

1-5

Rational Numbers

What You'll Learn

To compare and order rational numbers

New Vocabulary rational number

Why Learn This?

Rational numbers are part of everyday life. You see them on price tags, highway signs, and charts. Rational numbers can be written in different forms. To compare rational numbers, it is easier to convert them into the same form.



A **rational number** is a number that can be written as a quotient of two integers, where the divisor is not 0. Examples are $\frac{2}{5}$, $0.\bar{3}$, -6 , and $3\frac{1}{2}$.

EXAMPLE Comparing Rational Numbers

1 Compare $-\frac{1}{2}$ and $-\frac{3}{4}$.

Method 1



← Since $-\frac{3}{4}$ is farther to the left on the number line, it is the lesser number.

$$\text{So } -\frac{3}{4} < -\frac{1}{2}.$$

Method 2

$$-\frac{1}{2} = \frac{-1}{2} \quad \leftarrow \text{Rewrite } -\frac{1}{2} \text{ with } -1 \text{ in the numerator.}$$

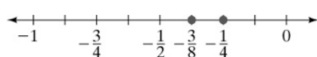
$$= \frac{-1 \times 2}{2 \times 2} \quad \leftarrow \text{The LCD is 4. Write an equivalent fraction.}$$

$$= \frac{-2}{4} = -\frac{2}{4} \quad \leftarrow \text{The fraction } -\frac{2}{4} \text{ is equivalent to } -\frac{2}{4}.$$

$$\text{Since } -\frac{3}{4} < -\frac{2}{4}, -\frac{3}{4} < -\frac{1}{2}.$$

1 **EXAMPLE** Compare $-\frac{1}{4}$ and $-\frac{3}{8}$.

Method 1



← Since $-\frac{3}{8}$ is farther to the left on the number line, it is the lesser number.

$$\text{So, } -\frac{1}{4} > -\frac{3}{8}.$$

Method 2

$$-\frac{1}{4} = \frac{-1}{4} \quad \leftarrow \text{Rewrite } -\frac{1}{4} \text{ with a } -1 \text{ in the numerator.}$$

$$= \frac{-1 \times 2}{4 \times 2} \quad \leftarrow \text{The LCD is 8. Write an equivalent fraction.}$$

$$= \frac{-2}{8} = -\frac{2}{8} \quad \leftarrow \text{The fraction } -\frac{2}{8} \text{ is equivalent to } -\frac{2}{8}.$$

Since $-\frac{2}{8} > -\frac{3}{8}$, then $-\frac{1}{4} > -\frac{3}{8}$.

Table talk about this problem.

Quick Check

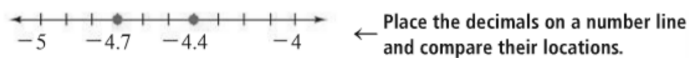
1. Compare $-\frac{2}{3}$ and $-\frac{1}{6}$. Use $<$, $=$ or $>$.

EXAMPLE Comparing Decimals

- 2 a. Compare -4.4 and 4.7 .

$$-4.4 < 4.7 \quad \leftarrow \text{Any negative number is less than a positive number.}$$

- b. Compare -4.4 and -4.7 .



$$-4.4 > -4.7 \text{ since } -4.4 \text{ is to the right of } -4.7.$$

2 EXAMPLE Compare. Use $<$, $>$, or $=$.

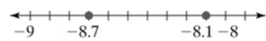
a. 8.7 and 8.1

$8.7 > 8.1$ ← Both numbers are positive. Compare the digits.

b. -8.7 and 8.1

$-8.7 < 8.1$ ← Any negative number is less than a positive number.

c. -8.7 and -8.1



← Place the decimals on a number line and compare their locations.

$-8.7 < -8.1$

Table talk about this problem.

Quick Check

2. Compare -4.2 and -4.9 . Use $<$, $=$, or $>$.

EXAMPLE Ordering Rational Numbers

3 Multiple Choice The peaks of four mountains or seamounts are located either below or above sea level as follows: $\frac{1}{4}$ mi, -0.2 mi, $-\frac{2}{9}$ mi, 1.1 mi. Which list shows the order of numbers from least to greatest?

Test Prep Tip
Sometimes it is easier to order rational numbers when they are all written as decimals.

(A) $\frac{1}{4}$, -0.2 , $-\frac{2}{9}$, 1.1

(C) $-\frac{2}{9}$, -0.2 , $\frac{1}{4}$, 1.1

(B) $\frac{1}{4}$, $-\frac{2}{9}$, 1.1 , -0.2

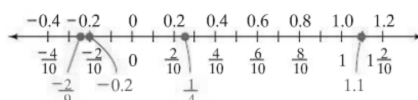
(D) -0.2 , $-\frac{2}{9}$, 1.1 , $\frac{1}{4}$

Order these numbers from least to greatest: $\frac{1}{4}$, -0.2 , $-\frac{2}{9}$, 1.1 .

$\frac{1}{4} = 1 \div 4 = 0.250$ ← Write as a decimal. Use long division if it helps.

$-\frac{2}{9} = -2 \div 9 = -0.22222 \dots = -0.\overline{2}$ ← Write as a repeating decimal.

You can use a number line to order the numbers.



$-0.\overline{2} < -0.2 < 0.25 < 1.1$ ← Compare the decimals.

In order, the numbers are $-\frac{2}{9}$, -0.2 , $\frac{1}{4}$, and 1.1 . The answer is C.

3 EXAMPLE Order these numbers from least to greatest:

$$-\frac{3}{5}, 0.625, \frac{2}{3}, -0.5$$

$$-\frac{3}{5} = -3 \div 5 = -0.6 \quad \leftarrow \text{Write as a decimal.}$$

$$\frac{2}{3} = 2 \div 3 = 0.\bar{6} \quad \leftarrow \text{Write as a repeating decimal.}$$

$$-0.6 < -0.5 < 0.625 < 0.\bar{6} \quad \leftarrow \text{Compare the decimals.}$$

From least to greatest, the numbers are $-\frac{3}{5}, -0.5, 0.625, \frac{2}{3}$.

Last table talk problem

3. The following temperatures were recorded during a science project: $12\frac{1}{2}^{\circ}\text{C}$, -4°C , 6.55°C , and $-6\frac{1}{4}^{\circ}\text{C}$. Order the temperatures from least to greatest.

Check Your Understanding

Compare. Use $<$, $=$, or $>$.

2. $2\frac{1}{5}$ $3\frac{1}{3}$

3. $-3\frac{1}{2}$ $-3\frac{3}{4}$

4. -6.1 -6

Order from least to greatest.

5. $-236, -7\frac{1}{7}, 0, \frac{41}{99}, -3.\bar{3}$

6. $-8, -5\frac{1}{3}, -8.22, -8\frac{1}{3}, \frac{16}{42}$

You have a worksheet assignment and time to begin working on it now.

Name _____ Class _____ Date _____

Reteaching 1-5 Rational Numbers

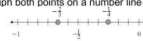
A **rational number** is a number that can be written as a quotient of two integers, where the divisor is not zero. A negative rational number can be written in three different ways.

$$-\frac{2}{3} = -\frac{2}{3} = \frac{-2}{3}$$

Comparing Negative Rational Numbers

Compare $-\frac{2}{3}$ and $-\frac{1}{4}$.

Method 1 Use a number line. Graph both points on a number line and see which is farther to the left.



Since $-\frac{2}{3}$ is farther to the left, $-\frac{2}{3} < -\frac{1}{4}$.

Method 2 Use the lowest common denominator.

$$-\frac{2}{3} = \frac{-2 \cdot 4}{3 \cdot 4} = \frac{-8}{12}$$

$$-\frac{1}{4} = \frac{-1 \cdot 3}{4 \cdot 3} = \frac{-3}{12}$$

Since $-\frac{8}{12} < -\frac{3}{12}$, then $-\frac{2}{3} < -\frac{1}{4}$.

Compare. Use $<$, $>$, or $=$.

- | | |
|------------------------|-------------------------|
| 1. $4/9$ _____ $2/3$ | 4. $-1/3$ _____ $-5/6$ |
| 2. -1 _____ $-4/5$ | 5. $-2/5$ _____ $-1/10$ |
| 3. $-7/8$ _____ $-1/8$ | 6. $-2/8$ _____ $-1/4$ |

Order from least to greatest.

- | | |
|--|---|
| 7. $-\frac{1}{3}$, 0.3 , -0.35 , $\frac{3}{10}$ | 8. $\frac{1}{5}$, 0.25 , 0.21 , $\frac{3}{10}$ |
|--|---|

9. You and your brother invested an equal amount of money in a college savings plan. In the last quarter your investment was worth $\frac{5}{6}$ of its original value. Your brother's investment was worth 1.85 of its original value. Whose investment is worth more? _____