

Solving Quadratic Equations by the Square Root Method

Quadratic Equation - An equation of the form $ax^2 + bx + c = 0$, where a , b and c are real numbers and $a \neq 0$.

Step 1: Isolate the perfect square.

Step 2: Take the square root of both sides.

Step 3: Solve for the variable.

Directions: Solve each quadratic equation by the square root method.

1. $x^2 - 121 = 0$

$$+121 \quad +121$$

$$\sqrt{x^2} = \sqrt{121}$$

$$x = \pm 11$$

2. $16x^2 - 1 = 0$

$$+1 \quad +1$$

$$\sqrt{16x^2} = \sqrt{1}$$

$$4x = \pm 1$$

$$\frac{4x}{4} = \frac{1}{4}$$

$$x = \frac{1}{4}$$

$$\frac{4x}{4} = \frac{-1}{4}$$

$$x = \frac{-1}{4}$$

$$3. \sqrt{49x^2} = 36$$

$$7x = \pm 6$$

$$\frac{7x}{7} = \frac{6}{7}$$

$$\frac{7x}{7} = \frac{-6}{7}$$

$$\boxed{x = \frac{6}{7}}$$

$$\boxed{x = -\frac{6}{7}}$$

$$4. \sqrt{(x+15)^2} = 25$$

$$x+15 = \pm 5$$

$$\begin{array}{r} x+15 = 5 \\ -15 \quad -15 \end{array}$$

$$\boxed{x = -10}$$

$$\begin{array}{r} x+15 = -5 \\ -15 \quad -15 \end{array}$$

$$\boxed{x = -20}$$

$$5. \sqrt{(3x+2)^2} = \frac{1}{4}$$

$$3x+2 = \pm \frac{1}{2}$$

$$2 \cdot \frac{3x+2}{2} = \frac{1}{2}$$

$$\text{LCD} = 2$$

$$\frac{6x}{2} + \frac{4}{2} = \frac{1}{2}$$

$$6x + 4 = 1$$
$$\quad -4 \quad -4$$

$$\frac{6x}{6} = \frac{-3}{6}$$

$$x = -\frac{1}{2}$$

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

$$\text{LCD} = 2$$

$$\frac{6x}{2} + \frac{4}{2} = -\frac{1}{2}$$

$$6x + 4 = -1$$
$$\quad -4 \quad -4$$

$$\frac{6x}{6} = \frac{-5}{6}$$

$$x = -\frac{5}{6}$$

$$6. \sqrt{(2x-1)^2} = 20$$

$$\sqrt{20} = \sqrt{4 \cdot 5} = 2\sqrt{5}$$

$$2x-1 = \pm 2\sqrt{5}$$

$$2x-1 = 2\sqrt{5}$$
$$\quad +1 \quad +1$$

$$\frac{2x}{2} = \frac{1+2\sqrt{5}}{2}$$

$$x = \frac{1+2\sqrt{5}}{2}$$

$$2x-1 = -2\sqrt{5}$$
$$\quad +1 \quad +1$$

$$\frac{2x}{2} = \frac{1-2\sqrt{5}}{2}$$

$$x = \frac{1-2\sqrt{5}}{2}$$

$$7. \sqrt{(x+6)^2} = \sqrt{(x-1)^2}$$

$$x+6 = \pm(x-1)$$

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

$$\cancel{x}+6 = \cancel{x}-1$$

$$6 = -1$$

NO SOLUTION

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

$$x+6 = -1x+1$$
$$+1x \quad +1x$$

$$2x+6 = 1$$
$$-6 \quad -6$$

$$\frac{2x}{2} = \frac{-5}{2}$$

$$\boxed{x = -\frac{5}{2}}$$

$$8. x^2 + 10x + 25 = 40$$

$$(x+5)(x+5) = 40$$

$$\sqrt{(x+5)^2} = \sqrt{40}$$

$$\sqrt{40} = \sqrt{4 \cdot 10} = 2\sqrt{10}$$

$$x+5 = \pm 2\sqrt{10}$$

$$x+5 = 2\sqrt{10}$$
$$-5 \quad -5$$

$$\boxed{x = -5 + 2\sqrt{10}}$$

$$x+5 = -2\sqrt{10}$$
$$-5 \quad -5$$

$$\boxed{x = -5 - 2\sqrt{10}}$$