Example 1 – Solve for x

$$\frac{x+1}{3}+\frac{x-1}{6}=\frac{2x+1}{2}$$

Step 1 → Multiply by LCM (or any multiple) so denominators "disappear"

Rewrite the equation leaving spaces on the right (or left) to multiply

$$\frac{x+1}{\mathbf{3}} \qquad +\frac{x-1}{\mathbf{6}} \qquad =\frac{2x+1}{\mathbf{2}}$$

What is the least common multiple (LCM) of **3**, **6**, and **2**?

6

Let's multiply EVERY TERM in the equation by **6** (or $\frac{\mathbf{6}}{\mathbf{1}}$)

$$\frac{x+1}{\mathbf{3}}\left(\frac{\mathbf{6}}{\mathbf{1}}\right)+\frac{x-1}{\mathbf{6}}\left(\frac{\mathbf{6}}{\mathbf{1}}\right)=\frac{2x+1}{\mathbf{2}}\left(\frac{\mathbf{6}}{\mathbf{1}}\right)$$

Our denominators "disappear" (or reduce to 1)

$$\mathbf{2}(x+1)+(x-1)=\mathbf{3}(2x+1)$$

Step 2 → Solve for the variable

$$\begin{gathered}2(x+1)+(x-1)=3(2x+1)\\2x+2+x-1=6x+3\\3x+1=6x+3\\-3x=2\end{gathered}$$

$$\boxed{x=-\frac{2}{3}}$$

Example 2 – Solve for m

$$\frac{2m+3}{4} - \frac{m}{6} < m + 1$$

Step 1 → Multiply by LCM (or any multiple) so denominators "disappear"

Rewrite the equation leaving spaces on the right (or left) to multiply

$$\frac{2m+3}{4} \qquad -\frac{m}{6} \qquad < m \qquad +1$$

What is the least common multiple (LCM) of **4** and **6**?

12

Let's multiply EVERY TERM in the equation by **12** (or $\frac{12}{1}$)

$$\frac{2m+3}{4}\left(\frac{12}{1}\right) - \frac{m}{6}\left(\frac{12}{1}\right) < m\left(\frac{12}{1}\right) + 1\left(\frac{12}{1}\right)$$

Our denominators "disappear" (or reduce to 1)

$$3(2m+3) - 2(m) < 12(m) + 12\ (1)$$

Step 2 → Solve for the variable

$$3(2m+3) - 2(m) < 12(m) + 12\ (1)$$
$$6m + 9 - 2m < 12m + 12$$
$$4m + 9 < 12m + 12$$
$$-8m < 3$$

$$\boldsymbol{m > -\frac{3}{8}}$$

[Remember to reverse inequality symbol when you multiply or divide both sides by a negative number!]

Example 3 – Solve for w

$$\frac{w(w+5)}{12} = \frac{w+8}{4}$$

Step 1 → Multiply by LCM (or any multiple) so denominators "disappear"

Rewrite the equation leaving spaces on the right (or left) to multiply

$$\frac{w(w+5)}{12} \qquad = \frac{w+8}{4}$$

What is the least common multiple (LCM) of **12** and **4**?

12

Let's multiply EVERY TERM in the equation by **12** (or $\frac{12}{1}$)

$$\frac{w(w+5)}{12}\left(\frac{12}{1}\right) = \frac{w+8}{4}\left(\frac{12}{1}\right)$$

Our denominators "disappear" (or reduce to 1)

$$w(w+5) = 3(w+8)$$

Step 2 → Solve for the variable

$$w(w+5) = 3(w+8)$$
$$w^2 + 5w = 3w + 24$$
$$w^2 + 2w - 24 = 0$$
$$(w+6)(w-4) = 0$$
$$w + 6 = 0 \qquad w - 4 = 0$$
$$w = -6 \qquad w = 4$$

$$\boxed{w = -6, 4}$$