# 9.3 Solving Quadratic Equations

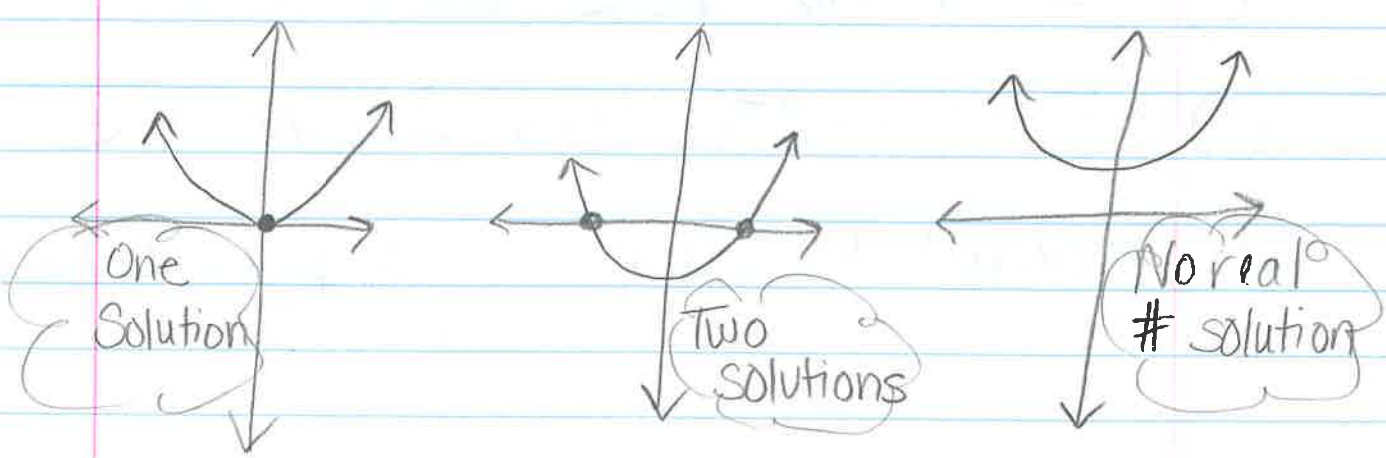
* Quadratic equation is an equation that can be written as $ax^2+bx+c=0$, where $a \neq 0$ (Standard form of a quadratic equation)

* 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 what else can you do?
(factor, solve for "x", etc.)

Answer: 2 solutions @ $\pm 4$

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) $3x^2 + 15 = 0$

$-15 \quad -15$

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

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

$x =$ No Solution

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

$-16 \quad -16$

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

$d^2 = 0$

$d = 0$

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) $V = lwh$

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

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

$62.5 = w^2$

$w = \pm 7.9$

7.9 ft

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

9.3 pg.563 #6,7,8-48 even (Solve by any method)

6) It is easier to solve using square roots when the equation has noninteger solutions. It is almost always easier to solve using square roots to find its solutions.

7) • if a & c have opposite signs, there will be two solutions (ex $x^2-1=0$ & $m^2-36=0$)

• if c=0, there will be one solution (vertex is (0,0))

• if a & c have the same sign, there will be no solution (ex: $x^2+1=0$ & $4d^2+16=16$)

8) $x^2-9=0$

$x^2=9$

$x=\pm 3$

two solutions

12) $x^2+4=0$

$x^2=-4$

no solution

10) $\frac{3x^2=0}{3}$

$x^2=0$

$x=0$

one solution

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

$2\left(\frac{1}{2}x=-1\right)2$

$x=-2$

no solution

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

$+1 \quad +1$

$4\left(\frac{1}{4}x^2 = 1\right)$

$x^2 = 4$

$x = \pm 2$

two solutions

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

$+10 \quad +10$

$x^2 = 0$

$x = 0$

one solution

20) $n^2 = 81$

$n = \pm 9$

two solutions

22) $K^2 - 196 = 0$

$K^2 = 196$

$K = \pm 14$

two solutions

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

$w^2 = -28$

no solution

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

$b^2 = 16/64$

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

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

two solutions

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

$-12 \quad -12$

$\frac{3a^2 = -12}{3}$

$a^2 = -4$ no solution

28) $144 - p^2 = 0$

$-p^2 = -144$

$p^2 = 144$

$p = \pm 12$ two solutions

32) $A = s^2$

13m

34) $A = \pi r^2$

$\frac{90 = \pi r^2}{\pi}$

$\frac{90}{\pi} = r^2$

$28.65 = r^2$

$r \approx 5.35$ cm

36) $100 = \pi r^2$

$\frac{100}{\pi} = r^2$

$31.8 = r^2$

$r = 5.6 \text{ ft}$

38) $c^2 - 18 = 9$

$+18 \quad +18$

$c^2 = 27$

two solutions

40) $V = \pi r^2 h$

$1100 = \pi r^2 \left(\frac{52}{12}\right)$ * inches to ft.

* see attached

$1100 = 4.3(\pi)(r^2)$

$\frac{1100 = 13.5(r^2)}{13.5}$

$81.48 = r^2$

$r = 9.027$

$r = 9 \text{ ft}$

42) larger square $36 \text{ ft}^2$

$36 \cdot (.50) = 18$

$A = s^2$

$\sqrt{18 = s^2}$

$s \approx 4.2 \text{ ft}$

44) $49p^2 - 16 = -7$

$+16 \quad +16$

$\frac{49p^2 = 9}{49}$

$p^2 = \frac{9}{49}$

$p = \frac{+3}{-7}$

two solutions

46) $\frac{1}{2}t^2 - 4 = 0$

$2\left(\frac{1}{2}t^2 = 4\right)$

$t^2 = 8$

$t = \pm 2.8$

two solutions

48) $-\frac{1}{4}x^2+3=0$

$-3 \quad -3$

$-4\left(-\frac{1}{4}x^2=-3\right)$

$x^2=12$

$x=\pm 3.5$

two solutions

* Use Labels with Formula

* Keep answer in feet

$$V = \pi r^2 h$$

$$1{,}100\ ft^3 = \pi(r^2)(52\ in)$$

$$1{,}100\ ft^3 = \pi(r^2)\left(\frac{52\ in}{1} \cdot \frac{1\ ft.}{12\ in.}\right)$$

$$1{,}100\ ft^3 = \pi(r^2)\left(\frac{52}{12}\ ft\right)$$

$$1{,}100\ ft^3 = \pi(r^2)(4.3\ ft)$$

$$1{,}100\ ft^3 = (\pi \cdot 4.3\ ft)(r^2)$$

$$\frac{1{,}100\ ft^3 = 13.5\ ft\,(r^2)}{13.5\ ft}$$

$$\frac{1{,}100\ ft^3}{13.5\ ft} = r^2$$

$$81.48\ ft^2 = r^2$$

$$81\ ft^2 = r^2$$

$$\sqrt{81\ ft^2} = \sqrt{r^2}$$

$$9\ ft = r$$

$$V = \pi r^2 h$$

* Keep answer in inches

$$1100 ft^3 = (\pi)(r^2)(52 in.)$$

$$\left(\frac{1100 \cancel{ft^3}}{1} \cdot \frac{1728 in^3}{1 \cancel{ft^3}}\right) = \pi r^2 (52 in)$$

$$1900800 in^3 = (3.14)(r^2)(52 in.)$$

$$\frac{1900800 in^3 = 163.28 r^2}{163.28 in}$$

$$\frac{1900800 in^3}{163.28 in} = r^2$$

$$11641.4 in^2 = r^2$$

$$\sqrt{11641.4 in^2} = \sqrt{r^2}$$

$$r \cong 107.9 in$$

* Problem asks for the answer in ft.

$$\frac{107.9 \cancel{in}}{1} \cdot \frac{1 ft.}{12 \cancel{in}} = 9 ft$$