

LESSON
9.4**Study Guide***For use with the lesson "Use Square Roots to Solve Quadratic Equations"***GOAL** Solve a quadratic equation by finding square roots.**EXAMPLE 1** Solve quadratic equations**Solve the equation.**

a. $x^2 - 7 = 9$

b. $11y^2 = 11$

c. $z^2 + 13 = 5$

Solution

a. $x^2 - 7 = 9$

Write original equation.

$x^2 = 16$

Add 7 to each side.

$x = \pm\sqrt{16}$

Take square roots of each side.

$= \pm 4$

Simplify.

The solutions are -4 and 4 .

b. $11y^2 = 11$

Write original equation.

$y^2 = 1$

Divide each side by 11.

$y = \pm\sqrt{1}$

Take square roots of each side.

$= \pm 1$

Simplify.

The solutions are -1 and 1 .

c. $z^2 + 13 = 5$

Write original equation.

$z^2 = -8$

Subtract 13 from each side.

Negative real numbers do not have real square roots. So, there is no solution.

EXAMPLE 2 Take square roots of a fraction**Solve $9m^2 = 169$.****Solution**

$9m^2 = 169$

Write original equation.

$m^2 = \frac{169}{9}$

Divide each side by 9.

$m = \pm\sqrt{\frac{169}{9}}$

Take square roots of each side.

$m = \pm\frac{13}{3}$

Simplify.

The solutions are $-\frac{13}{3}$ and $\frac{13}{3}$.

LESSON
9.4**Study Guide** *continued**For use with the lesson "Use Square Roots to Solve Quadratic Equations"***EXAMPLE 3** **Approximate solutions of a quadratic equation****Solve $2x^2 + 5 = 15$. Round the solutions to the nearest hundredth.****Solution**

$$2x^2 + 5 = 15$$

Write original equation.

$$2x^2 = 10$$

Subtract 5 from each side.

$$x^2 = 5$$

Divide each side by 2.

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

Take square roots of each side.

$$x \approx \pm 2.24$$

Use a calculator. Round to the nearest hundredth.

The solutions are about -2.24 and about 2.24 .**Exercises for Examples 1, 2, and 3****Solve the equation.**

1. $w^2 - 9 = 0$

2. $4r^2 - 7 = 9$

3. $5s^2 + 13 = 9$

4. $36x^2 = 121$

5. $16m^2 + 81 = 81$

6. $4q^2 - 225 = 0$

Solve the equation. Round the solutions to the nearest hundredth.

7. $7x^2 - 8 = 13$

8. $-6y^2 + 15 = -15$

9. $4z^2 + 7 = 12$

EXAMPLE 4 **Solve a quadratic equation****Solve $3(x + 3)^2 = 39$. Round the solutions to the nearest hundredth.****Solution**

$$3(x + 3)^2 = 39$$

Write original equation.

$$(x + 3)^2 = 13$$

Divide each side by 3.

$$x + 3 = \pm\sqrt{13}$$

Take square roots of each side.

$$x = -3 \pm\sqrt{13}$$

Subtract 3 from each side.

The solutions are $-3 + \sqrt{13} \approx 0.61$ and $-3 - \sqrt{13} \approx -6.61$.**Exercises for Example 4****Solve the equation.**

10. $5(x - 1)^2 = 40$

11. $2(y + 4)^2 = 18$

12. $4(z - 5)^2 = 32$