

# Multiple Operations and Fraction Equations

Now that you have learned to add, subtract, multiply, and divide fractions and mixed numbers, you can also solve calculations that involve several operations.

The order of operations still applies: Anything in parentheses comes first, multiplication and division next, from left to right, and addition and subtraction last, again from left to right.

**Example Problem 1:**  $\frac{2}{5} \div \left[ \frac{1}{8} + \frac{1}{3} \right]$

In this problem, we need to do the addition first since it is inside parentheses.

The addition is:  $\frac{1}{8} + \frac{1}{3} = \frac{3}{24} + \frac{8}{24} = \frac{11}{24}$ . We cannot simplify that, so the addition is done.

Continuing with the original problem:

$$\frac{2}{5} \div \frac{11}{24} = \frac{2}{5} \times \frac{24}{11} = \frac{48}{55}$$

The fraction 48/55 cannot be simplified, so that is the final answer.

**Example Problem 2:**  $1\frac{5}{6} - \frac{2}{3} + \frac{3}{4}$

You can solve this problem in two different ways:

- 1) First solve  $1\frac{5}{6} - \frac{2}{3}$ . Then take the answer to that and add  $\frac{3}{4}$  to it.  
In each calculation, you need to use a common denominator.
- 2) First find a common denominator for the denominators 6, 3, and 4. Convert all three fractions into equivalent fractions with that denominator. Then, subtract and add.

Method 1:

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

$$1\frac{1}{6} + \frac{3}{4} = 1\frac{2}{12} + \frac{9}{12} = 1\frac{11}{12}$$

Method 2:

$$1\frac{5}{6} - \frac{2}{3} + \frac{3}{4} = 1\frac{10}{12} - \frac{8}{12} + \frac{9}{12} = 1\frac{11}{12}$$

**Example Problem 3:**  $\frac{5}{6} \times \frac{2}{3} \div \frac{4}{3}$

Multiplication and division are on the same “level” in the order of operations, so we simply start solving with the first operation from the left, which is the multiplication.

Next we use the answer from that and divide.  
5/12 is the final answer.

$$\frac{5}{6} \times \frac{2}{3} = \frac{5}{9}$$

$$\frac{5}{9} \div \frac{4}{3} = \frac{5}{9} \times \frac{3}{4} = \frac{5}{12}$$

1. Solve.

a.  $\frac{7}{8} + \frac{1}{2} - \frac{2}{3}$

b.  $1\frac{3}{4} + \frac{1}{2} \times \frac{2}{3}$

c.  $8\frac{3}{4} \div 2\frac{5}{8} + 2\frac{2}{5}$

d.  $4\frac{2}{7} \div \frac{6}{7} \times \frac{5}{8}$

e.  $6\frac{5}{12} - 2\frac{7}{8} - \frac{1}{2}$

f.  $5\frac{3}{5} - \frac{5}{6} \times \frac{9}{10}$

g.  $\frac{3}{8} \div \frac{6}{7} - \frac{2}{3} \times \frac{3}{8}$

## Fraction equations (*optional*)

Equations that have fractions are solved the same way as equations with whole numbers. But you might feel intimidated by them or have forgotten how to solve some simple equations.

Suppose the equation  $x - \frac{7}{8} = \frac{11}{12}$  looks “unfriendly” or difficult. You can always use this trick:

First, replace the fractions with easy numbers, for example  $x - 5 = 2$ . You can probably easily see that the answer is 7. Now, THINK what operations will get you the answer “7”? You ADD 5 and 2.

So, use the same strategy with the original equation: add  $\frac{7}{8}$  and  $\frac{11}{12}$ .

$$x = \frac{7}{8} + \frac{11}{12} = \frac{21}{24} + \frac{22}{24} = \frac{43}{24} = 1 \frac{19}{24}$$

Then check that the solution is indeed a solution. Simply put  $1 \frac{19}{24}$  into the equation in place of  $x$ ,

and do the calculation:  $1 \frac{19}{24} - \frac{7}{8} = 1 \frac{19}{24} - \frac{21}{24} = \frac{22}{24} = \frac{11}{12}$ . Yes, the equation is correct.

2. Solve the equations.

a.  $x + \frac{1}{2} = \frac{5}{6}$

b.  $1 \frac{1}{3} - x = \frac{5}{8}$

c.  $x - \frac{4}{7} = \frac{2}{3}$

d.  $1 \frac{2}{3} + x = 3 \frac{9}{10}$