

Equations with Fractions

One way to solve equations with fractions is the same way that you would equations with integers: Just apply the same operation to both sides of the equation to isolate the unknown.

Sometimes we can make things even easier by choosing an operation that turns the fractions into integers.

Example 1. Solve the equation $x - \frac{7}{8} = \frac{11}{12}$.

One way is to simply add $\frac{7}{8}$ to both sides. We get:

$$\begin{aligned} x - \frac{7}{8} &= \frac{11}{12} && + \frac{7}{8} \\ x &= \frac{11}{12} + \frac{7}{8} \\ x &= \frac{22}{24} + \frac{21}{24} = \frac{43}{24} \end{aligned}$$

Lastly, we check that $\frac{43}{24}$ satisfies the equation:

$$\begin{aligned} \frac{43}{24} - \frac{7}{8} &\stackrel{?}{=} \frac{11}{12} \\ \frac{43}{24} - \frac{21}{24} &\stackrel{?}{=} \frac{11}{12} \\ \frac{22}{24} &= \frac{11}{12} \quad \checkmark \end{aligned}$$

Example 2. Solve the equation $\frac{x}{3} = \frac{7}{8}$.

Don't get "shook up" by the fraction. Looking at the left side, we see the variable is divided by 3. To isolate it, we simply multiply both sides by 3.

$$\begin{aligned} \frac{x}{3} &= \frac{7}{8} && \cdot 3 \\ \frac{3x}{3} &= \frac{7}{8} \cdot 3 \\ x &= \frac{21}{8} \end{aligned}$$

Lastly, we check that $\frac{21}{8}$ is indeed a solution by substituting it into the equation in place of x :

$$\begin{aligned} \frac{21}{8} \div 3 &\stackrel{?}{=} \frac{7}{8} \\ \frac{21}{8} \div 3 &= \frac{7}{8} \quad \checkmark \end{aligned}$$

1. Solve the equations. Give your answers as mixed numbers if applicable.

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

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

2. Solve. Give your answers as mixed numbers if applicable.

a. $s - \frac{7}{2} = 2\frac{1}{3}$

b. $1\frac{1}{5} + v = \frac{3}{10}$

c. $8x = -\frac{3}{4}$

d. $\frac{z}{8} = -\frac{11}{12}$

e. $2\frac{3}{8} - x = \frac{1}{2}$

f. $\frac{2}{11} - x = 3$

3. Three families shared the cost of purchasing a \$5,000 generator. The Martins paid $\frac{1}{3}$ of the cost, the Millers paid 40%, and the Browns paid the rest.

a. Find how much the Browns paid.

b. Check that your answer is reasonable by using mental math and estimation. Explain your reasoning.
(You *always* need to check that your answers are reasonable!)

4. Write an equation for each problem, and solve. You can also solve the problems using another method just to check that you get the same answer.

a. The perimeter of a square is $14\frac{1}{2}$ inches.
How long is one side?

b. The area of a rectangle is $32\frac{1}{2}$ square feet,
and one of its sides measures 6 feet.
How long is the other side?