

EUREKA MATH

The Long Division Algorithm

engage^{ny} (Cc) BY-NC-SA This work is iconsect under a Creative Commons Attribution-NonCommercial-ShareAllice 3.0 Linported License

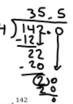
Lesson 8 8•7

c. Does the number $\frac{142}{2}$ have a finite or an infinite decimal expansion?

finite (terminating)

2.

a. Use long division to determine the decimal expansion of $\frac{142}{4}$.



b. Fill in the blanks to show another way to determine the decimal expansion of $\frac{142}{4}$.

$$\frac{142}{4} = \frac{35 \times 4 + 2}{4}$$

Mixed $\frac{142}{4} = \frac{35 \times 4}{4} + \frac{2}{4}$ Number $\frac{142}{4} = \frac{35}{4} + \frac{2}{4}$ Uses $\frac{142}{4} = \frac{35}{4} + \frac{2}{4}$

$$\frac{142}{4} = \frac{35 \times 4}{4} + \frac{2}{4}$$

$$\frac{142}{4} = \frac{35}{4} + \frac{2}{4}$$

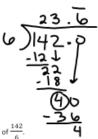
c. Does the number $\frac{142}{4}$ have a finite or an infinite decimal expansion?

EUREKA MATH

The Long Division Algorithm

Lesson 8 8•7

a. Use long division to determine the decimal expansion of $\frac{142}{6}$.



b. Fill in the blanks to show another way to determine the decimal expansion of $\frac{142}{6}$.

$$\frac{142}{6} = \frac{2.3 \times 6 + 4}{6}$$

$$\frac{142}{6} = \frac{23}{6} \times \frac{6}{6} + \frac{4}{6}$$

$$\frac{142}{6} = 23 + \frac{4}{6}$$

$$\frac{142}{6} = 23 \frac{2}{3}$$

c. Does the number $\frac{142}{6}$ have a finite or an infinite decimal expansion?

EUREKA MATH

The Long Division Algorithm

Lesson 8 8•7

a. Use long division to determine the decimal expansion of $\frac{142}{11}$. Report

11 cannot be made with a · base 2,5, 0-10

b. Fill in the blanks to show another way to determine the decimal expansion of $\frac{142}{11}$.

$$\frac{142}{11} = \frac{\times 11}{11} + \frac{\times}{11}$$

$$\frac{142}{11} = \underline{\hspace{1cm}} + \overline{\hspace{1cm}}$$

$$\frac{142}{11} =$$

c. Does the number $\frac{142}{11}$ have a finite or an infinite decimal expansion?

Lesson 8 8•7

5. In general, which fractions produce infinite decimal expansions?

Exercises 6–10

6. Does the number $\frac{65}{13}$ have a finite or an infinite decimal expansion? Does its decimal expansion have a repeating pattern?

13 cannot be made with a base 2,5,10.

EUREKA MATH

The Long Division Algorithm

engage^{ny} (Cc) BYINC-SA This work is iconsect under a Creative Common. Attribution-NonCommercial-ShamAlike 3.0 Lisported License 7. Does the number $\frac{17}{11}$ have a finite or an infinite decimal expansion? Does its decimal expansion have a repeating pattern? Repeat

rational? Explain. (Assume the pattern you see in the decimal 1 No

There is no repeating black of numbers

9. Does the number $\frac{860}{999}$ have a finite or an infinite decimal expansion? Does its decimal expansion have a repeating pattern?

999 cannot be made with base 2,5, or 10.

10. Is the number 0.1234567891011121314151617181920212223... rational? Explain. (Assume the pattern you see in the decimal expansion continues.)

There is no repeating black of numbers.

EUREKA MATH

The Long Division Algorithm

Lesson 8 8•7

Lesson Summary

A rational number is a number that can be written in the form $\frac{a}{b}$ for a pair of integers a and b with b not zero.

The long division algorithm shows that every rational number has a decimal expansion that falls into a repeating pattern. For example, the rational number 32 has a decimal expansion of 32. $\overline{0}$, the rational number $\frac{1}{3}$ has a decimal expansion of $0.\,\overline{3},$ and the rational number $\frac{4}{11}$ has a decimal expansion of $0.\,\overline{45}.$

Problem Set

1. Write the decimal expansion of $\frac{7000}{9}$ as an $\underbrace{\text{infinitely}}$ long repeating decimal.

2. Write the decimal expansion of $\frac{6555555}{2}$ as an <u>infinitely</u> long repeating decimal.

Write the decimal expansion of ³⁵⁰⁰⁰⁰/₁₁ as an infinitely long repeating decimal.

4. Write the decimal expansion of $\frac{1200000}{37}$ as an infinitely long repeating decimal.

5. Someone notices that the long division of 2,222,22 by 6 as a quotient of 370,370 and a remainder of 2 and wonders why there is a repeating block of digits in the quotient, namely 370. Explain to the person why

6. Is the answer to the division problem number $10 \div 3.2$ a rational number? Explain.



7. Is $\frac{3}{77\pi}$ a rational number? Explain.

8. The decimal expansion of a real number x has every digit 0 except the first digit, the tenth digit, the hundredth digit, the thousandth digit, and so on, are each 1. Is x a rational number? Explain.

EUREKA MATH

The Long Division Algorithm