Name _____

Solve

Step Up to Grade 5

Lesson 1
Understand Decimal Place Value

I can ...
read and write decimals in different ways.

Content Standard 5.NBT.A.3a
Mathematical Practices MP.1, MP.2, MP.4, MP.7, MP.8

Solve & Share

A runner won a 100-meter race with a time of 9.85 seconds. How can you use place value to explain this time? Complete a place-value chart to show this time.

Generalize
You can use what you know about whole-number place value to help you understand decimal place value.

Look Back! **MP.7 Use Structure** In the decimal 9.85, what is the value of the 8? the value of the 5?

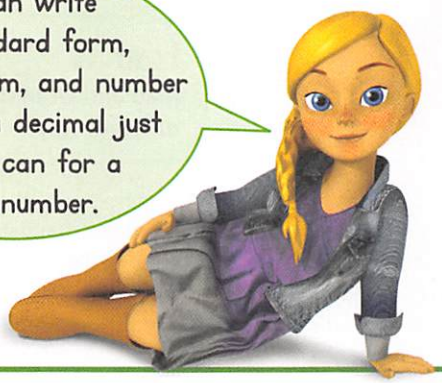
Learn Glossary A-Z

Essential Question

How Can You Represent Decimals?

A

Jo picked a seed from her flower. The seed has a mass of 0.245 gram. What are some different ways you can represent 0.245?



B

ones		tenths	hundredths	thousandths
0	•	2	4	5

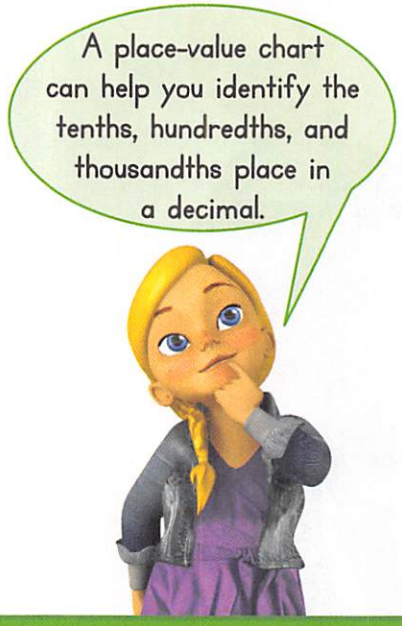
Standard Form: 0.245

The 5 is in the thousandths place. Its value is 0.005.

Expanded Form:

$$\left(2 \times \frac{1}{10}\right) + \left(4 \times \frac{1}{100}\right) + \left(5 \times \frac{1}{1{,}000}\right)$$

Number Name: two hundred forty-five thousandths



Convince Me! **MP.2 Reasoning** How many hundredths are in one tenth? How many thousandths are in one hundredth? Tell how you know.

Name _____

Tools Assessment

Another Example

Equivalent decimals name the same amount.

What are two other decimals equivalent to 1.4?

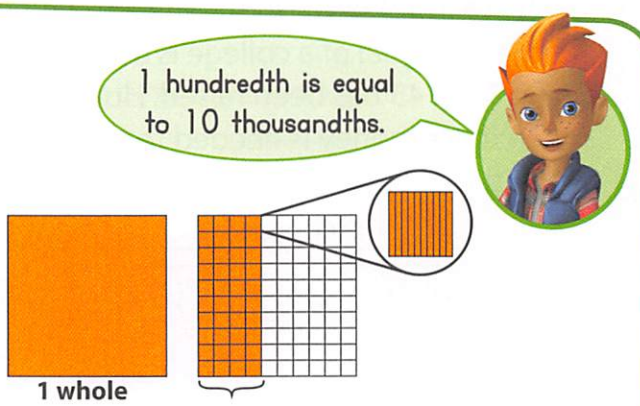
One and four tenths is the same as one and forty hundredths.

$$1.4 = 1.40$$

One and four tenths is the same as one and four hundred thousandths.

$$1.4 = 1.400$$

So, $1.4 = 1.40 = 1.400$.



Guided Practice

Do You Understand?

1. **MP.2 Reasoning** The number 2.452 has two 2s. Why does each 2 have a different value?

Do You Know How?

For **2–3**, write each number in standard form.

2. $5 + 0.5 + 0.03 + 0.006$

3. two and sixty-nine thousandths

Independent Practice

For **4–6**, write each number in standard form.

4. $(3 \times 1) + \left(6 \times \frac{1}{100}\right)$

5. $(7 \times 1) + \left(3 \times \frac{1}{10}\right) + \left(4 \times \frac{1}{1{,}000}\right)$

6. five and twenty hundredths

For **7–10**, write two decimals that are equivalent to the given decimal.

7. 3.300

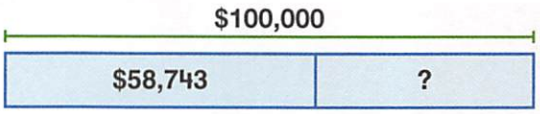
8. 9.1

9. 9.60

10. 4.400

Math Practices and Problem Solving

11. **MP.4 Model with Math** The annual fundraising goal of a college is $100,000. So far $58,743 has been raised. How much more money is needed to reach the goal?

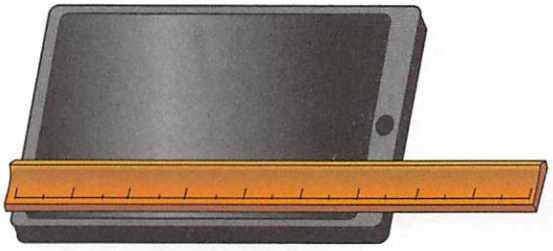


12. Trisha has a ribbon that measures $\left(5 \times \frac{1}{10}\right) + \left(3 \times \frac{1}{100}\right) + \left(5 \times \frac{1}{1{,}000}\right)$ meter. How can this measurement be written as a decimal?

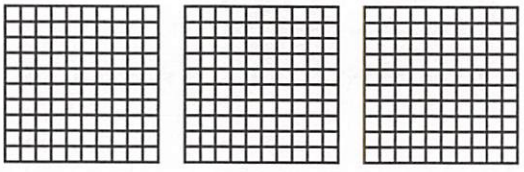
13. **MP.2 Reasoning** How can you tell that 4.620 and 4.62 are equivalent decimals?

14. **MP.1 Make Sense and Persevere** During a sports assembly, 0.555 students wore something blue. The rest of the students wore something red. If there were 1,000 students at the assembly, how many were wearing blue? How many red?

15. Collette incorrectly placed the decimal point when she wrote 0.065 inch for the width of her tablet. What is the correct decimal number for the width?



16. **Higher Order Thinking** Meg shades 1 whole and $\frac{1}{10}$, Corky shades $\frac{1}{2}$, and Derek does not shade a grid. Shade the grids to show the fractions. What decimal represents the amount each student shades?



Common Core Assessment

17. Find two decimals that are equivalent to $(6 \times 10) + \left(5 \times \frac{1}{100}\right)$. Write the decimals in the box.

60.5	60.05	6.5	60.050	6.50	60.50

Name _____

Solve

Step Up to Grade 5

Lesson 2
Compare Decimals

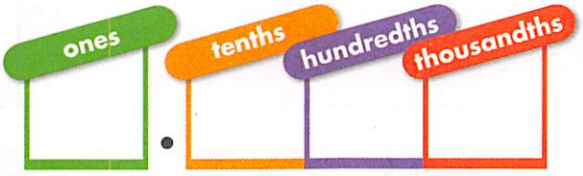
I can ...
compare decimals to the thousandths.

© Content Standard 5.NBT.A.3b
Mathematical Practices MP.3, MP.6, MP.7

Solve & Share

The lengths of three ants were measured in a laboratory. The lengths were 0.521 centimeter, 0.498 centimeter, and 0.550 centimeter. Which ant was the longest? Which ant was the shortest?

How can you use structure to compare and order the decimals? Tell how you decided.



Look Back! © **MP.6 Be Precise** What are the lengths of the ants in order from least to greatest?

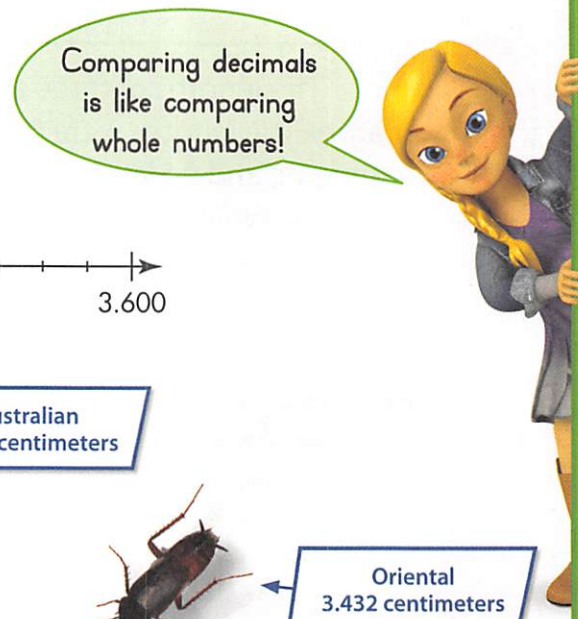
Learn Glossary

Essential Question

How Can You Compare Decimals?

A

Scientists collected and measured the lengths of different cockroach species. Which cockroach had the greater length, the American or the Oriental cockroach?



B Step 1

Line up the decimal points.

Start at the left.

Compare digits of the same place value.

3.576

3.432

C Step 2

Find the first place where the digits are different.

3.576

3.432

D Step 3

Compare.

$5 > 4$

$0.5 > 0.4$

So, $3.576 > 3.432$.

The American cockroach is longer than the Oriental cockroach.

Convince Me! **MP.3 Critique Reasoning** Valerie said, "12.68 is greater than 12.8 because 68 is greater than 8." Is she correct? Explain.

Name _____

Tools Assessment

Another Example

Order the cockroaches from least to greatest length.

Step 1

Write the numbers, lining up the decimal points. Start at the left. Compare digits of the same place value.

3.576
3.432
3.582

3.432 is the least.

Step 2

Write the remaining numbers, lining up the decimal points. Start at the left. Compare.

3.576
3.582

3.582 is greater than 3.576.

Step 3

Write the numbers from least to greatest.

3.432 3.576 3.582

From least to greatest lengths are the Oriental, the American, and the Australian.

Guided Practice

Do You Understand?

1. **MP.3 Critique Reasoning**
Scientists measured a Madeira cockroach and found it to be 3.44 centimeters long. Toby says that the Madeira is shorter than the Oriental because 3.44 has fewer digits than 3.438. Is he correct? Explain.

Do You Know How?

For **2–3**, write $>$, $<$, or $=$ for each ◯.

2. 2.345 ◯ 3.509 **3.** 7.317 ◯ 7.203

For **4–5**, order the decimals from least to greatest.

4. 4.540, 4.631, 4.625

5. 0.575, 1.429, 1.35, 0.593

Independent Practice

For **6–8**, compare the two numbers. Write $>$, $<$, or $=$ for each ◯.

6. 0.790 ◯ 0.79 **7.** 5.783 ◯ 4.692 **8.** 6.717 ◯ 6.718

For **9–10**, order the decimals from greatest to least.

9. 606.314, 606.219, 616.208

10. 234.639, 219.646, 234.630

Math Practices and Problem Solving

11. **MP.3 Critique Reasoning** Explain why it is not reasonable to say that 6.24 is less than 6.231 because 6.24 has fewer digits after the decimal point than 6.231.

12. **Number Sense** Krystal wrote three numbers between 0.63 and 0.64. What numbers could Krystal have written?

13. **Vocabulary** Write an *equivalent decimal* for each given decimal.

0.85 _____

1.6 _____

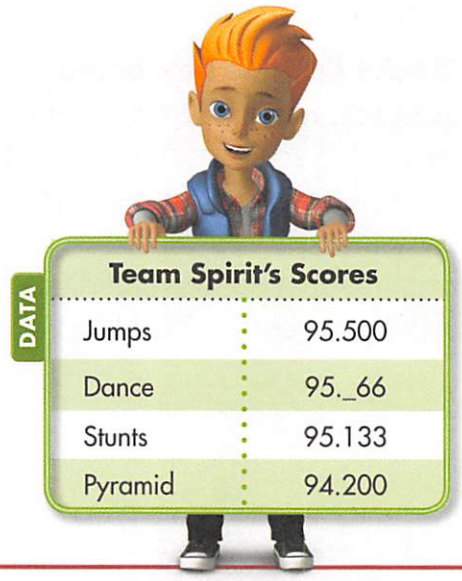
2.07 _____

1.02 _____

14. Is 0.6 greater than or less than $\frac{7}{10}$? Draw a number line to show your answer.

15. **Higher Order Thinking** Team Spirit's cheerleading scores were posted on the scoreboard in order from highest to lowest score. One digit in the team's dance score is not visible. List all the possible digits for the missing number.

16. Team Extreme's jumps score is 95.050. How does it compare to Team Spirit's jumps score?



Common Core Assessment

17. A grain of fine sand can have a diameter of 0.120 millimeter. Which numbers are less than 0.120?

- ☐ 0.1
- ☐ 0.10
- ☐ 0.121
- ☐ 0.122
- ☐ 0.126

18. Kara weighed some oranges at the grocery store. The oranges weighed 4.16 pounds. Which numbers are greater than 4.16?

- ☐ 4.15
- ☐ 4.19
- ☐ 4.2
- ☐ 4.24
- ☐ 4.26

Name _____

Solve

Step Up to Grade 5

Lesson 3
Use Models to Add and Subtract Decimals

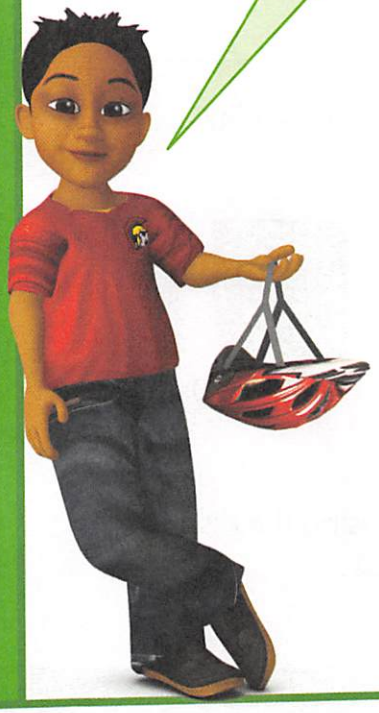
I can ...
model sums and differences of decimals.

Content Standard 5.NBT.B.7
Mathematical Practices MP.1, MP.3, MP.4, MP.5

Solve & Share

Gloria rode her bicycle 0.75 mile in the morning and 1.10 miles in the afternoon. How many miles did Gloria ride in all? ***Solve this problem any way you choose.***

You can use appropriate tools, such as decimal grids, to help determine how many miles Gloria rode.



Look Back! **MP.1 Make Sense and Persevere** How can you check that your answer is correct?

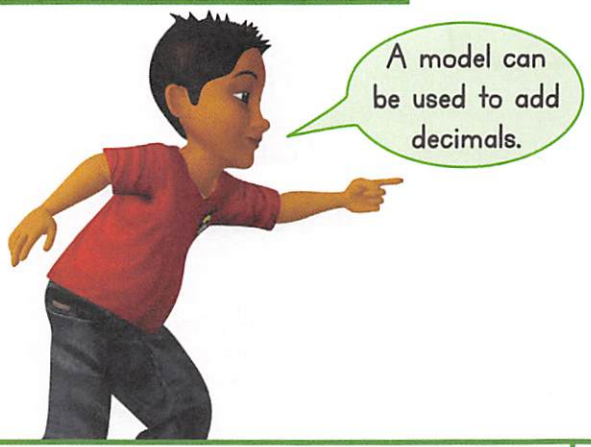
Learn Glossary

Essential Question

How Can You Use Grids to Add Decimals?

A

Use the table at the right to find the total monthly cost of using the dishwasher and the DVD player.

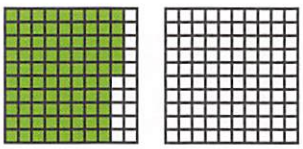


DATA

Device	Monthly Cost
DVD player	$0.40
Microwave oven	$3.57
Ceiling light	$0.89
Dishwasher	$0.85

B Use hundredths grids to add $0.85 + $0.40.

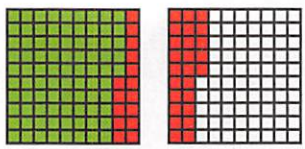
It costs $0.85 to use the dishwasher per month.



Shade 85 squares to show $0.85.

C It costs $0.40 to use the DVD player per month.

Use a different color and shade 40 more squares to show $0.40. Count all of the shaded squares to find the sum.



$0.85 + $0.40 = $1.25

The monthly cost of using the dishwasher and DVD player is $1.25.

Convince Me! **MP.3 Critique Reasoning** For the example above, Jesse said, "The total monthly cost of using the ceiling light and the dishwasher was $0.74." Is Jesse correct? Explain.

Name _____

Tools Assessment

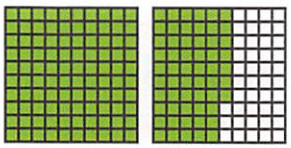
Another Example

You can subtract decimals with grids.

Use hundredths grids to find 1.57 − 0.89.

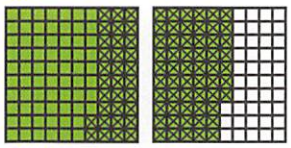
Step 1

Shade 1 grid and 57 squares to show 1.57.



Step 2

Cross out 8 columns and 9 squares of the shaded grid. The difference is the squares that are shaded but not crossed out.



1.57 − 0.89 = 0.68

Guided Practice

Do You Understand?

1. **MP.4 Model with Math** Explain how to use grids to find the difference between the monthly cost of using the DVD player and the dishwasher. Then find the difference.

Do You Know How?

For **2–7**, use hundredths grids to add or subtract.

2. 1.45 + 0.37

3. 0.89 + 0.41

4. 4.89 − 0.94

5. $1.45 − $0.76

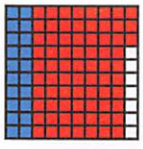
6. 0.41 − 0.37

7. 2.28 + 0.6

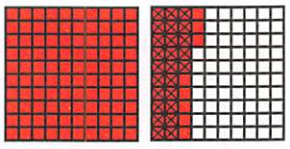
Independent Practice

For **8–11**, add or subtract. Use hundredths grids to help.

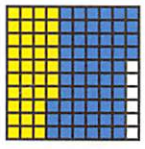
8. 0.2 + 0.73



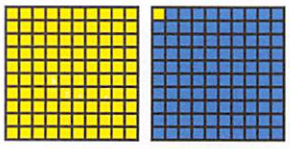
9. $1.33 − $0.25



10. $0.37 + $0.57



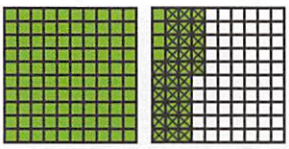
11. 1.01 + 0.99



Math Practices and Problem Solving

12. **MP.3 Construct Arguments** How is adding 5.51 + 2.31 similar to adding $2.31 + $5.51?

13. **MP.4 Model with Math** Write an expression that is represented by the model below.



14. Is the sum of 0.57 + 0.31 less than or greater than one? Explain.

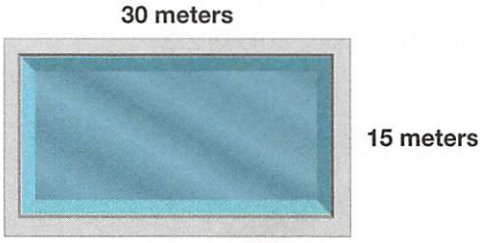
15. **Number Sense** Estimate to decide if the sum of 321 + 267 is more or less than 600.

16. **Higher Order Thinking** Do you think the difference of 1.45 − 0.97 is less than one or greater than one? Explain.

17. **Vocabulary** Estimate 53.7 − 27.5. Circle the *compatible numbers* to substitute.

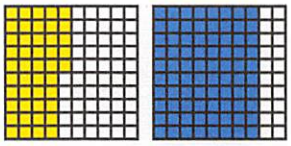
54 − 28 53 − 28 55 − 27 55 − 25

18. **Algebra** Write an expression that can be used to find the perimeter of the pool shown to the right. Remember, perimeter is the distance around a figure.



Common Core Assessment

19. Each shaded area in the grids below represents a decimal.



Part A

What is the sum of the decimals?

Part B

Explain how you found your answer.

Name _____

Solve

Step Up to Grade 5

Lesson 4
Estimate the Product of a Decimal and a Whole Number

I can ...
use rounding and compatible numbers to estimate the product of a decimal and a whole number.

Content Standard 5.NBT.B.7
Mathematical Practices MP.2, MP.6, MP. 8

Solve & Share

Renee needs 32 strands of twine for an art project. Each strand must be 1.25 centimeters long. About how many centimeters of twine does she need? ***Solve this problem any way you choose!***

Generalize
How can you relate what you know about estimating with whole numbers to estimating with decimals? *Show your work!*

Look Back! **MP.2 Reasoning** Is your estimate an overestimate or an underestimate? How can you tell?

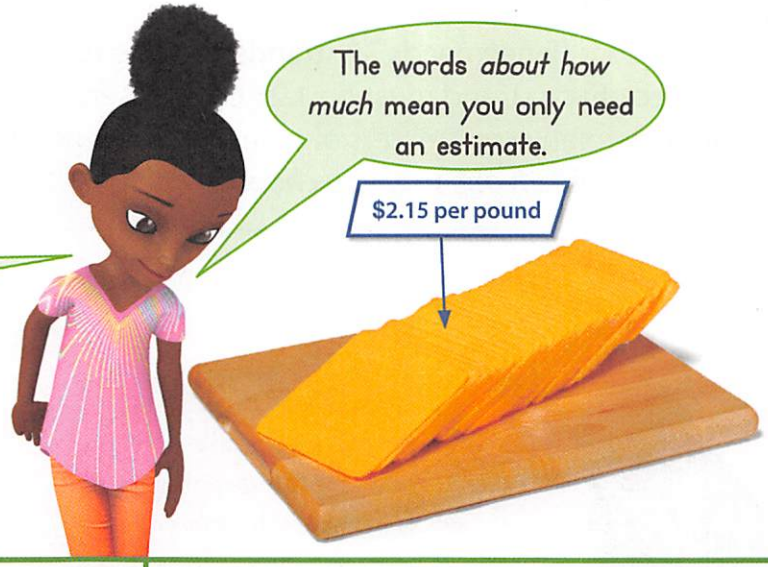
Learn Glossary

Essential Question

What Are Some Ways to Estimate Products with Decimals?

A

A wedding planner needs to buy 16 pounds of sliced cheddar cheese. About how much will the cheese cost?



B One Way

Round each number to the nearest dollar and nearest ten.

$$\$2.15 \times 16$$
$$\downarrow \qquad \downarrow$$
$$\$2 \times 20$$

$\$2 \times 20 = \$40$

The cheese will cost about $40.

C Another Way

Use compatible numbers that you can multiply mentally.

$$\$2.15 \times 16$$
$$\downarrow \qquad \downarrow$$
$$\$2 \times 15$$

$\$2 \times 15 = \$30$

The cheese will cost about $30.

Convince Me! **MP.2 Reasoning** About how much money would 18 pounds of cheese cost if the price is $3.95 per pound? Use two different ways to estimate the product. Are your estimates overestimates or underestimates? Explain.

Name _____

Tools Assessment

Another Example

Manuel walks a total of 0.75 mile to and from school each day. If there have been 105 school days so far this year, about how many miles has he walked in all?

Round to the nearest whole number.

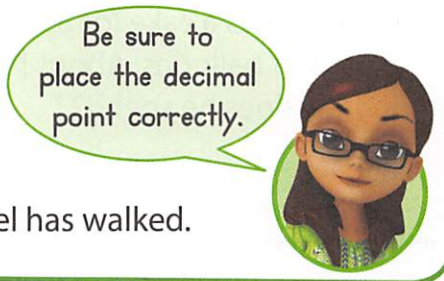
105×0.75

$105 \times 1 = 105$

Use compatible numbers.

105×0.75

$100 \times 0.8 = 80$



Both methods provide reasonable estimates of how far Manuel has walked.

Guided Practice

Do You Understand?

1. **Number Sense** There are about 20 school days in a month. About how many miles does Manuel walk each month? Write an equation to show your work.

2. **MP.2 Reasoning** Without multiplying, which estimate in the Another Example do you think is closer to the exact answer? Explain your reasoning.

Do You Know How?

For **3–8**, estimate each product using rounding or compatible numbers.

3. 2.87×412

4. 943×1.98

5. 107×5.15

6. 4.06×73

7. 41.05×300

8. 8.95×21

Independent Practice

For **9–16**, estimate each product.

9. 119×2.8

10. 4.7×69

11. 107×2.3

12. 35×3.5

13. 1.6×7

14. 9.1×53

15. 39×1.22

16. 4×7.8

Math Practices and Problem Solving

17. About how much money does Isaac need to buy 3 bags of balloons and 4 packs of gift bags?

18. Charlie buys a cake for $23.99 and 6 bags of balloons. About how much money does he spend?

19. Isabel walks 0.83 mile total to and from the library 3 days a week. About how many miles does she walk in 4 weeks?

20. **MP.6 Be Precise** One basketball weighs 20.2 ounces. The basketball team has a total of 15 basketballs. If each basketball weighs the same, how much do the basketballs weigh in all? Explain.

21. The side lengths of a square measure 25.3 cm. Estimate the area of the square.

22. **Higher Order Thinking** Carol drives 23.5 miles to work and 21.7 miles round trip to school each day, Monday to Friday. How many miles does Carol drive in one week?

Common Core Assessment

23. Rounding to the nearest tenth, which of the following give an **underestimate**?

- ☐ 38.45×1.7
- ☐ 28.54×0.74
- ☐ 9.91×8.73
- ☐ 78.95×1.25
- ☐ 18.19×2.28

24. Rounding to the nearest whole number, which of the following give an **overestimate**?

- ☐ 11.7×9.4
- ☐ 4.48×8.3
- ☐ 13.9×0.9
- ☐ 0.63×1.5
- ☐ 8.46×7.39

Name _____

Solve

Step Up to Grade 5

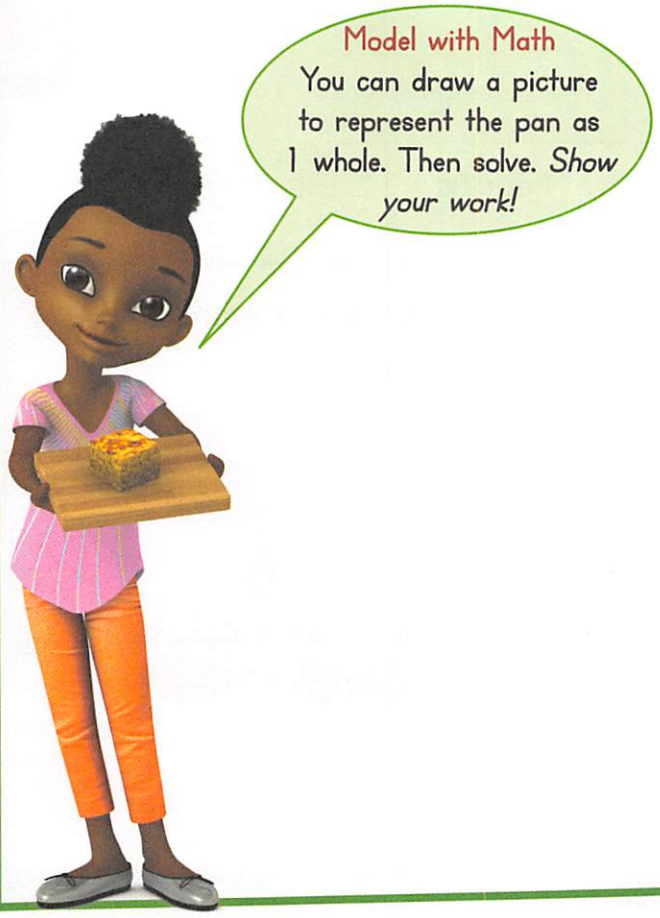
Lesson 5
Find Common Denominators

I can ...
find common denominators for fractions with unlike denominators.

Content Standards 5.NF.A.1, 5.NF.A.2
Mathematical Practices MP.3, MP.4

Solve & Share

Sue wants $\frac{1}{2}$ of a rectangular pan of cornbread. Dena wants $\frac{1}{3}$ of the same pan of cornbread. How should you cut the cornbread so that each girl gets the size portion she wants? ***Solve this problem any way you choose.***



Look Back! **MP.3 Construct Arguments** Is there more than one way to divide the pan of cornbread into equal-sized parts? Explain how you know.

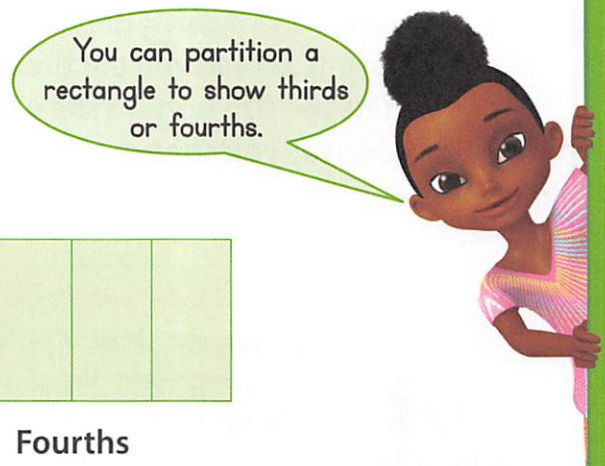
Learn Glossary

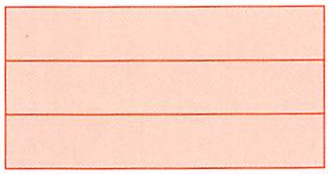
Essential Question

How Can You Find Common Denominators?

A

Tyrone partitioned a rectangle into thirds. Sally partitioned a rectangle of the same size into fourths. How could you partition a rectangle of the same size so that you see both thirds and fourths?





Thirds

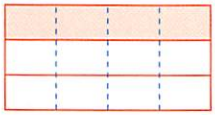
Fourths

B This rectangle is partitioned into thirds and fourths.

Twelfths

The rectangle is partitioned into 12 equal parts.
Each part is $\frac{1}{12}$.

C The fractions $\frac{1}{3}$ and $\frac{1}{4}$ can be renamed with equivalent fractions.



$\frac{1}{3} = \frac{4}{12}$

$\frac{1}{4} = \frac{3}{12}$

Fractions that have the same denominators, such as $\frac{4}{12}$ and $\frac{3}{12}$, are said to have common denominators.

Convince Me! **MP.4 Model with Math** Draw rectangles such as the ones above to find fractions equivalent to $\frac{2}{5}$ and $\frac{1}{3}$ that have the same denominator.

Name _____

Tools Assessment

Another Example

Find a common denominator for $\frac{7}{12}$ and $\frac{5}{6}$. Then rename each fraction with an equivalent fraction.

One Way

Multiply the denominators to find a common denominator: $12 \times 6 = 72$.

Write equivalent fractions with denominators of 72.

$\frac{7}{12} = \frac{7 \times 6}{12 \times 6} = \frac{42}{72}$ $\frac{5}{6} = \frac{5 \times 12}{6 \times 12} = \frac{60}{72}$

So, $\frac{42}{72}$ and $\frac{60}{72}$ is one way to name $\frac{7}{12}$ and $\frac{5}{6}$ with a common denominator.

Another Way

Think of a number that is a multiple of the other.

You know that 12 is a multiple of 6.

$\frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$

So, $\frac{7}{12}$ and $\frac{10}{12}$ is another way to name $\frac{7}{12}$ and $\frac{5}{6}$ with a common denominator.

Guided Practice

Do You Understand?

1. In the example on the previous page, how many twelfths are in each $\frac{1}{3}$ section of Tyrone's rectangle? How many twelfths are in each $\frac{1}{4}$ section of Sally's rectangle?

Do You Know How?

For **2–3**, find a common denominator for each pair of fractions.

2. $\frac{1}{6}$ and $\frac{1}{2}$

3. $\frac{2}{3}$ and $\frac{3}{4}$

Independent Practice

For **4–11**, find a common denominator for each pair of fractions. Then write equivalent fractions with the common denominator.

4. $\frac{3}{5}$ and $\frac{3}{8}$

5. $\frac{5}{8}$ and $\frac{3}{4}$

6. $\frac{1}{3}$ and $\frac{4}{5}$

7. $\frac{3}{12}$ and $\frac{9}{8}$

8. $\frac{4}{7}$ and $\frac{1}{2}$

9. $\frac{4}{5}$ and $\frac{3}{4}$

10. $\frac{2}{8}$ and $\frac{7}{20}$

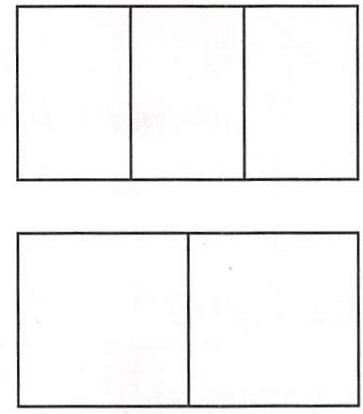
11. $\frac{1}{9}$ and $\frac{2}{3}$

Math Practices and Problem Solving

12. **MP.3 Critique Reasoning** Clara says the only common denominator of $\frac{3}{4}$ and $\frac{3}{5}$ is 20. Do you agree? Explain.

13. **Higher Order Thinking** The least common denominator is the least common multiple of the two denominators. What is the least common denominator of $\frac{3}{4}$ and $\frac{5}{6}$? Explain.

14. **MP.4 Model with Math** Gemma bought two cakes that are the same size. The first one was divided into 3 equal sections. The second one was divided into 2 equal sections. Gemma wants to cut the cakes so that there are 6 pieces in each cake. Draw on the pictures to show how Gemma should cut each cake.



15. **Number Sense** The table shows the price for three different sandwiches sold at a local deli. What are the prices of the sandwiches rounded to the nearest dollar? nearest dime?

DATA

Lunch Menu	
Sandwich	**Price**
Ham	$3.89
Turkey	$4.09
Chicken	$3.79

Common Core Assessment

16. Choose all the common denominators for $\frac{1}{3}$ and $\frac{2}{4}$.

- ☐ 8
- ☐ 12
- ☐ 16
- ☐ 36
- ☐ 48

17. Choose all the common denominators for $\frac{2}{3}$ and $\frac{4}{5}$.

- ☐ 12
- ☐ 15
- ☐ 30
- ☐ 60
- ☐ 72

Name _____

Solve

Step Up to Grade 5

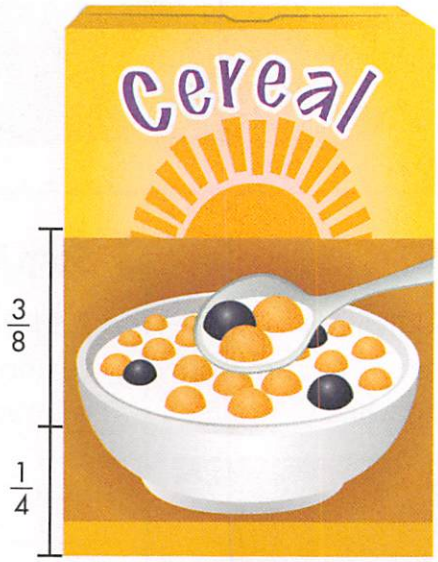
Lesson 6
Add Fractions with Unlike Denominators

I can ...
add fractions with unlike denominators.

Content Standards 5.NF.A.1, 5.NF.A.2
Mathematical Practices MP.1, MP.3, MP.4, MP.5

Solve & Share

Over the weekend, Eleni ate $\frac{1}{4}$ box of cereal, and Freddie ate $\frac{3}{8}$ of the same box. What portion of the box of cereal did they eat in all?



Use Appropriate Tools
You can use fraction strips to represent adding fractions. *Show your work!*

Look Back! **MP.1 Make Sense and Persevere**
What steps did you take to solve this problem?

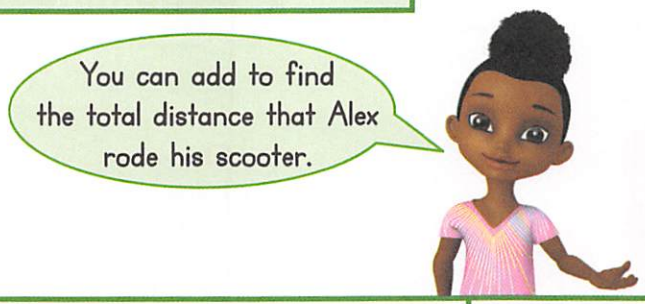
Learn Glossary

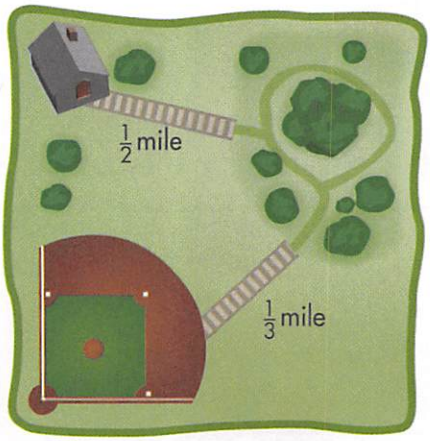
Essential Question

How Can You Add Fractions with Unlike Denominators?

A

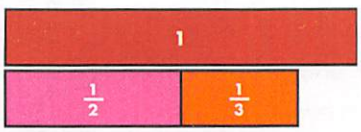
Alex rode his scooter from his house to the park. Later, he rode from the park to baseball practice. How far did Alex ride?





B Step 1

Change the fractions to equivalent fractions with a common, or like, denominator.



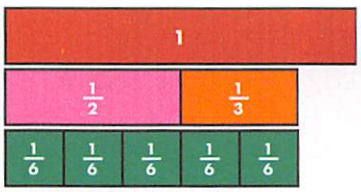
Multiples of 2: 2, 4, 6, 8, 10, 12, . . .

Multiples of 3: 3, 6, 9, 12, . . .

The number 6 is a common multiple of 2 and 3, so $\frac{1}{2}$ and $\frac{1}{3}$ can both be rewritten with a common denominator of 6.

C Step 2

Write equivalent fractions with a common denominator.



$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$

$\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$

D Step 3

Add the fractions to find the total number of sixths.

$$\begin{array}{r} \frac{1}{2} = \frac{3}{6} \\ +\ \frac{1}{3} = \frac{2}{6} \\ \hline \frac{5}{6} \end{array}$$

Alex rode his scooter $\frac{5}{6}$ mile.

Convince Me! **MP.3 Construct Arguments** In the example above, would you get the same sum if you used 12 as the common denominator? Explain.

Name _____

Tools Assessment

Another Example

Find $\frac{5}{12} + \frac{1}{4}$.

$\frac{5}{12} + \frac{1}{4} = \frac{5}{12} + \frac{3}{12}$ Write equivalent fractions with common denominators.

$= \frac{5+3}{12} = \frac{8}{12}$ or $\frac{2}{3}$ Find the total number of twelfths by adding the numerators.

Guided Practice

Do You Understand?

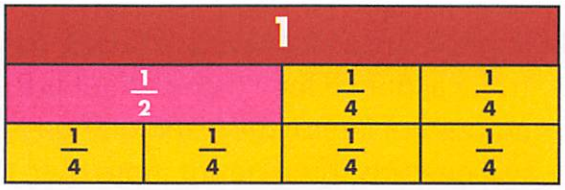
1. In the example at the top of page 888, if the park was $\frac{1}{8}$ mile from baseball practice instead of $\frac{1}{3}$ mile, how far would Alex ride his scooter in all?

2. **Vocabulary** Rico and Nita solved the same problem. Rico got $\frac{6}{8}$ for an answer, and Nita got $\frac{3}{4}$. Which answer is correct? Use the term *equivalent fraction* in your explanation.

Do You Know How?

For **3**, find the sum. Use fraction strips to help.

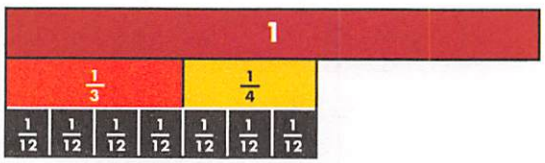
3. $\frac{1}{2} + \frac{2}{4} = \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$



Independent Practice

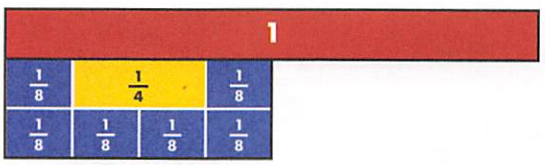
For **4–5**, find each sum. Use fraction strips to help.

4. $\frac{1}{3} + \frac{1}{4} = \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$



5. $\frac{1}{8} + \frac{1}{4} + \frac{1}{8} =$

$\frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$



Math Practices and Problem Solving

6. **MP.3 Construct Arguments** Explain why the denominator 12 in $\frac{5}{12}$ is not changed when adding the fractions.

$$\begin{array}{r} \frac{5}{12} = \frac{5}{12} \\ +\ \frac{1}{3} = \frac{4}{12} \\ \hline \frac{9}{12} \end{array}$$

7. **MP.4 Model with Math** To make juice, Cindy added $\frac{5}{8}$ cup of water to $\frac{1}{4}$ cup of juice concentrate. How much juice did Cindy make? Write and solve an equation.

8. **Math and Science** Of 36 chemical elements, 2 are named for women scientists and 25 are named for places. What fraction are named for women? Write two equivalent fractions.

9. **Higher Order Thinking** Alicia is making tropical punch for a picnic. What is the total amount of lemon juice and orange juice Alicia will need? Is this amount more than the amount of sugar she will need? Explain.

DATA

Tropical Punch Recipe	
Ingredient	**Amount**
Lemon Juice	$\frac{1}{3}$ cup
Water	4 cups
Sugar	$\frac{2}{3}$ cup
Orange Juice	$\frac{1}{2}$ cup

Common Core Assessment

10. Choose Yes or No to tell if the fraction $\frac{1}{2}$ will make each equation true.

$\square + \frac{6}{6} = \frac{3}{2}$	○ Yes	○ No
$\frac{1}{12} + \frac{2}{5} = \square$	○ Yes	○ No
$\frac{1}{2} + \square = \frac{4}{4}$	○ Yes	○ No
$\frac{1}{6} + \frac{2}{6} = \square$	○ Yes	○ No

11. Choose Yes or No to tell if the fraction $\frac{4}{8}$ will make each equation true.

$\frac{12}{12} + \square = \frac{9}{6}$	○ Yes	○ No
$\frac{1}{4} + \frac{2}{3} = \square$	○ Yes	○ No
$\square + \frac{2}{8} = \frac{6}{8}$	○ Yes	○ No
$\frac{1}{10} + \square = \frac{6}{10}$	○ Yes	○ No

Name _____

Solve

Step Up to Grade 5

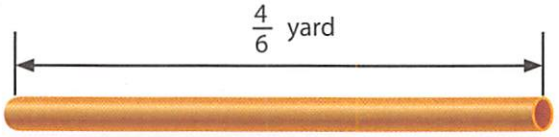
Lesson 7
Subtract Fractions with Unlike Denominators

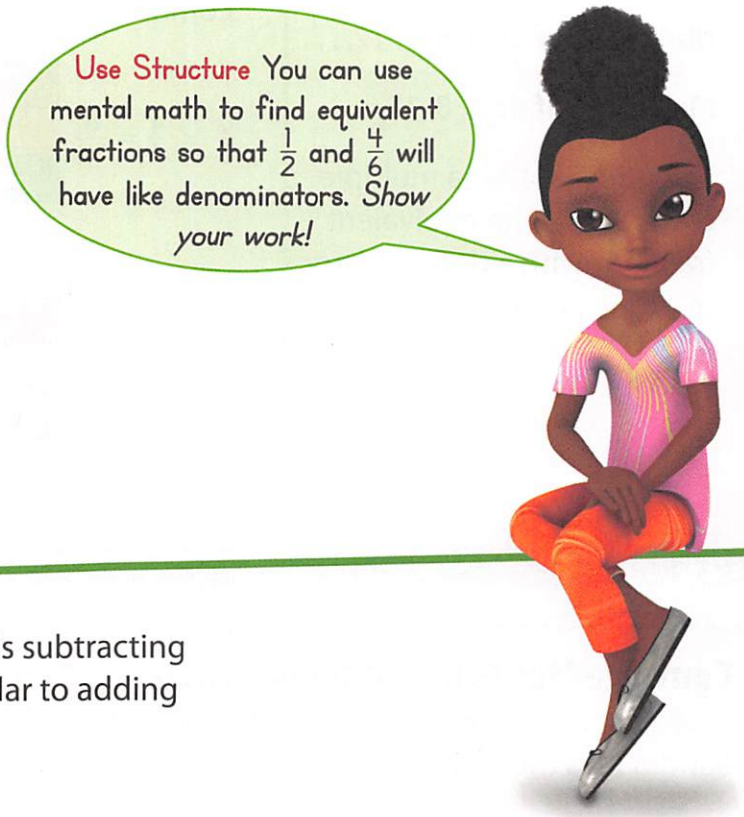
I can ...
subtract fractions with unlike denominators.

© **Content Standards** 5.NF.A.1, 5.NF.A.2
Mathematical Practices MP.2, MP.3, MP.4, MP.7, MP.8

Solve & Share

Rose bought the length of copper pipe shown below. She used $\frac{1}{2}$ yard to repair a water line in her house. How much pipe does she have left? ***Solve this problem any way you choose.***





Look Back! © **MP.8 Generalize** How is subtracting fractions with unlike denominators similar to adding fractions with unlike denominators?

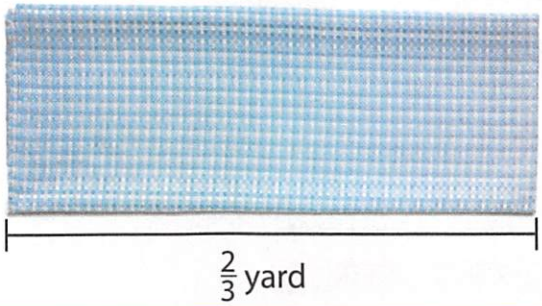
Learn Glossary A-Z

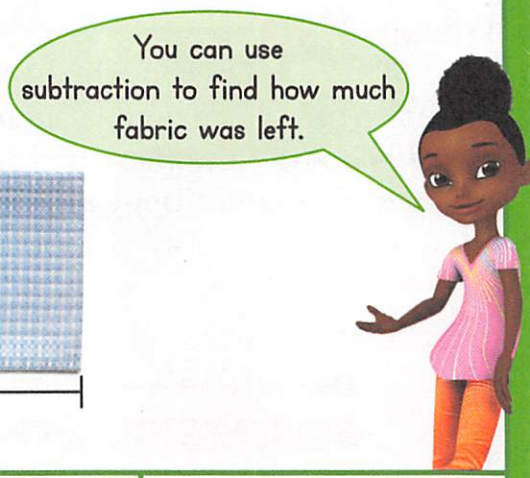
Essential Question

How Can You Subtract Fractions with Unlike Denominators?

A

Linda used $\frac{1}{4}$ yard of the fabric she bought for a sewing project. How much fabric did she have left?





B Step 1

Find a common multiple of the denominators.

Multiples of 3: 3, 6, 9, 12, . . .

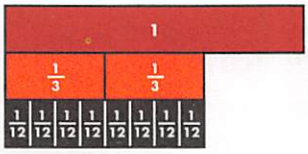
Multiples of 4: 4, 8, 12, . . .

The number 12 is a multiple of 3 and 4. Write equivalent fractions with a denominator of 12 for $\frac{2}{3}$ and $\frac{1}{4}$.

C Step 2

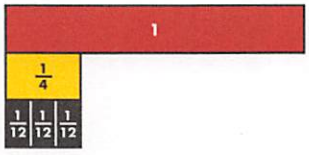
Use the Identity Property to rename the fractions with a common denominator.

$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$



$\frac{2}{3} = \frac{8}{12}$

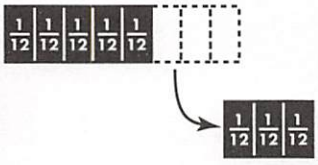
$\frac{1}{4} \times \frac{3}{3} = \frac{3}{12}$



$\frac{1}{4} \times \frac{3}{3} = \frac{3}{12}$

D Step 3

Subtract the numerators.



$$\begin{array}{r} \frac{2}{3} = \frac{8}{12} \\ -\frac{1}{4} = \frac{3}{12} \\ \hline \frac{5}{12} \end{array}$$

Linda has $\frac{5}{12}$ yard of fabric left.

Convince Me! **MP.3 Critique Reasoning** Suppose Linda had $\frac{2}{3}$ of a yard of fabric and told Sandra that she used $\frac{3}{4}$ of a yard. Sandra says this is not possible. Do you agree? Explain your answer.

Name _____

Tools Assessment

Guided Practice

Do You Understand?

1. **MP.2 Reasoning** In the example on page 892, is it possible to use a common denominator greater than 12 and get the correct answer? Why or why not?

2. In the example on page 892, if Linda had started with 1 yard of fabric and used $\frac{5}{8}$ yard, how much fabric would be left?

Do You Know How?

For **3–6**, find each difference.

3. $\frac{3}{4} = \frac{9}{12}$
$-\frac{1}{3} = \frac{4}{12}$

4. $\frac{5}{12} = \frac{10}{24}$
$-\frac{1}{8} = \frac{3}{24}$

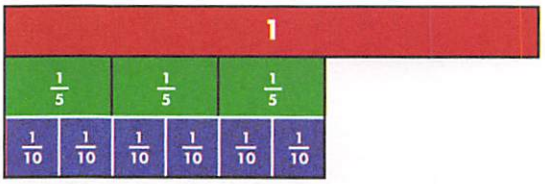
5. $\frac{2}{3}$
$-\frac{1}{6}$

6. $\frac{7}{10}$
$-\frac{3}{8}$

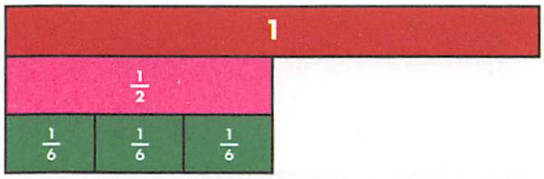
Independent Practice

Leveled Practice For **7–16**, find each difference.

7. $\frac{3}{5} = \frac{\square}{10}$
$-\frac{3}{10} = \frac{\square}{10}$
$\frac{\square}{\square}$



8. $\frac{1}{2} = \frac{\square}{6}$
$-\frac{2}{6} = \frac{\square}{6}$
$\frac{\square}{\square}$



9. $\frac{8}{9}$
$-\frac{5}{6}$

10. $\frac{5}{6}$
$-\frac{1}{2}$

11. $\frac{7}{8}$
$-\frac{2}{3}$

12. $\frac{4}{5}$
$-\frac{3}{4}$

13. $\frac{7}{10}$
$-\frac{1}{5}$

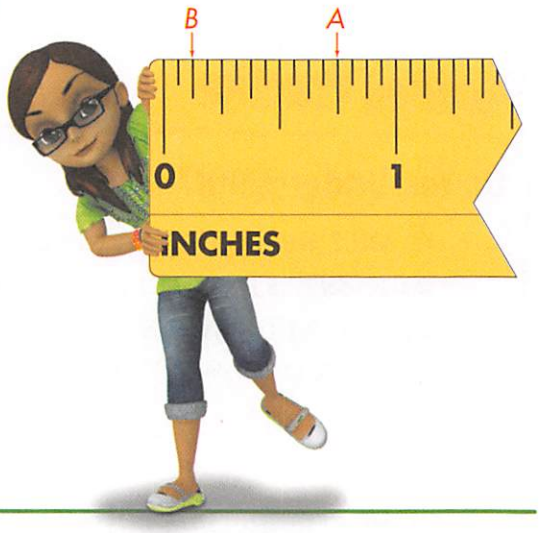
14. $\frac{12}{16}$
$-\frac{2}{4}$

15. $\frac{4}{9}$
$-\frac{2}{6}$

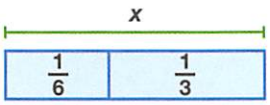
16. $\frac{5}{5}$
$-\frac{2}{8}$

Math Practices and Problem Solving

17. **MP.4 Model with Math** Write and solve an equation to find the difference between the location of Point *A* and Point *B* on the ruler.



18. **Algebra** Write an addition and a subtraction equation for the diagram. Then find the missing value.



19. **MP.3 Critique Reasoning** Seth said, "Fractions need to have a common denominator before you can add or subtract them." Is Seth correct? Explain.

20. **Number Sense** What mistake was made in the problem? What is the correct answer?

$$\begin{array}{r} \frac{7}{8} = \frac{7}{8} \\ -\frac{1}{4} = \frac{1}{8} \\ \hline \frac{6}{8} \end{array}$$

21. **Higher Order Thinking** Find two fractions with a difference of $\frac{1}{2}$ but with neither denominator equal to 2.

Common Core Assessment

22. Choose the correct fractions from the box below to complete the subtraction sentence that follows.

$\frac{5}{6}$	$\frac{2}{3}$	$\frac{1}{30}$	$\frac{6}{7}$	$\frac{3}{6}$

$\square - \frac{1}{3} = \square$

23. Choose the correct fractions from the box below to complete the subtraction sentence that follows.

$\frac{11}{12}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$

$\square - \square = \frac{9}{12}$

Name _____

Solve

Step Up to Grade 5

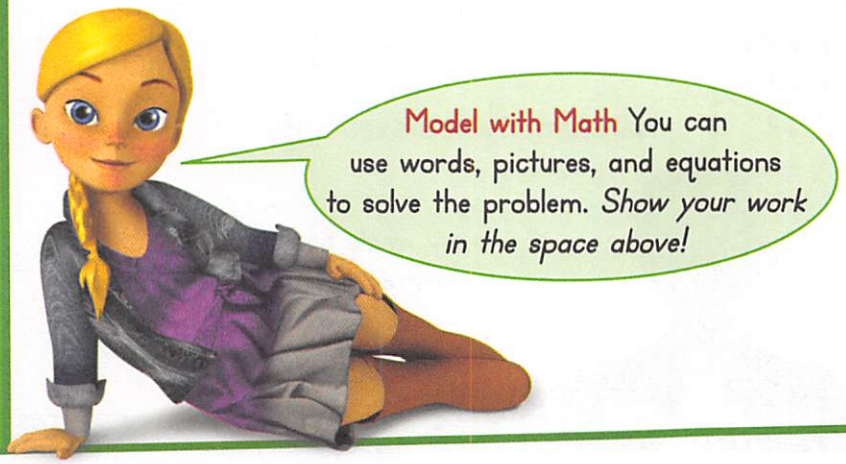
Lesson 8
Multiply Fractions and Whole Numbers

I can ...
multiply fractions and whole numbers.

Content Standard 5.NF.B.4a
Mathematical Practices MP.2, MP.3, MP.4, MP.6

Solve & Share

Julie has 10 yards of ribbon. She divides the ribbon into 3 equal pieces and uses 2 of the pieces on gifts. How much ribbon does she use? ***Solve this problem any way you choose.***



Look Back! **MP.2 Reasoning** Should the answer be less than or greater than 5? How do you know?

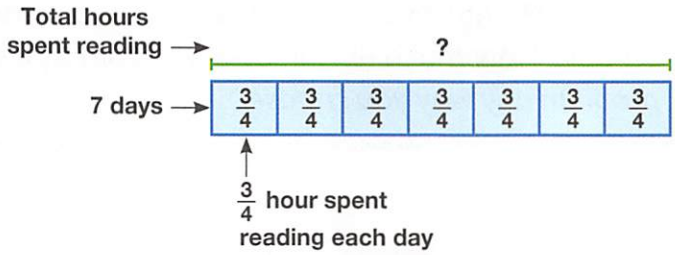
Learn Glossary

Essential Question

How Can You Multiply Fractions and Whole Numbers?

A

Hal spent $\frac{3}{4}$ hour reading each day for 7 days. How much total time did he spend reading?



B One Way

Multiply to find the number of fourths.

$$7 \times \frac{3}{4} = 7 \times 3 \times \frac{1}{4}$$
$$= 21 \times \frac{1}{4}$$
$$= \frac{21}{4}$$

Rewrite as a mixed number.

$$\frac{21}{4} = 5\frac{1}{4}$$

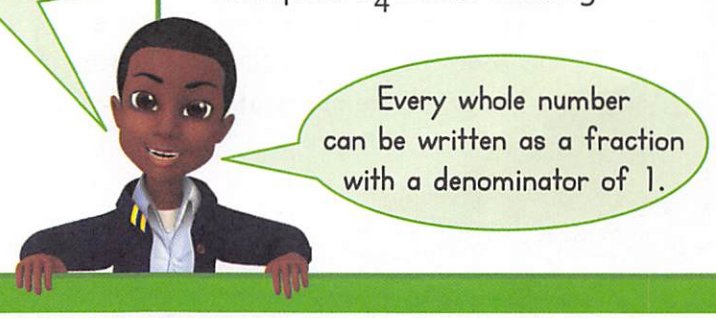
Hal spent $5\frac{1}{4}$ hours reading.

C Another Way

Rename the whole number as a fraction. Multiply the numerators, multiply the denominators, and then write the product as a mixed number.

$$\frac{7}{1} \times \frac{3}{4} = \frac{7 \times 3}{1 \times 4} = \frac{21}{4} = 5\frac{1}{4}$$

Hal spent $5\frac{1}{4}$ hours reading.



Convince Me! **MP.6 Be Precise** Find $6 \times \frac{4}{9}$. Then use repeated addition to justify your answer.

Name _____

Tools Assessment

Guided Practice

Do You Understand?

1. **MP.2 Reasoning** In the example at the top of the previous page, how can finding $\frac{1}{4}$ of 7 help you find $\frac{3}{4}$ of 7?

2. If Hal spent $\frac{2}{3}$ of an hour reading each day for 7 days, how much time, in all, did he spend reading? Show how you found your answer.

Do You Know How?

For **3–5**, find each product. Write the product as a mixed number.

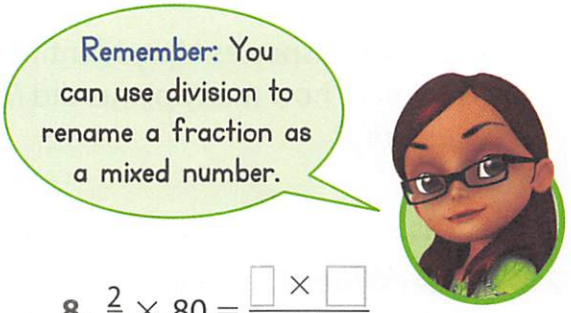
3. $\frac{1}{3} \times 18 = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square$

4. $\frac{5}{6} \times 35 = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square\ \frac{\square}{\square}$

5. $\frac{2}{3} \times 26 = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square\ \frac{\square}{\square}$

Independent Practice

Leveled Practice For **6–16**, find each product. Write the product as a mixed number.



6. $\frac{3}{5} \times 40 = \frac{\square \times \square}{\square}$
$= \frac{\square}{\square} = \square$

7. $\frac{7}{8} \times 56 = \frac{\square \times \square}{\square}$
$= \frac{\square}{\square} = \square$

8. $\frac{2}{3} \times 80 = \frac{\square \times \square}{\square}$
$= \frac{\square}{\square} = \square\ \frac{\square}{\square}$

9. $\frac{2}{5}$ of 35

10. $\frac{4}{7}$ of 45

11. $\frac{1}{4}$ of 28

12. $\frac{3}{7}$ of 63

13. $\frac{1}{6}$ of 205

14. $\frac{3}{4}$ of 100

15. $\frac{4}{5}$ of 231

16. $\frac{2}{3}$ of 204

Math Practices and Problem Solving

17. On Mars, your weight is about $\frac{1}{3}$ of your weight on Earth. If a fourth grader weighs 96 pounds on Earth, about how much would he or she weigh on Mars?

18. Number Sense How can you use mental math to find $25 \times \frac{2}{10}$?

19. During a nature walk, Mary identified 24 species of animals and plants.

a **MP.3 Construct Arguments** Mary said $\frac{1}{5}$ of the species she identified were animals. Can this be correct? Explain.

b If $\frac{1}{3}$ of the species Mary identified were animals, how many plants did Mary identify?

20. A rectangular painting is 3 feet long and $\frac{5}{6}$ foot wide. What is the area of the painting?

21. Higher Order Thinking One recipe calls for $\frac{1}{3}$ cup flour per batch and the other calls for $\frac{1}{2}$ cup flour per batch. How much flour will Marcy use if she makes 12 batches of each type of cookie?

22. Math and Science A water molecule is made up of 3 atoms. One third of the atoms are oxygen and the remaining atoms are hydrogen. If there are 125 water molecules, how many hydrogen atoms are there? Show your work.

Common Core Assessment

23. Which is the product of 21 and $\frac{3}{7}$?

Ⓐ $2\frac{3}{7}$

Ⓑ 5

Ⓒ 9

Ⓓ $32\frac{2}{3}$

24. Which is the product of $\frac{11}{12}$ and 3?

Ⓐ $1\frac{1}{4}$

Ⓑ $2\frac{3}{4}$

Ⓒ $4\frac{1}{3}$

Ⓓ 33

Name _____

Solve

Step Up to Grade 5

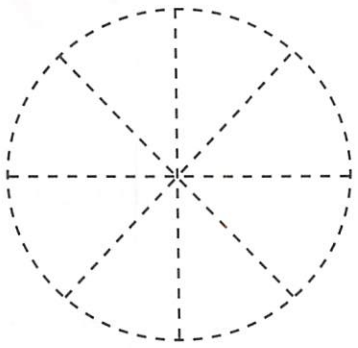
Lesson 9
Divide Whole Numbers by Unit Fractions

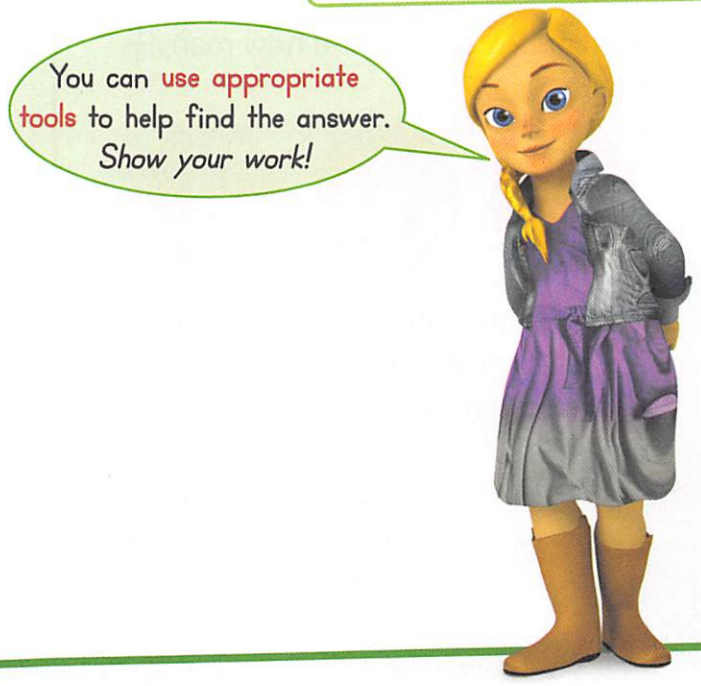
I can ...
divide a whole number by a unit fraction.

Content Standards 5.NF.B.7b, 5.NF.B.7c
Mathematical Practices MP.1, MP.2, MP.4, MP.5

Solve & Share

One ball of dough can be stretched into a circle to make a pizza. After the pizza is cooked, it is cut into 8 equal slices. How many slices of pizza can you make with 3 balls of dough? ***Solve this problem any way you choose.***





Look Back! **MP.2 Reasoning** Into how many slices of pizza will each ball of dough be divided? What fraction of a whole pizza does 1 slice represent?

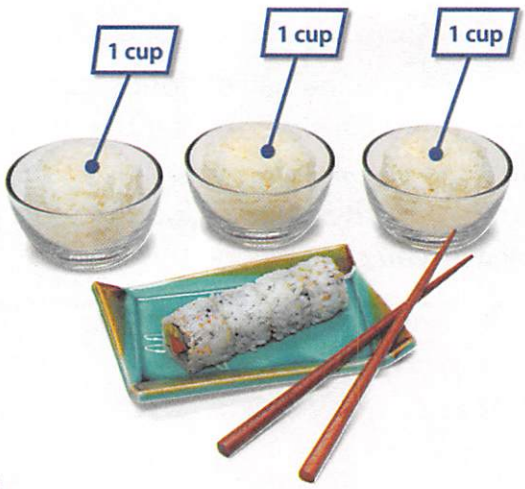
Learn Glossary

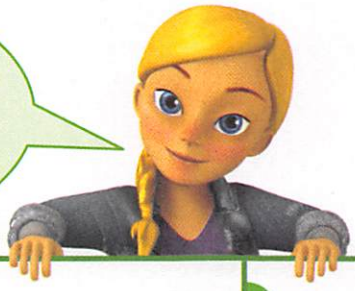
Essential Question

How Can You Divide by a Unit Fraction?

A

Joyce is making sushi rolls. She needs $\frac{1}{4}$ cup of rice for each sushi roll. How many sushi rolls can she make if she has 3 cups of rice?





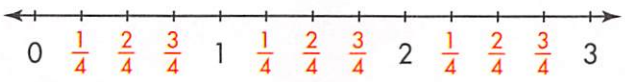
B One Way

Use an area model to find how many $\frac{1}{4}$s are in 3.

There are four $\frac{1}{4}$s in 1 whole cup. So, there are twelve $\frac{1}{4}$s in three whole cups. So, Joyce can make 12 sushi rolls.

C Another Way

Use a number line to to find how many $\frac{1}{4}$s are in 3.



You can see that there are four $\frac{1}{4}$s between each whole number.

There are four $\frac{1}{4}$s in 1 whole, eight $\frac{1}{4}$s in 2 wholes, and twelve $\frac{1}{4}$s in 3 wholes.

So, $3 \div \frac{1}{4} = 12$.
Joyce can make 12 sushi rolls.

Convince Me! MP.4 Model with Math

Use the diagram below to find $4 \div \frac{1}{3}$.

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

Name _____

Tools Assessment

Guided Practice

Do You Understand?

1. In the example at the top of page 900, if Joyce had 4 cups of rice, how many rolls could she make?

2. In the example at the top of page 900, how does the number line help to show that $3 \div \frac{1}{4}$ is equal to 3×4?

Do You Know How?

For **3–4**, use the picture below to find each quotient.

3. How many $\frac{1}{3}$s are in 2?

   $2 \div \frac{1}{3} =$ ____

4. How many $\frac{1}{3}$s are in 3?

   $3 \div \frac{1}{3} =$ ____

Independent Practice

Leveled Practice For **5–6**, use the picture to find each quotient.

5. How many $\frac{1}{6}$s are in 2?

   $2 \div \frac{1}{6} =$ ____

6. How many $\frac{1}{6}$s are in 3?

   $3 \div \frac{1}{6} =$ ____

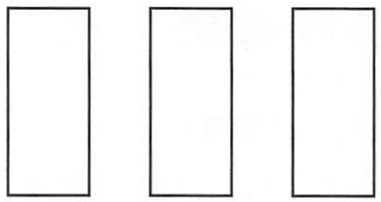
For **7–14**, draw a picture or use a number line to find each quotient.

7. $2 \div \frac{1}{4}$ **8.** $15 \div \frac{1}{5}$ **9.** $5 \div \frac{1}{6}$ **10.** $21 \div \frac{1}{7}$

11. $16 \div \frac{1}{5}$ **12.** $25 \div \frac{1}{2}$ **13.** $3 \div \frac{1}{8}$ **14.** $10 \div \frac{1}{5}$

Math Practices and Problem Solving

15. **MP.4 Model with Math** Sylvia made 3 loaves of bread. She gives each person $\frac{1}{6}$ of a loaf with dinner. How many people can Sylvia serve? Draw a picture to help answer the question.



16. **Higher Order Thinking** Explain why dividing a whole number by a unit fraction results in a number greater than the whole number.

17. **Number Sense** The distance from Virginia Beach, VA, to San Jose, CA, is 2,990 miles. If you want to travel this distance in 3 months, about how many miles need to be traveled each month?

18. **MP.1 Make Sense and Persevere** Carmen used one bag of flour. She baked three loaves of bread. Then she used the remaining flour to make 24 muffins. How much flour was in the bag to begin with?

DATA

Recipe	Amount of Flour Needed
Bread	$2\frac{1}{4}$ cups per loaf
Muffins	$3\frac{1}{4}$ cups per 24 muffins
Pizza	$1\frac{1}{2}$ cups per pie

Common Core Assessment

19. Alonso is making light-switch plates from pieces of wood. Each piece of wood is 6 feet long. How many light switch plates can Alonso make if he has 2 pieces of wood?

Ⓐ 12 light switch plates

Ⓑ 18 light switch plates

Ⓒ 36 light switch plates

Ⓓ 42 light switch plates

DATA

Wood Projects	
Item	Length Needed for Each
Cabinet Shelf	$\frac{3}{4}$ foot
Light Switch Plate	$\frac{1}{3}$ foot
Shingle	$\frac{2}{3}$ foot

Name _____

Solve

Step Up to Grade 5

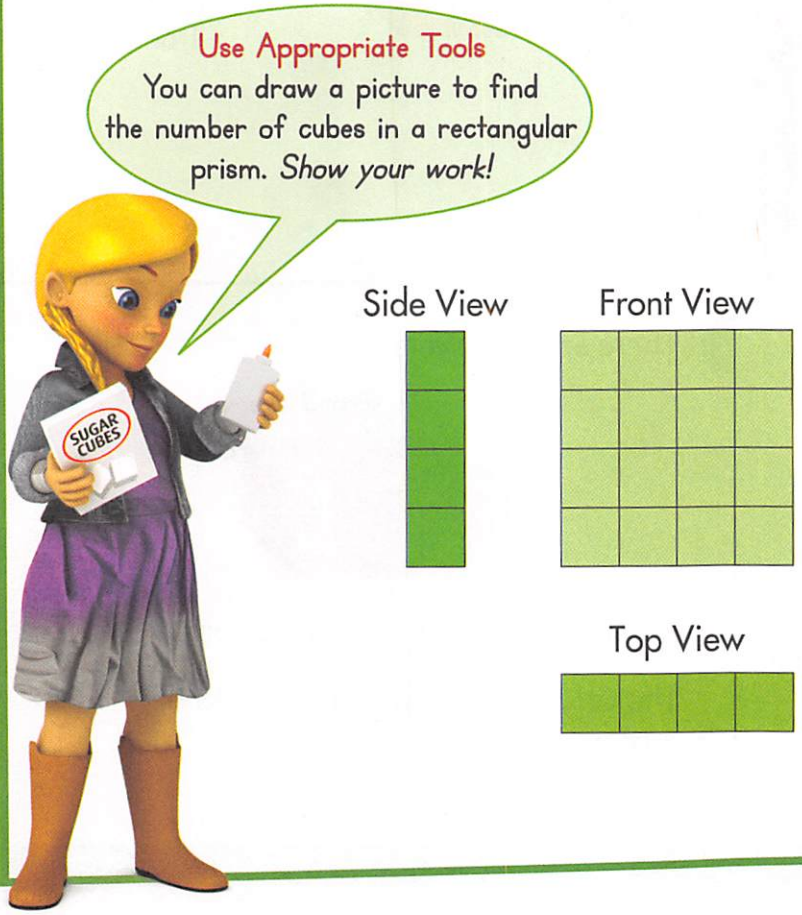
Lesson 10
Model Volume

I can ...
find the volume of solid figures.

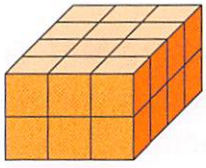
Content Standards 5.MD.C.3a, 5.MD.C.3b, 5.MD.C.4
Mathematical Practices MP.2, MP.5

Solve & Share

Gina is building a rectangular prism out of sugar cubes for her art class project. She started by drawing a diagram of the rectangular prism that is 4 cubes high and 4 cubes long. How many cubes does she use to make the prism? ***Solve this problem any way you choose.***



Look Back! **MP.2 Reasoning** Gina decided to change her art project and build a rectangular prism that is 3 cubes long, 4 cubes wide, and 2 cubes high. Use the picture to determine the number of cubes she used.



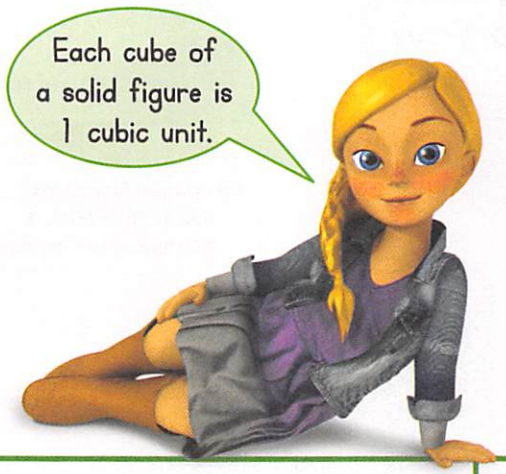
Learn Glossary

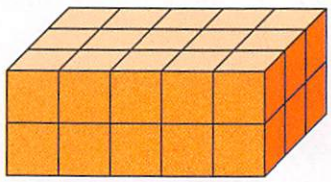
Essential Question

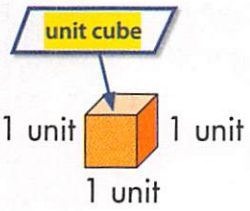
How Can You Measure Space Inside a Solid Figure?

A

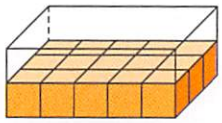
Volume is the number of cubic units needed to pack a solid figure without gaps or overlaps. A cubic unit is the volume of a cube measuring 1 unit on each edge. What is the volume of this rectangular prism?







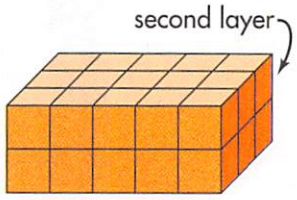
B Use unit cubes to make a model.



Count the number of cubes.

There are 15 unit cubes in the bottom layer. The volume of the bottom layer is 15 cubic units.

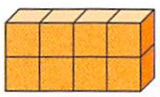
C There are two layers.



Multiply the volume of the bottom layer by 2.

The volume of the prism is 2×15 or 30 cubic units.

Convince Me! **MP.2 Reasoning** In the picture below, how many unit cubes does it take to make the rectangular prism on the left without gaps or overlaps? How many 2-unit cubes does it take to make the rectangular prism?



2-unit cube

Name _____

Tools Assessment

Guided Practice

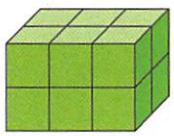
Do You Understand?

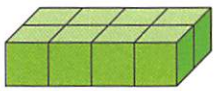
1. Make a model of a rectangular prism with a bottom layer that is 4 cubes long by 3 cubes wide. Make a top layer that is the same as the bottom layer. Then draw a picture of your model. What is the volume?

2. **Vocabulary** Describe how to find the *volume* of a *rectangular prism*.

Do You Know How?

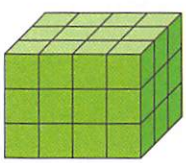
For **3–4**, use unit cubes to make a model of each rectangular prism. Find the volume.

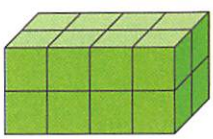
3. 

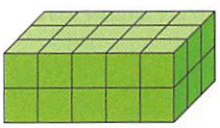
4. 

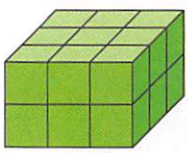
Independent Practice

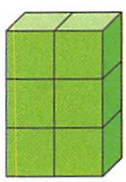
For **5–13**, find the volume of each solid. Use unit cubes to help.

5. 

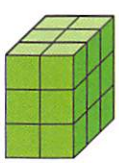
6. 

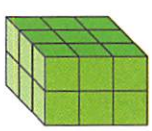
7. 

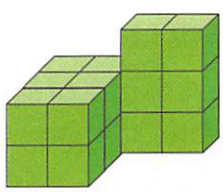
8. 

9. 

10. 

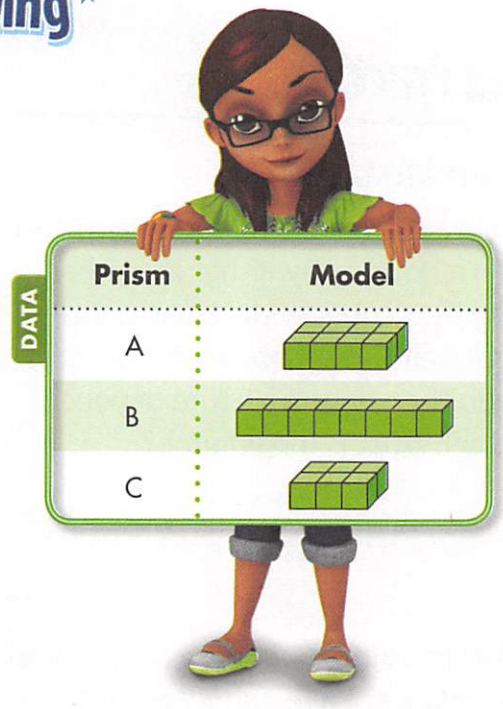
11. 

12. 

13. 

Math Practices and Problem Solving

For **14–18**, use the table.



Compare the volumes of the prisms. Write >, <, or = for each ◯.

14. Prism A ◯ Prism B

15. Prism B ◯ Prism C

16. Prism C ◯ Prism A

17. If you added another layer of unit cubes on top of Prism C, what would its volume be in cubic units?

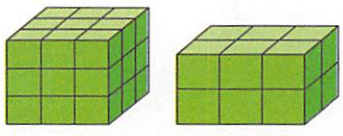
18. If you put Prism C on top of Prism A, what would the volume of the new solid be in cubic units?

19. **MP.2 Reasoning** In an election, 15,392 people voted. Candidate B received 8,205 votes. Candidate A received the rest of the votes. Which candidate won the election? By how many votes?

20. **Higher Order Thinking** Ms. Smith's boxes are each 5 inches long, 5 inches wide, and 5 inches tall. How many of her boxes can she fit into a case that is 20 inches long, 20 inches wide, and 20 inches tall? Explain.

Common Core Assessment

21. Frank made the solid figures shown using unit cubes. Which statement about these models is true?


Model X Model Y

Ⓐ Model X and Model Y have the same volume.

Ⓑ The volume of Model X is 7 cubic units greater than the volume of Model Y.

Ⓒ The volume of Model X is 15 cubic units greater than the volume of Model Y.

Ⓓ The volume of Model X and Model Y combined is 55 cubic units.