

Terminating and Repeating Decimals

Name: _____

Prerequisite: Understand Fractions as Division

Study the example showing fractions as division. Then solve problems 1–5.

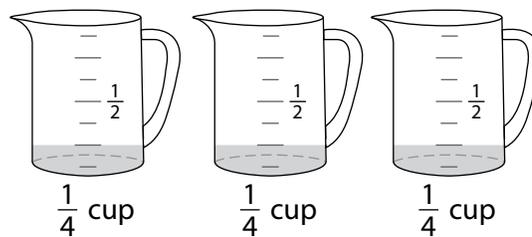
Example

A teacher has 3 cups of brown rice to share equally among 4 students in cooking class. How much rice will each student get?

You can model this problem with a picture.

Look at one of the cups. One cup divided among 4 students is $\frac{1}{4}$ cup.

You can think of this as $1 \div 4 = \frac{1}{4}$.



The teacher has 3 cups, so each student will receive $\frac{3}{4}$ cup of rice.

You can think of this as $\frac{1}{4} \times 3 = \frac{3}{4}$ or $3 \div 4 = \frac{3}{4}$.

- 1** The teacher has 5 cups of broth to share among the 4 students.

a. How much broth will each student get? Draw a model to explain your answer.

b. Will each student get more than or less than 1 cup of broth? Explain.

- 2** What if the teacher divides the 5 cups of broth among 6 students? Will each student get more than or less than 1 cup of broth? Explain.



Solve.

3 Five seventh-grade students are decorating 3 bulletin boards and want to divide the work equally.

a. Will each student decorate more than or less than 1 bulletin board? Explain how you know.

b. How many fifths of a bulletin board are there in 3 bulletin boards? Use a model to explain.

c. How many fifths of a bulletin board will each student decorate?

_____ fifths

d. Write this as a fraction of a bulletin board.

_____ of a bulletin board

4 A science teacher has 15 ounces of vinegar to divide equally among 8 students for an experiment. Matt said that each student should get $\frac{8}{15}$ ounce. How did he get that answer? Do you agree? Explain.

5 One restaurant uses 5 quarts of soup to make 20 equal servings. Another restaurant uses 7 quarts of soup to make 25 equal servings. Which restaurant has larger servings of soup? Write division expressions to represent the problem and then solve.

Show your work.

Solution: _____

Using Patterns to Write Fractions as Decimals

Study the example showing how to use patterns to write fractions as equivalent decimals. Then solve problems 1–7.

Example

Carlos knows that $\frac{1}{20} = 0.05$. He can use a table of values to find a pattern that will help him find the decimal forms of $\frac{2}{20}$, $\frac{3}{20}$, $\frac{4}{20}$, and $\frac{5}{20}$.

$$\begin{array}{r} 0.05 \\ 20 \overline{)1.00} \\ \underline{-1.00} \\ 0 \end{array}$$

Fraction	Decimal
$\frac{1}{20}$	0.05
$\frac{2}{20}$	0.10
$\frac{3}{20}$	0.15
$\frac{4}{20}$	0.20
$\frac{5}{20}$	0.25

Because $\frac{2}{20}$ is twice $\frac{1}{20}$, the decimal form of $\frac{2}{20}$ is twice 0.05, or 0.10.

1 Describe the patterns in the table.

a. What is the pattern in the first column?

b. What is the pattern in the second column?

c. How can you use the fraction in the first column to write the equivalent decimal in the second column?

2 Explain how you can use the patterns in the table to find the decimal form of $\frac{17}{20}$.



Solve.

3 What kind of decimal is 0.05? How do you know?

4 Use the fact that $\frac{1}{20} = 0.05$ to write the decimal form of the unit fractions $\frac{1}{10}$, $\frac{1}{5}$, and $\frac{1}{4}$ in the table below.

Unit Fraction	Decimal
$\frac{1}{10}$	
$\frac{1}{5}$	
$\frac{1}{4}$	

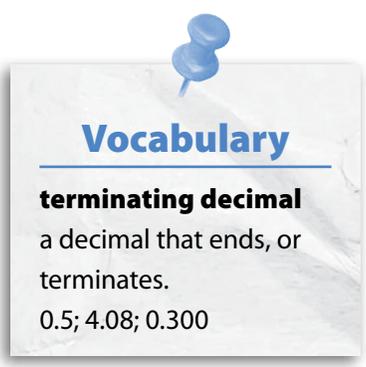
5 Explain how you can find each decimal form in problem 4 using the decimal form of $\frac{1}{20}$.

6 Marita knows that $\frac{1}{5}$ written as a decimal is 0.20.

a. How can she find the decimal form of $\frac{9}{5}$ without dividing?

b. What is another way that Marita could figure out the decimal form of $\frac{9}{5}$ without dividing?

7 Chuck knows that $\frac{1}{50} = 0.02$. How can he use this information to find the fraction form for the decimal 0.86?



Vocabulary

terminating decimal

a decimal that ends, or terminates.

0.5; 4.08; 0.300

Writing Fractions as Decimals

Study the example problem showing how to write a fraction as a decimal. Then solve problems 1–7.

Example

A relay race is 2 miles long. Eleven students will run the relay, splitting the distance as equally as possible for a distance of about $\frac{2}{11}$ mile each. Does the first relay exchange occur before or after 0.2 mile?

$$\frac{2}{11} = 2 \div 11$$

$$\begin{array}{r} 0.1818\dots \\ 11 \overline{)2.0000} \\ \underline{-11} \\ 90 \\ \underline{-88} \\ 20 \\ \underline{-11} \\ 90 \\ \underline{-88} \\ 2 \end{array}$$

$$\frac{2}{11} = 0.1818\dots = 0.\overline{18}$$



The first relay exchange occurs *before* 0.2 mile because $0.\overline{18} < 0.2$.

- 1 How do you know that the decimal for $\frac{2}{11}$ repeats without end?

- 2 Between which two tenths of a mile will the second relay exchange occur? Explain.

- 3 Will there be more than one relay exchange between 2 consecutive tenths of a mile? Explain.

Vocabulary

repeating decimal a decimal that never ends but instead repeats the same digit or digits over and over.
 $0.6666\dots = 0.\overline{6}$

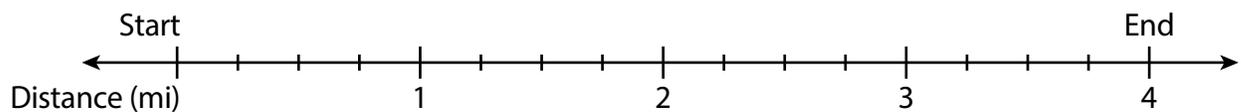


Solve.

- 4 You saw on the previous page that $\frac{2}{11} = 0.\overline{18}$. Show how you can use what you know about the decimal for $\frac{2}{11}$ to find the decimal for $\frac{1}{11}$.
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- 5 A 9-member team plans to run a 4-mile relay race. Distance markers are placed on the racecourse every 0.25 mile.

- a. Place an X on the number line at the approximate locations where the relay exchanges will take place.



- b. Will any of the relay exchanges take place at any of the 0.25-mile markers? If so, which one(s)? List the locations of all of the exchanges in decimal form.
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- 6 If the decimal form for a unit fraction is a repeating decimal, is it possible for a multiple of that fraction to have a decimal form that is not a repeating decimal? Use examples to explain your reasoning.
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- 7 Mario claims that if the denominator of a fraction is a prime number, then its decimal form is a repeating decimal. Do you agree? Use an example to explain.
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Terminating and Repeating Decimals

Solve the problems.

- 1 Carla says that $\frac{5}{6}$ is greater than 0.8. Is she correct?

Show your work.

How can you write a fraction as a division problem?



Solution: _____

- 2 Which of the following are repeating decimals when written in decimal form? Select all that apply.

- A $\frac{11}{16}$
 B $\frac{8}{11}$
 C $\frac{3}{9}$
 D $\frac{9}{18}$

Can you simplify any fractions to fractions that you know are not repeating decimals?



- 3 Complete the table. Then describe a pattern in the decimal forms of the fractions.

Unit Fraction	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$
Decimal	0.5				

What happens to the value of the decimal as the denominator of the fraction increases?



Solve.

- 4** Mark estimates that he spends $\frac{3}{8}$ of his money on lunches. What percent of his money does he spend on lunches?

- A** 2.6% **C** 26%
B 3.75% **D** 37.5%

Sue chose **B** as the correct answer. How did she get that answer?

When you write a decimal as a percent, what do you need to do to the decimal point?



- 5** Mrs. Gelb is making costumes for a play. The table shows how many yards of each color ribbon are needed and how many yards she has on hand.

Color	Yards She Needs	Yards She Has
Red	$2\frac{5}{8}$	2.5
Green	$\frac{7}{8}$	0.36
Black	$4\frac{3}{8}$	4.5

Tell whether each statement is *True* or *False*.

- a.** She does not need to buy any black ribbon.
b. She needs to buy $\frac{3}{8}$ yard of red ribbon.
c. She needs to buy at least $\frac{3}{5}$ yard of green ribbon.

- True False
 True False
 True False

How can you compare fractions and decimals?



- 6** Write a fraction and its decimal equivalent for the following conditions.

- a.** a fraction that is a repeating decimal between 0.25 and 0.5

- b.** a fraction that is a repeating decimal between 0.5 and 1

- c.** a fraction that is a terminating decimal between 1.25 and 1.5

What fractions can you think of that you know repeat? When will a fraction be greater than 1?

