

## 2.5 Equation Solving

## Solutions

<p>Solve for <math>x</math>. <span style="float: right;">LCM(<math>x, 1</math>) = <math>x</math></span></p> <p>1. <math display="block">\frac{x}{1} \cdot \left( \frac{3}{x} - \frac{4}{x} + \frac{5}{x} \right) = \frac{x}{1} \cdot 2</math></p> $\frac{x}{1} \cdot \frac{3}{x} - \frac{x}{1} \cdot \frac{4}{x} + \frac{x}{1} \cdot \frac{5}{x} = \frac{x}{1} \cdot 2$ $\frac{\cancel{x}}{1} \cdot \frac{3}{\cancel{x}} - \frac{\cancel{x}}{1} \cdot \frac{4}{\cancel{x}} + \frac{\cancel{x}}{1} \cdot \frac{5}{\cancel{x}} = \frac{x}{1} \cdot \frac{2}{1}$ $3 - 4 + 5 = 2x$ $4 = 2x$ $\frac{4}{2} = \frac{2x}{2}$ $2 = x$ <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;">{2}</div>	<p>2. <math display="block">\frac{1}{x} + \frac{2}{3x} = \frac{1}{3}</math></p>
<p>3. <span style="float: right;">LCM(<math>x-2, 1</math>) = <math>x-2</math></span></p> $\frac{x-2}{1} \cdot \left( \frac{x}{x-2} - 3 \right) = \frac{x-2}{1} \cdot \frac{2}{x-2}$ $\frac{x-2}{1} \cdot \frac{x}{x-2} - \frac{x-2}{1} \cdot \frac{3}{1} = \frac{x-2}{1} \cdot \frac{2}{x-2}$ $\frac{\cancel{x-2}}{1} \cdot \frac{x}{\cancel{x-2}} - \frac{\cancel{x-2}}{1} \cdot \frac{3}{1} = \frac{\cancel{x-2}}{1} \cdot \frac{2}{\cancel{x-2}}$ $x - 3(x-2) = 2$ $x - 3x + 6 = 2$ $-2x + 6 = 2$ $\frac{-6}{-2} = \frac{-6}{-2}$ $-2x = -4$ $\frac{-2x}{-2} = \frac{-4}{-2}$ $x = 2$ <p>However since <math>x = 2</math> makes the denominator <math>x - 2 = 2 - 2 = 0</math>, then the solution set = <math>\emptyset</math></p>	<p>4. <math display="block">\frac{y+6}{y+3} - 2 = \frac{3}{y+3}</math></p>
<p>Answers: 1. {2}; 3. <math>\emptyset</math></p>	

Solve for  $x$ .

$$\text{LCM}(2x, x, x-1) = 2x(x-1)$$

5.

$$\frac{2x(x-1)}{1} \cdot \left( \frac{1}{2x} + \frac{5}{x} \right) = \frac{2x(x-1)}{1} \cdot \frac{3}{x-1}$$

$$\frac{2x(x-1)}{1} \cdot \frac{1}{2x} + \frac{2x(x-1)}{1} \cdot \frac{5}{x} = \frac{2x(x-1)}{1} \cdot \frac{3}{x-1}$$

$$\frac{2x(x-1)}{1} \cdot \frac{1}{2x} + \frac{2\cancel{x}(x-1)}{1} \cdot \frac{5}{\cancel{x}} = \frac{2x(x-1)}{1} \cdot \frac{3}{\cancel{x-1}}$$

$$(x-1) + 2(x-1) \cdot 5 = 2x \cdot 3$$

$$x-1 + 10(x-1) = 6x$$

$$x-1 + 10x - 10 = 6x$$

$$11x - 11 = 6x$$

$$\begin{array}{r} -11x \\ \hline -11 = -5x \end{array}$$

$$\begin{array}{r} -11 \\ \hline -5 = -5x \end{array}$$

$$x = \frac{11}{5} \quad \left\{ \frac{11}{5} \right\}$$

6.

$$\frac{5-x}{x^2-1} + \frac{7}{x+1} = \frac{6}{x}$$

7.

$$\text{LCM}((x-2)(x+7), x-2, x+7) = (x-2)(x+7)$$

$$\frac{(x-2)(x+7)}{1} \cdot \frac{4x-1}{x^2+5x-14} = \frac{(x-2)(x+7)}{1} \cdot \left( \frac{1}{x-2} - \frac{2}{x+7} \right)$$

$$\frac{(x-2)(x+7)}{1} \cdot \frac{4x-1}{x^2+5x-14} = \frac{(x-2)(x+7)}{1} \cdot \frac{1}{x-2} - \frac{(x-2)(x+7)}{1} \cdot \frac{2}{x+7}$$

$$\frac{(x-2)(x+7)}{1} \cdot \frac{4x-1}{(x-2)(x+7)} = \frac{(x-2)(x+7)}{1} \cdot \frac{1}{x-2} - \frac{(x-2)(x+7)}{1} \cdot \frac{2}{x+7}$$

$$4x-1 = x+7-2(x-2)$$

$$4x-1 = x+7-2x+4$$

$$4x-1 = -x+11$$

$$\begin{array}{r} +x \\ \hline 5x-1 = 11 \end{array}$$

$$\begin{array}{r} +1 \\ \hline 5x = 12 \end{array}$$

$$\frac{5x}{5} = \frac{12}{5}$$

$$x = \frac{12}{5} \quad \left\{ \frac{12}{5} \right\}$$

8.

$$\frac{x}{x-1} - \frac{1}{x-4} = -\frac{3}{x^2-5x+4}$$

Answers: 5.  $\left\{ \frac{11}{5} \right\}$ ; 7.  $\left\{ \frac{12}{5} \right\}$