Go Math Unit 2
Ch. 4-5

Book Pages

LESSON 4.1 Applying GCF and LCM to Fraction Operations

COMMON CORE 6.NS.4

Find the greatest common factor…and the least common multiple of two whole numbers…

? ESSENTIAL QUESTION

How do you use the GCF and LCM when adding, subtracting, and multiplying fractions?

EXPLORE ACTIVITY
COMMON CORE 6.NS.4

Multiplying Fractions

To multiply two fractions you first multiply the numerators and then multiply the denominators.

$$\frac{\text{numerator} \times \text{numerator}}{\text{denominator} \times \text{denominator}} = \frac{\text{numerator}}{\text{denominator}}$$

The resulting product needs to be written in simplest form. Below are two methods for making sure that the product of two fractions is in simplest form.

EXAMPLE 1 Multiply. Write the product in simplest form.

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

Write the problem as a single fraction.
Multiply numerators. Multiply denominators.

$$\frac{1}{3} \times \frac{3}{5} = \frac{1 \times 3}{3 \times 5} = \frac{\square}{\square}$$

Simplify by dividing by the GCF.
The GCF of 3 and 15 is _____.

$$3 \div \square$$

$$15 \div \square$$

Write the answer in simplest form.

$$\frac{\square}{\square}$$

B $\frac{6}{7} \times \frac{2}{3}$

Write the problem as a single fraction.

$$\frac{6}{7} \times \frac{2}{3} = \frac{\square}{\square}$$

The 6 in the numerator and the 3 in the denominator have a GCF of _____. Divide 6 and 3 by 3 and write the quotients in the boxes.

$$\frac{\cancel{6} \times 2}{7 \times \cancel{3}}$$

Use the quotients from the previous steps to multiply the numerators and denominators.

$$\frac{\square \times 2}{7 \times \square} = \frac{\square}{\square}$$
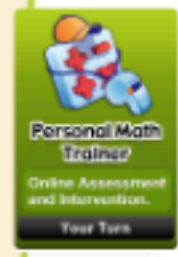

EXPLORE ACTIVITY (cont'd)

YOUR TURN

Multiply. Write each product in simplest form.

1. $\frac{1}{6} \times \frac{3}{5}$ _____

2. $\frac{3}{4} \times \frac{7}{9}$ _____

3. $\frac{3}{7} \times \frac{2}{3}$ _____

4. $\frac{4}{5} \times \frac{2}{7}$ _____

5. $\frac{7}{10} \times \frac{8}{21}$ _____

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

Multiplying Fractions and Whole Numbers

To multiply a fraction by a whole number, you rewrite the whole number as a fraction and multiply the two fractions. Remember to use the GCF to write the product in simplest form.

EXAMPLE 2 Real World
COMMON CORE 6.NS.4

A class has 18 students. The teacher asks how many students in the class have pets and finds $\frac{5}{9}$ of the students have pets. How many students have pets?

STEP 1 Estimate the product. Multiply the whole number by the nearest benchmark fraction.

$\frac{5}{9}$ is close to $\frac{1}{2}$, so multiply $\frac{1}{2}$ times 18.

$$\frac{1}{2} \times 18 = 9$$

STEP 2 Multiply. Write the product in simplest form.

You can write $\frac{5}{9}$ times 18 three ways.
$\frac{5}{9} \times 18$ $\frac{5}{9} \cdot 18$ $\frac{5}{9}(18)$

$$\frac{5}{9} \times 18$$

$$\frac{5}{9} \times 18 = \frac{5}{9} \times \frac{18}{1}$$ Rewrite 18 as a fraction.

$$= \frac{5 \times \cancel{18}^{2}}{\cancel{9}^{1} \times 1}$$ Simplify before multiplying using the GCF.

$$= \frac{5 \times 2}{1 \times 1}$$ Multiply numerators. Multiply denominators.

$$= \frac{10}{1} = 10$$ Simplify by writing as a whole number.

10 students have pets.

Math Talk
Mathematical Practices

How can you check to see if the answer is correct?

Reflect

7. Analyze Relationships Is the product of a fraction less than 1 and a whole number greater than or less than the whole number? Explain.

_____

_____

Multiply. Write each product in simplest form.

8. $\frac{5}{8} \times 24$ _____

9. $\frac{3}{5} \times 20$ _____

10. $\frac{1}{3} \times 8$ _____

11. $\frac{1}{4} \times 14$ _____

12. $3\frac{7}{10} \times 7$ _____

13. $2\frac{3}{10} \times 10$ _____

Adding and Subtracting Fractions

You have learned that to add or subtract two fractions, you can rewrite the fractions so they have the same denominator. You can use the least common multiple of the denominators of the fractions to rewrite the fractions.

EXAMPLE 3

COMMON CORE 6.NS.4

Add $\frac{8}{15} + \frac{1}{6}$. Write the sum in simplest form.

STEP 1 Rewrite the fractions as equivalent fractions. Use the LCM of the denominators as the new denominator.

$$\frac{8}{15} \rightarrow \frac{8 \times 2}{15 \times 2} \rightarrow \frac{16}{30}$$

$$\frac{1}{6} \rightarrow \frac{1 \times 5}{6 \times 5} \rightarrow \frac{5}{30}$$

The LCM of 15 and 6 is 30.

STEP 2 Add the numerators of the equivalent fractions. Then simplify.

$$\frac{16}{30} + \frac{5}{30} = \frac{21}{30}$$

$$= \frac{21 \div 3}{30 \div 3}$$

$$= \frac{7}{10}$$

Simplify by dividing by the GCF.
The GCF of 21 and 30 is 3.

Reflect

14. Can you also use the LCM of the denominators of the fractions to rewrite the difference $\frac{8}{15} - \frac{1}{6}$? What is the difference?

_____

My Notes

Add or subtract. Write each sum or difference in simplest form.

15. $\frac{5}{14} + \frac{1}{6}$ _____

16. $\frac{5}{12} - \frac{3}{20}$ _____

17. $\frac{5}{12} - \frac{3}{8}$ _____

18. $1\frac{3}{10} + \frac{1}{4}$ _____

19. $\frac{2}{3} + 6\frac{1}{5}$ _____

20. $3\frac{1}{6} - \frac{1}{7}$ _____

Guided Practice

Multiply. Write each product in simplest form. (Explore Activity Example 1)

1. $\frac{1}{2} \times \frac{5}{8}$ _____

2. $\frac{3}{5} \times \frac{5}{9}$ _____

3. $\frac{3}{8} \times \frac{2}{5}$ _____

4. $2\frac{3}{8} \times 16$ _____

5. $1\frac{4}{5} \times \frac{5}{12}$ _____

6. $1\frac{2}{10} \times 5$ _____

Find each amount. (Example 2)

7. $\frac{1}{4}$ of 12 bottles of water = _____ bottles

8. $\frac{2}{3}$ of 24 bananas = _____ bananas

9. $\frac{3}{5}$ of $40 restaurant bill = $ _____

10. $\frac{5}{6}$ of 18 pencils = _____ pencils

Add or subtract. Write each sum or difference in simplest form.

11. $\frac{3}{8} + \frac{5}{24}$ _____

12. $\frac{1}{20} + \frac{5}{12}$ _____

13. $\frac{9}{20} - \frac{1}{4}$ _____

14. $\frac{9}{10} - \frac{3}{14}$ _____

15. $3\frac{3}{8} + \frac{5}{12}$ _____

16. $5\frac{7}{10} - \frac{5}{18}$ _____

? ESSENTIAL QUESTION CHECK-IN

17. How can knowing the GCF and LCM help you when you add, subtract, and multiply fractions?

_____

_____

_____

_____

Name_____ Class_____ Date_____

4.1 Independent Practice

COMMON CORE 6.NS.4

Q Solve. Write each answer in simplest form.

18. Erin buys a bag of peanuts that weighs $\frac{3}{4}$ of a pound. Later that week, the bag is $\frac{2}{3}$ full. How much does the bag of peanuts weigh now? Show your work.

_____

_____

Q 19. Multistep Marianne buys 16 bags of potting soil that comes in $\frac{5}{8}$-pound bags.

a. How many pounds of potting soil does Marianne buy?

_____

_____

b. If Marianne's father calls and says he needs 13 pounds of potting soil, how many additional bags should she buy?

_____

_____

Q 20. Music Two fifths of the instruments in the marching band are brass, one third are percussion, and the rest are woodwinds.

a. What fraction of the band is woodwinds?

_____

b. One half of the woodwinds are clarinets. What fraction of the band is clarinets?

_____

c. One eighth of the brass instruments are tubas. If there are 240 instruments in the band, how many are tubas?

_____

21. Marcial found a recipe for fruit salad that **Q** he wanted to try to make for his birthday party. He decided to triple the recipe.

Fruit Salad

$3\frac{1}{2}$ cups thinly sliced rhubarb

15 seedless grapes, halved

$\frac{1}{2}$ orange, sectioned

10 fresh strawberries, halved

$\frac{3}{5}$ apple, cored and diced

$\frac{2}{3}$ peach, sliced

1 plum, pitted and sliced

$\frac{1}{4}$ cup fresh blueberries

a. What are the new amounts for the oranges, apples, blueberries, and peaches?

_____

_____

_____

_____

b. Communicate Mathematical Ideas
The amount of rhubarb in the original recipe is $3\frac{1}{2}$ cups. Using what you know of whole numbers and what you know of fractions, explain how you could triple that mixed number.

_____

_____

_____

_____

Rewriting Division as Multiplication

You can rewrite a division expression as a multiplication expression by changing the order of the terms.

EXAMPLE

COMMON CORE 6.NS.1

Rewrite $\frac{5}{8} \div \frac{7}{8} = \frac{5}{7}$ as a multiplication problem.

STEP 1 The dividend becomes the product, or answer, in the multiplication equation.

STEP 2 The divisor becomes one of the factors in the multiplication equation.

STEP 3 The quotient becomes the other factor in the multiplication equation.

$$\frac{5}{8} \div \frac{7}{8} = \frac{5}{7}$$

$$\frac{5}{7} \times \frac{7}{8} = \frac{5}{8}$$

Practice

Q Complete the table below by using the completed equation to fill in the missing fraction in the incomplete equation.

	Division	Multiplication
1.	$\frac{7}{4} \div \frac{6}{12} = \frac{7}{2}$	$\frac{7}{2} \times \frac{6}{12} = \boxed{}$
2.	$\frac{1}{3} \div \frac{3}{9} = 1$	$1 \times \boxed{} = \frac{1}{3}$
3.	$\frac{4}{8} \div \frac{9}{2} = \frac{1}{9}$	$\boxed{} \times \frac{9}{2} = \frac{4}{8}$
4.	$\boxed{} \div \frac{8}{9} = \frac{9}{56}$	$\frac{9}{56} \times \frac{8}{9} = \frac{1}{7}$
5.	$\frac{9}{5} \div \boxed{} = \frac{9}{10}$	$\frac{9}{10} \times \frac{10}{5} = \frac{9}{5}$
6.	$\frac{7}{1} \div \frac{4}{3} = \boxed{}$	$\frac{21}{4} \times \frac{4}{3} = \frac{7}{1}$

Modeling Fraction Division

6.NS.1
Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

? ESSENTIAL QUESTION

How can you model fraction division?

EXPLORE ACTIVITY 6.NS.1

Modeling Division

Just like division of whole numbers, one method of solving a division problem with fractions is to make a model.

Model the division expression and find the quotient.

$15 \div 3$

A To model 15, draw 15 dots.

• • • • •
• • • • •
• • • • •

B To model dividing by 3, circle groups of _____ in the model above.

C How many circles did you draw? _____

Therefore, $15 \div 3 =$ _____ .

Reflect

1. **Make a Conjecture** Using the Explore Activity above, make a conjecture about how to model a fraction division problem.

_____

_____

_____

Using Models to Divide Mixed Fractions

You can use a model to show division with mixed fractions the same way you modeled division with whole numbers.

EXAMPLE 6.NS.1

Model the division expression and find the quotient.

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

STEP 1 Model the dividend. To model $3\frac{1}{3}$ draw four rectangles of equal size. Then shade $3\frac{1}{3}$ of the rectangles.

STEP 2 Circle groups of $\frac{2}{3}$ which is groups of two $\frac{1}{3}$-pieces.

1 2 3   4   5

There are 5 groups of $\frac{2}{3}$. So, $3\frac{1}{3} \div \frac{2}{3} = 5$.

Practice

Model each fraction division expression, then find the quotient.

1. $2\frac{2}{4} \div \frac{2}{4} =$ ____

2. $\frac{4}{6} \div \frac{1}{6} =$ ____

3. $\frac{8}{2} \div \frac{1}{2} =$ ____

LESSON
4.2 Dividing Fractions

COMMON CORE **6.NS.1**
Interpret and compute quotients of fractions, …, e.g., by using visual fraction models…. .

? **ESSENTIAL QUESTION**

How do you divide fractions?

EXPLORE ACTIVITY 1 Real World · COMMON CORE **6.NS.1**

Modeling Fraction Division

In some division problems, you may know a number of groups and need to find how many or how much are in each group. In other division problems, you may know how many there are in each group and need to find the number of groups.
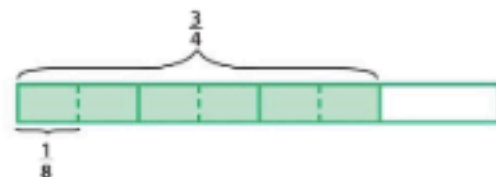
A You have $\frac{3}{4}$ cup of salsa for making burritos. Each burrito requires $\frac{1}{8}$ cup of salsa. How many burritos can you make?

To find the number of burritos that can be made, you need to determine how many $\frac{1}{8}$-cup servings are in $\frac{3}{4}$ cup. Use the diagram. How many eighths

are there in $\frac{3}{4}$? _____

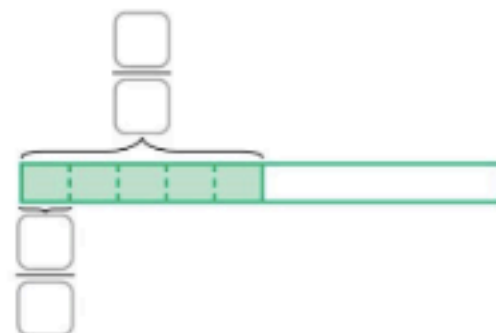You have enough salsa to make _____ burritos.

$\frac{3}{4}$

$\frac{1}{8}$

B Five people share $\frac{1}{2}$ pound of cheese equally. How much cheese does each person receive?

To find how much cheese each person receives, you need to determine how

much is in each of _____ parts.

How much is in each part? _____

Each person will receive _____ pound.

Reflect

1. Write the division shown by each model.

_____

Reciprocals

Another way to divide fractions is to use *reciprocals*. Two numbers whose product is 1 are **reciprocals**.

$\frac{3}{4} \times \frac{4}{3} = \frac{12}{12} = 1$ $\frac{3}{4}$ and $\frac{4}{3}$ are reciprocals.

To find the reciprocal of a fraction, switch the numerator and denominator.

$\frac{numerator}{denominator} \cdot \frac{denominator}{numerator} = 1$

EXAMPLE 1 COMMON CORE Prep for 6.NS.1

Find the reciprocal of each number.

A $\frac{2}{9}$ ⤫ $\frac{9}{2}$ Switch the numerator and denominator.

The reciprocal of $\frac{2}{9}$ is $\frac{9}{2}$

B $\frac{1}{8}$ ⤫ $\frac{8}{1}$ Switch the numerator and denominator.

The reciprocal of $\frac{1}{8}$ is $\frac{8}{1}$, or 8.

C 5

$5 = \frac{5}{1}$ Rewrite as a fraction.

$\frac{5}{1}$ ⤫ $\frac{1}{5}$ Switch the numerator and the denominator.

The reciprocal of 5 is $\frac{1}{5}$.

Math Talk
Mathematical Practices

How can you check that the reciprocal in **A** is correct?

Reflect

2. Is any number its own reciprocal? If so, what number(s)? Justify your answer.

_____

3. **Communicate Mathematical Ideas** Does every number have a reciprocal? Explain.

_____

_____

4. The reciprocal of a whole number is a fraction with _____ in the numerator.
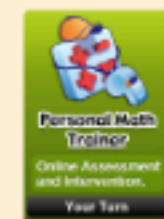
YOUR TURN

Find the reciprocal of each number.

5. $\frac{7}{8}$ _____   **6.** 9 _____   **7.** $\frac{1}{11}$ _____

EXPLORE ACTIVITY 2 COMMON CORE 6.NS.1

Using Reciprocals to Find Equivalent Values

A Complete the table below.

Division	Multiplication
$\frac{6}{7} \div \frac{2}{7} = 3$	$\frac{6}{7} \times \frac{7}{2} =$
$\frac{5}{8} \div \frac{3}{8} = \frac{5}{3}$	$\frac{5}{8} \times \frac{8}{3} =$
$\frac{1}{6} \div \frac{5}{6} = \frac{1}{5}$	$\frac{1}{6} \times \frac{6}{5} =$
$\frac{1}{4} \div \frac{1}{3} = \frac{3}{4}$	$\frac{1}{4} \times \frac{3}{1} =$

**B** How does each multiplication problem compare to its corresponding division problem?

_____

_____

_____

C How does the answer to each multiplication problem compare to the answer to its corresponding division problem?

_____

_____

Reflect

8. Make a Conjecture Use the pattern in the table to make a conjecture about how you can use multiplication to divide one fraction by another.

_____

_____

_____

9. Write a division problem and a corresponding multiplication problem like those in the table. Assuming your conjecture in **8** is correct, what is the answer to your division problem?

_____

_____

_____
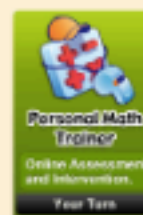
Using Reciprocals to Divide Fractions

Dividing by a fraction is equivalent to multiplying by its reciprocal.

$$\frac{1}{5} \div \frac{1}{4} = \frac{4}{5} \qquad \frac{1}{5} \times \frac{4}{1} = \frac{4}{5}$$

EXAMPLE 2 COMMON CORE 6.NS.1

Divide $\frac{5}{9} \div \frac{2}{3}$. Write the quotient in simplest form.

STEP 1 Rewrite as multiplication, using the reciprocal of the divisor.

$$\frac{5}{9} \div \frac{2}{3} = \frac{5}{9} \times \frac{3}{2}$$
The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

STEP 2 Multiply and simplify.

$$\frac{5}{9} \times \frac{3}{2} = \frac{15}{18}$$
Multiply the numerators. Multiply the denominators

$$= \frac{5}{6}$$
Write the answer in simplest form.

$$\frac{5}{9} \div \frac{2}{3} = \frac{5}{6}$$

$$\frac{15 \div 3}{18 \div 3} = \frac{5}{6}$$

YOUR TURN

Divide.

10. $\frac{9}{10} \div \frac{2}{5} =$ _____

11. $\frac{9}{10} \div \frac{3}{5} =$ _____

Guided Practice

Find the reciprocal of each fraction. (Example 1)

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

2. $\frac{1}{9}$ _____

3. $\frac{10}{3}$ _____

Divide. (Explore 1, Explore 2, and Example 2)

4. $\frac{4}{3} \div \frac{5}{3} =$ _____

5. $\frac{3}{10} \div \frac{4}{5} =$ _____

6. $\frac{1}{2} \div \frac{2}{5} =$ _____

? ESSENTIAL QUESTION CHECK-IN

7. How do you divide fractions?

_____

4.2 Independent Practice

COMMON CORE 6.NS.1

8. Alison has $\frac{1}{2}$ cup of yogurt for making fruit parfaits. Each parfait requires $\frac{1}{8}$ cup of yogurt. How many parfaits can she make?

9. A team of runners is needed to run a $\frac{1}{4}$-mile relay race. If each runner must run $\frac{1}{16}$ mile, how many runners will be needed?

10. Trevor paints $\frac{1}{6}$ of the fence surrounding his farm each day. How many days will it take him to paint $\frac{3}{4}$ of the fence?

11. Six people share $\frac{3}{5}$ pound of peanuts equally. What fraction of a pound of peanuts does each person receive?

12. Biology If one honeybee makes $\frac{1}{12}$ teaspoon of honey during its lifetime, how many honeybees are needed to make $\frac{1}{2}$ teaspoon of honey?

13. Jackson wants to divide a $\frac{3}{4}$-pound box of trail mix into small bags. Each of the bags will hold $\frac{1}{12}$ pound of trail mix. How many bags of trail mix can Jackson fill?

14. A pitcher contains $\frac{2}{3}$ quart of lemonade. If an equal amount of lemonade is poured into each of 6 glasses, how much lemonade will each glass contain?

15. How many tenths are there in $\frac{4}{5}$?

16. You make a large bowl of salad to share with your friends. Your brother eats $\frac{1}{3}$ of it before they come over.

   a. You want to divide the leftover salad evenly among six friends. What expression describes the situation? Explain.

   b. What fractional portion of the original bowl of salad does each friend receive?

Practice

Complete the real-world situation for each division equation.

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

It takes ▢ hour to build a birdhouse. If John works for ▢ hour today,

he can build ▢ birdhouses.

2. $1\frac{7}{8} \div \frac{3}{16} = 10$

Tom has a bottle of juice that contains ▢ quarts and is pouring

▢-quart servings. He can pour ▢ servings.

Write a real-world situation for each division equation.

3. $12\frac{2}{6} \div \frac{1}{3} = 37$

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

LESSON 4.3 Dividing Mixed Numbers

? ESSENTIAL QUESTION

How do you divide mixed numbers?

EXPLORE ACTIVITY   Real World   COMMON CORE 6.NS.1

Modeling Mixed Number Division

Antoine is making sushi rolls. He has $2\frac{1}{2}$ cups of rice and will use $\frac{1}{4}$ cup of rice for each sushi roll. How many sushi rolls can he make?

A To find the number of sushi rolls that can be made, you need to determine how many fourths are in $2\frac{1}{2}$. Use fraction pieces to represent $2\frac{1}{2}$ on the model below.

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

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$

B How many fourths are in $2\frac{1}{2}$? _____

Antoine has enough rice to make _____ sushi rolls.

Reflect

1. Communicate Mathematical Ideas Which mathematical operation could you use to find the number of sushi rolls that Antoine can make? Explain.

_____

_____

2. Multiple Representations Write the division shown by the model.

_____

3. What If? Suppose Antoine instead uses $\frac{1}{8}$ cup of rice for each sushi roll. How would his model change? How many rolls can he make? Explain.

_____

_____

_____

My Notes

Using Reciprocals to Divide Mixed Numbers

Dividing by a fraction is equivalent to multiplying by its reciprocal. You can use this fact to divide mixed numbers. First rewrite the mixed numbers as fractions greater than 1. Then multiply the dividend by the reciprocal of the divisor.

EXAMPLE 1   Real World   COMMON CORE 6.NS.1

One serving of Harold's favorite cereal contains $1\frac{2}{5}$ ounces. How many servings are in a $17\frac{1}{2}$-ounce box?

STEP 1 Write a division statement to represent the situation.

$17\frac{1}{2} \div 1\frac{2}{5}$

> You need to find how many groups of $1\frac{2}{5}$ are in $17\frac{1}{2}$.

STEP 2 Rewrite the mixed numbers as fractions greater than 1.

$17\frac{1}{2} \div 1\frac{2}{5} = \frac{35}{2} \div \frac{7}{5}$

STEP 3 Rewrite the problem as multiplication using the reciprocal of the divisor.

$\frac{35}{2} \div \frac{7}{5} = \frac{35}{2} \times \frac{5}{7}$ The reciprocal of $\frac{7}{5}$ is $\frac{5}{7}$.

STEP 4 Multiply.

$\frac{35}{2} \times \frac{5}{7} = \frac{\overset{5}{\cancel{35}}}{2} \times \frac{5}{\underset{1}{\cancel{7}}}$ Simplify first using the GCF.

$= \frac{5 \times 5}{2 \times 1}$ Multiply numerators. Multiply denominators.

$= \frac{25}{2}$, or $12\frac{1}{2}$ Write the result as a mixed number.

There are $12\frac{1}{2}$ servings of cereal in the box.

Reflect

4. Analyze Relationships Explain how can you check the answer.

_____

_____

5. What If? Harold serves himself $1\frac{1}{2}$-ounces servings of cereal each morning. How many servings does he get from a box of his favorite cereal? Show your work.

_____

_____

YOUR TURN

6. Sheila has $10\frac{1}{2}$ pounds of potato salad. She wants to divide the potato salad into containers, each of which holds $1\frac{1}{4}$ pounds. How many containers does she need? Explain.

_____

Solving Problems Involving Area

Recall that to find the area of a rectangle, you multiply length × width. If you know the area and only one dimension, you can divide the area by the known dimension to find the other dimension.

EXAMPLE 2 — Real World

COMMON CORE 6.NS.1

The area of a rectangular sandbox is $56\frac{2}{3}$ square feet. The length of the sandbox is $8\frac{1}{2}$ feet. What is the width?

STEP 1 Write the situation as a division problem.

$$56\frac{2}{3} \div 8\frac{1}{2}$$

STEP 2 Rewrite the mixed numbers as fractions greater than 1.

$$56\frac{2}{3} \div 8\frac{1}{2} = \frac{170}{3} \div \frac{17}{2}$$

STEP 3 Rewrite the problem as multiplication using the reciprocal of the divisor.

$$\frac{170}{3} \div \frac{17}{2} = \frac{170}{3} \times \frac{2}{17}$$

$$= \frac{\overset{10}{170} \times 2}{3 \times \underset{1}{17}}$$ Multiply numerators. Multiply denominators.

$$= \frac{20}{3}, \text{ or } 6\frac{2}{3}$$ Simplify and write as a mixed number.

The width of the sandbox is $6\frac{2}{3}$ feet.

Math Talk
Mathematical Practices
Explain how to find the length of a rectangle when you know the area and the width.

Reflect

7. **Check for Reasonableness** How can you determine if your answer is reasonable?

_____

_____

_____

YOUR TURN

8. The area of a rectangular patio is $12\frac{3}{8}$ square meters. The width of the patio is $2\frac{3}{4}$ meters. What is the length? _____

9. The area of a rectangular rug is $14\frac{1}{12}$ square yards. The length of the rug is $4\frac{1}{3}$ yards. What is the width? _____

Guided Practice

Divide. Write each answer in simplest form. (Explore Activity and Example 1)

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

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

$$\frac{\boxed{}}{4} \times \frac{\boxed{}}{\boxed{}} =$$

_____

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

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

$$\frac{\boxed{}}{2} \times \frac{\boxed{}}{\boxed{}} =$$

_____

3. $4 \div 1\frac{1}{8} = $ _____

4. $3\frac{1}{5} \div 1\frac{1}{7} = $ _____

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

6. $15\frac{1}{3} \div 3\frac{5}{6} = $ _____

Write each situation as a division problem. Then solve. (Example 2)

7. A sandbox has an area of 26 square feet, and the length is $5\frac{1}{2}$ feet. What is the width of the sandbox?

_____

8. Mr. Webster is buying carpet for an exercise room in his basement. The room will have an area of 230 square feet. The width of the room is $12\frac{1}{2}$ feet. What is the length?

_____

? ESSENTIAL QUESTION CHECK-IN

9. How does dividing mixed numbers compare with dividing fractions?

_____

_____

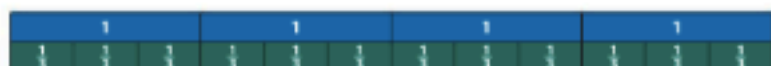Name_____ Class_____ Date_____

4.3 Independent Practice

COMMON CORE 6.NS.1

10. Jeremy has $4\frac{1}{2}$ cups of iced tea. He wants to divide the tea into $\frac{3}{4}$-cup servings. Use the model to find the number of servings he can make.

11. A ribbon is $3\frac{2}{3}$ yards long. Mae needs to cut the ribbon into pieces that are $\frac{2}{3}$ yard long. Use the model to find the number of pieces she can cut.

12. Dao has $2\frac{3}{8}$ pounds of hamburger meat. He is making $\frac{1}{4}$-pound hamburgers. Does Dao have enough meat to make 10 hamburgers? Explain.

_____

_____

13. **Multistep** Zoey made $5\frac{1}{2}$ cups of trail mix for a camping trip. She wants to divide the trail mix into $\frac{3}{4}$-cup servings.

a. Ten people are going on the camping trip. Can Zoey make enough $\frac{3}{4}$-cup servings so that each person on the trip has one serving?

_____

b. What size would the servings need to be for everyone to have a serving? Explain.

_____

c. If Zoey decides to use the $\frac{3}{4}$-cup servings, how much more trail mix will she need? Explain.

_____

_____

14. The area of a rectangular picture frame is $30\frac{1}{3}$ square inches. The length of the frame is $6\frac{1}{2}$ inches. Find the width of the frame.

_____

LESSON 4.4 Solving Multistep Problems with Fractions and Mixed Numbers

COMMON CORE 6.NS.1
...Solve word problems involving division of fractions by fractions...

? ESSENTIAL QUESTION

How can you solve word problems involving more than one fraction operation?

EXPLORE ACTIVITY Problem Solving   **COMMON CORE** 6.NS.1

Solving Rational Number Problems

Sometimes more than one operation will be needed to solve a multistep problem. You can use parentheses to group different operations. Recall that according to the **order of operations**, you perform operations in parentheses first.

EXAMPLE 1 Jon is cooking enough lentils for lentil barley soup and lentil salad. The soup recipe calls for $\frac{3}{4}$ cup of dried lentils. The salad recipe calls for $1\frac{1}{2}$ cups of dried lentils. Jon has a $\frac{1}{8}$-cup scoop. How many scoops of dried lentils will Jon need to have enough for the soup and the salad?

Analyze Information

Identify the important information.

• Jon needs _____ cup of dried lentils for soup and _____ cups for salad.

• Jon has a _____ cup scoop.

• You need to find the total number of _____ he needs.

Formulate a Plan

You can use the expression $\left(\frac{3}{4} + 1\frac{1}{2}\right) \div \frac{1}{8}$ to find the number of scoops of dried lentils Jon will need for the soup and the salad.

Solve

Follow the order of operations.

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

Perform the operations in parentheses first.

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

Find the total amount of dried lentils Jon will need.

$$= \frac{\square}{\square} \qquad = \square\frac{\square}{\square}$$

EXPLORE ACTIVITY (cont'd)

Q Jon needs _____ cups of dried lentils for both the soup and the salad.

To find how many $\frac{1}{8}$-cup scoops he needs, divide the total amount of dried lentils into groups of _____.

$$2\frac{1}{4} \div \frac{1}{8} = \frac{9}{4} \div \boxed{}$$

$$= \frac{9}{4} \times \boxed{}$$

$$= \frac{9 \times \cancel{8}}{\cancel{4} \times 1} \boxed{}$$

$$= \frac{18}{1} = 18$$

Jon will need 18 scoops of dried lentils to have enough for both the lentil barley soup and the lentil salad.

Personal Math Trainer
Online Assessment and Intervention
Guided Practice

Selected Answers
See all the selected answers.

Justify and Evaluate

You added _____ cups and _____ cups first to find the total number

of cups of lentils. Then you divided the sum by _____ to find the

number of $\frac{1}{8}$-cup scoops.

YOUR TURN

Personal Math Trainer
Online Assessment and Intervention
Your Turn

Q 1. Before conducting some experiments, a scientist mixes $\frac{1}{2}$ gram of Substance A with $\frac{3}{4}$ gram of Substance B. If the scientist uses $\frac{1}{8}$ gram of the mixture for each experiment, how many experiments can be conducted? _____

Guided Practice

1. An art student uses a roll of wallpaper to decorate two gift boxes. The student will use $1\frac{1}{3}$ yards of paper for one box and $\frac{5}{6}$ yard of paper for the other box. The paper must be cut into pieces that are $\frac{1}{6}$ yard long. How many pieces will the student cut to use for the gift boxes? (Explore Activity Example 1) _____

? ESSENTIAL QUESTION CHECK-IN

2. How can you solve a multistep problem that involves fractions?

_____

4.4 Independent Practice

COMMON CORE 6.NS.1

Personal Math Trainer
Online Assessment and Intervention
Independent Practice

Selected Answers
See all the selected answers.

Q 3. Naomi has earned $54 mowing lawns the past two days. She worked $2\frac{1}{2}$ hours yesterday and $4\frac{1}{4}$ hours today. If Naomi is paid the same amount for every hour she works, how much does she earn per hour to mow lawns?

_____

4. An art teacher has $1\frac{1}{2}$ pounds of red clay and $\frac{3}{4}$ pound of yellow clay. The teacher mixes the red clay and yellow clay together. Each student in the class needs $\frac{1}{8}$ pound of the clay mixture to finish the assigned art project for the class. How many students can get enough clay to finish the project?

_____

5. A hairstylist schedules $\frac{1}{4}$ hour to trim a customer's hair and $\frac{1}{6}$ hour to style the customer's hair. The hairstylist plans to work $3\frac{1}{3}$ hours each day for 5 days each week. How many appointments can the hairstylist schedule each week if each customer must be trimmed and styled?

_____

6. A picture framer has a thin board $10\frac{1}{12}$ feet long. The framer notices that $2\frac{3}{8}$ feet of the board is scratched and cannot be used. The rest of the board will be used to make small picture frames. Each picture frame needs $1\frac{2}{3}$ feet of the board. At most, how many complete picture frames can be made?

_____

7. Jim's backyard is a rectangle that is $15\frac{5}{6}$ yards long and $10\frac{2}{5}$ yards wide. Jim buys sod in pieces that are $1\frac{1}{3}$ yards long and $1\frac{1}{3}$ yards wide. How many pieces of sod will Jim need to buy to cover his backyard with sod?

_____

8. Eva wants to make two pieces of pottery. She needs $\frac{3}{5}$ pound of clay for one piece and $\frac{7}{10}$ pound of clay for the other piece. She has three bags of clay that weigh $\frac{4}{5}$ pound each. How many bags of clay will Eva need to make both pieces of pottery? How many pounds of clay will she have left over?

_____

9. Mark wants to paint a mural. He has $1\frac{1}{3}$ gallons of yellow paint, $1\frac{1}{4}$ gallons of green paint, and $\frac{7}{8}$ gallon of blue paint. Mark plans to use $\frac{3}{4}$ gallon of each paint color. How many gallons of paint will he have left after painting the mural?

_____

MODULE QUIZ

Ready to Go On?

4.1 Applying GCF and LCM to Fraction Operations

Q

Solve.

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

2. $\frac{5}{7} \times \frac{9}{10}$ _____

3. $\frac{3}{8} + 2\frac{1}{2}$ _____

4. $1\frac{3}{5} - \frac{5}{6}$ _____

4.2 Dividing Fractions

Q

Divide.

5. $\frac{1}{3} \div \frac{7}{9}$ _____

6. $\frac{1}{3} \div \frac{5}{8}$ _____

7. Luci cuts a board that is $\frac{3}{4}$ yard long into pieces that are $\frac{3}{8}$ yard long. How many pieces does she cut? _____

4.3 Dividing Mixed Numbers

Q

Divide.

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

9. $1\frac{7}{8} \div 2\frac{2}{5}$ _____

10. $4\frac{1}{4} \div 4\frac{1}{2}$ _____

11. $8\frac{1}{3} \div 4\frac{2}{7}$ _____

4.4 Solving Multistep Problems with Fractions and Mixed Numbers

Q

12. Jamal hiked on two trails. The first trail was $5\frac{1}{3}$ miles long, and the second trail was $1\frac{3}{4}$ times as long as the first trail. How many miles did Jamal hike? _____

? ESSENTIAL QUESTION

Q

13. Describe a real-world situation that is modeled by dividing two fractions or mixed numbers.

_____

_____

_____

COMMON CORE

MODULE 4 MIXED REVIEW
Assessment Readiness

Selected Response

Q

1. Two sides of a rectangular fence are $5\frac{5}{8}$ feet long. The other two sides are $6\frac{1}{4}$ feet long. What is the perimeter?

   Ⓐ $11\frac{7}{8}$ feet   Ⓑ 13 feet

   Ⓒ $23\frac{3}{4}$ feet   Ⓓ $35\frac{5}{32}$ feet

2. Which shows the GCF of 18 and 24 with $\frac{18}{24}$ in simplest form?

   Ⓐ GCF: 3; $\frac{3}{4}$

   Ⓑ GCF: 3; $\frac{6}{8}$

   Ⓒ GCF: 6; $\frac{3}{4}$

   Ⓓ GCF: 6; $\frac{6}{8}$

3. A jar contains 133 pennies. A bigger jar contains $1\frac{2}{7}$ times as many pennies. What is the value of the pennies in the bigger jar?

   Ⓐ $1.49   Ⓑ $1.52

   Ⓒ $1.68   Ⓓ $1.71

4. Which of these is the same as $\frac{3}{5} \div \frac{4}{7}$?

   Ⓐ $\frac{3}{5} \div \frac{7}{4}$

   Ⓑ $\frac{4}{7} \div \frac{3}{5}$

   Ⓒ $\frac{3}{5} \times \frac{4}{7}$

   Ⓓ $\frac{3}{5} \times \frac{7}{4}$

5. Andy has $6\frac{2}{3}$ cups of juice. How many $\frac{2}{3}$-cup servings can he pour?

   Ⓐ $4\frac{4}{9}$ Ⓑ 6

   Ⓒ 7   Ⓓ 10

6. What is the reciprocal of $3\frac{3}{7}$?

   Ⓐ $\frac{7}{24}$ Ⓑ $\frac{3}{7}$

   Ⓒ $\frac{7}{3}$ Ⓓ $\frac{24}{7}$

7. A rectangular patio has a length of $12\frac{1}{2}$ feet and an area of $103\frac{1}{8}$ square feet. What is the width of the patio?

   Ⓐ $4\frac{1}{8}$ feet

   Ⓑ $8\frac{1}{4}$ feet

   Ⓒ $16\frac{1}{2}$ feet

   Ⓓ 33 feet

8. Which number is greater than the absolute value of $-\frac{3}{8}$?

   Ⓐ $-\frac{5}{8}$

   Ⓑ $-\frac{1}{8}$

   Ⓒ $\frac{1}{4}$

   Ⓓ 0.5

Mini-Task

Q

9. Jodi is cutting out pieces of paper that measure $8\frac{1}{2}$ inches by 11 inches from a larger sheet of paper that has an area of 1,000 square inches

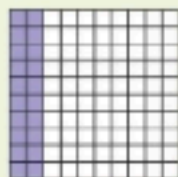   a. What is the area of each piece of paper that Jodi is cutting out?

   _____

   b. What is the greatest possible number of pieces of paper that Jodi can cut out of the larger sheet?

   _____

Are YOU Ready?

Complete these exercises to review skills you will need for this module.

Personal Math Trainer
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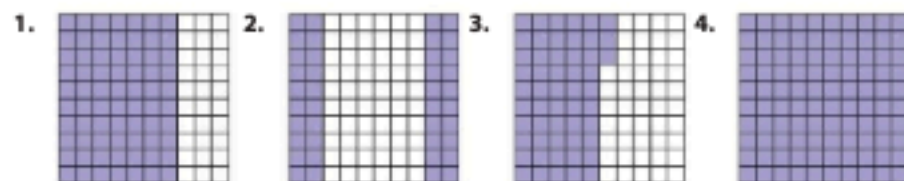Are You Ready?

Represent Decimals

EXAMPLE

Think: 1 square = 1 of 100 equal parts
$= \frac{1}{100}$, or 0.01

10 squares = 10 of 100 equal parts
$= \frac{1}{10}$, or 0.1

So, 20 squares represent 2 × 0.1, or 0.2.

Write the decimal represented by the shaded square.

1. _____ **2.** _____ **3.** _____ **4.** _____

Multiply Decimals by Powers of 10

EXAMPLE   6.574 × 100   Count the zeros in 100: 2 zeros.

6.574 × 100 = 657.4   Move the decimal point 2 places to the right.

Find the product.

5. 0.49 × 10 _____   **6.** 25.34 × 1,000 _____   **7.** 87 × 100 _____

Words for Operations

EXAMPLE   Write a numerical expression for the product of 5 and 9.   Think: *Product* means "to multiply."

5 × 9   Write 5 times 9.

Write a numerical expression for the word expression.

8. 20 decreased by 8 _____   **9.** the quotient of 14 and 7 _____

10. the difference between 72 and 16 _____   **11.** the sum of 19 and 3 _____

LESSON 5.1 Dividing Whole Numbers

COMMON CORE 6.NS.2
…Divide multi-digit numbers using the standard algorithm.…

? ESSENTIAL QUESTION

How do you divide multi-digit whole numbers?

EXPLORE ACTIVITY Real World   **COMMON CORE 6.NS.2**

Estimating Quotients

You can use estimation to predict the quotient of multi-digit whole numbers.

A local zoo had a total of 98,464 visitors last year. The zoo was open every day except for three holidays. On average, about how many visitors did the zoo have each day?

A To estimate the average number of visitors per day, you can divide the total number of visitors by the number of days. To estimate the quotient, first estimate the dividend by rounding the number of visitors to the nearest ten thousand.

98,464 rounded to the nearest ten thousand is _____.

B There were 365 days last year. How many

days was the petting zoo open? _____

C Estimate the divisor by rounding the number of days that the zoo was open to the nearest hundred.

_____ rounded to the nearest hundred is _____.

D Estimate the quotient. _____ ÷ _____ = _____

The average number of visitors per day last year was about _____.

quotient
divisor) dividend

Reflect

1. How can you check that your quotient is correct?

_____

_____

2. **Critical Thinking** Do you think that your estimate is greater than or less than the actual answer? Explain.

_____

Using Long Division

The exact average number of visitors per day at the zoo in the Explore Activity is the quotient of 98,464 and 362. You can use long division to find this quotient.

EXAMPLE 1 · Real World

6.NS.2

A local zoo had a total of 98,464 visitors last year. The zoo was open every day except three holidays? On average, how many visitors did the zoo have each day?

STEP 1 362 is greater than 9 and 98, so divide 984 by 362. Place the first digit in the quotient in the hundreds place. Multiply 2 by 362 and place the product under 984. Subtract.

```
         2
362) 98,464
    − 72 4
      26 0
```

Math Talk
Mathematical Practices
How does the estimate from the Explore Activity compare to the actual average number of visitors per day?

STEP 2 Bring down the tens digit. Divide 2,606 by 362. Multiply 7 by 362 and place the product under 2,606. Subtract.

```
        27
362) 98,464
    − 72 4↓
      26 06
    − 25 34
         72
```

STEP 3 Bring down the ones digit. Divide the ones.

```
       272
362) 98,464
    − 72 4
      26 06
    − 25 34↓
        724
      − 724
          0
```

The average number of visitors per day last year was 272.

YOUR TURN

Find each quotient.

3. 34,989 ÷ 321 _____

4. 73,375 ÷ 125 _____

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Dividing with a Remainder

Suppose you and your friend want to divide 9 polished rocks between you so that you each get the same number of polished rocks. You will each get 4 rocks with 1 rock left over. You can say that the quotient 9 ÷ 2 has a remainder of 1.

EXAMPLE 2 · Real World

6.NS.2

Callie has 1,850 books. She must pack them into boxes to ship to a bookstore. Each box holds 12 books. How many boxes will she need to pack all of the books?

Divide 1,850 by 12.

```
        154 R2
12) 1,850
   −12
     65
    −60
     50
    −48
      2
```

The quotient is 154, remainder 2. You can write 154 R2.

Reflect

5. Interpret the Answer What does the remainder mean in this situation?

_____

_____

6. Interpret the Answer How many boxes does Callie need to pack the books? Explain.

_____

_____

YOUR TURN

Divide.

7. 5,796 ÷ 25 _____

8. 67) 3,098 _____

9. A museum gift shop manager wants to put 1,578 polished rocks into small bags to sell as souvenirs. If the shop manager wants to put 15 rocks in each bag, how many complete bags can be filled? How many rocks will be left over? _____

My Notes

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Guided Practice

1. Estimate: $31{,}969 \div 488$ (Explore Activity)

Round the numbers and then divide.

$31{,}969 \div 488 =$ _____ $\div$ _____ $=$ _____

Divide. (Example 1, Example 2)

2. $3{,}072 \div 32 =$ _____ **3.** $4{,}539 \div 51 =$ _____ **4.** $9{,}317 \div 95 =$ _____

$$32 \overline{)3{,}0\ 7\ 2}$$

$$51 \overline{)4{,}5\ 3\ 9}$$

$$95 \overline{)9{,}3\ 1\ 7}$$

5. $2{,}226 \div 53 =$ _____ **6.** Divide 4,514 by 74. _____ **7.** $3{,}493 \div 37 =$ _____

8. $2{,}001 \div 83 =$ _____ **9.** $39{,}751 \div 313 =$ _____ **10.** $35{,}506 \div 438 =$ _____

11. During a food drive, a local middle school collected 8,982 canned food items. Each of the 28 classrooms that participated in the drive donated about the same number of items. Estimate the number of items each classroom donated. (Explore Activity) _____

12. A theater has 1,120 seats in 35 equal rows. How many seats are in each row? (Example 1) _____

13. There are 1,012 souvenir paperweights that need to be packed in boxes. Each box will hold 12 paperweights. How many boxes will be needed? (Example 2) _____

? ESSENTIAL QUESTION CHECK-IN

14. What steps do you take to divide multi-digit whole numbers?

_____

_____

_____

_____

Name _____ Class _____ Date _____

5.1 Independent Practice

6.NS.2

Divide.

15. $44{,}756 \div 167 =$ _____ **16.** $87{,}628 \div 931 =$ _____

17. $66{,}253 \div 317 =$ _____ **18.** $76{,}255 \div 309 =$ _____

19. $50{,}779 \div 590 =$ _____ **20.** $97{,}156 \div 107 =$ _____

**21.** $216{,}016 \div 368 =$ _____ **22.** $107{,}609 \div 72 =$ _____

23. Emilio has 8,450 trees to plant in rows on his tree farm. He will plant 125 trees per row. How many full rows of trees will he have? Explain.

_____

_____

24. Camilla makes and sells jewelry. She has 8,160 silver beads and 2,880 black beads to make necklaces. Each necklace will contain 85 silver beads

and 30 black beads. How many necklaces can she make? _____

25. During a promotional weekend, a state fair gives a free admission to every 175th person who enters the fair. On Saturday, there were 6,742 people attending the fair. On Sunday, there were 5,487 people attending the fair. How many people received a free admission over the two days?

_____

26. How is the quotient $80{,}000 \div 2{,}000$ different from the quotient $80{,}000 \div 200$ or $80{,}000 \div 20$?

_____

_____

27. Given that $9{,}554 \div 562 = 17$, how can you find the quotient $95{,}540 \div 562$?

_____

_____

28. **Earth Science** The diameter of the Moon is about 3,476 kilometers. The distance from Earth to the Moon is about 384,400 kilometers. About how many moons could be lined up in a row between Earth and the Moon? Round to the nearest whole number.

Diameter 3,476 km

_____
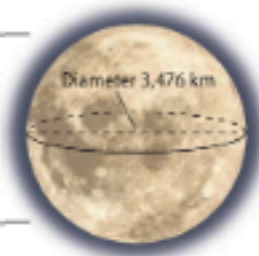
LESSON 5.2 Adding and Subtracting Decimals

? ESSENTIAL QUESTION

How do you add and subtract decimals?

EXPLORE ACTIVITY Real World   COMMON CORE 6.NS.3

Modeling Decimal Addition

You have probably used decimal grids to model decimals. For example, the decimal 0.25, or $\frac{25}{100}$, can be modeled by shading 25 squares in a 10 × 10 grid. You can also use decimal grids to add decimal values.

A chemist combines 0.17 mL of water and 0.49 mL of hydrogen peroxide in a beaker. How much total liquid is in the beaker?
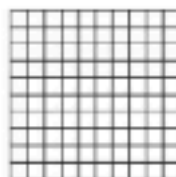
A How many grid squares should you shade to represent 0.17 mL of water? Why?

_____

B How many grid squares should you shade to represent 0.49 mL of hydrogen peroxide?

_____

C Use the grid at the right to model the addition. Use one color for 0.17 mL of water and another color for 0.49 mL of hydrogen peroxide.

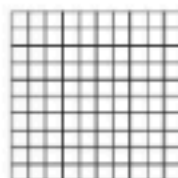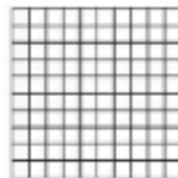**D** How much total liquid is in the beaker? $0.17 + 0.49 =$ _____ mL

Reflect

Multiple Representations Show how to shade each grid to represent the sum. Then find the sum.

1. $0.24 + 0.71 =$ _____

2. $0.08 + 0.65 =$ _____

Adding Decimals

Adding decimals is similar to adding whole numbers. First align the numbers by place value. Start adding at the right and regroup when necessary. Bring down the decimal point into your answer.

EXAMPLE 1 Real World   COMMON CORE 6.NS.3

Susan rode her bicycle 3.12 miles on Monday and 4.7 miles on Tuesday. How many miles did she ride in all?

STEP 1 Align the decimal points.

STEP 2 Add zeros as placeholders when necessary.

	3	.	1	2
+	4	.	7	0
	7	.	8	2

STEP 3 Add from right to left.

Susan rode 7.82 miles in all.

STEP 4 Use estimation to check that the answer is reasonable. Round each decimal to the nearest whole number.

$$\begin{array}{ccc} 3.12 & \longrightarrow & 3 \\ + 4.70 & \longrightarrow & + 5 \\ \hline 7.82 & & 8 \end{array}$$

Since 8 is close to 7.82, the answer is reasonable.

Reflect

3. Why can you rewrite 4.7 as 4.70?

_____

_____

4. Why is it important to align the decimal points when adding?

_____

_____
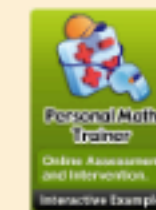
YOUR TURN

Add.

5. $0.42 + 0.27 =$ _____

6. $0.61 + 0.329 =$ _____

7. $3.25 + 4.6 =$ _____

8. $17.27 + 3.88 =$ _____

Subtracting Decimals

The procedure for subtracting decimals is similar to the procedure for adding decimals.

EXAMPLE 2 Real World   COMMON CORE **6.NS.3**

A Mia is 160.2 centimeters tall. Rosa is 165.1 centimeters tall. How much taller is Rosa than Mia?

STEP 1   Align the decimal points.

STEP 2   Add zeros as placeholders when necessary.

STEP 3   Subtract from right to left, regrouping when necessary.

	1	6	$\overset{4}{\cancel{5}}$	.	$\overset{1}{\cancel{1}}$
−	1	6	0	.	2
			4	.	9

Rosa is 4.9 centimeters taller than Mia.

To check that your answer is reasonable, you can estimate. Round each decimal to the nearest whole number.

$$165.1 \longrightarrow 165$$
$$- 160.2 \longrightarrow - 160$$
$$\overline{4.9} \qquad \overline{5}$$

Since 5 is close to 4.9, the answer is reasonable.

B Matthew throws a discus 58.7 meters. Zachary throws the discus 56.12 meters. How much farther did Matthew throw the discus?

STEP 1   Align the decimal points.

STEP 2   Add zeros as placeholders when necessary.

STEP 3   Subtract from right to left, regrouping when necessary.

	5	8	.	$\overset{6}{\cancel{7}}$	$\overset{10}{\cancel{0}}$
−	5	6	.	1	2
		2	.	5	8

Matthew threw the discus 2.58 meters farther than Zachary.

To check that your answer is reasonable, you can estimate. Round each decimal to the nearest whole number.

$$58.7 \longrightarrow 59$$
$$- 56.12 \longrightarrow - 56$$
$$\overline{2.58} \qquad \overline{3}$$

Since 3 is close to 2.58, the answer is reasonable.

Math on the Spot

My Notes

Math Talk
Mathematical Practices

How can you check a subtraction problem?
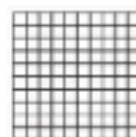

Guided Practice
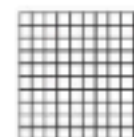
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Selected Answers See all the selected answers.

Shade the grid to find each sum. (Explore Activity)

1. $0.72 + 0.19 =$ _____

2. $0.38 + 0.4 =$ _____

Add. Check that your answer is reasonable. (Example 1)

3.
$$54.87 \longrightarrow 55$$
$$+ 7.48 \longrightarrow + 7$$

4.
$$2.19 \longrightarrow \boxed{}$$
$$+ 34.92 \longrightarrow + \boxed{}$$

5.
$$0.215 \longrightarrow \boxed{}$$
$$+ 3.74 \longrightarrow + \boxed{}$$

Subtract. Check that your answer is reasonable. (Example 2)

6.
$$9.73 \longrightarrow 10$$
$$- 7.16 \longrightarrow - 7$$

7.
$$18.419 \longrightarrow \boxed{}$$
$$- 6.47 \longrightarrow - \boxed{}$$

8.
$$5.006 \longrightarrow \boxed{}$$
$$- 3.2 \longrightarrow - \boxed{}$$

Add or subtract. (Example 1, Example 2)

9. $17.2 + 12.9 =$ _____

10. $28.341 + 37.5 =$ _____

11. $25.36 - 2.004 =$ _____

12. $15.52 - 8.17 =$ _____

13. $25.68 + 12 =$ _____

14. $150.25 - 78 =$ _____

15. Perry connects a blue garden hose and a green garden hose to make one long hose. The blue hose is 16.5 feet. The green hose is 14.75 feet. How long is the combined hose? (Example 1) _____

16. Keisha has $20.08 in her purse. She buys a book for $8.72. How much does she have left? (Example 2) _____

ESSENTIAL QUESTION CHECK-IN

17. How is adding and subtracting decimals similar to adding and subtracting whole numbers?

_____

_____

Name_____ Class_____ Date_____

5.2 Independent Practice

COMMON CORE 6.NS.3

Personal Math Trainer
Online Assessment and Intervention

Selected Answers
See all the selected answers.

Add or subtract.

18. $28.6 - 0.975 = $ _____

19. $5.6 - 0.105 = $ _____

20. $7.03 + 33.006 = $ _____

21. $57.42 + 4 + 1.602 = $ _____

22. $2.25 + 65.47 + 2.333 = $ _____

23. $18.419 - 6.47 = $ _____

24. $83 - 12.76 = $ _____

25. $102.01 - 95.602 = $ _____

26. **Multiple Representations** Ursula wrote the sum $5.815 + 6.021$ as a sum of two mixed numbers.

   a. What sum did she write? _____

   b. Compare the sum of the mixed numbers to the sum of the decimals. _____

Use the café menu to answer 27–29.

27. Stephen and Jahmya are having lunch. Stephen buys a garden salad, a veggie burger, and lemonade. Jahmya buys a fruit salad, a toasted cheese sandwich, and a bottle of water. Whose lunch cost more? How much more?

_____

28. Jahmya wants to leave $1.75 as a tip for her server. She has a $20 bill. How much change should she receive after paying for her food and leaving a tip?

_____

29. **What If?** In addition to his meal, Stephen orders a fruit salad for take-out, and wants to leave $2.25 as a tip for his server. He has a $10 bill and a $5 bill. How much change should he receive after paying for his lunch, the fruit salad, and the tip?

_____

30. A carpenter who is installing cabinets uses thin pieces of material called shims to fill gaps. The carpenter uses four shims to fill a gap that is 1.2 centimeters wide. Three of the shims are 0.75 centimeter, 0.125 centimeter, and 0.09 centimeter wide. What is the width of the fourth shim?

_____

Café Menu

Garden Salad **$2.29**
Fruit Salad **$2.89**

Veggie Burger **$4.75**
Toasted Cheese Sandwich **$4.59**

Bottle of Water **$1.39**
Lemonade **$1.29**

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LESSON
5.3 Multiplying Decimals

COMMON CORE 6.NS.3
Fluently ...multiply... multi-digit decimals using the standard algorithm....

? **ESSENTIAL QUESTION**

How do you multiply decimals?

EXPLORE ACTIVITY **COMMON CORE** 6.NS.3

Modeling Decimal Multiplication

Use decimal grids or area models to find each product.
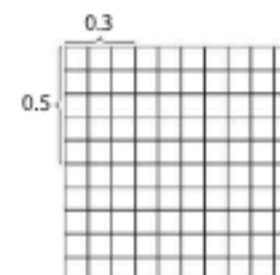
A **0.3 × 0.5**

0.3×0.5 represents 0.3 of 0.5. Shade 5 *rows* of the decimal grid to represent 0.5.

Shade 0.3 of each 0.1 that is already shaded

to represent 0.3 of _____.

_____ square(s) are double-shaded.

This represents _____ hundredth(s), or 0.15.

$0.3 \times 0.5 = $ _____

B **3.2 × 2.1**

Use an area model. In the model, the large squares represent wholes, the small rectangles along the right and lower edges represent tenths, and the small squares at the lower right represent hundredths. The model is 3 and 2 tenths units long, and 2 and 1 tenth unit wide.

The area of the model is

_____ whole(s) + _____ tenth(s) + _____ hundredth(s) square units.

$3.2 \times 2.1 = $ _____
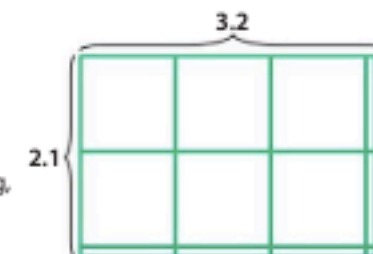
Reflect

1. **Analyze Relationships** How are the products 2.1×3.2 and 21×32 alike? How are they different?

_____

_____

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Multiplying Decimals

To multiply decimals, first multiply as you would with whole numbers. Then place the decimal point in the product. The number of decimal places in the product equals the sum of the number of decimal places in the factors.

EXAMPLE 1

6.NS.3

Delia bought 3.8 pounds of peppers. The peppers cost $1.99 per pound. What was the total cost of Delia's peppers?

$$\begin{array}{r} 1.99 \quad \leftarrow \quad 2 \text{ decimal places} \\ \times \quad 3.8 \quad \leftarrow + \quad 1 \text{ decimal place} \\ \hline 1592 \\ + 5970 \\ \hline 7.562 \quad \leftarrow \quad 3 \text{ decimal places} \end{array}$$

The peppers cost $7.56.

> Round the answer to hundredths to show a dollar amount.

Reflect

2. **Communicate Mathematical Ideas** How can you use estimation to check that you have placed the decimal point correctly in your product?

_____

_____

_____

_____

_____

YOUR TURN

Multiply.

3. $12.6 \leftarrow \boxed{}$ decimal place(s)
    $\times\ 15.3 \leftarrow +\boxed{}$ decimal place(s)
    $\overline{378}$

    $\boxed{}$
    $+\ \boxed{}$
    $\overline{\boxed{}} \leftarrow \boxed{}$ decimal place(s)

4. $9.76 \leftarrow \boxed{}$ decimal place(s)
    $\times\ 0.46 \leftarrow +\boxed{}$ decimal place(s)

    $\boxed{}$
    $+\ \boxed{}$
    $\overline{\boxed{}} \leftarrow \boxed{}$ decimal place(s)

Estimating to Check Reasonableness

In Example 1, you used estimation to check whether the decimal point was placed correctly in the product. You can also use estimation to check that your answer is reasonable.

EXAMPLE 2

6.NS.3

Blades of grass grow 3.75 inches per month. If the grass continues to grow at this rate, how much will the grass grow in 6.25 months?

$$\begin{array}{r} 3.75 \quad \leftarrow \quad 2 \text{ decimal places} \\ \times\ 6.25 \quad \leftarrow + \quad 2 \text{ decimal places} \\ \hline 1875 \\ 7500 \\ + 225000 \\ \hline 23.4375 \quad \leftarrow \quad 4 \text{ decimal places} \end{array}$$

The grass will grow 23.4375 inches in 6.25 months.
Estimate to check whether your answer is reasonable.

Round 3.75 to the nearest whole number. _____

Round 6.25 to the nearest whole number. _____

Multiply the whole numbers. _____ × _____ = 24

The answer is reasonable because 24 is close to 23.4375.

YOUR TURN

Multiply.

5. $\begin{array}{r} 7.14 \\ \times\ 6.78 \\ \hline 5712 \end{array}$
    $\boxed{}$
    $\boxed{}$
    $+ \boxed{}$
    $\boxed{}$

6. $\begin{array}{r} 11.49 \\ \times\ 8.27 \\ \hline \end{array}$
    $\boxed{}$
    $\boxed{}$
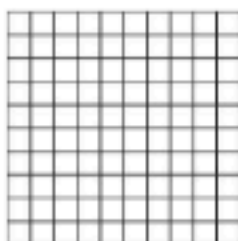 $\boxed{}$
    $+ \boxed{}$
    $\boxed{}$

7. Rico bicycles at an average speed of 15.5 miles per hour.

    What distance will Rico bicycle in 2.4 hours? _____ miles

8. Use estimation to show that your answer to **7** is reasonable.

    _____

Guided Practice

1. Use the grid to multiply 0.4 × 0.7.
   (Explore Activity)

   [grid]
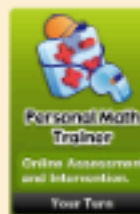
   0.4 × 0.7 = _____

2. Draw an area model to multiply 1.1 × 2.4.
   (Explore Activity)

   1.1 × 2.4 = _____

Multiply. (Example 1 and Example 2)

3. 0.18 × 0.06 = _____

4. 35.15 × 3.7 = _____

5. 0.96 × 0.12 = _____

6. 62.19 × 32.5 = _____

7. 3.4 × 4.37 = _____

8. 3.762 × 0.66 = _____

9. Chan Hee bought 3.4 pounds of coffee that cost $6.95 per pound.

   How much did he spend on coffee? $ _____

10. Adita earns $9.40 per hour working at an animal shelter.

    How much money will she earn for 18.5 hours of work? $ _____

Catherine tracked her gas purchases for one month.

11. How much did Catherine spend on gas in week 2?

    $ _____

12. How much more did she spend in week 4 than

    in week 1? $ _____

Week	Gallons	Cost per gallon ($)
1	10.4	2.65
2	11.5	2.54
3	9.72	2.75
4	10.6	2.70

? ESSENTIAL QUESTION CHECK-IN

13. How can you check the answer to a decimal multiplication problem?

    _____

    _____

Name _____ Class _____ Date _____

5.3 Independent Practice

COMMON CORE 6.NS.3

Make a reasonable estimate for each situation.

14. A gallon of water weighs 8.354 pounds. Simon uses 11.81 gallons of water while taking a shower. About how many pounds of water did Simon use?

    _____

15. A snail moves at a speed of 2.394 inches per minute. If the snail keeps moving at this rate, about how many inches will it travel in 7.489 minutes?

    _____

16. Tricia's garden is 9.87 meters long and 1.09 meters wide. What is the area of her garden?

    _____

Kaylynn and Amanda both work at the same store. The table shows how much each person earns, and the number of hours each person works in a week.

	Wage	Hours worked per week
Kaylynn	$8.75 per hour	37.5
Amanda	$10.25 per hour	30.5

17. Estimate how much Kaylynn earns in a week. _____

18. Estimate how much Amanda earns in a week. _____

19. Calculate the exact difference between Kaylynn and Amanda's weekly salaries. _____

20. Victoria's printer can print 8.804 pages in one minute. If Victoria prints pages for 0.903 minutes, about how many pages will she have? _____

A taxi charges a flat fee of $4.00 plus $2.25 per mile.

21. How much will it cost to travel 8.7 miles? _____

22. **Multistep** How much will the taxi driver earn if he takes one passenger 4.8 miles and another passenger 7.3 miles? Explain your process.

    _____

    _____

    _____

LESSON
5.4 Dividing Decimals

? ESSENTIAL QUESTION

How do you divide decimals?
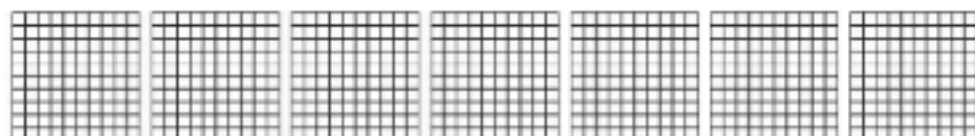

EXPLORE ACTIVITY COMMON CORE 6.NS.3

Modeling Decimal Division

Use decimal grids to find each quotient.

A $6.39 \div 3$
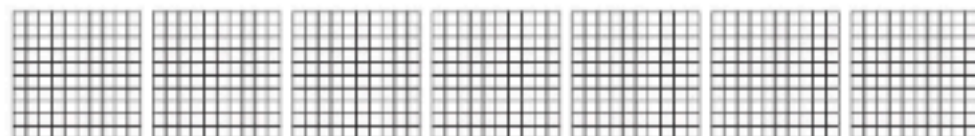
Shade grids to model 6.39. Separate the model into 3 equal groups.

How many are in each group? _____

$6.39 \div 3 =$ _____

B $6.39 \div 2.13$

Shade grids to model 6.39. Separate the model into groups of 2.13.

How many groups do you have? _____

$6.39 \div 2.13 =$ _____

Reflect

1. **Multiple Representations** When using models to divide decimals, when might you want to use grids divided into tenths instead of hundredths?

_____

_____

Math On the Spot

My Notes

Dividing Decimals by Whole Numbers

Dividing decimals is similar to dividing whole numbers. When you divide a decimal by a whole number, the placement of the decimal point in the quotient is determined by the placement of the decimal in the dividend.

EXAMPLE 1 Real World
COMMON CORE 6.NS.3

A A high school track is 9.76 meters wide. It is divided into 8 lanes of equal width for track and field events. How wide is each lane?

Divide using long division as with whole numbers.

Place a decimal point in the quotient directly above the decimal point in the dividend.

Each lane is 1.22 meters wide.

$$\begin{array}{r} 1.22 \\ 8\overline{)9.76} \\ -8 \\ \hline 17 \\ -16 \\ \hline 16 \\ -16 \\ \hline 0 \end{array}$$

B Aerobics classes cost \$153.86 for 14 sessions. What is the fee for one session?

Divide using long division as with whole numbers.

Place a decimal point in the quotient directly above the decimal point in the dividend.

The fee for one aerobics class is \$10.99.

$$\begin{array}{r} 10.99 \\ 14\overline{)153.86} \\ -14 \\ \hline 13 \\ -0 \\ \hline 138 \\ -126 \\ \hline 126 \\ -126 \\ \hline 0 \end{array}$$

Math Talk
Mathematical Practices
How can you check to see that the answer is correct?

Reflect

2. **Check for Reasonableness** How can you estimate to check that your quotient in **A** is reasonable?

_____

_____

_____

_____

Personal Math Trainer
Online Assessment and Intervention.
Interactive Example

YOUR TURN

Divide.

3. $5\overline{)9.75}$

4. $7\overline{)6.44}$

Personal Math Trainer
Online Assessment and Intervention.
Your Turn

Dividing a Decimal by a Decimal

When dividing a decimal by a decimal, first change the divisor to a whole number by multiplying by a power of 10. Then multiply the dividend by the same power of 10.

EXAMPLE 2 · Real World

6.NS.3

A Ella uses 0.5 pound of raspberries in each raspberry cake that she makes. How many cakes can Ella make with 3.25 pounds of raspberries?

STEP 1 The divisor has one decimal place, so multiply both the dividend and the divisor by 10 so that the divisor is a whole number.

$0.5)\overline{3.25}$ $0.5)\overline{3.25}$

$0.5 \times 10 = 5$

$3.25 \times 10 = 32.5$

Ella can make 6 cakes.

STEP 2 Divide.

$$
\begin{array}{r}
6.5 \\
5)\overline{32.5} \\
-30 \\
\hline
2\ 5 \\
-2\ 5 \\
\hline
0
\end{array}
$$

B Anthony spent $11.52 for some pens that were on sale for $0.72 each. How many pens did Anthony buy?

STEP 1 The divisor has two decimal places, so multiply both the dividend and the divisor by 100 so that the divisor is a whole number.

$0.72)\overline{11.52}$ $0.72)\overline{11.52}$

$0.72 \times 100 = 72$

$11.52 \times 100 = 1152$

Anthony bought 16 pens.

STEP 2 Divide.

$$
\begin{array}{r}
16 \\
72)\overline{1152} \\
-72 \\
\hline
432 \\
-432 \\
\hline
0
\end{array}
$$

Math Talk
Mathematical Practices
The number of cakes Ella can make is not equal to the quotient. Why not?

YOUR TURN

Divide.

5. $0.5)\overline{4.25}$

6. $0.84)\overline{15.12}$

Guided Practice

Divide. (Explore Activity, Examples 1 and 2)

1. $4)\overline{29.5}$ _____

2. $3.1)\overline{10.261}$ _____

3. $2.4)\overline{16.8}$ _____

4. $0.96)\overline{0.144}$ _____

5. $38.5 \div 0.5 =$ _____

6. $23.85 \div 9 =$ _____

7. $5.6372 \div 0.17 =$ _____

8. $8.19 \div 4.2 =$ _____

9. $66.5 \div 3.5 =$ _____

10. $0.234 \div 0.78 =$ _____

11. $78.74 \div 12.7 =$ _____

12. $36.45 \div 0.09 =$ _____

13. $90 \div 0.36 =$ _____

14. $18.88 \div 1.6 =$ _____

15. Corrine has 9.6 pounds of trail mix to divide into 12 bags. How many pounds of trail mix will go in each bag? _____

16. Michael paid $11.48 for sliced cheese at the deli counter. The cheese cost $3.28 per pound. How much cheese did Michael buy? _____

17. A four-person relay team completed a race in 72.4 seconds. On average, what was each runner's time? _____

18. Elizabeth has a piece of ribbon that is 4.5 meters long. She wants to cut it into pieces that are 0.25 meter long. How many pieces of ribbon will she have? _____

19. Lisa paid $43.95 for 16.1 gallons of gasoline. What was the cost per gallon, rounded to the nearest hundredth? _____

20. One inch is equivalent to 2.54 centimeters. How many inches are there in 50.8 centimeters? _____

? ESSENTIAL QUESTION CHECK-IN

21. When you are dividing two decimals, how can you check whether you have divided the decimals correctly?

_____

_____

_____

_____

5.4 Independent Practice

COMMON CORE **6.NS.3**

Personal Math Trainer
Online Assessment and Intervention
Independent Practice

Selected Answers
See all the selected answers.

Use the table for 22 and 23.

Custom Printing Costs				
Quantity	25	50	75	100
Mugs	$107.25	$195.51	$261.75	$329.00
T-shirts	$237.50	$441.00	$637.50	$829.00

22. What is the price per mug for 25 coffee mugs? _____

23. Find the price per T-shirt for 75 T-shirts. _____

A movie rental website charges $5.00 per month for membership and $1.25 per movie.

24. How many movies did Andrew rent this month if this month's bill was $16.25? _____

25. Marissa has $18.50 this month to spend on movie rentals.

   a. How many movies can she view this month? _____

   b. **Critique Reasoning** Marisa thinks she can afford 11 movies in one month. What mistake could she be making?

   _____

   _____

Victoria went shopping for ingredients to make a stew. The table shows the weight and the cost of each of the ingredients that she bought.

Ingredient	Weight (in pounds)	Cost
Potatoes	6.3	$7.56
Carrots	8.5	$15.30
Beef	4	$9.56
Bell peppers	2.50	$1.25

26. What is the price for one pound of bell peppers? _____

27. Which ingredient costs the most per pound? _____

28. **What If?** If carrots were $0.50 less per pound, how much would Victoria have paid for 8.5 pounds of carrots? _____

LESSON 5.5 Applying Operations with Rational Numbers

COMMON CORE **6.NS.3**
Fluently add, subtract, multiply, and divide multi-digit decimals....

? ESSENTIAL QUESTION
How can you solve problems involving multiplication and division of fractions and decimals?

EXPLORE ACTIVITY Problem Solving — COMMON CORE **6.NS.3**

Interpreting a Word Problem

When you solve a word problem involving rational numbers, you often need to think about the problem to decide which operations to use.

Math on the Spot

EXAMPLE 1 Naomi earned $54 mowing lawns in two days. She worked 2.5 hours yesterday and 4.25 hours today. If Naomi was paid the same amount for every hour she works, how much did she earn per hour?

Analyze Information

Identify the important information.

- Naomi made _____ mowing lawns.
- Naomi worked _____ hours yesterday and _____ hours today.
- You are asked to find _____.

Formulate a Plan

- The total amount she earned divided by the total hours she worked gives the amount she earned per hour.
- Use the expression $54 \div (2.5 + 4.25)$ to find the amount she earned per hour.

Solve
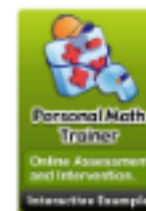
Follow the order of operations.
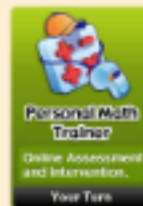
Add inside parentheses. $(2.5 + 4.25) =$ _____

Divide. $54 \div 6.75 =$ _____

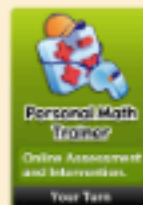Naomi earned _____ per hour mowing lawns.

Justify and Evaluate

You added _____ and _____ first to find the total number of hours worked. Then you divided _____ by the sum to find the amount earned per hour.

Personal Math Trainer
Online Assessment and Intervention
Interactive Example

YOUR TURN

1. Casey buys 6.2 yards of blue fabric and 5.4 yards of red fabric. If the blue and red fabric cost the same amount per yard, and Casey pays $58 for all of the fabric, what is the cost per yard?

Converting Fractions and Decimals to Solve Problems

Recall that you can use a number line to find equivalent fractions and decimals. If a fraction and a decimal are equivalent, they are represented by the same point on a number line.

EXAMPLE 2   Real World   6.NS.3

Each part of a multipart question on a test is worth the same number of points. The whole question is worth 37.5 points. Roz got $\frac{1}{2}$ of the parts of a question correct. How many points did Roz receive?

Solution 1

STEP 1 Convert the decimal to a fraction greater than 1.

$\frac{1}{2} \times 37.5 = \frac{1}{2} \times \frac{75}{2}$ Write 37.5 as $37\frac{1}{2}$, or $\frac{75}{2}$.

STEP 2 Multiply. Write the product in simplest form.

$\frac{1}{2} \times \frac{75}{2} = \frac{75}{4} = 18\frac{3}{4}$ Roz received $18\frac{3}{4}$ points.

Solution 2

STEP 1 Convert the fraction to a decimal.

$\frac{1}{2} \times 37.5 = 0.5 \times 37.5$

STEP 2 Multiply.

$0.5 \times 37.5 = 18.75$ Roz received 18.75 points.

Math Talk
Mathematical Practices
Do the solutions give the same result? Explain.

YOUR TURN

2. The bill for a pizza was $14.50. Charles paid for $\frac{1}{2}$ of the bill. Show two ways to find how much he paid.

Name _____ Class _____ Date _____

5.5 Guided Practice

1. Bob and Cheryl are taking a road trip that is 188.3 miles. Bob drove $\frac{1}{7}$ of the total distance. How many miles did Bob drive? (Explore Activity Example 1)

2. The winner of a raffle will receive $\frac{3}{4}$ of the $530.40 raised from raffle ticket sales. How much money will the winner get? (Example 2)

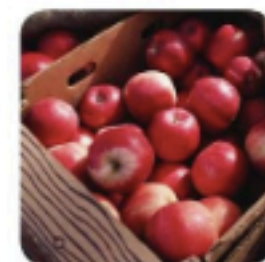## 5.5 Independent Practice

COMMON CORE **6.NS.3**

3. Chanasia has 8.75 gallons of paint. She wants to use $\frac{2}{5}$ of the paint to paint her living room. How many gallons of paint will Chanasia use?

4. Harold bought 3 pounds of red apples and 4.2 pounds of green apples from a grocery store, where both kinds of apples are $1.75 a pound. How much did Harold spend on apples?

Samuel and Jason sell cans to a recycling center that pays $0.40 per pound of cans. The table shows the number of pounds of cans that they sold for several days.

Day	Samuel's cans (pounds)	Jason's cans (pounds)
Monday	16.2	11.5
Tuesday	11.8	10.7
Wednesday	12.5	7.1

5. Samuel wants to use his earnings from Monday and Tuesday to buy some batteries that cost $5.60 each. How many batteries can Samuel buy? Show your work.

6. Jason wants to use his earnings from Monday and Tuesday for online movie rentals. The movies cost $2.96 each to rent. How many movies can Jason rent? Show your work.

7. **Multistep** Samuel and Jason spend $\frac{3}{5}$ of their combined earnings from Wednesday to buy a gift. How much do they spend? Is there enough left over from Wednesday's earnings to buy a card that costs $3.25? Explain.

Ready to Go On?

Personal Math Trainer
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Ready to Go On?
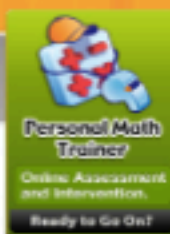
5.1 Dividing Whole Numbers

1. Landon is building new bookshelves for his bookstore's new mystery section. Each shelf can hold 34 books. There are 1,265 mystery books. How many shelves will he need to build? _____

5.2 Adding and Subtracting Decimals

2. On Saturday Keisha ran 3.218 kilometers. On Sunday she ran 2.41 kilometers. How much farther did she run on Saturday than on Sunday? _____

5.3 Multiplying Decimals

3. Marta walked at 3.9 miles per hour for 0.72 hours. How far did she walk? _____

Multiply.

4. 0.07×1.22 _____   5. 4.7×2.65 _____

5.4 Dividing Decimals

Divide.

6. $64 \div 0.4$ _____   7. $4.7398 \div 0.26$ _____

8. $26.73 \div 9$ _____   9. $4 \div 3.2$ _____

5.5 Applying Multiplication and Division of Rational Numbers

10. Doors for the small cabinets are 11.5 inches long. Doors for the large cabinets are 2.3 times as long as the doors for the small cabinets. How many large doors can be cut from a board that is $10\frac{1}{2}$ feet long? _____

? ESSENTIAL QUESTION

11. Describe a real-world situation that could be modeled by dividing two rational numbers.

_____

_____

Assessment Readiness

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Selected Response

1. Delia has 493 stamps in her stamp collection. She can put 16 stamps on each page of an album. How many pages can she fill completely?

   (A) 30 pages   (C) 31 pages
   (B) 32 pages   (D) 33 pages

2. Sumeet uses 0.4 gallon of gasoline each hour mowing lawns. How much gas does he use in 4.2 hours?

   (A) 1.68 gallons
   (B) 3.8 gallons
   (C) 13 gallons
   (D) 16 gallons

3. Sharon spent $3.45 on sunflower seeds. The price of sunflower seeds is $0.89 per pound. How many pounds of sunflower seeds did Sharon buy?

   (A) 3.07 pounds
   (B) 3.88 pounds
   (C) 4.15 pounds
   (D) 4.34 pounds

4. How many 0.4-liter glasses of water does it take to fill up a 3.4-liter pitcher?

   (A) 1.36 glasses   (C) 8.2 glasses
   (B) 3.8 glasses   (D) 8.5 glasses

5. Each paper clip is $\frac{3}{8}$ of an inch long and costs $0.02. Exactly enough paper clips are laid end to end to have a total length of 36 inches. What is the total cost of these paper clips?

   (A) $0.36   (C) $0.96
   (B) $0.54   (D) $1.20

6. Nelson Middle School raised $19,950 on ticket sales for its carnival fundraiser last year at $15 per ticket. If the school sells the same number of tickets this year but charges $20 per ticket, how much money will the school make?

   (A) $20,600   (C) $26,600
   (B) $21,600   (D) $30,600

7. Keri walks her dog every morning. The length of the walk is 0.55 kilometer on each weekday. On each weekend day, the walk is 1.4 times as long as a walk on a weekday. How many kilometers does Keri walk in one week?

   (A) 2.75 kilometers
   (B) 3.85 kilometers
   (C) 4.29 kilometers
   (D) 5.39 kilometers

Mini-Task

8. To prepare for a wedding, Aiden bought 60 candles. He paid $0.37 for each candle. His sister bought 170 candles at a sale where she paid $0.05 less for each candle than Aiden did.

   a. How much did Aiden spend on candles?

   _____

   b. How much did Aiden's sister spend on candles?

   _____

   c. Who spent more on candles? How much more?

   _____

Study Guide Review

MODULE 4 Operations with Fractions

Key Vocabulary
reciprocals *(recíprocos)*

? ESSENTIAL QUESTION

How can you use operations with fractions to solve real-world problems?

EXAMPLE 1

Add.

$\frac{7}{9} + \frac{5}{12}$ The LCM of 9 and 12 is 36.

$\frac{7 \times 4}{9 \times 4} + \frac{5 \times 3}{12 \times 3}$ Use the LCM to make fractions with common denominators.

$\frac{28}{36} + \frac{15}{36} = \frac{43}{36}$ Simplify.

$\frac{43}{36} = 1\frac{7}{36}$

Subtract.

$\frac{9}{10} - \frac{5}{6}$ The LCM of 10 and 6 is 30.

$\frac{9 \times 3}{10 \times 3} - \frac{5 \times 5}{6 \times 5}$ Use the LCM to make fractions with common denominators.

$\frac{27}{30} - \frac{25}{30} = \frac{2}{30}$ Simplify.

$\frac{2}{30} = \frac{1}{15}$

EXAMPLE 2

Multiply.

A. $\frac{4}{5} \times \frac{1}{8}$

$\frac{4 \times 1}{5 \times 8} = \frac{4}{40}$ Multiply numerators. Multiply denominators.

$\frac{4 \div 4}{40 \div 4} = \frac{1}{10}$ Simplify by dividing by the GCF.

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

$\frac{9}{4} \times \frac{1}{5}$ Rewrite the mixed number as a fraction greater than 1.

$\frac{9 \times 1}{4 \times 5} = \frac{9}{20}$ Multiply numerators. Multiply denominators.

EXAMPLE 3

Divide.

A. $\frac{2}{7} \div \frac{1}{2}$

$\frac{2}{7} \times \frac{2}{1}$ Rewrite the problem as multiplication using the reciprocal of the second fraction.

$\frac{2 \times 2}{7 \times 1} = \frac{4}{7}$ Multiply numerators. Multiply denominators.

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

$\frac{7}{3} \div \frac{7}{4}$ Write both mixed numbers as improper fractions.

$\frac{{}^1\cancel{7} \times 4}{3 \times \cancel{7}_1} = \frac{4}{3}$ Multiply by the reciprocal of the second fraction.

$1\frac{1}{3}$ Simplify: $\frac{4}{3} = 1\frac{1}{3}$

EXERCISES

Add. Write the answer in simplest form. (Lesson 4.1)

1. $\frac{3}{8} + \frac{4}{5}$ _____

2. $1\frac{9}{10} + \frac{3}{4}$ _____

3. $3\frac{5}{10} - \frac{4}{8}$ _____

Subtract. Write the answer in simplest form. (Lesson 4.1)

4. $\frac{2}{8} + \frac{6}{12}$ _____

5. $1\frac{3}{7} - \frac{4}{5}$ _____

6. $\frac{7}{8} - \frac{5}{12}$ _____

Multiply. Write the answer in simplest form. (Lesson 4.1)

7. $\frac{1}{7} \times \frac{4}{5}$ _____

8. $\frac{5}{6} \times \frac{2}{3}$ _____

9. $\frac{3}{7} \times \frac{14}{15}$ _____

10. $1\frac{1}{3} \times \frac{5}{8}$ _____

11. $1\frac{2}{9} \times 1\frac{1}{2}$ _____

12. $2\frac{1}{7} \times 3\frac{2}{3}$ _____

Divide. Write the answer in simplest form. (Lessons 4.2, 4.3)

13. $\frac{3}{7} \div \frac{2}{3}$ _____

14. $\frac{1}{8} \div \frac{3}{4}$ _____

15. $1\frac{1}{5} \div \frac{1}{4}$ _____

16. On his twelfth birthday, Ben was $4\frac{3}{4}$ feet tall. On his thirteenth birthday, Ben was $5\frac{3}{8}$ feet tall. How much did Ben grow between his twelfth and thirteenth birthdays? (Lesson 4.1)

_____

17. Ron had 20 apples. He used $\frac{2}{5}$ of the apples to make pies. How many apples did Ron use for pies? (Lesson 4.4)

_____

18. The area of a rectangular garden is $38\frac{1}{4}$ square meters. The width of the garden is $4\frac{1}{2}$ meters. Find the length of the garden. (Lesson 4.4)

_____

MODULE 5 Operations with Decimals

Key Vocabulary
order of operations *(orden de las operaciones)*

? ESSENTIAL QUESTION

How can you use operations with decimals to solve real-world problems?

EXAMPLE 1

To prepare for a race, Lloyd ran every day for two weeks. He ran a total of 67,592 meters. Lloyd ran the same distance every day. He took a two-day rest and then started running again. The first day after his rest, he ran the same distance plus 1,607.87 meters more. How far did Lloyd run that day?

Step 1 Divide to see how far Lloyd ran every day during the two weeks.

$$14\overline{)67{,}592} \quad = 4{,}828$$

Lloyd ran 4,828 meters a day.

Step 2 Add 1,607.87 to 4,828 to find out how far Lloyd ran the first day after his rest.

$$\begin{array}{r} 1{,}607.87 \\ + 4{,}828.00 \\ \hline 6{,}435.87 \end{array}$$

Lloyd ran 6,435.87 meters that day.

EXAMPLE 2

Rebecca bought 2.5 pounds of red apples. The apples cost $0.98 per pound. What was the total cost of Rebecca's apples?

$$
\begin{array}{rl}
2.5 & \leftarrow \quad 1 \text{ decimal place} \\
\times\ .98 & \leftarrow \ +2 \text{ decimal places} \\
\hline
200 & \\
+\ 2250 & \\
\hline
2.450 & \leftarrow \quad 3 \text{ decimal places}
\end{array}
$$

The apples cost $2.45.

EXAMPLE 3

Rashid spent $37.29 on gas for his car. Gas was $3.39 per gallon. How many gallons did Rashid purchase?

Step 1 The divisor has two decimal places, so multiply both the dividend and the divisor by 100 so that the divisor is a whole number:

$3.39\overline{)37.29}$ $339\overline{)3729}$

Step 2 Divide:

$$
\begin{array}{r}
11 \\
339\overline{)3729} \\
339 \\
\hline
339 \\
-339 \\
\hline
0
\end{array}
$$

Rashid purchased 11 gallons of gas.

EXERCISES

Add. (Lesson 5.2)

1. $12.24 + 3.9$ _____
2. $0.986 + 0.342$ _____
3. $2.479 + 0.31$ _____

Subtract. (Lesson 5.2)

4. $6.19 - 3.05$ _____
5. $7.285 - 0.975$ _____
6. $14.31 - 13.41$ _____

Multiply. (Lesson 5.3)

7. $\begin{array}{r} 12 \\ \times\ 0.4 \\ \hline \end{array}$ _____
8. $\begin{array}{r} 0.15 \\ \times\ 9.1 \\ \hline \end{array}$ _____
9. $\begin{array}{r} 3.12 \\ \times\ 0.25 \\ \hline \end{array}$ _____

Divide. (Lessons 5.1, 5.4)

10. $78,974 \div 21$ _____
11. $19,975 \div 25$ _____
12. $67,396 \div 123$ _____

13. $5\overline{)64.5}$ _____
14. $0.6\overline{)25.2}$ _____
15. $2.1\overline{)36.75}$ _____

16. A pound of rice crackers costs $2.88. Matthew purchased $\frac{1}{4}$ pound of crackers. How much did he pay for the crackers? (Lesson 5.5) _____

Assessment Readiness

Personal Math Trainer
Online Assessment and Intervention
my.hrw.com

Selected Response

1. Each paper clip is $\frac{7}{8}$ of an inch long and costs $0.03. Exactly enough paper clips are laid end to end to have a total length of 56 inches. What is the total cost of these paper clips?

Ⓐ $0.49   Ⓒ $1.47
Ⓑ $0.64   Ⓓ $1.92

2. Which of these is the same as $\frac{8}{9} \div \frac{2}{3}$?

Ⓐ $\frac{8}{9} \div \frac{3}{2}$ Ⓒ $\frac{8}{9} \times \frac{2}{3}$
Ⓑ $\frac{2}{3} \div \frac{8}{9}$ Ⓓ $\frac{8}{9} \times \frac{3}{2}$

3. A rectangular tabletop has a length of $4\frac{3}{4}$ feet and an area of $11\frac{7}{8}$ square feet. What is the width of the tabletop?

Ⓐ $1\frac{1}{16}$ feet
Ⓑ $2\frac{1}{2}$ feet
Ⓒ $4\frac{1}{4}$ feet
Ⓓ $8\frac{1}{2}$ feet

4. Dorothy types 120 words per minute. How many words does Dorothy type in 1.75 minutes?

Ⓐ 150 words
Ⓑ 180 words
Ⓒ 200 words
Ⓓ 210 words

5. What is the opposite of 17?

Ⓐ -17
Ⓑ $-\frac{1}{17}$
Ⓒ $\frac{1}{17}$
Ⓓ 17

6. What is the absolute value of -36?

Ⓐ -36
Ⓑ 0
Ⓒ 6
Ⓓ 36

7. Noelle has $\frac{5}{8}$ of a yard of purple ribbon and $\frac{9}{10}$ of a yard of pink ribbon. How much ribbon does she have altogether?

Ⓐ $1\frac{11}{15}$ yards   Ⓒ $2\frac{1}{3}$ yards
Ⓑ $1\frac{4}{5}$ yards   Ⓓ $1\frac{14}{16}$ yards

8. Apples are on sale for $1.20 a pound. Logan bought $\frac{3}{4}$ of a pound. How much money did he spend on apples?

Ⓐ $0.75   Ⓒ $0.90
Ⓑ $0.80   Ⓓ $1.00

9. Samantha bought 4.5 pounds of pears. Each pound cost $1.68. How much did Samantha spend in all?

Ⓐ $7.52   Ⓒ $8.40
Ⓑ $7.56   Ⓓ $75.60

10. Gillian earns $7.50 an hour babysitting on the weekends. Last week she babysat for 2.2 hours on Saturday and 3.5 hours on Sunday. How much did Gillian earn?

Ⓐ $4.25   Ⓒ $42.75
Ⓑ $40.25   Ⓓ $427.50

11. Luis made some trail mix. He mixed $4\frac{2}{3}$ cups of popcorn, $1\frac{1}{4}$ cups of peanuts, $1\frac{1}{3}$ cups of raisins, and $\frac{2}{3}$ cup of sunflower seeds. He gave 5 of his friends an equal amount of trail mix each. How much did each friend get?

Ⓐ $1\frac{3}{5}$ cups   Ⓒ $1\frac{3}{4}$ cups
Ⓑ $1\frac{2}{3}$ cups   Ⓓ 2 cups

12. Emily cycled 20.25 miles over 4 days last week. She cycled the same amount each day. How many miles did Emily cycle each day to the nearest hundredth?

(A) 5.01 miles   (C) 5.60 miles

(B) 5.06 miles   (D) 5.65 miles

13. Landon drove 103.5 miles on Tuesday, 320.75 miles on Wednesday, and 186.30 miles on Thursday. How far did Landon drive all three days combined?

(A) 61.55 miles   (C) 610.55 miles

(B) 610.055 miles   (D) 6,105.5 miles

Mini Task

14. Carl earns $3.25 per hour walking his neighbor's dogs. He walks them $\frac{2}{3}$ of an hour in the morning and $\frac{1}{2}$ of an hour in the afternoon.

a. How much time does Carl spend dog walking every day?

_____

b. How much time does Carl spend dog walking in a week?

_____

c. Ten minutes is equal to $\frac{1}{6}$ of an hour. How many minutes does Carl work dog walking each week?

_____

d. How much money does Carl earn each week?

_____

15. The city zoo had an equal number of visitors on Saturday and Sunday. In all, 32,096 people visited the zoo that weekend. How many visited each day?

_____

a. On Saturday, $\frac{1}{8}$ of the people who visited were senior citizens, $\frac{1}{8}$ were infants, $\frac{1}{4}$ were children, and $\frac{1}{2}$ were adults. How many of each group visited the zoo on Saturday?

Senior Citizens: _____

Infants: _____

Children: _____

Adults: _____

b. On Sunday, $\frac{1}{16}$ of the people who visited were senior citizens, $\frac{3}{16}$ were infants, $\frac{3}{8}$ were children, and $\frac{3}{8}$ were adults. How many of each group visited the zoo on Sunday?

Senior Citizens: _____

Infants: _____

Children: _____

Adults: _____

c. The chart shows how much each type of ticket costs.

Type of Ticket	Cost
Infants	Free
Children Over 2	$4.50
Adults	$7.25
Senior Citizens	$5.75

d. How much money did the zoo make on Saturday? Show your work.

_____

_____

_____

_____

e. How much did the zoo make on Sunday?

_____

_____

_____

_____