



Core Knowledge[®] MATHEMATICS

Fractions as Quotients and Fraction Multiplication



Student Workbook



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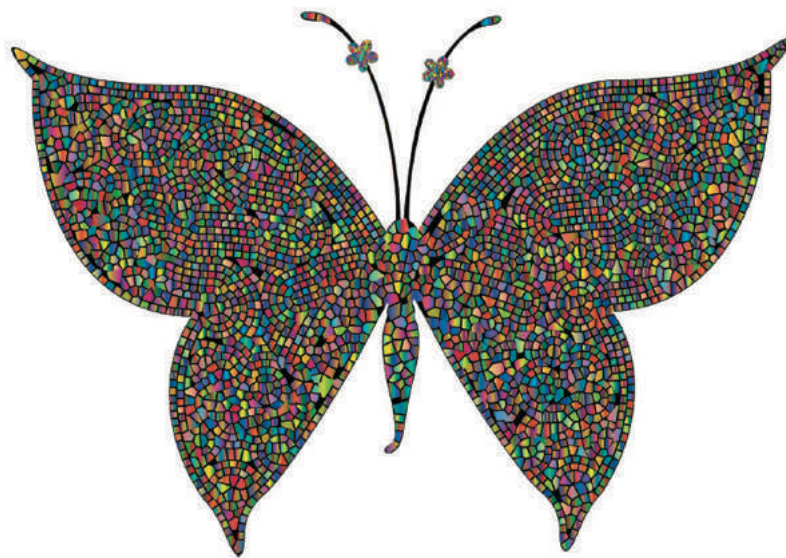
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Fractions as Quotients and Fraction Multiplication

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Student Workbook

Core Knowledge Mathematics™

Unit 2: Fractions as Quotients and Fraction Multiplication

At a Glance

Unit 2 is estimated to be completed in 17-19 days including 2 days for assessment.

This unit is divided into 3 sections including 15 lessons and 2 optional lessons.

- Section A - Fractions as Quotients (Lessons 1-5)
- Section B - Fractions of Whole Numbers (Lessons 6-8)
- Section C - Area and Fractional Side Lengths (Lessons 9-17)

On pages 10-11 of this Teacher Guide is a chart that identifies the section each lesson belongs in and the materials needed for each lesson.

This unit uses 6 new student centers.

- Rolling for Fractions
- Compare
- Target Measurements
- How Close?
- Rectangle Rumble
- Can You Build It

Lesson 1: Share Sandwiches

- Let's share sandwiches.

Warm-up: Which One Doesn't Belong: Sandwiches

Which one doesn't belong?

A



B



C



D



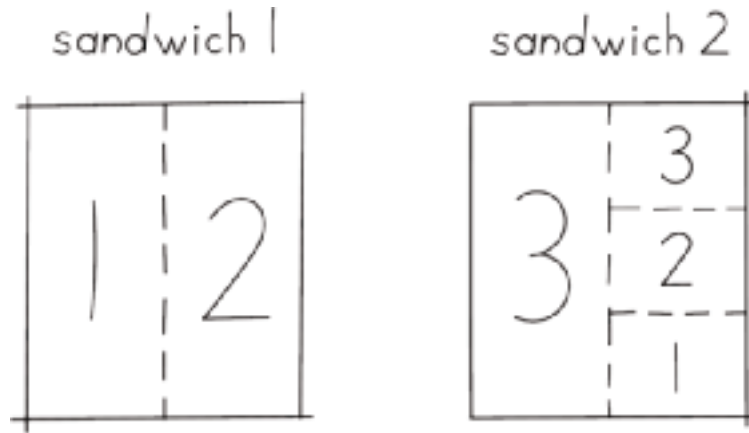
1.1: Share Sandwiches

_____ sandwiches are shared equally by _____ people.

1. Choose numbers to fill in the blanks. You can only use each number once: 2, 3, 5.
2. Represent the situation with a diagram or drawing.
3. Explain or show how you know that each person will get the same amount of sandwich.

1.2: The Same Amount

1. Han's work shows how 3 people could equally share 2 sandwiches.



How do you know that each person gets about the same amount of sandwich?
Explain or show your thinking. Organize it so it can be followed by others.

2. Draw a diagram to show a different way that 3 people could share 2 sandwiches so each person got about the same amount of sandwich.

Lesson 2: Share More Sandwiches

- Let’s use diagrams and expressions to represent division situations.

Warm-up: Estimation Exploration: Name that Fraction

The large rectangle represents 1. What fraction of the large rectangle is shaded?



Record an estimate that is:

| too low | about right | too high |
|---------|-------------|----------|
| | | |

2.1: One Sandwich

Jada's family made sandwiches to share at a family celebration. Complete the table to show how much sandwich each person gets.

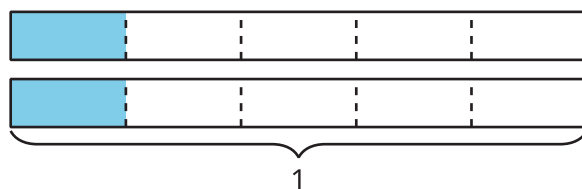


| sandwiches being shared | number of people sharing sandwiches | amount of sandwich each person gets | division expression |
|-------------------------|-------------------------------------|-------------------------------------|---------------------|
| 1 | 2 | | |
| 1 | 3 | | |
| 1 | 4 | | |
| 1 | 5 | | |

1. Choose one row from the table and represent your thinking with a diagram.

2. What patterns do you notice in the table?

2.2: Card Sort: Sandwich Match



Your teacher will give you a set of cards. Match each representation with a situation and expression. Some situations and expressions will have more than one matching representation.

Choose one set of matched cards.

1. Show or explain how the diagram(s) and expression represent the number of sandwiches being shared.

2. Show or explain how the diagram(s) and expression represent the number of people sharing the sandwiches.

3. How much sandwich does each person get in the situation?

Lesson 3: Interpret Equations

- Let's use equations to show the relationship between division and fractions.

Warm-up: What Do You Know About $\frac{3}{2}$?

What do you know about $\frac{3}{2}$?

3.1: Dehydrated Dancers



1. Three dancers share 2 liters of water. How much water does each dancer get? Write a division equation to represent the situation.
2. Mai said that each dancer gets $\frac{3}{2}$ of a liter of water because 3 divided into 2 equal groups is $\frac{3}{2}$. Do you agree with Mai? Show or explain your reasoning.

3.2: Interpret Expressions

1. Complete the table. Draw a diagram if it is helpful.

| number of dancers | liters of water | division expression | amount of water each dancer drank in liters |
|-------------------|-----------------|---------------------|---|
| 4 | 2 | | |
| | | $3 \div 4$ | |
| | | $3 \div 5$ | |
| 4 | | | |
| | 5 | | |

2. What patterns do you notice in the table?

Lesson 4: Division Situations

- Let's solve and represent division problems.

Warm-up: Number Talk: Division

Find the value of each expression mentally.

- $35 \div 7$

- $1 \div 7$

- $36 \div 7$

- $37 \div 7$

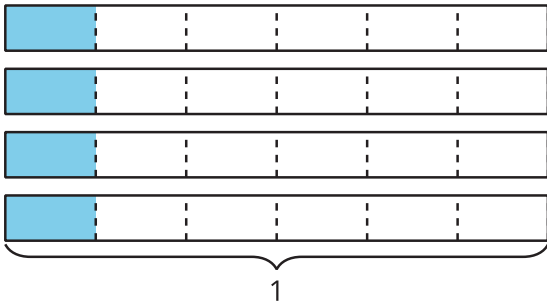
4.1: Pounds of Blueberries

- 1. Complete the missing parts of the table. Be prepared to explain your thinking.
- 2. Discuss both your solutions with your group. What is the same? What is different?

Partner A

| Equation | Situation |
|--------------------------|-----------|
| $4 \div 6 = \frac{4}{6}$ | |
| Diagram | |

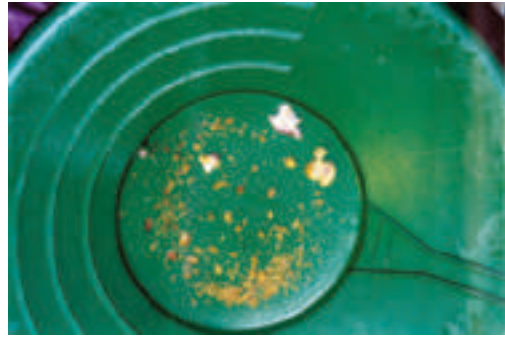
Partner B

| Equation | Situation |
|--|-----------|
| <div>Diagram</div> <div></div> | |

Partner C

| Equation | Situation |
|--------------------|---|
| | Six students share 4 pounds of blueberries. How many pounds of blueberries did each student get? |
| <div>Diagram</div> | |

4.2: Grams of Gold



1. A group of 3 friends spent the afternoon panning for gold. They shared the gold equally. If each friend got $\frac{4}{3}$ grams of gold, how much gold did they collect together? Explain or show your reasoning.

2. A group of friends spent the afternoon panning for gold. They shared the gold equally. If they collected 5 grams of gold together and each friend got $\frac{5}{6}$ grams of gold after they shared it, how many friends shared the gold? Explain or show your reasoning.

Lesson 5: Relate Division and Fractions

- Let's explain the relationship between division and fractions.

Warm-up: True or False: Interpret Fractions

Decide if each statement is true or false. Be prepared to explain your reasoning.

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

- $\frac{5}{2} = 5\frac{1}{2}$

- $\frac{6}{2} = 3$

5.1: Relate Pounds to People

| | Each person gets _____ pound(s) of blueberries. | | | |
|--|---|-------------------------------------|-------------------------------------|-------------------------------------|
| | more than 1 | exactly 1 | less than 1 | $\frac{1}{2}$ |
| _____ people share 7 pounds of blueberries | <input checked="" type="checkbox"/> | | | |
| _____ people share _____ pounds of blueberries | | <input checked="" type="checkbox"/> | | |
| Three people share _____ pounds of blueberries | | | <input checked="" type="checkbox"/> | |
| _____ people share _____ pounds of blueberries | | | | <input checked="" type="checkbox"/> |

1. Fill in the blanks to match the rules in the table.
2. How many pounds of blueberries did each person get when they got more than 1 pound of blueberries?
3. How many pounds of blueberries did each person get when they got less than 1 pound of blueberries?

(Pause for teacher directions.)

- Work with your group to make a poster that shows or explains your thinking about the questions below.
 - What is true about all of the pairs of numbers that were used when each person got less than 1 pound of blueberries?
 - What is true about all of the pairs of numbers that were used when each person got more than 1 pound of blueberries?
 - What is true about all of the pairs of numbers that were used when each person gets exactly $\frac{1}{2}$ pound of blueberries?

5.2: Why Does It Work?

1. What numbers can replace the question marks in each equation? Explain your reasoning.

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

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

(Pause for teacher directions.)

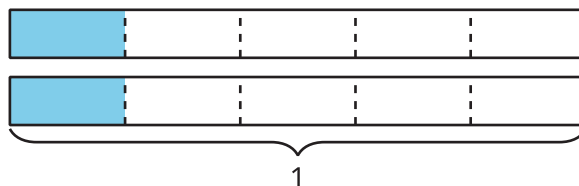
2. Work with your partner to explain why any division expression can be interpreted as a fraction. You can use diagrams, expressions, equations, and words.

Section Summary

Section Summary

We learned that there is a relationship between division and fractions.

We can see this relationship in diagrams, situations, and equations. This diagram represents 2 sandwiches being shared equally by 5 people. Each person will get $\frac{2}{5}$ of a sandwich. The equation, $2 \div 5 = \frac{2}{5}$ also represents the situation.



Lesson 6: Relate Division and Multiplication

- Let's explore the relationship between multiplication and division.

Warm-up: Number Talk: Multiply and Divide

Find the value of each expression mentally.

- $3 \times \frac{1}{2}$

- $3 \times \frac{2}{2}$

- $3 \times \frac{3}{2}$

- $5 \times \frac{3}{2}$

6.1: The Race



1. Lin and Han ran a 3 mile relay race as a team. They each ran the same distance. Draw a diagram to represent the situation.

2. Take turns describing to your partner how your diagrams represent the situation.
3. How far did each person run?

6.2: Where Do You See It?

Diagram A

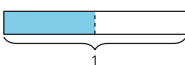
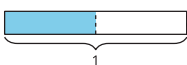
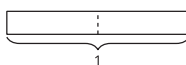
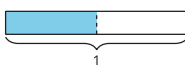
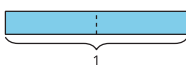


Diagram B



For each expression, choose one of the diagrams and describe how the diagram represents the expression. Be prepared to explain why you chose that diagram.

1. $3 \times \frac{1}{2}$

2. $3 \div 2$

3. $\frac{1}{2} \times 3$

Lesson 7: Divide to Multiply Unit Fractions

- Let’s solve problems about multiplying whole numbers by unit fractions.

Warm-up: Estimation Exploration: Number Line

What number is marked on the number line?



Record an estimate that is:

| too low | about right | too high |
|---------|-------------|----------|
| | | |

7.1: How Far Did They Run?

Solve each problem. Draw a diagram if it is helpful.

1. Mai ran $\frac{1}{4}$ the length of her road, which is 9 miles long. How far did Mai run?

2. Han ran $\frac{1}{4}$ the length of his road, which is 7 miles long. How far did Han run?

7.2: Match the Situation

Han, Lin, Kiran, and Jada together ran a 3 mile relay race. They each ran the same distance.

1. Find the expressions and diagrams that match this situation. Be prepared to explain your reasoning.

2. How far did each person run?

Lesson 8: Divide to Multiply Non-unit Fractions

- Let's solve problems about multiplying whole numbers by fractions.

Warm-up: True or False: A Fraction by a Whole Number

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $2 \times \left(\frac{1}{3} \times 6\right) = \frac{2}{3} \times 6$

- $2 \times \left(\frac{1}{3} \times 6\right) = 2 \times (6 \div 3)$

- $\frac{2}{3} \times 6 = 2 \times \left(\frac{1}{4} \times 6\right)$

8.1: Multiply a Whole Number by a Fraction

Find the value of each expression. Explain or show your reasoning. Draw a diagram if it is helpful.

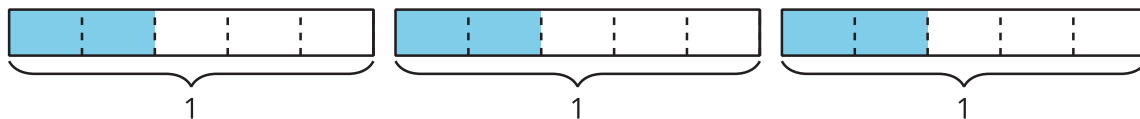
1. $\frac{1}{5} \times 3$

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

3. $\frac{3}{5} \times 3$

8.2: Match Expressions to Diagrams

Explain how each expression represents the shaded region.



1. $2 \times (3 \div 5)$

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

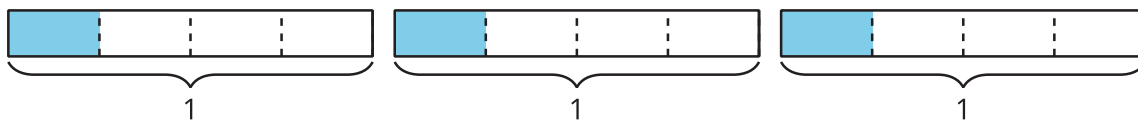
3. $3 \times \frac{2}{5}$

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

Section Summary

Section Summary

In this section, we explored the relationship between multiplication and division. We learned that 1 diagram can represent different multiplication and division expressions. For example, we can interpret this diagram with 4 different expressions:



- $\frac{3}{4}$ because each rectangle is divided into 4 equal parts and three of them are shaded.
- $3 \times \frac{1}{4}$ because there are 3 parts shaded and each one is $\frac{1}{4}$ of the rectangle.
- $3 \div 4$ because there are 3 rectangles and each one is divided into 4 equal parts.
- $\frac{1}{4} \times 3$ because there are 3 rectangles and $\frac{1}{4}$ of each one is shaded.

We know that all of these expressions are equal because they all represent the same diagram. We can use any of these expressions to represent and solve this problem:

- Mai ate $\frac{1}{4}$ of a 3 pound bag of blueberries. How many pounds of blueberries did Mai eat?

Lesson 9: Relate Area to Multiplication

- Let's explore the area of rectangles with one side length that is a unit fraction.

Warm-up: Which One Doesn't Belong: Area

Which one doesn't belong?

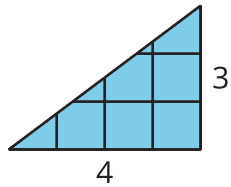
A



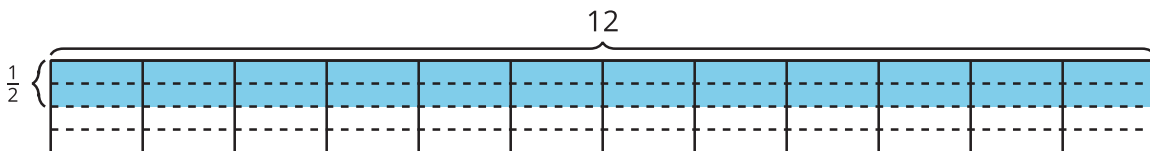
B



C



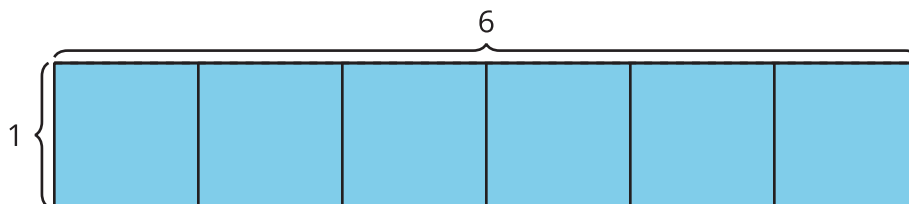
D



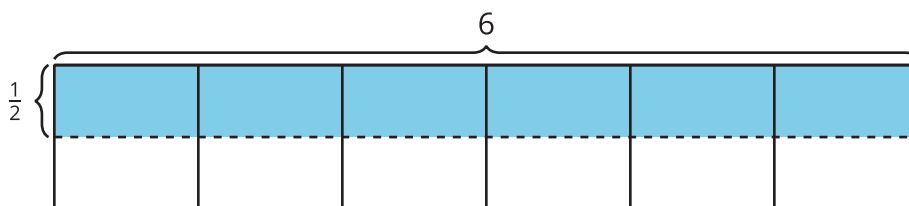
9.1: Find the Area

Find the area of the shaded region. Explain or show your reasoning.

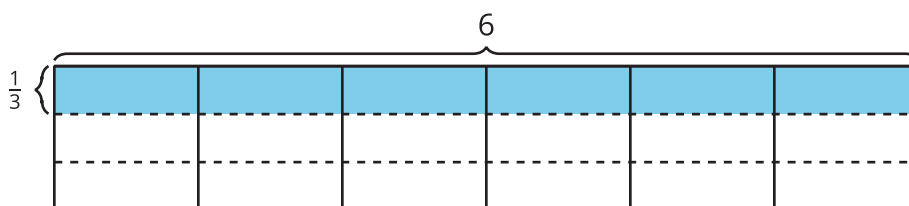
1.



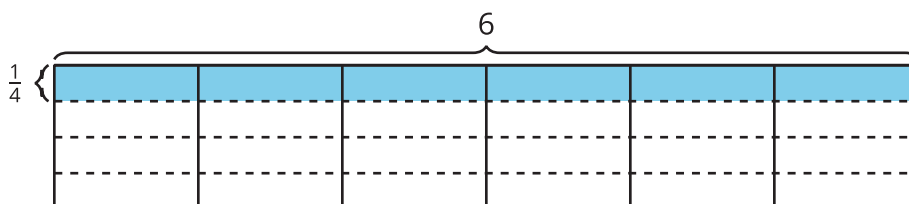
2.



3.



4.



9.2: Draw Rectangles

1. Represent each rectangle on grid paper:

- $\frac{1}{2}$ unit by 1 unit
- $\frac{1}{2}$ unit by 2 units
- $\frac{1}{2}$ unit by 3 units
- $\frac{1}{2}$ unit by 4 units

2. Find the area of each rectangle that you drew.

3. What information do you need to find the area of the shaded region?



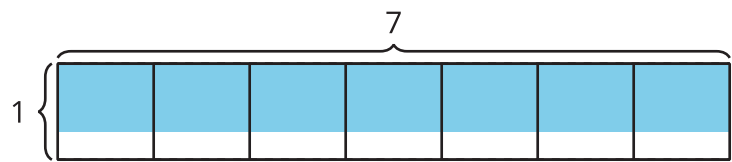
4. What might the area of the shaded region be? Explain or show your reasoning.

Lesson 10: Fractional Side Lengths Less Than 1

- Let’s find the area of rectangles with a fractional side length.

Warm-up: Estimation Exploration: What is the Area?

What is the area of the shaded region?



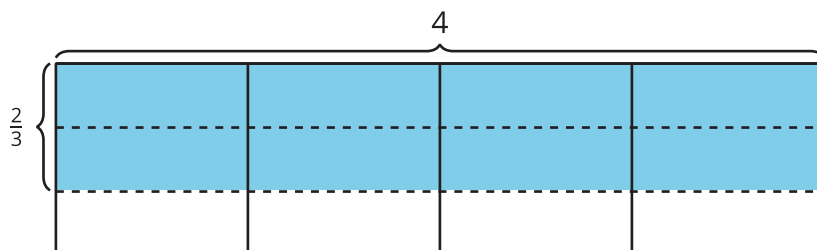
Record an estimate that is:

| too low | about right | too high |
|---------|-------------|----------|
| | | |

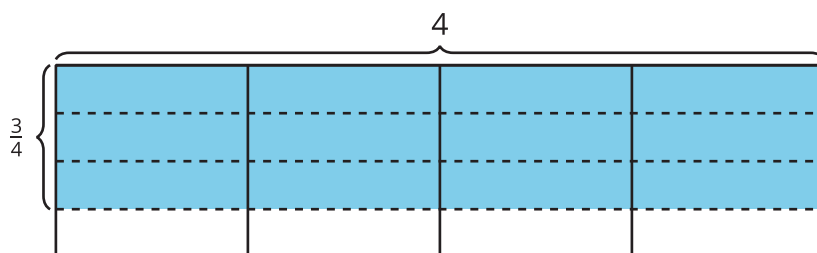
10.1: Rectangle With a Fractional Side Length

Write a multiplication expression to represent the area of each shaded region. Then find the area.

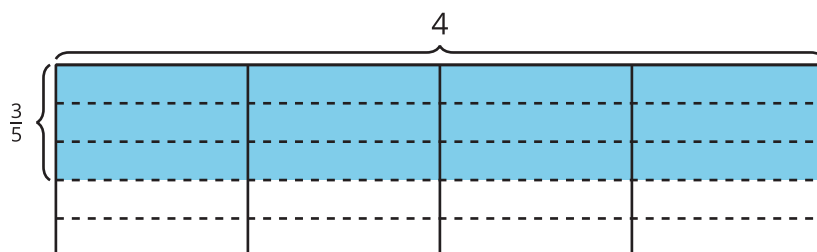
1.



2.

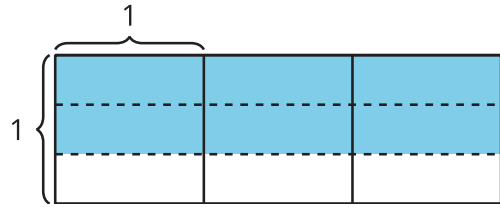


3.



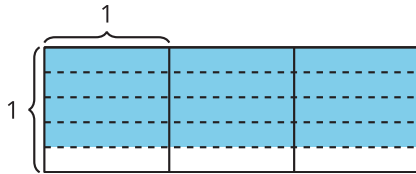
10.2: What Are the Side Lengths?

- Write a multiplication expression to represent the area of the shaded region.
What is the area?

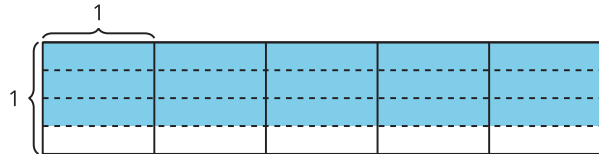


- Here are two diagrams. Consider each expression and decide whether it represents the shaded region in one of the diagrams. Be prepared to share your thinking.

X



Y



a. $\frac{3}{4} \times 5$

b. $3 \times \frac{3}{5}$

c. $3 \times 4 \times \frac{1}{5}$

d. $4 \times \frac{3}{4}$

e. $3 \times 3 \times \frac{1}{4}$

- For each diagram, what is the area?

Lesson 11: Fractional Side Lengths Greater Than 1

- Let's find the area of more rectangles.

Warm-up: True or False: Thirds

Decide if each statement is true or false. Be prepared to explain your reasoning.

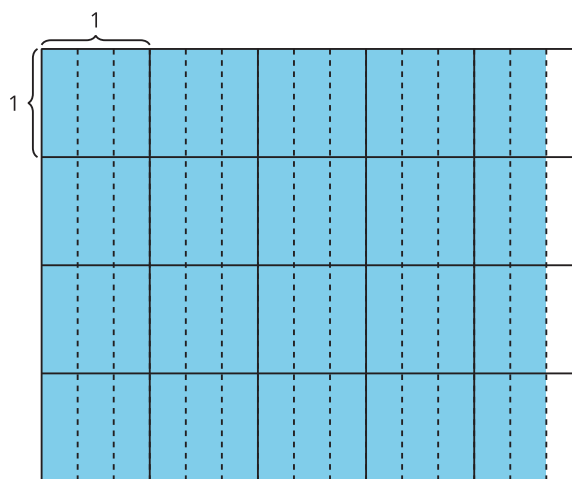
- $10 \div 3 = 10 \times \frac{1}{3}$

- $10 \div 3 = 10\frac{1}{3}$

- $\frac{10}{3} = 5 \times \frac{2}{3}$

11.1: Greater Than One

1. Find the area of the shaded region in square units. Explain or show your reasoning.



2. Select **all** the expressions which represent the area of the shaded region in square units. For each correct expression, explain your reasoning.

A. $4\frac{2}{3} \times 4$

B. $16 \times \frac{8}{3}$

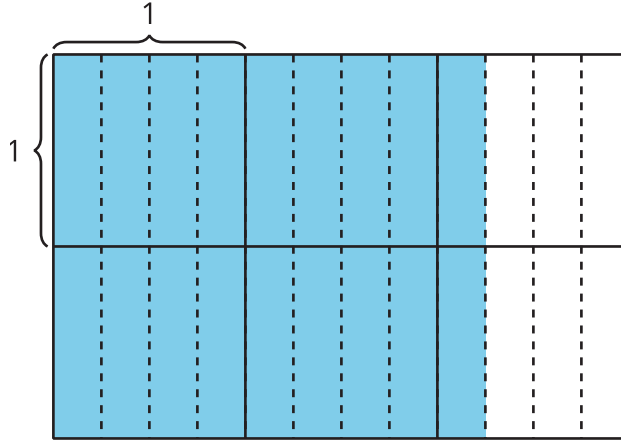
C. $\frac{14}{3} \times 4$

D. $\frac{56}{3}$

E. $4 \times \frac{5}{3}$

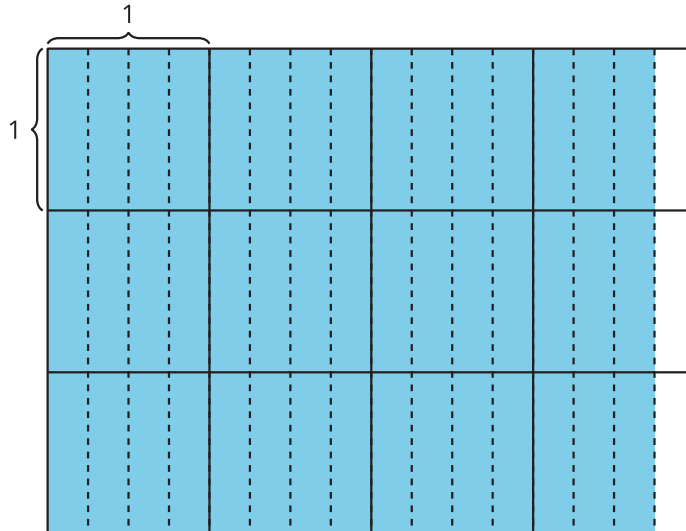
11.2: Diagrams and Expressions for Area

1. a. Write a multiplication expression to represent the area of the shaded region.



- b. What is the area of the shaded region?

2. a. Write a multiplication expression to represent the area of the shaded region.



- b. What is the area of the shaded region?

Lesson 12: Decompose Area

- Let's decompose rectangles to find their area.

Warm-up: Number Talk: Partial Products

Find the value of each expression mentally.

- 3×20

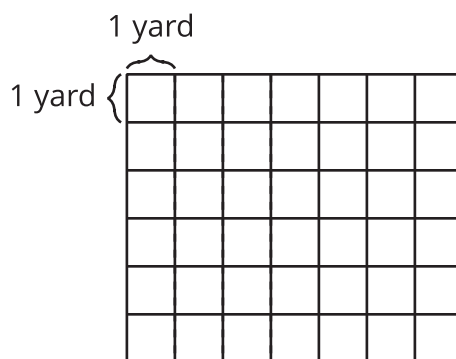
- 3×24

- 5×2

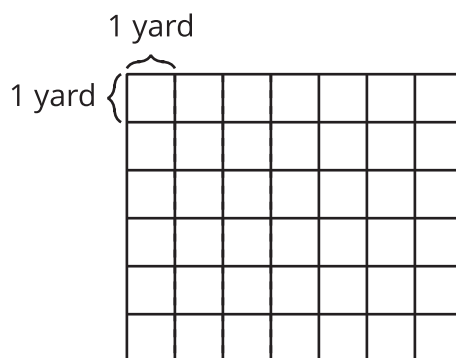
- $5 \times 2\frac{1}{2}$

12.1: Which Garden Is Larger?

1. Noah's garden is 5 yards by $6\frac{1}{4}$ yards. Draw a diagram of Noah's garden on the grid.



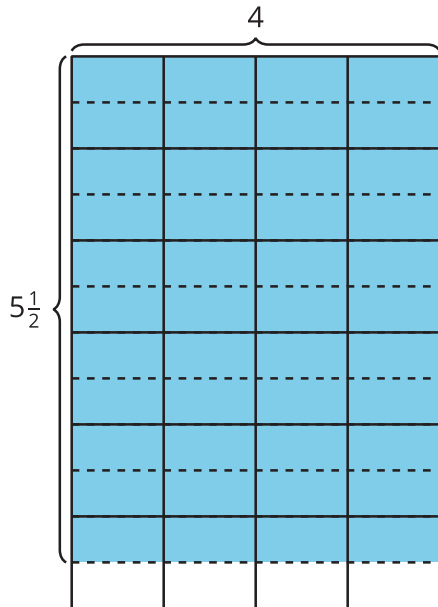
2. Priya's garden is 6 yards by $5\frac{1}{4}$ yards. Draw a diagram of Priya's garden on the grid.



3. Whose garden covers a larger area? Be prepared to explain your reasoning.

12.2: Different Ways to Find the Area

Partner A

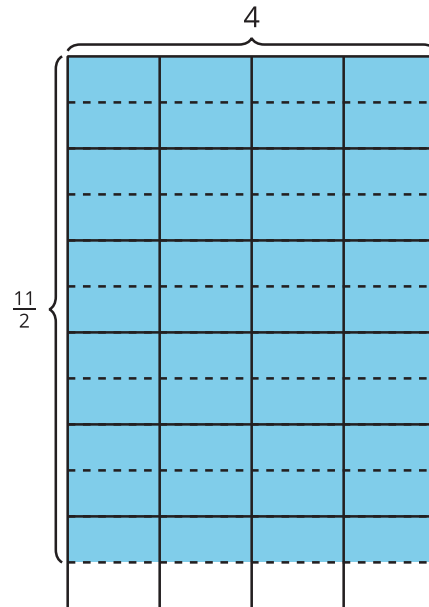


Jada: 4×5

Priya: $4 \times \frac{1}{2}$

Tyler: 6×4

Partner B



Clare: $\frac{10}{2} \times 4$

Diego: 4×6

Elena: 4×11

- Each problem shows the first step a student used to find the area of the shaded region. Explain how each student could finish their work to find the area and show your thinking on the diagram.

2. Share your response with your partner. What is the same? What is different?

Lesson 13: Area and Properties of Operations

- Let's write expressions to represent the area of rectangles.

Warm-up: Number Talk: Parentheses

Find the value of each expression mentally.

- $5 \times (7 + 4)$
- $(5 \times 7) + (5 \times 4)$
- $(5 \times 7) + (5 \times \frac{1}{4})$
- $(5 \times 7) - (5 \times \frac{1}{4})$

13.1: Card Sort: Diagrams and Expressions

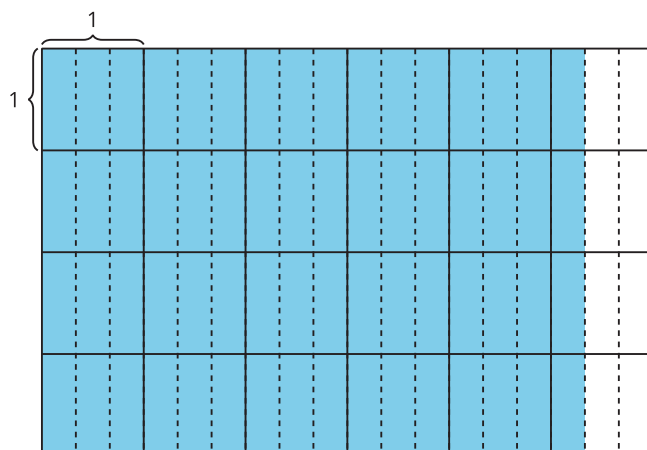
Your teacher will give you and your partner a set of cards.

1. Sort the cards in a way that makes sense to you.
2. Match each expression to an appropriate diagram. Some diagrams match more than one expression.
3. Work with your partner to find the area of each shaded region. Explain or show your reasoning.

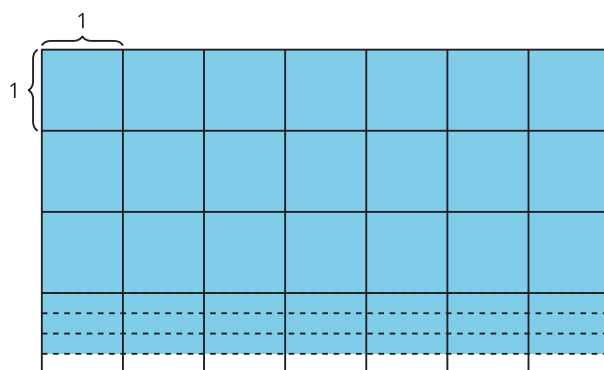
13.2: Write Expressions

Write as many expressions as you can to match the area of the shaded region in each diagram.

1.



2.



Lesson 14: Area Situations

- Let's apply what we've learned about fraction multiplication.

Warm-up: Number Talk: Multiply Fractions

Find the value of each expression mentally.

- $3 \times (10 \div 2)$

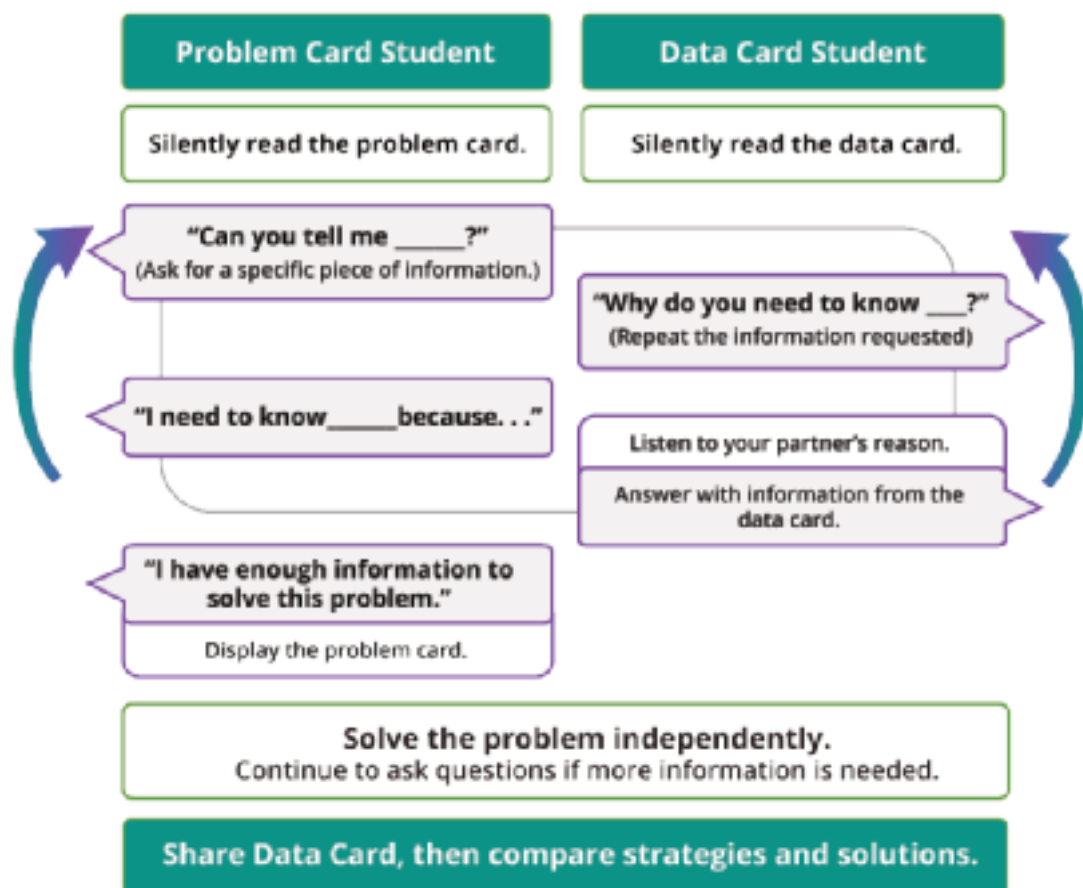
- $\frac{3}{2} \times 10$

- $\left(\frac{14}{7}\right) \times 10$

- $14 \times \frac{10}{7}$

14.1: Info Gap: Area

Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.



Pause here so your teacher can review your work. Ask your teacher for a new set of cards and repeat the activity, trading roles with your partner.

14.2: Fill in the Blank

Fill in the blanks to make each equation true. Be prepared to explain your reasoning.

1. $\frac{1}{3} \times 18 = \underline{\hspace{2cm}}$

2. $\frac{7}{9} \times \underline{\hspace{2cm}} = \frac{21}{9}$

3. $\frac{1}{15} \times \underline{\hspace{2cm}} = 2$

4. $9 \times 6\frac{2}{3} = \underline{\hspace{2cm}}$

5. $14\frac{99}{100} \times 10 = \underline{\hspace{2cm}}$

6. $7\frac{3}{5} \times 6 = \underline{\hspace{2cm}}$

7. $4 \times 6\frac{9}{10} = \underline{\hspace{2cm}}$

Lesson 15: Multiply More Fractions

- Let's multiply mixed numbers.

Warm-up: Number Talk: Multiply Mixed Numbers

Find the value of each expression mentally.

- $6 \times \frac{3}{8}$

- $6 \times 2\frac{3}{8}$

- $7 \times \frac{9}{10}$

- $7 \times 3\frac{9}{10}$

15.1: Multiply Your Way

Write numbers from the list in the blank spaces so the situations make sense. Each number will be used only one time. Be prepared to explain your thinking.

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

1. The area of the rug is $16\frac{1}{2}$ square feet. The length of the rug is _____ feet.

The width of the rug is _____ feet.

2. The puzzle is $2\frac{1}{2}$ feet wide. It is _____ feet long. It has an area of _____ square feet.

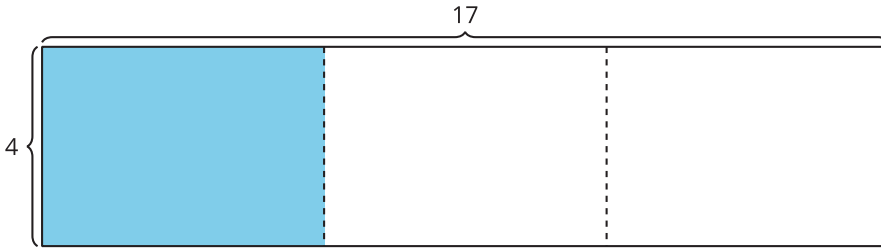
3. The area of the whiteboard is 23 square feet. The length of the whiteboard is _____ feet. The width of the whiteboard is _____ feet.

Share your solutions with your partner. Explain what choices you made and why.

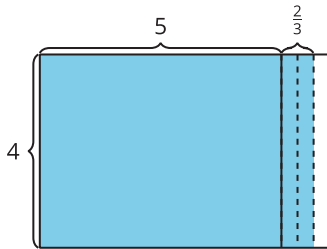
15.2: Equivalent Expressions

Each diagram represents a way to calculate $4 \times 5\frac{2}{3}$. Each expression is equivalent to $4 \times 5\frac{2}{3}$. Match the diagrams and expressions. Show or explain your reasoning.

A

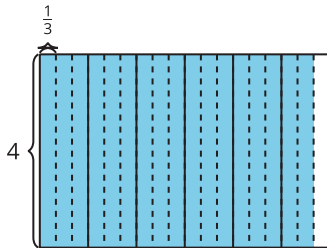


B



1. $(4 \times 5) + (4 \times \frac{2}{3})$

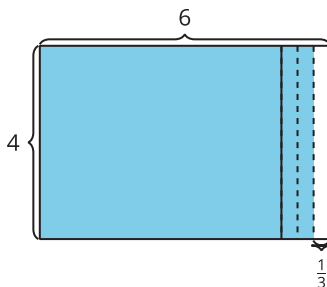
C



2. $(4 \times 6) - (4 \times \frac{1}{3})$

3. $4 \times \frac{17}{3}$

D



4. $(4 \times 17) \div 3$

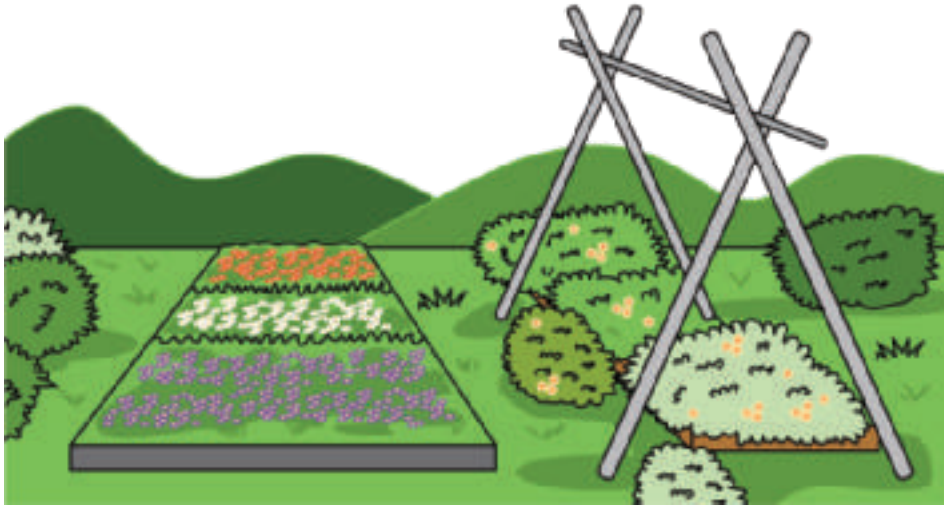
Choose your favorite diagram and expression to find the value of $4 \times 5\frac{2}{3}$. Explain why it is your favorite.

Lesson 16: Estimate Products

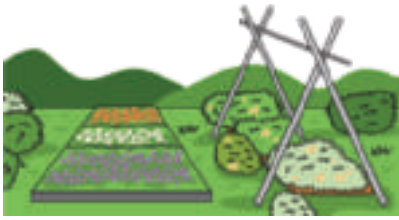
- Let's estimate products of a whole number and a fraction.

Warm-up: Notice and Wonder: Garden Size

What do you notice? What do you wonder?



16.1: Priya's Garden



Priya has enough materials to build a garden that is 36 square feet.

Choose **all** the side lengths that are reasonable for her garden. Be prepared to explain your thinking to your partner.

1. 9 feet by $4\frac{2}{3}$ feet

2. 9 feet by $3\frac{8}{9}$ feet

3. 12 feet by $2\frac{11}{12}$ feet

4. 9 feet by $2\frac{2}{3}$ feet

16.2: Too High, Too Low, Just About Right

1. Write a whole number product that is slightly less than, slightly greater than, or about equal to the value of $7 \times 12\frac{8}{9}$.

a. slightly less:

b. slightly greater:

c. just right:

2. Write a whole number product that is slightly less than, slightly greater than, or about equal to the value of $9 \times 4\frac{2}{29}$.

a. slightly less:

b. slightly greater:

c. just right:

3. Without calculating, use the numbers 2, 3, 5, 6, and 7, to complete the expression with a value close to 20.

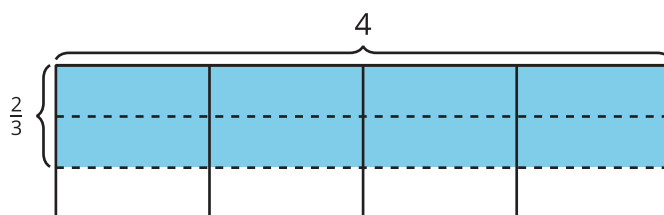
$$\underline{\quad} \times \underline{\quad} \frac{\boxed{\quad}}{\boxed{\quad}}$$

4. Explain how you know your expression represents a value close to 20.

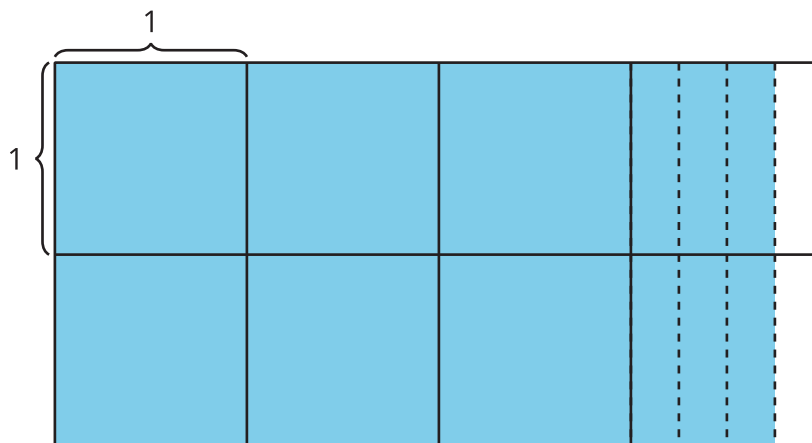
Section Summary

Section Summary

In this section, we learned how to find the area of a rectangle with a fractional side length. The shaded region has an area of $4 \times \frac{2}{3}$ because there are 4 groups of $\frac{2}{3}$ of a square unit shaded. The area is $\frac{8}{3}$ or $2\frac{2}{3}$ because there are 8 shaded parts and each one is $\frac{1}{3}$ of a square unit.



We also learned to multiply a mixed number by a whole number. We used area diagrams and expressions to see why our strategies work. For example, to solve $3\frac{3}{4} \times 2$, we can use the expression $(3 \times 2) + (\frac{3}{4} \times 2)$. We can see both of these expressions in the diagram.



Lesson 17: Mosaic Pictures

- Let's make a mosaic.

Warm-up: Notice and Wonder: Mosaic

What do you notice? What do you wonder?



17.1: Create a Mosaic

1. Use the colored paper and scissors to cut identical rectangles. Make sure the measurement of one side of the rectangle is a whole number and the other is a fraction greater than 1.
2. What is the area of one of your rectangles? Show your reasoning.
3. Use the rectangles from your group to make a group mosaic by arranging some of the different colored rectangles on a blank piece of paper.

17.2: Cost of Mosaic

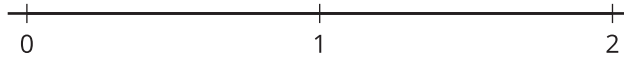
About how much would it cost to create your mosaic with your preferred material?
Explain or show your reasoning.

| Material | Cost per square unit |
|----------|----------------------|
| Stone | \$5 |
| Tile | \$3 |
| Glass | \$2 |

Section A: Practice Problems

1. Pre-unit

a. Locate $\frac{6}{4}$ on the number line.



b. Explain or show why your point represents $\frac{6}{4}$.

2. Pre-unit

Shade $\frac{3}{4}$ of the rectangle. Explain or show your reasoning.



3. Pre-unit

Explain or show why $\frac{4}{3} = 4 \times \frac{1}{3}$.

4. Pre-unit

Each workbook is $\frac{3}{8}$ inch thick. How many inches thick is a stack of 5 workbooks?

Explain or show your reasoning.

5. Pre-unit

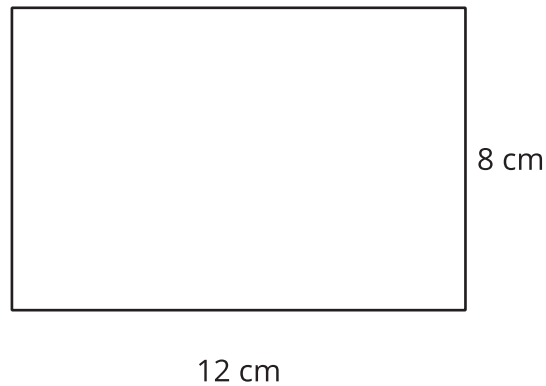
a. There are 36 fish in 4 aquariums. There are the same number of fish in each aquarium. How many fish are in each aquarium? Show or explain your reasoning.

b. There are 24 dogs at a shelter. There are 4 times as many dogs as cats at the shelter. How many cats are there at the shelter? Show or explain your reasoning.

6. Pre-unit

A bottle holds $\frac{7}{10}$ liter of water. How much water do 6 bottles hold? Explain or show your reasoning.

7. Pre-unit



What is the area of the rectangle? Explain or show your reasoning.

8. a. 3 students equally share 18 sheets of construction paper for an art project. How many sheets of paper does each student get? Explain or show your reasoning.
- b. 3 students equally share 1 tube of glue for an art project. How much glue does each student get? Explain or show your reasoning.

(From Unit 2, Lesson 1.)

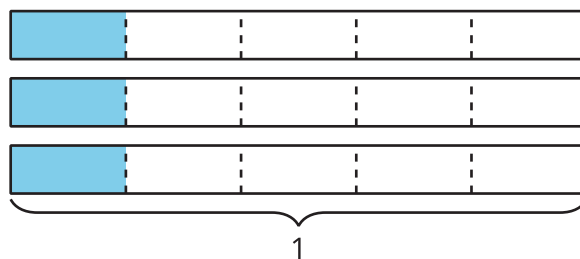
9. a. 4 hikers equally share 3 liters of water. How many liters of water does each hiker drink? Explain or show your reasoning.
- b. 4 hikers equally share 5 liters of water. How many liters of water does each hiker drink? Explain or show your reasoning.

(From Unit 2, Lesson 2.)

10. a. Jada cuts an 11 inch strip of paper into 5 equal parts. How many inches long is each part?

- b. Jada cuts a strip of paper into 5 equal parts. Each part is $\frac{7}{5}$ inches long. How long was the strip of paper?

(From Unit 2, Lesson 3.)



11. a. Describe a situation that the diagram could represent.

- b. Write an equation that represents the diagram and the situation.

(From Unit 2, Lesson 4.)

12. Decide whether each equation is true or false. Explain or show your reasoning.

a. $3 \div 7 = \frac{3}{7}$.

b. $18 \div 5 = \frac{5}{18}$.

c. $15 \div 6 = 2\frac{1}{2}$.

(From Unit 2, Lesson 5.)

13. Exploration

- a. Describe a situation in the classroom or at home where you share something equally with your classmates or family that results in fractional size parts.

- b. Draw a picture to represent the situation.

- c. Write a division equation to represent the situation.

14. Exploration

Elena is traveling to visit her grandparents who live 125 miles away.

a. Elena stops for lunch $\frac{2}{3}$ of the way. How far has Elena traveled? Explain or show your reasoning.

b. Elena enters the city where her grandmother lives after 110 miles. Is she more or less than $\frac{9}{10}$ of the way there? Explain or show your reasoning.

15. Exploration

a. Describe a situation that represents the equation $4 \div 6 = \frac{4}{6}$.

b. Draw a diagram to represent the situation.

Section B: Practice Problems

1. Han cuts a 15-foot piece of rope into 4 equal parts. Decide whether each expression represents the length of each part of the rope in feet. Explain or show your reasoning.

a. $15 \div 4$

b. 4×15

c. $3\frac{3}{4}$

(From Unit 2, Lesson 6.)

2. Find the value of each expression.

a. $\frac{1}{2} \times 6$

b. $\frac{1}{7} \times 6$

c. $\frac{1}{8} \times 11$

d. $\frac{1}{3} \times 34$

(From Unit 2, Lesson 7.)

3. a. Kiran ran $\frac{1}{5}$ the length of his road, which is 9 miles long. How far did Kiran run? Show or explain your thinking.

(From Unit 2, Lesson 8.)

4. Exploration

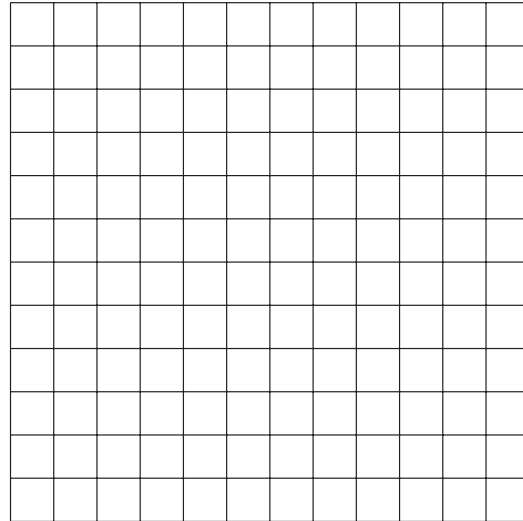


- a. Each square on the map represents 2,178 square feet. Make an estimate for the number of square feet shown on the map. Explain or show your reasoning.
- b. Each square represents $\frac{1}{20}$ acre of actual land. How many square feet are in an acre? Explain or show your reasoning.

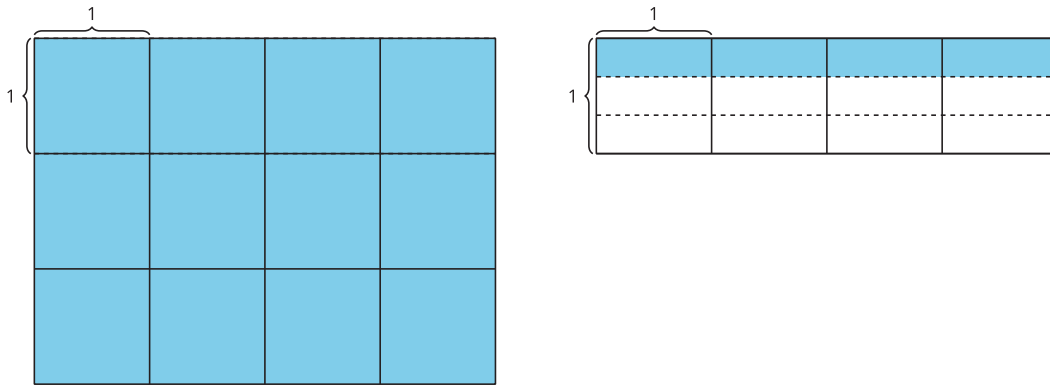
5. Exploration

A standard rectangular sheet of paper measures $8\frac{1}{2}$ inches in width and 11 inches in length. How many square inches are there in a sheet of paper?

If you get stuck, consider using the grid.



Section C: Practice Problems



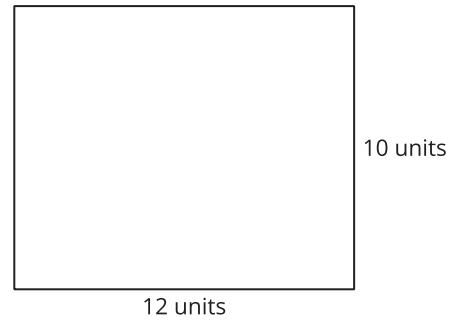
1.

a. How are the diagrams the same? How are they different?

b. How is finding the area of the shaded region the same? How is it different?

(From Unit 2, Lesson 9.)

2. a. What is the area of this rectangle? Explain or show your reasoning.



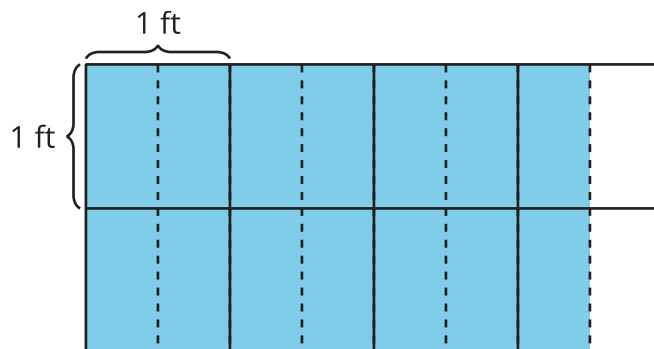
- b. What is the area of the shaded region? Explain or show your reasoning.



- c. How are these two area calculations the same? How are they different?

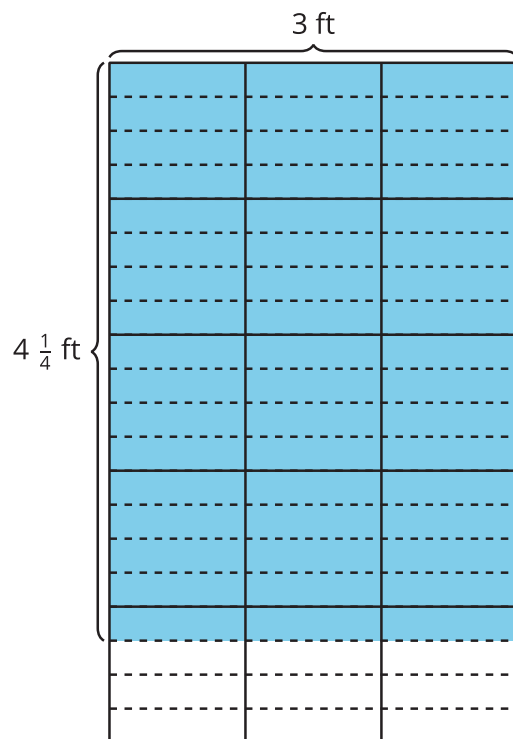
(From Unit 2, Lesson 10.)

3. The shaded part of this diagram shows the top of a stove. What is the area of the stove top? Explain or show your reasoning.



(From Unit 2, Lesson 11.)

4. Find the area of the shaded region. Explain or show your reasoning.



(From Unit 2, Lesson 12.)

5. Select **all** of the expressions that represent the shaded area in square feet.

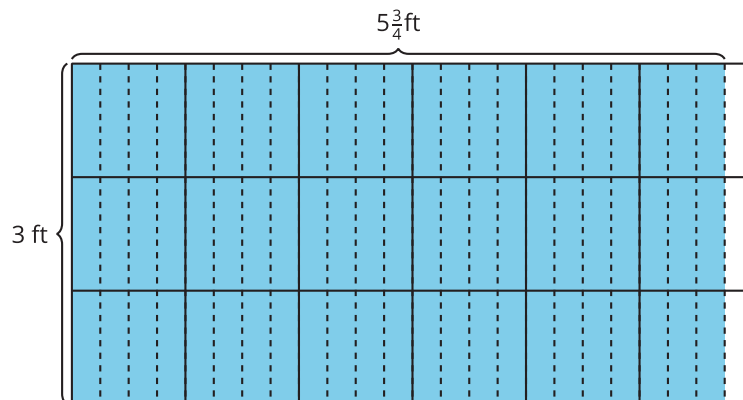
A. $3 + 5\frac{3}{4}$

B. $3 \times 5\frac{3}{4}$

C. $3 \times (5 + \frac{3}{4})$

D. $(3 \times 5) + \frac{3}{4}$

E. $3 \times 6 - (3 \times \frac{1}{4})$



Write one more expression that represents the shaded area.

(From Unit 2, Lesson 13.)

6. Tyler says that $9\frac{11}{12} \times 5$ is a little less than 50.

a. Do you agree with Tyler? Explain or show your reasoning.

b. What is the value of $9\frac{11}{12} \times 5$?

(From Unit 2, Lesson 16.)

7. A banner at a sporting event is 8 feet long and $2\frac{1}{3}$ feet wide.

a. Sketch and label a diagram of the banner.

b. Find the area of the banner.

(From Unit 2, Lesson 14.)

8. Evaluate each expression. Explain or show your reasoning.

a. $3\frac{2}{5} \times 10$

b. $8 \times \frac{14}{3}$

c. $3\frac{41}{100} \times 5$

(From Unit 2, Lesson 15.)

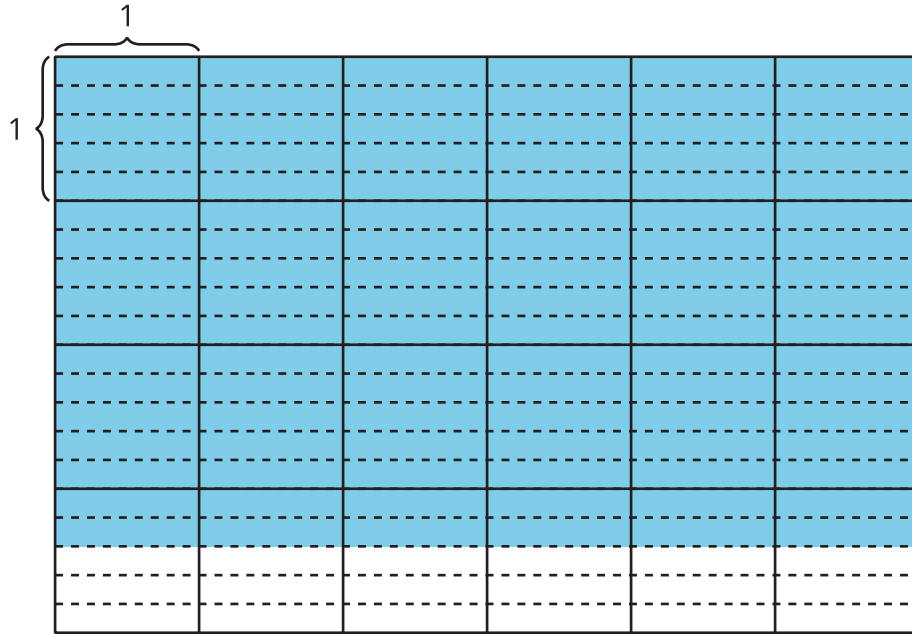
9. Exploration

a. A regular sheet of paper is $8\frac{1}{2}$ inches wide and 11 inches long. How many times would you need to fold the sheet of paper in half before the area is less than 1 square inch? Explain or show your reasoning.

b. A piece of chart paper is 23 inches wide by 33 inches long. How many times would you need to fold it in half before its area is less than 1 square inch?

10. Exploration

Part of the rectangle is shaded.



a. Write a multiplication expression that represents the shaded area.

b. Write a division expression that represents the shaded area.

c. Write any other expressions that represent the shaded area.

11. Exploration

This is a picture of the Empire State Building:



The base of the Empire State Building is a rectangle. What do you think the area of the rectangle is in square meters?

a. Make an estimate that is too small.

b. Make an estimate that is too large.

c. The length of the rectangle is $129\frac{1}{5}$ meters. The width is 57 meters. What is the area of the base of the Empire State Building?

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