Algebra I Name KEY

CHAPTER 9 REVIEW

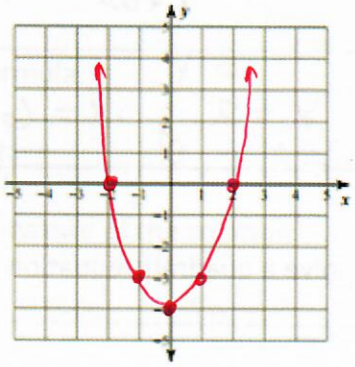
Write the Quadratic Equation: $y = ax^2 + bx + c$

How does the "a" value affect the graph? width; opens up or down

How does the "c" value affect the graph? y-intercept (0, c)

Example 1 Graph the quadratic equation $y = x^2 - 4$

x	$y = x^2 - 4$	y
-2	$(-2)^2-4 = 4-4$	0
-1	$(-1)^2-4 = 1-4$	-3
0	$(0)^2-4 = 0-4$	-4
1	$(1)^2-4 = 1-4$	-3
2	$(2)^2-4 = 4-4$	0



Vertex: (0, -4)

Max/Min: min

Axis of Symmetry: x = 0

Width: Standard

Domain: All ℝ

Range: All ℝ ≥ -4

Example 2 Consider the quadratic equations and label by width.

a. $y = \frac{1}{4}x^2$, $y = \frac{1}{10}x^2$

Wider graph: $y = \frac{1}{10}x^2$

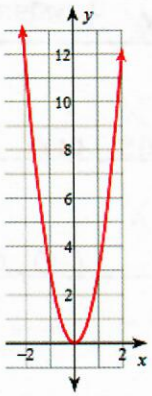
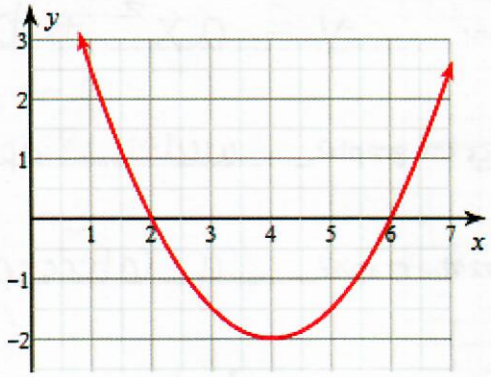
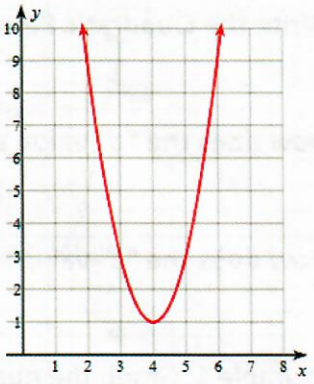
Narrower graph: $y = \frac{1}{4}x^2$

b. $y = -5x^2$, $y = -2x^2$

Wider graph: $y = -2x^2$

Narrower graph: $y = -5x^2$

Example 3 State the ***number and nature of the roots*** and ***state the solution*** for each.

Graph			
Number of solutions	1 real	2 real	0 real
Solution	$x = 0$	$x = 2$; $x = 6$	no soln

The ***four*** methods we discussed to solve a quadratic equation include:

1. Graphing
2. Factoring
3. Square Roots
4. Quadratic Formula

Example 4 Solve by using square roots.

a. $\sqrt{x^2} = \sqrt{49}$

$x = \pm 7$

b. $4n^2 - 12 = 0$

$\frac{4n^2}{4} = \frac{12}{4}$

$\sqrt{n^2} = \sqrt{3}$

$n = \pm\sqrt{3}$

c. $-5p^2 + 20 = 0$

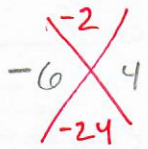
$\frac{-5p^2}{-5} = \frac{-20}{-5}$

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

$p = \pm 2$

Example 5 Solve by factoring.

a. $a^2 - 2a = 24$



$a^2 - 2a - 24 = 0$

$(a-6)(a+4) = 0$

$a-6=0$ or $a+4=0$

$a = 6$ $\quad a = -4$

b. $2x^2 + 5x = 3$

$2x^2 + 5x - 3 = 0$

$2x^2 + 6x - x - 3 = 0$

$2x(x+3) - 1(x+3) = 0$

$(2x-1)(x+3) = 0$

Example 6 State the quadratic formula: $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

State the discriminant: $b^2 - 4ac$

Example 7 State the number and nature of the solution.

a. $b^2 - 4ac > 0$ 2 real solns

b. $b^2 - 4ac = 0$ 1 real soln

c. $b^2 - 4ac < 0$ 0 real solns

Example 8 Solve $x^2 - 8x = -12$ using the quadratic formula. $x^2 - 8x + 12 = 0$

a = 1, b = -8, c = 12

Discriminant's Value: $b^2 - 4ac$

$= (-8)^2 - 4(1)(12)$

$= 64 - 48$

$= 16$

#/Nature of Roots: 2 real

Solution: $x = \dfrac{8 \pm \sqrt{16}}{2(1)}$

$x = \dfrac{8 \pm 4}{2}$

$x = \dfrac{8+4}{2}$ OR $x = \dfrac{8-4}{2}$

$x = \dfrac{12}{2}$ $\quad x = \dfrac{4}{2}$

$x = 6$ $\quad x = 2$

Example 9 Consider the equation $y = x^2 + 6x + 8$.

a. Solve by ***graphing***. a= 1, b= 6, c = 8

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

$x = \frac{-6}{2(1)}$

$x = -3$

Vertex: $(-3, -1)$

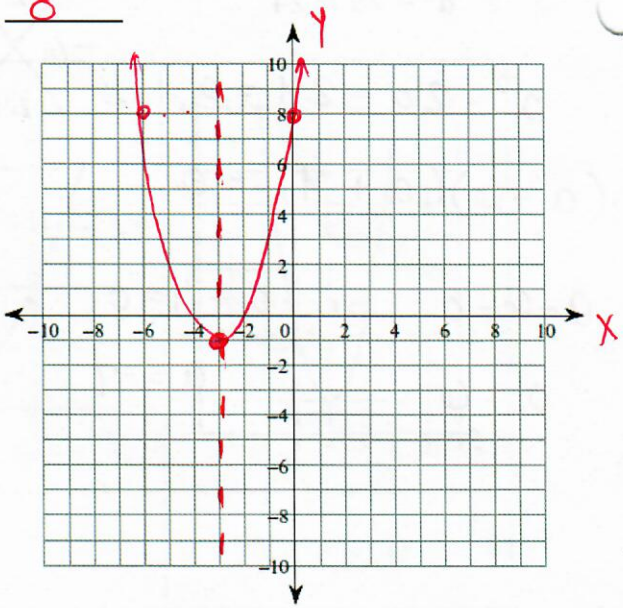
$y = (-3)^2 + 6(-3) + 8$

$y = 9 - 18 + 8$

$y = -9 + 8$

$y = -1$

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



Solution: $x = -2, -4$

b. Solve by ***factoring***.

$x^2 + 6x + 8 = 0$

$(x + 4)(x + 2) = 0$

$x + 4 = 0$ or $x + 2 = 0$

$x = -4$ $x = -2$

c. Solve by the ***quadratic formula.***

$b^2 - 4ac = (6)^2 - 4(1)(8)$

$= 36 - 32$

$= 4 \Rightarrow$ 2 real solns

$x = \frac{-6 \pm \sqrt{4}}{2(1)}$

$x = \frac{-6 \pm 2}{2}$

$x = \frac{-6+2}{2}$ OR $x = \frac{-6-2}{2}$

$x = -\frac{4}{2}$ $x = \frac{-8}{2}$

$x = -2$ $x = -4$