Name: Key 2018-2019 Period: _____ Date: _____ ID: A

Algebra 1 Chapter 8 Study Guide

1. **List the three quadratic forms** and the **axis of symmetry formula's** associated with each.

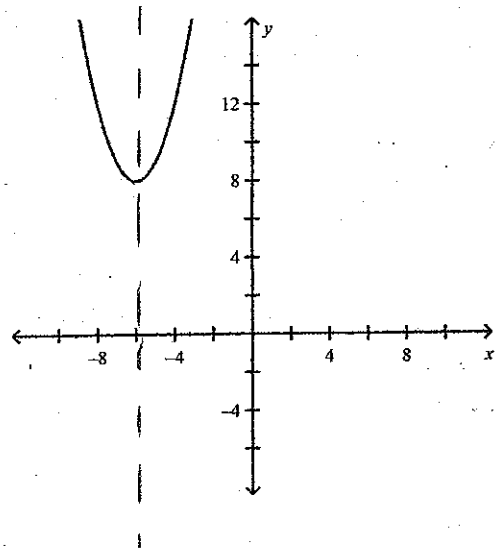
$y = ax^2 + bx + c$ $\quad$ $y = a(x-h)^2 + k$ $\quad$ $y = a(x-p)(x-q)$

$x = \frac{-b}{2a}$ $\quad$ $x = h$ $\quad$ $x = \frac{p+q}{2}$

(standard) $\quad$ (vertex) $\quad$ (intercept/factored)

Identify the following **characteristics** of the quadratic function and its graph.
Axis of symmetry, vertex, maximum or minimum and what the maximum or miniumum value is, where the function is increasing and/or decreasing.

2.



AoS: $x = -6$ $\quad$ Vertex: $(-6, 8)$

Has minimum of 8.

The function is decreasing when $x < -6$ and increasing when $x > -6$.

Find the vertex and axis of symmetry of the graph of the function.

3. $y = -3(x+4)^2 - 2$

$a = -3$ $\quad h = -4$ $\quad k = -2$

$x = -4$ AoS $\quad$ $(-4, -2)$ vertex

4. $g(x) = \frac{1}{2}x^2 - 6x + 10$

$a = \frac{1}{2}$ $\quad b = -6$ $\quad c = 16$

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

$x = 6$ AoS $\quad$ $(6, -8)$ vertex

$g(6) = \frac{1}{2}(6)^2 - 6(6) + 16$

$= \frac{1}{2}(36) - 36 + 16$

$= 18 - 36 + 10 = -8$

5. $f(x) = 2(x-7)(x+5)$

$a = 2$ $\quad p = 7$ $\quad q = -5$

$x = \frac{7 + -5}{2} = \frac{2}{2} = 1$

$x = 1$ AoS $\quad$ $(1, -72)$ vertex

$f(1) = 2(1-7)(1+5)$

$= 2(-6)(6)$

$= -72$

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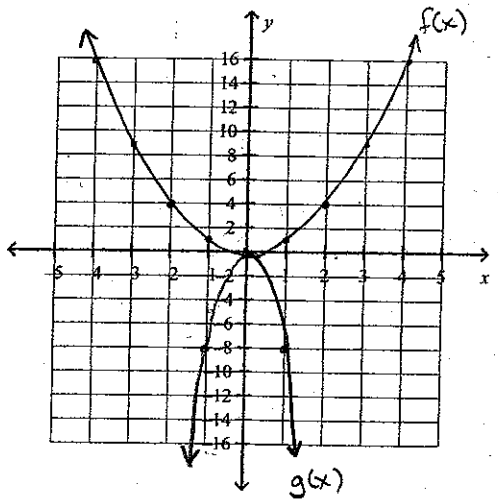
x	f(x)
-2	4
-1	1
0	0
1	1
2	4

Graph the function. Compare the graph to the graph of $f(x) = x^2$.

↓ 6. $g(x) = -8x^2$

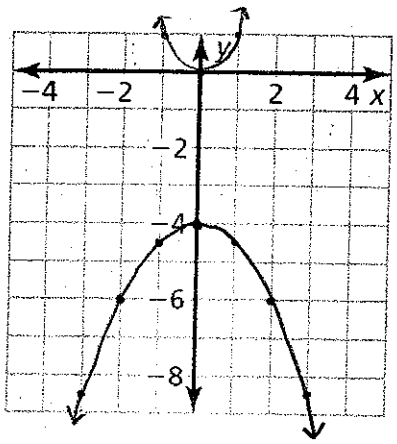


x	g(x)
-2	-32
-1	-8
0	0
1	-8
2	-32

g(x) is a reflection over the x-axis and a vertical stretch by a factor of 8 of f(x).

Graph the function. Compare the graph to the graph of $f(x) = x^2$.

↓ 7. $g(x) = -\frac{1}{2}x^2 - 4$



x	g(x)
-2	-6
-1	-4.5
0	-4
1	-4.5
2	-6

g(x) is a reflection over the x-axis, a vertical compression and a shift down 4 of f(x).

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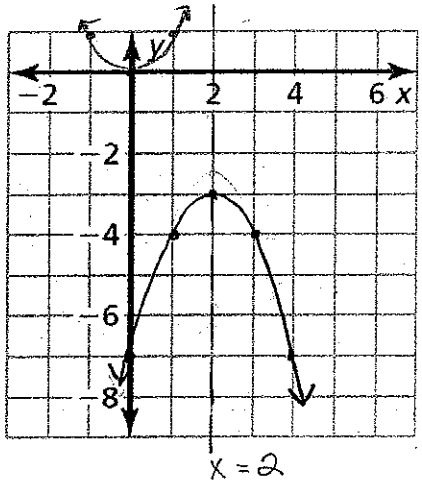
8. **Graph the function. Compare the graph to the graph of $f(x) = x^2$.**

$r(x) = -(x-2)^2 - 3$



↓ $a = -1$ $h = 2$ $k = -3$

$x = 2$ AoS

(2, -3) Vertex

$r(1) = -(1-2)^2 - 3$

$r(1) = -(-1)^2 - 3$

$r(1) = -1 - 3 = -4$

(1, -4)

r(x) is a reflection over the x-axis, a shift right 2 and a shift down 3 of f(x).

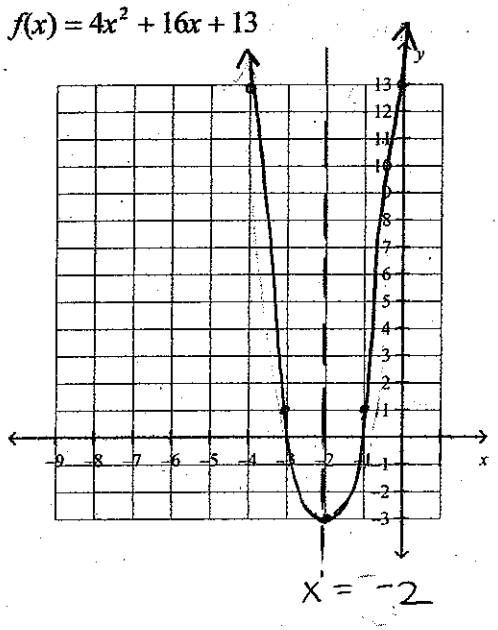
$r(0) = -(0-2)^2 - 3$

$= -4 - 3 = -7$

(0, -7)

Graph the function. Describe the domain and range.

9. $f(x) = 4x^2 + 16x + 13$



↑ $a = 4$ $b = 16$ $c = 13$

$x = \frac{-16}{2(4)} = \frac{-16}{8} = -2$ $x = -2$ AoS

$f(-2) = 4(-2)^2 + 16(-2) + 13$

$= 4(4) - 32 + 13$

$= 16 - 32 + 13$

$= -3$

(-2, -3) Vertex

y-int. (0, 13)

$f(-1) = 4(-1)^2 + 16(-1) + 13$

$= 4 - 16 + 13$

$= 1$

(-1, 1)

D: ℝ

R: $\{y \geq -3\}$

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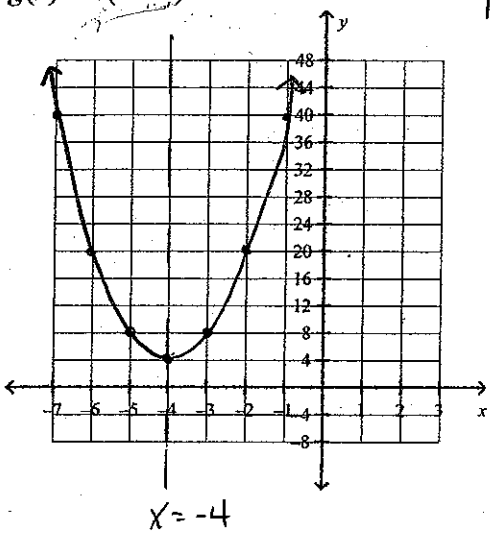
Graph the function. Compare the graph to the graph of $f(x) = x^2$.

10. $g(x) = 4(x+4)^2 + 4$



↑ $a = 4$ $h = -4$ $k = 4$

$X = -4$ AoS

$(-4, 4)$ Vertex

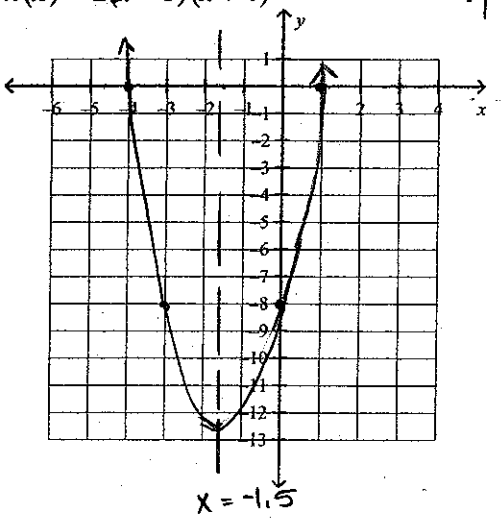
$g(x)$ is a vertical stretch by a factor of 4, a shift left of 4 and a shift up 4.

$g(-3) = 4(-3+4)^2 + 4$
$= 4(1)^2 + 4$
$= 4 + 4 = 8$ $(-3, 8)$

$g(-2) = 4(-2+4)^2 + 4$
$= 4(2)^2 + 4$
$= 16 + 4 = 20$ $(-2, 20)$

Use zeros to graph the function. Give the domain and range of the function.

11. $h(x) = 2(x-1)(x+4)$



↑ $a = 2$ $p = 1$ $q = -4$

$X = \frac{1+-4}{2} = \frac{-3}{2} = -1.5$ $X = -1.5$ AoS

$h(-1.5) = 2(-1.5-1)(-1.5+4)$
$= 2(-2.5)(2.5)$
$= 2(-6.25)$
$= -12.5$

$(-1.5, -12.5)$ Vertex

x-int. $(1, 0)$ $(-4, 0)$

3rd point.

$X = 0$
$h(0) = 2(0-1)(0+4)$
$= 2(-1)(4)$
$= -8$

$(0, -8)$

D: $\mathbb{R}$

R: $\{y \geq -12.5\}$

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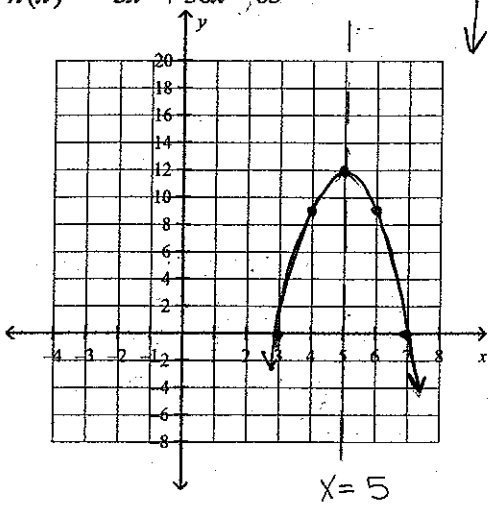
12. **Use zeros to graph the function.** ← need to put it in intercept form to find zeros.

$h(x) = -3x^2 + 30x - 63$



$h(x) = -3(x^2 - 10x + 21)$ $a=1$ $b=-10$ $c=21$

$\frac{-3}{-3} \cdot \frac{-7}{-7} = 21$

$\frac{-3}{-3} + \frac{-7}{-7} = -10$

$h(x) = -3(x-3)(x-7)$

(3,0) (7,0) x-int./zeros

$X = \frac{3+7}{2} = \frac{10}{2} = 5$ X=5 AoS

$h(5) = -3(5-3)(5-7)$
$= -3(2)(-2)$
$= 12$ (5,12) Vertex

$h(4) = -3(4-3)(4-7)$
$= -3(1)(-3) = 9$ (4,9) 3rd point

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

13. $f(x) = -4x^2 + 16x + 6$ This has a maximum of 22.

$a=-4$ $b=16$ $c=6$

$X = \frac{-16}{2(-4)} = 2$

$f(2) = -4(2)^2 + 16(2) + 6$
$= -16 + 32 + 6 = 16 + 6 = 22$

14. $f(x) = 2x^2 - 10x + 11$

$a=2$ $b=-10$ $c=11$

$X = \frac{10}{2(2)} = \frac{10}{4} = \frac{5}{2}$

This has a minimum of −1.5.

$f(\frac{5}{2}) = 2(\frac{5}{2})^2 - 10(\frac{5}{2}) + 11$
$= 2(\frac{25}{4}) - \frac{50}{2} + 11$
$= \frac{50}{4} - 25 + 11 = 12.5 - 25 + 11$
$= -1.5$

Determine whether the function is *even*, *odd*, or *neither*.

15. $d(x) = 2x - 3$

Even? $d(x) = d(-x)$
$d(-x) = 2(-x) - 3$
$d(-x) = -2x - 3$
$d(-x) \neq d(x)$
Not even

Odd $d(-x) = -d(x)$
$-d(x) = -(2x - 3)$
$-d(x) = -2x + 3$
$-d(x) \neq d(-x)$
Not odd

Neither

16. $p(x) = -2x^3 - 4x$

Even? $p(x) = p(-x)$
$p(-x) = -2(-x)^3 - 4(-x)$
$p(-x) = 2x^3 + 4x$
$p(-x) \neq p(x)$
Not even

Odd? $p(-x) = -p(x)$
$-p(x) = -(-2x^3 - 4x)$
$-p(x) = 2x^3 + 4x$
$-p(x) = p(-x)$
Odd

Odd