ALG I – §9-3 NOTES

Algebra I

9.3 Solving Quadratic Equations

Objective: To solve quadratic equations by graphing and using square roots

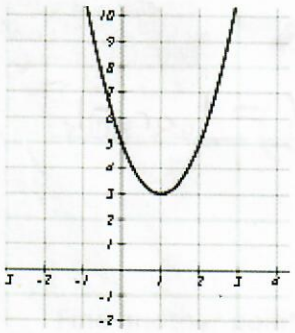
KEY CONCEPT

The quadratic equation $ax^2 + bx + c = 0$ can have 0, 1, 2 real solutions.

These solutions are called zeros or roots or x-int

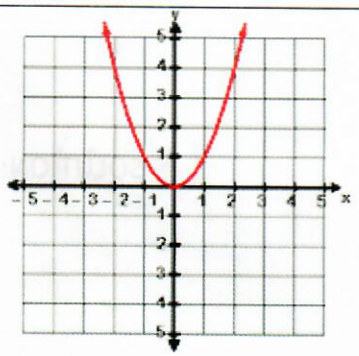
The solutions are also the x-intercepts of the graph.

Example 1 For each graph name the solution(s).



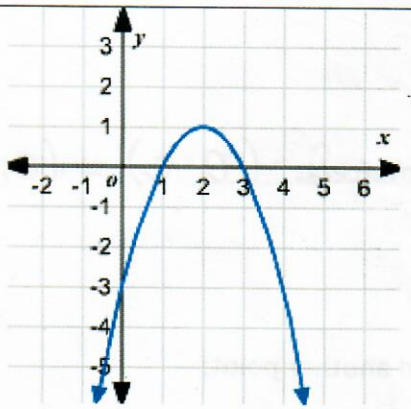
 # OF SOLUTIONS: 0

SOLUTIONS: no solution



 # OF SOLUTIONS: 1

SOLUTIONS: X = 0



 # OF SOLUTIONS: 2

SOLUTIONS: X = 1 or 3

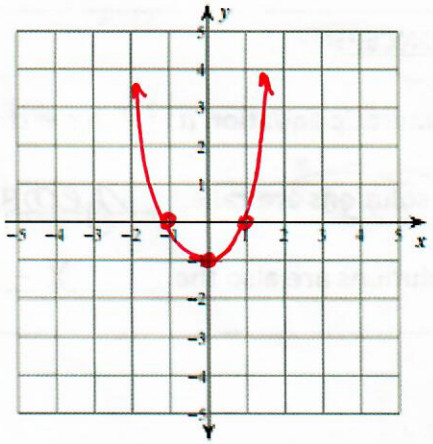
Example 2 **Solve each equation by *GRAPHING* the function.**

$x^2 - 1 = 0$ a = 1, b = 0, c = -1

Axis of Symmetry: $x = \frac{-b}{2a}$

$x = \frac{0}{2(1)}$

$x = 0$



Vertex: $y = x^2 - 1$ $(0, -1)$

$y = (0)^2 - 1$

$y = -1$

y-intercept: $(0, c) = (0, -1)$

SOLUTION: $x = 1$ or -1

Find another point:

$x = 1$ $y = x^2 - 1$

$y = (1)^2 - 1$

$y = 1 - 1$

$y = 0$

$(1, 0)$

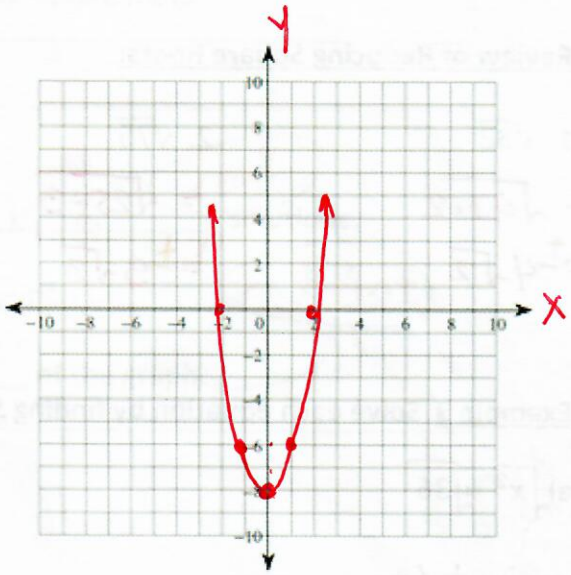
Example 3 Solve each equation by ***GRAPHING*** the function.

$2x^2 - 8 = 0$ a = 2, b = 0, c = -8

Axis of Symmetry: $x = \frac{-b}{2a}$

$x = \frac{0}{2(2)}$

$x = 0$



Vertex: $y = 2x^2 - 8$

$y = 2(0)^2 - 8$

$y = 0 - 8$

$y = -8$ $(0, -8)$

y-intercept: $(0, c) = (0, -8)$

SOLUTION: $y = -2$ or 2

Find another point:

let $x = 1$ $y = 2x^2 - 8$

$y = 2(1)^2 - 8$

$y = 2 - 8$

$y = -6$

$(1, -6)$

let $x = 2$ $y = 2x^2 - 8$

$y = 2(2)^2 - 8$

$y = 2(4) - 8$

$y = 8 - 8$

$y = 0$

$(2, 0)$

LIST THE PERFECT SQUARES:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

Review of Reducing Square Roots:

68 = 2 · 34, 34 = 2 · 17

405 = 5 · 81

1. $\sqrt{32}$

$= \sqrt{16 \cdot 2}$

$= \pm 4\sqrt{2}$

2. $\sqrt{75}$

$= \sqrt{25 \cdot 3}$

$= \pm 5\sqrt{3}$

3. $\sqrt{68}$

$= \sqrt{4 \cdot 17}$

$= \pm 2\sqrt{17}$

4. $\sqrt{405}$

$= \sqrt{81 \cdot 5}$

$= \pm 9\sqrt{5}$

Example 3 Solve each equation by finding ***SQUARE ROOTS***.

a) $\sqrt{x^2} = \sqrt{36}$

$x = \pm 6$

b) $5p^2 - 45 = 0$

$5p^2 = 45$

$\sqrt{p^2} = \sqrt{9}$

$p = \pm 3$

c) $9m^2 - 25 = 0$

$9m^2 = 25$

$\sqrt{m^2} = \sqrt{\frac{25}{9}}$

$m = \frac{5}{3}$

d) $3n^2 + 12 = 0$

$3n^2 = -12$

$\sqrt{n^2} = \sqrt{-4}$

no solution

e) $72 - 9n^2 = 0$

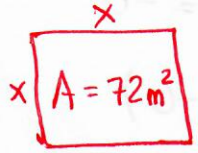
$72 = 9n^2$

$\sqrt{8} = \sqrt{n^2}$

$\sqrt{4 \cdot 2} = n$

$2\sqrt{2} = n$

f) Find the length of a square with area 72 m^2.



$\sqrt{x^2} = \sqrt{72}$

$x = \sqrt{36 \cdot 2}$

$x = 6\sqrt{2}$ m