6-3 Rational Numbers

CONTENT STANDARDS
6.NS.5, 6.NS.6, 6.NS.6.c, 6.NS.7.b

What You'll Learn

To show that numbers are rational and to plot rational numbers on a number line

New Vocabulary rational number

Why Learn This?

You see rational numbers when you read prices in ads on the Internet or in the newspaper. Rational numbers are also used in athletes' statistics, temperatures, and the weights of items.

Put this definition in your Evernote.

A **rational number** is any number that can be written as a quotient of two integers in which the denominator is not zero. Integers, fractions, mixed numbers, and certain types of decimals are rational numbers. The examples below show how different types of rational numbers can be written as a quotient of two integers.

$1\frac{2}{3}$	0.4	2	-8	-0.38
↕	↕	↕	↕	↕
$\frac{5}{3}$	$\frac{4}{10}$	$\frac{2}{1}$	$\frac{-8}{1}$	$\frac{-38}{100}$

EXAMPLE Showing That Numbers Are Rational

1 Show that each number is a rational number by writing it as a quotient of two integers.

a. $\frac{3}{4}$

$\frac{3}{4}$ is a fraction. It is rational.

b. -3

-3 is an integer and can be written as $\frac{-3}{1}$. It is rational.

c. $-1\frac{2}{5}$

$-1\frac{2}{5}$ can be written as $\frac{-7}{5}$. It is rational.

d. 11.06

11.06 can be written as $\frac{1106}{100}$. It is rational.

Examples

1 Showing That Numbers Are Rational Show that each number is a rational number by writing it as a quotient of two integers.

a. $\frac{2}{3}$

$\frac{2}{3}$ is a fraction. It is rational.

b. -7

-7 is an integer and can be written as $\frac{-7}{\square}$.
It is rational.

c. $-3\frac{4}{5}$

$-3\frac{4}{5}$ can be written as $\frac{-19}{\square}$.
It is rational.

d. 15.36

15.36 can be written as $\square$.
It is $\square$.

You previously graphed positive and negative integers on a number line. To graph rational numbers on a number line, divide the integer units into fractional parts.

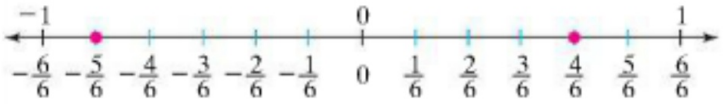
EXAMPLE 2 Plotting Fractions on a Number Line

Plot $\frac{4}{6}$ and $-\frac{5}{6}$ on a number line.

The denominator of $-\frac{5}{6}$ and $\frac{4}{6}$ is 6. So, divide your number line into sixths. Label the sixths.

For positive numbers, count right from 0. Find and plot a point at $\frac{4}{6}$.

For negative numbers, count left from 0. Find and plot a point at $-\frac{5}{6}$.

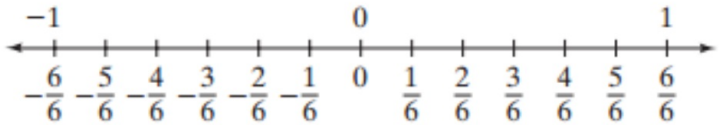


2 Plotting Fractions on a Number Line Plot $-\frac{2}{6}$ and $\frac{1}{6}$ on a number line.

The denominator of each fraction is 6. Divide your number line in [ ]. Label the sixths.

For positive numbers, count right from 0. Find and plot a point at [ ].

For negative numbers, count [ ] from 0. Find and plot a point at [ ].

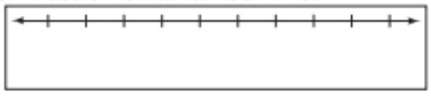


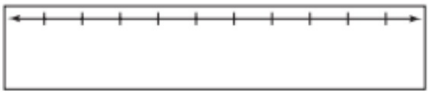
Quick Check

1. Show that each number is a rational number by writing it as a quotient of two integers.

   a. -6.4 **b.** 9 **c.** $-\frac{5}{7}$ **d.** -0.75

2. Plot each fraction on a number line.

   a. $-\frac{5}{3}$ 

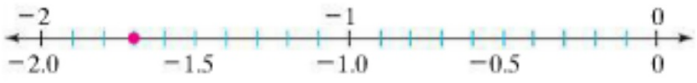
   b. $\frac{3}{8}$ 

EXAMPLE **Plotting Decimals on a Number Line**

3. Vera owes her brother \$1.70. This debt is represented by -1.7. Plot the decimal on a number line.

   The smallest place value in -1.7 is tenths. So, divide your number line into tenths. Label the tenths.

   For negative numbers, count left from 0. Find and plot a point at -1.7.

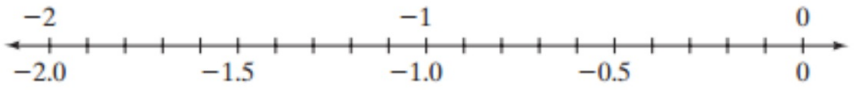


Example

3 Plotting Decimals on a Number Line Guy owes his sister $1.40. This debt is represented by −1.4. Plot the decimal on a number line.

The smallest place value in −1.4 is tenths. Divide your number line into ☐. Label the tenths.

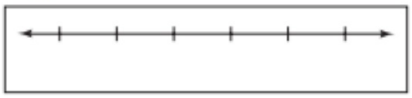
For negative numbers, count left from 0. Find and plot a point at ☐.



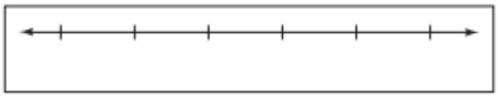
Quick Check

3. Plot each decimal on a number line.

a. −0.3



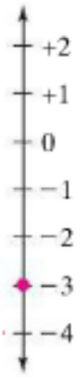
b. 1.52



EXAMPLE Plotting on a Vertical Number Line

4 Plot -3 on a vertical number line.

Draw a vertical number line. Label the integers.
Count down from 0 to find -3. Plot a point at -3.

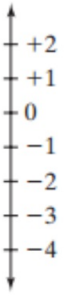


Example

4 **Plotting on a Vertical Number Line** Plot –2 on a vertical number line.

Draw a vertical number line. Label the integers.

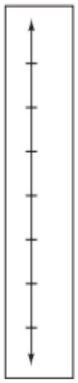
Count down from 0 to find [ ]. Plot a point at -2.



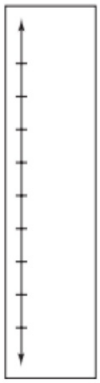
Quick Check

4. Plot each rational number on a vertical number line.

a. 6



b. −3.85



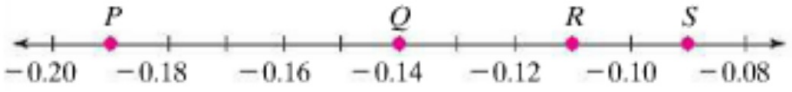
Check Your Understanding

2. Modeling Complete each statement.

a. On a horizontal number line, negative rational numbers appear _____ 0.

b. On a vertical number line, negative rational numbers appear _____ 0.

Match each rational number with a point on the line.



3. −0.14 **4.** −0.11 **5.** −0.19 **6.** −0.09

Name _____ Class _____ Date _____

6-3 • Guided Problem Solving

GPS **Student Page 216, Exercise 30:**

Number Sense Between what two integers on a number line does −3.425 lie? Between what two rational numbers, in tenths, does it lie? Between what two rational numbers, in hundredths, does it lie? Explain.

Understand

1. What do you need to do? _____

2. What types of numbers do you need to find?

Plan and Carry Out

3. Draw a number line. Divide it into tenths and plot −3.425.

4. Between what two integers on a number line does −3.425 lie?

5. Which rational number, in tenths, is to the left of –3.425? _____

6. Between what two rational numbers, in tenths, does −3.425 lie?

7. Which rational number, in hundredths, is to the left of −3.425?

8. Between what two rational numbers, in hundredths, does −3.425 lie? _____

Check

9. How can you check your answers? _____

Solve Another Problem

10. Between what two integers on a number line does −2.643 lie? Between what two rational numbers, in tenths, does it lie? Between what two rational numbers, in hundredths, does it lie? Explain.