

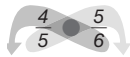
Rational Numbers (Pages 94–99)

A **rational number** is a number that can be expressed in the form $\frac{a}{b}$, where a and b are integers and b is not equal to 0. A mathematical sentence that uses $<$ and $>$ to compare two expressions is called an **inequality**.

Comparing Rational Numbers	<ul style="list-style-type: none"> If the graph of a is to the left of the graph of b on a number line, then $a < b$. For any two numbers a and b, exactly one of these is true: $a < b$ $a = b$ $a > b$ You can use cross products, the products of diagonal terms, to compare two fractions. For rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, with $b > 0$ and $d > 0$, <ol style="list-style-type: none"> If $\frac{a}{b} < \frac{c}{d}$, then $ad < bc$, and If $ad < bc$, then $\frac{a}{b} < \frac{c}{d}$.
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EXAMPLES

A Replace \bullet to make $\frac{4}{5} \bullet \frac{5}{6}$ a true sentence.



Find the cross products.

$$6(4) \bullet 5(5)$$

$$24 < 25$$

The true sentence is $\frac{4}{5} < \frac{5}{6}$.

B Write $-\frac{1}{4}$, $-\frac{5}{8}$, and $\frac{2}{9}$ in order from least to greatest.

Express the fractions as terminating or repeating decimals and then order.

$$-1 \div 4 = -0.25 \qquad -5 \div 8 = -0.625$$

$$2 \div 9 = 0.222\dots \text{ or } 0.\overline{2}$$

The decimals from least to greatest are -0.625 , -0.25 , $0.\overline{2}$. So the fractions should be ordered $-\frac{5}{8}$, $-\frac{1}{4}$, $\frac{2}{9}$.

PRACTICE

Replace each \bullet with $<$, $>$, or $=$ to make a true sentence.

1. $4.5 \bullet -5$

2. $-2.3 \bullet -1.8$

3. $7 - 25 \bullet -3(2)(3)$

4. $-\frac{3}{4} \bullet -\frac{6}{7}$

5. $\frac{3}{8} \bullet \frac{2}{6}$

6. $\frac{3}{5} \bullet \frac{2}{3}$

Write the numbers in each set from least to greatest.

7. $-\frac{3}{4}$, $-\frac{5}{6}$, $-\frac{4}{5}$

8. $-\frac{3}{8}$, $\frac{3}{5}$, $-\frac{2}{3}$

9. 0.4 , $-\frac{3}{7}$, -0.1

10. $\frac{3}{8}$, $\frac{3}{9}$, $\frac{5}{6}$

11. $-\frac{1}{7}$, $-\frac{2}{5}$, -0.7

12. $\frac{1}{3}$, $\frac{4}{10}$, $\frac{2}{8}$



13. Standardized Test Practice Which number is between $\frac{1}{3}$ and $\frac{4}{5}$?

A $\frac{2}{7}$

B $\frac{3}{8}$

C $\frac{6}{7}$

D $\frac{7}{8}$

Answers: 1. $<$ 2. $<$ 3. $=$ 4. $<$ 5. $<$ 6. $<$ 7. $-\frac{5}{6}$, $-\frac{4}{5}$, $-\frac{3}{4}$ 8. $-\frac{3}{2}$, $-\frac{3}{3}$, $\frac{5}{3}$ 9. $-\frac{7}{3}$, -0.1 , 0.4 10. $\frac{3}{3}$, $\frac{8}{3}$, $\frac{6}{5}$ 11. $-\frac{5}{2}$, $-\frac{7}{4}$, $-\frac{1}{2}$ 12. $\frac{1}{3}$, $\frac{2}{5}$, $\frac{1}{2}$ 13. B