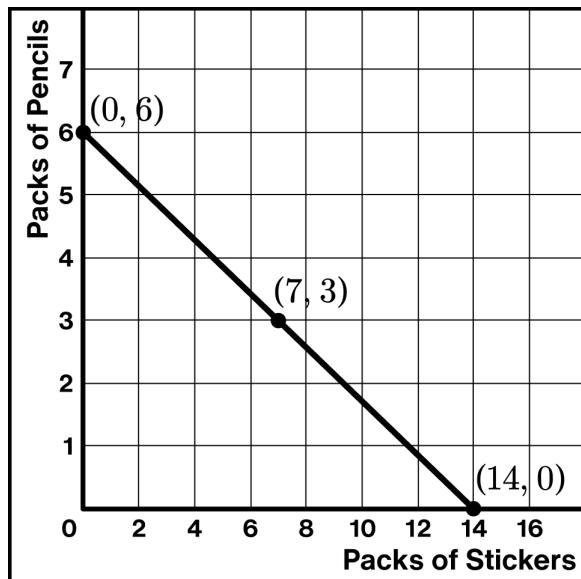
Show or explain how you know this graph represents this situation.

- 2.2 Circle a coordinate and explain what it means in this situation.

(0, 6)

(7, 3)

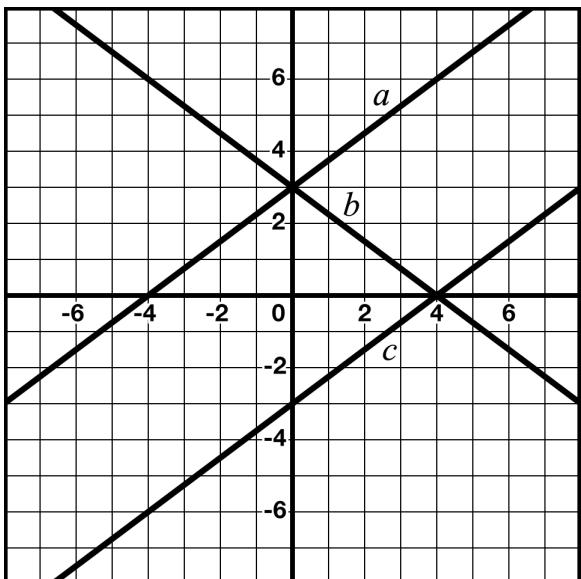
(14, 0)



3. Which line represents $12 = 3x + 4y$?

- A. Line *a* B. Line *b* C. Line *c*

Show or explain how you know.



Unit A1.2, Lesson 8: Practice Problems

4. Which equation is equivalent to $15x + 3y = 2$?

A. $y = \frac{2}{3} + 5x$

B. $y = \frac{2}{3} - 5x$

C. $y = 2 - 15x$

D. $y = 2 - 5x$

Looking Back

5.1 Solve for y : $-3x + 4y = 28$

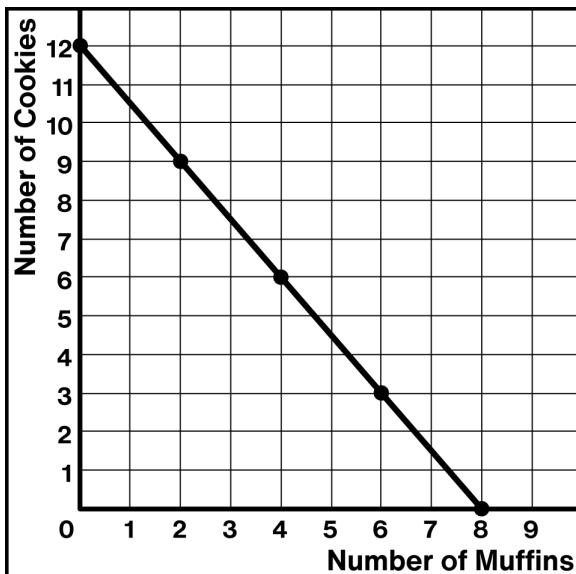
5.2 Solve for y : $6x - 3y = 36$

6. Jordan had a bake sale. Muffins cost \$3 each and cookies cost \$2 each. Jordan earned \$24.

Here is a graph of Jordan's situation.

Select **all** the combinations of muffins and cookies they could have sold.

- 0 muffins and 8 cookies
- 9 muffins and 2 cookies
- 2 muffins and 9 cookies
- 6 muffins and 4 cookies
- 4 muffins and 6 cookies

**Reflect**

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

Warm-Up

1. ✓ $2(x + 5) = x + 8$
✓ $5 + 3x = -1$

Practice

- 2.1 *Explanations vary.* I know this graph matches this situation because each coordinate pair corresponds to a total of \$21. When I multiply the x -value by 1.50 and the y -value by 3.50, the total is always 21.
- 2.2 *Responses vary.*
- (0, 6) means that the teacher bought 0 packs of stickers and 6 packs of pencils for \$21.
 - (7, 3) means that the teacher bought 7 packs of stickers and 3 packs of pencils for \$21.
 - (14, 0) means that the teacher bought 14 packs of stickers and 0 packs of pencils for \$21.
3. Line b . *Explanations vary.* When I solve $12 = 3x + 4y$ for y , I get $y = 3 - \frac{3}{4}x$. Line b is the only choice that starts at 3 on the y -axis and has a negative slope.
4. B. $y = \frac{2}{3} - 5x$
Explanations vary. To solve $15x + 3y = 2$ for y , first subtract $15x$ from each side, then divide everything by 3.

Looking Back

- 5.1 $y = \frac{3}{4}x + 7$ (or equivalent)
- 5.2 $y = -12 + 2x$ (or equivalent)
6. ✓ 2 muffins and 9 cookies
✓ 4 muffins and 6 cookies



Science Mom Lesson 14

Unit A1.2, Lesson 10: Practice Problems

Name _____

Warm-Up

1. For each constraint, write the letter of the matching inequality.

A. $a \leq 10$	B. $a > 10$	C. $a \geq 10$
----------------	-------------	----------------

_____ a is less than or equal to 10. _____ a is as much as 10.

_____ a is greater than or equal to 10. _____ a is at most 10.

_____ a is at least 10. _____ a is greater than 10.

Practice

2. Marquis wants to work at least 20 hours a week to earn enough money for a concert.

Which inequality represents x , the number of hours Marquis wants to work?

A. $x > 20$ B. $x < 20$ C. $x \leq 20$ D. $x \geq 20$

3. Demetrius can spend as much as \$50 on shirts. Shirts, s , cost \$16 each at a nearby store.

Which inequality represents this situation?

A. $50s \leq 16$ B. $50s \geq 16$ C. $16s \geq 16$ D. $16s \leq 50$

Explain your thinking.

4. List **at least three** values for x that would make $8 + 2x \leq 20$ true.



Unit A1.2, Lesson 10: Practice Problems

Write an inequality for each constraint. Use t for time (in hours).

5.1 Trevor practices his clarinet at least 1 hour each day.

5.2 At some colleges, students must work 20 hours or less per week.

5.3 The American Academy of Pediatrics recommends teenagers play video games for no more than 2 hours each day.

Write a constraint for each inequality. Be sure to specify what the variables represent.

6.1 $x \geq 3$

6.2 $5 > y$

Looking Back

Solve each equation.

7.1 $4x - 6 = 12 - 2x$

7.2 $\frac{1}{3}x - 8 = 12 - 3x$

7.3 $2x + 7 - 3x = \frac{5}{2}$

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.

Warm-Up

1.

 A a is less than or equal to 10. **C** a is greater than or equal to 10. **C** a is at least 10. **A** a is as much as 10. **A** a is at most 10. **B** a is greater than 10.**Practice**2. $x \geq 20$ 3. $16s \leq 50$

Explanations vary. $16s$ represents \$16 for each shirt and 50 represents \$50, which is the most that Demetrius can spend. Demetrius can spend \$50 and anything less than that, so I used the symbol \leq .

4. *Responses vary. Any value of $x \leq 6$ is acceptable.*

$$x = 0 ; x = 1 ; x = \frac{5}{3}$$

5.1 $t \geq 1$ 5.2 $t \leq 20$ 5.3 $t \leq 2$

6.1 *Responses vary.* Sahana needs to practice playing the clarinet at least 3 hours per week.
 x represents the number of hours that she practices this week.

6.2 *Responses vary.* Your height must be less than 5 feet to ride the kids rollercoaster at the fair.
 y represents your height.

Looking Back

7.1 3

7.2 6

7.3 $\frac{9}{2}$ (or equivalent)

Unit A1.2, Lesson 11: Practice Problems

Name _____

Practice

1. Match each statement to the inequality.

$$h > 50$$

h is greater than **or** equal to a number

$$30 \leq h$$

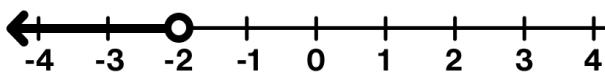
h is less than **or** equal to a number

$$h \leq 20$$

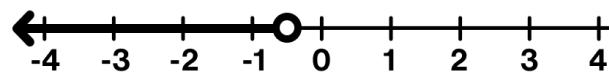
h is greater than a number

2. Which graph represents the solutions to $2x < -4$?

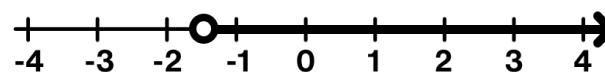
A.



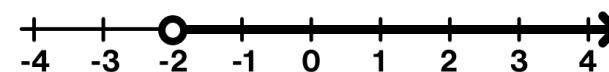
B.



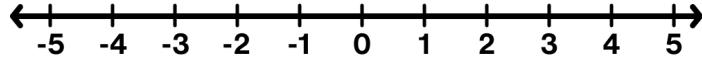
C.



D.

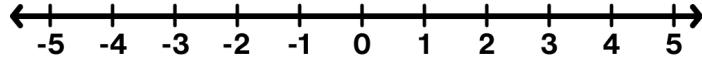


3. Graph the solutions to $2x < 10$ on the number line. Then explain your thinking.



4. Leo is solving $-15 + x < -14$. He knows the solution to $-15 + x = -14$ is $x = 1$.

How can he determine whether the solutions to $-15 + x < -14$ are $x < 1$ or $x > 1$?



5. Diego says that $x = 5$ is a solution to the inequality $-3x > 9$ because when you divide both sides by -3 , you get $x > -3$. Is this correct?

Explain your thinking.

Unit A1.2, Lesson 11: Practice Problems

A community pool offers two different membership plans:

- Plan A: \$4 per visit
- Plan B: An initial \$12 fee, then \$2 per visit

Brielle wants to spend \$48 to swim at the community pool this month.

6.1 How many times could she visit the pool with Plan A?

6.2 How many times could she visit the pool with Plan B?

6.3 Nekeisha says that it is cheaper for her to use Plan A than Plan B.

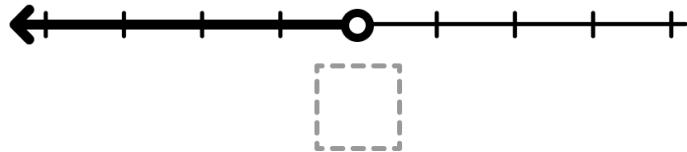
Write an inequality to represent this situation.

Use x for the number of visits to the pool.

Explore

7. Using the digits 0–9 without repeating, fill in each blank to create an inequality and the graph of its solutions.

$$\boxed{}x + \boxed{} > \boxed{}x$$

**Reflect**

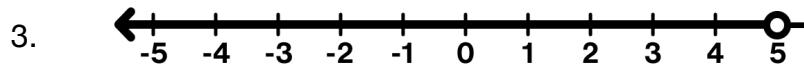
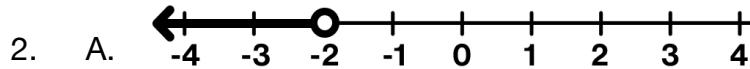
1. Put a question mark next to a problem you would like to compare with a classmate.
2. Use the space below to ask a question or share something you are proud of.

Warm-Up

1. $h \leq 20$: h is less than **or** equal to a number.

$h > 50$: h is greater than a number.

$30 \leq h$: h is greater than **or** equal to a number.

Practice

Explanations vary. If I divide each side of $2x < 10$ by 2, then I get $x < 5$, which would be represented by a graph with an open circle at 5 and all of the values that are less than 5 are solutions.

4. *Explanations vary.* The solutions are $x < 1$ because any value that is less than 1 makes the original inequality true.
5. No. *Explanations vary.* I know $x = 5$ is not a solution because when you substitute 5 for x in $-3x > 9$, you get a false statement.

6.1 12 times

6.2 18 times

6.3 $4x < 12 + 2x$ **or** $4x \leq 12 + 2x$ (or equivalent)

Explore

7. Responses vary.
- $3x + 8 > 5x$ and $x < 4$
 - $4x + 6 > 7x$ and $x < 2$



Science Mom Lesson 16

Unit A1.2, Lesson 12: Practice Problems

Name _____

Warm-Up

1. Imani is going shopping with a budget of \$125.

Which inequality represents the amount of money that Imani can spend while shopping?

A. $x > 125$

B. $x \leq 125$

C. $x \geq 125$

D. $x < 125$

Practice

2. Here is Isabella's work solving the inequality

$$7x + 5 > 2x + 35.$$

Explain how solving the equation helps Isabella solve the inequality $7x + 5 > 2x + 35$.

$$7x + 5 > 2x + 35$$

$$7x + 5 = 2x + 35$$

$$5x = 30$$

$$x = 6$$

3. Solve this inequality: $-3x + 4 \geq 12$. Use the number line if it helps with your thinking.



Solve each inequality.

4.1 $4x + 5 \geq 37$

4.2 $-6 + \frac{x}{2} < 7$

4.3 $-8x - 6 > 2x - 26$



Unit A1.2, Lesson 12: Practice Problems

5. Here is an inequality: $7x + 6 < 3x + 2$. Select **all** the values that are solutions.

$x = 1$

$x = 0$

$x = -1$

$x = -2$

$x = -8$

Rudra takes medicine every day. The equation $y = 24\left(\frac{1}{2}\right)^x$ represents the amount of medicine in Rudra's body (in milligrams) x hours after he takes it.

- 6.1 How much medicine does Rudra take? 6.2 How much medicine is still in his body after 1 hour?

Explore

7. Using the digits 0–9, fill in each blank such that the two inequalities are equivalent.

$$\boxed{}x + \boxed{} < \boxed{}x + \boxed{}$$

$$x > \boxed{}$$

Reflect

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

Warm-Up

1. $x \leq 125$

Practice

2. *Responses vary.* Solving the equation is a great first step to solving the inequality. Now that we know the solution is $x = 6$, we can try a value for x in the original inequality and see if it makes a true statement to decide which symbol to use.

3. $x \leq -\frac{8}{3}$ (or equivalent)

4.1 $x \geq 8$

4.2 $x < 26$

4.3 $x < 2$

5. ✓ $x = -2$
✓ $x = -8$

6.1 24 milligrams

6.2 12 milligrams

Explore7. *Responses vary.*

- $2x + 7 < 4x + 1$ and $x > 3$
- $5x + 6 < 8x + 0$ and $x > 2$

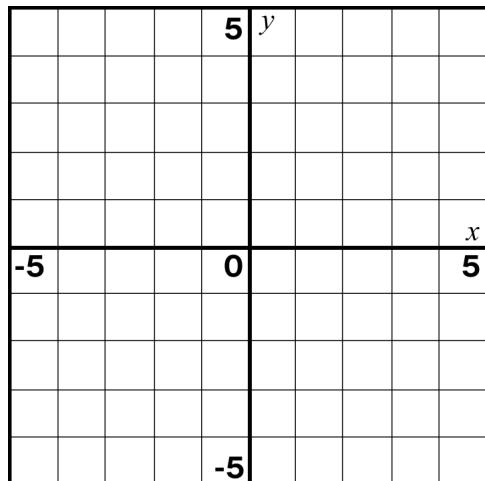
Unit A1.2, Lesson 13: Practice Problems

Name _____

Warm-Up

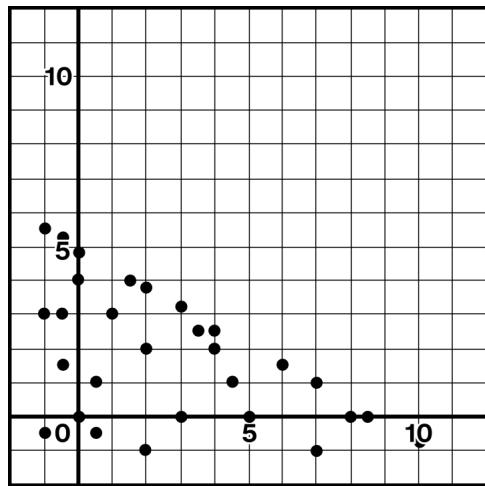
1. Plot and label each point on the graph.

A	B	C	D	E
(-4, 0)	(4, 0)	(3, -4)	(0, 4)	(-1, -2)

**Practice**

2. This graph shows some solutions to $5x + 9y < 45$.
Select **all** of the points that are also solutions.

- (1, 1)
- (4, 0)
- (10, 4)
- (0, 10)
- (6, -1)

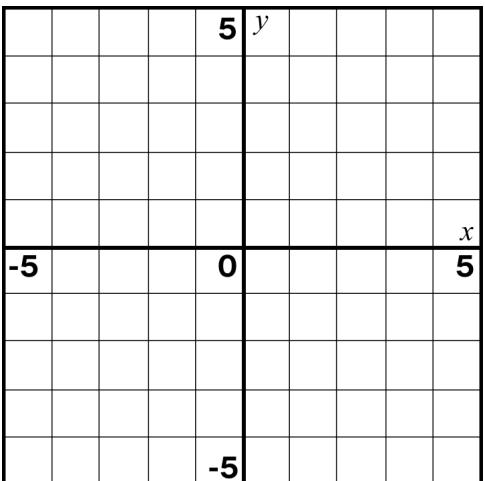


3. Here is an inequality: $x \leq y$.

Write at least three coordinate pairs that are solutions to this inequality.

Use the graph if it helps with your thinking.

(x, y)
1.
2.
3.



Unit A1.2, Lesson 13: Practice Problems

Tyler can spend up to \$45 on shirts and socks. A shirt costs \$10 and a pair of socks cost \$2.50.

- 4.1 Which inequality represents this situation?
- Use t for the number of shirts.
 - Use p for the number of pairs of socks.
- A. $10t + 2.50p > 45$
B. $10t + 2.50p < 45$
C. $10t + 2.50p \geq 45$
D. $10t + 2.50p \leq 45$
- 4.2 Explain how you know $t = 2$ and $p = 1$ are solutions in this situation.

Looking Back

Write an inequality to show each situation.

- 5.1 Duri will stay warm in their sleeping bag when the temperature is at least 30°F.
Use t to represent temperatures where Duri will stay warm in their sleeping bag.
- 5.2 Duri wants their backpack to weigh less than 45 pounds.
Use w to represent weights where Duri can carry their backpack.

Here is an equation: $6x + 2y = 36$.

- 6.1 For each value of x , determine the value of y .

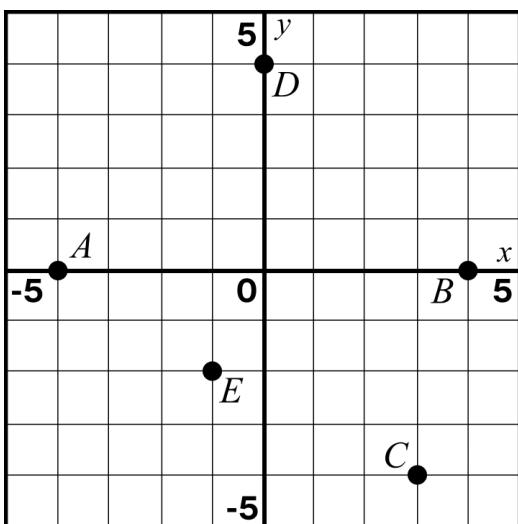
x	y
2	
4	

- 6.2 Which equation represents the same relationship?

- A. $y = 6 - 3x$ B. $y = 18 - \frac{1}{3}x$ C. $y = 18 - 3x$ D. $y = 6 - \frac{1}{3}x$

Warm-Up

1.



Practice

2. ✓ (1, 1) ✓ (4, 0) ✓ (6, - 1)

3. Responses vary. Accept all responses where x is less than or equal to y . (0, 1), (-2, 2), (3, 5)

4.1 D. $10t + 2.50p \leq 45$

4.2 Explanations vary.

- I know that $t = 2$ and $p = 1$ are solutions because when I substitute $t = 2$ and $p = 1$ into the inequality $10t + 2.50p \leq 45$, I get $22.50 \leq 45$, which is true.
- I know that $t = 2$ and $p = 1$ are solutions because the cost of 2 shirts and 1 pair of socks is less than \$45.

Looking Back

5.1 $t \geq 30$

5.2 $w < 45$

6.1

x	y
2	12
4	6

6.2 C. $y = 18 - 3x$

Unit A1.2, Lesson 14: Practice Problems

Name _____

Warm-Up

1. Select **all** of the inequalities that are true when $x = 5$.

$x < 2$

$x < 10$

$x < 5$

$x \geq 5$

$x \geq 8$

Practice

Here is a graph of the equation $x + 2y = 7$.

- 2.1 Which of these points (x, y) is a solution to the inequality $x + 2y < 7$?

A. $(0, 0)$

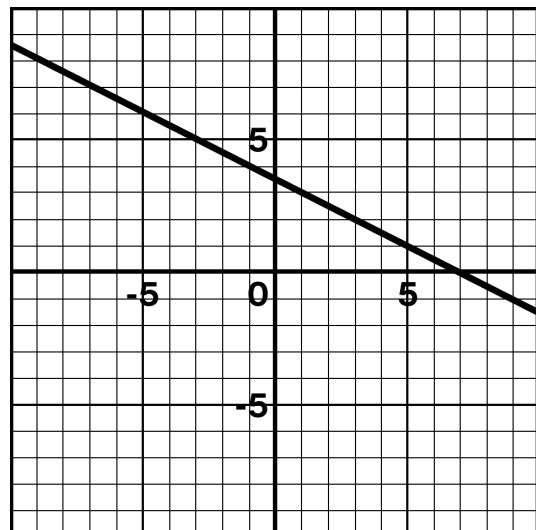
B. $(7, 0)$

C. $(0, 7)$

D. $(10, 0)$

- 2.2 Complete the graph of $x + 2y < 7$.

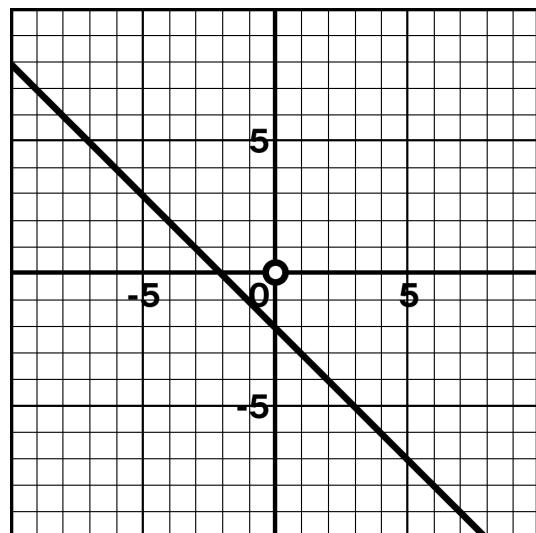
Explain how you decided which region to shade.



3. Here is an inequality: $x + y \leq -2$.

- Ada graphed the equation $x + y = -2$.
- Ada noticed that $(0, 0)$ is **not** a solution to $x + y \leq -2$.

How can Ada use this information to graph the solutions to this inequality?





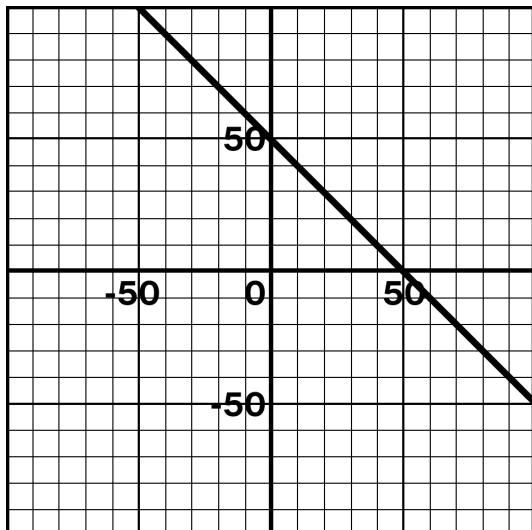
Unit A1.2, Lesson 14: Practice Problems

A food truck only sells hot dogs and hamburgers.
They want to sell 50 items or more each day.

- 4.1 Which inequality represents this situation?

- A. $x + y > 50$ B. $x + y \geq 50$
C. $x + y \leq 50$ D. $x + y < 50$

- 4.2 Complete the graph so that it represents all the solutions to the inequality for this situation.



For each graph, write the letter of the inequality that matches it.

You will have two inequalities left over.

A. $4 > x$

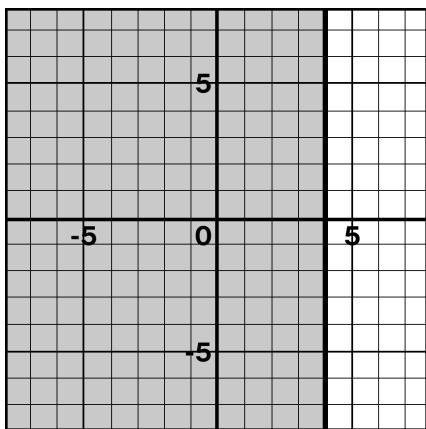
B. $4 \geq y$

C. $y < 4$

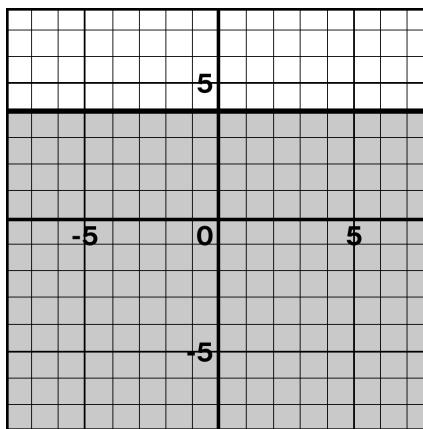
D. $x > 4$

E. $x \leq 4$

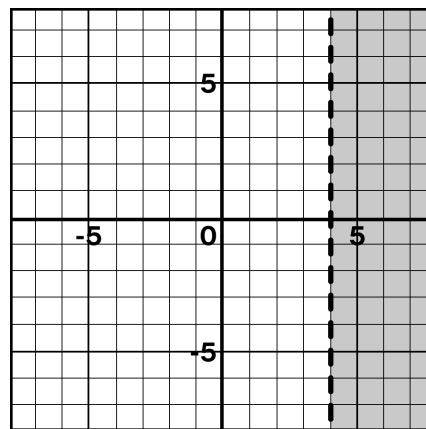
5.1



5.2



5.3



Inequality _____

Inequality _____

Inequality _____

Looking Back

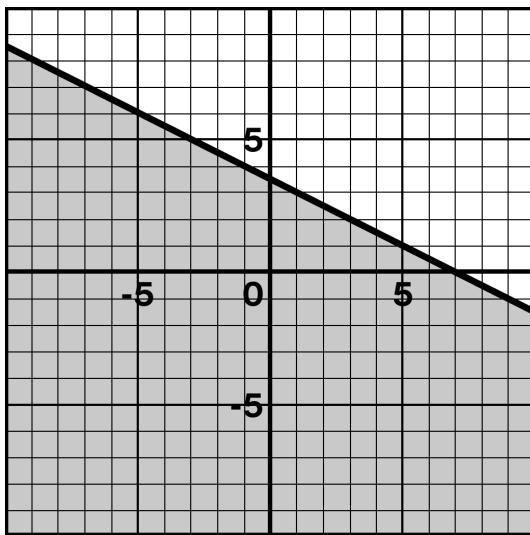
6. Write two equations that are equivalent to $2(3x - 1) = 6 + 4x - 10$.

Warm-Up

1. ✓ $x < 10$ ✓ $x \geq 5$

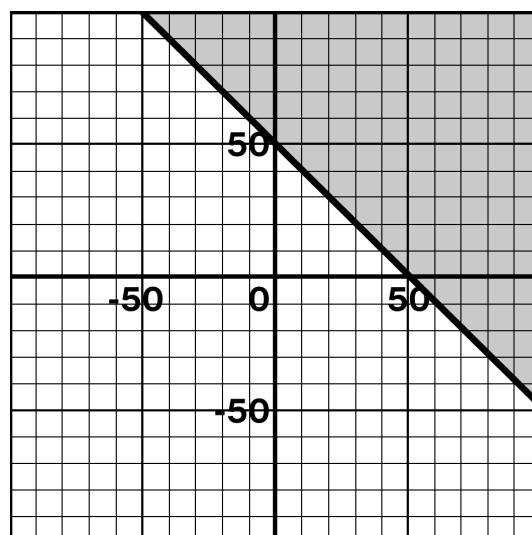
Practice

2.1 A. $(0, 0)$



4.1 $x + y \geq 50$

4.2



Explanations vary. The line should be dashed because the inequality sign is $<$. When I plugged $(0, 0)$ into the inequality, I got a true statement, so I shaded that side of the line.

3. *Responses vary.* Since the inequality symbol in this problem is \leq , the line should be solid. Ada knows that $(0, 0)$ is not a solution, so Ada should shade the side of the line that does not include that point.

5.1 E. $x \leq 4$

5.2 B. $4 \geq y$

5.3 D. $x > 4$

Looking Back

6. *Responses vary.*

- $3x - 1 = 3 + 2x - 5$
- $6x - 2 = 6 + 4x - 10$
- $2(3x - 1) = 4x - 4$
- $x = -1$



Science Mom Lesson 19

Unit A1.3, Lesson 1: Practice Problems

Name _____

Warm-Up

1. Which would **not** be a good survey question?
 - A. What grade are you in?
 - B. How many books did you read in the last year?
 - C. How many inches are in 1 foot?
 - D. How many pets do you have?

Practice

2. For each question, write the letter of the type of data they produce.

A. Quantitative Data

_____ Do you have any pets?

_____ How many siblings do you have?

B. Categorical Data

_____ What language is spoken most in your home?

_____ What is your age?

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

- How many people live in your home?
- What is your favorite breakfast food?
- How did you travel to school this morning?
- How many minutes did it take you to get ready this morning?
- What is the last thing you ate or drank?

4. Callen claims that players on the school basketball teams are taller than players on the soccer teams. Write two survey questions that Callen could ask to investigate the claim.

1.

2.

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



Unit A1.3, Lesson 1: Practice Problems

Looking Back

6. Solve for x . $5(3x - 2) = -55$

A scientist is studying how two different types of bacteria grow. The two tables represent the number of cells of bacteria in the days since her experiment began.

If the patterns continue, which will there be more of:

- 7.1 After 4 days? (Circle one.)

Bacteria A Bacteria B There will be the same

- 7.2 After 10 days? (Circle one.)

Bacteria A Bacteria B There will be the same

Show or explain how you decided.

Day	Cells of Bacteria A
0	1
1	3
2	9
3	27
4	?

Day	Cells of Bacteria B
0	80
1	100
2	120
3	140
4	?

Explore

Here are two questions that generate data. Jaylin is unclear whether the data is categorical or quantitative.

- 8.1 Choose one of the questions and explain why it is unclear.

- 8.2 What is another question that might generate data that is unclear?

The image shows two separate speech bubbles. The top bubble contains the question "What is your zip code?" followed by three smaller speech bubbles containing the responses "94117", "43272", and "06001". The bottom bubble contains the question "What is your birthday?" followed by three smaller speech bubbles containing the responses "January 7", "March 18", and "December 23".

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.

Warm-Up

1. C. How many inches are in 1 foot?

Practice

2. B Do you have any pets?

A How many siblings do you have?

B What language is spoken most in your home?

A What is your age?

3. ✓ How many people live in your home?

✓ How many minutes did it take you to get ready this morning?

4. Responses vary.

- What team are you on?
- What is your height?

5. Responses vary.

- What is your favorite food?
- What do you like to eat for breakfast?
- Do you prefer salty or sweet food?

Looking Back

6. $x = -3$

- 7.1 4 days: Bacteria B

- 7.2 10 days: Bacteria A

Explanations vary.

- I continued the pattern in each table. Bacteria A grows 3 times bigger each day; Bacteria B grows by 40 each day.
- Bacteria A grows by tripling, so even though there will not be more at 4 days, there will be much more after 10 days.

Explore

- 8.1 Responses vary. “What is your zip code?” is unclear because the responses are numbers but they are not numbers that really measure anything. “What is your birthday?” is unclear because the responses have both words and numbers.

- 8.2 Responses vary.

- What is your address?
- What is your phone number?

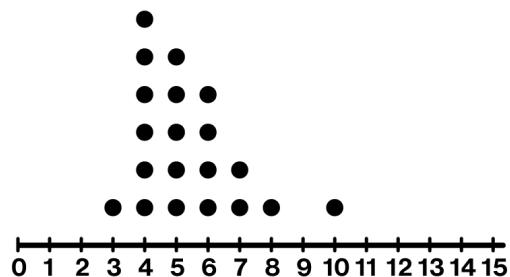
Warm-Up

1. Which would produce *categorical* data?
- A. What is your height?
 - B. Do you have any pets?
 - C. How many books did you read in the last year?
 - D. How many pets do you have?

Practice

2. A class made this dot plot to explore how many letters are in their first names.

How many letters are in the longest first name?

Number of Letters in First Name

3. Thiago asked ten of his classmates how many pets they had.

These were their responses:

3, 0, 1, 0, 2, 4, 4, 0, 3, 5

Number of Pets

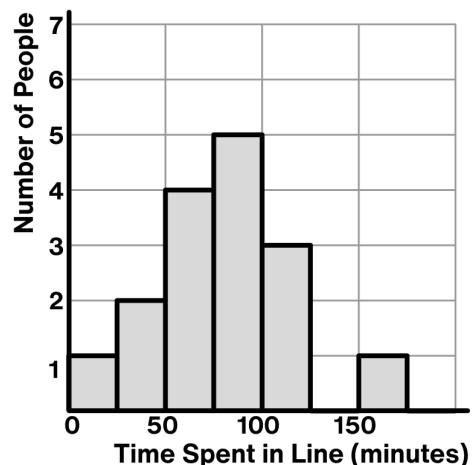
Make a dot plot of the data.



4. A group of 15 people went to a theme park for the day. Each person kept track of how many minutes they spent waiting in line. The data is shown in the histogram.

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

- 1 person was in line for over 150 minutes.
- 3 people were in line for less than 50 minutes.
- Most people spent over 100 minutes in line.
- 1 person spent 0 minutes in line.
- No one spent exactly 125 minutes in line.



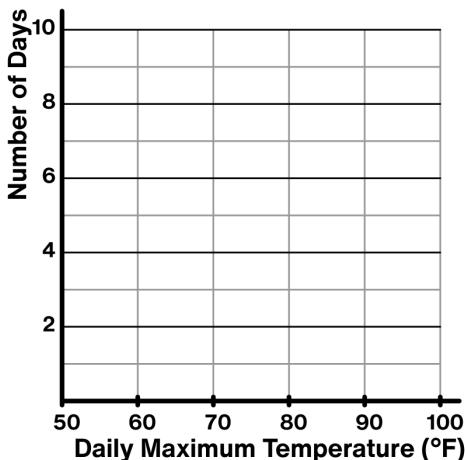
Unit A1.3, Lesson 2: Practice Problems

5. Tiam recorded the high temperature where they live each day for the past ten days.

Here is their data:

56, 62, 73, 65, 68, 74, 81, 65, 59, 53

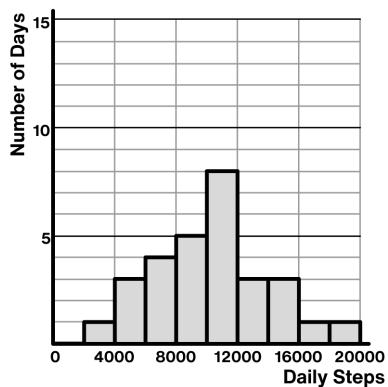
Make a histogram of this data.



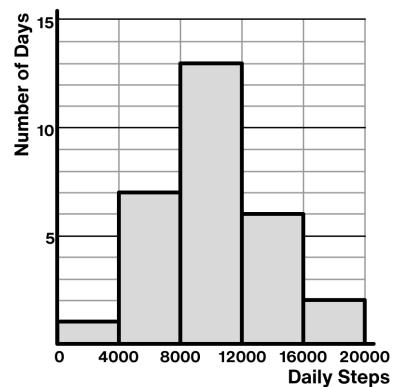
6. These histograms show how many steps Dakota took each day in June.

On how many days did Dakota walk more than 15 000 steps? *Choose the appropriate bin width to answer the question.*

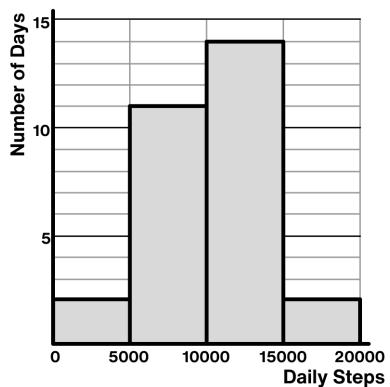
Bin Width: 2 000



Bin Width: 4 000



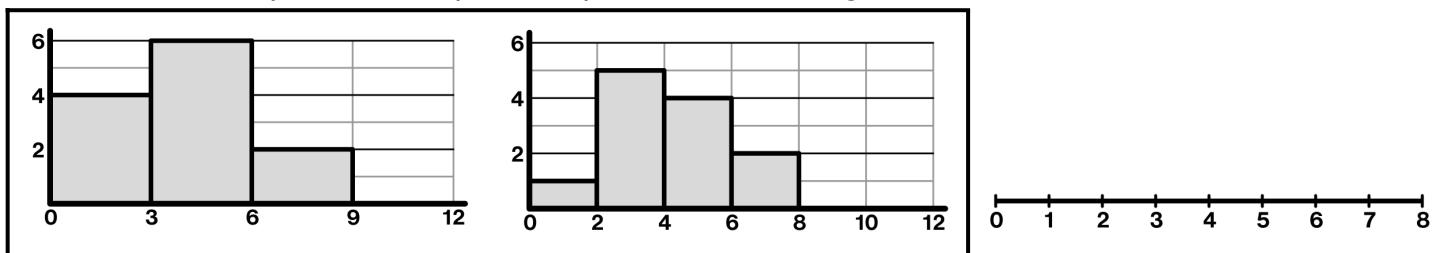
Bin Width: 5 000



Explore

7. Here are two histograms of the same data but with different bin widths.

Create one possible dot plot to represent both histograms.



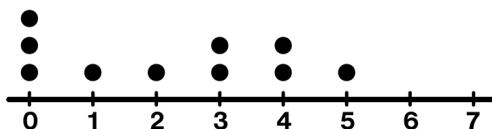
Warm-Up

1. B. Do you have any pets?

Practice

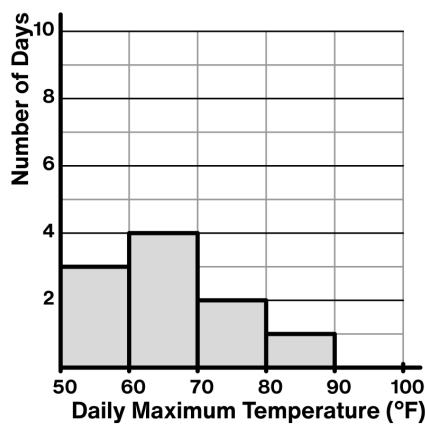
2. 10 letters

- 3.



4. ✓ 1 person was in line for over 150 minutes.
✓ 3 people were in line for less than 50 minutes.
✓ No one spent exactly 125 minutes in line.

- 5.



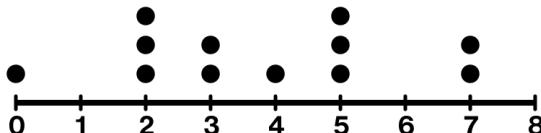
- 6.

- 7.

- Bin Width: 5 000
- 2 days

Explore

8. Responses vary.



Unit A1.3, Lesson 3: Practice Problems

Name _____

Warm-Up

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

1 and 13

5 and 45

3 and 30

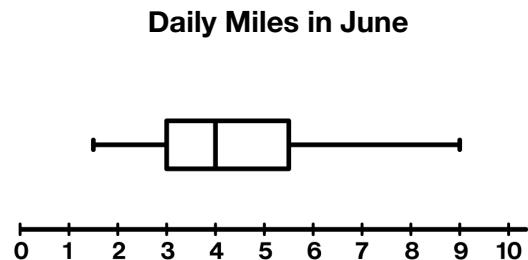
Practice

2. Ricardo used a fitness app to track how many miles he walked each day in June. The box plot represents the data.

Determine each of the statistics below.

Daily Miles in June

Min	Q1	Median	Q3	Max



3. Select **all** of the questions that the box plot can answer.

- Did Ricardo walk more than 8 miles any day in June?
- How many times did Ricardo walk more than 8 miles in a day?
- Did Ricardo walk more on weekends or weekdays?
- About how often did Ricardo walk 4 miles or more in a day?
- Did Ricardo walk exactly 5 miles on any day in June?

4. A team of scientists wanted to know how long people with a particular virus were contagious.

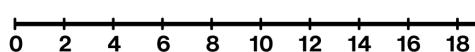
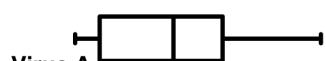
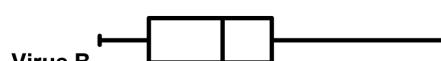
They studied 500 people and measured how many days each person was contagious.

Days of Contagiousness

What can you say about the results of the study?



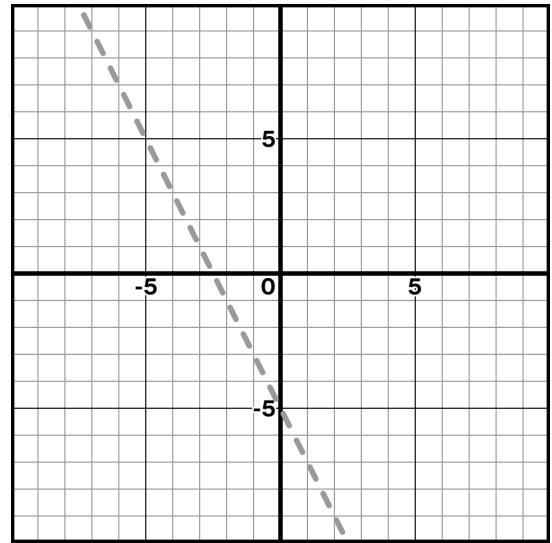
5. The scientists found data about a similar virus. How do the two viruses compare?

Days of Contagiousness

Looking Back

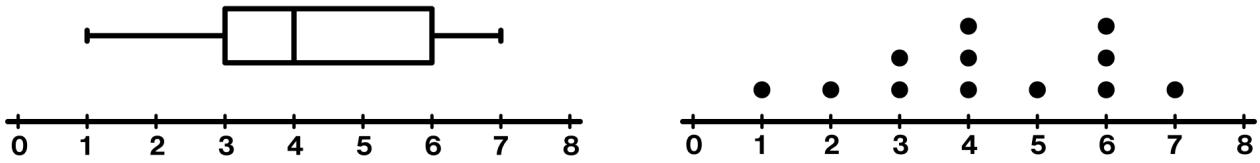
6. Solve $3(x - 4) = 12x$.

7. Create a graph of $2x + y \leq -5$.

**Explore**

8. Here is a dot plot and a box plot of the same data.

Remove five points from the dot plot such that it produces the same box plot.

**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.

Warm-Up

1. 7, 25, 16.5

Practice

2.

Min	Q1	Median	Q3	Max
1.5	3	4	5.5	9

3. ✓ Did Ricardo walk more than 8 miles any day in June?
✓ About how often did Ricardo walk 4 miles or more in a day?

4. *Responses vary.*

- Most people will be contagious for less than 8 days.
- Half of the people studied were contagious for less than 6 days.
- It is rare to be contagious for more than 8 days.

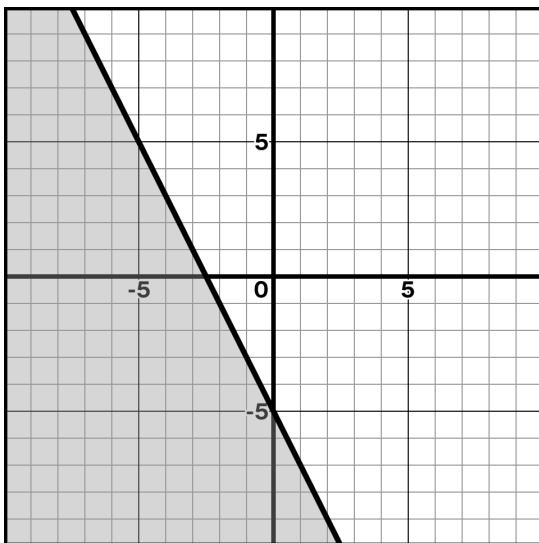
5. *Responses vary.*

- Generally, Virus B is contagious for a longer time than Virus A.
- There is more variability in the data for Virus B.

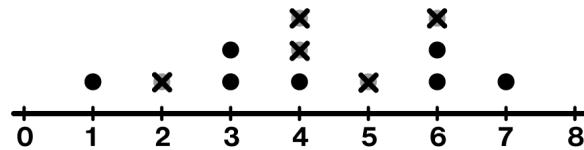
6. $x = \frac{4}{3}$ (or equivalent)

Looking Back

7.

**Explore**

8. *Responses vary.*



Unit A1.3, Lesson 4: Practice Problems

Name _____

Warm-Up

1. Determine the median of each set.

0, 0, 1, 7, 15

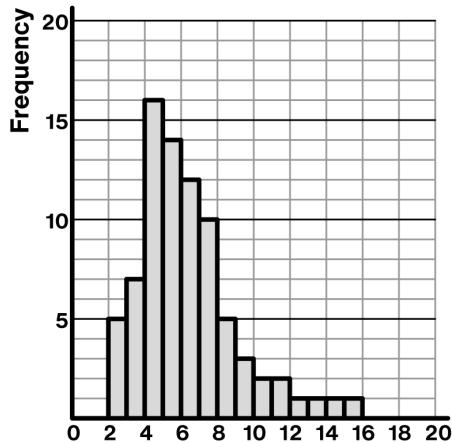
2, 4, 6, 8, 8, 8

15, 17, 18, 25

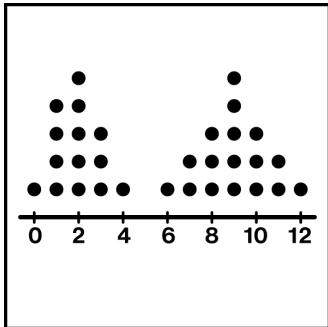
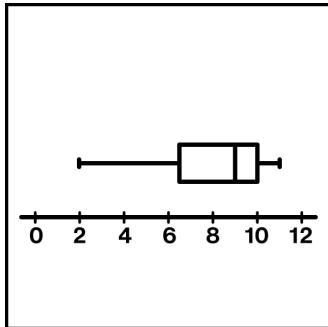
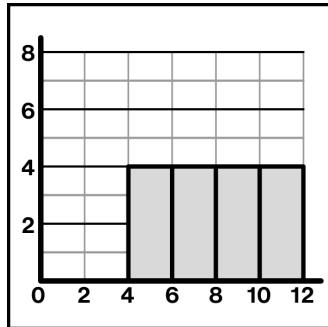
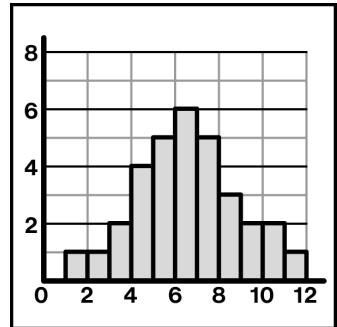
Practice

2. Which term best describes the data shown in the histogram?

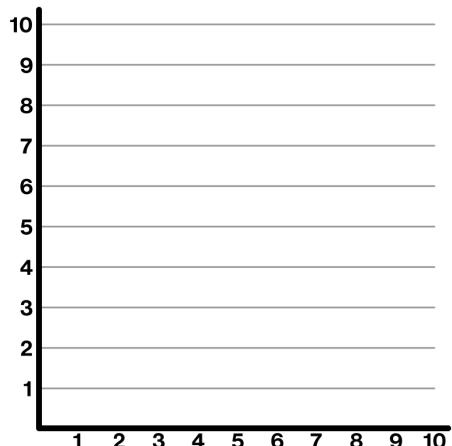
- A. Symmetric
- B. Skewed
- C. Uniform
- D. Bimodal
- E. Bell-shaped



3. Write the letter for each graph next to the term that best describes it.

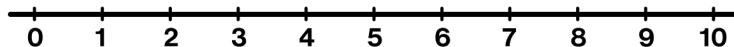
A.**B.****C.****D.** **Skewed** **Bell-shaped** **Bimodal** **Uniform**

4. Create a histogram that is bell-shaped.



Unit A1.3, Lesson 4: Practice Problems

5. Use the number line to create a dot plot that is **symmetric but not uniform**.
Plot at least eight points.



6. This box plot shows the average cost of 1 gigabyte (GB) of cell data in 25 countries.

Cost of 1GB of Data (dollars)



In the U.S., the average cost of 1 gigabyte is \$5.62.



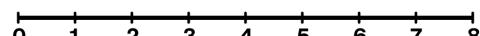
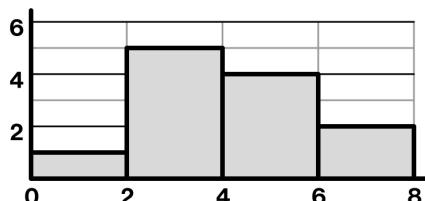
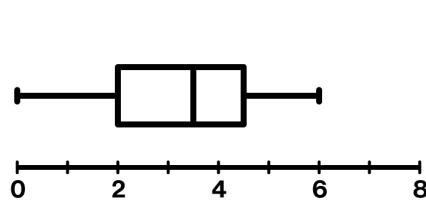
Which sentence best describes how the U.S. compares to the other countries?

- A. Cell data in the U.S. is **cheaper** than in most other countries.
B. Cell data in the U.S. is **more expensive** than in most other countries.

Explain your thinking.

Explore

7. Here is a box plot and a histogram of the same data set.
Create a possible dot plot that could also represent this data set.



Warm-Up

1. 1, 7, 17.5

Practice

2. B. Skewed

3.

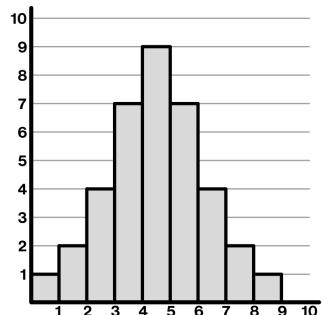
B Skewed

D Bell-shaped

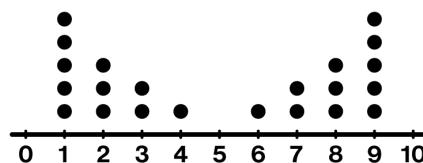
A Bimodal

C Uniform

4. *Responses vary.*



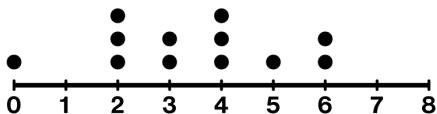
5. *Responses vary.*



6. *Explanations vary.* I know that the U.S. is more expensive because \$5.62 is near the maximum of the value of the box plot. Since \$5.62 is higher than Q3, it is more expensive than more than 50% of the other countries.

Explore

7. *Responses vary.*



Unit A1.3, Lesson 5: Practice Problems

Name _____

Warm-Up

1. Use mental math to determine the mean and median of each data set.

Data Set	Mean	Median
27, 30, 33		
0, 100, 100, 100, 100		
3, 5, 7, 15		

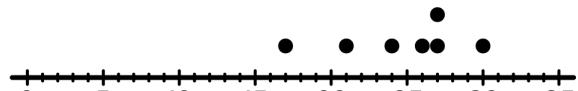
Practice

2. Seven people estimated how many marbles there were in a jar.

Marble Jar Estimates

Determine the mean and median of the estimates.
Use a calculator if it helps with your thinking.

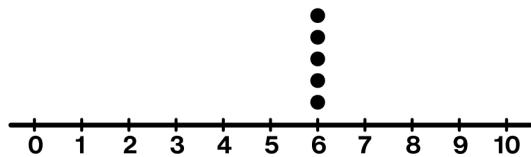
17 21 27 27 24 26 30



Median	Mean

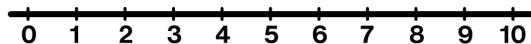
3. Here is a dot plot. If the values 4 and 9 are added to the data set, which statistic(s) will change?

- A. Mean
- B. Median
- C. Both
- D. Neither



4. Create a dot plot that has:

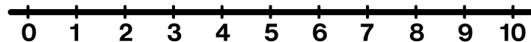
- A median of 3.
- A mean that is greater than the median.



Unit A1.3, Lesson 5: Practice Problems

5. Create a dot plot that has:

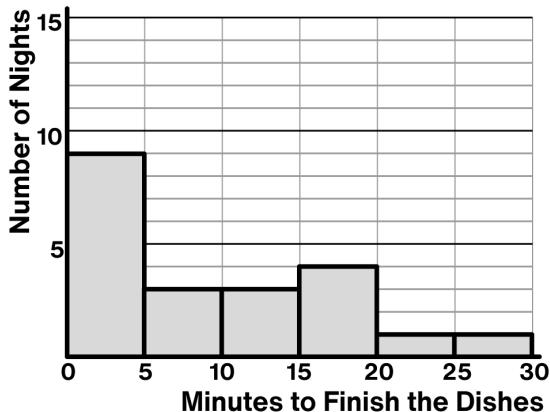
- Has a median of 6.
- Is bell-shaped.



6. Anand does the dishes every night. For the past few weeks, he kept track of how long it took him each night. The histogram shows the results.

Which interval contains the median?

- A. 0 to 5 minutes
- B. 5 to 10 minutes
- C. 10 to 15 minutes
- D. 15 to 20 minutes

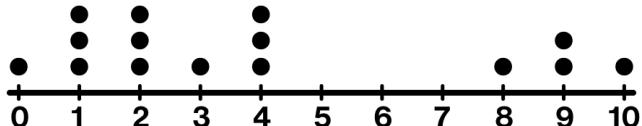


7. Select **all** the expressions that are equivalent to $2(x + 3)$.

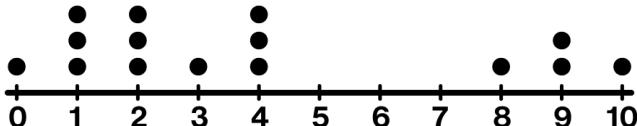
- $2 \cdot (x + 3)$
- $2 \cdot x + 3 \cdot 2$
- $(2 + x) 3$
- $(x + 3) 2$
- $2 \cdot x + 3$

Explore

Remove one value to change the **mean**, not the median.



Remove one value to change the **median**, not the mean.



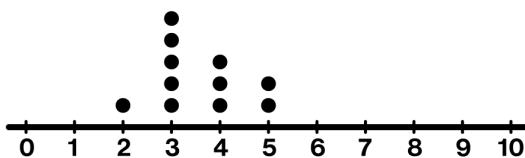
Warm-Up

1.

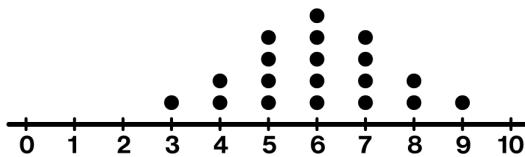
Data Set	Mean	Median
27, 30, 33	30	30
0, 100, 100, 100, 100	80	100
3, 5, 7, 15	7.5	6

Practice

2. Median: 26, Mean: 24.57
3. Mean. *Explanations vary.* Since the total value and the number of points are changing, the mean will change. The median won't change because you are adding a value that is higher and lower than the group of points, so the middle point will still be in the middle.
4. Responses vary.



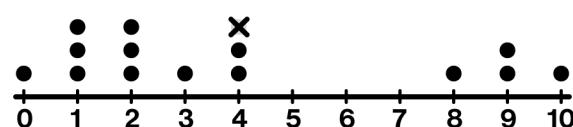
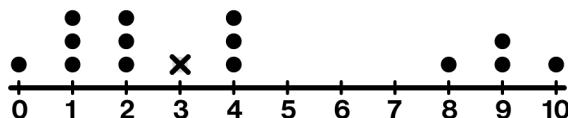
5. Responses vary.



6. 5 to 10 minutes. *Explanations vary.* The median is the middle night, so I counted the number of nights and found that the median would be the 11th night. The first interval includes 9 nights, so the 11th night will be in the 5 to 10 minutes interval.
7. $2 \cdot (x + 3)$, $(x + 3)2$, $2 \cdot x + 3 \cdot 2$

Explore

8. Responses vary.





Science Mom Lesson 24

Unit A1.3, Lesson 6: Practice Problems

Name _____

Warm-Up

1. Use mental math to determine the mean and median of each data set.

Data Set	Mean	Median
15, 25, 35		
4, 24, 24, 24, 24		
2, 3, 7, 8		

Practice

2. Use a calculator to determine the mean and standard deviation of this data set.

[14, 14, 15, 16, 16, 18, 18, 19]

Mean	Standard Deviation

Titus and Alejandro are both on the track team. Each day in May, they recorded how long it took them to run one mile.

- 3.1 Based on the data, who had a greater spread?

Titus
Mean: 7.2 minutes
Standard deviation: 0.15 minutes

- 3.2 What does that tell you about how the two runners compare?

Alejandro
Mean: 7.1 minutes
Standard deviation: 0.34 minutes

4. Here are three data sets.

Set A: [7, 10, 12, 14, 17, 19]

Set B: [2, 2, 5, 22, 25, 25]

Set C: [4, 8, 9, 10, 12, 13]

Order the data sets from smallest to largest standard deviation.

Use a calculator to help you with your thinking.

Smallest _____, _____, _____ Largest

Unit A1.3, Lesson 6: Practice Problems

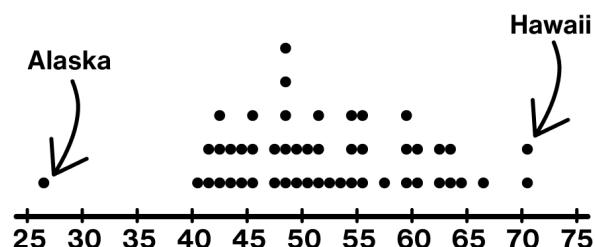
5. Here are the average temperatures in all 50 states.

The arrows show the data points for Hawaii and Alaska, where the climates are different from other states.

If the data points for Alaska and Hawaii were removed, what would happen to the standard deviation?

- A. It would increase
- B. It would decrease
- C. It would stay the same

Average Temp by State (°F)



6. Here is a data set. Which of the following will make the standard deviation **smaller**? Use a calculator to help you with your thinking.

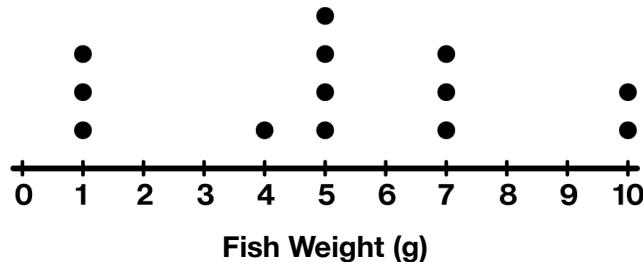
- Add a 2 to the data set.
- Add a 6 to the data set.
- Remove the 4 from the data set.
- Remove the 9 from the data set.
- Increase each value by 10.

4, 5, 5, 6, 7, 9

Explore

The dot plot represents the weights of all the fish in Rafael's tank.

He wants to add a new fish.



- 7.1 Which weight of fish would change the standard deviation the **most**?

- A. 1 gram
- B. 4 grams
- C. 5 grams
- D. 7 grams
- E. 10 grams

- 7.2 Which weight would change the standard deviation the **least**?

- A. 1 gram
- B. 4 grams
- C. 5 grams
- D. 7 grams
- E. 10 grams

Warm-Up

1.

Data Set	Mean	Median
15, 25, 35	25	25
4, 24, 24, 24, 24	20	24
2, 3, 7, 8	5	5

Practice

2. Mean: 16.25, Standard deviation: 1.79

3.1 *Responses.*3.2 *Explanations vary.*

- Alejandro had a greater spread in his run times, so his times were less consistent.
- Titus ran a bit faster than Alejandro, and his times were more similar each time he ran.

4. Smallest Set C, Set A, Set B Largest

5. B. It would decrease.

6. ✓ Add a 6 to the data set.

✓ Remove the 4 from the data set.

✓ Remove the 9 from the data set.

Explore

7.1 10 grams

7.2 7 grams

Warm-Up

1. Create three different data sets that have a median of 13.
Each set should have five numbers or less.

Practice

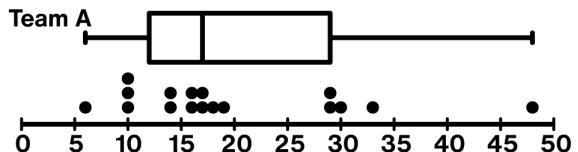
The box plots represent the points scored per game for three different football teams over the course of a season.

- 2.1 Which team generally scored the most points?

Team A

Team B

Team C

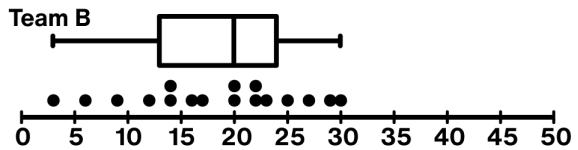
Points by Game

- 2.2 Which team scored the most points in a single game?

Team A

Team B

Team C



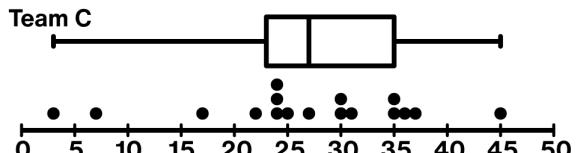
- 2.3 Which team was the most consistent?

Team A

Team B

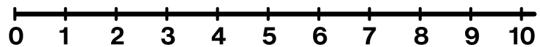
Team C

Explain your thinking.



3. Mariana used a fitness app to track how many miles she walked each day in June. The box plot represents the data.

Determine the IQR for the data.

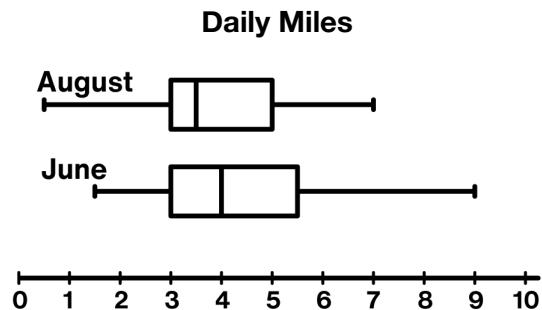
Daily Miles in June

Unit A1.3, Lesson 8: Practice Problems

Mariana used the app again in August.

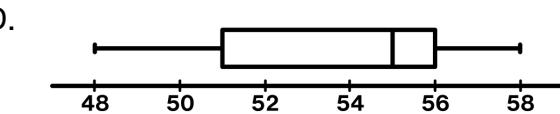
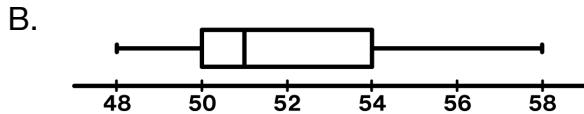
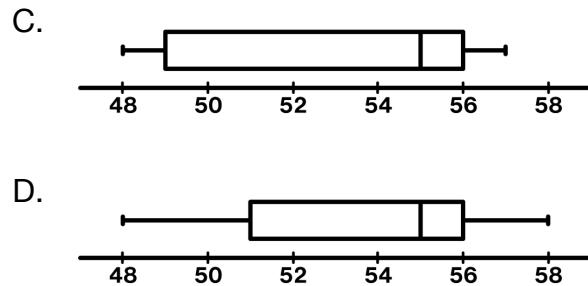
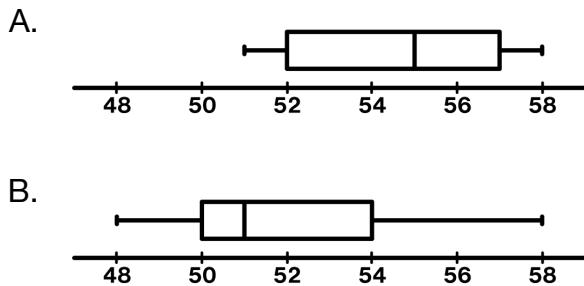
- 4.1 Which data set has a smaller IQR?

- A. June
- B. August
- C. They're the same



- 4.2 What does this tell you about Mariana's walking habits in June and August?

5. Which data set has the largest IQR?



6. Here is a data set: [2, 2, 4, 4, 5, 5, 6, 7, 9, 15].

If 24 was added as a new data point, how would the IQR change?

Use a calculator if it helps with your thinking.

- A. Increase
- B. Decrease
- C. Stay the same

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 are proud of.

Warm-Up

1. *Responses vary.* [2, 7, 13, 15, 30], [0, 13, 13, 20], [10, 12, 14, 15]

Practice

2.1 Team C

2.2 Team A

2.3 Team B

Explanations vary. The spread is smallest for Team B, which means the scores are the most consistent.

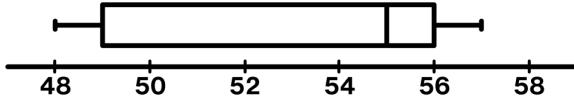
3. 2.5 miles

4.1 August

4.2 *Responses vary.*

- The distance that Mariana walks each day in August is more consistent.
- There is more variability in Mariana's walks in June.

5. C.



6. Increase.

Explanations vary.

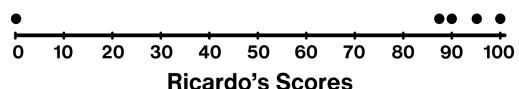
- I used the calculator to check. The IQR changes from 3 to 5.
- 24 will increase the spread of the whole data set, so I think it will also increase the IQR.

Warm-Up

1. Use mental math to determine the value of each.
- A. 50% of 60
 - B. 25% of 60
 - C. 10% of 60
 - D. 30% of 60

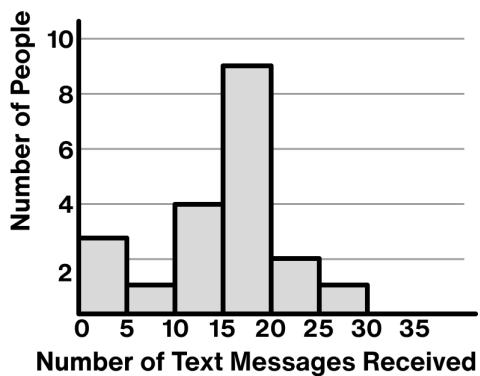
Practice

2. Ricardo got the following scores on his five class assignments: 87, 90, 0, 85, 100.

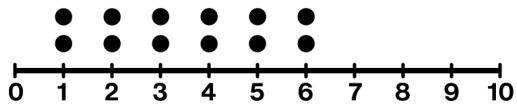
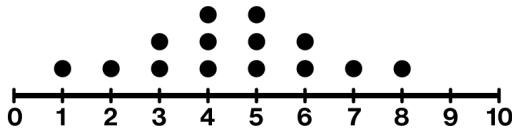


His teacher lets students select a measure of center to summarize the scores. Which would you recommend Ricardo use?

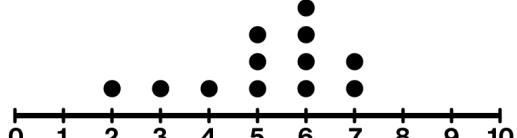
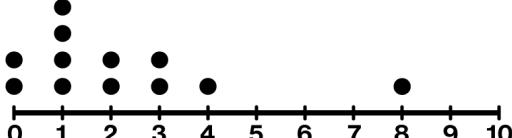
- A. Mean
 - B. Median
3. The histogram represents the number of text messages that 20 people received in one day. A new person with 52 text messages received is added to the data set. Which is likely to change more?
- A. Mean
 - B. Median
4. Select the data set that contains an outlier.



- A.
- B.



- C.
- D.



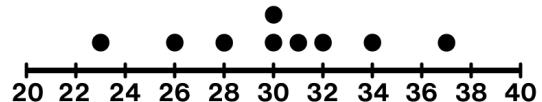
Unit A1.3, Lesson 9: Practice Problems

5. Here is a data set.

[26, 30, 31, 32, 28, 30, 34, 37, 23]

Julian says that 37 is an outlier because it is the maximum value.

What could you say to Julian to help him understand his mistake?

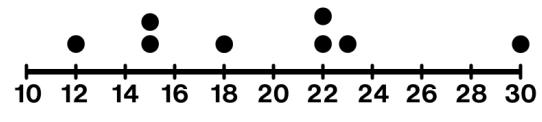


6. The data set represents the ages of different people in a bike shop.

[12, 15, 15, 18, 22, 22, 23, 30]

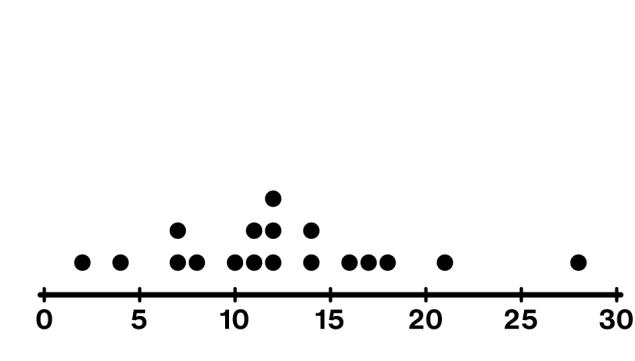
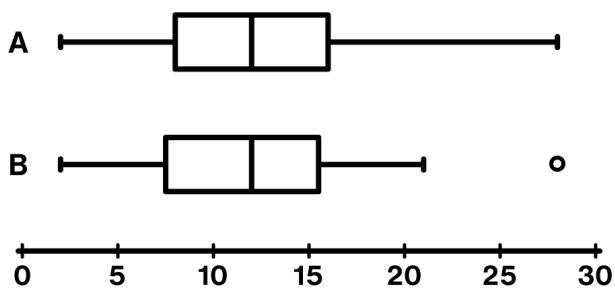
Which data point would be an outlier if it were added to the data set?

- A. 44 B. 8 C. Both D. Neither

**Explore**

7. Here are two box plots. Box Plot A represents the data in the dot plot.

Remove one point from the dot plot so that it represents Box Plot B.

**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.

Warm-Up

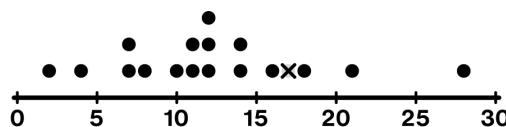
1. A. 30
- B. 15
- C. 6
- D. 18

Practice

2. *Responses and explanations vary.*
 - Median because Ricardo did really well on 4 of his 5 assignments, so reporting the median makes more sense.
 - Mean because otherwise the assignment that Ricardo did badly on won't really be included.
3. *Mean. Explanations vary.*
 - The mean will change more because 52 is much bigger than the rest of the numbers, so it will increase the total value a lot but only increase the number of points by 1.
 - The median won't change as much because there are many points clustered in the center of the data, so adding a single point probably won't move the middle value out of that cluster.
4. C.
5. *Responses vary.* Just because something is the maximum value doesn't mean it is also an outlier. To figure out for sure whether 37 is an outlier, Julian could use a graphing calculator or use $1.5 \cdot IQR$. In this case, the maximum value is 3 from the next value in the data set and the minimum is also 3 away from the next value in the data set, so it is likely not an outlier.
6. A. 44

Explore

7. *Responses vary.*



Warm-Up

1. Order these numbers from least to greatest.

$$\frac{4}{5}$$

$$0.07$$

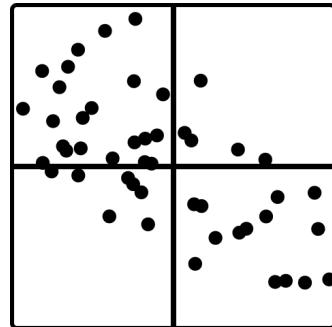
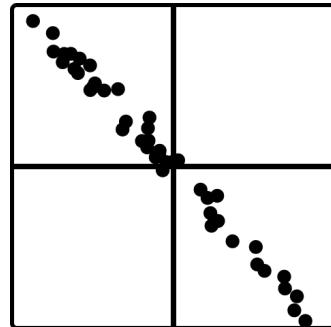
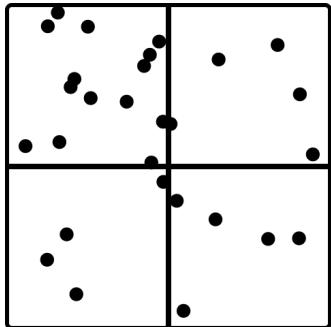
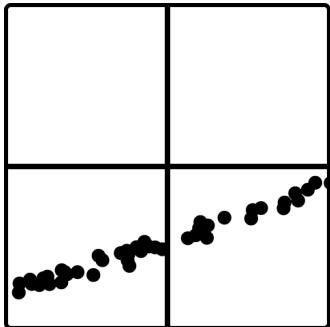
$$-0.2$$

$$-\frac{9}{10}$$

$$0.65$$

Practice

2. Match each scatter plot to the words that describe it.

No Linear Relationship**Weak Linear Relationship****Strong Linear Relationship**

3. Which number could be the correlation coefficient for this scatter plot?

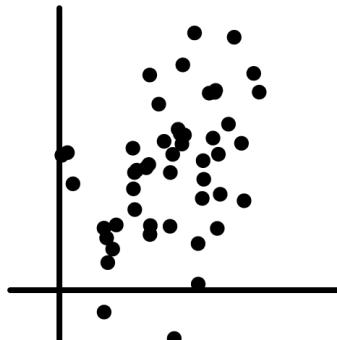
A. 0.4

B. -0.4

C. 0.9

D. -0.9

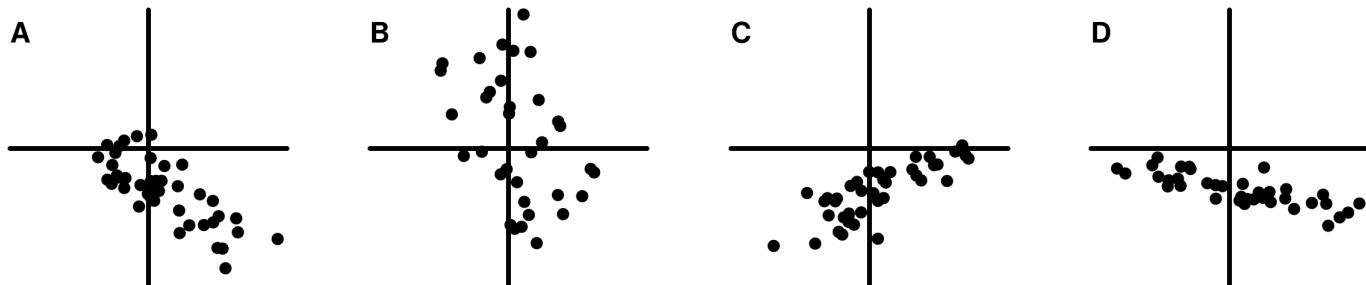
Explain your thinking.



4. A scatter plot is found to have a correlation of $r = 0.85$. What does this tell you about the data?

Unit A1.3, Lesson 11: Practice Problems

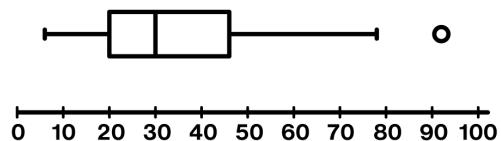
5. Select **all** of the scatter plots that have an r -value of -0.8 .



An online store is curious about who buys the fanny packs they sell. The box plot represents the ages of people who have bought fanny packs this year.

- 6.1 What is the median age?

Ages of Fanny Pack Buyers



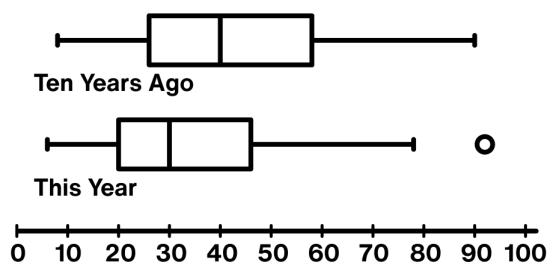
- 6.2 What is the interquartile range?

7. The box plots represent the ages of people who bought fanny packs this year compared to ten years ago.

According to these data sets, which has changed since ten years ago?

- A. More **younger** people are buying fanny packs now than ten years ago.
- B. More **older** people are buying fanny packs now than ten years ago.

Ages of Fanny Pack Buyers



Reflect

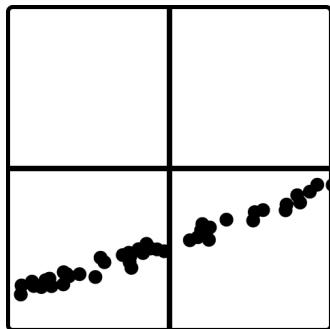
1. Put a heart next to the problem you feel most confident about.
2. Use the space below to ask a question or share something you are proud of.

Warm-Up

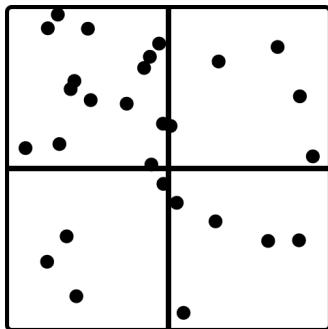
1. $-\frac{9}{10}, -0.2, 0.07, 0.65, \frac{4}{5}$

Practice

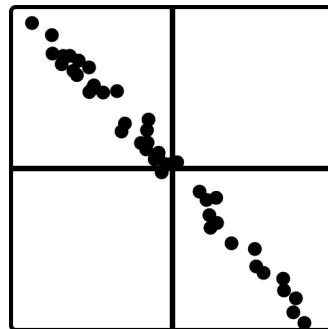
2.



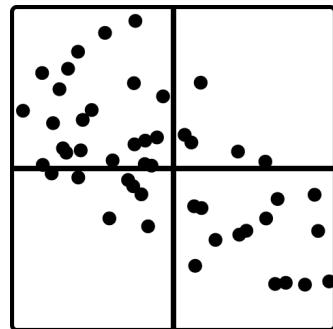
Strong Linear Relationship



No Linear Relationship



Strong Linear Relationship



Weak Linear Relationship

3. 0. 4. *Explanations vary.* The trend is going up as x increases, so I know that the correlation coefficient is positive, but the points are not that close to a line, so I chose 0. 4. The correlation is not that strong, so it has to be 0. 4 or -0.4 . I picked 0. 4 because the trend is going in the direction of a positive slope.
4. This tells me that the data has a strong, positive correlation.
5. A and D
- 6.1 30 years
- 6.2 26 years
7. More **younger** people are buying fanny packs now than ten years ago.

Unit A1.3, Lesson 12: Practice Problems

Name _____

Warm-Up

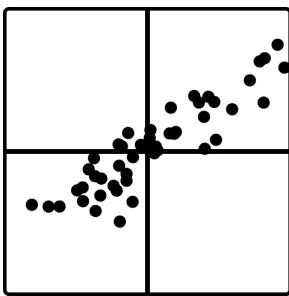
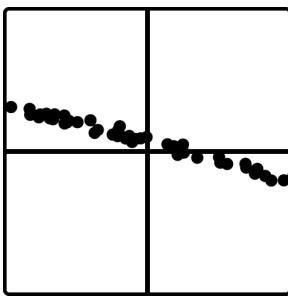
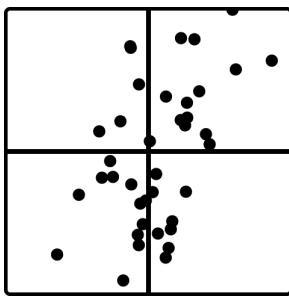
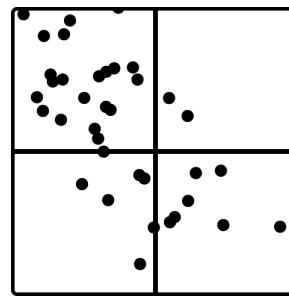
1. Order these numbers from least to greatest.

$$1.4 \quad -1.5 \quad \frac{3}{7} \quad -1 \quad 0.5$$

Least _____, _____, _____, _____, _____ Greatest

Practice

2. Match each scatter plot to its r -value.

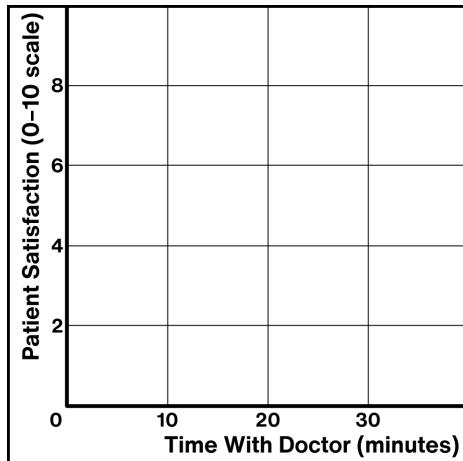
A. 0.7**B.** -0.7**C.** 0.9**D.** -0.99

3. A medical clinic wanted to know about the experiences of their patients. They looked at the following variables:

- Patient satisfaction (on a 1-10 scale).
- The number of minutes spent with a doctor.

They found a **weak, positive** relationship.

Make a scatter plot that could be this data.



Unit A1.3, Lesson 12: Practice Problems

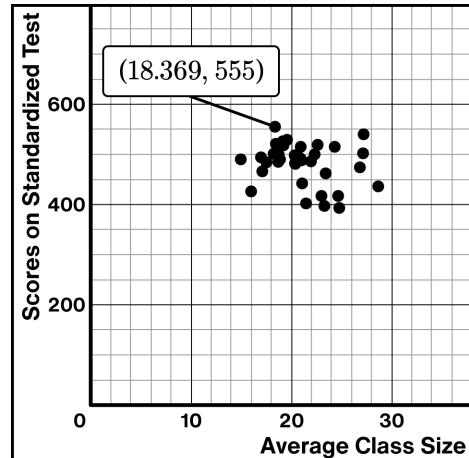
Martina was interested in education systems in different countries.

She found data about two variables for different countries:

- The average class size.
- The scores on a standardized test.

The scatter plot for the data is shown.

- 4.1 The point $(18.369, 555)$ represents Slovakia.
What do the coordinates tell you about Slovakia?



- 4.2 The r -value for the data is $r = -0.23$.
Is there a positive association, negative association or no association between the variables?

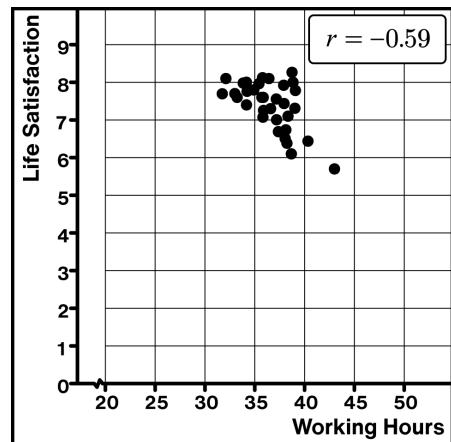
Is there a weak or strong association between the variables?

5. Saanvi was interested in life in different countries.

She found data about two variables:

- Average life satisfaction (on a 1–10 scale).
- The average number of hours people worked in a week.

What does the r -value tell you about the relationship between life satisfaction and hours worked?



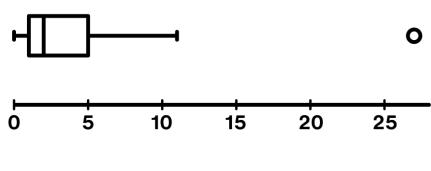
6. The World Series determines which Major League Baseball team is the league champion.

The box plot shows how many World Series championships each team has won.

The San Francisco Giants have won 8 championships.

Where does this put them compared to the other teams?
(Circle your choice)

Number of World Series Championships



Lowest 25%

Middle 50%

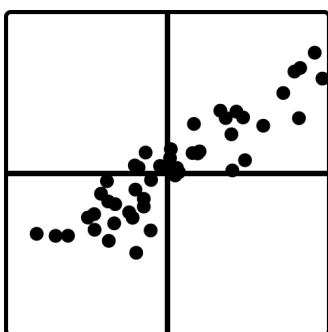
Top 25%

Warm-Up

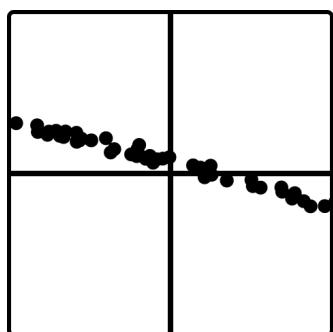
1. Least $-1.5, -1, \frac{3}{7}, 0.5, 1.4$ Greatest

Practice

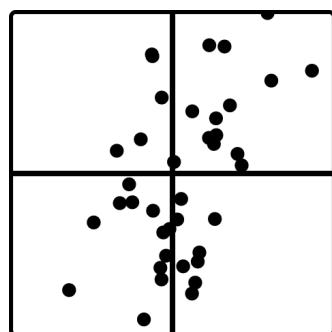
2.



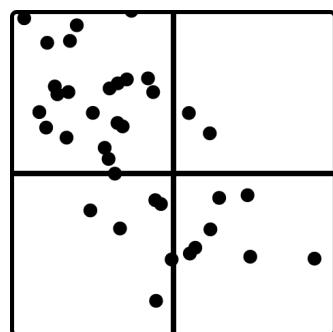
C. 0.9



D. -0.99

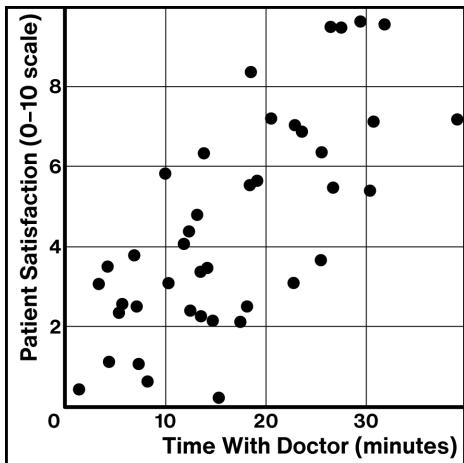


A. 0.7



B. -0.7

3. Responses vary.



4.1 Responses vary. The coordinate (18.369, 555) tells me that the average class size in Slovakia is about 18 students and the average score on a standardized test is 555.

4.2 Negative. Weak.

5. Responses vary. The r -value is negative so it tells me that the more hours someone works, the lower their life satisfaction tends to be.

6. Top 25%

Unit A1.3, Lesson 13: Practice Problems

Name _____

Warm-Up

1. Circle **all** of the coordinate pairs that are solutions to $y = 3x + 5$.

(5, 3)

(4, 17)

(0, 5)

(3, 5)

(1, 8)

Practice

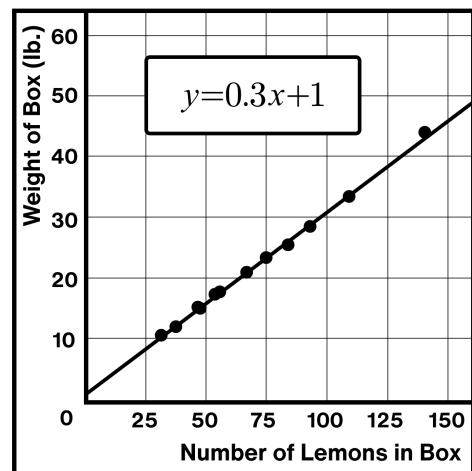
A store receives 12 boxes that contain many different numbers of lemons. They weigh each box and then count the lemons. The data is in the scatter plot.

- 2.1 A new box weighs 30 pounds.

Approximately how many lemons are in the box?

- 2.2 The equation for the line that best fits the data is $y = 0.3x + 1$.

What do the numbers 0.3 and 1 mean in this context?



3. Other fruits also come in boxes.

Here are the equations for each fruit's line of fit.

Order these fruits by weight:

lemons, mangos, oranges, pomegranates.

Heaviest
Lightest

x = number of fruits in box
 y = weight of box in pounds



Orange
 $y = 0.45x + 0.95$



Lemon
 $y = 0.3x + 1$



Pomegranate
 $y = 1.05x + 1.15$



Mango
 $y = 0.85x + 1.25$

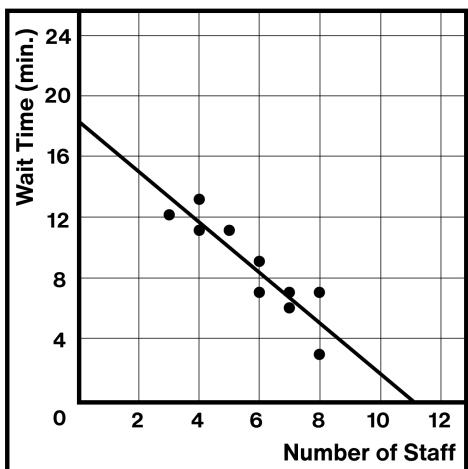
Unit A1.3, Lesson 13: Practice Problems

A restaurant gathered data about how long customers had to wait and how many staff members were working.

The slope of the line of fit is -1.62 .

The r -value is -0.9 .

- 4.1 What does each number mean in this context?



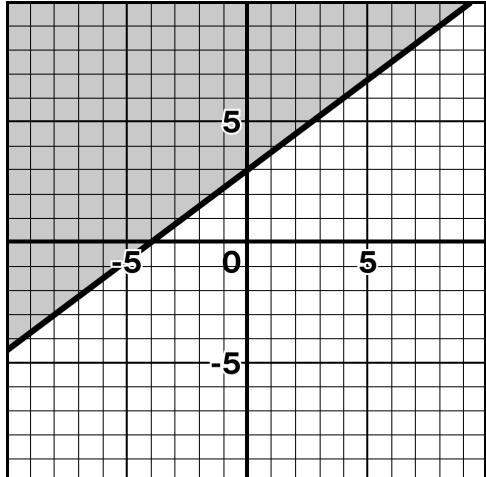
- 4.2 Madison says that for **any** scatter plot, if the r -value is negative, the slope must also be negative.

Is this true or false? Explain your thinking.

Looking Back

5. The inequality $y \geq 0.75x + 3$ is graphed.
Select **all** the coordinate pairs that are solutions to the inequality.

- $(-9, -5)$
- $(0, 3)$
- $(-3, 2)$
- $(6, 8)$
- $(2, -3)$

**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.

Warm-Up

1. ✓ (0, 5) ✓ (4, 17) ✓ (1, 8)

Practice

- 2.1 95 lemons. *Values between 90 and 97 are acceptable.*
- 2.2 The number 0.3 means that as you add each new lemon, the weight of the box tends to increase by 0.3 pounds.
The number 1 means that the weight of the box is 1 pound before any lemons are added.
- 3.

Heaviest
Pomegranate
Mango
Orange
Lemon
Lightest

- 4.1 The number -1.62 means that for each additional staff member working, the customer wait time tends to decrease by -1.62 minutes.
The number -0.9 means that there is a strong, negative correlation between the number of staff and wait time.
- 4.2 True.
Explanations vary. The r -value and slope of the line of fit both describe the trend of the data, so if the data shows a negative trend, they must both be negative.

Looking Back

5. ✓ (0, 3) ✓ (6, 8) ✓ $(-3, 2)$

Warm-Up

1. Solve each equation for x .

$$y = 3x + 5$$

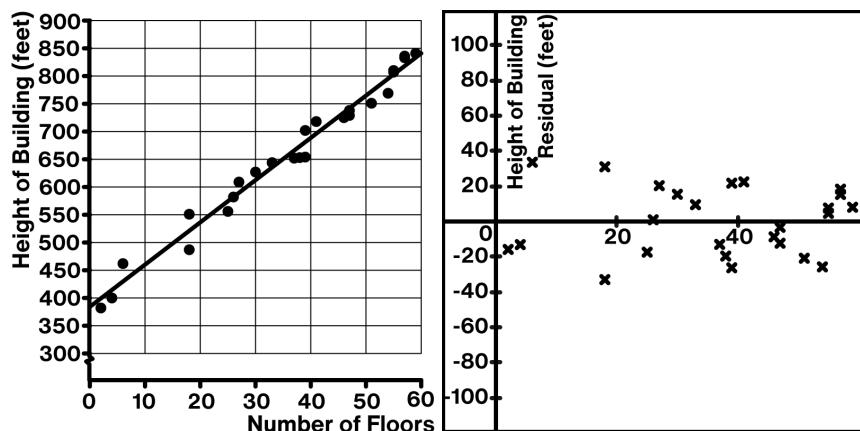
$$4y - 2x = 10$$

$$y = \frac{1}{6}x$$

Practice

The scatter plot shows the heights and number of floors of many buildings, and the line that best fits the data.

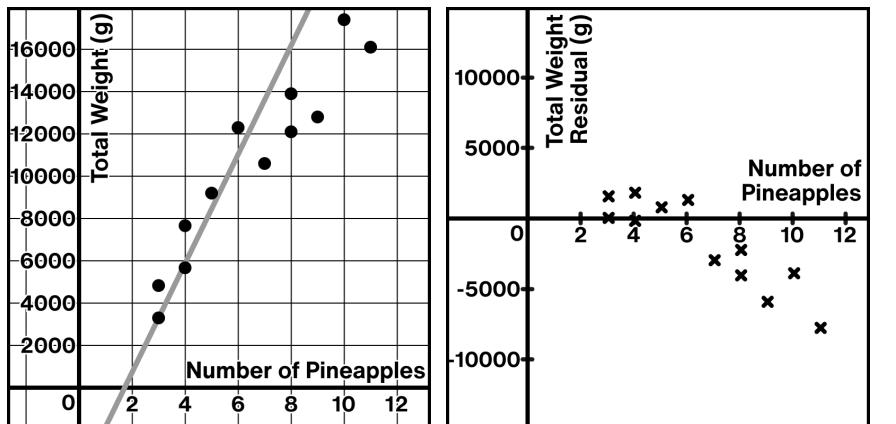
- 2.1 Predict the height of a building that has 50 floors.



- 2.2 Explain how you can tell that the graphed line is a good fit for the data.
Use the residual plot if it helps with your thinking.

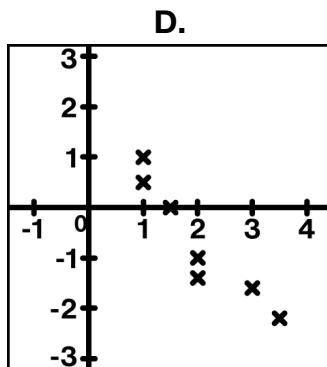
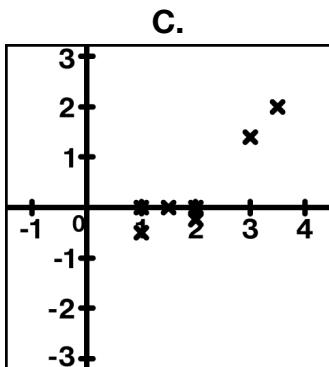
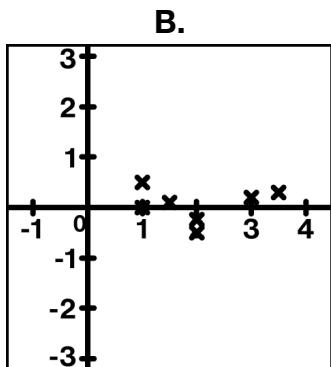
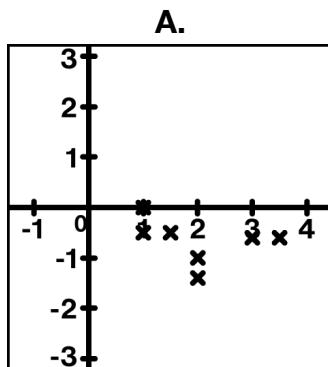
3. Here is a line of fit and a residual plot.

Draw a line that is a **better** fit for the data.



Unit A1.3, Lesson 14: Practice Problems

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



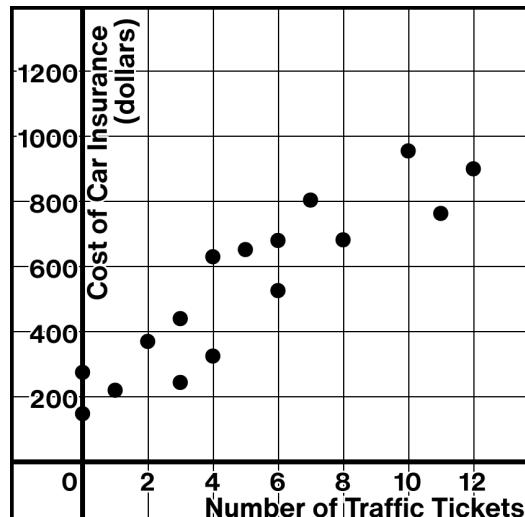
Explain your thinking.

The scatter plot shows the cost of car insurance for many people and the number of traffic tickets they have gotten.

- 5.1 What is the best estimate for the correlation coefficient (r -value) for the data?
- A. 0.25 B. -0.25 C. 0.9 D. -0.9

- 5.2 Which equation is the best estimate for the line of best fit?
- A. $y = -62x + 220$
 B. $y = 62x + 220$
 C. $y = -220x + 62$
 D. $y = 220x + 62$

Explain your thinking.



Looking Back

6. Are there any outliers in this data set? Explain your thinking.

Use a calculator if it helps with your thinking.

[1, 1, 1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 5, 6, 20]

Warm-Up

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

$$x = -5 + 2y$$

$$6y = x$$

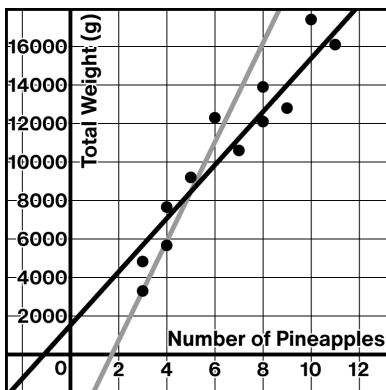
Practice

2.1 Responses between 750–770 feet are acceptable.

2.2 *Explanations vary.*

- The line is a good fit because it is right in the middle of the points and goes in the same direction.
- The line is a good fit because the points on the residual plot are close to the x -axis, and they are both above and below the x -axis.

3. Responses vary.



4. B.

Explanations vary. I chose B because all of the values are close to the x -axis. All of the other sets have some points that are much higher or much lower.

5.1 C. 0.9

5.2 B. $y = 62x + 220$

Explanations vary.

- I drew a line to fit the data. My line started near 250 and had a positive slope, so I picked $y = 62x + 220$.
- I can see that the trend has a positive slope but is not steep enough to be increasing by \$220 for each ticket, so I picked $y = 62x + 220$.

Looking Back

8. Yes, 20 is an outlier.

Explanations vary.

- I used the pop-up calculator to create a box plot. When I clicked “Exclude outliers” I saw that 20 was an outlier.
- 20 is an outlier because it is 14 units away from the next highest number, and 14 units is bigger than the spread of the rest of the data.

Warm-Up

- Solve each equation for y .

$$7 = 6x - y$$

$$3y + 15x = 24$$

$$4y - x = 44$$

Practice

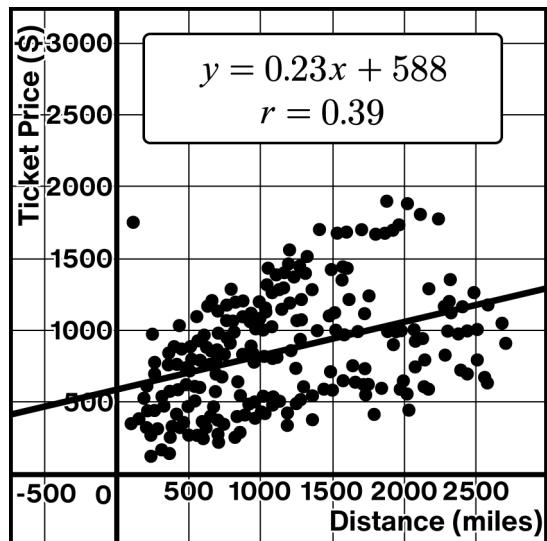
- The scatter plot shows the distances of flights and their ticket prices.

The equation for the line of best fit is

$$y = 0.23x + 588$$

What does the number 0.23 mean in this situation?

The distance from Phoenix, Arizona, to Jacksonville, Florida, is 1 795 miles.



- Use the line of best fit to predict the cost of a plane ticket from Phoenix to Jacksonville.

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

Unit A1.3, Lesson 15: Practice Problems

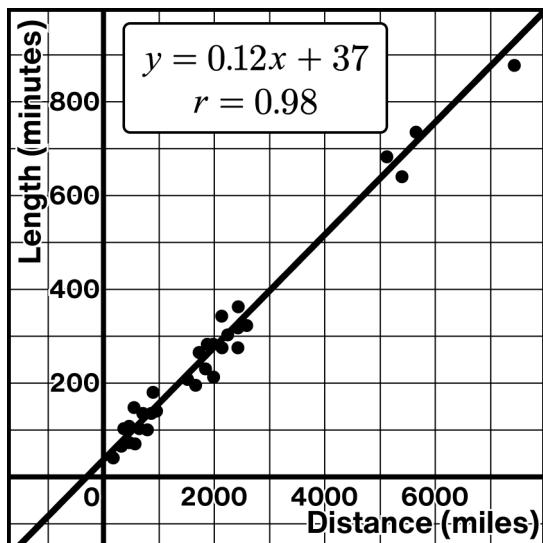
4. The scatter plot shows the distances of non-stop flights and their lengths in minutes.

The equation for the line of best fit is

$$y = 0.12x + 37.$$

What does the number 0.12 mean in this situation?

The distance from Phoenix, Arizona, to Jacksonville, Florida, is 1 795 miles.



- 5.1 Use the line of best fit to predict the length, in minutes, of a direct flight from Phoenix to Jacksonville.

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

6. The line of best fit $y = -1.83x + 67.4$ was calculated for a data set. Which value could be the r -value of the data?

$$r = 0.65$$

$$r = -0.65$$

Both are possible

Here is a data set: [1, 1, 2, 2, 3, 3, 7, 8, 9, 10, 11, 35].

- 7.1 Complete the table. Use the graphing calculator if it helps with your thinking.

Min.	Q1	Median	Q3	Max.

- 7.2 Are there any outliers in this data set?

Yes

No

Warm-Up

1.

$$y = 6x - 7$$

$$y = 8 - 5x$$

$$y = \frac{1}{4}x + 11$$

Practice

2. The number 0.23 means that for every mile that the distance increases, the price of a ticket tends to increase by \$0.23.
- 3.1 \$1000.85
- 3.2 *Responses vary.* No, I do not think that the prediction is accurate because the r -value is only 0.39, which shows a weak correlation.
4. The number 0.12 means that for every mile that the distance increases, the length of a flight tends to increase by 0.12 minutes.
- 5.1 252.4 minutes (or 4.2 hours)
- 5.2 *Responses vary.* Yes, I think that the prediction is accurate because the r -value is 0.98, which shows a very strong linear association.
6. $r = -0.65$. *Explanations vary.* Since the slope of the line of best fit is negative, the correlation coefficient will be negative too.
- 7.1 **Min.: 1 , Q1: 2 , Median: 5 , Q3: 9.5 , Max.: 35**
- 7.2 Yes.



Science Mom Lesson 32

Unit A1.4, Lesson 1: Practice Problems

Name _____

Warm-Up

1. Use the rule below to complete the table.

Rule: Add 2 to the input, then multiply by 3 to get the output.

Input	-5	0	4
Output	-9		

Practice

Predict the missing output of Rule A and B.

Then determine if each of the following rules represent a function. Explain your thinking.

2.1 Rule A

Input	Output
4	blue
6	purple
6	yellow
4	gray
3	

2.2 Rule B

Input	Output
5	
6	4
8	5
12	7

2.3 Rule C

Takes any word as an input and writes the word backwards as an output.

3. A machine uses Rule F to turn inputs into outputs. The table shows two inputs and their outputs.

Hoang tried the input 4 again and the output was not 27.

He claims that this is enough information to determine whether Rule F is a function.

Is Hoang correct? Explain how you know.

Rule F

Input	Output
2	3
4	27

Unit A1.4, Lesson 1: Practice Problems

4. This table shows every month of the year and how many days are in each month. Imagine a rule where the input is a month and the output is the number of days in that month.

	J	F	M	A	M	J	J	A	S	O	N	D
28		X										
29		X										
30				X		X			X		X	
31	X		X		X		X	X		X		X

Does this rule represent a function? Explain your thinking.

Looking Back

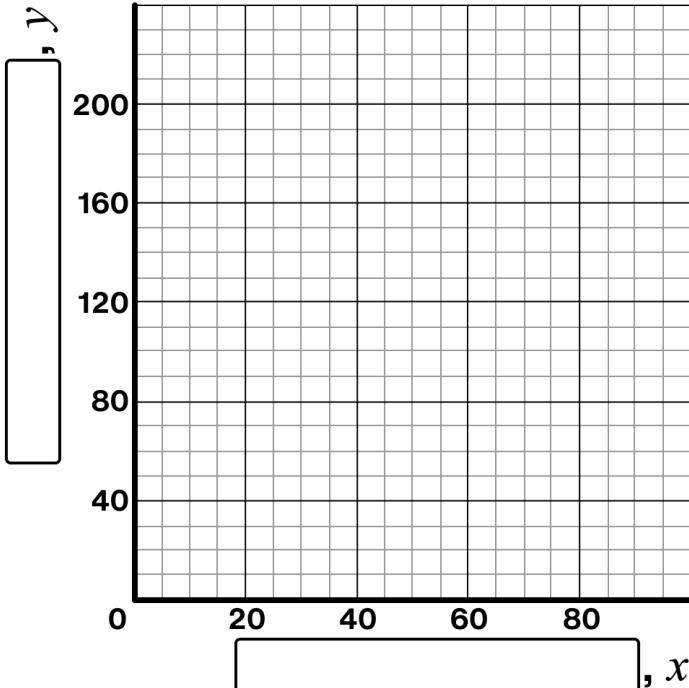
A school sells adult tickets and student tickets for a sports game.

Adult tickets cost \$5 each and student tickets cost \$2 each. They collected \$400 in total.

- 5.1 Write an equation that represents the relationship.

Use x to represent the number of adult tickets sold and y to represent the number of student tickets sold.

- 5.2 Sketch a graph representing this relationship. Make sure to label the axes

**Reflect**

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

Warm-Up

1.

Input	-5	0	4
Output	-9	6	18

Practice

- 2.1 *Responses may vary, but can be any three-letter color.* Red.

Rule A is not a function because there are two different outputs for the input 6.

- 2.2 *Responses and explanations may vary.*

3. 5. Rule B is a function because every input only has one output.

- 2.3 Rule C is a function. Any word written backwards results in only one sequence of letters.

3. Hoang is correct.

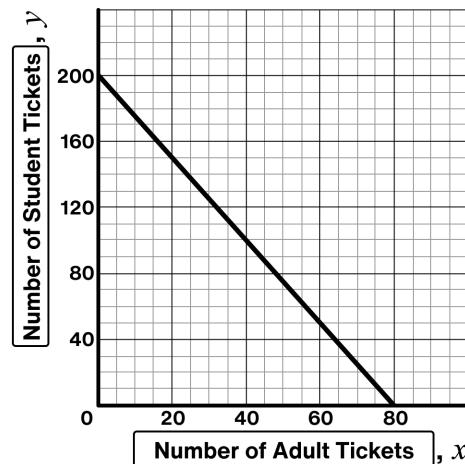
Explanations vary. If the input 4 results in any output value other than 27, then Rule F is not a function. This is because a function only has one output for every input.

4. This does not represent a function because the input February has two possible outputs of either 28 or 29 days.

Looking Back

5.1 $5x + 2y = 400$

5.2





Science Mom Lesson 33

Unit A1.4 Lesson 2: Practice Problems

Name _____

Warm-Up

1. Using the table of $f(x)$, determine the missing values in the function statements:

$$f(\underline{\hspace{1cm}}) = 23$$

$$f(-5) = \underline{\hspace{1cm}}$$

$$f(\underline{\hspace{1cm}}) = -5$$

x	$f(x)$
-5	17
-2	-5
5	23

Practice

The function $f(t)$ gives the temperature, in degrees Celsius, t hours after midnight.

- 2.1 Select the equation that represents the statement: *At 1:30 AM, the temperature was 20°C.*

A. $f(1.3) = 20$

B. $f(1.5) = 20$

C. $f(20) = 1.3$

D. $f(20) = 1.5$

Use function notation to represent each statement.

- 2.2 The temperature at 2 AM.

- 2.3 The temperature was the same at 9 AM and at 11 AM.

- 2.4 It was warmer at 9 AM than at 6 PM.

- 2.5 Sometime after midnight, the temperature was 24°C.

A restaurant sells three different salads.

They use the functions $c(x)$, $g(x)$, and $p(x)$ to represent the price of their Caesar, Garden, and Pasta salads in dollars, with x additional ingredients added.

Explain the meaning of each statement:

3.1 $g(0) = 10$

3.2 $g(3) > c(1)$

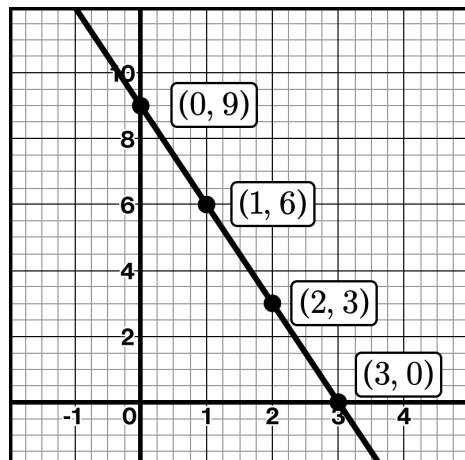
3.3 $p(2) < g(3)$

Unit A1.4, Lesson 2: Practice Problems

Looking Back

4. Here's a graph of a relationship and its table of values. Write a linear equation to represent this relationship.

x	y
0	9
1	6
2	3
3	0



Explore

5. Desminos Pizza's online menu offers small, medium, and large pizzas.

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

MENU	
SIZE	PRICE
SMALL	\$12 + \$1 PER TOPPING
MEDIUM	\$15 + \$2 PER TOPPING
LARGE	\$18 + \$3 PER TOPPING

$$S(\square) = m(\square)$$

$$m(\square) = l(\square)$$

$$l(\square) = S(\square)$$

Reflect

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

Warm-Up

1. 5, 17, -2

Practice

2.1 **B.** $f(1.5) = 20$

2.2 $f(2)$

2.3 $f(9) = f(11)$

2.4 $f(9) > f(18)$

2.5 $f(t) = 24$ (or equivalent)

3.1 A Garden salad with no additional ingredients costs \$10.

3.2 A Garden salad with 3 additional ingredients costs more than the Caesar salad with 1 additional ingredient.

3.3 A Pasta salad with 2 additional ingredients costs less than the Garden salad with 3 additional ingredients.

Looking Back

4. $y = -3x + 9$ or equivalent

Explore

5. $s(7) = m(2)$

$m(9) = l(5)$

$l(0) = s(6)$



Science Mom Lesson 34

Unit A1.4, Lesson 3: Practice Problems

Name _____

Warm-Up

1. Let $f(x) = 2x + 5$.

Calculate the value of each function notation expression.

The first value has already been completed for you.

Expression	Value
$f(0)$	$f(0) = 2(0) + 5$ $f(0) = 5$
$f(4)$	
$f(6)$	
$f(-3)$	

Practice

A toy factory makes toy bunnies. Each toy bunny holds a carrot. A bunny's height, $h(x)$, is three times the length of the carrot, x .

- 2.1 Complete the table.

x	1	2	3	4	5	6
$h(x)$						

- 2.2 Write an equation for the function $h(x)$.

3. The functions $f(x)$ and $g(x)$ are defined by these equations:

$$f(x) = -15x + 80$$

$$g(x) = 10x + 25$$

Which is greater: $f(2)$ or $g(2)$? Explain your thinking.

The function $p(s)$ gives the perimeter of an equilateral triangle of side length s .

It is represented by the equation $p(s) = 3s$.

- 4.1 What is the value of $p(20)$?

- 4.2 What does your answer mean in this context?

Unit A1.4, Lesson 3: Practice Problems

5. Model rockets are created in various sizes. The height of a rocket in inches, $h(x)$, depends on the radius of the base of the rocket in inches, x .

Use the table to write an equation for $h(x)$ that outputs the height of the rocket with a base radius, x .

Radius, x	Height, $h(x)$
1	5
3	13
5	21
10	41

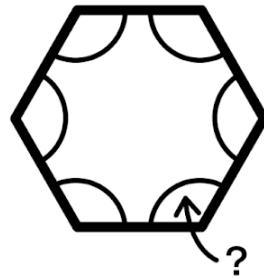
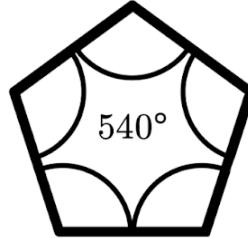
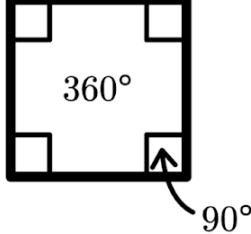
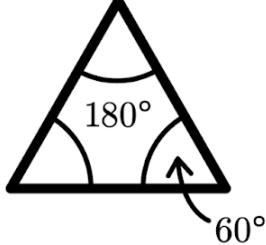
Looking Back

The function $w(t)$ gives the weight of a puppy, in pounds, as a function of its age t , in months. Explain the meaning of each statement.

- 6.1 $w(2) = 5$
- 6.2 $w(6) > w(4)$
- 6.3 $w(12) = w(15)$

Explore

A regular polygon is a polygon where all side lengths are equal and all interior angle measures are equal. Here are four regular polygons with interior angles labeled.



- 7.1 Write an equation for the interior angle of any regular polygon, where n represents the number of sides.
- 7.2 Use your equation to determine the interior angle of a regular hexagon.

Reflect

1. Circle the question you think will help you most on the end of unit assessment.
2. Use the space below to ask a question or share something you are proud of.

Warm-Up

1.	Expression	Value
	$f(0)$	$f(0) = 2(0) + 5$ $f(0) = 5$
	$f(4)$	13
	$f(6)$	17
	$f(-3)$	-1

Practice

2.1	x	1	2	3	4	5	6
	$h(x)$	3	6	9	12	15	18

2.2 $h(x) = 3x$

3. $f(2)$. Explanations vary. $f(2) = 50$ and $g(2) = 45$, so $f(2)$ is greater.

4.1 $p(20) = 60$

4.2 When the side length of a triangle is 20, the perimeter of the triangle is 60.

5. $h(x) = 4x + 1$

Looking Back

6.1 At 2 months, the puppy weighed 5 pounds.

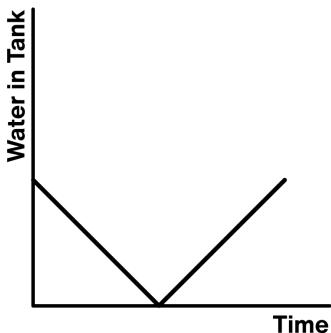
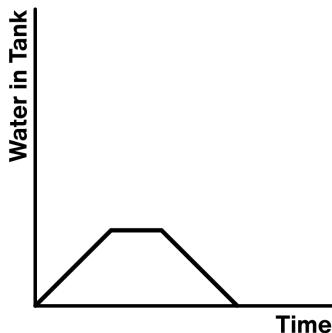
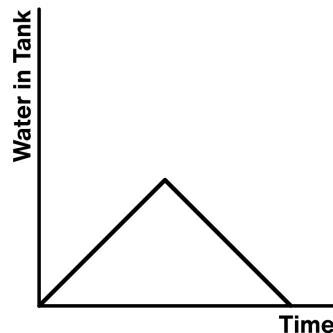
6.2 The puppy weighed more when it was 6 months old than when it was 4 months old.

6.3 The puppy's weight was the same at 12 months and 15 months of age.

Explore7.1 Responses vary. Should be equivalent to $a(n) = \frac{180(n-2)}{n}$.7.2 120°

Warm-Up

1. An empty water tank is filled until it is half full. Two minutes later, it drains until it is empty again. Which graph could represent this situation? Circle your choice.

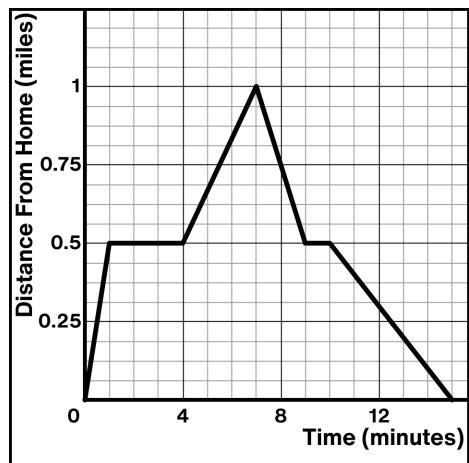
Graph A**Graph B****Graph C****Practice**

Prisha rode her bike around town. Her fitness tracker made a graph to represent the distance she was from her home at any given time during her ride.

- 2.1 How many minutes was Prisha's bike ride?

- 2.2 What was the farthest distance she was from her home?

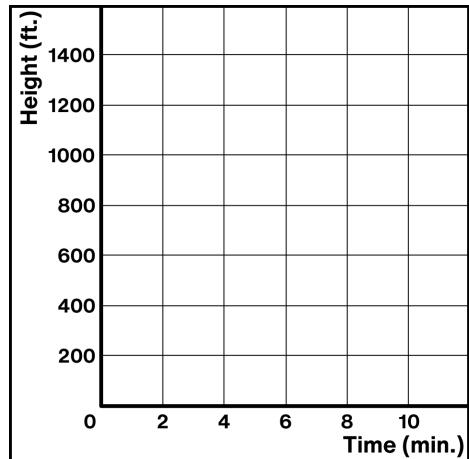
- 2.3 Did Prisha take any rest periods?
If so, how long did she rest in total?



3. The relationship between time spent in the air and the height of a hot air balloon can be expressed as a function.

Use the following information to sketch a possible graph of the function.

- Rises a vertical distance of 1000 feet in 2 minutes.
- Continues to rise for another minute until it reaches a maximum height of 1200 feet.
- Maintains a height of 1200 feet for 2.5 minutes.
- Descends for the next 4 minutes until it lands on the ground.

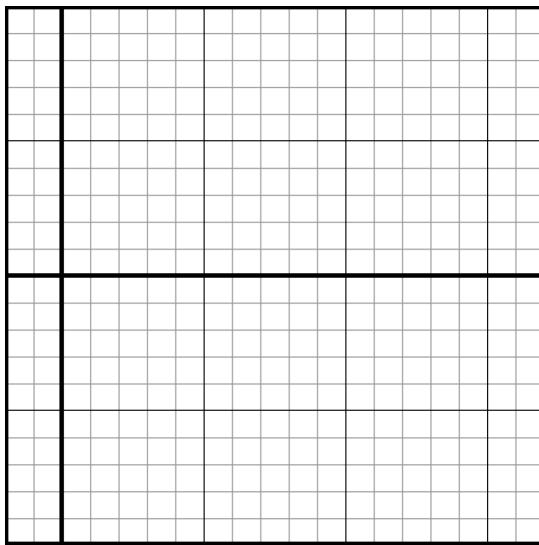


Unit A1.4, Lesson 5: Practice Problems

4. Aba describes her morning at school yesterday like this:

I entered the school on the ground floor, then walked up the stairs to the third floor to attend an hour-long class. Afterward, I had an hour-long class in the basement, then I went up to the ground floor and sat outside to eat my lunch.

Sketch a possible graph of Aba's height from the ground floor as a function of time.
Label both axes.

**Looking Back**

5. $p(t)$ represents the height of water in a bathtub, in inches, after t minutes. Match each sentence to its equation.

- | | |
|---|-------------------|
| A. After 20 minutes, the bathtub is empty. | _____ $p(10) = 4$ |
| B. The bathtub starts out with no water. | _____ $p(t) = w$ |
| C. After 10 minutes, the height of the water is 4 inches. | _____ $p(20) = 0$ |
| D. The height of the water is 10 inches after 4 minutes. | _____ $p(0) = 0$ |
| E. The height of the water is w inches after t minutes. | _____ $p(4) = 10$ |

Reflect

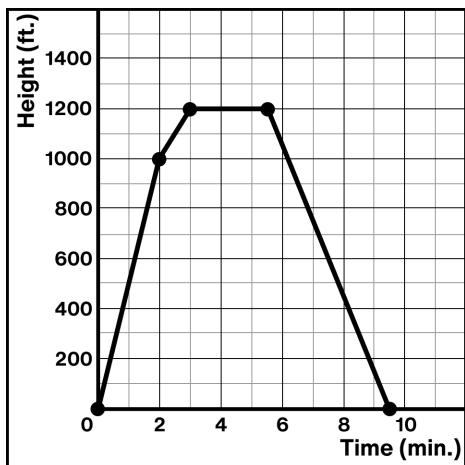
1. Circle a question you want to talk to a classmate about.
2. Use the space below to ask a question or share something you are proud of.

Warm-Up

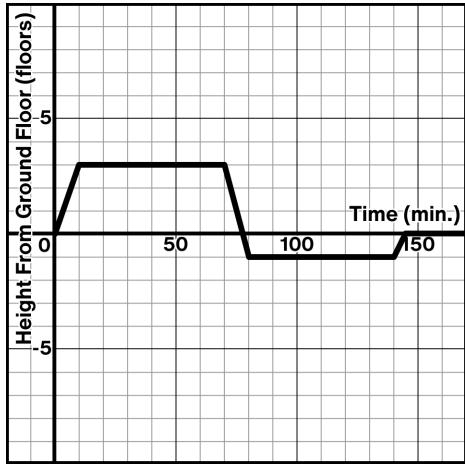
1. Graph B

Practice

- 2.1 15 minutes
2.2 1 mile
2.3 Yes, she rested for a total of 4 minutes.
3. *Responses vary.*



4. *Responses vary.*

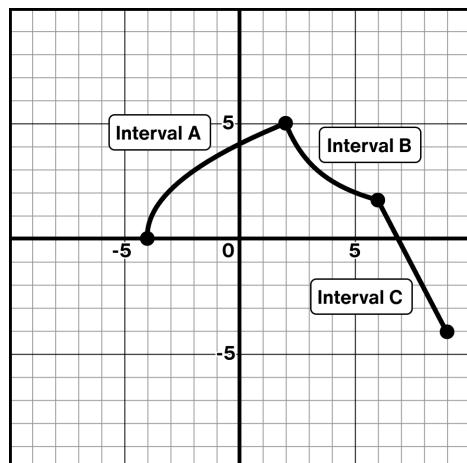
**Looking Back**

5. **C** $p(10) = 4$
E $p(t) = w$
A $p(20) = 0$
B $p(0) = 0$
D $p(4) = 10$

Warm-Up

1. Select **all** the true statements about this graph.

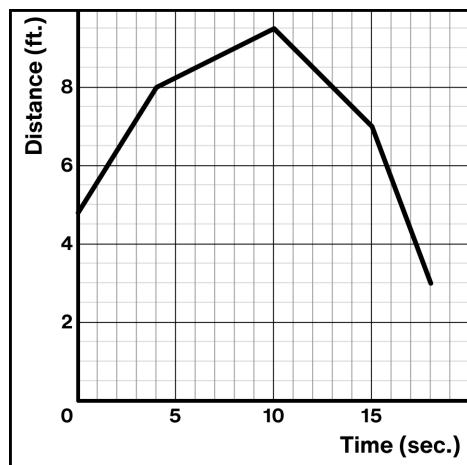
- This graph is a function.
- Interval A is decreasing.
- Interval B is decreasing
- The maximum is at (2, 5).
- The minimum is at (-4, 0).

**Practice**

2. Manuel is watching his little brother at the park.

The graph represents the distance Manuel is from his brother as a function of time.

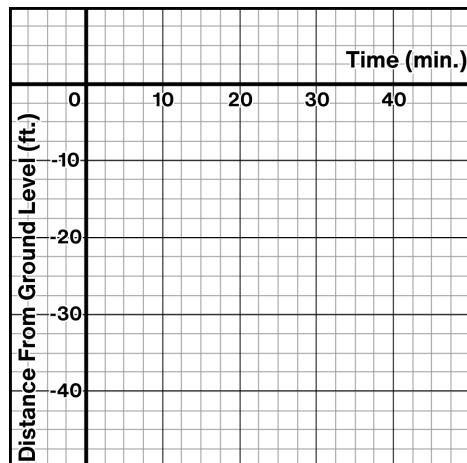
Describe Manuel's distance from his brother over time.
Use terms that you learned in this lesson.



3. Ivory goes on a tour of a cave. The tour starts at ground level.

- The tour stays at this level for 15 minutes.
- Then the tour descends (goes down) for 15 minutes to a depth of 20 feet below ground level.
- The tour stays at this level for 10 minutes.
- The tour spends the last 5 minutes ascending (going up) to ground level.

Sketch a possible graph describing Ivory's elevation as a function of time.



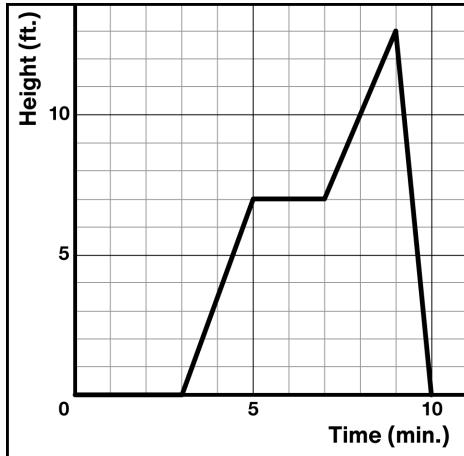
Unit A1.4, Lesson 6: Practice Problems

4. A squirrel is searching for food on the ground and in trees.

The graph represents the height of the squirrel $h(t)$, in feet, as a function of time t , in minutes.

Select **all** of the statements that are true.

- The squirrel spent more time in the trees than on the ground.
- The squirrel's height is always increasing.
- The squirrel spent a total of 4 minutes climbing up.
- The squirrel moved faster when it was climbing down the tree than when it was climbing up.
- 10 feet is the maximum height the squirrel climbed.

**Looking Back**

5. Consider the function $h(x) = 4x - 11$. What is the value of $h(4)$?

A. 16 B. -3.2 C. -28.8 D. 4.8

6. Consider the function $f(x) = 2x + 11$.

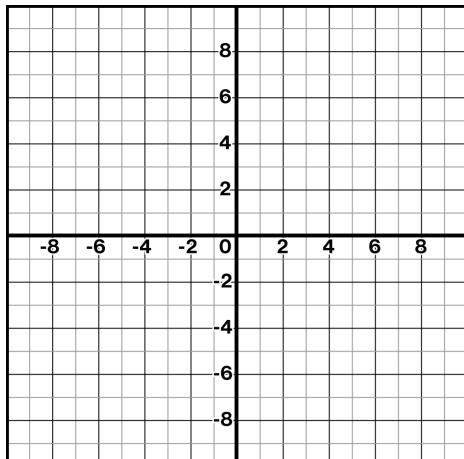
Determine the value of c that makes $f(c) = 37$ true.

Explore

7. Here are three statements:

- The function is always positive.
- The function is sometimes increasing.
- The function is sometimes decreasing.

Sketch a graph of a function such that two of the statements are true and one is a lie.

**Reflect**

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

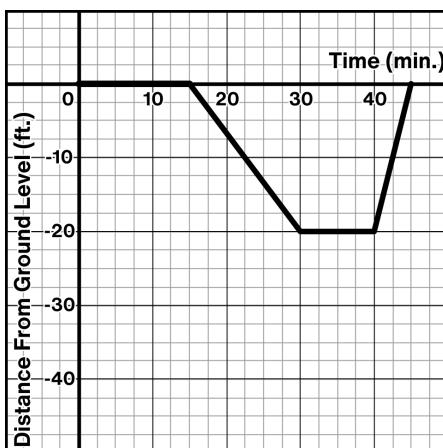
Warm-Up

1. ✓ This graph is a function ✓ Interval B is decreasing ✓ The maximum is (2, 5).

Practice

2. Responses vary. Manuel starts out a little less than 5 feet from his brother. Manuel's distance from his brother increases for about 4 seconds to about 8 feet. His distance from his brother continues to increase to a maximum distance of about 9.5 feet. Then Manuel's distance from his brother starts to decrease to about 7 feet, and then decreases at a faster rate to about 3 feet.

3.



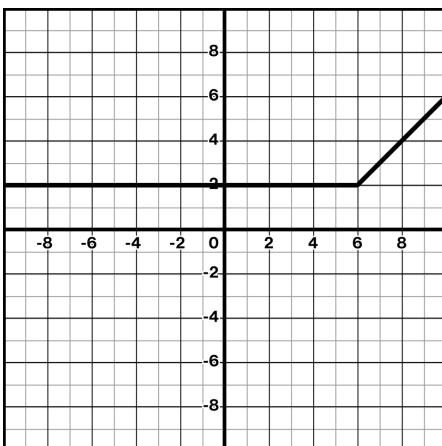
4. ✓ The squirrel spent more time in the trees than on the ground.
✓ The squirrel spent a total of 4 minutes climbing up.
✓ The squirrel moved faster when it was climbing down the tree than when it was climbing up.

Looking Back

5. D. 4.8
6. $c = 13$

Explore

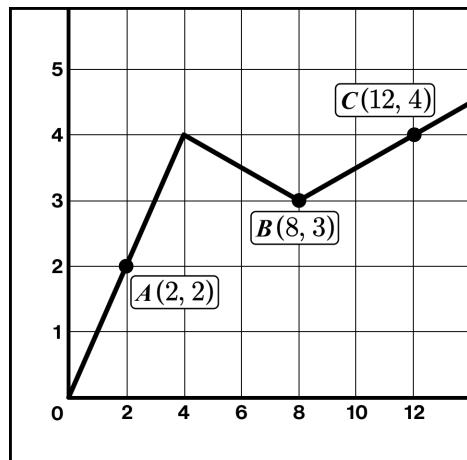
7. Responses vary.



Warm-Up

1. Use the graph to match each interval to its average rate of change.

Interval	Average Rate of Change
A to B	_____ $\frac{1}{5}$
B to C	_____ $\frac{1}{4}$
A to C	_____ $\frac{1}{6}$

**Practice**

The temperature was recorded at several times in a 24-hour period.

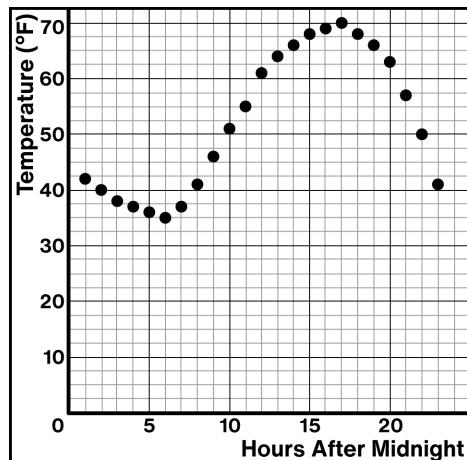
Function $t(n)$ gives the temperature in degrees Fahrenheit n hours after midnight.

Use the graph to determine if the average rate of change for each interval is *positive*, *negative*, or *zero*.

2.1 $n = 1$ to $n = 5$ _____

2.2 $n = 5$ to $n = 7$ _____

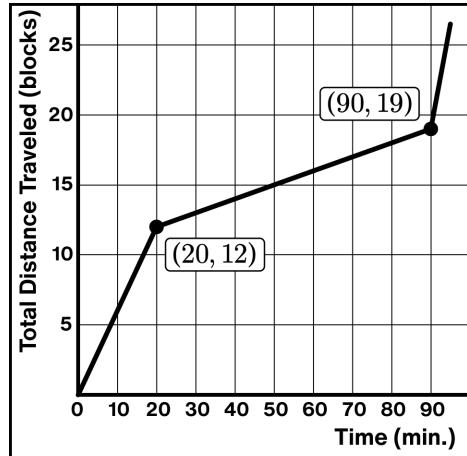
2.3 $n = 10$ to $n = 20$ _____



The graph shows the total distance in city blocks, $d(t)$, that Pilar walked as a function of time in minutes, t .

3.1 Determine the average rate of change between $t = 20$ and $t = 90$.

3.2 What do you think the average rate of change you calculated means in this situation?



Unit A1.4, Lesson 7: Practice Problems

The table gives the population of a city from 1988 to 2016.

- 4.1 Determine the average rate of change for $p(t)$ between 1992 and 2000.

- 4.2 Select two values of t that create an interval with a **negative** average rate of change. Determine the average rate of change of this interval.

- 4.3 Select two values of t that create an interval with a **positive** average rate of change. Determine the average rate of change of this interval.

Year, t	Population, $p(t)$
1988	35 700
1992	42 700
1996	33 100
2000	33 700
2004	45 000
2008	48 400
2012	40 900
2016	43 000

Looking Back

5. Jada is walking to school. The function $d(t)$ gives her distance from school, in meters, t minutes since she left home. Which equation represents the statement:
Jada is 600 meters from school after 5 minutes.
- A. $d(5) = 600$ B. $d(600) = 5$ C. $t(5) = 600$ D. $t(600) = 5$

Explore

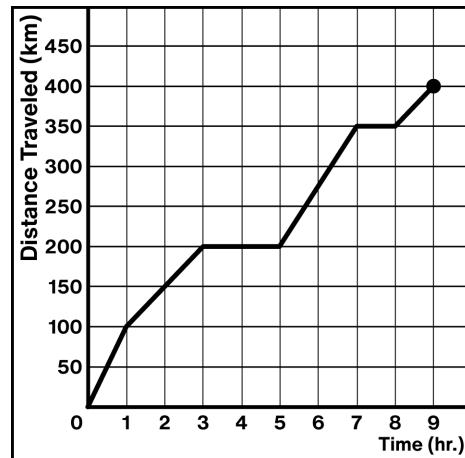
6. Mayra's car trip was 400 kilometers and took 9 hours.

Using the digits 0–9, without repeating, fill in each blank such that each interval has the same average rate of change.

to hours

to hours

to hours



Warm-Up

1. A to C : $\frac{1}{5}$

B to C : $\frac{1}{4}$

A to B : $\frac{1}{6}$

Practice

2.1 Negative

2.2 Positive

2.3 Positive

3.1 0.1

3.2 *Explanations vary.* This average rate of change means that Priya walked 0.1 blocks per minute, or $\frac{1}{10}$ of a block per minute, from 20 minutes to 90 minutes into her walk.

4.1 -1 125 people per year

4.2 *Responses vary.* 2008 and 2012: -1 875 people per year

4.3 *Responses vary.* 1988 and 2016: about 260.71 people per year

Looking Back

5. **A**

Explore

6. *Responses vary.*

1 to 9 hours: 37.5 kph

3 to 7 hours: 37.5 kph

4 to 8 hours: 37.5 kph

Unit A1.4, Lesson 8: Practice Problems

Name _____

Warm-Up

1. Mai built a model racecar to race for a school competition.

$m(t)$ gives Mai's car's distance after t seconds.

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

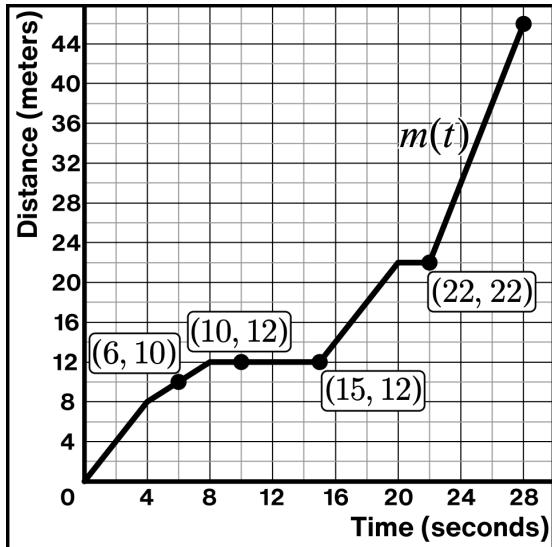
$$m(\underline{\hspace{1cm}}) = 10$$

$$m(10) = \underline{\hspace{1cm}}$$

$$m(15) = \underline{\hspace{1cm}}$$

$$m(22) = \underline{\hspace{1cm}}$$

$$m(\underline{\hspace{1cm}}) = 46$$



Practice

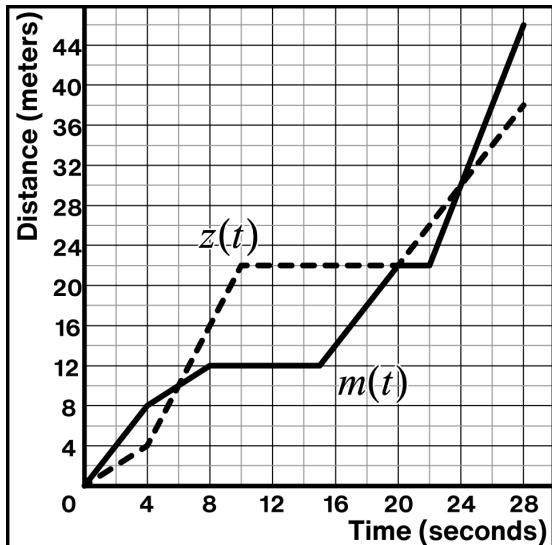
Zion also built a model racecar for the school competition.

The graph shows the distance of Zion's car $z(t)$ after t seconds and the graph for Mai's car, $m(t)$.

Who had the greater average rate of change over the following intervals? Explain your thinking.

2.1 $t = 4$ to $t = 8$

2.2 $t = 10$ to $t = 20$



Unit A1.4, Lesson 8: Practice Problems

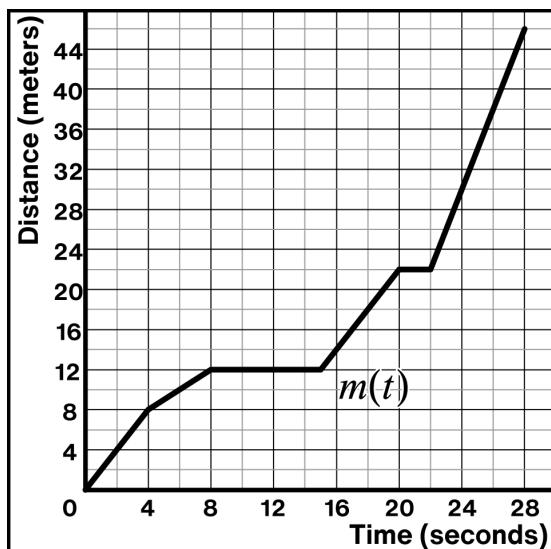
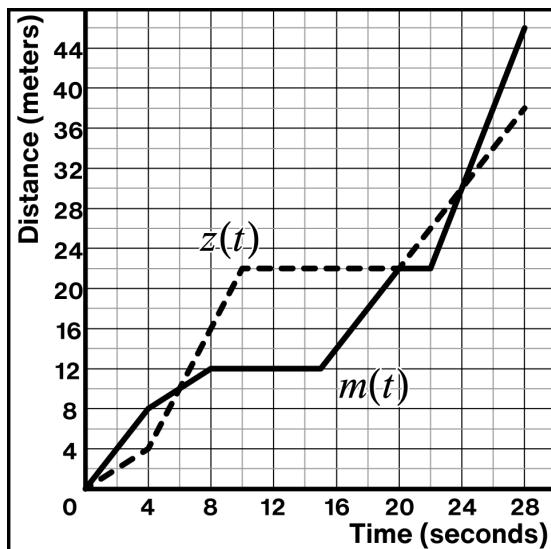
3. Use the graph of $m(t)$ and $z(t)$ to determine all the true statements.

- $m(t)$ has a greater maximum than the maximum of $z(t)$.
- $z(t)$ and $m(t)$ have the same minimum at $(6, 10)$.
- $z(20) = m(20)$
- $m(t)$ and $z(t)$ are both increasing from 22 to 28 seconds.
- $m(15) > z(15)$

4. Parv made a racecar to race against Mai. Here is the graph of Mai's racecar.

Make a graph that could represent Parv's racecar's distance after t seconds:

- $p(8) < m(8)$
- $p(12) = m(12)$
- The average rate of change of $p(t)$ and $m(t)$ is the same from $t = 22$ to $t = 28$.
- The maximum of $m(t)$ is greater than the maximum of $p(t)$.



Looking Back

Nekeisha goes for a bike ride. $d(t)$ represents the distance from home, in miles, t minutes after Nekeisha leaves. Explain the meaning of each statement in context.

5.1 $d(0) = 0$

5.2 $d(30) = d(60)$

5.3 $d(90) = 0$

Warm-Up

1. $m(6) = 10$

$m(10) = 12$

$m(15) = 12$

$m(22) = 22$

$m(28) = 46$

Practice

2.1 Zion

Explanations vary. The average rate of change for Zion's car is 3, and for Mai's car is 1.

2.2 Mai

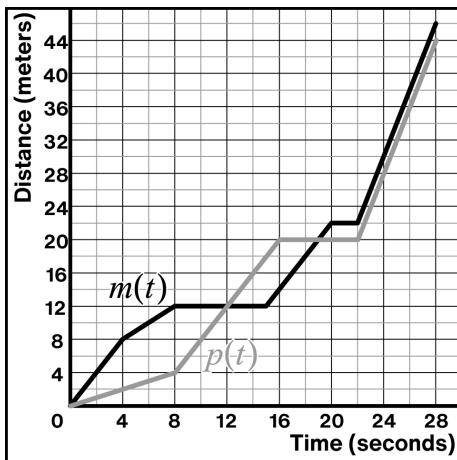
Explanations vary. The average rate of change for Mai's car is 1, and for Zion's car is 0.

3. ✓
- $m(t)$
- has a greater maximum than the maximum of
- $z(t)$
- .

✓ $z(20) = m(20)$

✓ $m(t)$ and $z(t)$ are both increasing from 22 to 28 seconds.

- 4.
- Responses vary.*

**Looking Back**

- 5.1 Nekeisha starts her bike ride at home.

- 5.2 Nekeisha is the same distance from home at 30 minutes and at 60 minutes into her bike ride.

- 5.3 Nekeisha is back home at 90 minutes into her bike ride.

Unit A1.4, Lesson 10: Practice Problems

Name _____

Warm-Up

1. Tickets to the state fair cost \$10 each. The function $c(t) = 10t$ gives the cost in dollars for the number of tickets purchased, t . Select **all** values that are possible outputs for $c(t)$.

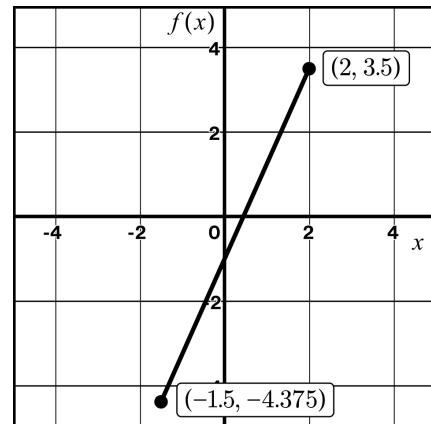
 0 70 105 880 963

Practice

2. Valeria and Thiago disagree about the domain of the graph of the function.

- Valeria says the domain is $-1.5 \leq x \leq 2$
- Thiago says the domain is $-4.375 \leq x \leq 3.5$

Who is correct? Why is the other person incorrect? Explain your thinking.



Haru bikes to his friend's house. After visiting for a while, Haru heads home. On the way, he stops at the market to buy a bottle of water. $d(t)$ represents Haru's distance from his house, in kilometers, after t hours.

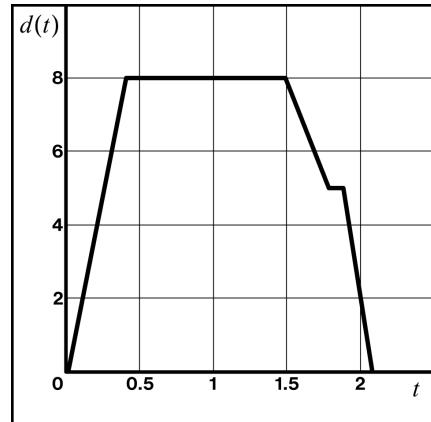
- 3.1 Which describes the domain of $d(t)$?

- $0 \leq d(t) \leq 2.1$
- $0 \leq d(t) \leq 8$
- $0 \leq t \leq 2.1$
- $0 \leq t \leq 8$

- 3.2 Which describes the range of $d(t)$?

- $0 \leq d(t) \leq 2.1$
- $0 \leq d(t) \leq 8$
- $0 \leq t \leq 2.1$
- $0 \leq t \leq 8$

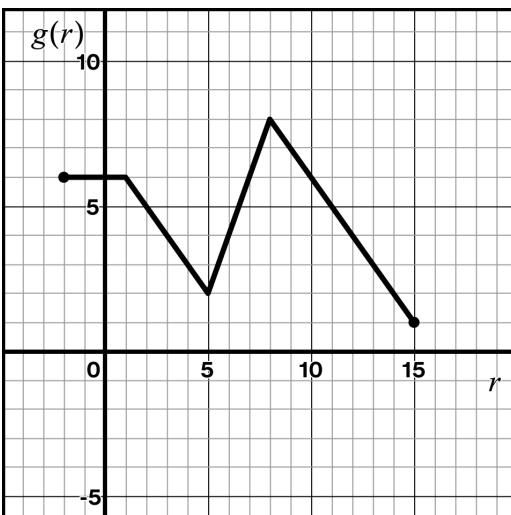
- 3.3 If Haru had not stopped at the market, which would have changed: the domain or the range? Explain your thinking.



Unit A1.4, Lesson 10: Practice Problems

Here is a graph of $g(r)$.

- 4.1 Write a compound inequality to describe the domain.



- 4.2 Write a compound inequality to describe the range.

Looking Back

5. Refer to the graph of $g(r)$ in problem 4.

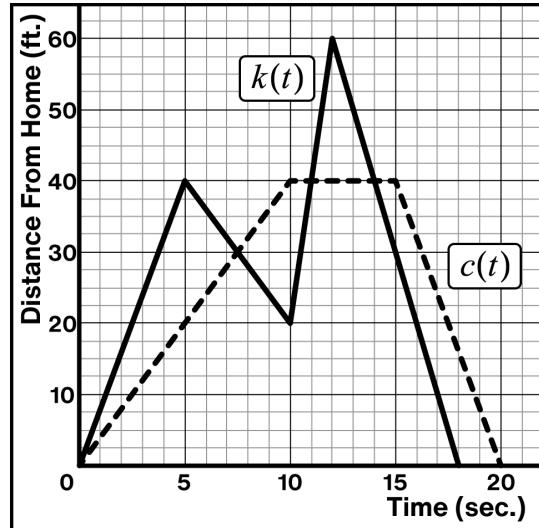
Determine the average rate of change for each interval.

Interval	Average Rate of Change
$r = -2$ to $r = 1$	
$r = -2$ to $r = 5$	
$r = -2$ to $r = 8$	

6. Functions $c(t)$ and $k(t)$ give the distance of two cats from home after t seconds.

Select **all** of the true statements.

- $k(5) > c(5)$
- $k(t)$ and $c(t)$ have the same domain and range.
- $k(t)$ is always increasing from 0 to 13 seconds.
- $k(11) = c(11)$
- Both cats return home.



Warm-Up

1. ✓ 0 ✓ 70 ✓ 880

Practice

2. Valeria is correct.

Explanations vary. The domain is the set of all possible input values of a function. In this case, the domain is $-1.5 \leq x \leq 2$ because the graph starts at $x = -1.5$ and continues until $x = 2$. Thiago gave the output values for the function. That is the range.

- 3.1 **C** $0 \leq t \leq 2.1$

- 3.2 **B** $0 \leq d(t) \leq 8$

- 3.3 The domain would have changed.

Explanations vary. Haru would have spent less time away from home, so the domain would have been affected. Because the market was on the way, the distance he rode did not change, so the range would not have changed.

- 4.1 $-2 \leq r \leq 15$

- 4.2 $1 \leq g(r) \leq 8$

Looking Back

5.	Interval	Average Rate of Change
	$r = -2$ to $r = 1$	0
	$r = -2$ to $r = 5$	$-\frac{4}{7}$
	$r = -2$ to $r = 8$	$\frac{1}{5}$

6. ✓ $k(5) > c(5)$

- ✓ $k(11) = c(11)$

- ✓ Both cats return home.

Unit A1.4, Lesson 11: Practice Problems

Name _____

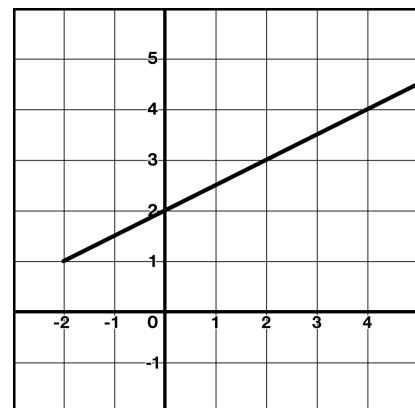
Warm-Up

Here is the graph of a function.

- 1.1 What is the domain of the function?

A. $x \geq 0$ B. $x \geq -2$ C. $x \leq -2$ D. $x \geq 1$

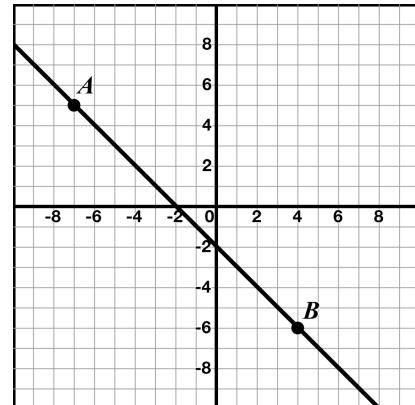
- 1.2 What is the range of the function?

A. $y \geq 0$ B. $y \geq -2$ C. $y \leq 1$ D. $y \geq 1$ **Practice**

2. Fill in the blanks for the domain and range of
- $y = -x - 2$
- to restrict the graph from point A to point B.

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

$$\underline{\hspace{2cm}} \leq y \leq \underline{\hspace{2cm}}$$



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

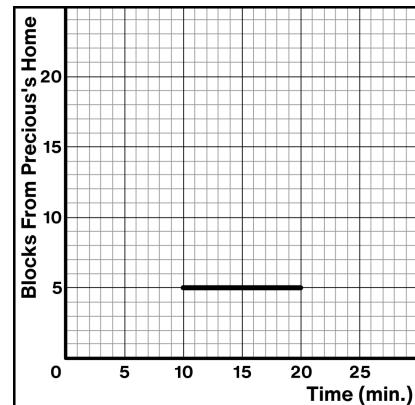
- She walks to the store, which is 5 blocks away, at a speed of half of a block per minute.
- She is in the store for 10 minutes.
- She runs back home at a speed of 1 block per minute.

Part of her path is shown on the graph.

- 3.1 Sketch the graph of the missing pieces of Precious's path.

- 3.2 Which of these equations represents the beginning piece of Precious's path? Explain your thinking.

- | | | | |
|----------------------------------|-----------------------------------|----------------------------------|---------------------------------------|
| A. $y = 0.5x$
$\{0 < x < 5\}$ | B. $y = 0.5x$
$\{0 < x < 10\}$ | C. $y = -x$
$\{20 < x < 25\}$ | D. $y = -x + 15$
$\{10 < x < 20\}$ |
|----------------------------------|-----------------------------------|----------------------------------|---------------------------------------|



Unit A1.4, Lesson 11: Practice Problems

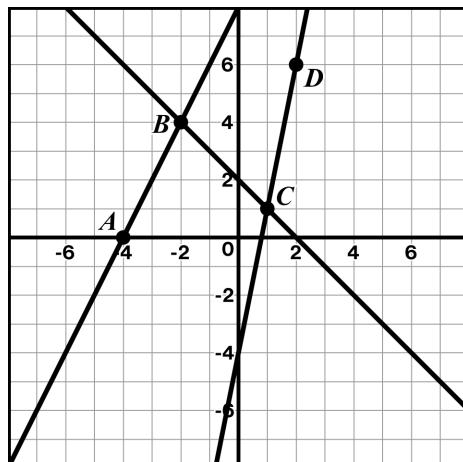
Sneha attempts to connect points A to B to C to D with three segments. She graphs three lines but needs help restricting each line's domain.

Determine the domain restriction for each of the lines.

4.1 Domain restriction for A to B :

4.2 Domain restriction for B to C :

4.3 Domain restriction for C to D :

**Looking Back**

Elena is deciding between two cafeteria meal plans:

Plan 1: Each meal costs \$2.50.

Plan 2: One month of meals costs \$30.

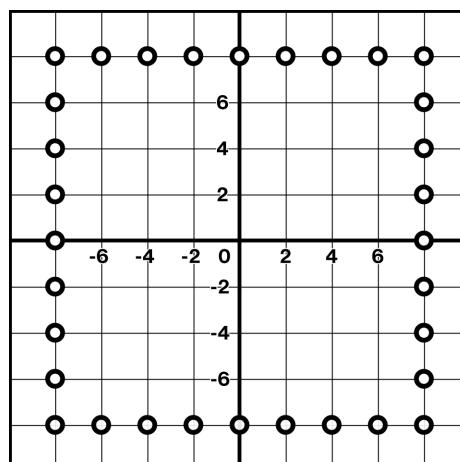
5.1 Write an equation for $f(n)$ that gives the cost of buying n meals under Plan 1 for a month.

5.2 Write an equation for $g(n)$ that gives the cost of buying n meals under Plan 2 for a month.

5.3 Elena estimates that she will buy 15 meals per month. Which meal plan should she choose? Explain your thinking.

Explore

6. Connect some dots on the graph with line segments to create a design. Then write the equations with their domain or range restriction to represent each line segment in your design.



Warm-Up

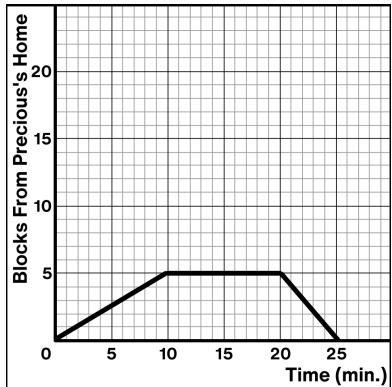
1.1 **B.** $x \geq -2$

1.2 **D.** $y \geq 1$

Practice

2. $-7 \leq x \leq 4$
 $-6 \leq y \leq 5$

3.1



3.2 **B.** $y = 0.5x$
 $\{0 < x < 10\}$

Explanations vary. Precious travels from her home to the grocery store at a speed of $\frac{1}{2}$ a block per minute from time 0 to 10 seconds.

- 4.1 $-4 < x < -2$
 4.2 $-2 < x < 1$
 4.3 $1 < x < 2$

Looking Back

5.1 $f(n) = 2.50n$

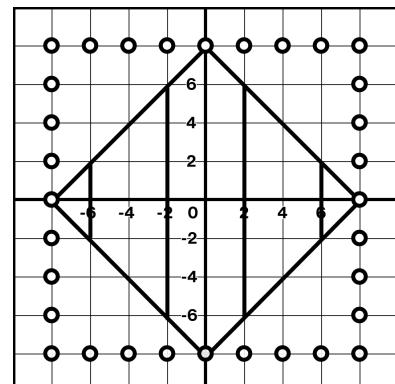
5.2 $g(n) = 30$

- 5.3 Plan 2. *Explanations vary.* Elena should choose Plan 2 because it will cost less. 15 meals will cost \$37.50 for Plan 1, but only \$30 for Plan 2.

Explore

6. *Responses vary.*

- $x = 6 \quad \{-2 < y < 2\}$
- $x = -6 \quad \{-2 < y < 2\}$
- $y = -x + 8 \quad \{0 < x < 8\}$
- $y = x - 8 \quad \{0 < x < 8\}$
- $y = x + 8 \quad \{-8 < x < 0\}$
- $y = -x - 8 \quad \{-8 < x < 0\}$
- $x = -2 \quad \{-6 < y < 6\}$
- $x = 2 \quad \{-6 < y < 6\}$

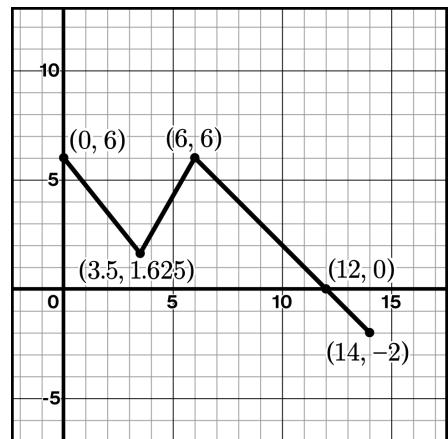


Warm-Up

Use the graph of $f(x)$ to determine the following:

1.1 $f(0)$

1.2 x when $f(x) = 0$

**Practice**

Inola is not feeling well. She decides to monitor her temperature for 24 hours. The graph represents her recorded temperatures.

- 2.1 Explain what each term says about Inola's temperature.

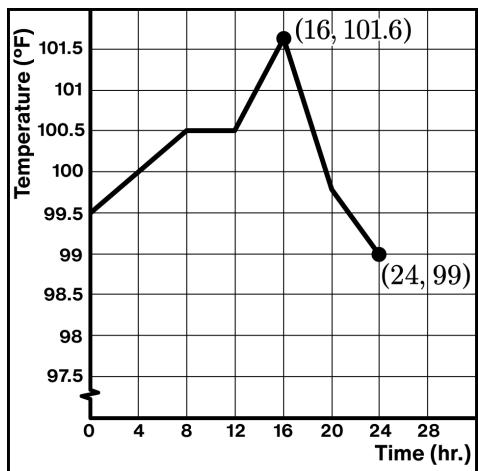
Maximum:

Minimum:

Increasing interval:

Decreasing interval:

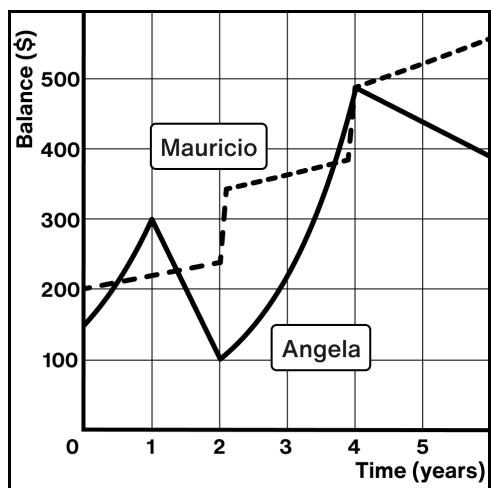
- 2.2 There are two points labeled on the graph.
What is the average rate of change for that interval?



3. Mauricio and Angela each drew a graph of their savings account balances.

Select **all** of the statements that are true.

- Angela's balance is always less than Mauricio's.
- Mauricio's balance is increasing from year 0 to year 6.
- Mauricio has a higher average rate of change in the first four years.
- These graphs have the same domain.
- These graphs have the same range.

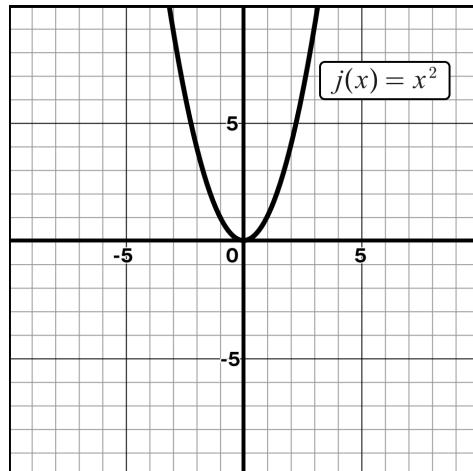


Unit A1.4, Lesson 12: Practice Problems**Looking Back**

Jamal is trying to write his name using graphing technology.

- 4.1 How could he restrict the domain of the graph of $j(x) = x^2$ so that it creates a J?

- 4.2 Could Jamal restrict the range instead to accomplish the same thing? Explain your thinking.

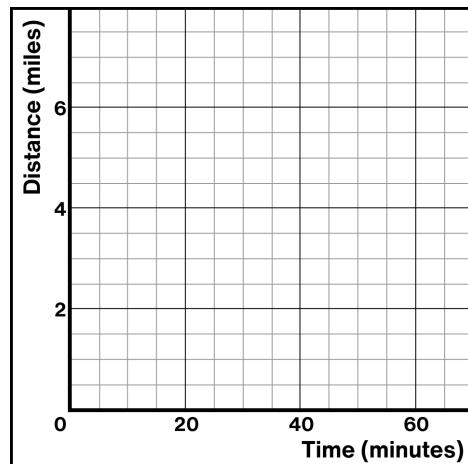


Kanna runs for 20 minutes at a constant rate and goes a total distance of 2.5 miles. She stops and rests for 15 minutes. She then runs 2 more miles for 25 minutes at a constant rate.

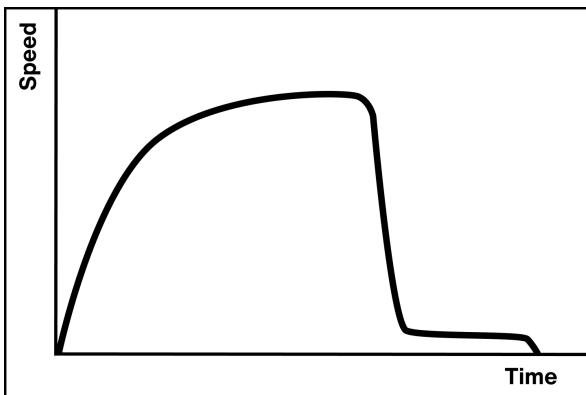
- 5.1 Sketch a graph to represent this situation.

- 5.2 What is the domain of this situation and what does it represent?

- 5.3 What is the range and what does it represent?

**Explore**

Here is a graph of speed and time. Which sport do you think produced this graph?



- A. Fishing B. Skydiving C. 100-yard sprint
- D. Golf E. Soccer F. Something else

Explain how you think that sport fits the graph.

Warm-Up

1.1. $f(0) = 6$

1.2. $f(12) = 0$

Practice

- 2.1
- Explanations vary.*

Maximum: Inola's highest temperature (101.6°F)

Minimum: Inola's lowest temperature of (99°F)

Increasing interval: The time when Inola's temperature is increasing (hour 0 to hour 16)

Decreasing interval: The time when Inola's temperature is decreasing (hour 16 to hour 24)

- 2.2
- -0.325

3. ✓ Maurico's balance is increasing from year 0 to year 6.

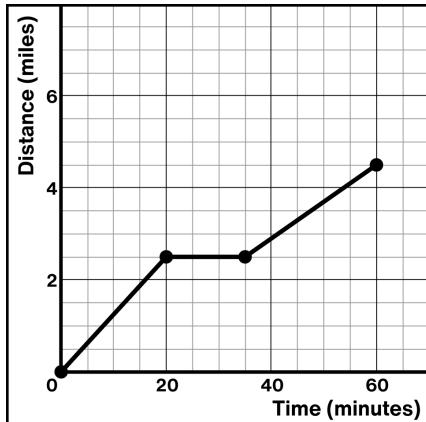
✓ These graphs have the same domain.

Looking Back

- 4.1
- Responses vary.*
- $-1 \leq x \leq 2$

- 4.2 No.
- Explanations vary.*
- This graph has symmetry about the
- y
- axis. If Jamal tries to restrict the range, any portion of the graph will have two identical parts on each side of the
- y
- axis. The letter is not symmetric.

- 5.1



- 5.2 The domain is
- $0 \leq t \leq 60$
- (or equivalent). It represents the time Kanna spent on her run. We can see that Kanna ran for 60 minutes, or one hour.

- 5.3 The range is
- $0 \leq d(t) \leq 4.5$
- (or equivalent). It represents the distance Kanna ran in miles. That day she ran 4.5 miles.

Explore

Responses vary.

- B. Skydiving. As the person falls out of the plane, she speeds up. When the parachute opens up, she slows down a lot and travels at that speed for a while.
- C. 100-yard sprint. The runner gets faster until reaching his top speed. Once he crosses the finish line, he quickly slows down and jogs at that slow speed to cool down.

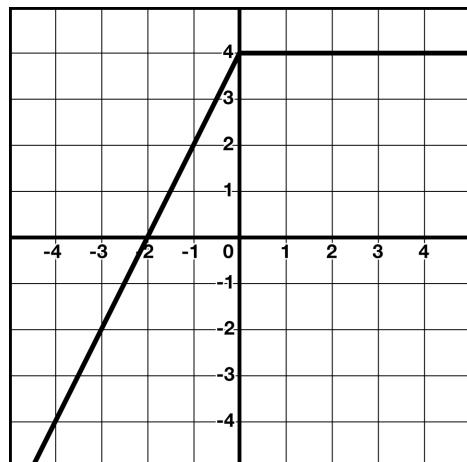
Unit A1.4, Lesson 13: Practice Problems

Name _____

Warm-Up

Here is the graph of $f(x)$. Determine the following values from the graph.

- 1.1 $f(-3)$
- 1.2 $f(0)$
- 1.3 $f(3)$

**Practice**

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

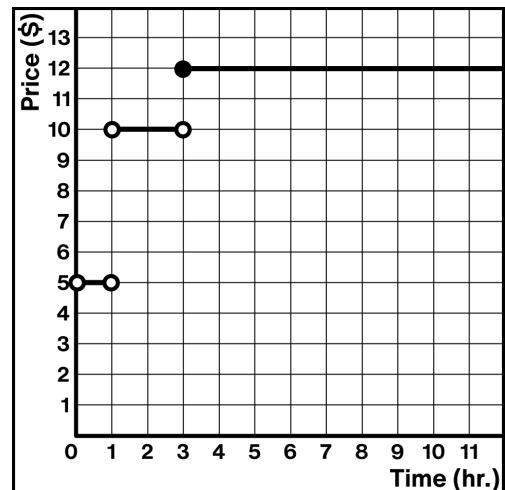
- 2.1 $g(0)$
- 2.2 $g(2)$
- 2.3 $g(4)$

$$g(x) = \begin{cases} -3x & x < 2 \\ 12 & x \geq 2 \end{cases}$$

A parking garage charges \$5 to park for less than 1 hour, \$10 to park 1 to 3 hours, and \$12 to park more than 3 hours. Let $c(t)$ represent the price of parking, in dollars, for t hours.

- 3.1 Complete the table.
- 3.2 The parking garage tried to represent their pricing with this graph. What is correct and what should change to make the graph more accurate?

t (hours)	$c(t)$ (dollars)
0	
0.5	
1	
1.75	
2	
5	



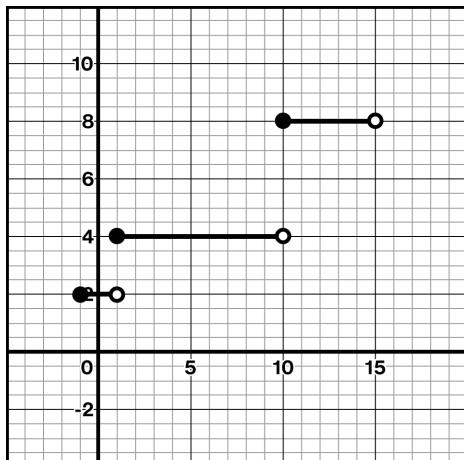
Unit A1.4, Lesson 13: Practice Problems

Use the graph of function $h(x)$ to complete the following problems.

- 4.1 Complete $h(x)$ so that it matches the graph.

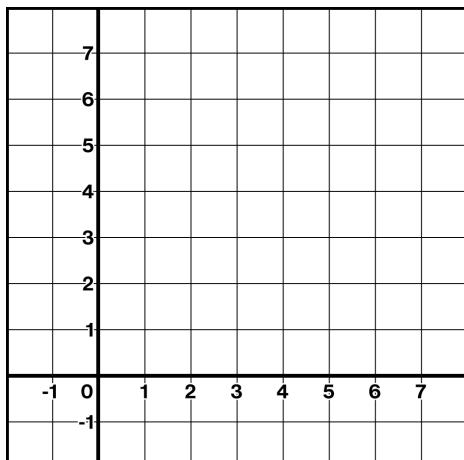
$$h(x) = \begin{cases} \boxed{} & -1 \leq x < 1 \\ 4 & \boxed{} \leq x < \boxed{} \\ 8 & 10 \leq x < 15 \end{cases}$$

- 4.2 What are the values of $h(2)$ and $h(10)$?



Looking Back

5. Graph the function $f(x) = x + 2$ over the domain $0 \leq x \leq 3$.

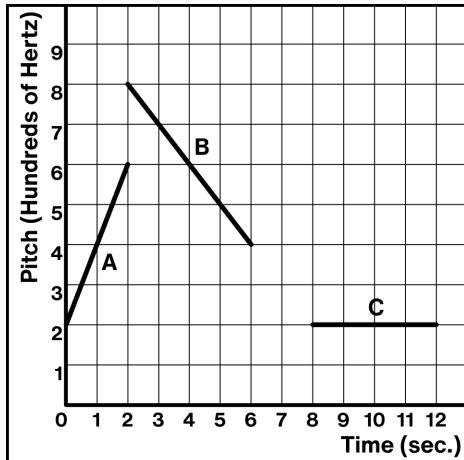


Explore

6. The pitch of a singer's recorded voice is represented by the piecewise function $p(t)$ and its graph, which consists of pieces A, B, and C.

$$p(t) = \begin{cases} 2t + 2 & 0 \leq t < 2 \\ -t + 10 & 2 \leq t < 6 \\ 2 & 8 \leq t < 12 \end{cases}$$

Eliminate any breaks or jumps in her recording by changing two values in the piecewise function.



Warm-Up

1.1 $f(-3) = -2$

1.2 $f(0) = 4$

1.3 $f(3) = 4$

Practice

2.1 $g(0) = 0$

2.2 $g(2) = 12$

2.3 $g(4) = 12$

3.1

t (hours)	$c(t)$ (dollars)
0	0
0.5	5
1	10
1.75	10
2	10
5	12

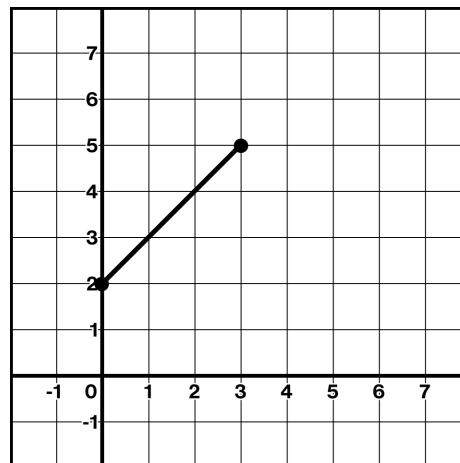
- 3.2 The location of the horizontal lines correctly represent the different amounts in the pricing structure. Some of the end points don't correctly reflect this pricing though. The points at $(0, 0)$, $(1, 10)$ and $(3, 10)$ should be filled in and the point at $(3, 12)$ should be an open circle.

4.1

$$h(x) = \begin{cases} 2 & -1 \leq x < 1 \\ 4 & 1 \leq x < 10 \\ 8 & 10 \leq x < 15 \end{cases}$$

4.2 $h(2) = 4$ and $h(10) = 8$.

5.

**Explore**

6. Responses vary.

$$p(t) = \begin{cases} 2t + 2 & 0 \leq t < 2 \\ -t + 8 & 2 \leq t < 6 \\ 2 & 6 \leq t < 12 \end{cases}$$

$$p(t) = \begin{cases} 2t + 4 & 0 \leq t < 2 \\ -t + 10 & 2 \leq t < 8 \\ 2 & 8 \leq t < 12 \end{cases}$$

$$p(t) = \begin{cases} 3t + 2 & 0 \leq t < 2 \\ -t + 10 & 2 \leq t < 8 \\ 2 & 8 \leq t < 12 \end{cases}$$

Unit A1.4, Lesson 15: Practice Problems

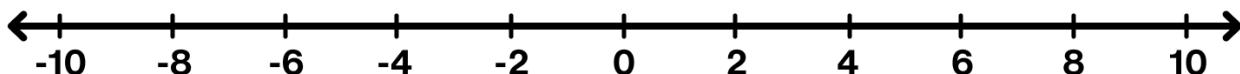
Name _____

Warm-Up

1. Select **all** of the true statements. Use the number line if it helps with your thinking.

- $-4 > -2$
 $-4 \geq -6$
 $|3| = |-3|$

- 8 is the only number 2 units away from 6.
 The distance from -2 to 2 is equal to the distance from 6 to 10.

**Practice**

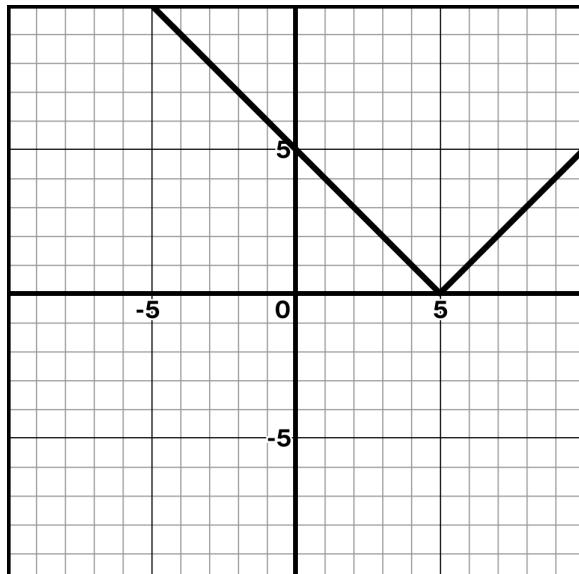
The function $f(x) = |x - 5|$ is graphed.

Determine each value below.

2.1 $f(0)$

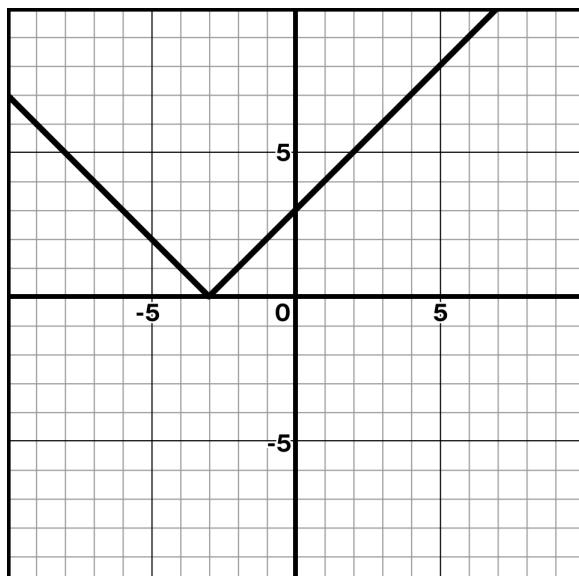
2.2 $f(8)$

2.3 $f(5)$



3. Which equation represents the graph?

- A. $g(x) = |x| - 3$
- B. $g(x) = |x - 3|$
- C. $g(x) = |x| + 3$
- D. $g(x) = |x + 3|$



Unit A1.4, Lesson 15: Practice Problems

Ricardo works at a juice packaging facility. He randomly selects and measures the weights of 10 containers of juice. The graph shows the error scores given to each container.

Ricardo writes the function $j(x) = |x - 16|$ to represent the relationship between the weight and the score.

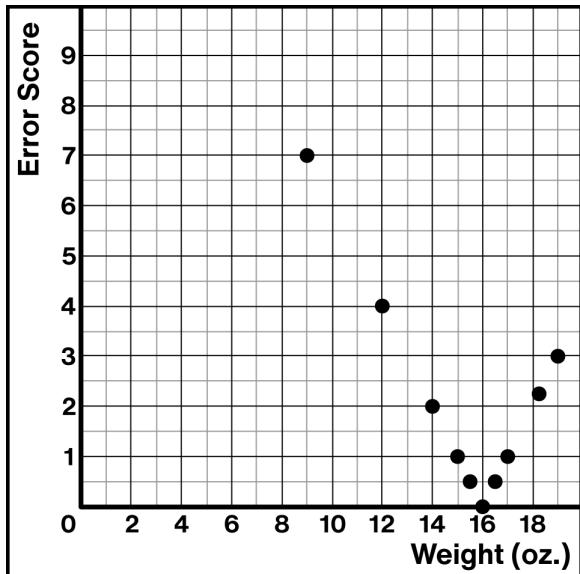
- 4.1 What does each part of the function represent?

$j(x)$ represents:

x represents:

16 represents:

- 4.2 What does $j(14) = 2$ mean in this situation?

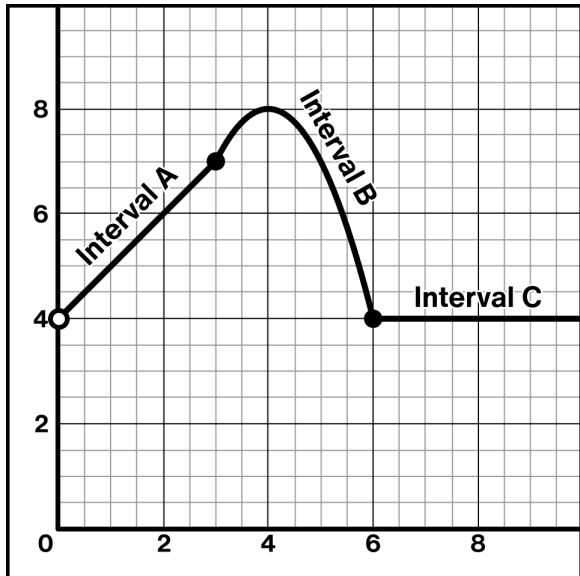
**Looking Back**

Match each domain to an interval of the piecewise function on the graph.

5.1 $3 \leq x \leq 6$ _____

5.2 $x \geq 6$ _____

5.3 $0 < x \leq 3$ _____



6. The California Department of Fish and Wildlife estimated there were 460 420 deer in the state in 2021. The deer population in 2018 was estimated to be 470 000.

Calculate the average rate of change during this time interval and explain what it tells us about the deer population.

Warm-Up

1. ✓ $-4 \geq -6$
- ✓ $|3| = |-3|$
- ✓ The distance from -2 to 2 is equal to the distance from 6 to 10 .

Practice

2.1 $f(0) = 5$

2.2 $f(8) = 3$

2.3 $f(5) = 0$

3. **D.** $h(x) = |x + 3|$

4.1 *Explanations vary.*

$j(x)$ represents the score given to the container when the weight was measured.

x represents the weight of the container in ounces.

16 represents the weight that the other containers are being compared to.

4.2 *Explanations vary.* A container with a weight of 14 ounces would receive a score of 2 because the container is 2 ounces away from the target weight of 16 ounces.

Looking Back

5.1 $3 \leq x \leq 6$ Interval B

5.2 $x \geq 6$ Interval C

5.3 $0 < x \leq 3$ Interval A

6. About -3193.3

Explanations vary. The population of deer in California is decreasing at an average of approximately 3193 deer per year.

Unit A1.4, Lesson 16: Practice Problems

Name _____

Warm-Up

Write each expression as a single integer.

1.1 $(5 - 2) + 6$

1.2 $|-4|$

1.3 $|7| - 2$

1.4 $|-8| + 1$

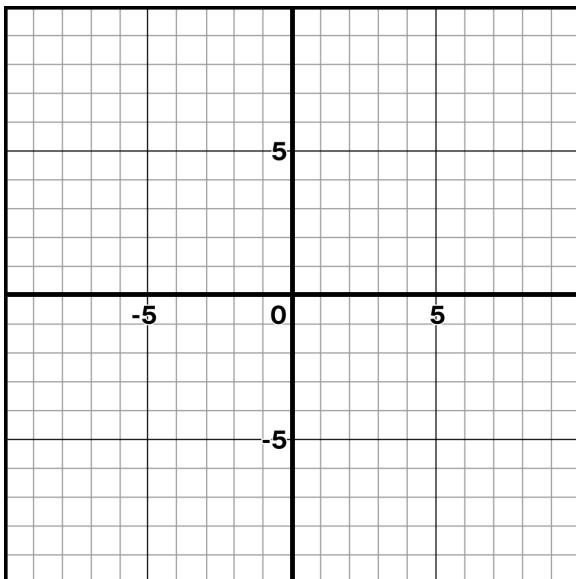
Practice

- 2.1 Complete the table using the equation

$$g(x) = |x + 1| + 4.$$

x	$g(x)$
-3	
-1	
0	

- 2.2 Sketch a graph of
- $g(x)$
- .

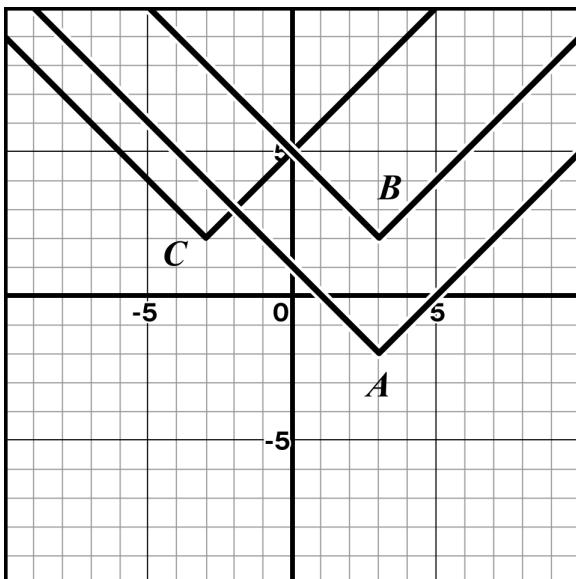


Match each function with its graph.

3.1 $f(x) = |x + 3| + 2$ _____

3.2 $g(x) = |x - 3| - 2$ _____

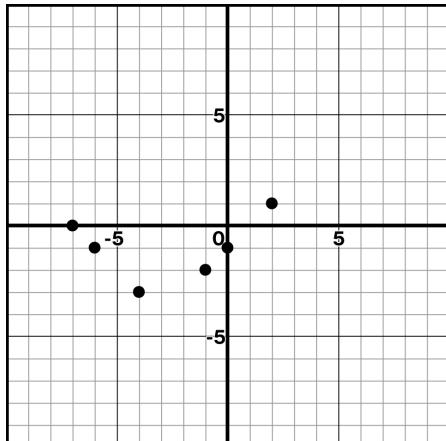
3.3 $h(x) = |x - 3| + 2$ _____



Unit A1.4, Lesson 16: Practice Problems

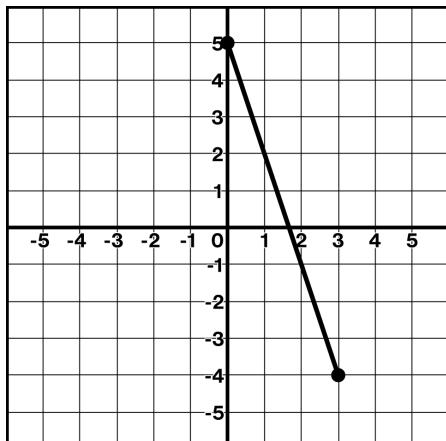
Here are some points on the graph of $h(x) = |x + 3| - 4$.

- 4.1 Make a sketch to show what all the points look like.
- 4.2 Describe your sketch using vocabulary from this unit.

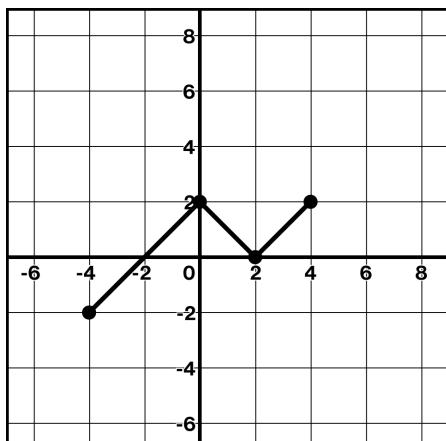
**Looking Back**

5. Select **all** of the statements that apply to this graph.

- The domain is $0 < x < 3$.
- The range is $-4 \leq f(x) \leq 5$.
- The graph is always decreasing.
- The graph is always negative.
- The maximum occurs at $(0, 5)$.

**Explore**

6. Determine two different piecewise-defined functions that could represent this graph.



Warm-Up

1.1 9

1.2 4

1.3 5

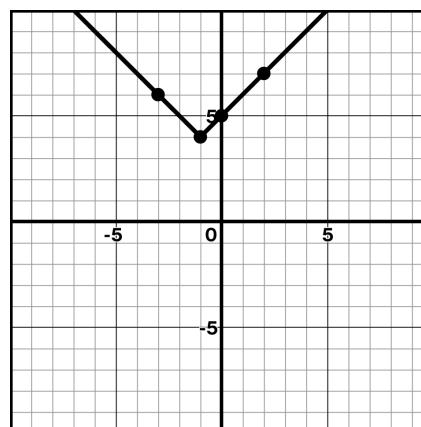
1.4 9

Practice

2.1

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

2.2

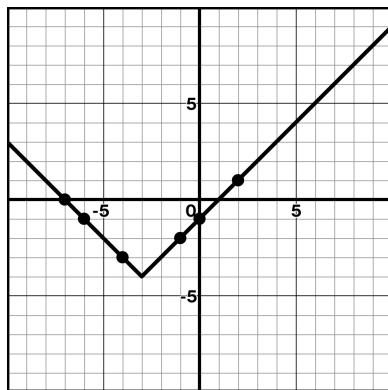


3.1 C

3.2 A

3.3 B

4.1



4.2

Responses vary. This graph has a minimum of -4 when $x = -3$. The domain is all numbers and the range is all numbers greater than or equal to -4 . The graph is increasing when $x > -3$ and decreasing when $x < -3$.

Looking Back

5. ✓ The range is $-4 \leq f(x) \leq 5$.
✓ The graph is always decreasing.
✓ The maximum occurs at $(0, 5)$.

Explore

6. Responses vary.

$$f(x) = \begin{cases} -|x| + 2 & -4 \leq x \leq 2 \\ x - 2 & 2 < x \leq 4 \end{cases} \quad g(x) = \begin{cases} x + 2 & -4 \leq x \leq 0 \\ |x - 2| & 0 < x \leq 4 \end{cases}$$