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. $2x^2 - 8 = 0$

$+8 \quad +8$

$2x^2 = 8$

$x^2 = 4$

$x = \pm 2$

3. $t^2 = 144$

$t = \pm 12$

4. $y^2 - 225 = 0$

$+225 \quad +225$

$y^2 = 225$

$y = \pm 15$

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)

$x^2 = 25 \quad \{\pm 5\}$ $\qquad x^2 - 49 = 0 \quad \{\pm 7\}$

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

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. $x^2 - 9 = 0$

$+9 \quad +9$

$x^2 = 9$

$x = \pm 3$

10. $3x^2 = 0$

$x^2 = 0$

$x = 0$

12. $x^2 + 4 = 0$

$-4 \quad -4$

$x^2 = -4$

no solution

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

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

$x^2 = -2$

no solution

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

$+1 \quad +1$

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

$x^2 = 4$

$x = \pm 2$

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

$x^2 = 0$

$x = 0$

20. $n^2 = 81$

$n = \pm 9$

$\{9, -9\}$

22. $K^2 - 196 = 0$

$K^2 = 196$

$K = \pm 14$

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

$+36 \quad +36$

$w^2 = -28$

no solution

26. $64b^2 = 16$

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

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

28. $144 - p^2 = 0$

$+p^2 \quad +p^2$

$144 = p^2$

$\pm 12 = p$

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

$3a^2 = 12$

$a^2 = 4$

$a = \pm 2$

 1 solution

 2 solutions  no real no. solution

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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. $x^2 - 9 = 0$

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

$x+3=0 \quad x-3=0$

$x=-3 \quad x=3$

$\{-3, 3\}$

10. $3x^2 = 0$

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

$x = 0$

12. $x^2 + 4 = 0$

$-4 \quad -4$

$x^2 = -4$

no solution

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

$-1 \quad -1$

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

$x^2 = -2$ no solution

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

$+1 \quad +1$

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

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

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

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

$+10 \quad +10$

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

$x = 0$

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

$n = \pm 9$

$\{9, -9\}$

22. $K^2 - 196 = 0$

$+196 \quad 196$

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

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

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

$+36 \quad +36$

$w^2 = -28$

no solution

26. $\frac{64b^2}{64} = \frac{16}{64}$

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

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

28. $144 - p^2 = 0$

$+p^2 \quad p^2$

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

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

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

$-12 \quad -12$

$3a^2 = -12$

$a^2 = -4$ no solution

$a = \pm 2i$

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