Name: Date: Hour:

Algebra 1 - Unit 9A Test Review

I. Determine if the given function is quadratic.

1. $y + 6x = -14$

$-6x \quad -6x$

$y = -6x - 14$

Not Quadratic - Linear

2. $2x^2 + y = 3x - 1$

$-2x^2 \quad -2x^2$

$y = -2x^2 + 3x - 1$

Quadratic

3.

x	−4	−3	−2	−1	0
y	39	18	3	−6	−9

+1 +1 +1 +1

−21 −15 −9 −3

+6 +6 +6

Quadratic

4. $\{(-10, 15), (-9, 17), (-8, 19), (-7, 21), (-6, 23)\}$

+1 +1 +1 +1

+2 +2 +2 +2

Not Quadratic - Linear

5.

x	−2	−1	0	1	2
y	−1	0	4	9	15

+1 +4 +5 +6

+3 +1 +1

Not Quadratic

6. $\{(0, -3), (1, -2), (2, 1), (3, 6), (4, 13)\}$

+1 +3 +5 +7

+2 +2 +2

Quadratic

II. Graphing

#7-9. Answer the following questions for each given function. (Show your work to the right)

7. $y = -5x^2 + 10x + 3$ $y = -5(1)^2 + 10(1) + 3 = 8$

Vertex $x = \frac{-b}{2a}$

a. Find the vertex : $\frac{-10}{2(-5)} = \frac{-10}{-10} = 1$ (1, 8)

b. Find the y-intercept (ordered pair): (0, 3)

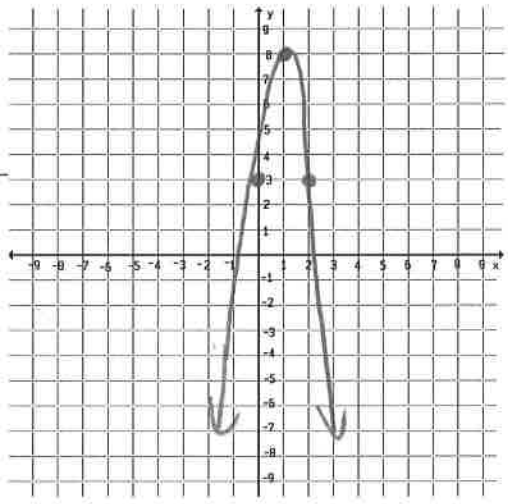
c. Does it open up or down? Down

d. Is the vertex a maximum or a minimum? Max

e. Is the graph Normal, Narrow or wide? Narrow

f. Give the domain and range: D: $\{x \in \mathbb{R}\}$

R: $\{y \leq 8\}$



8. $y = \frac{1}{2}x^2 + 2x$

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

$y = \frac{1}{2}(-2)^2 + 2(-2)$

$2 - 4 = -2$

$y = \frac{1}{2}(1)^2 + 2(1)$

$\frac{1}{2} + 2 = 1.5$

a. Find the vertex : (−2, −2)

b. Find the y-intercept: (0, 0)

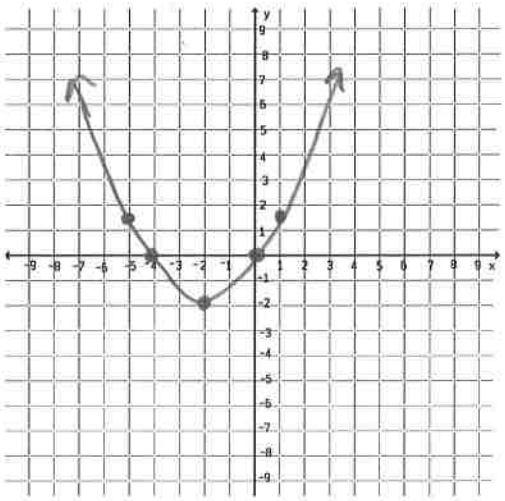
c. Does it open up or down? Up

d. Is the vertex a maximum or a minimum? Min

e. Is the graph Normal, Narrow or wide? Wide

f. Give the domain and range: D: $\{x \in \mathbb{R}\}$

R: $\{y \geq -2\}$



9. $y = -x^2 + 6x + 1$

$x = \frac{-6}{2(-1)} = 3$

$y = -(3)^2 + 6(3) + 1$

$-9 + 18 + 1 = 10$

a. Find the vertex : (3,10)

b. Find the y-intercept: (0,1)

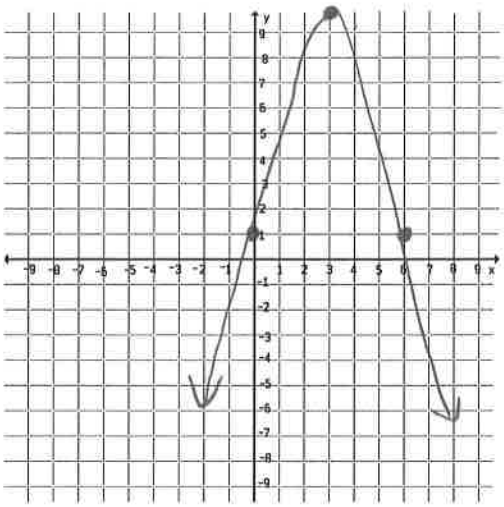
c. Does it open up or down? Down

d. Is the vertex a maximum or a minimum? Max

e. Is the graph Normal, Narrow or wide? Normal

f. Give the domain and range: D: $\{x \in \mathbb{R}\}$

R: $\{y \leq 10\}$



III. Comparing Graphs of Quadratics

Using the description of the transformation, write a quadratic equation in vertex form.

10. Shifted left 8 and down 4, opening down, vertically compressed

$y = -\frac{1}{2}(x+8)^2 - 4$

11. Opening up, vertex at (2, -5), narrow

$y = 2(x-2)^2 - 5$

12. Reflected, normal, shifted right 3 and up 10

$y = -(x-3)^2 + 10$

#13-16. Describe the difference between each graph and the parent function $y = x^2$.

13. $y = \frac{1}{3}(x-2)^2 + 5$

Compressed
shifted right 2, up 5
opens up
vertex (2,5)

14. $g(x) = x^2 + 6$

opens up, normal width
Vertex (0,6)
Shifted up 6

15. $f(x) = -2(x+1)^2 - 7$

Stretched, opens down
vertex (-1,-7)
shifted left 1, down 7

16. $y = -\frac{7}{4}(x+1)^2 + 6$

17. You graphed the function $f(x) = x^2 - 4$. I graphed the function $f(x) = x^2 + 3$. How is my graph going to look compared to yours?

My graph is shifted up 7 units

18. Put the graphs in order from narrowest to widest.

$f(x) = x^2, g(x) = -\frac{4}{5}x^2, h(x) = 3x^2$

h(x), f(x), g(x)
Narrow Normal Wide

IV. Application Problems

#19 – 23. Follow the directions for each question.

19. The height in feet that a football is kicked can be modeled by the function $f(x) = -16x^2 + 64x$. What is the maximum height the football will reach?

↳ Find vertex!

$X = \frac{-b}{2a} = \frac{-64}{2(-16)} = 2$ $\quad f(2) = -16(2)^2 + 64(2) = 64$

max height = 64 feet

20. The height of a volleyball after being hit can be modeled by the equation $f(x) = -4.9x^2 + 9x + 5$, where x is the time in seconds after the hit. If the other team jumps up and gets their hands 8 feet in the air, will the ball make it over their hands? (Find max height!)

$X = \frac{-b}{2a} = \frac{-9}{2(-4.9)} = .918$ $\quad f(.918) = -4.9(.918)^2 + 9(.918) + 5$

$= 9.13$ feet

Yes, it makes it over

21. Tanisha kicks soccer ball during a game. The height of the ball in feet can be modeled by the function $f(x) = -16x^2 + 48x$, where x is the time in seconds. What is the height of the ball after 2 seconds?

$f(2) = -16(2)^2 + 48(2) =$ 32 feet

22. The height of a flare can be approximated by the function $h = -16t^2 + 95t + 6$, where h is the height in feet and t is the time in seconds. Find the height of the flare after 4 seconds.

$h(4) = -16(4)^2 + 95(4) + 6 =$ 130 feet

23. A water balloon is dropped from a window at a height of 144 feet. This can be modeled by the function $h(t) = -16t^2 + 144$. What is the height of the balloon after 2 seconds?

$h(2) = -16(2)^2 + 144 =$ 80 feet

24. **What is the maximum height of the ball?** A ball is thrown directly upward with an initial velocity of 96 feet per second from a cliff that is 200 feet above the beach. This can be modeled by the equation $s(t) = -16t^2 + 96t + 200$.

$X = \frac{-96}{2(-16)} = 3$ $\quad S(3) = -16(3)^2 + 96(3) + 200$

$S(3) = 344$ feet