Lesson 6: Finite and Infinite Decimals

Classwork

Exercises 1–5

1. Use long division to determine the decimal expansion of .
2. Use long division to determine the decimal expansion of .
3. Use long division to determine the decimal expansion of .
4. Use long division to determine the decimal expansion of .
5. What do you notice about the decimal expansions of Exercises 1 and 2 compared to the decimal expansions of Exercises 3 and 4?

**Example 1**

Consider the fraction . Is it equal to a finite decimal? How do you know?

**Example 2**

Consider the fraction . Is it equal to a finite or infinite decimal? How do you know?

Exercises 6–10

Show your steps, but use a calculator for the multiplications.

1. Convert the fraction to a decimal.
   1. Write the denominator as a product of ’s or ’s. Explain why this way of rewriting the denominator helps to find the decimal representation of .
   2. Find the decimal representation of . Explain why your answer is reasonable.
2. Convert the fraction to a decimal.
3. Convert the fraction to a decimal.
4. Convert the fraction to a decimal.
5. Identify the type of decimal expansion for each of the numbers in Exercises 6–9 as finite or infinite. Explain why their decimal expansion is such.

Example 3

Write as a decimal. Will it be finite or infinite? Explain.

Example 4

Write as a decimal. Will it be finite or infinite? Explain.

Exercises 11–13

Show your steps, but use a calculator for the multiplications.

1. Convert the fraction to a decimal.
   1. Write the denominator as a product of ’s and/or ’s. Explain why this way of rewriting the denominator helps to find the decimal representation of .
   2. Find the decimal representation of . Explain why your answer is reasonable.
2. Convert the fraction to a decimal.
3. Convert the fraction to a decimal.

Lesson Summary

Fractions with denominators that can be expressed as products of 2’s and/or 5’s have decimal expansions that are finite.

Example:

Does the fraction have a finite or infinite decimal expansion?

Since , then the fraction has a finite decimal expansion. The decimal expansion is found by:

When the denominator of a fraction cannot be expressed as a product of ’s and/or ’s then the decimal expansion of the number will be infinite.

When infinite decimals repeat, such as or they are typically abbreviated using the notation and ,respectively. The notation indicates that the digit repeats indefinitely and that the two-digit block repeats indefinitely.

Problem Set

Convert each fraction to a finite decimal. If the fraction cannot be written as a finite decimal, then state how you know. Show your steps, but use a calculator for the multiplications.

* 1. Write the denominator as a product of ’s and/or ’s. Explain why this way of rewriting the denominator helps to find the decimal representation of .
  2. Find the decimal representation of . Explain why your answer is reasonable.