

Study Guide

Rational Numbers

Definition of a Rational Number	A rational number is a number that can be expressed in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.
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You can compare rational numbers by graphing them on a number line.

Comparing Numbers on the Number Line	If a and b represent any numbers and the graph of a is to the left of the graph of b , then $a < b$. If the graph of a is to the right of the graph of b , then $a > b$.
Comparison Property	For any two numbers a and b , exactly one of the following sentences is true. $a < b$ $a = b$ $a > b$

Example 1: $-3\frac{1}{2} < -\frac{1}{2}$ The graph of $-3\frac{1}{2}$ is to the left of the graph of $-\frac{1}{2}$.

Example 2: $-2\frac{1}{4} > -3\frac{1}{4}$ The graph of $-2\frac{1}{4}$ is to the right of the graph of $-3\frac{1}{4}$.

Example 3: Replace $\underline{\quad ? \quad}$ with $<$, $>$, or $=$ to make the sentence true.

$$-15 \underline{\quad ? \quad} -3$$

$$-15 < -3$$

Since -15 is to the left of -3 on a number line, -15 is less than -3 .

The symbols \neq , \leq and \geq can also be used to compare numbers and are called **inequality symbols**.

You can use **cross products** to compare two fractions with different denominators.

Comparison Property for Rational Numbers	For any rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, with $b > 0$ and $d > 0$: 1. if $\frac{a}{b} < \frac{c}{d}$ then $ad < bc$, and 2. if $ad < bc$, then $\frac{a}{b} < \frac{c}{d}$.
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This property also holds if $<$ is replaced by $>$, \leq , \geq , or $=$.

A property that is true for rational numbers but is not true for integers is the **density property**.

Density Property for Rational Numbers	Between every pair of distinct rational numbers, there is another rational number.
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Replace each $\underline{\quad ? \quad}$ with $<$, $>$, or $=$ to make each sentence true.

1. $-4 \underline{\quad ? \quad} 10$

2. $\frac{-29}{2} \underline{\quad ? \quad} -28.5 + 14$

3. $-5 - 6 \underline{\quad ? \quad} -12 - 1$

Write the numbers in each set in order from least to greatest.

4. $3\frac{1}{3}$, $\frac{5}{8}$, 0.4

5. $-\frac{3}{2}$, $\frac{1}{4}$, 0.2

Find a number between the given numbers.

6. $\frac{1}{2}$ and $\frac{7}{9}$

7. $\frac{7}{6}$ and $\frac{9}{8}$

8. $\frac{9}{17}$ and $\frac{2}{5}$