10-2 Solving Quadratic Equations Using Square Roots

❒ Every positive number has TWO square roots, one POSITIVE and one NEGATIVE.

$\sqrt{9} = 3$ BECAUSE $(3)(3) = 9$

but...

$\sqrt{9} = -3$ BECAUSE $(-3)(-3) = 9$

❒ You can indicate both the positive and negative root by $\pm$, so $\sqrt{9} = \pm 3$.

❒ Solve using square roots. Check ✓

1. $x^2 = 25$

$\sqrt{x^2} = \sqrt{25}$

$\boxed{x = \pm 5}$

* SQUARE ROOT IS THE INVERSE OF SQUARE.

CHECK:

$(5)^2 = 25$! $(-5)^2 = 25$

$25 = 25$ ✓ ! $25 = 25$ ✓

2. $x^2 = -49$

$\sqrt{x^2} = \sqrt{-49}$ $(7)^2 = 49$? $(-7)^2 = 49$?

$\boxed{\text{NO REAL SOLUTION}}$

*If necessary, use inverse operations to ISOLATE THE SQUARED PART of a quadratic equation before taking the square root of both sides.

3. $x^2 + 7 = 7$

$-7 \quad -7$

$\sqrt{x^2} = \sqrt{0}$

$x = 0$

$(0)^2 + 7 = 7$

$7 = 7$ ✓

4. $3x^2 - 48 = 0$

$+48 \quad +48$

$\frac{3x^2}{3} = \frac{48}{3}$

$x^2 = 16$

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

$x = \pm 4$

CHECK:

$3(4)^2 - 48 = 0$

$3(16) - 48 = 0$

$48 - 48 = 0$

$0 = 0$ ✓

$3(-4)^2 - 48 = 0$

$3(16) - 48 = 0$

$48 - 48 = 0$

$0 = 0$ ✓

5. $16x^2 - 49 = 0$

$+49 \quad +49$

$\frac{16x^2}{16} = \frac{49}{16}$

$x^2 = 49/16$

$\sqrt{x^2} = \sqrt{\frac{49}{16}}$

$x = \pm \frac{7}{4}$

CHECK:

$16(7/4)^2 - 49 = 0$

$16(49/16) - 49 = 0$

$49 - 49 = 0$

$0 = 0$ ✓

$16(-7/4)^2 - 49 = 0$

$16(49/16) - 49 = 0$ ✓

6. $100x^2 + 49 = 0$

$-49 \quad -49$

$\frac{100x^2}{100} = \frac{-49}{100}$

$\sqrt{x^2} = \sqrt{-\frac{49}{100}}$

NO REAL SOLUTION

7. $\sqrt{(x-5)^2} = \sqrt{16}$

$x - 5 = \pm 4$

$x - 5 = 4$ | $x - 5 = -4$

$+5 \quad +5$ | $+5 \quad +5$

$x = 9$ | $x = 1$

CHECK

$(9-5)^2 = 16$

$4^2 = 16$

$16 = 16$ ✓

$(1-5)^2 = 16$

$(-4)^2 = 16$

$16 = 16$ ✓

8. $(x+3)^2 + 7 = 32$

$-7 \quad -7$

$\sqrt{(x+3)^2} = \sqrt{25}$

$x + 3 = \pm 5$

$x + 3 = 5$ | $x + 3 = -5$

$-3 \quad -3$ | $-3 \quad -3$

$x = 2$ | $x = -8$

9. $3(x+2)^2 + 4 = 112$

$-4 \quad -4$

$\frac{3(x+2)^2}{3} = \frac{108}{3}$

$\sqrt{(x+2)^2} = \sqrt{36}$

$x + 2 = \pm 6$

$x + 2 = 6$ | $x + 2 = -6$

$-2 \quad -2$ | $-2 \quad -2$

$x = 4$ | $x = -8$