1.1 Linear Equations

Ex: Solve $8x+7=39$

$8x=32$

$x=4$

Check: $LS = 8x+7$

$= 8(4)+7$

$= 39$

$RS = 39$ ✓

Solution: $\{4\}$

Ex: Solve $(x+2)(x-3)=0$

If $ab=0$ then $a=0$ or $b=0$

$x+2=0$ or $x-3=0$

$x=-2$ $x=3$

Check: ✓✓

$\{-2,3\}$

Ex: Solve $\frac{1}{4}(x+2) = \frac{1}{3}(x+3) + 6$

denominators: 4, 3

LCM = 12

$$\frac{12}{4}(x+2) = 12\left[\frac{1}{3}(x+3) + 6\right]$$

$$3(x+2) = 4(x+3) + 72$$

$$3x + 6 = 4x + 12 + 72$$

$$6 = x + 84$$

$$-78 = x$$

Check ✓

$\{-78\}$

Ex: Solve and round to 2 decimal places

$$2.16x + \frac{3}{1.892} = 2$$

$$2.16x = 2 - \frac{3}{1.892}$$

$$x = \frac{1}{2.16}\left(2 - \frac{3}{1.892}\right)$$

Keep exact values until final step

$$x \approx 0.19$$

Check ✓

$\{0.19\}$

Ex: Solve $(3x+4)(x-1) = (x+5)(3x+2)$

$3x^2 - 3x + 4x - 4 = 3x^2 + 2x + 15x + 10$

$x - 4 = 17x + 10$

$-14 = 16x$

$x = \frac{-14}{16} = -\frac{7}{8}$

Check ✓

$\{-\frac{7}{8}\}$

Ex: Solve $\frac{5}{x-3} + \frac{4}{x-2} = \frac{7}{(x-3)(x-2)}$

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

$5(x-2) + 4(x-3) = 7$

$5x - 10 + 4x - 12 = 7$

$9x - 22 = 7$

$9x = 29$

$x = 29/9$

Check ✓

$\{\frac{29}{9}\}$

Ex: Solve $\frac{3x}{x+2} + 7 = \frac{-6}{x+2}$

$$3x + 7(x+2) = -6$$
$$3x + 7x + 14 = -6$$
$$10x = -20$$
$$x = -2$$

Check: LS = undefined

$x = -2$ is an "extraneous solution"

No Solution

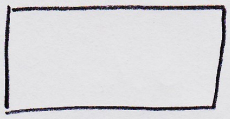
Ex: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ Solve for R

LCM $= RR_1R_2$

$$R_1R_2 = RR_1R_2\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$$
$$R_1R_2 = RR_2 + RR_1$$
$$R_1R_2 = R(R_2 + R_1)$$
$$\frac{R_1R_2}{R_1+R_2} = R$$

$$R = \frac{R_1R_2}{R_1+R_2}$$ —

Ex: The perimeter of a rectangle is 42m. Its length is twice its width. Find dimensions.



Variables

Let width = w

length = 2w

Equation

Perimeter = 42m

$2 \cdot \text{width} + 2 \cdot \text{length} = 42$

$2w + 2(2w) = 42$

$6w = 42$

$w = 7$

Width = 7m Length = 14m.