Science Mom Lesson 1

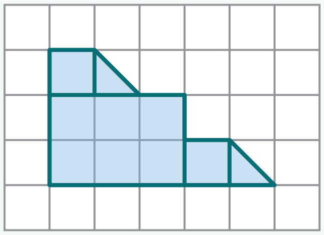
Lesson Summary

Area measures the space inside a two-dimensional figure and is expressed in square units.

Here are two possible strategies to determine the area of the same shape.

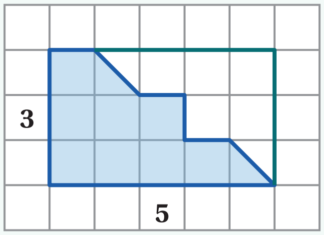
Break the shape into non-overlapping rectangles and triangles.

We can break this shape into a 2-by-3 rectangle, two unit squares, and two triangles to calculate an area of $6 + 2 + 0.5 + 0.5 = 9$ square units.



Draw a rectangle around the shape and subtract the empty space.

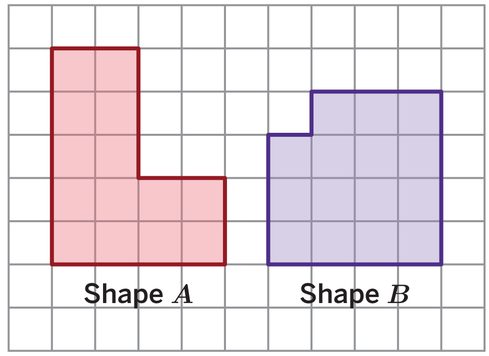
We can draw a 3-by-5 rectangle around this shape and subtract the empty squares to calculate an area of $15 - 6 = 9$ square units.



Things to Remember:

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

1. Which shape has a greater area? Show or explain your thinking.

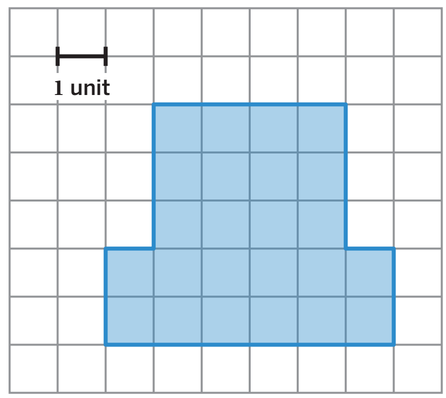


A. Shape A

B. Shape B

C. They have the same area

Problems 2–4: Here is a new shape.



2. Determine the area of the shape. Show or explain your thinking.

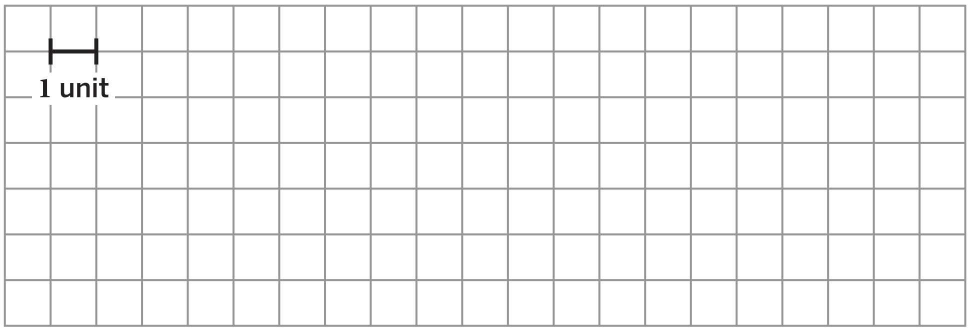
3. Show or describe another way to determine the area of this shape.

4. Show or describe how you could change this shape so it has an area of 26 square units.

Lesson Practice
6.1.01

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

5. Draw *three* different quadrilaterals, each with an area of 12 square units. Each square in this grid has an area of 1 square unit.



Spiral Review

6. Select *all* the numbers that are equivalent to 12.

- ☐ **A.** $4 \bullet 3$
- ☐ **B.** $2 + 6$
- ☐ **C.** $24 \bullet \frac{1}{2}$
- ☐ **D.** $24 \bullet 2$
- ☐ **E.** $4 + 4 \bullet 2$

Reflection

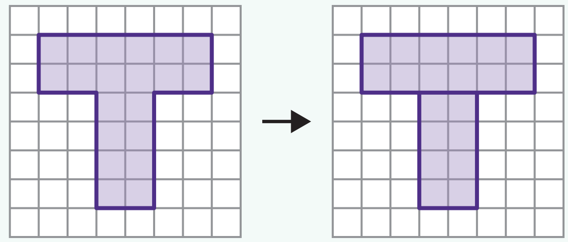
1. Circle the problem you feel least confident about.

2. Use this space to ask a question or share something you're proud of.

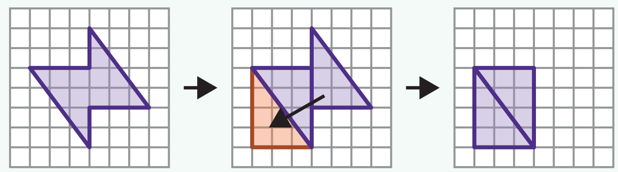
Lesson Summary

We can use shapes like rectangles, squares, and triangles to help us determine the area of more complex shapes. Here's how!

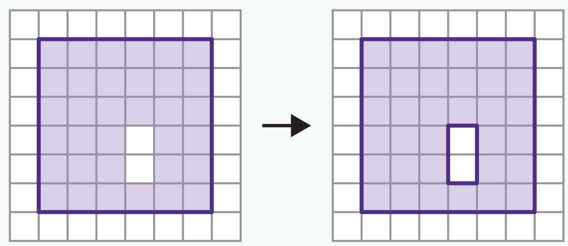
- *Decompose* the shape into two or more smaller shapes that have areas you know how to calculate.
- Add the smaller areas together.



- Decompose the shape and *rearrange* the pieces to form one or more other shapes that have areas you know how to calculate.
- Calculate the area of the new, simpler shape(s).



- If your shape has empty areas in it, determine its area as if it were a solid shape.
- Calculate the area of the empty space and subtract it from the total area.

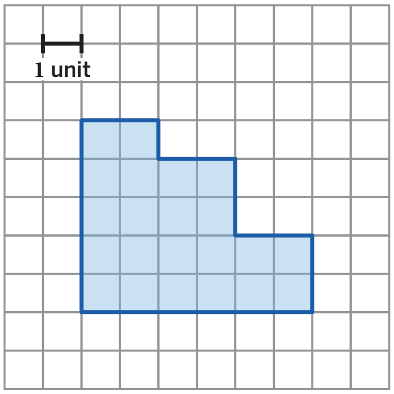


Things to Remember:

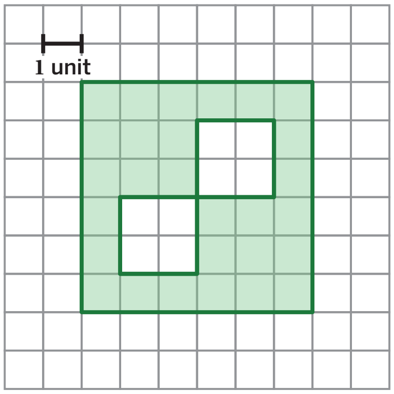
Name: ____________ Date: ________ Period: ________

Problems 1–4: Determine the total area of each shaded region.

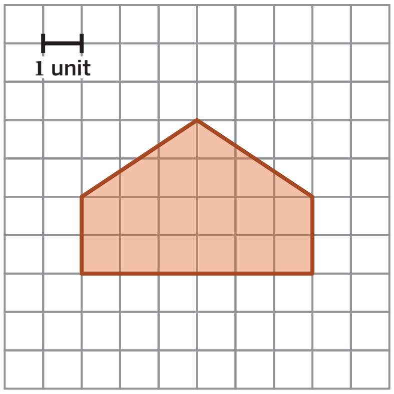
1.



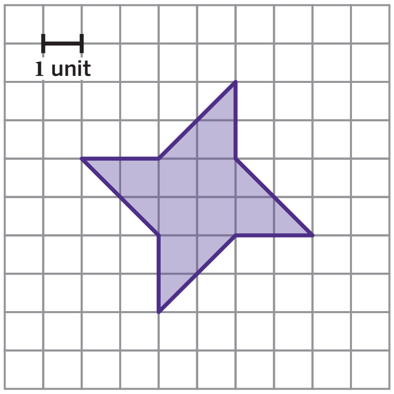
2.



3.



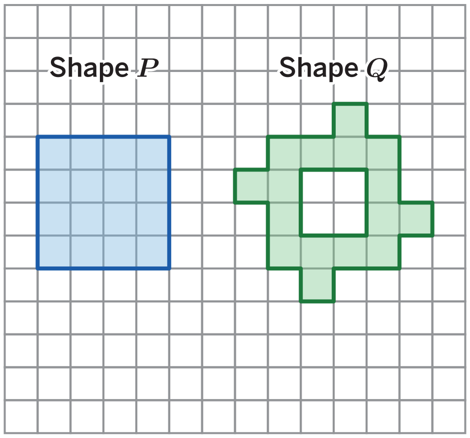
4.



5. Which shape has a greater area? Circle one.

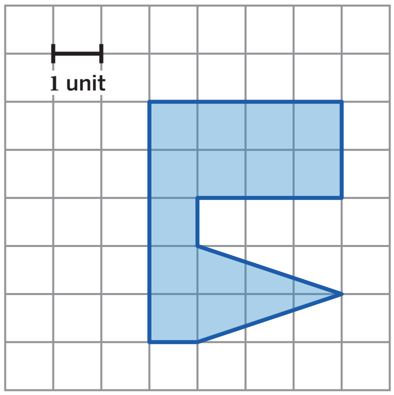
Shape P Shape Q They have the same area.

Show or explain how you know.



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

6. Jasmyn drew this shape. Determine its area.



A. 17 square units

B. 16 square units

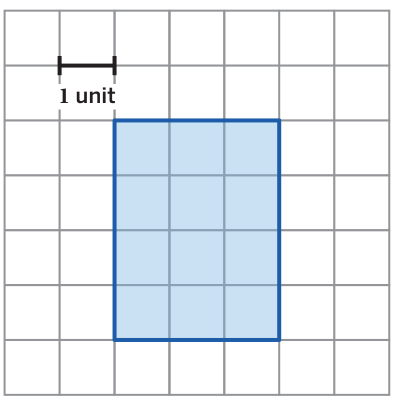
C. 14 square units

D. 11 square units

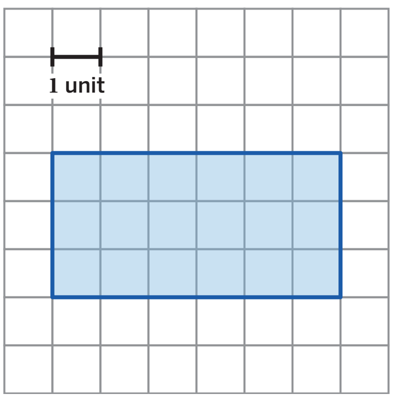
Spiral Review

7. Select *all* the rectangles with an area of 12 square units.

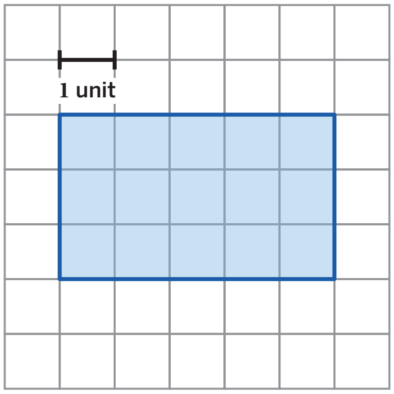
☐ **A.**



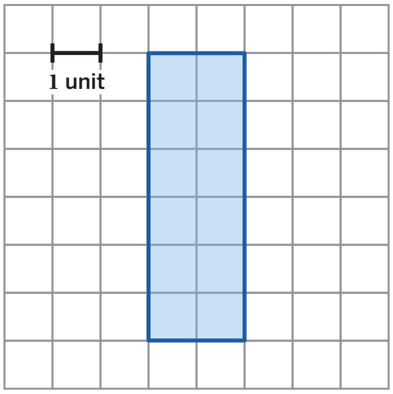
☐ **B.**



☐ **C.**



☐ **D.**



Reflection

1. Put a question mark next to a response you'd like to compare with a classmate's.

2. Use this space to ask a question or share something you're proud of.

Science Mom Lesson 3

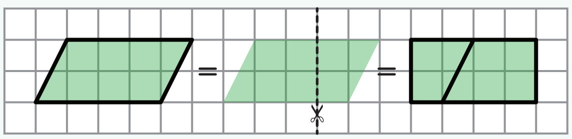
Lesson Summary

A *quadrilateral* is any shape that has four sides. A *parallelogram* is a type of quadrilateral that has two pairs of parallel sides, such as rectangles and squares.

We can use different strategies to determine the area of a parallelogram.

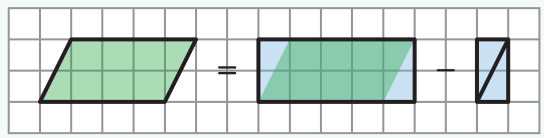
Cut the parallelogram into two pieces and rearrange the pieces to form a rectangle.

The parallelogram's area is equal to the area of the rectangle.



Draw a rectangle around the parallelogram so that it includes two right triangles. Rearrange the two triangles to form a smaller rectangle.

The parallelogram's area is equal to the difference between the areas of the larger rectangle and the smaller rectangle.

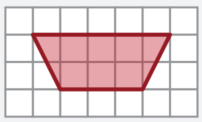
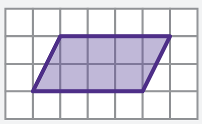
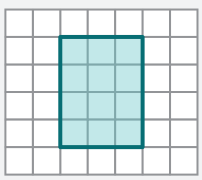
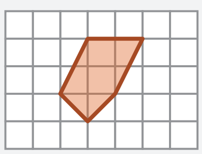


Things to Remember:

Lesson Practice
6.1.03

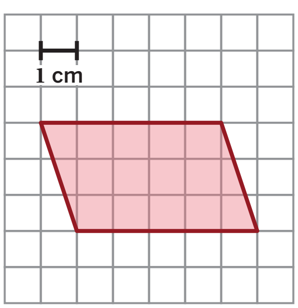
Name: ____________ Date: ________ Period: ________

Problems 1–4: Determine whether each figure is a parallelogram. For figures that are not parallelograms, explain how you know.

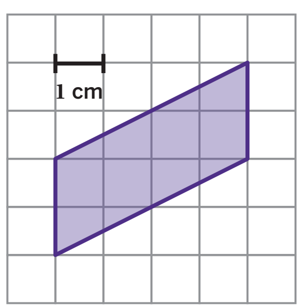
	Figure	Parallelogram (Yes / No)	If not a parallelogram, how do you know?
1.			
2.			
3.			
4.			

Problems 5–7: Use any strategy to determine the area of the parallelograms.

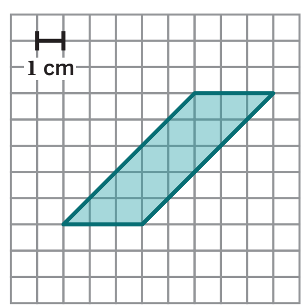
5.



6.

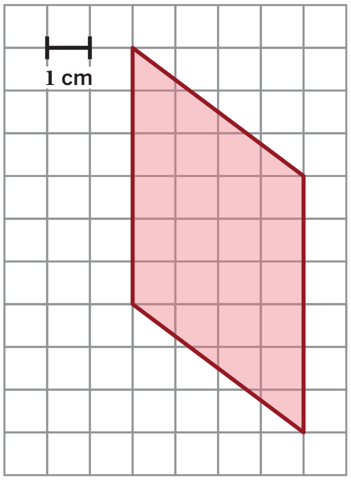


7.



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

Problems 8–9: Here is another parallelogram.

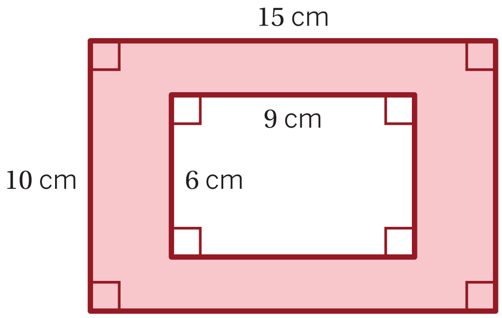


8. Determine its area. Explain your thinking.

9. Show or describe another way to determine the area.

Spiral Review

10. Calculate the area of the shaded region. Show or explain your thinking.



Reflection

1. Star the problem you spent the most time on.

2. Use this space to ask a question or share something you're proud of.

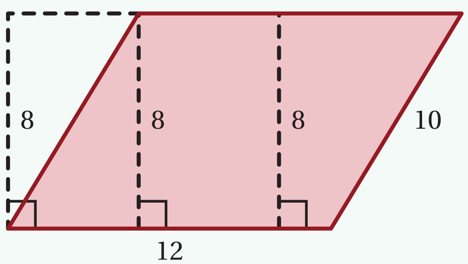
Lesson Practice 6.1.05

Science Mom Lesson 4

Lesson Summary

We can use a ruler to determine the lengths of the base and height of a parallelogram when it is not presented on a grid with lengths that we can count. No matter which side of a parallelogram you choose as the base, its area will be equal to the product of the length of the base and the length of its matching height.

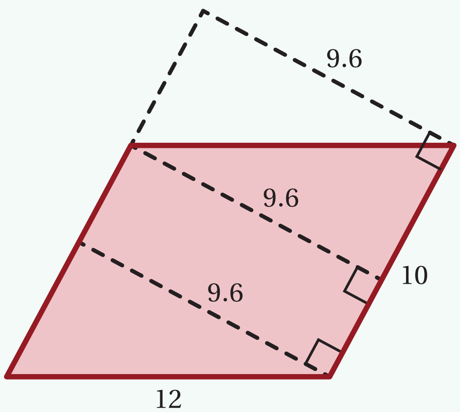
Here's an example of the same parallelogram with different sides selected as the base and different points used to measure the height. Each set of measurements will produce the same area.



Area = base • height

$A = 12 \cdot 8$

$A = 96$ square units



Area = base • height

$A = 10 \cdot 9.6$

$A = 96$ square units

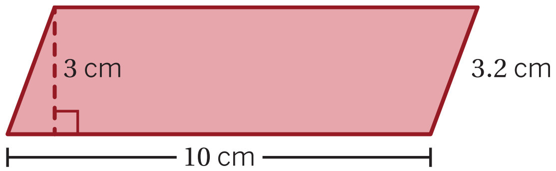
Things to Remember:

Lesson Practice
6.1.05

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

Problems 1–4: Determine the base, height, and area of each parallelogram.

1.

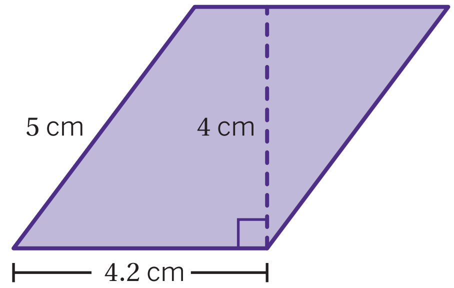


Base: ....

Height: ....

Area: ....

2.

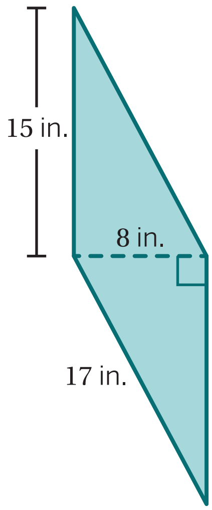


Base: ....

Height: ....

Area: ....

3.

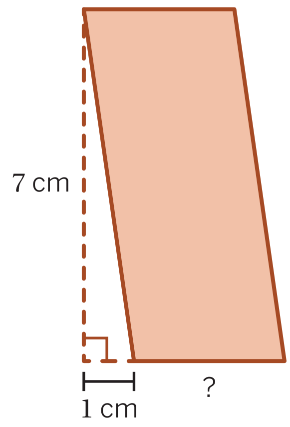


Base: ....

Height: ....

Area: ....

4.

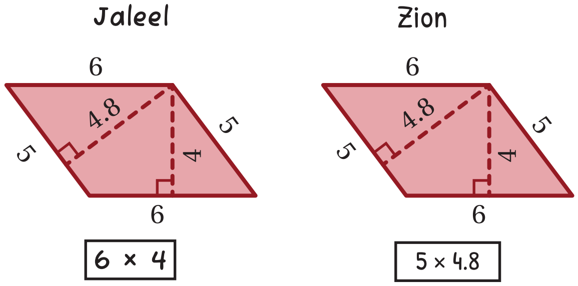


Base: ....

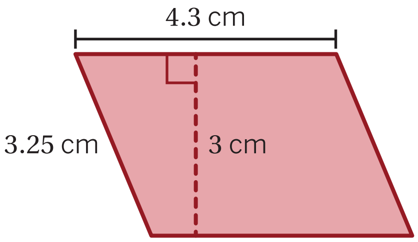
Height: ....

Area: 21 square centimeters

5. Jaleel and Zion each calculated the area of a parallelogram. Whose calculation is correct? Explain your thinking.



6. What is the area of this parallelogram in square centimeters?



A. 9.75
B. 10.55
C. 12.9
D. 13.97

Spiral Review

Problems 7–10: Determine each product.

7. $4321 \cdot 2$

8. $6534 \cdot 5$

9. $42 \cdot 21$

10. $38 \cdot 57$

Reflection

1. Star a problem you're still feeling confused about.

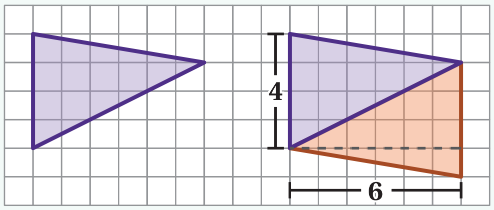
2. Use this space to ask a question or share something you're proud of.

Science Mom Lesson 5

Lesson Summary

You can use what you know about the area of quadrilaterals to help you determine the area of triangles. Here are two ways of doing so using a grid.

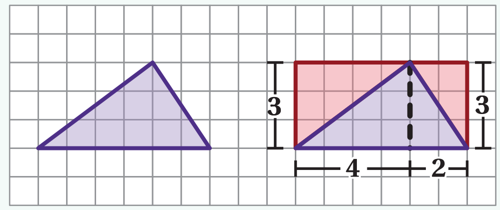
Strategy 1



- Make a copy of the triangle and rearrange the two triangles to form a parallelogram.
- Determine the area of the parallelogram by multiplying its base by its height.

  $4 \cdot 6 = 24$ square units
- The area of the triangle is half the area of the parallelogram. $\frac{24}{2} = 12$ square units

Strategy 2



- Draw a rectangle around the triangle.
- Cut the rectangle into two smaller rectangles. This also cuts the triangle into two smaller triangles.
- Determine the area of each rectangle.

  $4 \cdot 3 = 12$ square units

  $2 \cdot 3 = 6$ square units
- The area of each triangle is half the area of its matching rectangle.

  $\frac{12}{2} = 6$ square units

  $\frac{6}{2} = 3$ square units
- Add the two smaller triangle areas together.
  $6 + 3 = 9$ square units

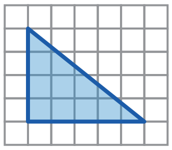
Things to Remember:

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

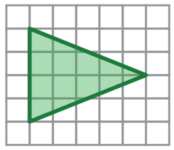
Problems 1–4: Determine the area of each triangle.

Each small square in the grid has an area of 1 square unit.

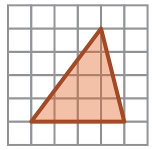
1.



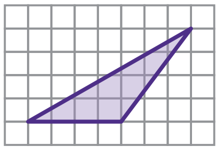
2.



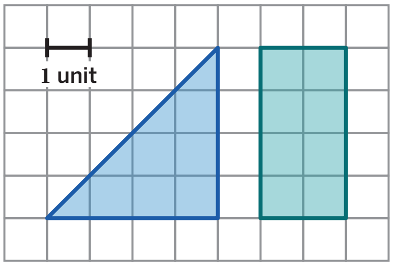
3.



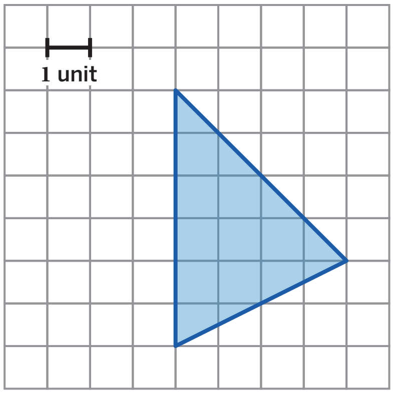
4.



5. Aki thinks that these two shapes have the same area. Is Aki's thinking correct? Explain your thinking.



6. Determine the area of this triangle. Show or explain your thinking.



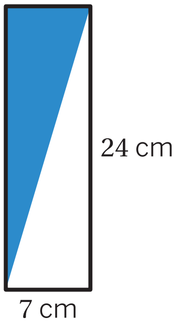
7. What is the area, in square centimeters, of the shaded part of this rectangle?

A. 15.5

B. 62

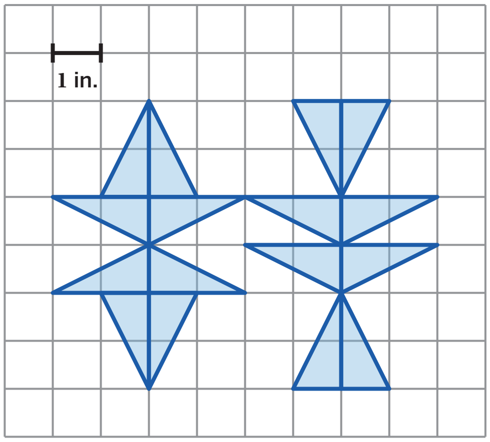
C. 84

D. 168



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

8. Alice used triangle tiles to make a design on an 8-by-6 inch area. Determine the total area, in square inches, that is covered by the triangle tiles in her design.

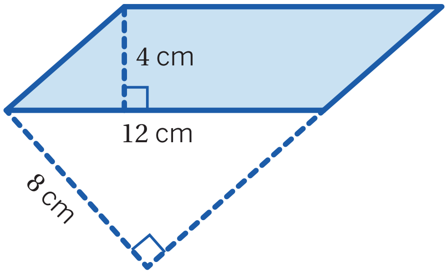


Spiral Review

9. Select *all* of the expressions that have the same value as $8 \div 2$.

- ☐ A. $\frac{8}{2}$
- ☐ B. $8 \bullet 2$
- ☐ C. $2 \div 8$
- ☐ D. $\frac{1}{2} \bullet 8$
- ☐ E. $\frac{2}{8}$

10. Determine the perimeter of this parallelogram. Show or explain your thinking.



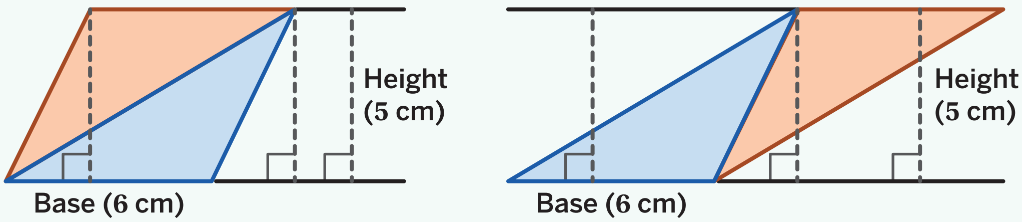
Reflection

1. Put a star next to a problem where you revised your thinking.
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

You can arrange two identical copies of any triangle to create a parallelogram with the same base and height measurements. This shows us that the area of a triangle is equal to half the area of its related parallelogram.

Here are two ways to form a parallelogram using two identical triangles with a base of 6 centimeters and a height of 5 centimeters.



The area of the parallelogram is $A = 6 \cdot 5 = 30$ square centimeters. Since the area of the triangle is half the area of the parallelogram, the area of the triangle is 15 square centimeters. In general, the formula for the area of a triangle is Area $= \frac{1}{2} \cdot$ base $\cdot$ height.

Things to Remember:

Lesson Practice
6.1.07

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

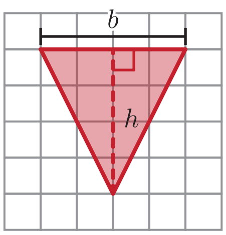
1. Determine whether each statement is true or false.

Statement	True	False
Any side of a triangle can be the base.		
The height of a triangle must always be one of its sides.		
A height that matches the base of a triangle can be drawn at any angle to the base.		
You can only draw one possible height for a chosen base.		

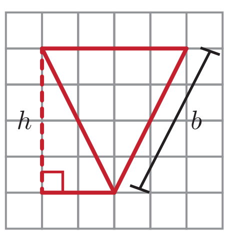
2. Choose one of the false statements in Problem 1 and explain why it is false.

3. Which triangle incorrectly identifies a height, h, and its matching base, b?

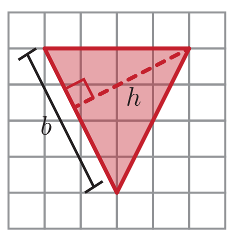
A. Triangle A



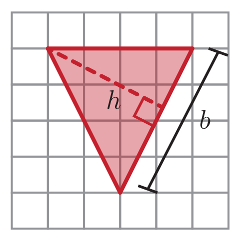
B. Triangle B



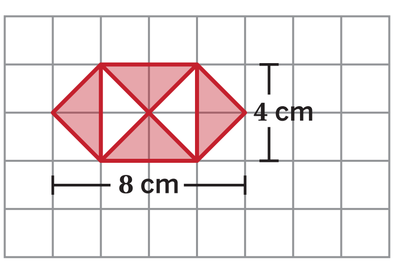
C. Triangle C

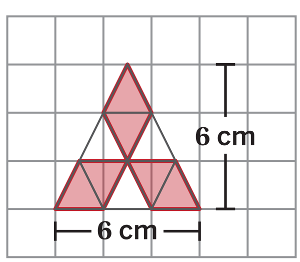


D. Triangle D



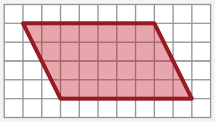
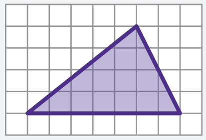
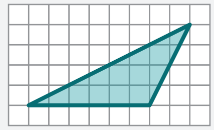
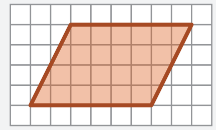
4. Ali and Haruto are drawing logos for a "Guess the Logo" competition. They added a bonus round where contestants determine the shaded area of each logo. Help them create the answer key for the bonus round.



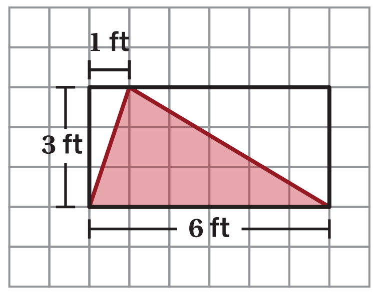


Name: .... Date: .... Period: ....

Problems 5–8: Determine the base, height, and area of each figure.
Each small square in the grid has an area of 1 square unit.

	5. 	**6.** 	**7.** 	**8.** 
Base				
Height				
Area				

9. An artist painted this triangle on the wall of a game room. What is the area, in square feet, of the triangle they painted?

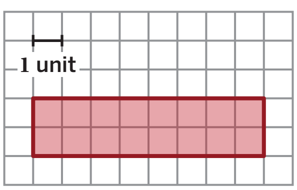


A. 3
B. 6
C. 9
D. 18

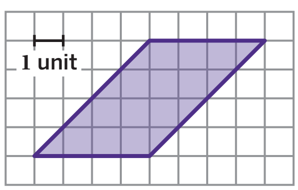
Spiral Review

Problems 10–12: Determine the area of each parallelogram.

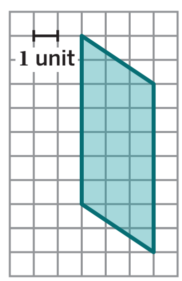
10.



11.



12.



Reflection

1. Put a heart next to the problem you found most interesting.
2. Use this space to ask a question or share something you're proud of.

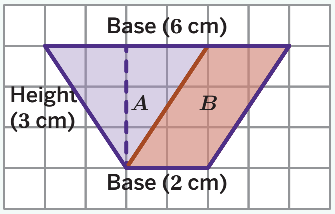
Lesson Summary

A **polygon** is a closed two-dimensional shape. For any polygon:

- The end of every side connects to the end of another side.
- All sides are straight, not curved.
- The sides do not cross each other.

You can use shapes that have areas you know how to calculate, like triangles and parallelograms, to help you determine the area of polygons.

Here are two ways a polygon can be cut into triangles and parallelograms to help determine its area.



Area of Triangle A

$A = \frac{1}{2} \bullet 4 \bullet 3$

$A = 6$

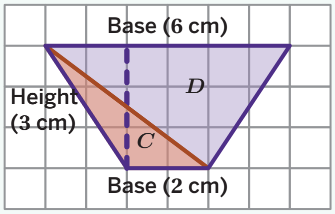
Area of Parallelogram B

$A = 2 \bullet 3$

$A = 6$

Area $= 6 + 6$

Area $= 12$ square centimeters



Area of Triangle C

$A = \frac{1}{2} \bullet 2 \bullet 3$

$A = 3$

Area of Triangle D

$A = \frac{1}{2} \bullet 6 \bullet 3$

$A = 9$

Area $= 3 + 9$

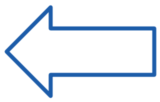
Area $= 12$ square centimeters

Things to Remember:

Lesson Practice
6.1.09

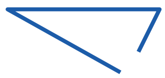
Name: .... Date: .... Period: ....

1. Select *all* the polygons.

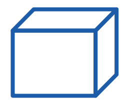
☐ **A.** 

☐ **B.** 

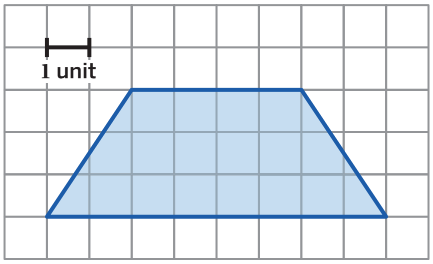
☐ **C.** 

☐ **D.** 

☐ **E.** 

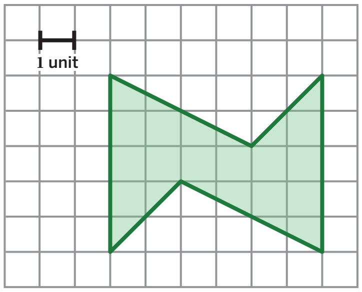
☐ **F.** 

2. Determine the area of this polygon. Each square has an area of 1 square unit.

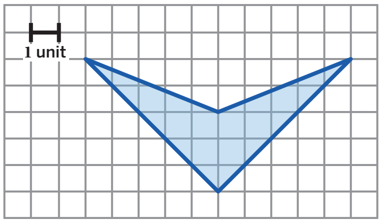


Problems 3–5: Determine the area of each polygon. Show your thinking.

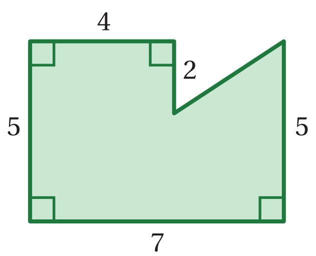
3.



4.



5.



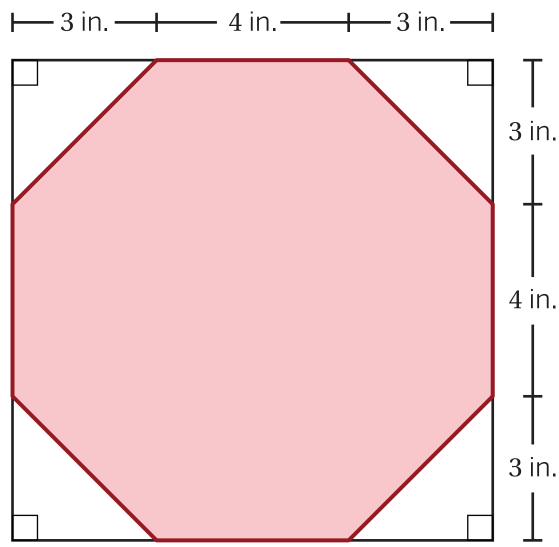
Lesson Practice
6.1.09

Name: ______________________ Date: __________ Period: __________

6. What is the total area of the shaded figure in square inches?

A. 16 **B.** 64

C. 82 **D.** 100



Spiral Review

Problems 7–8: Determine each product.

7. $\begin{array}{r} 5126 \\ \times \quad 15 \\ \hline \end{array}$

8. $\begin{array}{r} 875 \\ \times \quad 463 \\ \hline \end{array}$

Reflection

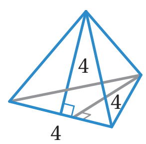
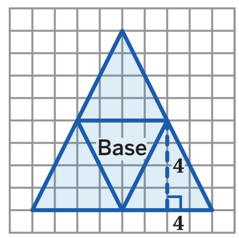
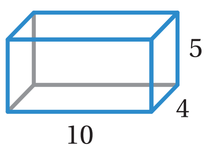
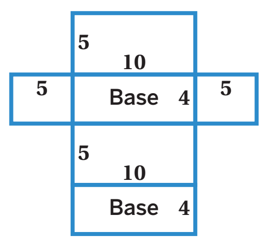
1. Put a smiley face next to a problem you were stuck on and then figured out.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

We can draw a net to create a two-dimensional representation of a three-dimensional figure. A net can help us determine the surface area of a polyhedron because it shows every face at once.

Here are some examples of how to use a net to determine the surface area of a pyramid or a prism.

<table>
<tr><th>Polyhedron</th><th>Net</th><th>Surface Area</th></tr>
<tr><td>Triangular pyramid
</td><td></td><td>$4\left(\frac{1}{2} \cdot 4 \cdot 4\right) = 32$ square units</td></tr>
<tr><td>Rectangular prism
</td><td></td><td>$2(4 \cdot 10) + 2(4 \cdot 5) + 2(5 \cdot 10) = 220$ square units</td></tr>
</table>

Things to Remember:

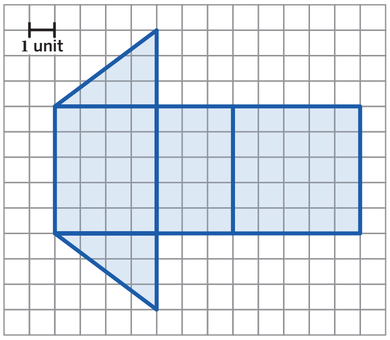
Lesson Practice
6.1.12

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

1. Select *all* the units that can be used to describe surface area.

- ☐ **A.** Square meters
- ☐ **B.** Feet
- ☐ **C.** Centimeters
- ☐ **D.** Cubic inches
- ☐ **E.** Square inches
- ☐ **F.** Square feet

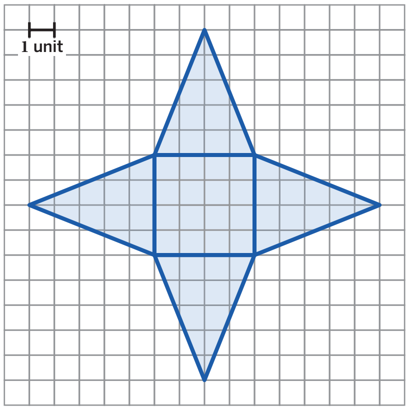
Problems 2–3: Here is a net.



2. Name the type of polyhedron that can be created from this net. Explain your thinking.

3. Determine the surface area of this polyhedron. Show or explain your thinking.

Problems 4–5: Here is a new net.



4. Name the type of polyhedron that can be created from this net. Show or explain your thinking.

5. Determine the surface area of this polyhedron. Show your thinking.

Lesson Practice
6.1.12

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

Spiral Review

Problems 6–9: Complete each equation.

6. $3 \cdot \boxed{} = 15$

7. $4 \cdot \boxed{} = 24$

8. $15 \cdot \boxed{} = 5$

9. $24 \cdot \boxed{} = 4$

10. Take a look at the triangles in this pattern. What is the fewest number of these triangles needed to cover this pattern completely? Explain your thinking.

Reflection

1. Put a star next to the problem you understood best.

2. Use this space to ask a question or share something you're proud of.

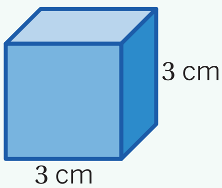
Science Mom Lesson 10

Lesson Summary

The surface area of any polyhedron is the total area of all the faces. Drawing a net or sketching individual faces can help us make sense of and keep track of calculations.

We can group identical faces together to reduce the number of steps in our calculations. For example, a cube is made of 6 identical faces, so we can determine the area of one face and multiply by 6 to determine the total surface area.

Here's an example.



One Face
$3 \cdot 3 = 9$

All Faces
$9 \cdot 6 = 54$

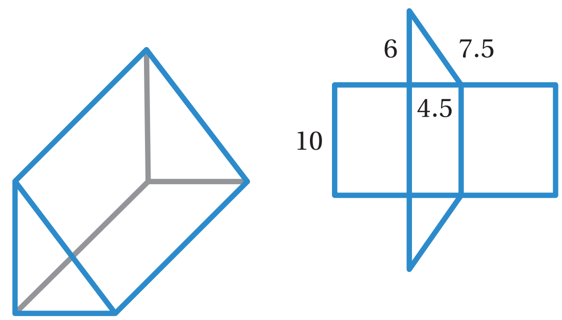
Surface Area
54 square centimeters

Things to Remember:

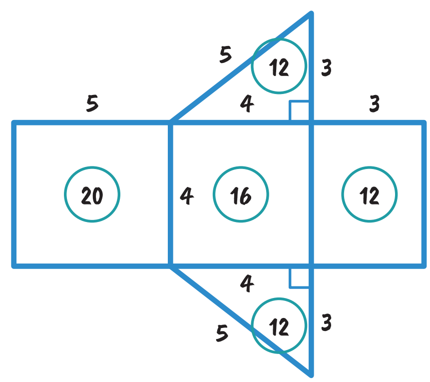
Lesson Practice
6.1.13

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

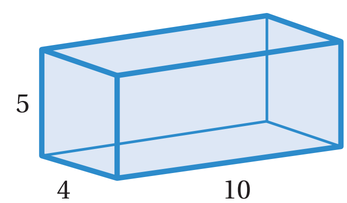
1. Label *all* the edges of this polyhedron so that the lengths match the net.



2. Takeshi made some mistakes when calculating the surface area of the triangular prism shown. Describe Takeshi's mistakes and correct them.

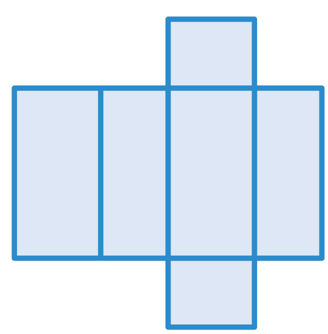


Problems 3–5: Here is a polyhedron and its matching net.



3. What is the name of this type of polyhedron?

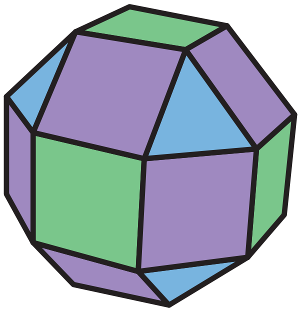
4. Use the polyhedron to label all the lengths in this net.



5. Use the net to calculate the surface area in square units. Show or explain your thinking.

Name: ______ Date: ______ Period: ______

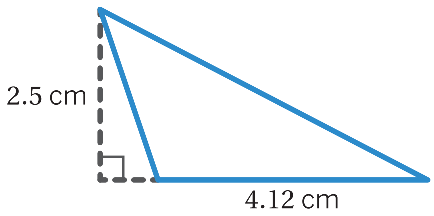
6. A *rhombicuboctahedron* is a polyhedron composed of 18 squares and 8 triangles. Here's an example where each square face has an edge length of 24 inches and each triangular face has a height of about 20.8 inches. Calculate the surface area. Show or explain your thinking.



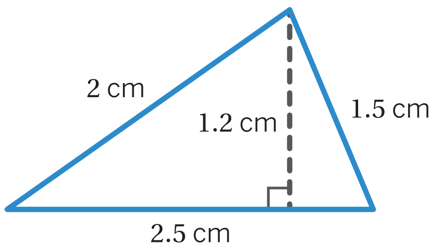
Spiral Review

Problems 7–8: Determine the area of each triangle.

7.



8.



Reflection

1. Circle one problem, word, or concept that you want to know more about.
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

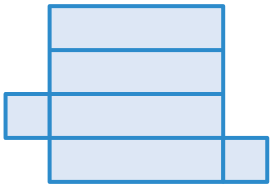
To-go containers and reusable plastic food containers are examples of polyhedra that we see in everyday life.

Mathematical modeling can help us design everyday objects, such as to-go containers. To do this, we need to:

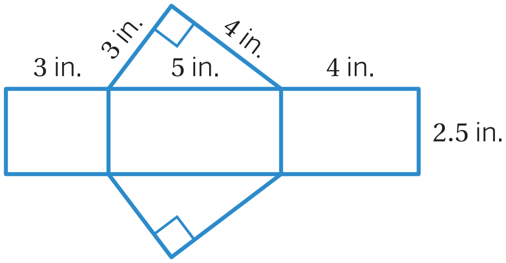
- Know the size and shape of the food item that will be placed in the container.
- Decide on the shape of the container.
- Make sure that the container will be big enough to hold the food item, without being too big.
- Know how much material we need to make the container. That's where surface area comes in handy!

Things to Remember:

1. Taylor says that this cannot be a net for a square prism because not all the faces are squares. Is Taylor correct? Explain your thinking.



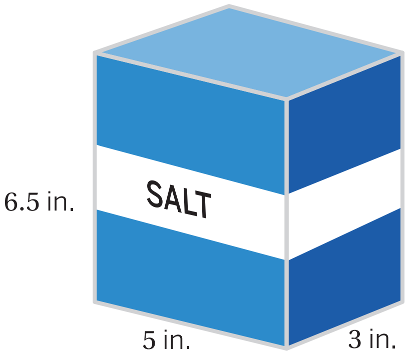
Problems 2–3: Here is a net.



2. Can you create a three-dimensional figure from this net? If so, which one?

3. What is the surface area of this figure? Explain your thinking.

Problems 4–5: This box of salt measures 5 inches by 3 inches by 6.5 inches.



4. Estimate how much cardboard the box uses. Explain your thinking.

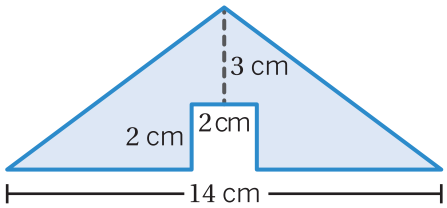
5. Estimate how much salt the box can hold. Explain your thinking.

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

6. In 2011, a group called Scenic Oasis built a giant tipped-over cereal box outside the Vancouver Art Gallery. It measured 6 meters tall, 4 meters long, and 1.6 meters wide. Determine the amount of cardboard they used to build it.

Spiral Review

7. Calculate the area of the shaded polygon. Explain your thinking.



8. Select *all* the values that are equivalent to 7.32.

☐ **A.** Seven and thirty-two tenths

☐ **B.** $7 + 0.3 + 0.02$

☐ **C.** 732 tenths

☐ **D.** 732 hundredths

☐ **E.** 7 ones + 3 tenths + 2 hundredths

Reflection

1. Put a star next to a problem you're still wondering about.

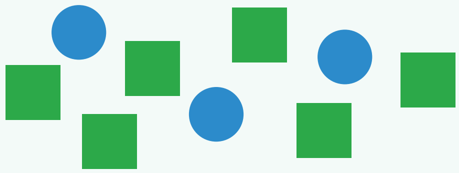
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

A **ratio** is a relationship between two quantities. One way to write a ratio is $a : b$ which means for every a of the first quantity, there are b of the second quantity.

There are many ways to describe a ratio in words.

For example, here are some ways you can describe the ratio between circles and squares in this diagram.



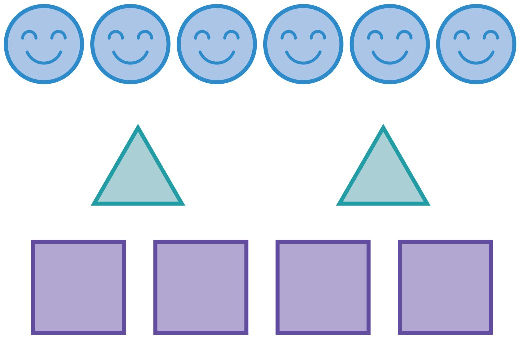
- The ratio of circles to squares is 3 to 6.
- There are 6 squares for every 3 circles.
- There are 2 times as many squares as there are circles.
- For every 1 circle, there are 2 squares.

Things to Remember:

Lesson Practice
6.2.02

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

Problems 1–4: Here is a set of smiley faces, triangles, and squares.



1. The ratio of smiley faces to triangles is

.... to ....

2. The ratio of squares to triangles is

.... : ....

3. For every 2 triangles, there are .... squares.

4. Which statement is false?

A. The ratio of smiley faces to squares is $4 : 6$.

B. The ratio of squares to triangles is $4 : 2$.

C. There are 3 smiley faces for every 1 triangle.

Problems 5–8: There are 9 bananas, 4 apples, and 3 plums in a fruit basket.

5. The ratio of bananas to apples is .... : ....

6. The ratio of plums to apples is .... to ....

7. For every .... apples, there are .... plums.

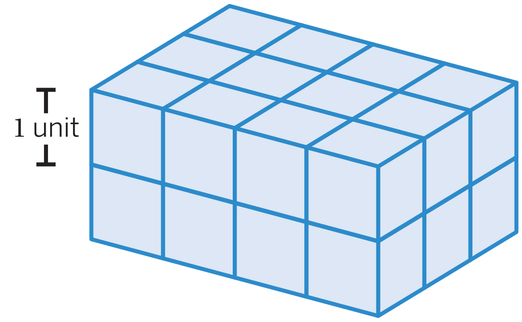
8. For every 3 bananas, there is .... plum.

Lesson Practice
6.2.02

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

Spiral Review

Problems 9–10: Here is a rectangular prism.



9. Determine the volume of the prism. Show or explain your thinking.

10. Determine the surface area of the prism. Show or explain your thinking.

Reflection

1. Put a star next to a problem you could explain to a classmate.

2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.2.03

Science Mom Lesson 13

Lesson Summary

Recipes can help us understand **equivalent ratios**. Each recipe calls for a specific ratio of ingredients, but you can halve, double, or triple the ratio to make different amounts of the same recipe.

Original Recipe

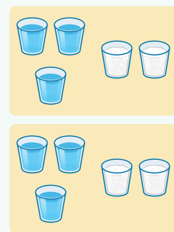
Boil 3 cups of water for every 2 cups of rice.

3 to 2

Halved Recipe

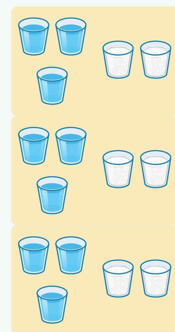
$1\frac{1}{2}$ to 1

Doubled Recipe



6 to 4

Tripled Recipe



9 to 6

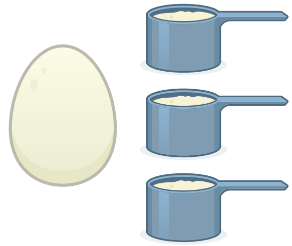
These ratios are equivalent because they all represent the same recipe. You can multiply or divide each of the values in the first ratio by the same number to get the values in each of the other ratios.

Things to Remember:

Lesson Practice
6.2.03

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

Problems 1–2: There are many recipes for pasta. Some suggest a ratio of 1 egg for every 3 ounces of flour.



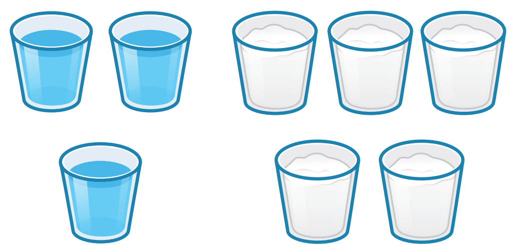
1. Draw a picture that shows how many ounces of flour you would need for 2 eggs. Then write the ratio of eggs to flour that represents your drawing.

2. Fill in the blanks to create equivalent ratios.

4 eggs : .... ounces of flour

.... eggs : 15 ounces of flour

3. A bakery uses a ratio of 3 cups of water for every 5 cups of flour to bake bread. List 2 equivalent ratios of water to flour they could use to bake the same bread.



Problems 4–7: Koharu's pie dough recipe uses 6 ounces of flour, 4 ounces of butter, and 2 ounces of water. Complete the sentences to describe the ratios in Koharu's recipe.

4. For every 2 ounces of ...., there are 6 ounces of ....

5. The ratio of .... to .... is 6 : 2.

6. The ratio of .... to .... is 2 : 3.

7. The ratio of .... to .... is 3 : 2.

Name: ________ Date: ________ Period: ________

8. Koharu wants to double the recipe to make 2 pies. How much of each ingredient does Koharu need?

________ ounces of flour

________ ounces of butter

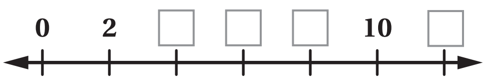
________ ounces of water

9. Koharu made a new batch of pie dough with 3 ounces of flour, 2 ounces of butter, and 1 ounce of water. Will the pie dough taste the same as the original recipe? Explain your thinking.

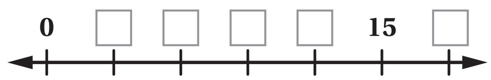
Spiral Review

Problems 10–11: Fill in the blanks on each number line.

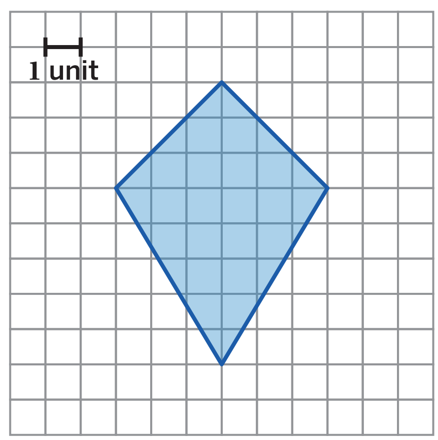
10.



11.



12. Determine the area of this polygon. Show or explain your thinking.



Reflection

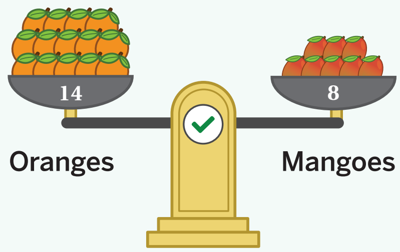
1. Circle the problem you feel least confident about.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

We can use balance scales to help us understand equivalent ratios. When both quantities in a ratio are multiplied or divided by the same amount, the ratio relationship remains the same, and the scale stays balanced.

For example, the ratio of oranges to mangoes on this scale is $14 : 8$.



You can create an equivalent ratio of $7 : 4$ by dividing the number of each fruit by 2. This means that 7 oranges and 4 mangoes will also balance on the scale. 21 oranges to 12 mangoes would also be an equivalent ratio because you can get those values by multiplying 14 and 8 by $\frac{3}{2}$.

You can use a **table** to organize and keep track of equivalent values. Tables organize information into horizontal rows and vertical columns. The first row or column usually tells us what the numbers represent.

Here is a table that represents the different numbers of oranges and mangoes needed to balance the scale.

Number of Oranges	Number of Mangoes
14	8
7	4
21	12

Things to Remember:

Lesson Practice
6.2.04

Name: ____________________ Date: __________ Period: __________

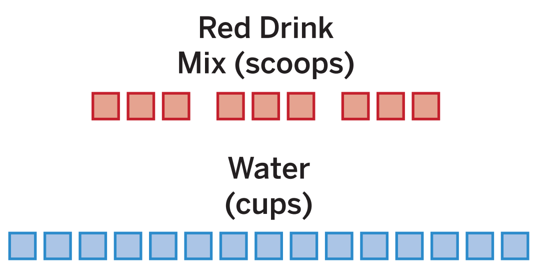
Problems 1–3: A package of red drink mix says to combine 3 scoops of red drink mix and 5 cups of water.

1. Complete the table with several ratios of red drink mix to water that are equivalent to the package instructions.

Red Drink Mix (scoops)	Water (cups)
3	5

2. Choose one of your ratios and explain how you know it's equivalent. Draw a diagram if it helps with your thinking.

3. Taj drew this diagram for one of the ratios. Will this mix taste the same as the original? Show or explain your thinking.



4. Select *all* of the ratios that are equivalent to $4 : 5$.

- ☐ **A.** $3 : 4$
- ☐ **B.** $8 : 10$
- ☐ **C.** $1 : 2.5$
- ☐ **D.** $9 : 10$
- ☐ **E.** $20 : 25$

5. Write a different ratio that is equivalent to $4 : 5$.

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

Problems 6–7: You can make a certain color of green paint by mixing 10 ounces of green paint with 2 gallons of white paint.

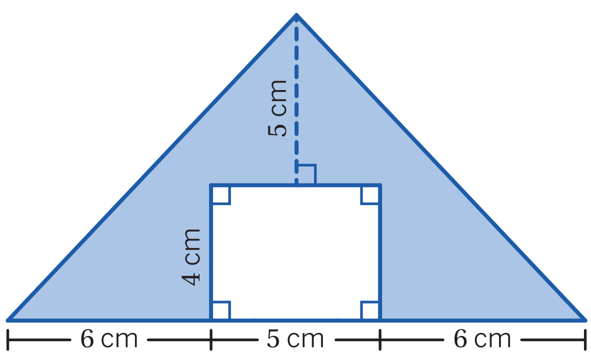
6. Draw a diagram to represent this ratio.

7. Select *all* the true statements.

- ☐ **A.** For every 5 ounces of green paint, you need 1 gallon of white paint.
- ☐ **B.** The ratio of green paint to white paint is $1 : 5$.
- ☐ **C.** For every gallon of white paint, you need 5 ounces of green paint.
- ☐ **D.** For every ounce of green paint, you need 5 gallons of white paint.
- ☐ **E.** The ratio of white paint to green paint is $10 : 2$.

Spiral Review

8. Determine the area of the shaded region. Explain your thinking.



Reflection

1. Put a heart next to the problem you found most interesting.

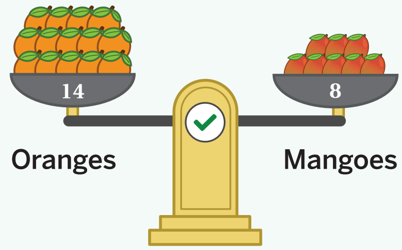
2. Use this space to ask a question or share something you're proud of.

Science Mom Lesson 15

Lesson Summary

We can use balance scales to help us understand equivalent ratios. When both quantities in a ratio are multiplied or divided by the same amount, the ratio relationship remains the same, and the scale stays balanced.

For example, the ratio of oranges to mangoes on this scale is $14 : 8$.



You can create an equivalent ratio of $7 : 4$ by dividing the number of each fruit by 2. This means that 7 oranges and 4 mangoes will also balance on the scale. 21 oranges to 12 mangoes would also be an equivalent ratio because you can get those values by multiplying 14 and 8 by $\frac{3}{2}$.

You can use a **table** to organize and keep track of equivalent values. Tables organize information into horizontal rows and vertical columns. The first row or column usually tells us what the numbers represent.

Here is a table that represents the different numbers of oranges and mangoes needed to balance the scale.

Number of Oranges	Number of Mangoes
14	8
7	4
21	12

Things to Remember:

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

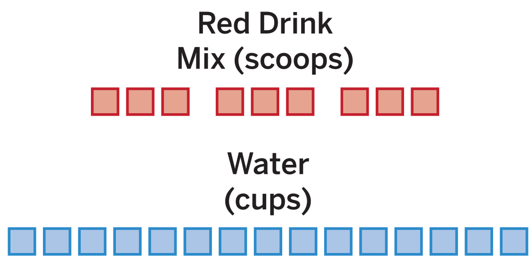
Problems 1–3: A package of red drink mix says to combine 3 scoops of red drink mix and 5 cups of water.

1. Complete the table with several ratios of red drink mix to water that are equivalent to the package instructions.

Red Drink Mix (scoops)	Water (cups)
3	5

2. Choose one of your ratios and explain how you know it's equivalent. Draw a diagram if it helps with your thinking.

3. Taj drew this diagram for one of the ratios. Will this mix taste the same as the original? Show or explain your thinking.



4. Select *all* of the ratios that are equivalent to $4:5$.

- ☐ **A.** $3:4$
- ☐ **B.** $8:10$
- ☐ **C.** $1:2.5$
- ☐ **D.** $9:10$
- ☐ **E.** $20:25$

5. Write a different ratio that is equivalent to $4:5$.

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

Problems 6–7: You can make a certain color of green paint by mixing 10 ounces of green paint with 2 gallons of white paint.

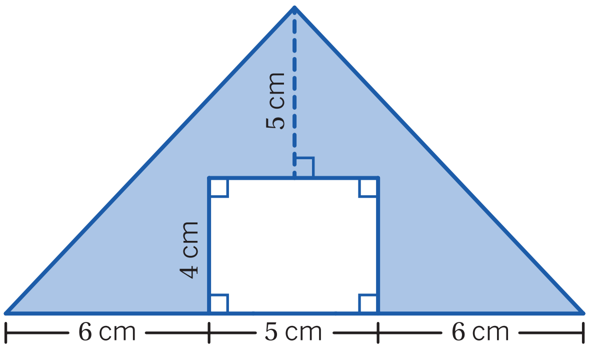
6. Draw a diagram to represent this ratio.

7. Select *all* the true statements.

- ☐ **A.** For every 5 ounces of green paint, you need 1 gallon of white paint.
- ☐ **B.** The ratio of green paint to white paint is $1 : 5$.
- ☐ **C.** For every gallon of white paint, you need 5 ounces of green paint.
- ☐ **D.** For every ounce of green paint, you need 5 gallons of white paint.
- ☐ **E.** The ratio of white paint to green paint is $10 : 2$.

Spiral Review

8. Determine the area of the shaded region. Explain your thinking.



Reflection

1. Put a heart next to the problem you found most interesting.

2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.2.08

Science Mom Lesson 16

Lesson Summary

A *factor* of a number is a whole number that divides evenly into the given number (with no remainder). A **common factor** of two numbers is a number that is a factor of both numbers.

Here's a chart that shows some factors of 8 (marked with squares) and some factors of 12 (marked with circles). We can see that some common factors of 8 and 12 are 1, 2, and 4.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

The **greatest common factor (GCF)** is the largest number that is a common factor of two numbers. In the example of 8 and 12, the GCF is 4.

Things to Remember:

Lesson Practice
6.2.08

Name: ______ Date: ______ Period: ______

1. What is the greatest common factor of 12 and 44?

2. What is the greatest common factor of 4 and 6?

3. What is the least common multiple of 4 and 6?

Problems 4–6: Jayla's parents are replacing their bathroom floor with square tiles. The tiles will be laid side by side to cover the entire floor with no gaps, and none of the tiles can be cut. The floor is a rectangle that measures 48-by-60 inches.

4. What is the side length of the largest possible tile Jayla's parents could use?

5. How many of these tiles do they need?

6. List *three* other whole-number tile sizes that could cover the bathroom floor.

Problems 7–8: A teacher is making gift bags filled with pencils and stickers. They have 45 pencils and 60 stickers to use. Each bag will have the same amount of each item.

7. What is the greatest number of bags the teacher can make, with no items left over? Show or explain your thinking.

8. Using your answer from the previous problem, determine how many pencils and how many stickers would be in each gift bag.

   Pencils: ______ Stickers: ______

Lesson Practice
6.2.08

Name: ______ Date: ______ Period: ______

Spiral Review

Problems 9–11: Circle the expression that has the greater value.

9. $5 \bullet 0.4$ $\quad$ $500 \bullet 0.04$ $\quad$ They have the same value.

10. $14.2 - 2.35$ $\quad$ $142 - 23.5$ $\quad$ They have the same value.

11. $1.82 + 33.3$ $\quad$ $18.2 + 3.33$ $\quad$ They have the same value.

Reflection

1. Put a question mark next to a problem you're feeling unsure of.
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

You can use different strategies to compare two ratios.

Let's compare the ratios of two cans of paint to see which will make a lighter shade of gray.

Ratio A	Ratio B
5 ounces black paint	7 ounces black paint
3 gallons white paint	4 gallons white paint

Strategy 1: Multiply both ratios so they each have the same amount of black paint.

- The LCM for the number of ounces of black paint for both ratios is 35.
- Multiply Ratio A by 7 to get 35 ounces of black paint and 21 gallons of white paint.
- Multiply Ratio B by 5 to get 35 ounces of black paint and 20 gallons of white paint.

When both ratios have the same amount of black paint, Ratio A has more gallons of white paint, which means it will be a lighter shade of gray.

Strategy 2: Calculate the number of ounces of black paint per gallon of white paint.

- Ratio A has $\frac{5}{3} = 1\frac{2}{3}$ ounces of black paint for every gallon of white paint.
- Ratio B has $\frac{7}{4} = 1\frac{3}{4}$ ounces of black paint for every gallon of white paint.

Ratio A has less black paint for 1 gallon of white paint, which means it will be a lighter shade of gray.

Things to Remember:

Lesson Practice
6.2.09

Name: ______ Date: ______ Period: ______

Problems 1–3: To make 1 can of sky blue paint, Ama mixes 2 ounces of blue tint with 3 gallons of white paint.

1. Write a ratio of blue tint to white paint that would make the *same* color blue.

2. Write a ratio of blue tint to white paint that would make a *darker* blue.

3. Write a ratio of blue tint to white paint that would make a *lighter* blue.

4. If you blend 2 scoops of chocolate frozen yogurt with 1 cup of milk, you will make a milkshake with a stronger chocolate flavor than if you blended 3 scoops of chocolate frozen yogurt with 2 cups of milk. Show or explain why this is true.

5. There are two mixtures of light purple paint.

- Mixture A is made with 5 cups of purple paint and 2 cups of white paint.
- Mixture B is made with 15 cups of purple paint and 8 cups of white paint.

Which mixture makes a lighter shade of purple? Explain your thinking.

Name: ________ Date: ________ Period: ________

6. Order these mixtures from *lightest* green to *darkest* green.

A. 2 gallons white : 4 ounces green

B. 3 gallons white : 5 ounces green

C. 5 gallons white : 8 ounces green

Lightest Green **Darkest Green**

Spiral Review

Problems 7–9: Here are two recipes for lemonade.

- Recipe A: Mix 3 cups of lemon juice with 2 cups of water.
- Recipe B: Mix 3 cups of lemon juice with 3 cups of water.

7. What fraction of Recipe A is lemon juice?

8. What fraction of Recipe B is lemon juice?

9. Which recipe has a stronger lemon flavor? Explain your thinking.

Reflection

1. Put a smiley face next to the problem you learned from most.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

We can use ratio tables to help make plans for situations that we haven't experienced yet.

Here are some supply recommendations for a 50-person taco party:

- 10 pounds of carnitas
- 15 cups of pinto beans
- 125 tortillas

People	Carnitas (lb)	Pinto Beans (cups)	Tortillas
50	10	15	125
200	40	60	500
10	2	3	25

$\times 4$

$\div 5$

Let's use a table to determine the different amounts of each ingredient we might need for different-sized parties. For example, if we only had 10 people coming to the taco party, we would only need 2 pounds of carnitas, 3 cups of pinto beans, and 25 tortillas. If 200 people were coming to the party, we could multiply the values for the 50-person party by 4 to determine the amount for each ingredient. We just have to multiply or divide all of the values in each row by the same number to preserve each ratio relationship.

Things to Remember:

Lesson Practice
6.2.10

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

Problems 1–3: A recipe for tropical fruit juice says to combine 4 cups of pineapple juice with 5 cups of orange juice.

1. Complete the table to determine how much of each type of juice you need for 1, 2, 3, and 4 batches of the recipe.

Batches	Pineapple Juice (cups)	Orange Juice (cups)
1	4	5
2		
3		
4		

2. The recipe also calls for $\frac{1}{3}$ cups of lime juice for every 5 cups of orange juice. Add an additional column of values to the table to represent the amount of lime juice for 1, 2, 3, and 4 batches of the recipe.

3. If you use 12 cups of pineapple juice with 20 cups of orange juice, will the recipe taste the same? Explain your reasoning.

Problems 4–5: It takes about 9 kilograms of olives to make 2 liters of olive oil.

4. Complete the table to determine how much olive oil each orchard made.

	Olives (kg)	Olive Oil (L)
Ratio	9	2
Orchard A	9,000	
Orchard B	5,400	

5. Afia claims that to make 4 liters of olive oil, you need 11 kilograms of olives. Is Afia correct? Explain your thinking.

Lesson Practice
6.2.10

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

6. Determine the unknown values in the table.

Number of Loaves	Bananas	Butter (cups)	Sugar (cups)	Eggs	Flour (cups)
4	12	2	3	8	6
2					

Spiral Review

Problems 7–8: Determine each product. Show your thinking.

7.

$$\begin{array}{r} 680 \\ \times\ 502 \\ \hline \end{array}$$

8.

$$\begin{array}{r} 401 \\ \times\ 285 \\ \hline \end{array}$$

Reflection

1. Circle a problem you want to talk to a classmate about.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

There are a few helpful strategies you can use to determine missing values in equivalent ratios. One strategy is to determine a new ratio where one of the quantities is equal to 1.

For example, if 6 balloons can make 3 marbles float, you can use the ratio 6 : 3 and equivalent ratios to solve different problems.

To determine the number of balloons that can float 8 marbles:

- Determine the number of balloons that float 1 marble.
- Then you can multiply that ratio by 8 to determine that 16 balloons float 8 marbles.

	Number of Balloons	Number of Marbles	
	6	3	
$\div 3$	2	1	$\div 3$
$\times 8$	16	8	$\times 8$

To determine the number of marbles that 4 balloons can float:

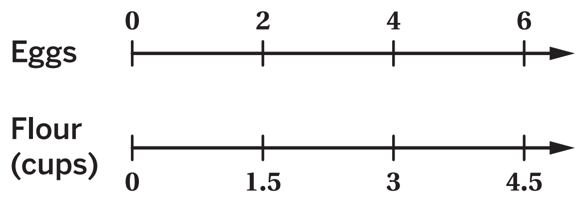
- Determine the number of marbles that 1 balloon can float.
- Then you can multiply that ratio by 4 to determine that 4 balloons float 2 marbles.

	Number of Balloons	Number of Marbles	
	6	3	
$\div 6$	1	0.5	$\div 6$
$\times 4$	4	2	$\times 4$

Things to Remember:

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

Problems 1–2: Here is a double number line showing the ratio of eggs to flour for different-sized cakes.



1. How much flour do you need for each egg in this recipe?

2. How many eggs would you need for 18 cups of flour?

Problems 3–5: The same cake recipe uses 2 cups of sugar for every 3 cups of flour.

3. Draw a double number line to represent this situation.

4. How much sugar do you need for 18 cups of flour?

5. Which representation do you prefer to help you answer the previous question: a table, a double number line, or some other tool? Explain your thinking.

6. Raven and Tiana are both training for a swimming competition in the same pool. Raven can swim 6 laps in 3 minutes. Tiana can swim 3 laps in 2 minutes. If both swimmers maintain their pace, which statement is *not* true?

A. Raven can swim 2 laps per minute.

B. Tiana can swim 1.5 laps in one minute.

C. In 6 minutes, Raven can swim 3 more laps than Tiana.

D. In 12 minutes, Tiana swims 8 fewer laps than Raven.

Lesson Practice
6.2.11

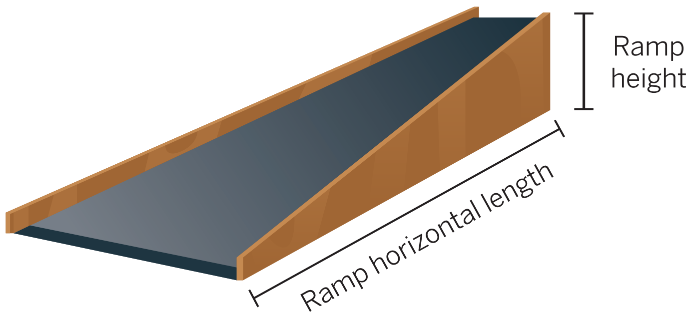
Name: .... Date: .... Period: ....

7. Inola is making personal pizzas for a friend's birthday party. For 4 pizzas, Inola uses 10 ounces of cheese. Complete the table using this ratio.

Number of Pizzas	Cheese (oz)
12	
22	
11	

8. The Americans with Disabilities Act (ADA) states that the maximum height-to-length ratio of a curb ramp is $1 : 12$. That means for every 1 inch of ramp height, there must be at least 12 inches of ramp length.[2]

Crow measured the height of this ramp as 30 inches. What's the minimum horizontal length of the ramp?



Spiral Review

9. Fill in each blank using the numbers 1 to 12 only once to make each expression true.

$\frac{\square}{\square} < \frac{\square}{\square}$ $\frac{\square}{\square} = \frac{\square}{\square}$ $\frac{\square}{\square} > \frac{\square}{\square}$

Reflection

1. Star the problem you spent the most time on.

2. Use this space to ask a question or share something you're proud of.

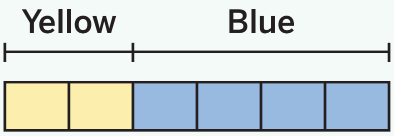
[2] Source: *Americans with Disabilities Act*

Lesson Summary

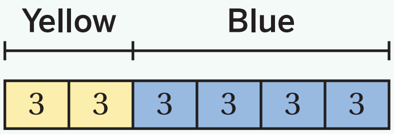
A *tape diagram* is a way to represent relationships between quantities (such as ratios) as lengths of tape. The diagram is divided up to represent the parts. Together, these parts represent the whole.

We can use tape diagrams to represent things like the ratio of different paints in a mixture.

For example, when 2 cups of yellow paint are mixed with 4 cups of blue paint, it creates 6 cups of green paint. Here is a tape diagram representing that ratio, where each part represents 1 cup of paint.



But if each part represented 3 cups of paint, there would be 6 cups of yellow paint, 12 cups of blue paint, and a total of 18 cups of green paint. This is a way to see a ratio that is equivalent to the original ratio.



Things to Remember:

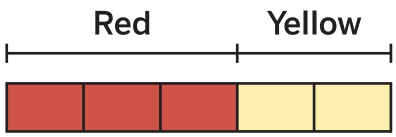
Name: .... Date: .... Period: ....

Problems 1–2: The ratio of coaches to players at practice is $2 : 5$. There are 21 people at practice.

1. How many coaches are at practice?

2. How many players are at practice?

Problems 3–4: Here is a tape diagram representing the ratio of red paint to yellow paint in a mixture of orange paint.



3. What is the ratio of red paint to yellow paint?

4. Complete the table below to show the amount of yellow and red paint needed to make each quantity of orange paint.

Orange (gal)	Red (gal)	Yellow (gal)
25		
30		

5. The ratio of cats to dogs at a shelter is $4 : 5$. In total, there are 27 dogs and cats.

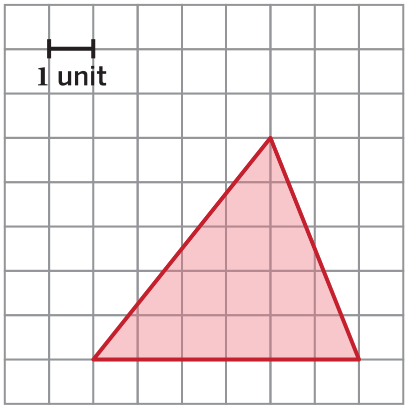
How many dogs are there? Show or explain your thinking.

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

6. Last month, there were 4 sunny days for every rainy day. If there were 30 days in the month, how many days were rainy? Show or explain your thinking.

Spiral Review

7. Determine the area of this triangle. Show or explain your thinking.



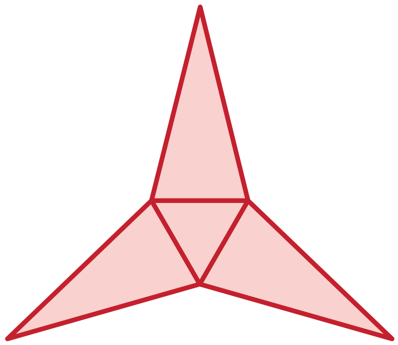
8. What type of polyhedron can you assemble from this net?

   A. Triangular pyramid

   B. Trapezoidal pyramid

   C. Rectangular pyramid

   D. Triangular prism



Reflection

1. Put a star next to a problem you could explain to a classmate.
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.2.14

Science Mom Lesson 21

Lesson Summary

Ratio tables, tape diagrams, and models can help us determine unknown amounts, which can help us solve real-world problems.

For example, Metropolis has requirements for the ratio of green space to building space in each new neighborhood development. The requirements say that there should be 2 units of green space for every 5 units of building space.

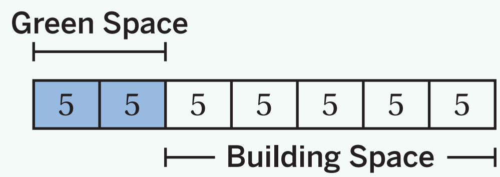
A new development has 35 units of land. Let's use both a ratio table and a tape diagram to determine how many units of building space they can build.

Ratio Table

Green Space	Building Space	Total
2	5	7
10	25	35

$35 \div 7 = 5$

$5 \cdot 5 = 25$



$7 \cdot 5 = 35$

$5 \cdot 5 = 25$

So for 35 total units of land, Metropolis will have 25 units of building space.

Things to Remember:

Lesson Practice
6.2.14

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

Problems 1–2: Pasta is made from 3 parts water and 5 parts flour. Sora is making 32 ounces of pasta for a party.

1. How much water does Sora need to make 32 ounces of pasta?

2. How much flour does Sora need to make 32 ounces of pasta?

Problems 3–4: Sora's salad dressing recipe uses 6 teaspoons of vinegar for every 15 teaspoons of olive oil.

3. Complete the table to show the amount of vinegar and olive oil needed to make each amount of salad dressing.

Vinegar (tsp)	Oil (tsp)	Salad Dressing (tsp)
		42
		14

4. Mar used a recipe that makes 7 teaspoons of salad dressing by combining oil and vinegar. Mar used 3 teaspoons of vinegar. Could Mar be using the same recipe as Sora? Explain your thinking.

5. A teacher is planning a class trip to the aquarium. The aquarium requires 2 adults to join for every 15 students. If the teacher orders 85 tickets, how many tickets are for adults and how many are for students? Show or explain your thinking.

Lesson Practice
6.2.14

Name: ______ Date: ______ Period: ______

Spiral Review

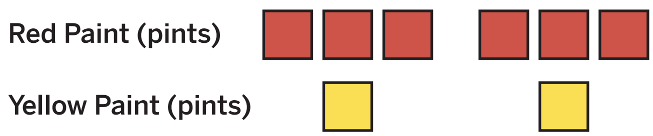
Problems 6–8: Determine each product mentally.

6. $3.4 \cdot 10$

7. $3.4 \cdot 100$

8. $0.34 \cdot 100$

9. This diagram represents the pints of red and yellow paint in a mixture. Select *all* the statements that accurately describe the diagram.



- ☐ **A.** The ratio of pints of yellow paint to pints of red paint is 6 to 2.
- ☐ **B.** For every 3 pints of red paint, there is 1 pint of yellow paint.
- ☐ **C.** For every pint of yellow paint, there are 3 pints of red paint.
- ☐ **D.** For every pint of yellow paint, there are 6 pints of red paint.
- ☐ **E.** The ratio of pints of red paint to pints of yellow paint is $6 : 2$.

Reflection

1. Put a question mark next to a problem you were feeling stuck on.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

Units of measurement can be used to describe things like length, volume, and weight or mass. Certain units of measurement might be more appropriate to use than others, depending on what you're measuring. Here are some examples of units of measurement, arranged from the *smallest* unit to the *largest* unit.

Length	**Volume**	**Weight**
Millimeter	Milliliter	Gram
Centimeter	Fluid ounce	Ounce
Inch	Cup	Pound
Foot	Quart	Kilogram
Yard	Liter	Ton
Meter	Gallon	
Kilometer		
Mile		

Things to Remember:

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

Problems 1–3: For each pair, circle the larger unit of measurement.

1. Meter Kilometer

2. Yard Foot

3. Pound Ounce

4. Match each object with the unit you would most likely use to measure it.

a. The height of a building .... Gallons

b. The length of a fingernail .... Centimeters

c. The weight of a paper clip .... Grams

d. The distance between two cities .... Pounds

e. The weight of a bowling ball .... Feet

f. The volume of a water cooler .... Kilometers

5. Determine whether each unit of measurement measures length, volume, or weight.

Unit	Length	Volume	Weight
Yard			
Milliliter			
Fluid ounce			
Pound			
Ounce			

Name: ______ Date: ______ Period: ______

Problems 6–7: Identify a unit that can be used to measure:

6. The length of a neighborhood road.

7. The volume of a car's gas tank.

Spiral Review

Problems 8–9: Determine each quotient. Show or explain your thinking.

8. $1275 \div 15$

9. $1500 \div 25$

10. In a jazz orchestra, there is a horn section and a rhythm section. The ratio of horn players to rhythm players is 13 to 4. What is the ratio of rhythm players to total players?

A. $4 : 13$

B. $13 : 17$

C. $4 : 9$

D. $4 : 17$

Reflection

1. Circle the problem you feel least confident about.

2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.3.03

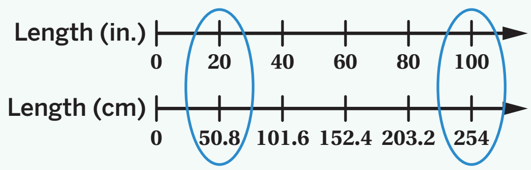
Science Mom Lesson 23

Lesson Summary

You can use equivalent ratios to convert measurements from one unit to another.

For example, if you know that 100 inches = 254 centimeters, you can use a double number line or a table to convert 20 inches to centimeters, too.

Double Number Line



Ratio Table

Inches	Centimeters
100	254
1	2.54
20	50.8

$\div 100$ $\times 20$

Things to Remember:

Name: ______ Date: ______ Period: ______

1. Malik is 57 inches tall. If 100 inches = 254 centimeters, which value is closest to his height in centimeters?

A. 22.4 centimeters

B. 57 centimeters

C. 144.8 centimeters

D. 3,551 centimeters

Problems 2–3: Use the conversion rate that makes the most sense to determine the approximate value of each missing quantity. Show or explain your thinking.

1 kilogram = 1000 grams	3 ounces ≈ 85 grams
11 pounds ≈ 5 kilograms	4 kilograms ≈ 141 ounces

2. 15 ounces ≈ ______ grams

3. 20 kilograms ≈ ______ pounds

4. Dhruv's family exchanged 250 dollars for 4,250 pesos. Complete the table to determine the conversions between pesos and dollars.

Dollars	Pesos
250	4,250
25	
1	
3	
	510

5. A yard is equal to 3 feet, and there are 1,760 yards in 1 mile. How many feet are there in 4 miles?

A. 3,520

B. 5,280

C. 7,040

D. 21,120

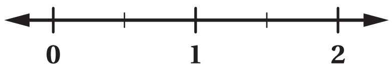
Lesson Practice
6.3.03

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

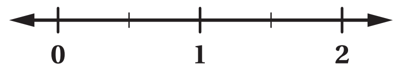
Spiral Review

Problems 6–9: Plot each value on the number line.

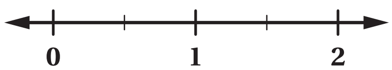
6. $\frac{2}{5}$



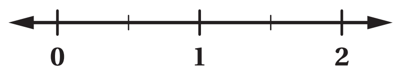
7. $1\frac{2}{5}$



8. $\frac{5}{8}$



9. $\frac{12}{8}$



Reflection

1. Put a heart next to the problem you feel most confident about.

2. Use this space to ask a question or share something you're proud of.

Science Mom Lesson 24

Lesson Summary

When you're comparing different rates, like speeds, it's helpful to convert the rates to the same units of measurement. Then you can use equivalent ratios or unit rates to more accurately compare the rates.

Let's compare the speeds of two runners competing in different races.

- Runner A runs the 400-meter dash in 50 seconds.
- Runner B runs a 5-kilometer race in 20 minutes.

We can convert both of these speeds to meters per second.

Runner A

Seconds	Meters
50	400
1	8

8 meters per second

Runner B

5 kilometers = 5000 meters

20 minutes = 1200 seconds

Seconds	Meters
1,200	5,000
1	$4\frac{1}{6}$

$4\frac{1}{6}$ meters per second

Runner A runs at a faster rate because they ran a greater distance (8 meters) than Runner B ($4\frac{1}{6}$ meters) in the same amount of time (1 second).

Things to Remember:

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

Problems 1–2: Skye and Ari were trying out new remote control cars. Skye's car traveled 135 feet in 3 seconds. Ari's car traveled 228 feet in 6 seconds. Both cars traveled at a constant speed.

1. Determine the speed of each remote control car in feet per second.

Skye's Car's Speed	**Ari's Car's Speed**
.... feet per second	.... feet per second

2. Whose car traveled faster?

3. Emmanuel types 208 words in 4 minutes. Kele types 342 words in 6 minutes. Both type at a constant rate. Who types faster? Explain your thinking.

4. Here are the approximate distances and times for four swimmers in different events. Order the swimmers from *slowest* to *fastest*.

Swimmer A: 800 meters in 8 minutes	**Swimmer B:** 100 meters in 50 seconds
Swimmer C: 1.5 kilometers in 15.5 minutes	**Swimmer D:** 50 meters in 20 seconds

Slowest			**Fastest**

Lesson Practice
6.3.05

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

Problems 5–6: Penguin A walks 10 feet in 5 seconds. Penguin B walks 12 feet in 8 seconds. Each penguin keeps walking at those speeds.

5. How far does each penguin walk in 45 seconds?

6. If the two penguins start at the same place and walk in the same direction, how far apart will the two penguins be after 2 minutes? Show or explain your thinking.

Spiral Review

Problems 7–8: There are 3,785 milliliters in 1 gallon, and there are 4 quarts in 1 gallon.

7. How many milliliters are in 3 gallons? Show or explain your thinking.

8. How many milliliters are in 1 quart? Show or explain your thinking.

Reflection

1. Put a smiley face next to a problem you were stuck on and then figured out.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

When two quantities are related in a ratio, you can describe the relationship using two different unit rates.

For example, the ratio A : B can be represented as:

- The amount of Quantity A per 1 of Quantity B.
- The amount of Quantity B per 1 of Quantity A.

In situations that involve money, one of the two possible unit rates is the **unit price** (the price per unit of an item).

Let's say a store advertises 4 pounds of granola for $5.

You can use a table to determine the two different unit rates.

- Price per 1 pound: $1.25 per pound of granola. This is the unit price.
- Number of pounds per $1: 0.8 pounds of granola per dollar.

Granola (lb)	Price ($)
4	5.00
1	1.25
0.8	1.00

Things to Remember:

Lesson Practice
6.3.06

Name: ____________ Date: ________ Period: ________

Problems 1–4: A copy machine can make 500 copies every 4 minutes.

1. How many copies can the copy machine make per minute?

2. How many minutes does it take per copy?

3. How many copies can the copy machine make in 10 minutes?

4. A teacher made 700 copies. How long did it take?

Problems 5–7: Jamar's class painted 50 square feet of a mural using 4 cans of paint.

5. How many square feet did they paint per can of paint?

6. How many cans did they use per square foot?

7. Jamar's class wants to paint a total of 310 square feet. Jamar calculated that they would need $3{,}875$ cans of paint. Here is Jamar's work.

Jamar

12.5 square feet

$310 \cdot 12.5 = 3875$

Is this work correct? Circle one.

Yes No

Explain your thinking.

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

8. Here are the prices for cans of juice at different stores. The cans are the same brand and size. Which store offers the best deal? Explain your thinking.

Store A	Store B	Store C
4 cans for $\$2.48$	5 cans for $\$3.00$	$\$0.59$ per can

Spiral Review

Problems 9–10: Evaluate each expression.

9. $\frac{1}{4}$ of 60

10. $\frac{3}{4}$ of 60

Reflection

1. Circle a problem you want to talk to a classmate about.
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.3.07

Science Mom Lesson 26

Lesson Summary

Unit rates can help you determine missing values in a table.

For example, let's say 4 pounds of apples cost $\$10$.

That means the cost of 1 pound of apples is $\$2.50$. So you can calculate the cost of any amount of apples by multiplying the weight by 2.5.

That also means that for $\$1$, you can buy 0.4 pounds of apples. So you can calculate the number of pounds of apples you can buy for any amount of money by multiplying the amount of money by 0.4.

$\div 0.4$

$\cdot 2.50$

Pounds	Dollars
4	10
2	5
1	2.5
0.4	1

$\div 2.5$

$\cdot 0.4$

Things to Remember:

Name: ________ Date: ________ Period: ________

Problems 1–4: This table shows how many onions and tomatoes you need to make different-sized batches of a salsa recipe.

Onions	Tomatoes
2	16
4	32
6	48

1. How many onions do you need for 40 tomatoes?

2. How many tomatoes do you need for 3.5 onions?

3. One unit rate in this situation is 8. What does that represent?

4. Another unit rate is $\frac{1}{8}$. What does that represent?

Problems 5–6: It takes 10 pounds of potatoes to make 15 servings of mashed potatoes.

5. How many servings of mashed potatoes can you make with 15 pounds of potatoes? Use the table if it helps with your thinking.

Potatoes (lb)	Mashed Potatoes (servings)
10	15

6. How many pounds of potatoes do you need to make 45 servings of mashed potatoes? Use the table if it helps with your thinking.

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

7. Theo walks 1 mile in 20 minutes. At this rate, how many miles could Theo walk in 1 hour 30 minutes?

8. A train is traveling at a constant rate. Complete the table to show the relationship between the train's travel time and its distance traveled.

Time (hr)	Distance Traveled (mi)
2	110
1	
	27.5
$1\frac{1}{2}$	
	165

Spiral Review

9. A sandwich is placed on a digital scale. The scale reads 4.3. What could be the unit of measurement?

A. Milligrams **B.** Ounces **C.** Pounds **D.** Inches

10. Lola's family is planning to purchase a car that is 176.5 inches long. They have a parking space that is 16.25 feet long. Could this car fit in the parking space? Explain your thinking.

Reflection

1. Put a star next to a problem that looked more difficult than it really was.
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.4.03

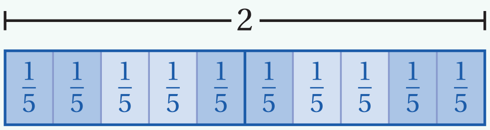
Science Mom Lesson 27

Lesson Summary

You can answer the question "How many groups?" using different representations that include both whole numbers and fractions.

Here's the problem "How many $\frac{2}{5}$s are in 2?" represented using a tape diagram, a multiplication equation, and a division equation.

Tape Diagram



Multiplication Equation

$$\frac{2}{5} \bullet ? = 2$$

Division Equation

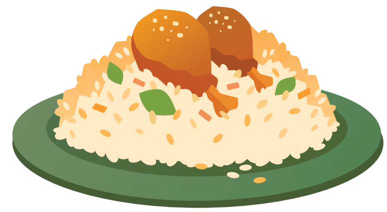
$$2 \div \frac{2}{5} = ?$$

Because there are 5 groups of $\frac{2}{5}$ in 2, the value 5 makes both equations $\frac{2}{5} \bullet 5 = 2$ and $2 \div \frac{2}{5} = 5$ true.

Things to Remember:

Name: ________ Date: ________ Period: ________

Problems 1–4: Biryani is a rice dish from South Asia. Three students made the same biryani recipe using different-sized scoops. If the recipe calls for 4 cups of rice, how many scoops of rice does each student need?



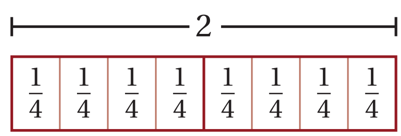
1. Hanjung: 2-cup scoop

2. Leah-James: $\frac{1}{2}$-cup scoop

3. Emma: $\frac{1}{3}$-cup scoop

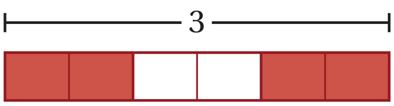
4. Explain how the equation $4 \div \frac{1}{3} = ?$ represents Emma's situation.

5. Lukas drew this diagram to represent the question "How many $\frac{1}{4}$s make 2?" Write a division equation to represent Lukas's diagram.

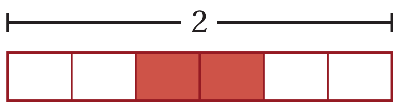


6. Ash has a 2-pound bag of cat food. Ash's family has 6 cats. Together, the cats eat $\frac{2}{3}$ pounds of cat food per day. Which model best represents how many days the 2-pound bag of food will last?

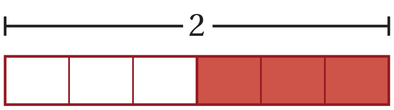
A.



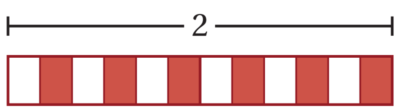
B.



C.



D.



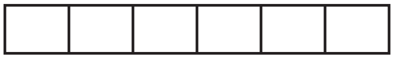
Lesson Practice
6.4.03

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

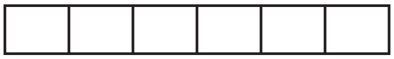
Spiral Review

Problems 7–9: Shade the boxes to represent each fraction.

7. $\frac{1}{3}$



8. $\frac{1}{2}$



9. $\frac{5}{6}$

10. *When you multiply one number by another, the result will be larger than the first number.*

Is this statement *always*, *sometimes*, or *never* true? Circle one.

Always Sometimes Never

Explain your thinking.

Reflection

1. Put a star next to a problem you're still wondering about.
2. Use this space to ask a question or share something you're proud of.

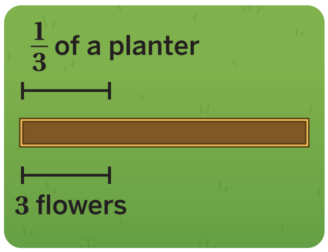
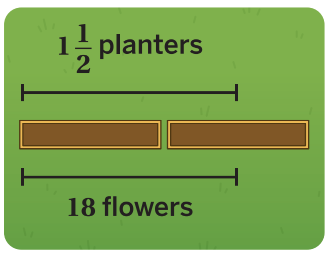
Lesson Practice 6.4.04

Science Mom Lesson 28

Lesson Summary

You can answer “How many are in *one* group?” by:

- Evaluating division and multiplication expressions.
- Using tape diagrams that represent division and multiplication expressions.

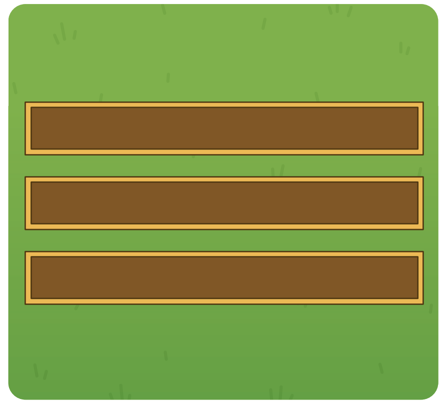
Situation	Diagram	Expressions	Number of Flowers in 1 Planter
3 flowers fill $\frac{1}{3}$ of a planter.		$3 \div \frac{1}{3} = ?$ or $\frac{1}{3} \cdot ? = 3$	9
18 flowers fill $1\frac{1}{2}$ planters.		$18 \div 1\frac{1}{2} = ?$ or $1\frac{1}{2} \cdot ? = 18$	12

Things to Remember:

Lesson Practice
6.4.04

Name: ________ Date: ________ Period: ________

Problems 1–4: Abena is planting vegetables in the school garden. Determine how many of each vegetable plant Abena can fit in 1 planter.



Use the diagrams if they help with your thinking.

1. Onion plants, if 10 onion plants fill $\frac{1}{2}$ of a planter

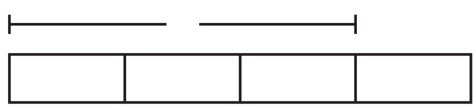
2. Asparagus crowns, if 8 asparagus crowns fill $\frac{2}{3}$ of a planter

3. Potato plants, if 6 potato plants fill $\frac{3}{4}$ of a planter

4. Abena wrote the expression $6 \div \frac{3}{4}$ to represent how many potato plants fill 1 planter. Describe a situation that represents the expression $8 \div \frac{4}{5}$.

Problems 5–6: Ashley picks 9 strawberries from the school garden. The strawberries fill $\frac{3}{4}$ of a cup.

5. Label the tape diagram to represent Ashley's situation.



6. Determine how many strawberries fill 1 cup. Use the tape diagram if it helps with your thinking.

7. A painter is making a mural. They use 3 gallons of paint for $\frac{3}{8}$ of the mural. How many gallons of paint would they need to paint the whole mural?

Lesson Practice
6.4.04

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

Spiral Review

Problems 8–9: Nur made 9 pairs of earrings in 6 hours.

8. How long will it take Nur to make 12 pairs of earrings?

9. How many pairs of earrings can Nur make in 10 hours?

Problems 10–12: Calculate each unknown number.

10. 5 is 50% of what number?

11. 300 is 10% of what number?

12. 18 is 150% of what number?

Reflection

1. Put a heart next to a problem you understand well.

2. Use this space to ask a question or share something you're proud of.

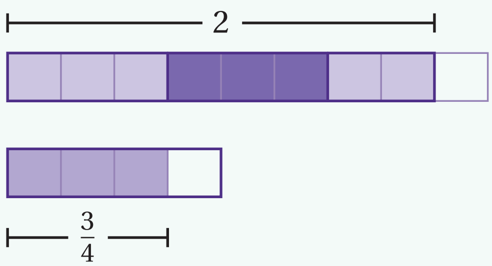
Lesson Practice 6.4.05

Science Mom Lesson 29

Lesson Summary

You can use division to determine how many groups fit into a whole. For example, the expression $2 \div \frac{3}{4}$ can represent how many $\frac{3}{4}$-foot-long bricks fit along a 2-foot garden wall. You can use tape diagrams or reasoning about equal groups to determine how many groups (bricks) fit into the whole (along the garden wall).

Tape Diagram



$$2 \div \frac{3}{4} = 2\frac{2}{3}$$

Reasoning About Equal Groups

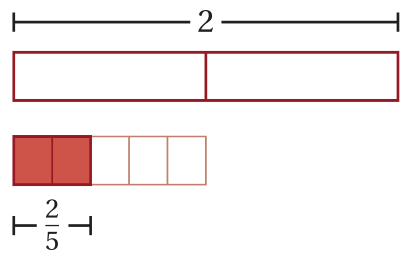
- To calculate how many lengths of $\frac{3}{4}$ fit into 2, it would help to determine how many $\frac{1}{4}$s there are in 2 wholes.
- I can rewrite 2 as $\frac{8}{4}$.
- There are two groups of $\frac{3}{4}$ in $\frac{8}{4}$, with $\frac{2}{4}$ left over.
- The leftover $\frac{2}{4}$ has 2 of the 3 parts needed to complete a whole group of $\frac{3}{4}$. That means there are $2\frac{2}{3}$ groups of $\frac{3}{4}$ in 2.

Things to Remember:

Lesson Practice
6.4.05

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

1. How many $\frac{2}{5}$s are in 2? Use the diagram if it helps with your thinking.



Problems 2–3: Think about how many $\frac{1}{4}$s are in 3.

2. Draw a tape diagram to represent the situation.

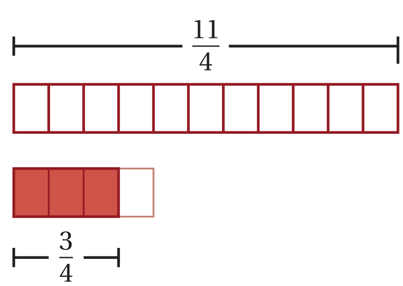
3. Determine how many $\frac{1}{4}$s are in 3.

Problems 4–5: Think about the expression $3\frac{2}{5} \div \frac{4}{5}$.

4. Draw a tape diagram to represent this expression.

5. Calculate the quotient.

Problems 6–7: Here is a tape diagram.



6. What expression does this tape diagram represent?

.... ÷ ....

7. Calculate the quotient for this expression.

Name: ____________ Date: ________ Period: ________

Problems 8–9: Think about the expression $6\frac{1}{2} \div \frac{3}{4}$.

8. Draw a tape diagram to represent this expression.

9. Calculate the quotient.

10. Kayleen's family buys one 3-pound bag of rice. They eat about $\frac{3}{4}$ of a pound every week. How many weeks does one bag last? Use a tape diagram if it helps you with your thinking.

Spiral Review

11. Complete the table.

Fraction	Decimal	Percent
$\frac{1}{4}$	0.25	25%
	0.1	
$\frac{1}{5}$		
		140%

Reflection

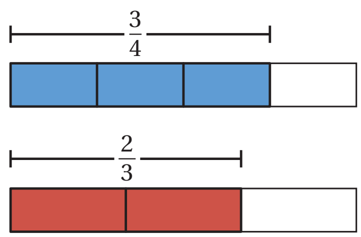
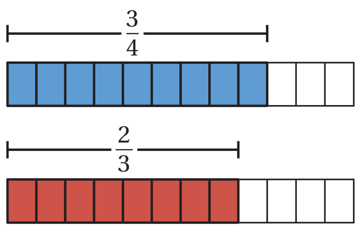
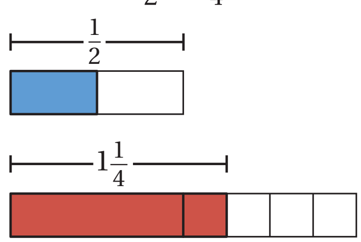
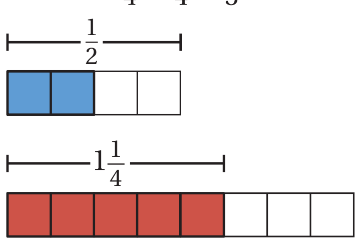
1. Circle the problem you're most interested in knowing more about.

2. Use this space to ask a question or share something you're proud of.

Science Mom Lesson 30

Lesson Summary

Creating equal-sized pieces, or using a *common denominator*, is a helpful strategy for calculating quotients involving fractions and determining when there is more or less than 1 group.

	Expression and Tape Diagram	Expression and Tape Diagram Using a Common Denominator
More Than 1 Group	$\frac{3}{4} \div \frac{2}{3}$ 	$\frac{9}{12} \div \frac{8}{12} = \frac{9}{8}$  A common denominator of 4 and 3 is 12.
Less than 1 Group	$\frac{1}{2} \div 1\frac{1}{4}$ 	$\frac{2}{4} \div \frac{5}{4} = \frac{2}{5}$  A common denominator of 2 and 4 is 4.

Things to Remember:

Lesson Practice
6.4.06

Name: ________________ Date: ________ Period: ________

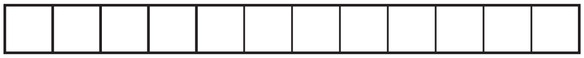
1. Select *all* the expressions whose value is greater than 1.

- ☐ **A.** $\frac{2}{3} \div 5$
- ☐ **B.** $5 \div \frac{2}{3}$
- ☐ **C.** $\frac{5}{3} \div 4$
- ☐ **D.** $\frac{1}{3} \div \frac{4}{5}$
- ☐ **E.** $\frac{4}{5} \div \frac{1}{3}$

2. Afia uses a $\frac{1}{2}$-cup scoop for flour. How many scoops does Afia need for each amount of flour? Draw a diagram if it helps with your thinking.

Flour (cups)	Number of Scoops
1	
$\frac{1}{4}$	
$\frac{3}{4}$	

Problems 3–4: Here is a diagram.

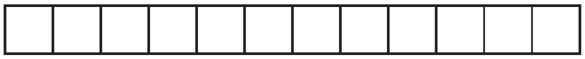


3. Determine if the value of $1\frac{1}{2} \div \frac{2}{3}$ is:

Less than 1 Greater than 1

4. Calculate the value of the expression in Problem 3.

Problems 5–6: Here is a diagram.



5. Determine if the value of $\frac{4}{3} \div \frac{3}{2}$ is:

Less than 1 Greater than 1

6. Calculate the value of the expression in Problem 5.

Lesson Practice
6.4.06

Name: ________ Date: ________ Period: ________

Spiral Review

Problems 7–9: Determine the missing value that creates a pair of equivalent fractions. Draw diagrams if it helps with your thinking.

7. $\frac{2}{3} = \frac{\square}{9}$

8. $2\frac{1}{2} = \frac{\square}{8}$

9. $\frac{4}{\square} = \frac{10}{25}$

Problems 10–11: A school's Latino Student Union has a budget of $\$240$ for the year.

10. The club wants to spend 40% of their budget on snacks. How much money will they spend on snacks?

11. The club spent $\$36$ on decorations for Día de los Muertos. What percent of their budget is that?

Reflection

1. Put a star next to a problem you could explain to a classmate.
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.4.07

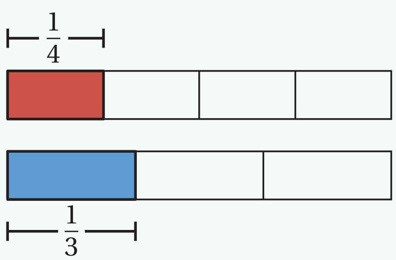
Science Mom Lesson 31

Lesson Summary

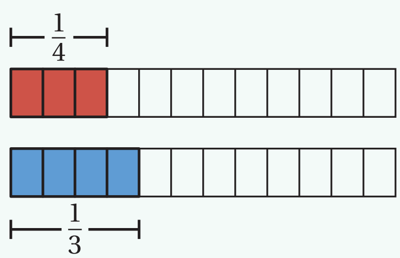
You can use common denominators to determine quotients involving fractions.

For example, in $\frac{1}{4} \div \frac{1}{3}$, you can use 12 as a common denominator of 4 and 3. Then you can rewrite the division expression as $\frac{3}{12} \div \frac{4}{12}$. This helps you determine that there are $\frac{3}{4}$ groups of $\frac{4}{12}$ in $\frac{3}{12}$.

Tape Diagram of Original Problem



Tape Diagram With Common Denominator



Equivalent Fractions With Common Denominator

$$\frac{1}{4} \div \frac{1}{3}$$

$$\frac{3}{12} \div \frac{4}{12}$$

$$3 \div 4$$

$$\frac{3}{4}$$

Things to Remember:

Lesson Practice
6.4.07

Name: ______ Date: ______ Period: ______

1. Here is Irelle's work for calculating $\frac{2}{3} \div \frac{3}{4}$. Explain what you think Irelle did at each step.

Irelle

$\frac{2}{3} \div \frac{3}{4}$

Step 1: $\frac{8}{12} \div \frac{9}{12}$

Step 2: $\frac{8}{9}$

Problems 2–5: Calculate the value of each expression. Draw a diagram if it helps with your thinking.

2. $5 \div \frac{2}{3}$

3. $2\frac{1}{2} \div \frac{5}{8}$

4. $\frac{4}{3} \div \frac{5}{2}$

5. $\frac{10}{4} \div \frac{4}{5}$

6. Sahana's work for Problem 5 is incorrect. What advice would you give Sahana?

Sahana

$\frac{10}{4} \div \frac{4}{5}$

$10 \div 5 = 2$ and $4 \div 4 = 1$

$\frac{2}{1} = 2$

7. Crow made $2\frac{1}{2}$ cups of slime. The shaded part of the rectangles show how many cups of slime there are.

Crow is putting the slime into small containers. Each container holds $\frac{2}{3}$ of a cup of slime. What is the greatest number of containers Crow can completely fill with slime?

A. 2 containers

B. 3 containers

C. 4 containers

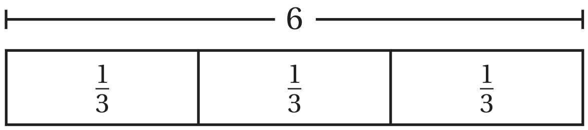
D. 5 containers

Name: ______ Date: ______ Period: ______

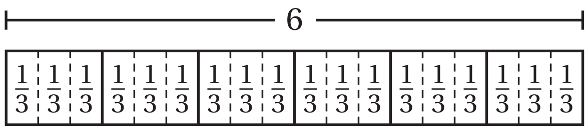
Spiral Review

8. Which of these tape diagrams represent the expression $6 \div \frac{1}{3}$?

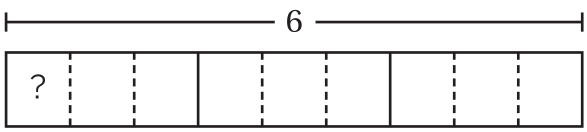
A.



B.



C.



9. Jordan and Sid are running on a track. Sid starts 10 meters ahead of Jordan. Jordan runs 120 meters in 24 seconds. Sid runs 120 meters in 25 seconds. If they both continue running at this pace, how long will it take for Jordan to catch up to Sid? Explain your thinking.

Problems 10–11: A rocking horse has a weight limit of 60 pounds.

10. What percent of the weight limit is 33 pounds?

11. What weight is 95% of the weight limit?

Reflection

1. Put a heart next to the problem you found most interesting

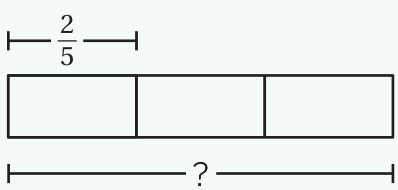
2. Use this space to ask a question or share something you're proud of.

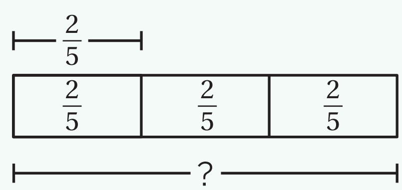
Lesson Summary

When you divide a number by a unit fraction $\frac{1}{b}$, it's generally the same as multiplying the number by b.

For example, think about the expression $\frac{2}{5} \div \frac{1}{3}$. In our planter and soil situation, this means it takes $\frac{2}{5}$ bags of soil to fill $\frac{1}{3}$ of a planter.

To fill the entire planter, you would need 3 times $\frac{2}{5}$ bags of soil, or $\frac{2}{5} \cdot 3$.





$$\frac{2}{5} \div \frac{1}{3}$$

$$= \frac{2}{5} \cdot 3$$

$$= \frac{6}{5}$$

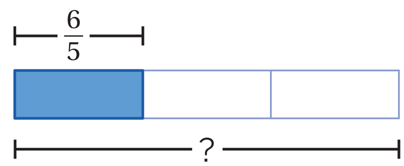
$$= 1\frac{1}{5}$$

Things to Remember:

Lesson Practice
6.4.08

Name: ________ Date: ________ Period: ________

1. Calculate $\frac{6}{5} \div \frac{1}{3}$. Use the tape diagram if it helps with your thinking.



2. $\frac{2}{3}$ cups of apple chips fill $\frac{1}{4}$ of a jar. Write and evaluate an expression to determine how many cups fill 1 jar.

Problems 3–4: Determine whether each statement is *always*, *sometimes*, or *never* true. Circle your answer and explain your thinking.

3. Dividing the same numbers in a different order keeps the value the same, like $2 \div 3 = 3 \div 2$.

   Always Sometimes Never

4. Dividing a number by $\frac{1}{3}$ produces the same value as multiplying the number by 3.

   Always Sometimes Never

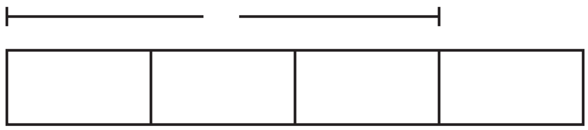
5. $\frac{2}{5}$ of the student population walked to school on a given Friday. If 150 students walked to school that day, how many total students go to the school?

Lesson Practice
6.4.08

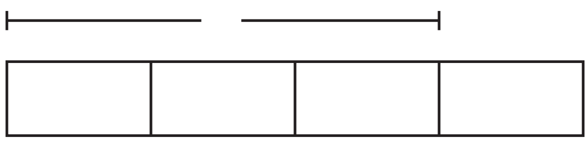
Name: ______________ Date: ______ Period: ______

Problems 6–7: Complete the tape diagram to represent and solve each problem.

6. Mai picked 1 cup of strawberries, which is enough for $\frac{3}{4}$ of a pan of strawberry oatmeal bars. How many cups does Mai need for a whole pan?



7. Prisha picked $1\frac{1}{2}$ cups of raspberries, which is enough for $\frac{3}{4}$ of a loaf of raspberry bread. How many cups does Prisha need for a whole loaf?



Spiral Review

Problems 8–10: Determine each quotient.

8. $6 \div \frac{1}{3}$

9. $4 \div \frac{1}{9}$

10. $\frac{1}{10} \div 8$

Reflection

1. Circle a problem you're still curious about.
2. Use this space to ask a question or share something you're proud of.

Science Mom Lesson 33

Lesson Summary

You don't have to use tape diagrams to determine the quotient of two fractions!

Here are two ways to calculate the quotient of the expression $\frac{9}{10} \div \frac{3}{4}$: by using common denominators and by simplifying numerators.

Common Denominators

- Rewrite the expression using common denominators.
  $\frac{18}{20} \div \frac{15}{20}$
- Then divide the numerator of the first fraction by the numerator of the second fraction.
  $18 \div 15 = \frac{18}{15}$ or $\frac{6}{5}$

Simplifying Numerators

- Divide the first fraction by the numerator of the divisor to create a unit fraction.
  $\frac{3}{10} \div \frac{1}{4}$
- To divide by the unit fraction, multiply the dividend by the denominator of the divisor.
  $\frac{3}{10} \bullet 4 = \frac{12}{10}$ or $\frac{6}{5}$

Things to Remember:

Lesson Practice
6.4.09

Name: ____________ Date: ________ Period: ________

Problems 1–4: Use any strategy to calculate each quotient.

1. $10 \div \frac{1}{5}$

2. $10 \div \frac{3}{5}$

3. $3\frac{3}{4} \div \frac{3}{8}$

4. $\frac{1}{2} \div \frac{5}{3}$

5. How many groups of $\frac{3}{4}$ are in $4\frac{1}{2}$?

6. How many groups of $\frac{3}{4}$ are in $2\frac{2}{3}$?

7. Use the equation $2\frac{1}{2} \div \frac{1}{8} = 20$ to determine $2\frac{1}{2} \div \frac{5}{8}$. Explain your thinking.

Spiral Review

8. Basheera has 90 songs on a playlist and has listened to 40% of them. How many songs has Basheera listened to?

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

9. One batch of trail mix uses 2 cups of cereal, $\frac{1}{4}$ cups of raisins, and $\frac{2}{3}$ cups of almonds. Complete the table to show how much of each ingredient you would need to make 3 or 4 batches of trail mix.

	Cereal (cups)	Raisins (cups)	Almonds (cups)
3 Batches			
4 Batches			

Problems 10–11: Here are three expressions.

$56 \div 8$	$56 \div 8000000$	$56 \div 0.000008$

10. Without calculating, order the quotients from *least* to *greatest*.

Least **Greatest**

11. Explain how you ordered the three quotients.

Reflection

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

Lesson Summary

You can use division to determine how many times as large one quantity is compared to another.

For example, let's say a song is $1\frac{1}{2}$ minutes long, and another song is $3\frac{3}{4}$ minutes long. You can compare the lengths of the two songs by answering either of these questions:

How many times longer is the second song than the first song?

$$3\frac{3}{4} \div 1\frac{1}{2} = ?$$
$$= \frac{15}{4} \div \frac{3}{2}$$
$$= \frac{15}{4} \cdot \frac{2}{3}$$
$$= \frac{30}{12} \text{ or } 2\frac{1}{2}$$

The second song is $2\frac{1}{2}$ times as long as the first song.

What fraction of the second song is the first song?

$$1\frac{1}{2} \div 3\frac{3}{4} = ?$$
$$= \frac{3}{2} \div \frac{15}{4}$$
$$= \frac{6}{4} \div \frac{15}{4}$$
$$= \frac{6}{15} \text{ or } \frac{2}{5}$$

The first song is $\frac{2}{5}$ as long as the second song.

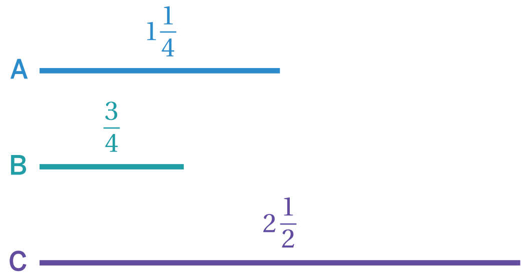
Things to Remember:

Lesson Practice
6.4.12

Name: ______________ Date: ______ Period: ______

1. Segment A is is $1\frac{1}{4}$ centimeters long. Segment B is $\frac{3}{4}$ centimeters long, and Segment C is $2\frac{1}{2}$ centimeters long.

Match each question with the expression that could be used to answer it.



a. How much longer is Segment A than Segment B? ______ $\frac{3}{4} \div 1\frac{1}{4}$

b. Segment B is how many times as long as Segment A? ______ $1\frac{1}{4} \div 2\frac{1}{2}$

c. Segment A is how many times as long as Segment B? ______ $1\frac{1}{4} \div \frac{3}{4}$

d. What fraction of Segment A is Segment C? ______ $1\frac{1}{4} - \frac{3}{4}$

e. What fraction of Segment C is Segment A? ______ $2\frac{1}{2} \div 1\frac{1}{4}$

Problems 2–3: Deiondre's teacher challenged the class to bike $4\frac{1}{2}$ miles each day.

2. On Monday, Deiondre biked 6 miles. How many times the daily goal did Deiondre ride?

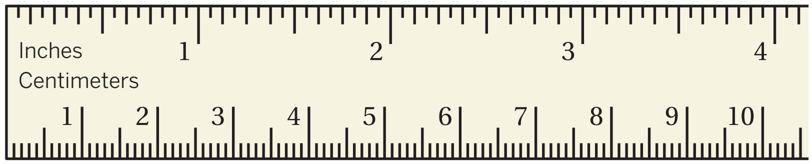
3. On Tuesday, Deiondre biked $1\frac{4}{5}$ miles. What fraction of the daily goal did Deiondre ride?

4. A security guard works $9\frac{1}{2}$-hour-long shifts. At one point during a shift, the guard looks at the clock and realizes it has been $3\frac{3}{4}$ hours since the shift started. Calculate exactly how much of the shift the guard has worked. Show or explain your thinking.

Lesson Practice
6.4.12

Name: ________ Date: ________ Period: ________

Problems 5–7: When taking measurements, engineers in the U.S. use the U.S. customary system, while engineers in Canada use the metric system. On an international project, it's important to convert measurements precisely. For example, one inch is the same length as $2\frac{27}{50}$ centimeters.



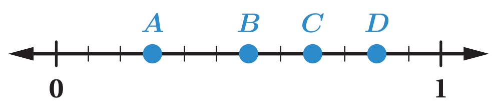
5. How many centimeters long is 3 inches? Show or explain your thinking.

6. What fraction of 1 inch is 1 centimeter? Show or explain your thinking.

7. What question can you answer about this situation by determining the value of $10 \div 2\frac{27}{50}$?

Spiral Review

8. Here are four points plotted on a number line. Which point best represents $66\frac{2}{3}\%$ of the distance between 0 and 1?



A. Point A **B.** Point B **C.** Point C **D.** Point D

Problems 9–10: Determine each product.

9. $\frac{2}{3} \cdot \frac{9}{20}$

10. $1\frac{2}{5} \cdot \frac{3}{14}$

Reflection

1. Circle the problem that was the most challenging for you.

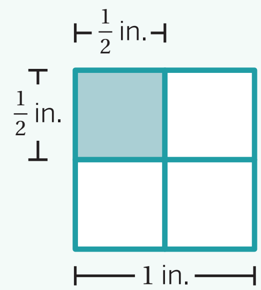
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.4.13

Lesson Summary

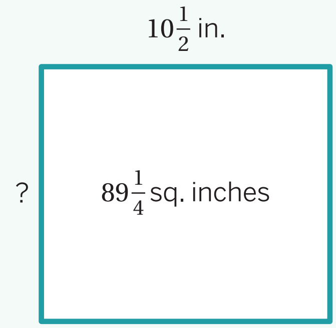
You can determine the area of a polygon that has fractional side lengths just like you would a polygon that has whole-number side lengths.

For example, you can calculate the area of the shaded square using the formula $A = l \cdot w$. The area is equal to $\frac{1}{2} \cdot \frac{1}{2}$, or $\frac{1}{4}$ square inches.



You can also use area formulas to determine an unknown length. If you know the area and one side length of a rectangle, you can divide to determine the other side length.

For example, to determine the missing side length of this rectangle, you can calculate $89\frac{1}{4} \div 10\frac{1}{2} = 8\frac{1}{2}$. The missing side length is $8\frac{1}{2}$ inches.



Things to Remember:

Lesson Practice
6.4.13

Name: ______________ Date: ________ Period: ________

1. A rectangular lawn has an area of $7\frac{1}{3}$ square yards and a width of $2\frac{1}{5}$ yards. What is the length of the lawn, in yards?

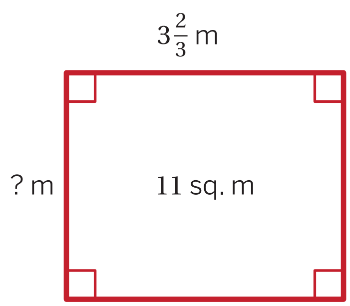
A. $9\frac{8}{15}$ **B.** $3\frac{1}{3}$ **C.** $\frac{3}{10}$ **D.** $5\frac{2}{15}$

2. A television screen has a length of $16\frac{1}{2}$ inches, a width of w inches, and an area of 462 square inches. Select *all* the equations that represent the relationship between the dimensions of the television.

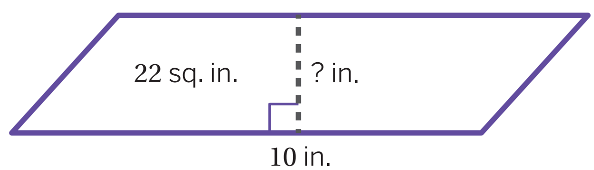
- ☐ **A.** $w \cdot 462 = 16\frac{1}{2}$
- ☐ **B.** $16\frac{1}{2} \cdot w = 462$
- ☐ **C.** $462 \div 16\frac{1}{2} = w$
- ☐ **D.** $462 \div w = 16\frac{1}{2}$
- ☐ **E.** $16\frac{1}{2} \cdot 462 = w$

Problems 3–6: Determine the missing length or lengths in each figure.

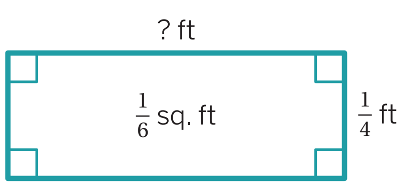
3.



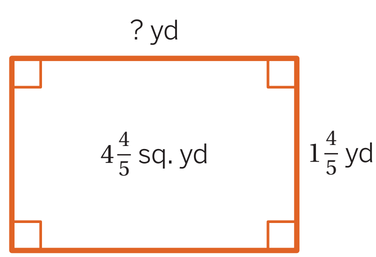
4.



5.



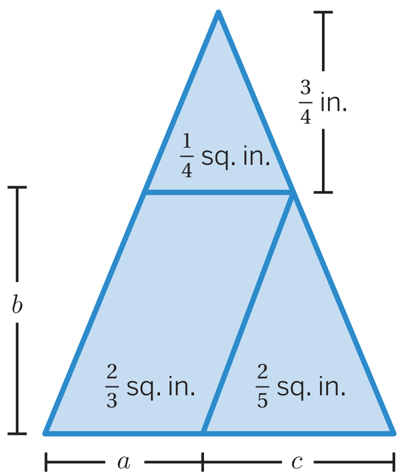
6.



Name: ______ Date: ______ Period: ______

7. Determine the missing lengths in this figure made up of a parallelogram and two triangles.

Unknown	Length (in.)
a	
b	
c	



Spiral Review

Problems 8–9: A bookshelf is 42 inches long.

8. How many books will fit on the bookshelf if each book is $1\frac{1}{2}$ inches wide? Show your thinking.

9. A bookcase has five of these 42-inch-long bookshelves. How many total feet of shelf space does the bookcase have? Show your thinking.

Reflection

1. Put a star next to the problem you think is the most important.

2. Use this space to ask a question or share something you're proud of.

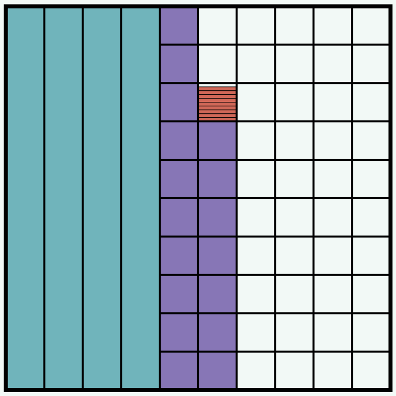
Lesson Summary

You can represent decimals in more than one way using words, diagrams, and decimal points. For example, six tenths, 0.6, sixty hundredths, and 0.60 all represent the same quantity.

Using multiple representations can help when you're adding or subtracting decimals.

Let's say we're calculating $0.189 + 0.39$.

Hundredths Chart



Vertical Calculation

$$\begin{array}{r} {}^{1} \\ 0.189 \\ +\ 0.390 \\ \hline 0.579 \end{array}$$

Both the hundredths chart and vertical calculation show a total of 4 tenths, 17 hundredths, and 9 thousandths. 10 hundredths equals 1 tenth, so the final answer is 5 tenths, 7 hundredths, and 9 thousandths, or 0.579.

Things to Remember:

Lesson Practice
6.5.02

Name: ______________ Date: ________ Period: ________

Problems 1–2: Determine each sum. Use a hundredths chart if it helps with your thinking.

1. $0.24 + 0.607$

2. $0.203 + 0.01$

Problems 3–4: Complete each calculation.

3.

$$\begin{array}{cccccc} & 1 & 4 & 2 & . & 6 \\ - & & & 1 & . & 4 \\ \hline & \boxed{} & \boxed{} & \boxed{} & . & \boxed{2} \end{array}$$

4.

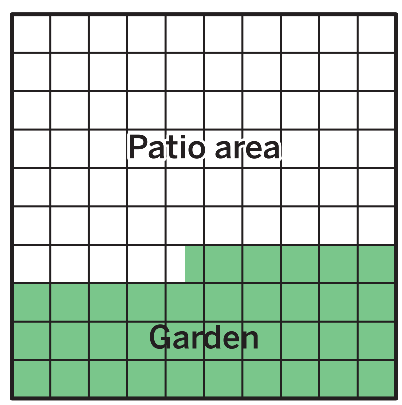
$$\begin{array}{cccccc} & 3 & 8 & . & 6 & 0 \\ - & & 6 & . & 7 & 5 \\ \hline & \boxed{} & \boxed{} & . & \boxed{} & \boxed{5} \end{array}$$

5. Determine the value of $0.15 - 0.08$. Use a hundredths chart if it helps with your thinking.

6. Select *all* the expressions that have a value greater than 1.

- ☐ **A.** $0.52 + 0.49$
- ☐ **B.** $0.7 + 0.04$
- ☐ **C.** $0.85 + 0.072$
- ☐ **D.** $0.903 + 0.09$
- ☐ **E.** $0.432 + 0.6$

7. This diagram represents a square backyard with a patio area and a garden. The shaded area represents the garden, and the unshaded area represents the patio. Each small square represents 1 hundredth of the total backyard area.



Which equation represents the difference between the size of the garden and the size of the patio area?

A. $1 - 0.645 = 0.355$

B. $0.355 + 0.645 = 1$

C. $0.355 + 0.355 = 0.71$

D. $0.645 - 0.355 = 0.29$

Lesson Practice
6.5.02

Name: ______ Date: ______ Period: ______

Spiral Review

Problems 8–10: A school band has 70 students. 50% of them are sixth graders, 30% are seventh graders, and the rest are eighth graders.

8. How many band members are sixth graders?

9. How many band members are seventh graders?

10. What percentage of the band members are eighth graders? Explain your thinking.

Reflection

1. Star the problem you spent the most time on.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

One strategy that can help you make sense of decimal addition and subtraction is vertical calculations.

To use a vertical calculation, you just align numbers by place value so that you're adding or subtracting ones with ones, tenths with tenths, hundredths with hundredths, and thousandths with thousandths.

Here's a vertical calculation. To check if the calculation is correct, you could either estimate or use the opposite operation (addition).

$$\begin{array}{r} 6.2 \\ -\boxed{2}.5 \\ \hline 3.\boxed{7} \end{array}$$

You could estimate that $6.2 - 3 = 3.2$, so your difference should be larger than 3.2.

You could also use addition to check your work, adding 2.5 to 3.7 to get 6.2.

Things to Remember:

Lesson Practice
6.5.04

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

Problems 1–4: Fill in the blanks with the digits that make each statement true.

1.
$$\begin{array}{r} 1.036 \\ +\ \square.\square\square\square \\ \hline 4.000 \end{array}$$

2.
$$\begin{array}{r} 38.60 \\ -\ 6.75 \\ \hline \square\square.\square 5 \end{array}$$

3.
$$\begin{array}{r} 241.76 \\ -\ 2.18 \\ \hline \square\square\square.\square 8 \end{array}$$

4.
$$\begin{array}{r} 0.404 \\ +\ \square.\square\square\square \\ \hline 1.000 \end{array}$$

Problems 5–6: The label on a bag of chocolates states that there are 0.384 pounds of chocolates. The actual weight of the chocolates is 0.3798 pounds.

5. Is the actual weight of the chocolates heavier or lighter than the weight written on the label? Explain how you know.

6. What is the difference, in pounds, between the weight on the label and the actual weight of the chocolates?

7. What is $99.22 - 78.095$?

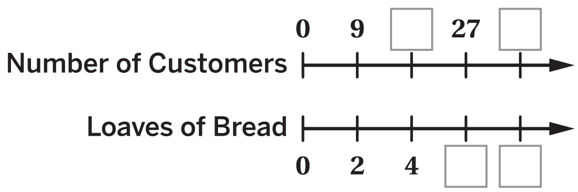
Lesson Practice
6.5.04

Name: ______ Date: ______ Period: ______

Spiral Review

Problems 8–9: For every 9 customers, a chef prepares 2 loaves of bread.

8. The double number line and table show the number of loaves prepared by the chef for different numbers of customers. Complete each representation with the missing values.



Number of Customers	Number of Loaves
9	2
	4
27	
	14

9. How many loaves does the chef prepare for 63 customers?

10. If the chef prepares 20 loaves, how many customers can they serve?

11. What fraction of a loaf is prepared for each customer?

Reflection

1. Put a question mark next to a response you'd like to compare with a classmate's.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

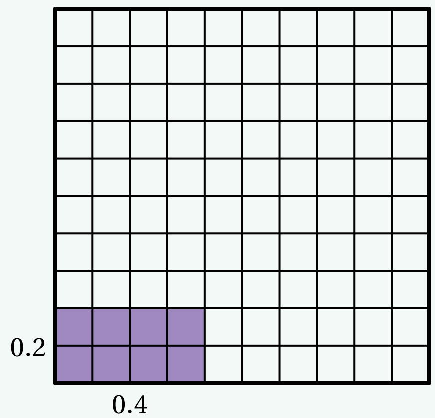
Two strategies for multiplying decimals are:

- Using an area model.
- Writing the decimals as equivalent fractions.

One advantage to using an area model is that you can visualize the product. For example, you can represent $0.4 \cdot 0.2$ as a rectangle with a length of 0.4 and a width of 0.2. On a hundredths chart, you can count the shaded boxes, each representing $\frac{1}{100}$, to determine the product.

It can, however, be challenging to use an area model to represent decimals smaller than tenths or hundredths.

Your other option is to convert decimals to equivalent fractions. $0.4 \cdot 0.2$ can be written as $\frac{4}{10} \cdot \frac{2}{10}$, which equals $\frac{8}{100}$ or 0.08.



$$\begin{aligned} \text{Area} &= \text{length} \cdot \text{width} \\ &= 0.4 \cdot 0.2 \\ &= 0.08 \end{aligned}$$

Things to Remember:

Name: ________ Date: ________ Period: ________

Problems 1–4: Determine the value of each expression.

1. $20 \cdot 40$

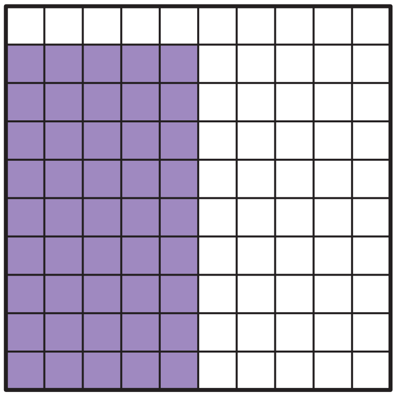
2. $200 \cdot 40$

3. $2 \cdot 40$

4. $2 \cdot 0.4$

Problems 5–6: Here is an expression: $0.5 \cdot 0.9$.

5. Explain why the diagram represents $0.5 \cdot 0.9$.



6. What is the value of $0.5 \cdot 0.9$?

7. Select *all* the expressions that have the same value as $0.05 \cdot 0.6$.

- ☐ **A.** $5 \cdot \frac{1}{100} \cdot 6 \cdot \frac{1}{10}$
- ☐ **B.** $5 \cdot 6 \cdot \frac{1}{1000}$
- ☐ **C.** $5 \cdot 0.001 \cdot 6 \cdot 0.01$
- ☐ **D.** 0.03
- ☐ **E.** 0.003

Lesson Practice
6.5.05

Name: ______ Date: ______ Period: ______

Problems 8–9: Here is how Emiliano attempted to calculate $0.003 \cdot 0.007$.

$$0.003 \cdot 0.007 = \frac{3}{1000} \cdot \frac{7}{1000}$$
$$= \frac{21}{1000} = 0.021$$

8. What do you think Emiliano's mistake might be?

9. What is the value of $0.003 \cdot 0.007$?

Problems 10–11: Determine the value of each expression.

10. $0.3 \cdot 0.2$

11. $1.2 \cdot 5$

Spiral Review

12. A plumber has 52.2 meters of PVC pipe to use on a job. On the first day, she used 21.863 meters of the pipe. How many meters of pipe does she have left after the first day?

A. 30.663 **B.** 30.337 **C.** 30.763 **D.** 30.237

Reflection

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

Lesson Practice 6.5.07

Science Mom Lesson 39

Lesson Summary

One way to multiply two decimals is to use an area model.

To use an area model, separate the decimals into parts. This rectangle has side lengths measuring 3.4 and 1.2 units. Each side length has been split apart by place value: 3.4 has been split into $3 + 0.4$ and 1.2 has been split into $1 + 0.2$.

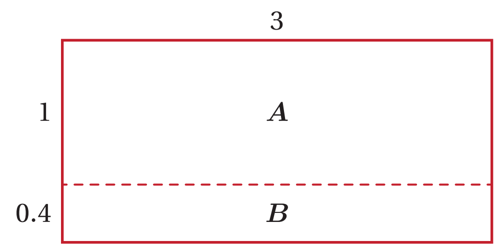
	3	0.4
1	3	0.4
0.2	0.6	0.08

The total area of the rectangle is equal to the sum of the areas of the four smaller rectangles: $3.4 \cdot 1.2 = 3 + 0.4 + 0.6 + 0.08 = 4.08$.

Things to Remember:

Name: ________________ Date: ________ Period: ________

Problems 1–2: Here is a diagram that represents $3 \cdot 1.4$.

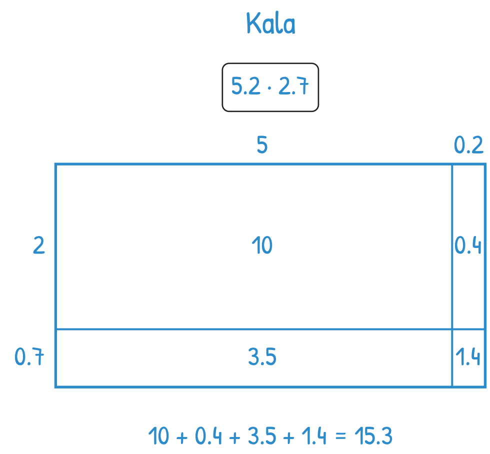


1. Determine the areas of A and B.

A	B

2. What is the value of $3 \cdot 1.4$?

Problems 3–4: Here is Kala's work for determining $5.2 \cdot 2.7$.



3. Kala made an error. Circle what you think the error is. Explain your thinking.

4. What is the value of $5.2 \cdot 2.7$? Show or explain your thinking.

5. Draw an area diagram that represents $2.5 \cdot 1.4$.

6. Determine the product of $2.5 \cdot 1.4$. Use your area diagram from Problem 5 if it helps with your thinking.

7. Determine the value of $0.34 \cdot 0.02$.

Spiral Review

8. Tariq buys a granola bar that costs $\$1.59$ and pays with seven quarters, for a total of $\$1.75$. How much change should Tariq get?

Problems 9–10: Fill in the blanks with the missing digits that make each problem true.

9.
$$\begin{array}{r} 4\,.\,3\,\square \\ +\ \square\,.\,1\,5 \\ \hline 6\,.\,\square\,2 \end{array}$$

10.
$$\begin{array}{r} 1\,.\,5\,\square \\ +\ \square\,.\,3\,8 \\ \hline 1\,.\,\square\,4 \end{array}$$

Reflection

1. Put a star next to a problem that looked more difficult than it really was.
2. Use this space to ask a question or share something you’re proud of.

Lesson Summary

There are several different strategies you can use to multiply decimals. Depending on the problem, one strategy might be more helpful than another.

Let's solve $2.4 \cdot 0.03$ using two strategies: *converting fractions* and *using whole numbers with place value reasoning*.

Strategy 1

Converting Fractions

Rewrite each value as an equivalent fraction.

$$2.4 \cdot 0.03 = \frac{24}{10} \cdot \frac{3}{100}$$

Multiply the fractions.

$$\frac{24}{10} \cdot \frac{3}{100} = \frac{72}{1000}$$

Use the denominator to determine the place value.

$\frac{72}{1000}$ is 72 thousandths.

$$\frac{72}{1000} = 0.072$$

Strategy 2

Whole Numbers With Place Value Reasoning

Think of each term as a whole number, then multiply.

$$2.4 \cdot 0.03 \rightarrow 24 \cdot 3$$

$$24 \cdot 3 = 72$$

Think about the place value of each term.

2.4 is 24 tenths.

0.03 is 3 hundredths.

Determine the appropriate place value of the product.

tenths times hundredths = thousandths

$2.4 \cdot 0.03 = 72$ thousandths

$$2.4 \cdot 0.03 = 0.072$$

Things to Remember:

Lesson Practice
6.5.08

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

1. Explain how you could use $3 \cdot 65 = 195$ to determine $0.003 \cdot 0.65$.

2. Maia wrote this expression to try and calculate $4.5 \cdot 0.17$.

$$45 \cdot 17 \cdot \frac{1}{10} \cdot \frac{1}{100}$$

If $45 \cdot 17 = 765$, then what is $4.5 \cdot 0.17$?

3. Select *all* the expressions that have a product of 0.0042.

- ☐ **A.** $0.007 \cdot 0.6$
- ☐ **B.** $0.07 \cdot 0.06$
- ☐ **C.** $0.007 \cdot 0.06$
- ☐ **D.** $0.7 \cdot 0.06$
- ☐ **E.** $0.21 \cdot 0.02$

Problems 4–5: Determine the value of each expression using any strategy. Show or explain your thinking.

4. $5.4 \cdot 2.4$

5. $1.01 \cdot 0.00035$

6. A pound of blueberries costs $\$3.50$ and a pound of clementines costs $\$2.50$. What is the total cost of 0.6 pounds of blueberries and 1.8 pounds of clementines? Show or explain your thinking.

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

Spiral Review

Problems 7–10: Determine the value of each expression.

7. $20 \cdot 5$

8. $20 \cdot 0.8$

9. $20 \cdot 0.04$

10. $20 \cdot 5.84$

Problems 11–12: Amari bought 12 mini muffins for $5.40.

11. At this rate, what is the price of 4 mini muffins? Show or explain your thinking.

12. How many mini muffins can Amari buy with $4.00? Explain your thinking.

Number of Mini Muffins	Price ($)
12	5.40

Reflection

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

Lesson Practice 6.5.10

Lesson Summary

When you get a remainder in a division expression, you can just continue to divide.

Here is how you can calculate $86 \div 4$ using **long division**.

In this strategy, you break down the remaining 2 ones into 20 tenths by writing the dividend of 86 as 86.0.

$$\begin{array}{r} 21.5 \\ 4\overline{)\,86.0} \\ -8 \\ \hline 6 \\ -4 \\ \hline 2\,0 \\ -2\,0 \\ \hline 0 \end{array}$$

This allows you to bring a 0 down to the right of the remaining 2 ones.

Then you add a decimal point to the right of the 1 in the quotient, to show that the resulting 5 is in the tenths place.

So $86 \div 4 = 21.5$.

Things to Remember:

Lesson Practice
6.5.10

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

1. Here are two long division problems. Which one represents $6 \div 10$? Circle one.

$6\overline{)\,10}$ $\qquad\qquad$ $10\overline{)\,6}$

Explain your thinking.

2. Here is a partially completed long division problem. Fill in the missing digits in each box to complete the calculations.

$$
\begin{array}{r}
8\ \square \\
6\overline{)\,5\ 3\ 4} \\
-\ \square\ \square \\
\hline
\square\ \square \\
-\ \square\ \square \\
\hline
0
\end{array}
$$

3. Use long division to calculate the quotient of $99 \div 12$. Show your thinking.

Problems 4–5: Use long division to show that the fraction and decimal in each pair are equal.

4. $\frac{3}{50}$ and 0.06

5. $\frac{7}{25}$ and 0.28

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

6. A volleyball team has $90 to buy volleyballs. If each volleyball costs $16, what is the greatest number of volleyballs the team can buy?

   A. 5   B. 6   C. 7   D. 8

Spiral Review

Problem 7–10: Determine each quotient.

7. $300 \div 3$

8. $12 \div 3$

9. $60 \div 3$

10. $372 \div 3$

11. The mass of one coin is 16.718 grams. The mass of a second coin is 27.22 grams. How much greater is the mass of the second coin than the first? Show or explain your thinking.

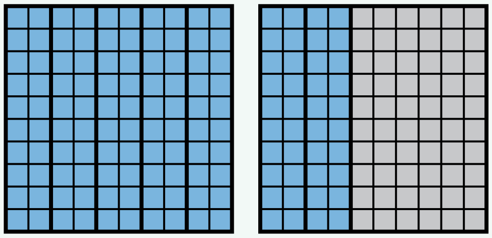
Reflection

1. Put a smiley face next to the problem you learned from most.
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

We can use hundredths charts, thousandths charts, and fractions to help us visualize and divide decimals.

This diagram represents the expression $1.4 \div 0.2$.



- Using the hundredths chart, you can count the number of groups of 2 tenths needed to fill the 1 whole and 4 tenths. It takes 7 groups, so $1.4 \div 0.2 = 7$.
- You can rewrite each decimal as an equivalent fraction, so 1.4 becomes $\frac{14}{10}$ and 0.2 becomes $\frac{2}{10}$. Now you can use your knowledge of fraction division to calculate the quotient.

$$\begin{aligned} 1.4 \div 0.2 &= \frac{14}{10} \div \frac{2}{10} \\ &= 14 \div 2 \\ &= 7 \end{aligned}$$

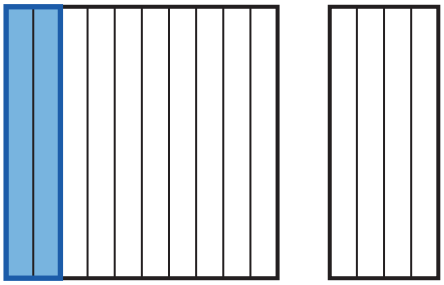
Sometimes you will need to use common denominators to solve expressions with fractions. For example, $1.5 \div 0.03 = \frac{15}{10} \div \frac{3}{100} = \frac{150}{100} \div \frac{3}{100} = 150 \div 3 = 50$.

Things to Remember:

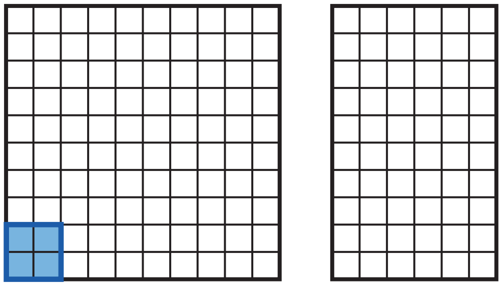
Lesson Practice
6.5.11

Name: ______ Date: ______ Period: ______

1. Determine the value of $1.4 \div 0.2$.



2. Determine the value of $1.6 \div 0.04$.



3. Select *all* the expressions that are equivalent to $3.5 \div 0.005$.

☐ **A.** $35 \div 5$

☐ **B.** $3500 \div 5$

☐ **C.** $35 \div 0.05$

☐ **D.** $\frac{35}{10} \div \frac{5}{100}$

☐ **E.** $\frac{35}{10} \div \frac{5}{1000}$

4. Calculate $3.5 \div 0.005$.

Problems 5–6: Remy says: *To determine the value of* $0.27 \div 0.003$, *I can divide* 270 *by* 3.

5. Is Remy correct? Explain your reasoning.

6. Calculate $0.27 \div 0.003$. Show or explain your thinking.

Lesson Practice
6.5.11

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

7. Calculate $0.225 \div 0.005$. Show or explain your thinking.

Spiral Review

Problems 8–9: Xavier is multiplying $1.5 \cdot 0.82$. He knows that $15 \cdot 82 = 1230$.

8. What is $1.5 \cdot 0.82$?

   A. 0.0123 B. 0.123 C. 1.23 D. 12.3

   Show or explain your thinking.

9. What is $0.15 \cdot 0.82$?

Reflection

1. Circle one problem, word, or concept that you want to know more about.
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

When dividing by a decimal, it can be helpful to rewrite the expression using whole numbers by multiplying by a power of 10.

For example, you can rewrite $7.65 \div 1.2$ as $765 \div 120$.

$$\begin{aligned} 7.65 \div 1.2 &= \frac{765}{100} \div \frac{12}{10} \\ &= \frac{765}{100} \div \frac{120}{100} \\ &= 765 \div 120 \end{aligned}$$

Once you have an expression with whole numbers, you can use long division to calculate the quotient.

$$\begin{array}{r} 6.375 \\ 120\overline{)\,765.000} \\ -720 \\ \hline 45\,0 \\ -36\,0 \\ \hline 9\,00 \\ -8\,40 \\ \hline 600 \\ -600 \\ \hline 0 \end{array}$$

Things to Remember:

Lesson Practice
6.5.12

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

1. Select *all* the expressions that are equivalent to $4.5 \div 0.08$.

- ☐ **A.** $\frac{45}{100} \div \frac{8}{100}$
- ☐ **B.** $45 \div 8$
- ☐ **C.** $\frac{450}{100} \div \frac{8}{100}$
- ☐ **D.** $450 \div 8$
- ☐ **E.** $45 \div 0.8$

2. What is the value of $4.5 \div 0.08$?

Problems 3–5: Use long division to calculate each quotient. Show your thinking.

3. $7.89 \div 2$

4. $176 \div 0.5$

5. $199.8 \div 0.8$

6. Four students set up a lemonade stand. By the end of the day, they earned $\$17.52$. If they split the amount equally, how much money would each student get? Show or explain your thinking.

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

7. A bag of pennies weighs 5.1 kilograms. Each penny weighs 2.5 grams. Which of these is the best estimate for the number of pennies in the bag? Show or explain your thinking. (1 kilogram $= 1000$ grams)

A. 20 **B.** 200 **C.** $2{,}000$ **D.** $20{,}000$

8. Determine the quotient of $33.8 \div 32.5$.

Spiral Review

Problems 9–10: Fill in the blanks to make each subtraction problem true.

9.

$$\begin{array}{r} 5 \\ -\ \square.\square\square\square \\ \hline 4.329 \end{array}$$

10.

$$\begin{array}{r} 1 \\ -\ \square.\square\square\square \\ \hline 0.863 \end{array}$$

Reflection

1. Put a star next to a problem you want to understand better.

2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.5.16

Lesson Summary

You've used ratios, double number lines, and tape diagrams to model and solve percent problems. Another strategy you can use is to convert the percent to a decimal, then multiply or divide.

Let's say BZ's family spent 4% of their monthly income on groceries last week. Their monthly income is $\$4,000.00$. How much money did they spend on one week's worth of groceries?

To determine the answer, first write 4% as a decimal: $4\% = 0.04$.

Then multiply by the total monthly income: $0.04 \cdot 4000 = 160$.

That means BZ's family spent $\$160.00$ on their groceries last week.

Things to Remember:

Lesson Practice
6.5.16

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

Problems 1–4: Jada's family has a weekly income of $1,150.00. They try to spend no more than 9% of their weekly income on groceries.

1. Write an expression to represent how much money they spend on their weekly groceries.

2. How much money, at most, does Jada's family spend on groceries each week?

3. Jada's family puts 12% of their weekly income into a savings account. How much money do they save each week?

4. Jada's family recently had to spend $184.00 on a car repair. What percent of their weekly income did they spend on the car repair?

A. 0.16% **B.** 6.25% **C.** 16% **D.** 62.5%

5. Circle the expression that has a greater value.

7% of 250 70% of 25 They have the same value.

6. Raine went to the store and purchased these items. Beef is the most expensive item. What percent of the total is it?

Items	Cost ($)
Milk (1 gal)	$3.61
Beef (1 lb)	$7.10
Apples (1 lb)	$2.39
Bananas (1 lb)	$0.91
Oranges (1 lb)	$1.99
Potatoes (1 lb)	$1.75
Total	$17.75

Lesson Practice
6.5.16

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

Spiral Review

7. One ounce of yogurt contains 1.2 grams of sugar. How many grams of sugar are in 14.25 ounces of yogurt?

A. 1.71 grams **B.** 11.875 grams **C.** 15.45 grams **D.** 17.1 grams

Problems 8–11: Determine the value of each expression. Show your thinking.

8. $4.4 - 0.72$

9. $4 + 1.3 + 0.56$

10. $4.34 \div 0.7$

11. $0.32 \bullet 4.7$

Reflection

1. Put a heart next to a problem you understand well.

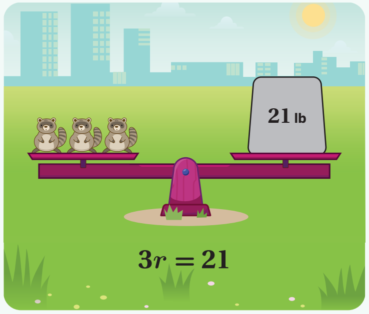
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

You can use seesaws and tape diagrams to represent *equations* and help determine unknown values.

We often use a letter, such as x or a, as a placeholder for an unknown number in tape diagrams and equations. This letter is called a **variable**.

For example, if 3 equal-weight raccoons weigh a total of 21 pounds, you can represent the weight of each raccoon with r and write the equation $3r = 21$.

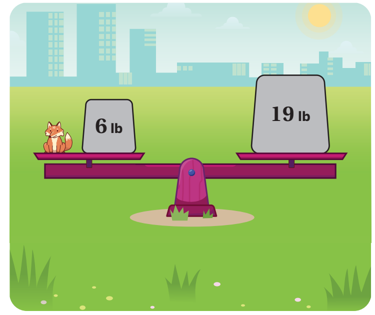


Things to Remember:

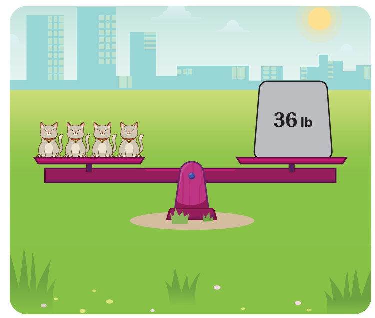
Lesson Practice
6.6.01

Name: ________ Date: ________ Period: ________

1. Determine the weight of 1 fox.

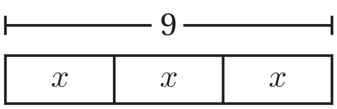


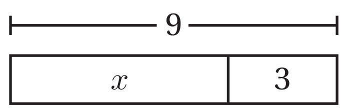
2. All 4 cats weigh the same amount. Determine the weight of 1 cat.



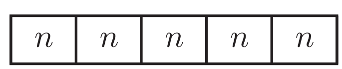
3. Match each equation to the tape diagram it represents.

$3 + x = 9$	$x + x + x = 9$	$x = 9 \div 3$	$3 \cdot x = 9$	$x = 9 - 3$





Problems 4–5: Kwabena is trying to determine the value of n in the equation $5 \cdot n = 35$. Kwabena begins drawing a tape diagram, but isn't sure how to complete it.

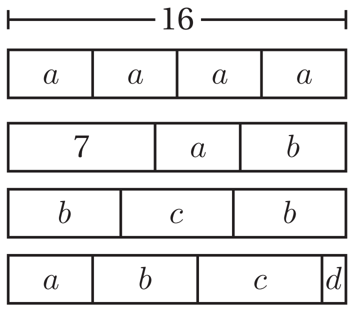


4. Complete the tape diagram so it represents the equation $5 \cdot n = 35$.

5. Determine the value of n.

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

6. Determine the value of a, b, c, and d.



$a =$ ....

$b =$ ....

$c =$ ....

$d =$ ....

Spiral Review

Problems 7–8: Calculate the price per pound for each item.

7. $2.52 for 4.5 pounds of potatoes.

8. $7.75 for 2.5 pounds of broccoli.

Problems 9–12: Fill in each box to create a true equation.

9. $7 + \square = 10$

10. $\square \cdot 5 = 45$

11. $23 - \square = 11$

12. $\square \div 4 = 8$

Reflection

1. Put a star next to a problem that looked more difficult than it really was.

2. Use this space to ask a question or share something you're proud of.

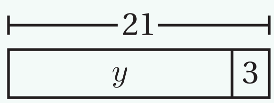
Lesson Summary

A tape diagram can help us visualize an equation and determine its solution. The **solution to an equation** is a value of the variable that makes the equation true.

When we work with an equation that represents a situation, it is important to determine what the variable represents when we determine the solution.

Here is an example.

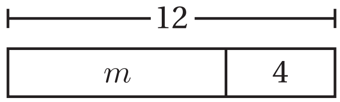
Emmanuel needed \$21 to buy a gift. He had \$3 and borrowed the rest from his parents. The variable y represents the amount Emmanuel borrowed from his parents.

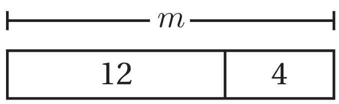
Equation	Tape Diagram	Solution to the Equation	Solution's Meaning
$3 + y = 21$		$y = 18$	Emmanuel borrowed \$18 from his parents.

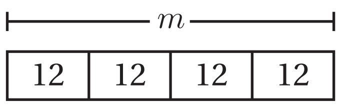
Things to Remember:

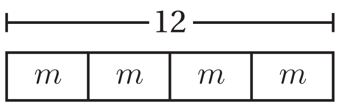
Name: ________ Date: ________ Period: ________

1. Match each equation to the tape diagram that represents it.

a.


b.


c.


d.


________ $12 = 4m$

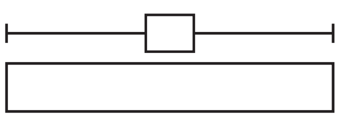
________ $m \div 4 = 12$

________ $12 + 4 = m$

________ $12 - 4 = m$

Problems 2–5: Aaliyah filled a water bottle with 24 ounces of water before school. She drank 15 ounces at lunch. There are x ounces of water left.

2. Draw a tape diagram to represent the situation.



3. Select *all* the equations that could represent this situation.

- ☐ **A.** $24 - 15 = x$
- ☐ **B.** $24 + 15 = x$
- ☐ **C.** $x + 15 = 24$
- ☐ **D.** $15x = 24$
- ☐ **E.** $24 \div 15 = x$

4. Determine the solution to one of the equations you selected in Problem 3.

5. Explain the solution's meaning in this situation.

Lesson Practice
6.6.02

Name: ____________ Date: ________ Period: ________

Spiral Review

Problems 6–8: Fill in each blank to create a true equation.

6. $2.83 - 1.6 = \square$

7. $\square + 2.1 = 7$

8. $\frac{3}{4} \cdot \square = 8$

9. Fill in each blank using whole numbers from 0 to 9 only once so that x is the same value in each equation.

$x = \square \cdot \square$

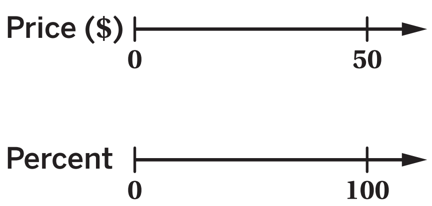
$x = \square + \square$

$x + \square = \square$

10. Select *all* the true equations.

- ☐ **A.** $5 + 0 = 0$
- ☐ **B.** $15 \cdot 0 = 0$
- ☐ **C.** $1.4 + 2.7 = 4.1$
- ☐ **D.** $\frac{2}{3} \cdot \frac{5}{9} = \frac{7}{12}$
- ☐ **E.** $4\frac{2}{3} = 5 - \frac{1}{3}$

11. Joseph-Grace paid $40 for a jacket. The regular price was $50. What percent of the regular price did Joseph-Grace pay? Use the double number line if it helps with your thinking.



Reflection

1. Put a star next to a problem you could explain to a classmate.

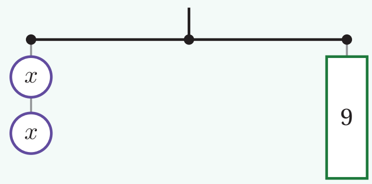
2. Use this space to ask a question or share something you're proud of.

Lesson Summary

Hangers are a helpful way to represent equations. A hanger is balanced when the weight on both sides is equal.

Here is an example.

This hanger represents the equation $2x = 9$, or $x + x = 9$. The solution to this equation is the value of x that will keep the hanger balanced. The solution for this hanger is 4.5 because $4.5 + 4.5 = 9$ or $2(4.5) = 9$.

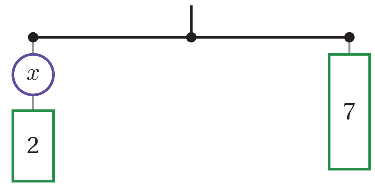


Things to Remember:

Lesson Practice
6.6.03

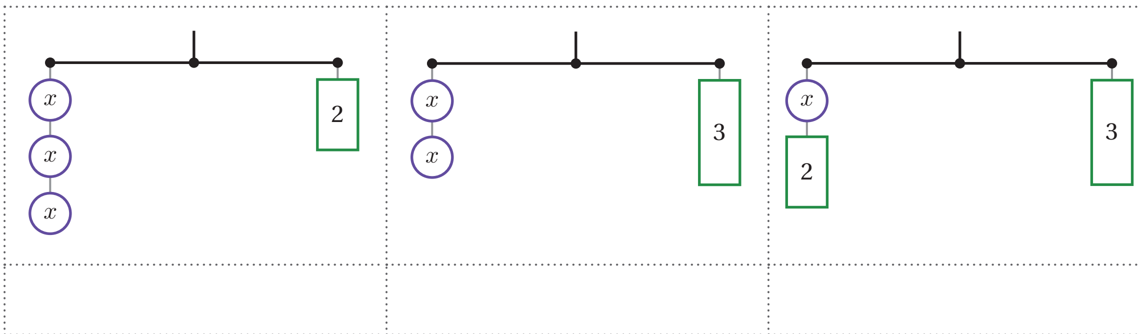
Name: ______________ Date: ______ Period: ______

1. Anushka says that to balance this hanger the value of x must be 7. Is Anushka correct? Explain your thinking.



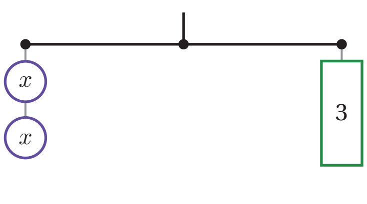
2. Match each equation to the hanger it represents. One equation will have no match.

$2x = 3$	$2 + x = 3$	$3 + x = 2$	$3x = 2$

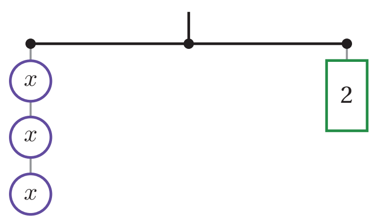


Problems 3–4: Determine the value of x that balances the hanger.

3.



4.



Name: ______________ Date: ________ Period: ________

Spiral Review

Problems 5–8: Determine the value of each expression.

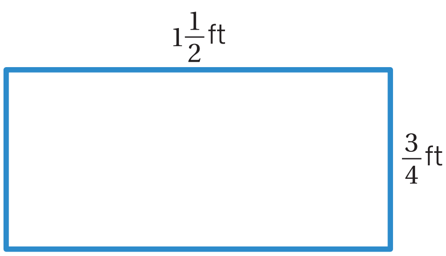
5. $12 + 2.4$

6. $12 \cdot 2.4$

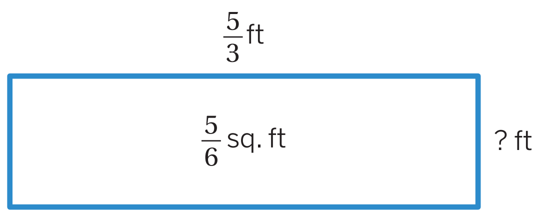
7. $12 - 2.4$

8. $12 \div 2.4$

9. Calculate the area of this rectangle.



10. Calculate the length of this rectangle.



11. Precious set a goal to save $20 for a new game. Complete the table to show how much money Precious saved at different percentages of the goal.

Percentage of Goal (%)	Money Saved ($)
25	
75	
125	

Reflection

1. Put a question mark next to a problem you were feeling stuck on.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

There are many strategies to solve equations, such as drawing models, using number sense to determine the value that makes an equation true, making a hanger balanced, or using inverse operations to isolate a variable.

Here are two examples that use inverse operations to solve an equation.

Equation	Explanation
$x + 1.5 = 3.25$	Original equation
$x + 1.5 - 1.5 = 3.25 - 1.5$	Subtract 1.5 from both sides.
$x = 1.75$	The solution to this equation is 1.75.

Equation	Explanation
$\frac{1}{2}y = 54$	Original equation
$\frac{1}{2}y \div \frac{1}{2} = 54 \div \frac{1}{2}$	Divide both sides by $\frac{1}{2}$.
$y = 108$	The solution to this equation is 108.

Things to Remember:

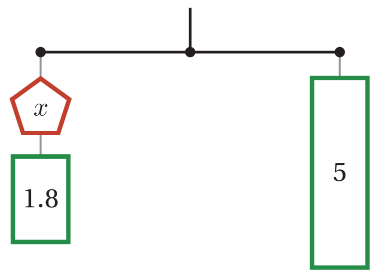
Name: ______ Date: ______ Period: ______

1. Select *all* the equations that have a solution of $n = 11$.

- ☐ **A.** $2n = 22$
- ☐ **B.** $23 - n = 12$
- ☐ **C.** $4n = 411$
- ☐ **D.** $n \div 1 = 11$
- ☐ **E.** $n - 7 = 4$

Problems 2–3: Use the hanger diagram if it helps with your thinking.

2. Determine the value of x in the equation $x + 1.8 = 5$.



3. Vihaan says the solution to $x + 1.8 = 5$ is $x = 6.8$. Explain how you know this is incorrect.

Problems 4–9: Solve each equation. Draw a hanger or tape diagram if it helps with your thinking.

4. $4m = 8$

5. $\frac{1}{2}a = \frac{5}{8}$

6. $10d = 32$

7. $w + 5.2 = 17$

8. $1.5x = 0.9$

9. $24.6 = 6.1 + c$

Lesson Practice
6.6.04

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

10. Fill in each blank using the numbers 0 to 9 only once so that x has the same value in each pair of equations.

$x = \square$

$x + \square = \square$

$x = \square$

$x + \square = \square$

Spiral Review

11. Calculate each product.

Expression	Product
$212 \cdot 2$	
$21.2 \cdot 0.2$	
$21.2 \cdot 0.02$	

12. Kweku and Javier each used a different strategy to determine 25% of 60. Whose strategy is correct? Circle one.

Kweku
60×25

Javier
$60 \div 4$

Kweku's   Javier's   Both   Neither

Explain your thinking.

Reflection

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

Lesson Summary

Writing an equation to match a situation is a helpful tool when trying to determine an unknown value. You can solve the equation using a variety of strategies such as tape diagrams, hangers, or inverse operations.

We can check the solution to an equation by substituting the value of the variable to see if it makes the equation true. Once we have a solution to the equation, it's important to determine the meaning of the solution.

Here is an example.

Situation	Equation	Solution	Solution Check	Solution's Meaning
Adah has \$42 to spend on music downloads. Each download costs \$7. Adah can buy x downloads.	$7x = 42$	$x = 6$	$7 \cdot 6 = 42$	Adah can buy 6 music downloads.

Things to Remember:

Lesson Practice
6.6.05

Name: ________ Date: ________ Period: ________

1. Anika buys 5 notebooks that contain 60 pages each. Select *all* the equations that represent the total number of pages, p.

- ☐ **A.** $p = 60 \div 5$
- ☐ **B.** $5 + 60 = p$
- ☐ **C.** $p = 5 \bullet 60$
- ☐ **D.** $p \div 5 = 60$
- ☐ **E.** $5p = 60$

2. Tiara buys a pack of paper with 200 sheets. She divides the sheets of paper equally into 5 binders. Select *all* the equations that represent the number of sheets of paper in each binder, b.

- ☐ **A.** $b = 200 \div 5$
- ☐ **B.** $200 \div b = 5$
- ☐ **C.** $b = 5 \bullet 200$
- ☐ **D.** $b \div 5 = 200$
- ☐ **E.** $5b = 200$

Problems 3–4: Here is an equation: $\frac{1}{2} + x = 4$.

3. Write a situation that the equation could represent.

4. Describe the meaning of the x in your situation.

Problems 5–6: A plant in Zahra's garden grows 0.8 inches taller each week. After x weeks, the plant has grown 6 inches.

5. Write an equation that could represent this situation.

6. Describe the meaning of the x in the situation.

7. Fill in the blanks using the numbers 0 to 9 only once to complete each equation so that the value of x is the same.

$\square x = \square$ $\qquad x + \square = \square$ $\qquad x - \square = \square$

Lesson Practice
6.6.05

Name: ________ Date: ________ Period: ________

Spiral Review

8. Select *all* the equations that have a solution of $c = 1.5$.

- ☐ **A.** $4c = 41.5$
- ☐ **B.** $150 \div c = 100$
- ☐ **C.** $13.5 - c = 10$
- ☐ **D.** $6c = 9$
- ☐ **E.** $0.2c = 0.3$

Problems 9–11: Solve each equation.

9. $6m = 33$

10. $p + 7.04 = 11.8$

11. $n + \frac{3}{5} = \frac{8}{10}$

12. Compare the information given about triangle C and triangle D.

Triangle C	**Triangle D**
Base = 12 inches	Base = 15 inches
Height = 8 inches	Height = 6.5 inches

Which triangle has the greater area?

Explain your thinking.

Reflection

1. Circle a problem you want to talk to a classmate about.
2. Use this space to ask a question or to share something you're proud of.

Lesson Summary

We can use an expression with a variable to represent a situation. Each part in the expression represents a different value in the situation. Here are two examples.

- The cost of 1 pound of grapes is $\$2.25$. Let p represent pounds of grapes. You can use the expression $2.25p$ to calculate the total cost for any number of pounds of grapes. This expression only has one **term**, $2.25p$.

Grapes (lb)	Total Cost ($)
1	2.25
2	4.50
5	11.25
p	$2.25p$

- A grocery store adds a $\$10$ fee to the cost of groceries for delivery. Let c represent the cost of groceries. You can use the expression $c + 10$ to calculate the total cost for any cost of groceries. This expression has two terms, c and 10.

Cost of Groceries	Total Cost ($)
1	11
2	12
5	15
c	$c + 10$

Things to Remember:

Lesson Practice
6.6.06

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

Problems 1–3: Oranges cost $1.25 per pound. How much would it cost to buy:

1. 2 pounds of oranges?

2. 5 pounds of oranges?

3. x pounds of oranges?

4. You need red and blue ribbon for a craft project. The instructions say that the red ribbon should be 7 inches longer than the blue ribbon.

Complete the table to show how long the red ribbon should be for different lengths of blue ribbon.

Blue Ribbon (in.)	Red Ribbon (in.)
10	
27	
x	

5. 35 riders are on a bus, and n riders get off at the same stop. In this scenario, what does the expression $35 - n$ represent?

Problems 6–7: The variable s represents the number of students in one class in your school.

6. What does $\frac{1}{2}s$ represent?

7. What does $s + 1$ represent?

Problems 8–10: Evaluate the expression $3m + 5$ for each value of m.

Example

$m = 7$

$3(7) + 5 = 26$

8. $m = 8$

9. $m = 0.8$

10. $m = \dfrac{5}{6}$

Lesson Practice

6.6.06

Name: ______ Date: ______ Period: ______

Spiral Review

11. LaShawn's class raised $\$500$ for a fundraiser. They used 10% of the money to cover the cost of materials, saved 20% for the next fundraising project, and donated the rest. How much money did LaShawn's class donate? Explain your thinking.

12. A garbage bin can hold 50 gallons of waste.

Complete the table to show what percent of the bin would be filled for different amounts of waste.

Waste (gal)	Percent Filled (%)
5	
30	
45	

13. Choose any value for a.

$a =$ ☐

Use your value to complete the puzzle.

$3a$	$+$	4	$=$					
$-$				$+$				$-$
a		$4a$	$+$	$4a$	$-$		$=$	$5a$
$-$		$+$		$=$				$=$
a					$-$	$2a$	$=$	
$-$		$=$				$+$		
a	$+$	$6a$	$-$		$=$	$4a$		
$=$		$+$				$=$		
		a		a	$+$		$=$	

Reflection

1. Put a question mark next to a problem you are feeling unsure of.

2. Use this space to ask a question or share something you're proud of.

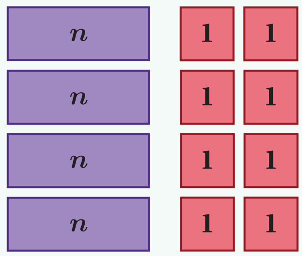
Lesson Practice 6.6.07

Science Mom Lesson 51

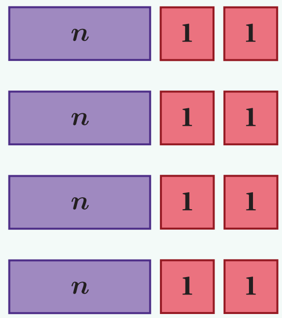
Lesson Summary

Equivalent expressions are expressions that are equal for every value of a variable, such as $4n + 8$ and $4(n + 2)$. Diagrams that represent these expressions can help us visually decide if the expressions are equivalent.

$4n + 8$



$4(n + 2)$

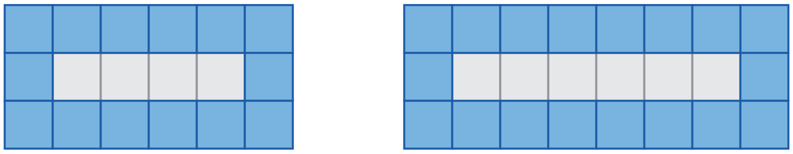


The diagrams for $4n + 8$ and $4(n + 2)$ both show 4 n-tiles and 8 one-tiles. Therefore, $4n + 8$ and $4(n + 2)$ are equivalent expressions because they are equal for every value of n.

Things to Remember:

Name: ______ Date: ______ Period: ______

Problems 1–3: Here are examples of an n-by-1 rectangle.



1. How many border tiles are there in the 4-by-1 rectangle?

2. How many border tiles are in the 6-by-1 rectangle?

3. Diego says $2n + 6$ represents the number of tiles needed for the border of an n-by-1 rectangle. Explain why Diego's strategy is correct.

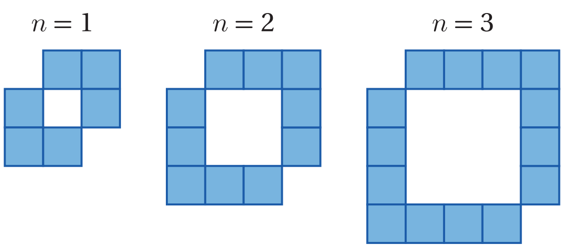
Problems 4–5: Here are five expressions.

$2 + 6n$	$2(n + 3)$	$n + 3$	$n + n + 6$	$(n + 3) + (n + 3)$

4. Write *all* of the expressions that are equivalent to $2n + 6$.

5. Choose an expression that is *not* equivalent to $2n + 6$. Explain how you know it is not equivalent.

Problems 6–7: Here is a pattern.



6. Write an expression that describes the number of tiles for any stage, n.

7. Write an equivalent expression.

Lesson Practice
6.6.07

Name: ______ Date: ______ Period: ______

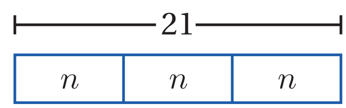
Spiral Review

Problems 8–9: Write an equation to represent each situation.

8. Amahle's dog was $5\frac{1}{2}$ inches tall when it was a puppy but is now 14 inches tall. Amahle's dog grew n inches.

9. Apples cost $\$1.10$ per pound. Darius bought x pounds of apples for a total cost of $\$2.75$.

Problems 10–11: Here is a tape diagram.



10. Write an equation to represent the tape diagram.

11. Determine the value of n.

Problems 12–15: Evaluate each expression for $b = 5$.

12. $3.5b$

13. $6b + 1$

14. $\frac{1}{4} + b$

15. $\frac{1}{2}b$

Reflection

1. Circle the problem that was the most challenging for you.

2. Use this space to ask a question or share something you're proud of.

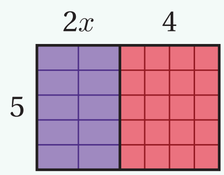
Lesson Practice 6.6.08

Science Mom Lesson 52

Lesson Summary

You can use areas of rectangles to write equivalent expressions. For any rectangle, you can write a *product* expression and a *sum* expression that each represent the area. No matter what value you substitute for the variable, the total area is the same, so the product and sum expressions are equivalent.

Area Model



Product of Two Side Lengths

$5(2x + 4)$

$10x + 20$

Sum of Two Areas

$5 \cdot 2x + 5 \cdot 4$

$10x + 20$

Things to Remember:

Lesson Practice
6.6.08

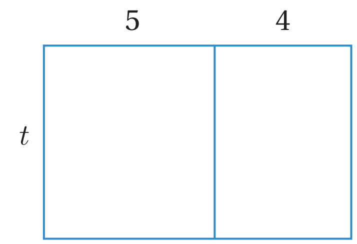
Name: ______________ Date: ________ Period: ________

1. Select *all* the expressions that are equivalent to $4b$.

☐ **A.** $b + b + b + b$ ☐ **B.** $b + 4$ ☐ **C.** $b \bullet b \bullet b \bullet b$

☐ **D.** $2b + 2b$ ☐ **E.** $4 \bullet b$

2. Select *all* the expressions that represent the area of the rectangle.



☐ **A.** $t + 5 + 4$

☐ **B.** $5t + 4t$

☐ **C.** $9t$

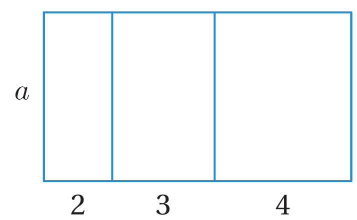
☐ **D.** $4 \bullet 5 \bullet t$

☐ **E.** $(5 + 4)t$

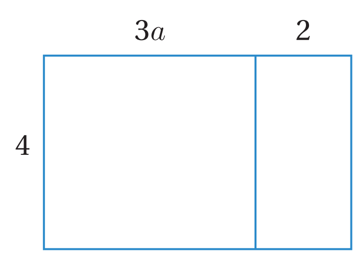
3. Zola wrote the total area of the rectangle as $2a + 3a + 4a$.

Amir wrote the total area as $(2 + 3 + 4)a$.

Explain why they are *both* correct.



4. Write two equivalent expressions that could be used to represent the area of the rectangle.



Expression 1: ______________

Expression 2: ______________

Lesson Practice
6.6.08

Name: ______ Date: ______ Period: ______

5. Fill in the blanks using the numbers 0 to 9 only once so that each rectangle has the same area.

Spiral Review

Problems 6–8: Titus's aunt is 17 years older than he is.

6. How old will his aunt be when Titus is 15 years old?

7. How old will his aunt be when Titus is 30 years old?

8. How old will his aunt be when Titus is x years old?

Problems 9–11: Solve each equation. Show your thinking.

9. $10m = 25$

10. $13.65 = h + 4.88$

11. $k + \frac{1}{4} = 5\frac{1}{8}$

Reflection

1. Put a star next to a problem where you revised your thinking.

2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.6.09

Science Mom Lesson 53

Lesson Summary

The expression $8x + 2$ has two terms, and the term $8x$ has a **coefficient** of 8.
The expression $2(x + 1) + 3(2x)$ also has two terms, $2(x + 1)$ and $3(2x)$, but the terms are more complex.

To decide if two expressions are equivalent, you can draw models, substitute values, or rewrite the expressions. If the expressions are equivalent, you can use the distributive property and other operations to rewrite one expression to look like the other.

Here is an example: Determine whether $2(x + 1) + 3(2x)$ is equivalent to $8x + 2$.

$$\begin{aligned} 2(x + 1) + 3(2x) &= 2x + 2 + 6x \\ &= 2x + 6x + 2 \\ &= 8x + 2 \end{aligned}$$

$2(x + 1) + 3(2x)$ and $8x + 2$ are equivalent expressions because after using the distributive property and adding the **like terms**, the expressions are the same.

Things to Remember:

Lesson Practice
6.6.09

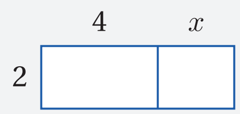
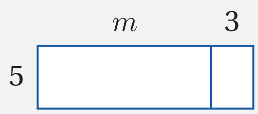
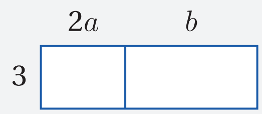
Name: ____________ Date: ________ Period: ________

1. Select *all* the expressions that are equivalent to $4x + 8$.

☐ **A.** $4(x + 2)$　　☐ **B.** $(4 + 8)x$　　☐ **C.** $2(2x + 4)$

☐ **D.** $2(2x + 6)$　　☐ **E.** $4 + 4(x + 1)$

2. Complete the table.

Rectangle			
Product		$5(m + 3)$	
Sum	$8 + 2x$		

3. Latifa and Joel are trying to rewrite $8y + 24$ as a product expression.

Latifa	Joel
8(y + 3)	2(4y + 12)

Are Latifa's and Joel's expressions both equivalent to $8y + 24$? Circle one.

Yes　　　　No

Explain your thinking.

Problems 4–6: Determine whether each pair of expressions are equivalent.

	Expression A	Expression B	Equivalent?
4.	$2(x + 8) + 3$	$2x + 19$	Yes　No
5.	$5 + 2(y + 4)$	$7y + 28$	Yes　No
6.	$3(z + 1) + 3(z + 1)$	$6(z + 1)$	Yes　No

Name: ______ Date: ______ Period: ______

7. Complete the table.

Product Expression	Sum Expression
	$4x + 8$
$(6 + 8)d$	
	$10m + 7m$
$3(2b + 5)$	
$6(u + 2t)$	

8. The area of a rectangle is $30 + 12x$.

List three possibilities for the length and the width of the rectangle.

Length	Width

Spiral Review

Problems 9–11: Solve each equation. Show your thinking.

9. $x + 5 = 11$

10. $0.6y = 1.8$

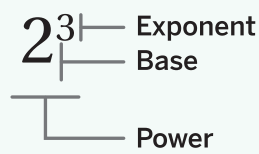
11. $5w = 17.5$

Reflection

1. What advice would you give to yourself or others when writing equivalent expressions?
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.6.10

Lesson Summary



Exponents are used to represent repeated multiplication. In the expression 2^n, 2 is the **base**, and n is the **exponent**. If n is a positive whole number, it represents how many times 2 should be multiplied to determine the value of the expression.

Here are some examples.

$2^1 = 2$ $\qquad$ $2^3 = 2 \cdot 2 \cdot 2$

There are several different ways to say "2^3."

- "Two to the power of three"
- "Two raised to the power of three"
- "Two to the third power"
- "Two cubed"

Things to Remember:

Lesson Practice
6.6.10

Name: ____________ Date: ________ Period: ________

1. Determine the value of each expression.

Expression	Value
$3 + 3 + 3 + 3$	
$3 \cdot 3 \cdot 3 \cdot 3$	
$4(3)$	
3^4	

2. Complete the table. The first row has been completed for you.

Expression With Exponent	Expression Without Exponent
3^5	$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
	$2 \cdot 2 \cdot 2 \cdot 2$
4^3	
5^1	
	$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$
$\left(\frac{1}{3}\right)^4$	

3. Select *all* the expressions that are equal to 16.

- ☐ **A.** 8^2
- ☐ **B.** 2^4
- ☐ **C.** 2^8
- ☐ **D.** 4^2
- ☐ **E.** 16^1

4. Circle the two expressions that have the same value.

$6 + 6 + 6$ $\quad$ 6^3 $\quad$ 3^6 $\quad$ $3 \cdot 6$

Lesson Practice
6.6.10

Name: ______ Date: ______ Period: ______

5. Write the expression that represents each description, then determine its value.

Description	Expression	Value
Three to the third power		
Five to the second power		
Two to the power of five		
Three to the second power		

6. Determine a value of a that makes both of these equations true. Explain your thinking.

$a^2 = 2^a$ $\qquad$ $a^4 = 4^a$

Spiral Review

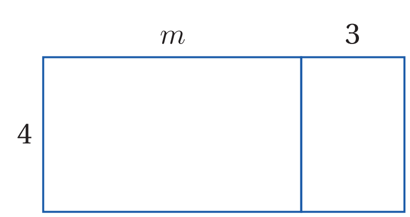
Problems 7–9: Solve each equation.

7. $a - 2.01 = 5.5$ $\qquad$ **8.** $b + 2.01 = 5.5$ $\qquad$ **9.** $10c = 13.71$

10. Write two expressions for the area of the rectangle.

Product: ______

Sum: ______



Reflection

1. Circle the problem you feel least confident about.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

There is a specific *order of operations* we use to evaluate expressions with more than one operation, like $5 \bullet 2^4$ or $(5 \bullet 2)^4$.

With Parentheses	Without Parentheses
Evaluate the operations in parentheses first:	Evaluate the term with the exponent first:
$(5 \bullet 2)^4$	$5 \bullet 2^4$
$(10)^4$	$5 \bullet (2 \bullet 2 \bullet 2 \bullet 2)$
$10 \bullet 10 \bullet 10 \bullet 10$	$5 \bullet 16$
$10{,}000$	80

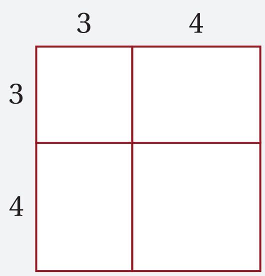
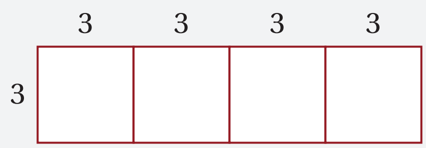
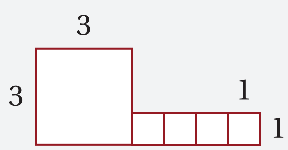
Things to Remember:

Lesson Practice
6.6.11

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

1. Match each expression with the diagram it represents. Evaluate the expression to determine the area of each diagram.

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

Diagram	Expression	Area (sq. units)
		
		
		

Problems 2–3: Evaluate each expression.

2.

Expression	Value
$5 + 4^2$	
$(3+2)^3$	
$2^2 \cdot 5$	
$8 \cdot \left(\frac{1}{2}\right)^2$	

3.

Expression	Value
$42 - 9 \cdot 2^2$	
$\frac{12 - 3^2}{6}$	
$\frac{3 + (2+1)^2}{4}$	
$\frac{1}{4}(3-1)^3$	

4. What is the value of the expression $\frac{3 + 5^2}{4}$?

A. 16

B. 7

C. 4

D. $\frac{13}{4}$

Lesson Practice
6.6.11

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

Spiral Review

5. Fill in the blanks using the numbers 0 to 9 only once so that the values of the expressions are in order from least to greatest.

$4^{\square}$	$\square^{4}$	$\square^{2}$	$3^{\square}$	$\square^{3}$	$2^{\square}$

Least **Greatest**

Problems 6–9: Determine the value of each expression.

6. $3(5)$

7. $3(5) + 2$

8. $3(5 + 2)$

9. $3(2 + 5)$

10. Select *all* the expressions that are equal to 3^4.

- ☐ **A.** $3 \cdot 3 \cdot 3 \cdot 3$
- ☐ **B.** 12
- ☐ **C.** $3 + 3 + 3 + 3$
- ☐ **D.** $9 \cdot 9$
- ☐ **E.** 81

Reflection

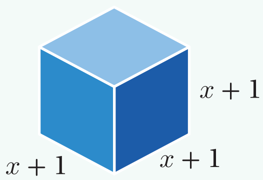
1. Put a heart next to the problem you feel most confident about.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

To use the order of operations, *evaluate* the operations in parentheses first. When there are no parentheses, exponents should be evaluated first.

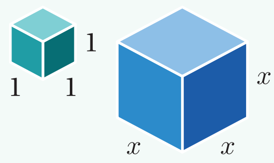
Area is useful for modeling expressions with exponents of 2. Volume is useful for modeling expressions with exponents of 3. When evaluated, these become perfect squares and **perfect cubes**. Here are two examples of expressions evaluated when $x = 2$. Look for the perfect cubes.



$(x + 1)^3$ is

$(2 + 1)^3 = 3^3$

$= 27$



$x^3 + 1$ is

$2^3 + 1 = 8 + 1$

$= 9$

If the exponent is larger than 3, substitute the value of the variable and use the order of operations.

For example, when $x = 2$:

$(x + 1)^4$ is

$(2 + 1)^4 = 3^4$

$= 81$

$x^5 + 1$ is

$2^5 + 1 = 32 + 1$

$= 33$

Things to Remember:

Lesson Practice
6.6.12

Name: ______ Date: ______ Period: ______

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

Expression	$x^2 + 6$	$4x^2$	2^x	$4 + 2^x$
Value when $x = 3$				

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

Expression	$x^4 + 5x$	$4x^3 + x - 10$	$1 + 3x^3$	$\left(\frac{1}{3}\right)^x$
Value when $x = 2$				

3. Determine the value of $2x^2 - 4x + 5$ when $x = 6$.

Problems 4–5: Here are two figures.

Figure A

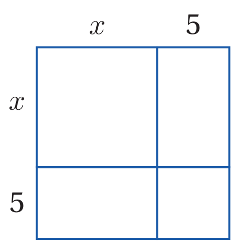
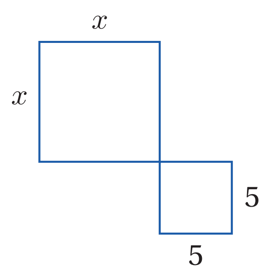


Figure B



4. Match each figure with an expression that represents its area. One expression will not have a match.

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

______ ______ ______

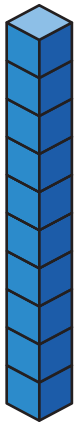
5. Explain why $(x + 5)^2$ and $x^2 + 5^2$ are *not* equivalent.

Lesson Practice
6.6.12

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

Spiral Review

Problems 6–7: Jalen built a tower out of 10 cubes. Each cube has a side length of 5 inches.



6. Which expression represents the volume of the tower?

A. $5(10)^3$

B. $10(5)^3$

C. $10 + 5^3$

D. $5 + 10^3$

7. Calculate the volume of the tower.

8. For each row, circle the expression with the greater value or circle that they have the same value.

Expression A	Expression B	Same Value
2^3	3^2	They have the same value.
1^{10}	10^1	They have the same value.
3^4	9^2	They have the same value.
$\left(\frac{1}{2}\right)^3$	$\left(\frac{1}{3}\right)^2$	They have the same value.

9. Fill in the blanks using the numbers 1 to 9 only once to create equivalent expressions.

$$\square \cdot \square^2$$

$$(\square + \square)^2$$

Reflection

1. Circle the problem you're most interested in knowing more about.

2. Use this space to ask a question or to share something you're proud of.

Lesson Summary

Tables and equations can be used to represent and describe a relationship between two variables or quantities.

- The **dependent variable** is the variable in a relationship that is the effect or result.
- The **independent variable** is the variable in a relationship that is the cause. It is used to calculate the value of the dependent variable.

Let's say a boat can travel 36 miles in 3 hours. How far can the boat travel in 8 hours?

- The dependent variable is the distance traveled, d.
- The independent variable is the amount of time, t.

Table

t (hr)	d (mi)
3	36
1	12
8	96

In 8 hours, the boat can travel 96 miles.

Equation

$$d = 12t$$

In 8 hours, the boat can travel $d = 12 \cdot 8 = 96$ miles.

In both strategies, the distance *depends* on how many hours the boat travels.

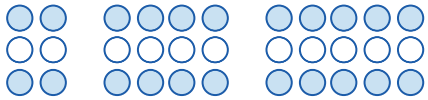
Things to Remember:

Lesson Practice
6.6.13

Name: ______________ Date: ______ Period: ______

1. The number of circles along the bottom, c, is the independent variable in this relationship.

List two to three dependent variables you could count or measure.



$c = 2$ $c = 4$ $c = 5$

Problems 2–4: Karima wants to help a community kitchen determine how much broth they need for their famous chicken soup. Each serving of soup uses 2 cups of broth.

2. Complete the table.

Number of Servings of Soup, s	Number of Cups of Broth, b
1	
2	
5	
	16

3. Which variable is the independent variable, s or b? Explain your thinking.

4. Karima and her sibling each wrote an equation for the relationship.

Karima: $s = 2b$ Karima's sibling: $b = 2s$

Who is correct? Circle one.

Karima Karima's sibling Both Neither

Explain your reasoning.

5. This table shows the number of scooters a factory produces in different amounts of time.

Write an equation to represent the relationship between the number of hours, x, and the number of scooters, y, the factory produces.

Number of Hours, x	Number of Scooters, y
2	21
4	42
6	63
8	84

Lesson Practice
6.6.13

Name: ________ Date: ________ Period: ________

Problems 6–8: Crow has a coupon for $4 off any item at a store.

6. How much would Crow pay for an item that costs $10?

7. How much would Crow pay for an item that costs $22?

8. How much would Crow pay for an item that costs d dollars?

Problems 9–10: Here is a table.

n	a
1	5
2	10
3	15

9. Draw a visual pattern that represents this relationship.

10. What do the variables n and a represent in your pattern?

n represents . . .

a represents . . .

Spiral Review

11. Determine the value of each expression.

Expression	3^2	2^3	2^5	2^1
Value				

12. Determine the value of each expression when $x = 4$.

Expression	$(6-x)^3$	$2(6-x)^3$	$2^x - 6$	$\left(\frac{1}{x}\right)^3$
Value when $x = 4$				

Reflection

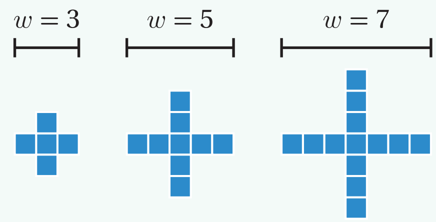
1. Put a heart next to the problem you found most interesting.

2. Use this space to ask a question or share something you're proud of.

Lesson Practice 6.6.14

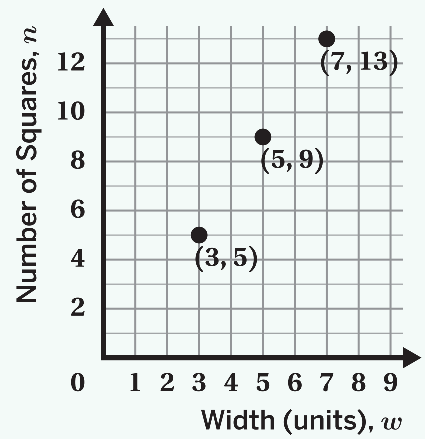
Lesson Summary

Like tables and equations, graphs are another way of representing the relationship between two quantities. For example, in this pattern, the independent variable is the width of the figure, w, and the dependent variable is the number of squares, n.



Here are the table and graph of this relationship.

Width of the Figure (units), w	Number of Squares, n
3	5
5	9
7	13



The numbers in each row of the table indicate an *ordered pair* on the coordinate plane. In the first row of the table, w is 3 and n is 5, which is represented by the point (3, 5) on the graph.

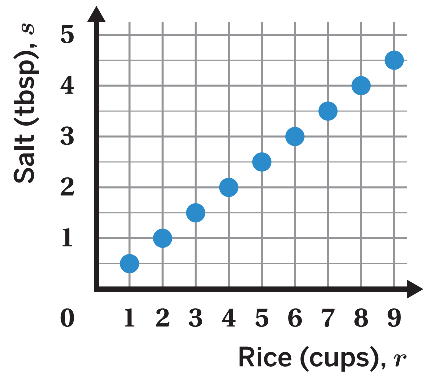
While representing a relationship using a graph, we usually use the x-axis for the independent variable.

Things to Remember:

Lesson Practice
6.6.14

Name: ______________________ Date: __________ Period: __________

Problems 1–3: This graph shows the number of tablespoons of salt, s, needed to make r cups of rice.



1. Complete the table to reflect some of the values on the graph.

Rice (cups), r	Salt (tbsp), s
1	
4	
	3

2. What does the point $(8, 4)$ mean in this situation?

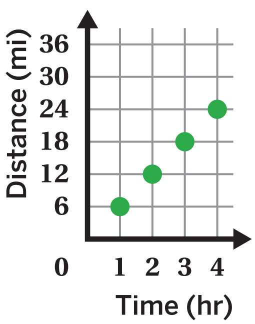
3. Which equation represents the relationship between the number of tablespoons of salt, s, and the number of cups of rice, r?

A. $r = \frac{1}{2}s$ B. $s = 2r$ C. $s = \frac{1}{2}r$ D. $s = \frac{1}{2} + r$

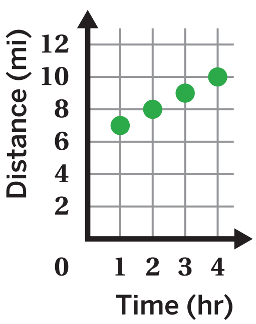
Explain how you know that equation is correct.

4. Rebecca rides her bike at a constant rate. The equation $d = 6t$ describes the relationship between the time, t, she rides in hours, and the distance, d, she rides in miles. Select the graph that represents the relationship between the amount of time and the distance she rides.

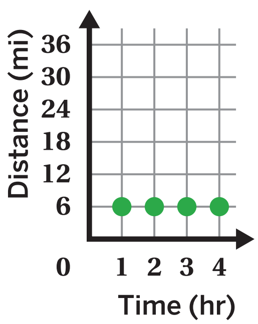
A.



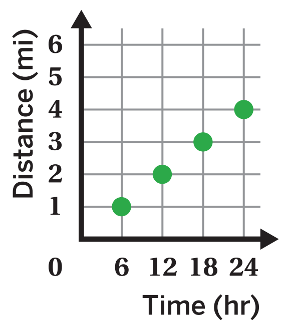
B.



C.

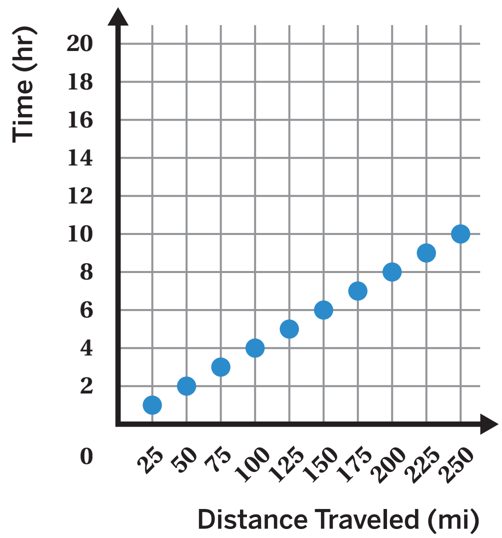


D.



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

Problems 5–7: The graph represents the amount of time in hours that it takes a ship to travel various distances in miles.

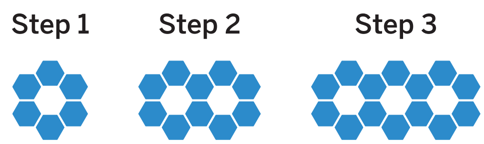


5. Select one point on the graph. Explain what that point means in this situation.

6. What is the independent variable?

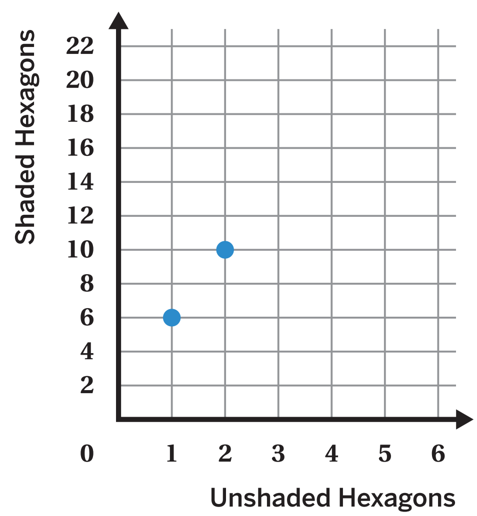
7. What is the dependent variable?

Problems 8–9: Here are the first three steps of a pattern.



8. Draw the fourth step of the pattern.

9. Plot the missing points that represent the third and fourth steps of the pattern.



Spiral Review

Problems 10–13: Determine the value of each expression.

10. 3^3 **11.** $2(3)^3$ **12.** $3^3 + 4$ **13.** $2 \cdot 3^3 + 4$

Reflection

1. Star a problem that you are still feeling confused about.

2. Use this space to ask a question or share something you're proud of.

Lesson Summary

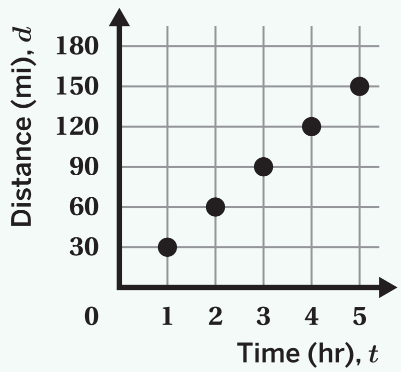
All three representations — tables, equations, and graphs — hold the same mathematical information described in a situation but display it in different ways.

For example, if a car travels 30 miles per hour at a constant speed, you can determine the distance the car traveled in 4 hours using a table, a graph, or an equation.

Table

Time, t (hr)	Distance, d (mi)
1	30
2	60
4	120

Graph



Equation

$d = 30t$

$d = 30(4)$

$d = 120$

In all three representations, we can see that the car traveled 120 miles in 4 hours.

Things to Remember:

Lesson Practice
6.6.15

Name: ______ Date: ______ Period: ______

Problems 1–2: Kris is selling little toy cars for $\$1.50$ each.

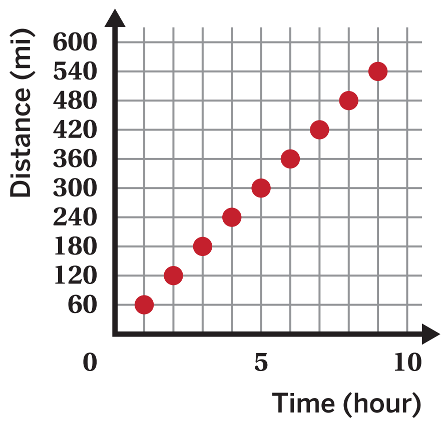
1. Write an equation that represents how much money Kris earns, m, for selling any number of toy cars, c.

2. Complete the table that represents this situation.

c	m
2	
4	
	$16.50
	$22.50

Problems 3–4: This graph represents the distance a car traveled, d, over time, t.

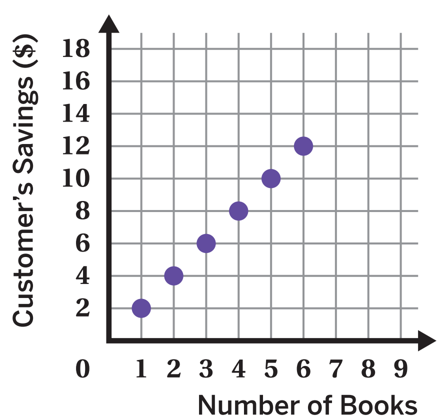
3. Create a table that matches the graph.



4. Nathan determined that the equation $d = 60t$ represents this situation. Explain how the parts of his equation relate to the situation.

5. A bookstore gives out coupons for $2 off each book. This graph represents the situation.

Select one point on the graph. Explain what that point means in this situation.



6. The equation $a = e - 4$ represents the relationship between Amanda's age, a, and Estaban's age, e. Which table represents the same relationship?

A.

a	e
10	14
11	15
12	16

B.

a	e
14	10
15	11
16	12

C.

a	e
10	6
11	7
12	8

D.

a	e
12	3
16	4
20	5

Spiral Review

Problems 7–9: Calculate each percentage.

7. 25% of 40

8. 30% of 60

9. 45% of 90

Problems 10–11: Rishi sells lemonade for $0.35 per cup.

10. If Rishi earned $9.80, how many cups of lemonade did he sell?

11. Rishi bought 50 paper cups for $0.05 each. How much did he spend on the paper cups?

Reflection

1. Circle the problem you are most interested to know more about.

2. Use this space to ask a question or share something you're proud of.

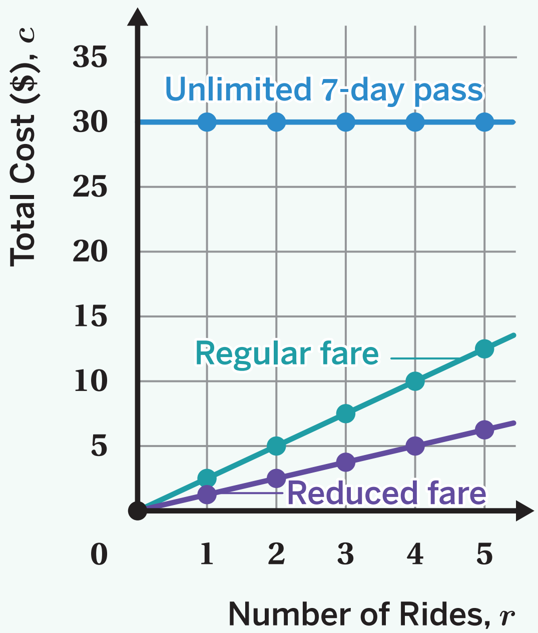
Science Mom Lesson 60

Lesson Summary

We can use data in tables, graphs, and equations to help make decisions in real-world situations. When it comes to analyzing subway ticket fares, these representations can help us make informed decisions about what type of transportation ticket to purchase.

Using the graph, we can see that the regular fare ticket is the best choice if we ride 5 times or less and do not qualify for the reduced fare. If we extend each line on the graph, we'll be able to determine when the price of an unlimited 7-day pass will be lower than the regular fare.

We can use these tools to make sure we get the best subway ticket for our needs.



Things to Remember:

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

1. Match each equation to the table it represents.

$p = 2n$	$p = \frac{1}{2}n$	$p = n + 2$

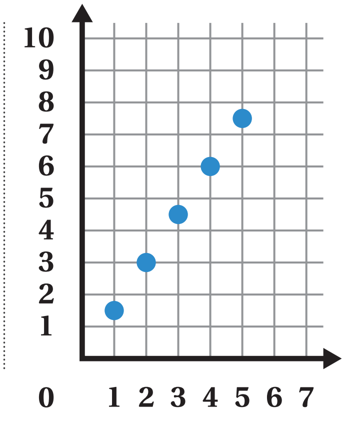
n	p
10	5
20	10
100	50

n	p
10	20
20	40
100	200

n	p
10	12
20	22
100	102

....

Problems 2–4: Here is a graph.



2. Write a situation that could be represented by the graph.

3. Label the axes on the graph to match your situation.

4. Complete the table using the points on the graph. Label each column with variables to match the graph.

....	....
1	1.5
2	
	4.5
4	

Lesson Practice
6.6.16

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

Problems 5–8: A biking app says that Riya rides at a speed of 5 miles per hour.

5. At this speed, how far does Riya ride in 1 hour?

6. At this speed, how far does Riya ride in 3 hours?

7. Write an equation for the relationship between Riya's distance biked, d, and time, t.

8. Riya's speed last week could be represented by the equation $d = 3t$. What can you say about last week's speed compared to this week's speed? Explain your thinking.

Problems 9–10: A school supply store sells boxes of markers. Each box contains 16 markers.

9. Write an equation to represent the total number of markers, y, given x boxes.

Equation: ....

10. If $x = 5$ for one day of sales, use your equation to determine the total number of markers the supply store sells. Show your thinking.

Spiral Review

11. Select *all* the equations with a solution of $n = 3$.

- ☐ **A.** $10n = 103$
- ☐ **B.** $5n = 15$
- ☐ **C.** $\frac{1}{4} + n = \frac{13}{4}$
- ☐ **D.** $n \div 2 = 6$
- ☐ **E.** $\frac{1}{3}n = 3$

12. Fill in the blanks using the numbers 1 to 9 only once to make each inequality true.

$\square^2 < 2^{\square}$ $\quad$ $\square^2 > 2^{\square}$ $\quad$ $\square^3 < 3^{\square}$ $\quad$ $\square^3 > 3^{\square}$

Reflection

1. Circle the problem you think will help you most on the End-of-Unit Assessment.

2. Use this space to ask a question or share something you're proud of.

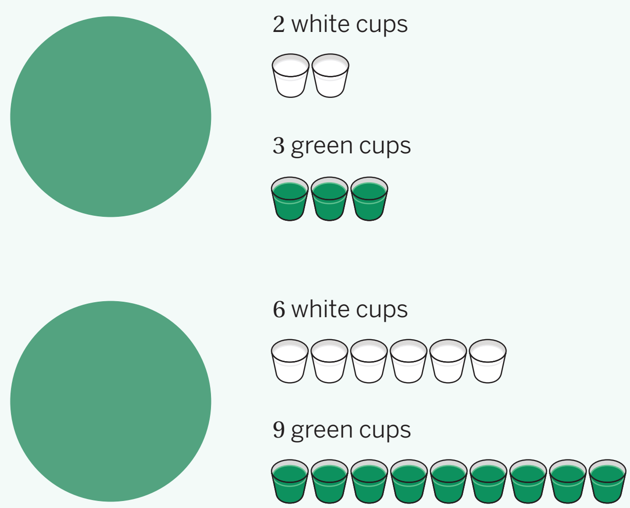
Lesson Practice 7.2.01

Science Mom Lesson 61

Lesson Summary

Ratios are said to be *equivalent ratios* when you can multiply the numbers in one ratio by the same factor to get the numbers in the other ratio.

For example, 2 cups of white paint mixed with 3 cups of green paint creates the same color as 6 cups of white paint mixed with 9 cups of green paint. You can multiply the number of white cups and green cups in the first ratio by 3 to get the second ratio.



When determining if two ratios are equivalent, it can be helpful to use a table of ratios, like this one:

White Paint (cups)	Green Paint (cups)
2	3
6	9

$\times 3$ $\times 3$

Things to Remember:

Lesson Practice
7.2.01

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

Problems 1–5: The table shows an original recipe for orange-pineapple juice, as well as four other recipes.

Recipe	Orange Juice (cups)	Pineapple Juice (cups)
Original	10	15
Recipe A	4	6
Recipe B	3	2
Recipe C	9	12
Recipe D	6	9

1. Select *all* the recipes that taste the same as the original.

- ☐ **A.** Recipe A
- ☐ **B.** Recipe B
- ☐ **C.** Recipe C
- ☐ **D.** Recipe D

2. Choose one recipe that tastes the same as the original and explain your thinking.

3. Choose a recipe that does not taste the same as the original. How do the two recipes compare?

4. How much pineapple juice would you need to mix with 1 cup of orange juice to make a mixture that tastes the same as the original?

5. Complete the table to create a different recipe that will also taste the same as the original.

Orange Juice (cups)	Pineapple Juice (cups)

6. Brielle mixed 6 cups of blue paint with 3 cups of white paint to make the perfect color to paint her mural.

Complete the table to show several other ways to make this color.

Blue Paint (cups)	White Paint (cups)
6	3
8	
12	6
	15

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

7. Determine whether $\frac{6}{14}$ and $\frac{9}{21}$ are equivalent ratios or not. Explain your thinking.

8. Select *all* the values that are *not* equivalent to $\frac{8}{10}$.

- ☐ **A.** $\frac{16}{20}$
- ☐ **B.** 0.8
- ☐ **C.** $\frac{12}{20}$
- ☐ **D.** $\frac{36}{40}$
- ☐ **E.** $\frac{20}{25}$

9. Create equivalent ratios. Fill in each blank using the numbers 0 to 9 as many times as you want.

...... : ...... = ... : ...... = ... : ....

Spiral Review

10. A grocery store has three types of fish for sale. Carp costs \$5 for 3 pounds, mullet costs \$4 for 2 pounds, and herring costs \$3 for 2 pounds. Which fish costs the least per pound? Circle one.

Carp Mullet Herring

Show or explain your thinking.

Reflection

1. Put a heart next to a problem you understand well.
2. Use this space to ask a question or share something you're proud of.

Lesson Practice 7.2.02

Science Mom Lesson 62

Lesson Summary

A **proportional relationship** is a set of equivalent ratios. The values for one quantity are each multiplied by the same number to get the values for the other quantity.

You can see this when moving between the columns of this table that shows the cost of varying amounts of soybeans. You can multiply the pounds of soybeans by 2 to get the cost.

When you multiply one quantity in a proportional relationship by a value, the other quantity will change by the same factor.

You can see this when moving between the rows of the table. When the pounds of soybeans is multiplied by 8, the cost for them is multiplied by the same number.

Soybeans (lb)	Cost ($)
1	2
2	4
8	16
$\frac{1}{2}$	1
$\frac{1}{4}$	0.50

Things to Remember:

Lesson Practice
7.2.02

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

Problems 1–4: Complete the tables so that the relationship is proportional.

1.

x	y
30	3
120	
	10

2.

x	y
1	1.5
3	
	12

3.

x	y
15	45
1	
	0

4.

x	y
0.2	1
1	
	20

5. Entrance to a state park costs $6 per vehicle, plus $2 per person. The table shows the entry cost for several recent groups of visitors. Is the relationship between the number of people and the total entrance cost a proportional relationship? Circle one.

Number of People in Vehicle	Total Cost ($)
2	10
3	12
4	14
10	26

Yes No

Explain your thinking.

6. A store charges $4.80 for 16 ounces of bubble tea. Complete the table so that it shows a proportional relationship between ounces of tea and cost.

Tea (oz)	Cost ($)
16	4.80
20	
	7.20

Name: ________ Date: ________ Period: ________

7. A bakery uses 8 tablespoons of honey for every 10 cups of flour to make bread dough. Complete the table so that it shows a proportional relationship between the amount of honey and the amount of flour. Show or explain your thinking.

Honey (tbsp)	Flour (cups)
8	10
20	
13	
	12.5

Spiral Review

Problems 8–10: Solve each equation. Show your thinking.

8. $\frac{1}{2} + x = 2$

9. $\frac{2}{3}y = 6$

10. $3 = \frac{1}{4}b$

11. A student makes a scaled copy of a rectangle. The dimensions of the original rectangle are 3.5-by-2.5 meters. Select *all* the possible dimensions of the scaled copy.

- ☐ **A.** 1.75 meters and 1.25 meters
- ☐ **B.** 7 meters and 5 meters
- ☐ **C.** 7 meters and 6 meters
- ☐ **D.** 10 meters and 2.5 meters
- ☐ **E.** 10.5 meters and 7.5 meters

Reflection

1. Put a question mark next to a problem you were feeling stuck on.

2. Use this space to ask a question or share something you're proud of.