

LESSON  
10.4**Study Guide**

For use with pages 652–658

Homework #1-12 on  
the next page w/answer  
key**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.  $x^2 - 7 = 9$

$x^2 = 16$

$x = \pm\sqrt{16}$

$= \pm 4$

Write original equation.

Add 7 to each side.

Take square roots of each side.

Simplify.

The solutions are  $-4$  and  $4$ .

b.  $11y^2 = 11$

$y^2 = 1$

$y = \pm\sqrt{1}$

$= \pm 1$

Write original equation.

Divide each side by 11.

Take square roots of each side.

Simplify.

The solutions are  $-1$  and  $1$ .

c.  $z^2 + 13 = 5$

$z^2 = -8$

Write original equation.

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  $\frac{13}{3}$ .

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

**Study Guide**

1.  $-3, 3$  2.  $-2, 2$  3. no solution 4.  $-\frac{11}{16}, \frac{11}{16}$

5.  $0$  6.  $-\frac{15}{2}, \frac{15}{2}$  7.  $-1.73, 1.73$

8.  $-2.24, 2.24$  9.  $-1.12, 1.12$

10.  $-1.83, 3.83$  11.  $-1, -7$  12.  $2.17, 7.83$

Answer  
Key  
←