

OPERATIONS WITH FRACTIONS

ADDING or SUBTRACTING FRACTIONS

1. If the fractions are like fractions, go to Step 4.
2. Find the common denominator. (For help, see the *COMMON DENOMINATOR* Information Sheet.)
3. For each fraction, find the equivalent fraction with the common denominator
4. Add or subtract the numerators.
5. The denominator remains the same. **Never add denominators.**
6. Reduce to lowest terms.

EXAMPLES:

Subtract: $\frac{4}{9} - \frac{1}{9}$

$$\frac{4}{9} - \frac{1}{9} = \frac{3}{9} = \frac{1 \cdot 3}{3 \cdot 3} = \frac{1 \cdot \cancel{3}}{3 \cdot \cancel{3}} = \frac{1}{3}$$

Add: $\frac{2}{5} + \frac{1}{3}$

The common denominator is 15

$$\frac{2 \cdot 3}{5 \cdot 3} + \frac{1 \cdot 5}{3 \cdot 5} = \frac{6}{15} + \frac{5}{15} = \frac{11}{15}$$

MULTIPLYING FRACTIONS

1. A common denominator is not needed.
2. You may cancel any factor in any numerator with any factor in any denominator. This will make the numbers smaller and easier to work with.
3. Multiply straight across. The product of the numerators is the new numerator. The product of the denominators is the new denominator.
4. Reduce to lowest terms. (Always check for lowest terms, even if you canceled in Step 2.)

EXAMPLES:

Multiply: $\frac{5}{6} \cdot \frac{4}{5}$

$$\frac{5}{6} \cdot \frac{4}{5} = \frac{1 \cdot 5 \cdot 2 \cdot 2}{2 \cdot 3 \cdot 1 \cdot 5} = \frac{1 \cdot \cancel{5} \cdot 2 \cdot \cancel{2}}{\cancel{2} \cdot 3 \cdot 1 \cdot \cancel{5}} = \frac{2}{3}$$

Multiply: $\frac{2}{7} \cdot \frac{7}{9} \cdot \frac{1}{6}$

$$\frac{2}{7} \cdot \frac{7}{9} \cdot \frac{1}{6} = \frac{2 \cdot 7 \cdot 1}{7 \cdot 3 \cdot 3 \cdot 2 \cdot 3} = \frac{\cancel{2} \cdot \cancel{7} \cdot 1}{\cancel{7} \cdot 3 \cdot 3 \cdot \cancel{2} \cdot 3} = \frac{1}{27}$$

DIVIDING FRACTIONS

1. Invert (flip) the fraction following the division symbol or in the denominator of a complex fraction.
2. Multiply the fractions together.

EXAMPLES:

Divide: $\frac{4}{7} \div \frac{4}{5}$

$$\frac{4}{7} \div \frac{4}{5} = \frac{4}{7} \cdot \frac{5}{4} = \frac{\cancel{4} \cdot 5}{7 \cdot \cancel{4}} = \frac{5}{7}$$

Divide: $\frac{6}{5} \div \frac{8}{3}$

$$\frac{6}{5} \div \frac{8}{3} = \frac{6}{5} \cdot \frac{3}{8} = \frac{2 \cdot 3 \cdot 3}{5 \cdot 2 \cdot 4} = \frac{\cancel{2} \cdot 3 \cdot 3}{5 \cdot \cancel{2} \cdot 4} = \frac{9}{20}$$