

LESSON 9-3 SOLVING QUADRATIC EQUATIONS

Solve each equation by graphing the related function or by finding the square roots.

1. $x^2 - 25 = 0$

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

$$x = \pm 5$$

2. $2x^2 - 8 = 0$

$$\frac{+8 \quad +8}{2x^2 = 8}$$

$$2x^2 = 8$$

$$x^2 = 4$$

$$x = \pm 2$$

3. $t^2 = 144$

$$t = \pm 12$$

4. $y^2 - 225 = 0$

$$\frac{+225 \quad +225}{y^2 = 225}$$

$$y^2 = 225$$

$$y = \pm 15$$

5. What are the zeros of a function? Give an example of a quadratic function and its zeros.

The values that can be substituted for x that will result in a zero. (Also called the roots, the x -intercepts, solutions)

$$x^2 = 25 \quad \{\pm 5\}$$

$$x^2 - 49 = 0 \quad \{\pm 7\}$$

$$x^2 + 4x + 4 = 0 \quad \{-2\}$$

6. When is it easier to solve a quadratic equation of the form $ax^2 + c = 0$ using square roots than using a graph? If c is obviously a perfect square

7. Consider the equation $ax^2 + c = 0$, where $a \neq 0$. What is true of a and c if the equation has two solutions? Only one solution? No solutions?

2 solutions: $a + c$ have opposite signs.

1 solution: $c = 0$

No solutions: $a + c$ have the same sign.

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Solve each equation by graphing the related function (or using square roots). If the equation has no real-number solution, write no solution.

$$8. \quad \begin{array}{r} x^2 - 9 = 0 \\ +9 \quad +9 \\ \hline x^2 = 9 \end{array}$$

$$x = \pm 3$$

$$10. \quad 3x^2 = 0$$

$$x^2 = 0$$

$$x = 0$$

$$12. \quad \begin{array}{r} x^2 + 4 = 0 \\ -4 \quad -4 \\ \hline x^2 = -4 \end{array}$$

no solution

$$14. \quad \frac{1}{2}x^2 + 1 = 0$$

$$\frac{1}{2}x^2 = -1$$

$$x^2 = -2$$

no solution

$$16. \quad \begin{array}{r} \frac{1}{4}x^2 - 1 = 0 \\ +1 \quad +1 \\ \hline \frac{1}{4}x^2 = 1 \end{array}$$

$$4 \cdot \frac{1}{4}x^2 = 1 \cdot 4$$

$$x^2 = 4$$

$$x = \pm 2$$

$$18. \quad x^2 - 10 = -10$$

$$x^2 = 0$$

$$x = 0$$

$$20. \quad n^2 = 81$$

$$n = \pm 9$$

$$\{9, -9\}$$

$$22. \quad k^2 - 196 = 0$$

$$k^2 = 196$$

$$k = \pm 14$$

$$24. \quad \begin{array}{r} w^2 - 36 = -64 \\ +36 \quad +36 \\ \hline w^2 = -28 \end{array}$$

no solution

$$26. \quad 64b^2 = 16$$

$$b^2 = \frac{1}{4}$$

$$b = \pm \frac{1}{2}$$

$$28. \quad \begin{array}{r} 144 - p^2 = 0 \\ +p^2 \quad p^2 \\ \hline 144 = p^2 \end{array}$$

$$144 = p^2$$

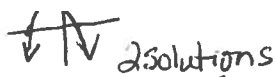
$$\pm 12 = p$$

$$30. \quad 3a^2 + 12 = 0$$

$$3a^2 = -12$$

$$a^2 = -4$$

$$a = \pm 2i$$



LESSON 9-3 SOLVING QUADRATIC EQUATIONS

1 solution

Solve each equation by graphing the related function (or using square roots). If the equation has no real-number solution, write no solution.

8. $x^2 - 9 = 0$

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

$$\begin{array}{l} x+3=0 \quad x-3=0 \\ x=-3 \quad x=3 \end{array}$$

$$\{-3, 3\}$$

10. $3x^2 = 0$

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

$$x = 0$$

12. $x^2 + 4 = 0$

$$\begin{array}{l} x^2 + 4 = 0 \\ -4 \quad -4 \\ \hline x^2 = -4 \end{array}$$

no solution

14. $\frac{1}{2}x^2 + 1 = 0$

$$\begin{array}{l} \frac{1}{2}x^2 + 1 = 0 \\ -1 \quad -1 \\ \hline 2 \cdot \frac{1}{2}x^2 = -1 \cdot 2 \end{array}$$

$$x^2 = -2$$

no solution

16. $\frac{1}{4}x^2 - 1 = 0$

$$\begin{array}{l} \frac{1}{4}x^2 - 1 = 0 \\ +1 \quad +1 \\ \hline 4 \cdot \frac{1}{4}x^2 = 1 \cdot 4 \end{array}$$

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

$$x = \pm 2 \quad \{2, -2\}$$

18. $x^2 - 10 = -10$

$$\begin{array}{l} x^2 - 10 = -10 \\ +10 \quad +10 \\ \hline \end{array}$$

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

$$x = 0$$

20. $\sqrt{n^2} = \sqrt{81}$

$$n = \pm 9$$

$$\{9, -9\}$$

22. $k^2 - 196 = 0$

$$\begin{array}{l} k^2 - 196 = 0 \\ +196 \quad +196 \\ \hline \end{array}$$

$$\sqrt{k^2} = \sqrt{196}$$

$$k = \pm 14 \quad \{14, -14\}$$

24. $w^2 - 36 = -64$

$$\begin{array}{l} w^2 - 36 = -64 \\ +36 \quad +36 \\ \hline \end{array}$$

$$w^2 = -28$$

no solution

26. $64b^2 = 16$

$$\begin{array}{l} 64b^2 = 16 \\ \frac{64}{64} \quad \frac{16}{64} \\ \hline \end{array}$$

$$\sqrt{b^2} = \sqrt{\frac{1}{4}}$$

$$b = \pm \frac{1}{2} \quad \left\{ \frac{1}{2}, -\frac{1}{2} \right\}$$

28. $144 - p^2 = 0$

$$\begin{array}{l} 144 - p^2 = 0 \\ +p^2 \quad +p^2 \\ \hline \end{array}$$

$$\sqrt{144} = \sqrt{p^2}$$

$$\pm 12 = p \quad \{-12, 12\}$$

30. $3a^2 + 12 = 0$

$$\begin{array}{l} 3a^2 + 12 = 0 \\ -12 \quad -12 \\ \hline \end{array}$$

$$3a^2 = -12$$

$$a^2 = -4$$

no solution

$$a = \pm 2i$$

LESSON 9-8 SOLVING QUADRATIC EQUATIONS

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