Algebra 2

Graphing Quadratics Review

Name: Key

Period:_____ Date:_____

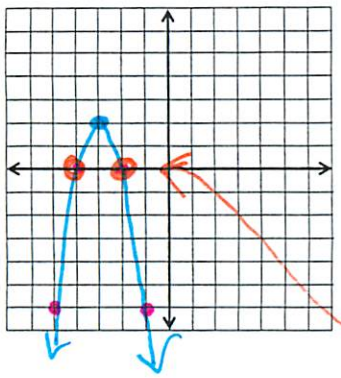
Graph the following quadratic functions. Label the vertex, the axis of symmetry, state the domain and range, identify the end behavior, and zeros.

Vertex Form Change Keep

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

$(-3, 2)$

x	y	a = -2
1	1(-2)	-2
2	4(-2)	-8
3	9(-2)	-18



Vertex: $(-3, 2)$

Axis of Sym: $x = -3$

Domain: $\mathbb{R}$

Range: $y \le 2$

Zeros: $(-2, 0)$ $(-4, 0)$

$y \to$ $-\infty$ as $x \to -\infty$ and $y \to$ $-\infty$ as $x \to \infty$

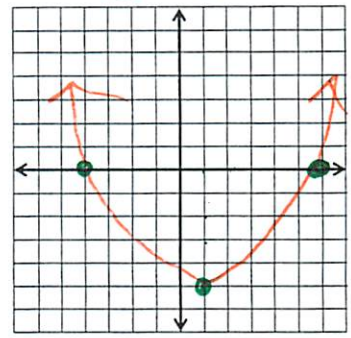
Intercept Form Change change

2. $h(x) = \frac{1}{5}(x+4)(x-6)$

$-4 \quad 6$

$x = \frac{-4+6}{2} = \frac{2}{2} = 1$

$y = \frac{1}{5}(1+4)(1-6) = \frac{1}{5}(5)(-5) = -5$



Vertex: $(1, -5)$

Axis of Sym: $x = 1$

Domain: $\mathbb{R}$

Range: $y \ge -5$

Zeros: $(6, 0)$ & $(-4, 0)$

$h(x) \to$ $+\infty$ as $x \to -\infty$ and $h(x) \to$ $+\infty$ as $x \to \infty$

Standard Form

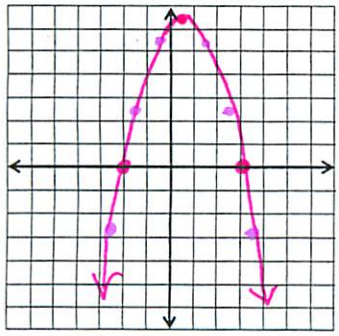
3. $y = -x^2 + x + 6$

A B C

$x = -b/2a = -1/2(-1) = 1/2$

$y = -(1/2)^2 + (1/2) + 6 = \frac{25}{4}$

x	y	a = -1
1	1	-1
2	4	-4
3	9	-9



Vertex: $(0.5, 6.25)$

Axis of Sym: $x = 0.5$

Domain: $\mathbb{R}$

Range: $y \le 6.25$

Zeros:

$y \to$ $-\infty$ as $x \to -\infty$ and $y \to$ $-\infty$ as $x \to \infty$

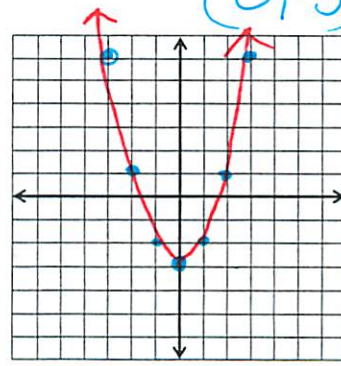
4. $g(x) = x^2 - 3$

Vertex Form

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

Change Keep

$(0, -3)$



Vertex: $(0, -3)$

Axis of Sym: $x = 0$

Domain: $\mathbb{R}$

Range: $y \ge -3$

Zeros: $(-\sqrt{3}, 0)$ & $(\sqrt{3}, 0)$

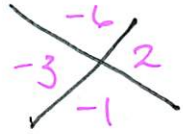
$g(x) \to$ $+\infty$ as $x \to -\infty$ and $g(x) \to$ $+\infty$ as $x \to \infty$

Zeros → Factor

$-(x^2 - x - 6)$

$-(x-3)(x+2)$

$x = 3 \quad x = -2$



Zeros → Solve by √

$0 = x^2 - 3$

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

$x = \pm\sqrt{3}$

y part of the Vertex

Tell whether the function has a minimum or maximum value, and then find the min/max value

5. $y = 2x^2 - 8x + 10$ (A B C)

Standard Form

so $x = -b/2a$

$x = -b/2a = \frac{-(-8)}{2(2)} = \frac{8}{4} = 2$

$y = 2(2)^2 - 8(2) + 10 = \boxed{2}$

min 2

6. $y = -\frac{1}{2}(x+4)(x-5)$

Intercept Form

$x = \frac{-4+5}{2} = \frac{1}{2}$

$y = -\frac{1}{2}(\frac{1}{2}+4)(\frac{1}{2}-5) = \frac{81}{8}$

max $\frac{81}{8}$

Write the following function in both vertex form and intercept form.

7. $y = x^2 + 8x + 12$

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

I. Form $y = (x+2)(x+6)$

Vertex Form

Complete the □

$y - 12 + 16 = x^2 + 8x + 16$

$\frac{8}{2}$

$(4)^2$

$y + 4 = x^2 + 8x + 16$

16

4 4

8

$y + 4 = (x+4)^2$

Intercept Form

Factor

$x^2 + 8x + 12$

12

2 6

8

$(x+2)(x+6)$

Write the following function in standard form and vertex form.

8. $y = -3(x+2)(x-1)$

S. Form $y = -3x^2 - 3x + 6$

V. Form $y = -3(x - \frac{1}{2})^2 + \frac{27}{4}$

Standard

"unpack"

$-3\boxed{(x+2)(x-1)}$

First

$x^2 - 1x + 2x - 2$

$-3(x^2 + 1x - 2)$

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

Vertex Form

Complete the □

$y - 6 = -3x^2 - 3x$

$y - 6 - 3/4 = -3(x^2 - \frac{1}{2}x + \frac{1}{4})$

$-3(1/4)$

$(\frac{-1}{2})^2$

$y - \frac{24}{4} - \frac{3}{4} = -3(x^2 - 1x + \frac{1}{4})$

1/4

-1/2 -1/2

-1

$y - \frac{27}{4} = -3(x - 1/2)^2$

Vertex Form

State the vertex, the zeroes, the domain and range, and the end behavior of the following function.

9. $y = (x+3)^2 - 1$

Change Keep

$V(-3,-1)$

Zeros Solve by $\sqrt{\ }$

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

$\sqrt{1} = \sqrt{(x+3)^2}$

$\pm 1 = x + 3$

$x = -3 \pm 1$ → $-3+1=-2$, $-3-1=-4$

Vertex $(-3,-1)$

Zeros $(0,-2)$ & $(0,-4)$

Domain $\mathbb{R}$

Range $y \geq -1$

$y \to +\infty$ as $x \to -\infty$ and $y \to +\infty$ as $x \to \infty$

10. Write a parabola that has a vertex at (-4,4) and is vertically stretched by a factor of -2 in standard form.

(h k) a unpack

$y = a(x-h)^2 + k$

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

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

unpack for standard form

$-2(x+4)(x+4) + 4$

$-2(x^2 + 8x + 16) + 4$

$-2x^2 - 16x - 32 + 4$

$\boxed{-2x^2 - 16x - 28}$

11. Write a parabola that has roots at -2 and 6, is vertically shrunk by a factor of $\frac{1}{3}$, and is reflected over the x-axis in standard form.

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

$-\frac{1}{3}(x^2 - 4x - 12)$

$\boxed{y = -\frac{1}{3}x^2 + \frac{4}{3}x + 4}$

Intercept Form

12. The path of a placekicked football can be modeled by the function $y = -.026x(x-46)$ where x is the horizontal distance (in yards) and y is the corresponding height (in yards).

$.026x = 0$, $x = 0$ $\quad$ $x - 46 = 0$, $x = 46$

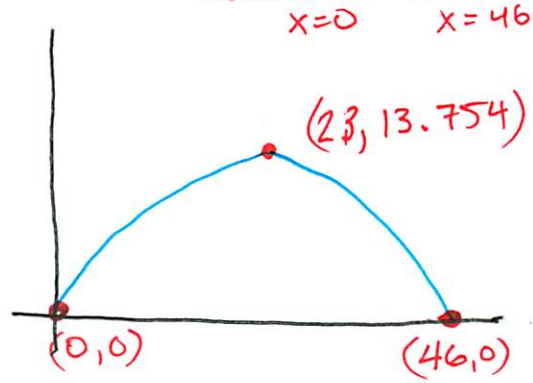
Zero a. How far is the football kicked?

$\boxed{46 \text{ yards}}$

Vertex b. How high is the football kicked?

$x = \frac{0+46}{2} = 23$ $\quad$ $y = -0.26(23)(23-46)$

$= \boxed{13.754}$



c. What is the height of the ball after it has traveled 40 yards?

~~Vertex~~ Plug in 40

$y = -0.026(40)(40-46)$

$= 6.24$ yards

Standard Form $x = -b/2a = \frac{-(-6)}{2(-1)} = \frac{6}{-2} = -3$ $y = -(-3)^2 - 6(-3) - 7$
$y = 2$

13. For the function $y = -x^2 - 6x - 7$, find the vertex and the axis of symmetry.

a. Vertex (3, 2); axis of symmetry x = 3
b. Vertex (-3, 2); axis of symmetry x = 4
c. Vertex (-3, 2); axis of symmetry x = -3
d. Vertex (3, -2); axis of symmetry x = -4

y part of the vertex A B C $x = -b/2a = \frac{-(-8)}{2(2)} = \frac{8}{4} = 2$

14. What is the minimum or maximum value of the function $y = 2x^2 - 8x + 5$?

a. y = -3 b. x = -2 c. y = 2 d. x = 2 e. y = 29 $y = 2(2)^2 - 8(2) + 5 = -3$

(h, k) change keep

15. What is the vertex of the graph of the function $y = 2(x-4)^2 + 6$?

(4, 6)

a. (-6, 4) b. (-4, -6) c. (-4, 6) d. (4, 6) e. (6, 4)

x part of vertex

16. What is the axis of symmetry of the graph of the function $y = 7(x+1)(x-3)$? $x = \frac{-1+3}{2} = \frac{2}{2} = 1$

a. x = -1 b. x = 1 c. y = 1 d. x = 2 e. y = 2

SOLVE

17. What are the roots of the equation $y = x^2 - 5x - 24$?

-24
-8 3
-5

$(x-8)(x+3) = 0$
$x - 8 = 0$ $x + 3 = 0$
$x = 8$ $x = -3$

a. -3, 8 b. 3, -8 c. -5, -24 d. 5, 24 e. -6, 4

18. If the graph of $y = ax^2 + bx + c$ opens down, which of the following must be true?

means a is negative

a. $a < 0$ b. $a > 0$ c. $c < 0$ d. $c > 0$

19. What is the effect on the graph of the function $y = 3x^2 + 4$ when it is changed to $y = -3x^2 + 4$?

a change

a. The graph stretches vertically
b. The graph compresses vertically
c. The graph opens up
d. The graph opens down
e. The vertex moves down the y-axis

20. Which function does not have a maximum value? Because it is going up

a. $y = -x^2 - 5x - 6$
b. $y = -x^2 - x - 6$
c. $y = 3x^2 - 15x + 2$ a is positive so goes up
d. $y = 49 - x^2$

Change Keep

21. What is the vertex of $y = -3(x-2)^2 - 4$?

(2, -4)

a. (-2, -4) b. (-2, 4) c. (2, -4) d. (2, 4)

22. What are the x-intercepts of $y = -2(x-7)(x+2)$?

Zeros Change change

a. -7 and 2 b. 7 and -2 c. 14 and 4 d. 14 and -2

7, -2