

Fractions: Reciprocal and Division

Vocabulary

Reciprocal	The reciprocal of a number, $\frac{a}{b}$ is $\frac{b}{a}$. To form the reciprocal, invert or interchange the numerator and the denominator. When the reciprocal of any number (except 0) is multiplied together with the number, the result is 1.
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Example: The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$. When multiplied together, the result is 1. $\frac{2}{3} \cdot \frac{3}{2} = \frac{1}{1} = 1$

The reciprocal of $\frac{7}{5}$ is $\frac{5}{7}$.

TRY: What is the reciprocal of $\frac{3}{5}$? _____ What is the reciprocal of $\frac{8}{3}$? _____

Dividing Fractions

To **divide fractions**, multiply the first fraction by the reciprocal of the second fraction.

Example: $\frac{2}{3} \div \frac{5}{7} = ?$ $\frac{2}{3} \div \frac{5}{7} = \frac{2}{3} \cdot \frac{7}{5} = \frac{14}{15}$

$$\frac{3}{8} \div \frac{21}{22} = ? \qquad \frac{3}{8} \div \frac{21}{22} = \frac{3}{8} \cdot \frac{22}{21} = \frac{\cancel{3} \cdot \cancel{22}}{\cancel{8} \cdot \cancel{21}} = \frac{11}{28}$$

Rule: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$ as long as $b \neq 0$, $c \neq 0$, and $d \neq 0$ (Remember, division by 0 is undefined.)

TRY: $\frac{3}{5} \div \frac{7}{10} =$ $\frac{2}{7} \div \frac{8}{21} =$ $\frac{-4}{9} \div \frac{-16}{45} =$

Since the fraction bar means division, $\frac{2}{7} \div \frac{8}{21}$ could be thought of as the **complex fraction**: $\frac{\frac{2}{7}}{\frac{8}{21}}$

When working with a complex fraction, write it first as the fraction in the numerator divided by the fraction in the denominator. Then, rewrite it as the first fraction times the reciprocal of the second.