MATH 1
week of 2/10- 2/14/20

Be Rational!

Quotients of Integers

2

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

LEARNING GOALS

- Know that the decimal form of a rational number terminates in 0s or eventually repeats.
- Represent rational numbers as terminating or repeating decimals.
- Use long division to represent quotients of integers as rational numbers.
- Write equivalent forms of signed rational numbers.
- Determine that every quotient of integers is a rational number, provided the divisor is not zero.

KEY TERMS

- terminating decimals
- non-terminating decimals
- repeating decimals
- bar notation
- non-repeating decimals

You have learned the rule to determine the sign of a quotient. Does a quotient change if the negative sign is on the divisor instead of the dividend?

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. $5 \div 8$

   b. $5 \div 11$

   c. $7 \div 9$

   d. $6 \div 2$

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?

ACTIVITY
2.1 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.**

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

Pi (π) is one of the most well-known non-repeating decimals.

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.

The bar is called a vinculum.

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

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.

ACTIVITY
2.2 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.**

Consider how you can use positive and negative signs to write an equivalent form of $\frac{3}{5}$.

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

NOTES

TALK the TALK

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

$-\frac{2}{3}$	$\frac{-4}{5}$	$\frac{11}{-4}$	$\frac{-13}{15}$
$\frac{-39}{60}$	$\frac{-7}{22}$	$\frac{2}{-3}$	$-0.8\overline{6}$
$-\frac{11}{4}$	$\frac{4}{-5}$	$\frac{13}{-15}$	$-0.\overline{6}$
$-\frac{39}{60}$	$\frac{7}{-22}$	$\frac{-2}{3}$	$-\frac{4}{5}$

Assignment

Write

Explain how the three different fractional representations of a rational number are related to determining the sign of the quotient of two integers.

Remember

The sign of a negative rational number in fractional form can be placed in front of the fraction, in the numerator of the fraction, or in the denominator of the fraction.

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. $-\frac{8}{5}$

Stretch

Use what you know about multiplying signed numbers to evaluate each expression.

1. $\left(-\frac{1}{2}\right)^2$
2. $-\left(\frac{1}{2}\right)^2$
3. $\left(-\frac{1}{2}\right)^3$
4. $-\left(\frac{1}{2}\right)^3$

What do you notice?

Review

Represent each scenario as a multiplication or division problem. Then, solve the problem.

1. The temperature changed $-2°$ per hour for 5 hours. How many degrees did the temperature drop during that time period.
2. Lina missed 8 questions on her science final, which changed her final score by -32 points. If each question is weighted equally, how many points did she lose for each question?

Determine each product.

3. $2\frac{1}{2} \times \left(-3\frac{3}{4}\right)$
4. $-5\frac{1}{3} \times \left(-2\frac{1}{2}\right)$

Determine an 18% gratuity for each restaurant bill.

5. \$29.50
6. \$56.70