

Solve the equations.

1. $x - (2x + 6) = 3x + 5$

$$x - 2x - 6 = 3x + 5$$

$$-x - 6 = 3x + 5$$

$$+x - 5 \quad +x - 5$$

$$\boxed{\left\{-\frac{11}{4}\right\}} \quad \frac{-11}{4} = \frac{4x}{4} \quad \boxed{x = -\frac{11}{4}}$$

2. $-x^2 + 5x - 6 = 0$

$$(-x^2 + 5x - 6 = 0) - 1$$

$$x^2 - 5x + 6 = 0$$

$$(x - 3)(x - 2) = 0$$

$$\begin{array}{l|l} x-3=0 & x-2=0 \\ +3 & +2 \\ \hline x=3 & x=2 \end{array} \quad \boxed{\{3, 2\}}$$

3. $2x^2 + x - 3 = 0$

$$(2x + 3)(x - 1) = 0$$

$$\begin{array}{l|l} 2x+3=0 & x-1=0 \\ -3 & +1 \\ \hline 2x=-3 & x=1 \\ \frac{2}{2} & \end{array}$$

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

$$\boxed{\left\{1, -\frac{3}{2}\right\}}$$

4. $2m^3 + m^2 - 10m - 5 = 0$

$$m^2(2m + 1) - 5(2m + 1) = 0$$

$$(m^2 - 5)(2m + 1) = 0$$

Square Root Property

$$\begin{array}{l|l} m^2-5=0 & 2m+1=0 \\ +5 & -1 \\ \hline m^2=5 & \frac{2m}{2} = \frac{-1}{2} \\ \downarrow & \\ m = \sqrt{5} & m = -\frac{1}{2} \\ \text{or} & \\ m = -\sqrt{5} & \end{array}$$

$$\boxed{\left\{\sqrt{5}, -\sqrt{5}, -\frac{1}{2}\right\}}$$

5. $(x - 4)^2 = 25$

2 ways you can solve this problem.

① Square Root Prop.

$$\sqrt{(x - 4)^2} = \sqrt{25}$$

$$x - 4 = \sqrt{25} \quad | \quad x - 4 = -\sqrt{25}$$

$$\begin{array}{l|l} x-4=5 & x-4=-5 \\ +4 & +4 \\ \hline x=9 & x=-1 \end{array}$$

$$\boxed{\{9, -1\}}$$

② Factoring & using Zero Factor Prop.

$$(x - 4)^2 = 25$$

$$x^2 - 8x + 16 = 25$$

$$x^2 - 8x - 9 = 0$$

$$(x - 9)(x + 1) = 0$$

$$\begin{array}{l|l} x-9=0 & x+1=0 \\ \hline x=9 & x=-1 \end{array}$$

6. $(\sqrt{2x - 3})^2 = (x - 2)^2$

$$2x - 3 = (x - 2)^2$$

$$2x - 3 = x^2 - 4x + 4$$

$$0 = x^2 - 6x + 7$$

cannot be factored. Have to use Quad. Formula. We will learn later.

Bonus: $(\sqrt{2x - 4})^2 = (x - 2)^2$

$$2x - 4 = x^2 - 4x + 4$$

$$0 = x^2 - 6x + 8$$

$$0 = (x - 4)(x - 2)$$

$$\begin{array}{l|l} x-4=0 & x-2=0 \\ \hline x=4 & x=2 \end{array}$$

$$\boxed{\{2, 4\}}$$

State the LCD and restrictions, and then SOLVE THE EQUATIONS.

7. $\frac{5}{x+1} - \frac{2}{x} = \frac{11}{3x+3}$ $x+1 \neq 0$ $x \neq 0$ $3x+3 \neq 0$ LCD $3x(x+1)$
 $x \neq -1$ $x \neq 0$ Restrictions $0, -1$

Multiply every term by LCD.

$$\left(\frac{3x(x+1)}{1}\right)\left(\frac{5}{x+1}\right) - \left(\frac{2}{x}\right)\left(\frac{3x(x+1)}{1}\right) = \left(\frac{11}{3(x+1)}\right)\left(\frac{3x(x+1)}{1}\right)$$

$\{-3\}$

$$(3x)(5) - (2)(3)(x+1) = (11)(x) \rightarrow 15x - 6(x+1) = 11x$$

$$\rightarrow 15x - 6x - 6 = 11x \rightarrow 9x - 6 = 11x \rightarrow \frac{-6}{2} = \frac{2x}{2} \quad x = -3$$

8. $\frac{x+5}{x+2} = \frac{x+3}{x+4}$ $x+2 \neq 0$ $x+4 \neq 0$ LCD $(x+2)(x+4)$
 $x \neq -2$ $x \neq -4$ Restrictions $-2, -4$

Multiply every term by the LCD

$$\left(\frac{(x+2)(x+4)}{1}\right)\left(\frac{x+5}{x+2}\right) = \left(\frac{x+3}{x+4}\right)\left(\frac{(x+2)(x+4)}{1}\right) \rightarrow (x+4)(x+5) = (x+3)(x+2)$$

$$x^2 + 9x + 20 = x^2 + 5x + 6$$

$$9x + 20 = 5x + 6$$

$$-5x - 20 = 5x - 20$$

$\{-\frac{7}{2}\}$

$x = -\frac{7}{2}$ Lowest terms

$$\frac{4x}{4} = \frac{-14}{4}$$

$$x = -\frac{14}{4}$$

9. $\frac{x}{x-2} = \frac{8}{x^2-4} - \frac{1}{x+2}$ $x-2 \neq 0$ $x+2 \neq 0$ LCD $(x-2)(x+2)$
 $x \neq 2$ $x \neq -2$ Restrictions $-2, 2$

Multiply every term by the LCD

$$\left(\frac{(x-2)(x+2)}{1}\right)\left(\frac{x}{x-2}\right) = \left(\frac{8}{(x-2)(x+2)}\right)\left(\frac{(x-2)(x+2)}{1}\right) - \left(\frac{1}{x+2}\right)\left(\frac{(x-2)(x+2)}{1}\right)$$

$x = -5$ or $x = 2$
 But 2 is a rest.

$\{-5\}$

$$(x+2)(x) = 8 - 1(x-2) \rightarrow x^2 + 2x = 8 - x + 2 \rightarrow x^2 + 3x = 10$$

$$\rightarrow x^2 + 3x - 10 = 0 \rightarrow (x+5)(x-2) = 0 \rightarrow \begin{matrix} x+5=0 & \text{or} & x-2=0 \\ x=-5 & & x=2 \end{matrix}$$

10. $\frac{5}{y^2+9y+14} - \frac{1}{y+2} = \frac{3}{y+7}$ $y+2 \neq 0$ $y+7 \neq 0$ LCD $(y+2)(y+7)$
 $y \neq -2$ $y \neq -7$ Restrictions $-2, -7$

Multiply every term by LCD

$$\left(\frac{(y+2)(y+7)}{1}\right)\left(\frac{5}{(y+2)(y+7)}\right) - \left(\frac{1}{y+2}\right)\left(\frac{(y+2)(y+7)}{1}\right) = \left(\frac{3}{y+7}\right)\left(\frac{(y+7)(y+2)}{1}\right)$$

$\{\emptyset\}$
 No Solution

$$5 - 1(y+7) = 3(y+2) \rightarrow 5 - y - 7 = 3y + 6 \rightarrow 5 - 13 = 4y$$

* But -2 is a restriction. *

$$\frac{-8}{4} = \frac{4y}{4}$$