Lesson 14: Converting Rational Numbers to Decimals Using Long Division

Classwork

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

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

* 1. 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?

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

Use the long division algorithm to find the decimal value of .

Exercise 1

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

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

Use long division to find the decimal representation of .

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.

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| --- | --- |
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**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**

* 1. 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 , how much will each person have to pay?
  2. 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 tolls now?

Lesson Summary

The real world requires that we represent rational numbers in different ways depending on the context of a situation. All rational numbers can be represented as either terminating decimals or repeating decimals using the long division algorithm. We represent repeating decimals by placing a bar over the shortest sequence of repeating digits.

Problem Set

1. Convert each rational number into its decimal form.

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

Enrichment:

1. Chandler tells Aubrey that the decimal value of is not a repeating decimal. Should Aubrey believe him? Explain.
2. Complete the quotients below without using a calculator and answer the questions that follow.
   1. Convert each rational number in the table to its decimal equivalent.

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| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Do you see a pattern? Explain.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

Do you see a pattern? Explain.

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