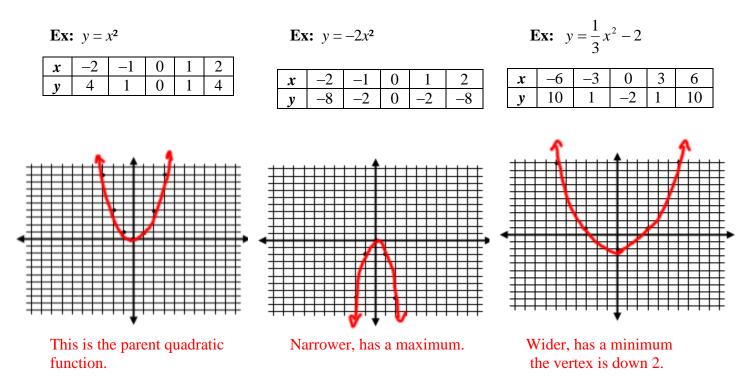# Chapter 10: Quadratic Equations and Functions
Study Guide Answer Key
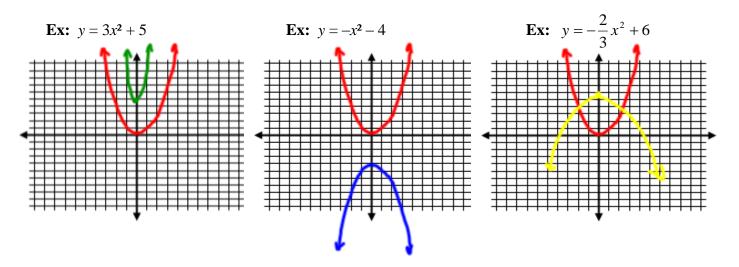
10.1: Graph $y = ax^2 + c$:

- Be able to graph a quadratic using a table and compare it to the parent function.

Graph the following quadratic equations by making a table. Compare the graph to the parent function.

Ex: $y = x^2$

x	−2	−1	0	1	2
y	4	1	0	1	4

Ex: $y = -2x^2$

x	−2	−1	0	1	2
y	−8	−2	0	−2	−8

Ex: $y = \dfrac{1}{3}x^2 - 2$

x	−6	−3	0	3	6
y	10	1	−2	1	10

This is the parent quadratic function.

Narrower, has a maximum.

Wider, has a minimum the vertex is down 2.

- Be able to identify characteristics of quadratic equations based on a and c changing and sketch the resulting parabola.

Sketch the parent function, then sketch the following parabolas based on the equation.

Ex: $y = 3x^2 + 5$

Ex: $y = -x^2 - 4$

Ex: $y = -\dfrac{2}{3}x^2 + 6$

<u>**10.2: Graph $y = ax^2 + bx + c$:**</u>

- Be able to find the axis of symmetry and vertex of a parabola.

Find the axis of symmetry and vertex of each quadratic equation.

Ex: $y = 2x^2 - 8x + 6$ **Ex:** $y = -3x^2 + 24x - 22$

Axis of symm: $x = 2$ Axis of symm: $x = 4$
Vertex $(2, -2)$ Vertex: $(4, 26)$
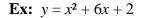
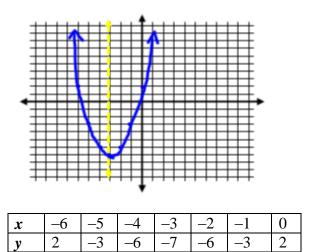- Be able to tell if a quadratic equation has a maximum or minimum value, then find the max. or min.

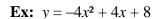**Tell whether the function has a *minimum* or *maximum* value. Then find the min. or max. value.**

Ex: $f(x) = -3x^2 + 12x - 20$ **Ex:** $f(x) = 4x^2 + 32x$

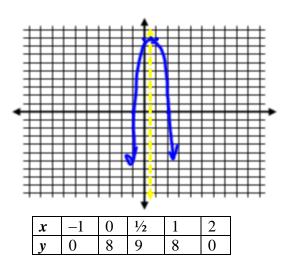Maximum value of -8 Minimum value of -64

- Be able to graph a quadratic function in the form $y = ax^2 + bx + c$ by finding the axis of symmetry and vertex and making a symmetrical table about the axis.
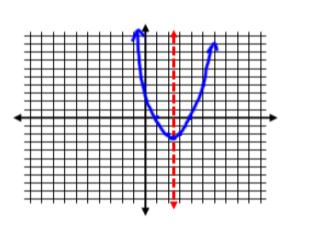
Graph the quadratic function.

Ex: $y = x^2 + 6x + 2$ **Ex:** $y = -4x^2 + 4x + 8$

x	−6	−5	−4	−3	−2	−1	0
y	2	−3	−6	−7	−6	−3	2

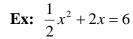| x	−1	0	½	1	2
y	0	8	9	8	0

10.3: Solve Quadratic Equations by Graphing:

- Be able to solve an equation by graphing.

Solve the following quadratic equations by graphing.
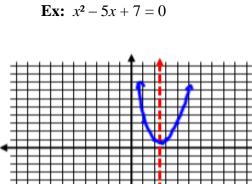
Ex: $x^2 - 5x + 4 = 0$ **Ex:** $2x^2 + x = 3$

$x = 4$ and $x = 1$ $x = 1$ and $x = -1.5$

Ex: $\dfrac{1}{2}x^2 + 2x = 6$ **Ex:** $x^2 - 5x + 7 = 0$

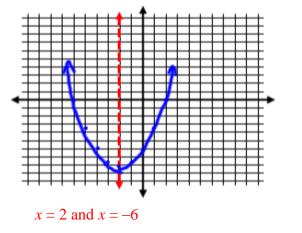
$x = 2$ and $x = -6$ no solution

- Be able to approximate zeros of a function to the nearest tenth by making a table.

Approximate the zeros of the function to the nearest tenth.

Ex: $f(x) = x^2 + 4x - 5$ **Ex:** $f(x) = -3x^2 + 8x - 2$

10.4: Use Square Roots to Solve Quadratic Equations:

- Be able to solve a quadratic equation using square roots

Solve the following quadratic equations.

Ex: $4x^2 - 400 = 0$

$x = \pm\, 10$

Ex: $3z^2 - 18 = -18$

$z = 0$

Ex: $3x^2 - 35 = 45 - 2x^2$

$x = \pm\, 4$

Ex: $11\left(\dfrac{w-7}{2}\right)^2 - 20 = 101$

$w = 13.63$ and $w = 0.37$

10.6: Solve Quadratic Equations by the Quadratic Formula:

- Be able to solve quadratic equations by using the quadratic formula

Solve:

Ex: $x^2 + 5x - 104 = 0$

$x = 8$ and $x = -13$

Ex: $4t^2 - 3t = 5 - 3t^2$

$t = 1.09$ and $t = -0.66$

Ex: $x^2 - 8x = -16$

$x = 4$

Ex: $(x + 13)^2 = 25$

$x = -8$ and $x = -18$

10.7: Interpret the Discriminant:

- Be able to identify the value of the discriminant and use it to determine the number of solutions to a quadratic equation.

Tell whether the equation has *two solutions, one solution*, or *no solution*.

Ex: $x^2 + x + 1 = 0$ **Ex:** $-2x^2 + 8x - 4 = 0$

Discriminant $= -3$, no solution   Discriminant $= 32$, two solutions

Ex: $-3g^2 - 4g = \dfrac{4}{3}$ **Ex:** $10 = x^2 - 5x$

Discriminant $= 0$, one solution   Discriminant $= 65$, two solutions