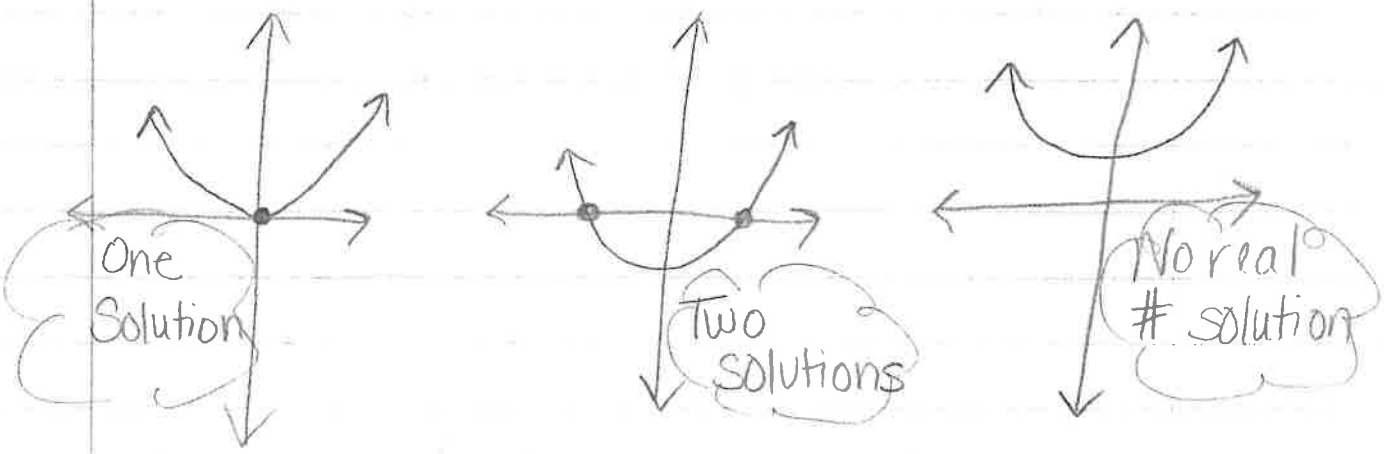
9.3 Solving Quadratic Equations

* Quadratic equation is an equation that can be written as $ax^2+bx+c=0$, where $a \neq 0$ (Standard form of a quadratic equation)

* To solve a quadratic equation:
  - graph ($y=ax^2+bx+c$)
  OR
  - use square roots ($ax^2+bx+c=0$)

* The solutions to a quadratic equation are the x-intercepts (also called roots of the equation or zeros of the functions)

* There can be two solution, one solution OR no real #s for the solutions.



* Review solving by graphing with Problem 1 (A-C) on pg. 562

* Got it #1)

A) Think it out. How would this equation be graphed. $y = x^2 - 16$

→ No bx, therefore, the line of sym. is $x=0$
→ Vertex would be $(0, -16)$
→ If $(0, -16)$ is the min. (b/c "a" is positive) then the parabola must extend upward, crossing the x-axis @ 2 points (meaning 2 solution)
→ graph to find those solutions
Or whatelse can you do?
(factor, solve for "x", etc.)

Answer: 2 solutions @ ± 4

B) $y = 3x^2 + 6$ has No solution

C) $x^2 - 25 = -25$ has 1 solution @ 0

* Review Problem 2 on pg. 562

Got it #2) Solve by using Square Roots

A) $m^2 - 36 = 0$

$m = \pm 6$

B) $3x^2 + 15 = 0$

$-15 \quad -15$

$\frac{3x^2 = -15}{3}$

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

$x =$ No Solution

C) $4d^2 + 16 = 16$

$-16 \quad -16$

$\frac{4d^2 = 0}{4}$

$d^2 = 0$

$d = 0$

One Solution @ 0

* Review Problem 3 on pg. 563

* In many real world situations, the negative square root may not be a reasonable solution.

* Got it #3

A) $V = lwh$

$500 = (2w)(w)(4)$

$\frac{500 = 8w^2}{8}$

$62.5 = w^2$

$w = \pm 7.9$

7.9 ft

B) The solutions of the equation are irrational #s, which are difficult to approximate on a graph.

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9-3 Practice

Form G

Solving Quadratic Equations

OR by finding the square roots.

Solve each equation by graphing the related function. If the equation has no real-number solution, write *no solution*.

1. $x^2 - 16 = 0$
2. $x^2 + 12 = 0$
3. $2x^2 - 18 = 0$
4. $7x^2 = 0$
5. $\frac{1}{2}x^2 - 2 = 0$
6. $x^2 + 49 = 0$
7. $x^2 - 15 = -15$
8. $4x^2 - 36 = 0$
9. $x^2 + 36 = 0$

OR by graphing.

Solve each equation by finding square roots. If the equation has no real-number solution, write *no solution*.

10. $t^2 = 25$
11. $k^2 = 484$
12. $z^2 - 256 = 0$
13. $d^2 - 14 = -50$
14. $9y^2 - 16 = 0$
15. $2g^2 - 32 = -32$
16. $4a^2 = 36$
17. $7x^2 + 28 = 0$
18. $6n^2 - 54 = 0$
19. $81 - c^2 = 0$
20. $16x^2 - 49 = 0$
21. $64 + j^2 = 0$

Model each problem with a quadratic equation. Then solve. If necessary, round to the nearest tenth.

22. Find the side length of a square with an area of 196 ft^2.

23. Find the radius of a circle with an area of 100 in^2.

24. Find the side length of a square with an area of 50 cm^2.

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9-3 Practice (continued) Form G

Solving Quadratic Equations

25. The square tarp you are raking leaves onto has an area of 150 ft^2. What is the side length of the tarp? Round your answer to the nearest tenth of a foot if necessary.

26. There is enough mulch to spread over a flower bed with an area of 85 m^2. What is the radius of the largest circular bed that can be covered by the mulch? Round your answer to the nearest tenth of a meter if necessary.

Mental Math Tell how many solutions each equation has.

27. $q^2 - 22 = -22$ **28.** $m^2 + 15 = 0$ **29.** $b^2 - 12 = 12$

Solve each equation by finding square roots. If the equation has no real-number solution, write *no solution*. If a solution is irrational, round to the nearest tenth.

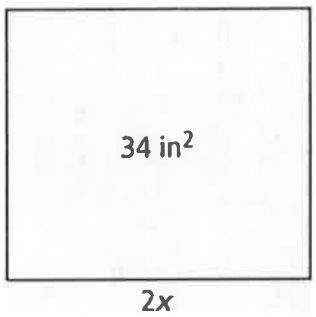
30. $3.35z^2 + 2.75 = -14$ **31.** $100t^2 + 36 = 100$ **32.** $5a^2 - \frac{1}{125} = 0$

33. $\frac{1}{3}k^2 - 12 = 0$ **34.** $-\frac{1}{2}m^2 + 5 = -10$ **35.** $11x^2 - 0.75 = 3.21$

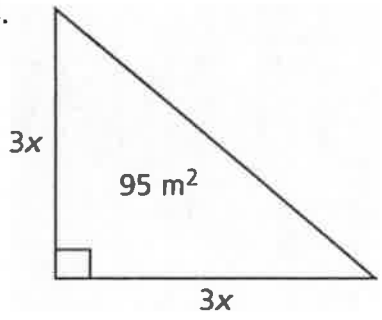
36. Find the value of n such that the equation $x^2 - n = 0$ has 24 and –24 as solutions.

Find the value of x for the square and triangle. If necessary, round to the nearest tenth.

37.



38.



39. Writing Explain how the number of solutions for a quadratic equation relates to the graph of the function.

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9-3 Practice

Form G

Solving Quadratic Equations

Solve each equation by graphing the related function. If the equation has no real-number solution, write *no solution*.

1. $x^2 - 16 = 0$ 4; −4
2. $x^2 + 12 = 0$ no solution
3. $2x^2 - 18 = 0$ 3; −3
4. $7x^2 = 0$ 0
5. $\frac{1}{2}x^2 - 2 = 0$ 2; −2
6. $x^2 + 49 = 0$ no solution
7. $x^2 - 15 = -15$ 0
8. $4x^2 - 36 = 0$ 3; −3
9. $x^2 + 36 = 0$ no solution

Solve each equation by finding square roots. If the equation has no real-number solution, write *no solution*.

10. $t^2 = 25$ 5; −5
11. $k^2 = 484$ 22; −22
12. $z^2 - 256 = 0$ 16; −16
13. $d^2 - 14 = -50$ no solution
14. $9y^2 - 16 = 0$ $\frac{4}{3}$; $-\frac{4}{3}$
15. $2g^2 - 32 = -32$ 0
16. $4a^2 = 36$ 3; −3
17. $7x^2 + 28 = 0$ no solution
18. $6n^2 - 54 = 0$ 3; −3
19. $81 - c^2 = 0$ 9; −9
20. $16x^2 - 49 = 0$ $\frac{7}{4}$; $-\frac{7}{4}$
21. $64 + j^2 = 0$ no solution

Model each problem with a quadratic equation. Then solve. If necessary, round to the nearest tenth.

22. Find the side length of a square with an area of 196 ft^2.
$x^2 = 196$; 14 ft

23. Find the radius of a circle with an area of 100 in^2.
$\pi r^2 = 100$; 5.6 in.

24. Find the side length of a square with an area of 50 cm^2.
$x^2 = 50$; $5\sqrt{2}$ cm or 7.1 cm

* The best answer is when it is written as a decimal. In the real-world, no one talks about measurment as sq. roots,

Name _____ Class _____ Date _____

9-3 Practice (continued) Form G

Solving Quadratic Equations

25. The square tarp you are raking leaves onto has an area of 150 ft^2. What is the side length of the tarp? Round your answer to the nearest tenth of a foot if necessary.

12.2 ft

26. There is enough mulch to spread over a flower bed with an area of 85 m^2. What is the radius of the largest circular bed that can be covered by the mulch? Round your answer to the nearest tenth of a meter if necessary.

5.2 m

Mental Math Tell how many solutions each equation has.

27. $q^2 - 22 = -22$

one

28. $m^2 + 15 = 0$

none

29. $b^2 - 12 = 12$

two

Solve each equation by finding square roots. If the equation has no real-number solution, write *no solution.* If a solution is irrational, round to the nearest tenth.

30. $3.35z^2 + 2.75 = -14$

no solution

31. $100t^2 + 36 = 100$

0.8; −0.8

32. $5a^2 - \frac{1}{125} = 0$

0.04; −0.04

33. $\frac{1}{3}h^2 - 12 = 0$

6; −6

34. $-\frac{1}{2}m^2 + 5 = -10$

5.5; −5.5

35. $11x^2 - 0.75 = 3.21$

0.6; −0.6

36. Find the value of n such that the equation $x^2 - n = 0$ has 24 and −24 as solutions.

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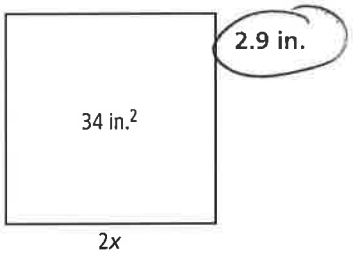
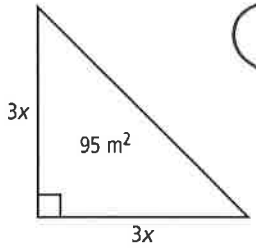
Find the value of x for the square and triangle. If necessary, round to the nearest tenth.

37.



2.9 in.

38.



4.6 m

39. Writing Explain how the number of solutions for a quadratic equation relates to the graph of the function.

When there is no solution, the graph does not cross the x-axis. When there is only one solution, the vertex of the graph is on the x-axis. When the graph has two x-intercepts, the equation has two solutions.