Lesson 8: The Long Division Algorithm

Classwork

**Example 1**

Show that the decimal expansion of is .

Exercises 1–5

1. Use long division to determine the decimal expansion of .
   1. Fill in the blanks to show another way to determine the decimal expansion of .
   2. Does the number have a finite or infinite decimal expansion? Explain how you know.
2. Use long division to determine the decimal expansion of .
   1. Fill in the blanks to show another way to determine the decimal expansion of .
   2. Does the number have a finite or infinite decimal expansion? Explain how you know.
3. Use long division to determine the decimal expansion of .
   1. Fill in the blanks to show another way to determine the decimal expansion of .
   2. Does the number have a finite or infinite decimal expansion? Explain how you know.
4. Use long division to determine the decimal expansion of .
   1. Fill in the blanks to show another way to determine the decimal expansion of
   2. Does the number have a finite or infinite decimal expansion? Explain how you know.
5. Which fractions produced an infinite decimal expansion? Why do you think that is?

Exercises 6–10

1. Does the number have a finite or infinite decimal expansion? Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
2. Does the number have a finite or infinite decimal expansion? Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
3. Does the number have a finite or infinite decimal expansion? Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
4. Does the number have a finite or infinite decimal expansion? Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
5. Does the number have a finite or infinite decimal expansion? Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.

Problem Set

Lesson Summary

The long division algorithm is a procedure that can be used to determine the decimal expansion of infinite decimals.

Every rational number has a decimal expansion that repeats eventually. For example, the number is rational because it has a repeat block of the digit in its decimal expansion, The number is rational because it has a repeat block of the digit in its decimal expansion, . The number is rational because it has a repeat block of the digits in its decimal expansion, .

1. Write the decimal expansion of . Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
2. Write the decimal expansion of . Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
3. Write the decimal expansion of . Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
4. Write the decimal expansion of . Based on our definition of rational numbers having a decimal expansion that repeats eventually, is the number rational? Explain.
5. Someone notices that the long division of by has a quotient of and remainder and wonders why there is a repeating block of digits in the quotient, namely Explain to the person why this happens.
6. Is the number rational? Explain.
7. Is the number rational? Explain.
8. Is the number rational? Explain.