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 infinitely long repeating decimal.

2. Write the decimal expansion of $\frac{6555555}{3}$ as an infinitely long repeating decimal.

3. Write the decimal expansion of $\frac{350000}{11}$ 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 $2{,}222{,}222$ by 6 has 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 this happens.

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

7. Is $\frac{3\pi}{77\pi}$ 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.

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