

## Study Guide

## Rational Numbers

<b>Definition of a Rational Number</b>	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.

<b>Comparing Numbers on the Number Line</b>	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 $a > b$ .
<b>Comparison Property</b>	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.

<b>Comparison Property for Rational Numbers</b>	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**.

<b>Density Property for Rational Numbers</b>	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  $\frac{2}{5}$