

**Solving Quadratic Equations using the Square Root Method**

- Step 1: Isolate the variable on one side of equation
- Step 2: Take the square root of both sides

**Example 1:** Solve by taking the square root.

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

$$+48 \quad +48$$


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$$4x^2 = 48$$

$$\frac{4x^2}{4} = \frac{48}{4}$$

$$x^2 = 12$$

$$x = \pm\sqrt{12} = \pm 2\sqrt{3}$$

**Example 2:** Solve by taking the square root.

$$-7x^2 + 1,386 = 0$$

$$-7x^2 = -1386$$

$$x^2 = 198$$

$$x = \pm\sqrt{198}$$

$$x = \pm 3\sqrt{22}$$

**Example 3:** Solve by taking the square root.

$$2x^2 - 32 = 0$$

$$2x^2 = 32$$

$$x^2 = 16$$

$$x = \pm 4$$

**Zero Product Property:** Some equations can be solved by factoring. If the product of two factors is equal to zero, then at least one of the factors must be zero. For any real numbers  $a$  and  $b$ , if  $ab = 0$ , then  $a = 0$ ,  $b = 0$ , or both  $a$  and  $b$  equal zero.

Solve each equation by using the zero-product property. Remember, you may have to take out the GCF first.

**Example 1:**  $(2d+6)(3d-15) = 0$

$$2d + 6 = 0 \quad 3d - 15 = 0$$

$$2d = -6 \quad 3d = 15$$

$$d = -3 \quad d = 5$$

**Example 2:**  $c^2 - 3c = 0$

$$c^2 - 3c = 0$$

$$c(c-3) = 0$$

$$c = 0 \quad c = 3$$

**Example 3:**  $3n(n+2) = 0$

$$3n = 0 \quad n + 2 = 0$$

$$n = 0 \quad n = -2$$

**Example 4:**  $8b^2 - 40b = 0$

$$8b(b-5) = 0$$

$$b = 0 \quad b = 5$$

**Practice**

1.  $x^2 + 4x = 0$

$$x(x+4) = 0$$

$$x = 0 \quad x = -4$$

2.  $-6d^2 - 10d = 0$

$$-2d(3d+5) = 0$$

$$-2d = 0 \quad 3d + 5 = 0$$

$$d = 0 \quad d = -5/3$$

3.  $-3x^2 = 9x$

$-3x^2 - 9x = 0$

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

$x=0$  |  $x=-3$

4.  $\frac{x^2}{25} - 1 = 11$

25.  $\frac{x^2}{25} = 12 \cdot 25$

$x^2 = 300$

$x = \pm \sqrt{300}$

$x = \pm 10\sqrt{3}$

5.  $2x^2 + 7 = 41$

$2x^2 = 36$

$x^2 = 18$

$x = \pm \sqrt{18} = \pm 3\sqrt{2}$

6.  $\frac{1}{4}(x-8)^2 = 7 \cdot 4$

$\sqrt{(x-8)^2} = \sqrt{28}$

$x-8 = \pm 2\sqrt{7}$

$x = 8 \pm 2\sqrt{7}$

7.  $\sqrt{(3x+4)^2} = \sqrt{49}$

$3x+4 = \pm 7$

$3x+4 = 7$

$3x = 3$  |  $x = 1$

$3x+4 = -7$

$3x = -11$

$x = -11/3$

8.  $-x^2 + 9 = 2x^2 - 6$

$+x^2 - 9 = x^2 - 9$

$0 = 3x^2 - 15$

$15 = 3x^2$

$x^2 = 15/3$

$x = \pm \sqrt{15/3}$

9.  $3x^2 - 7 = 2(x^2 + 3)$

$3x^2 - 7 = 2x^2 + 6$

$x^2 = 13$

$x = \pm \sqrt{13}$

10.  $9x^2 - 21x = 0$

$3x(3x-7) = 0$

$x=0$  |  $x=7/3$

\* 11.  $24x^4 - 13x = 5$

skip!

12.  $28x + 16x^2 = 4x^2$

$-4x^2 + 28x = 0$

$28x + 12x^2 = 0$

$2x(14 + 6x) = 0$

$x=0$

$x = -14/6$

$x = -7/3$

13.  $5x^2 = 20x$

$5x^2 - 20x = 0$

$5x(x-4) = 0$

$x=0$  |  $x=4$

14.  $4x^2 = 81$

$4x^2 = 81$

$\sqrt{x^2} = \sqrt{81/4}$

$x = \pm \frac{9}{2}$