

9-3 Study Guide and Intervention

Solving Quadratic Equations by Completing the Square

Find the Square Root An equation such as $x^2 - 4x + 4 = 5$ can be solved by taking the square root of each side.

Example 1 Solve $x^2 - 2x + 1 = 9$.

Round to the nearest tenth if necessary.

$$x^2 - 2x + 1 = 9$$

$$(x - 1)^2 = 9$$

$$\sqrt{(x - 1)^2} = \sqrt{9}$$

$$|x - 1| = \sqrt{9}$$

$$x - 1 = \pm 3$$

$$x - 1 + 1 = \pm 3 + 1$$

$$x = 1 \pm 3$$

$$x = 1 + 3 \quad \text{or} \quad x = 1 - 3$$

$$= 4 \qquad \qquad = -2$$

The solution set is $\{-2, 4\}$.

Example 2 Solve $x^2 - 4x + 4 = 5$.

Round to the nearest tenth if necessary.

$$x^2 - 4x + 4 = 5$$

$$(x - 2)^2 = 5$$

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

$$|x - 2| = \sqrt{5}$$

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

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

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

Use a calculator to evaluate each value of x .

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

$$\approx 4.2 \qquad \qquad \approx -0.2$$

The solution set is $\{-0.2, 4.2\}$.

Exercises

Solve each equation by taking the square root of each side. Round to the nearest tenth if necessary.

1. $x^2 + 4x + 4 = 9$

2. $m^2 + 12m + 36 = 1$

3. $r^2 - 6r + 9 = 16$

4. $x^2 - 2x + 1 = 25$

5. $x^2 - 8x + 16 = 5$

6. $x^2 - 10x + 25 = 8$

7. $c^2 - 4c + 4 = 7$

8. $p^2 + 16p + 64 = 3$

9. $x^2 + 8x + 16 = 9$

10. $x^2 + 6x + 9 = 4$

11. $a^2 + 8a + 16 = 10$

12. $y^2 - 12y + 36 = 5$

13. $x^2 + 10x + 25 = 1$

14. $y^2 + 14y + 49 = 6$

15. $m^2 - 8m + 16 = 2$

16. $x^2 + 12x + 36 = 10$

17. $a^2 - 14a + 49 = 3$

18. $y^2 + 8y + 16 = 7$