TOPIC 6

LESSON 6.2

Be Rational

Objective Quotient of Integers

Warm-Up

Classify each number into as many categories as it belongs: natural number, whole number, integer, rational number.

1. -3

2. $\frac{1}{2}$

3. 0

4. 5

GETTING STARTED

Are You a Terminator?

1. For each pair of numbers, use long division to calculate the quotient. Write quotients in fractional and decimal form.

a. 5 ÷ 8

b. 5 ÷ 11

c. 7 ÷ 9

d. 6 ÷ 2

2. What types of numbers are the quotients in Question 1? Use the definitions of the different number classifications to explain why this makes sense.

3. How many decimal places did you need to go to in the long division for each quotient? Why?

EXPLORE 1

Classifying Decimals

Decimals can be classified into two categories: terminating and non-terminating.

A **terminating** decimal has a finite number of digits, meaning that after a finite number of decimal places, all following decimal places have a value of 0. Terminating decimals are rational numbers.

A **non-terminating** decimal is a decimal that continues on infinitely without ending in a sequence of zeros.

1. Classify the decimals in Question 1 as terminating or non-terminating decimals.

2. Determine which unit fractions are terminating and which are non-terminating? Explain your reasoning for each.

$$\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{1}{5} \quad \frac{1}{6} \quad \frac{1}{7} \quad \frac{1}{8} \quad \frac{1}{9} \quad \frac{1}{10}$$

Non-terminating decimals can be further divided into two categories: repeating and non-repeating.
A **repeating decimal** is a decimal in which a digit, or a group of digits, repeat(s) infinitely. Repeating decimals are rational numbers.

Bar notation is used to indicate the digits that repeat in a repeating decimal. In the quotient of 3 and 7, the sequence 428571 repeats. The numbers that lie underneath the bar are the numbers that repeat.

$$\frac{3}{7} = 0.4285714285714\ldots = 0.\overline{428571}$$

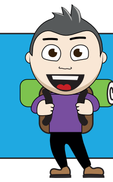
A **non-repeating decimal** continues without terminating and without repeating a sequence of digits. Non-repeating decimals are not rational numbers.

3. Classify the non-terminating decimals in Question 1 as repeating or non-repeating decimals. If they are repeating decimals, rewrite them using bar notation.

4. Use your results in Question 2 to make a conjecture about other fractions. Which fractions will have repeating decimal representations? Use examples to support your conjecture.

EXPLORE 2

Equivalent Rational Numbers



Cut out the numbers at the end of the lesson. There are four possible representations of each rational number, but not all of the rational numbers have all four representations provided.

1. Sort the numbers into their equivalent representations. For any numbers that do not have four representations, create the missing representation using the blank cards. Tape or glue the sets of representations in the space provided.

2. What do you notice about the negative sign in the fraction form of the representations?

Show You KNOW

It's All the Same to Me

Any quotient of two integers is a rational number, so long as the divisor is not 0.

For each rational number,

- write two equivalent representations in fractional form,
- convert to a decimal,
- classify the decimal as terminating or non-terminating and, if applicable, repeating or non-repeating.

1. $\frac{-11}{25}$

2. $\frac{-1}{6}$

3. $\frac{27}{-50}$

4. $\frac{-3}{7}$

Name: ______________________ Date: ____________ Class: __________

Homework HW

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Practice

Convert each fraction to a decimal. Classify the decimal as *terminating*, *non-terminating*, *repeating*, or *non-repeating*. If the decimal repeats, rewrite it using bar notation.

1. $\frac{3}{8}$
2. $\frac{5}{6}$
3. $\frac{7}{25}$
4. $\frac{2}{11}$
5. $\frac{5}{12}$

Write each rational number as an equivalent fraction by changing the placement of the negative sign(s).

6. $-\frac{4}{7}$
7. $\frac{-5}{3}$
8. $\frac{1}{2}$
9. $\frac{9}{-2}$
10. $-\frac{8}{5}$