

Content and Language Objective:

SWBAT understand the processes and techniques that are used when working with fractions. SWBAT solve problems involving fractions and be able to explain each process in their own words.

Warm-Up

Simplify and solve the following fractions.

$$7\frac{1}{3} + 4\frac{3}{4}$$

$$7\frac{1}{3} + 4\frac{3}{4}$$

$\times 4 \qquad \qquad \times 3$

$$7\frac{4}{12} + 4\frac{9}{12}$$

$$11\frac{13}{12} \rightarrow 12\frac{1}{12}$$

$$\frac{19}{5} - \frac{7}{3}$$

$3 \times \frac{19}{5} - \frac{7}{3} \times \frac{5}{5}$

$$\frac{57}{15} - \frac{35}{15} = \frac{22}{15}$$

$1\frac{7}{15}$

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Keywords

- **Reciprocal**
- **Reduce**
- **Improper Fraction**
- **Mixed Fraction**

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Multiplication is the simplest of fraction operations since

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

is

$$\text{fraction} \times \text{fraction} = \frac{\text{product of numerators}}{\text{product of denominators}}$$

Only complication is remembering to cancel any common factors; this is easier if you cancel as much as possible before performing the multiplication.

Example 1 :

$$\begin{aligned} \frac{5}{9} \times \frac{6}{7} &= \frac{5 \times 6}{9 \times 7} \\ &= \frac{5 \times \cancel{3} \times 2}{3 \times \cancel{3} \times 7} \\ &= \frac{10}{21} \end{aligned}$$

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Example 2 :

$$\begin{aligned} \frac{1}{2} \times \frac{4}{7} &= \frac{1 \times 4}{2 \times 7} \\ &= \frac{1 \times \cancel{2} \times \cancel{2}}{\cancel{2} \times 7} \\ &= \frac{2}{7} \end{aligned}$$

Example 3 :

$$\begin{aligned} \frac{13}{3} \times \frac{9}{26} &= \frac{13 \times 9}{3 \times 26} \\ &= \frac{\cancel{13} \times \cancel{3} \times 3}{\cancel{3} \times 2 \times \cancel{13}} \\ &= \frac{3}{2} \end{aligned}$$

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When multiplying mixed numbers, change the mixed numeral(s) to an improper fraction first.

Example 4 :

$$\begin{aligned} 1\frac{2}{3} \times 2\frac{1}{4} &= \frac{5}{\cancel{3}} \times \frac{\cancel{2}^3}{4} \\ &= \frac{15}{4} \\ &= 3\frac{3}{4} \end{aligned}$$

Example 5 :

$$\begin{aligned} 2\frac{3}{5} \times 1\frac{5}{13} &= \frac{\cancel{13}}{5} \times \frac{18}{\cancel{13}} \frac{234}{65} \\ &= \frac{18}{5} \\ &= 3\frac{3}{5} \end{aligned}$$

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Let's Practice with these

$$\frac{\cancel{3}^1}{5} \cdot \frac{7}{\cancel{9}_3} = \frac{7}{15}$$

$$\frac{15}{7} \cdot \frac{3}{1} = \frac{15}{7} \cdot 3$$

$$\left(\frac{45}{7} \right)$$

$$1\frac{2}{5} \cdot 2\frac{4}{7} = \frac{18}{5} = 3\frac{3}{5}$$

$$\begin{array}{r} \cancel{\frac{7}{5}} \quad \cancel{\frac{18}{7}} \\ 5\sqrt{18} \\ \underline{15} \\ 3 \end{array}$$

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Warm-Up

$$\frac{15}{8} * \frac{64}{72}$$

$$\frac{5 \cdot 3 \cdot 2 \cdot 2 \cdot 2}{3 \cdot 3 \cdot 2 \cdot 2 \cdot 2} = \frac{5}{3}$$

$$\begin{array}{r} 18 \\ 12 \overline{) 217} \\ \underline{12} \\ 97 \\ \underline{96} \\ 1 \end{array}$$

$$18 \frac{1}{12}$$

$$3\frac{7}{8} * 4\frac{2}{3}$$

$$\frac{31}{8} \cdot \frac{14}{3}$$

$$\frac{31 \cdot 7 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 3}$$

$$= \frac{217}{12}$$

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Division of fractions makes use of the reciprocal. Dividing by a fraction is the same as multiplying by its reciprocal. So

Skip, Flip, Multiply
1st 2nd

$$\frac{a}{b} \div \frac{x}{y} = \frac{a}{b} \times \frac{y}{x}$$

Example 6 : The reciprocal of $\frac{1}{2}$ is $\frac{2}{1} = 2$.

reciprocal \rightarrow flip

Example 7 : The reciprocal of $\frac{5}{8}$ is $\frac{8}{5}$.



Example 8 : The reciprocal of $3 = \frac{3}{1}$ is $\frac{1}{3}$.

flip \leftarrow reciprocal

Example 9 : The reciprocal of $2\frac{2}{3} = \frac{8}{3}$ is $\frac{3}{8}$. (That is, to find the reciprocal of a mixed number, we need to change it to a proper fraction).

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Example 10 :

$$\begin{aligned} \frac{5}{8} \div \frac{1}{4} &= \frac{5}{8} \times \frac{4}{1} \\ &= \frac{5 \times 4}{2 \times 4} \\ &= \frac{5}{2} \\ &= 2\frac{1}{2} \end{aligned}$$

Example 11 :

$$\begin{aligned} \frac{\frac{6}{7}}{\frac{3}{7}} &= \frac{(\frac{6}{7})}{(\frac{3}{7})} = \frac{6}{7} \div \frac{3}{7} \\ &= \frac{6}{7} \times \frac{7}{3} \\ &= \frac{3 \times 2 \times \cancel{7}}{\cancel{7} \times 3} = 2 \end{aligned}$$

Example 12 :

$$\begin{aligned} 2\frac{1}{2} \div 1\frac{3}{5} &= \frac{5}{2} \div \frac{8}{5} \\ &= \frac{5}{2} \times \frac{5}{8} \\ &= \frac{25}{16} \\ &= 1\frac{9}{16} \end{aligned}$$

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Write the reciprocal

$$\frac{2}{3}$$

$$\frac{3}{2}$$

$$1\frac{1}{2}$$

$$\frac{2}{3}$$

$$5\frac{2}{7}$$

$$\frac{7}{37}$$

$$\frac{1}{8}$$

$$8$$

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Divide

$$\frac{3}{5} \div \frac{6}{7} = \frac{1}{\cancel{2}} \cdot \frac{7}{\cancel{6}_2} = \frac{7}{10}$$

$$3\frac{1}{4} \div 1\frac{1}{2} = \frac{13}{4} \cdot \frac{2}{3} = \frac{13}{6}$$

$$\frac{6}{11} \div \frac{9}{20} = \frac{2}{\cancel{3}} \cdot \frac{20}{\cancel{9}_3} = \frac{40}{33}$$

$$\frac{2 \cdot 3 \cdot 4 \cdot 5}{11 \cdot 8 \cdot 3}$$

$$8\frac{7}{12} \div 3\frac{3}{4} = \frac{103}{12} \cdot \frac{4}{15} = \frac{103}{45}$$

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