Lesson 14: Converting Rational Numbers to Decimals Using Long Division

Classwork

Example 1: Can All Rational Numbers Be Written as Decimals?

a. Using the division button on your calculator, explore various quotients of integers 1 through 11. Record your fraction representations and their corresponding decimal representations in the space below.

b. What two types of decimals do you see?

Example 2: Decimal Representations of Rational Numbers

In the chart below, organize the fractions and their corresponding decimal representation listed in Example 1 according to their type of decimal.

What do these fractions have in common?   What do these fractions have in common?

[Type here]

Example 3: Converting Rational Numbers to Decimals Using Long-Division

Use the long division algorithm to find the decimal value of $-\dfrac{3}{4}$.

Exercise 1

Students convert each rational number to its decimal form using long division.

a. $-\dfrac{7}{8} =$

b. $\dfrac{3}{16} =$

[Type here]

Example 4: Converting Rational Numbers to Decimals Using Long-Division

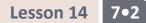Use long division to find the decimal representation of $\frac{1}{3}$.

Exercise 2

Calculate the decimal values of the fraction below using long division. Express your answers using bars over the shortest sequence of repeating digits.

a. $-\frac{4}{9}$ b. $-\frac{1}{11}$

[Type here]

c. $\dfrac{1}{7}$ d. $-\dfrac{5}{6}$

Example 5: Fractions Represent Terminating or Repeating Decimals

How do we determine whether the decimal representation of a quotient of two integers, with the divisor not equal to zero, will terminate or repeat?

Example 6: Using Rational Number Conversions in Problem Solving

a.   Eric and four of his friends are taking a trip across the New York State Thruway. They decide to split the cost of tolls equally. If the total cost of tolls is $8, how much will each person have to pay?

b.   Just before leaving on the trip, two of Eric's friends have a family emergency and cannot go.   What is each person's share of the $8 tolls now?
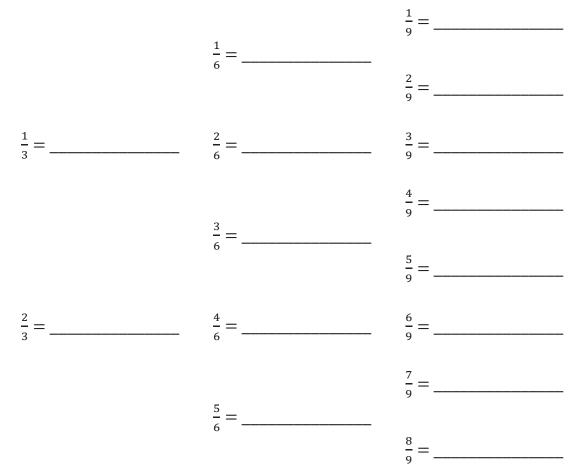
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Problem Set

1. Convert each rational number into its decimal form:

$$\frac{1}{9} = \underline{\hspace{3cm}}$$

$$\frac{1}{6} = \underline{\hspace{3cm}}$$

$$\frac{2}{9} = \underline{\hspace{3cm}}$$

$$\frac{1}{3} = \underline{\hspace{3cm}} \qquad \frac{2}{6} = \underline{\hspace{3cm}} \qquad \frac{3}{9} = \underline{\hspace{3cm}}$$

$$\frac{4}{9} = \underline{\hspace{3cm}}$$

$$\frac{3}{6} = \underline{\hspace{3cm}}$$

$$\frac{5}{9} = \underline{\hspace{3cm}}$$

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

$$\frac{7}{9} = \underline{\hspace{3cm}}$$

$$\frac{5}{6} = \underline{\hspace{3cm}}$$

$$\frac{8}{9} = \underline{\hspace{3cm}}$$

One of these decimal representations is not like the others. Why?

[Type here]

Enrichment

2. Chandler tells Aubrey that the decimal value of $-\dfrac{1}{17}$ is not a repeating decimal. Should Aubrey believe him? Explain.

3. Complete the quotients below without using a calculator and answer the questions that follow.

    a. Convert each rational number in the table to its decimal equivalent.

$\dfrac{1}{11}=$	$\dfrac{2}{11}=$	$\dfrac{3}{11}=$	$\dfrac{4}{11}=$	$\dfrac{5}{11}=$
$\dfrac{6}{11}=$	$\dfrac{7}{11}=$	$\dfrac{8}{11}=$	$\dfrac{9}{11}=$	$\dfrac{10}{11}=$

   Do you see a pattern? Explain.

    b. Convert each rational number in the table to its decimal equivalent.

$\dfrac{0}{99}=$	$\dfrac{10}{99}=$	$\dfrac{20}{99}=$	$\dfrac{30}{99}=$	$\dfrac{45}{99}=$
$\dfrac{58}{99}=$	$\dfrac{62}{99}=$	$\dfrac{77}{99}=$	$\dfrac{81}{99}=$	$\dfrac{98}{99}=$

   Do you see a pattern? Explain.

    c. Can you find other rational numbers that follow similar patterns?

[Type here]