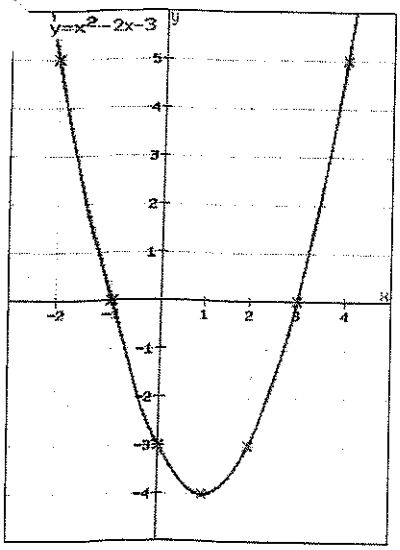
GSE Algebra I

Name: _____

Practice on Characteristics of Quadratics

Date: _____ Block: _____



Vertex: (1, -4) **Axis of Symmetry:** x = 1

Extrema: min **Max/Min Value:** y = -4

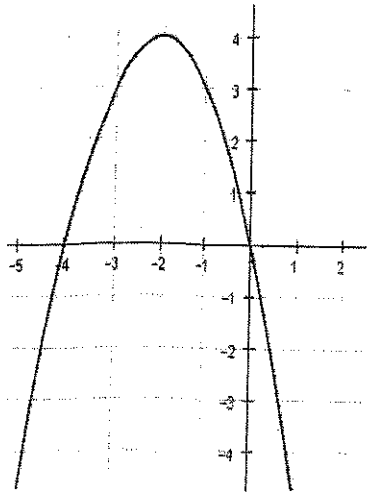
Domain: ℝ **Range:** y ≥ -4

a > 0 **Y-Intercept:** (0, -3)

X-Intercepts: (-1, 0) (3, 0) **Zeros:** x = -1, 3

End Behavior: As x → -∞, y → +∞

As x → ∞, y → +∞



Vertex: (-2, 4) **Axis of Symmetry:** x = -2

Extrema: max **Max/Min Value:** y = 4

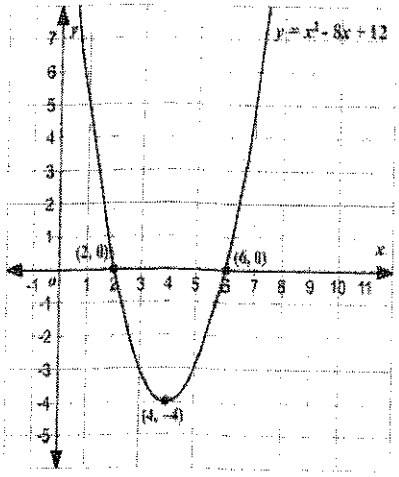
Domain: ℝ **Range:** y ≤ 4

a < 0 **Y-Intercept:** (0, 0)

X-Intercepts: (-4, 0) (0, 0) **Zeros:** x = -4, 0

End Behavior: As x → -∞, y → -∞

As x → ∞, y → -∞



Vertex: (4, -4) **Axis of Symmetry:** x = 4

Extrema: min **Max/Min Value:** y = -4

Domain: ℝ **Range:** y ≥ -4

a > 0 **Y-Intercept:** (0, 12)

X-Intercepts: (2, 0) (6, 0) **Zeros:** x = 2, 6

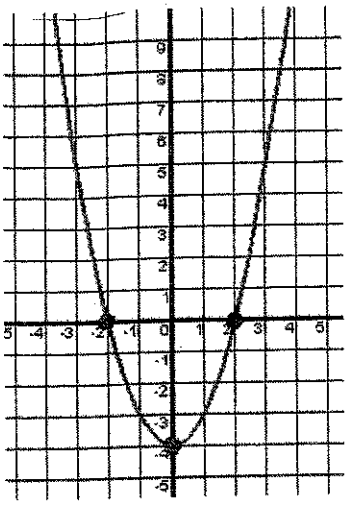
End Behavior: As x → -∞, y → ∞

As x → ∞, y → ∞

$y = (0)^2 - 8(0) + 12$

$= 0 - 0 + 12$

$= 12$



Vertex: (0,-4) Axis of Symmetry: $x=0$

Extrema: min Max/Min Value: $y=-4$

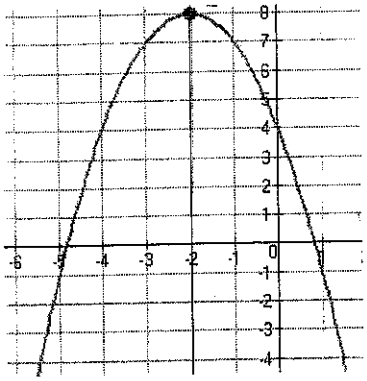
Domain: $\mathbb{R}$ Range: $y \geq -4$

a >0 Y-Intercept: (0,-4)

X-Intercepts: (-2,0)(2,0) Zeros: $x=-2,2$

End Behavior: As $x \to -\infty$, $y \to +\infty$

As $x \to \infty$, $y \to +\infty$



Vertex: (-2,8) Axis of Symmetry: $x=-2$

Extrema: max Max/Min Value: $y=8$

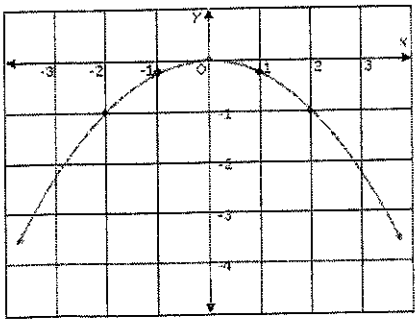
Domain: $\mathbb{R}$ Range: $y \leq 8$

a <0 Y-Intercept: (0,4)

X-Intercepts: (-4.8,0) (.8,0) Zeros: $x=.8,-4.8$

End Behavior: As $x \to -\infty$, $y \to -\infty$

As $x \to \infty$, $y \to -\infty$



Vertex: (0,0) Axis of Symmetry: $x=0$

Extrema: max Max/Min Value: $y=0$

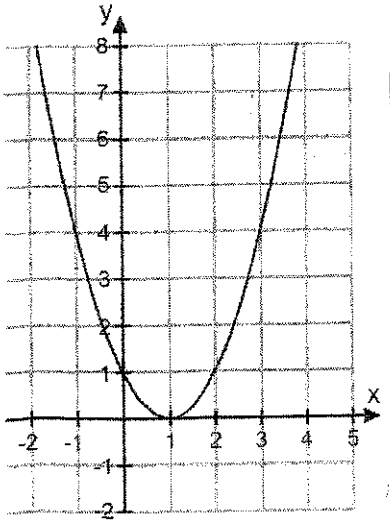
Domain: $\mathbb{R}$ Range: $y \leq 0$

a <0 Y-Intercept: (0,0)

X-Intercepts: (0,0) Zeros: $x=0$

End Behavior: As $x \to -\infty$, $y \to -\infty$

As $x \to \infty$, $y \to -\infty$



Vertex: (1,0) Axis of Symmetry: $x=1$

Extrema: min Max/Min Value: $y=0$

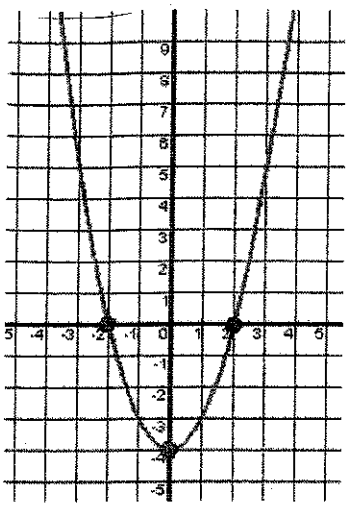
Domain: $\mathbb{R}$ Range: $y \geq 0$

a >0 Y-Intercept: (0,1)

X-Intercepts: (1,0) Zeros: $x=1$

End Behavior: As $x \to -\infty$, $y \to \infty$

As $x \to \infty$, $y \to \infty$



Vertex: (0, −4) Axis of Symmetry: $x = 0$

Extrema: min Max/Min Value: $y = -4$

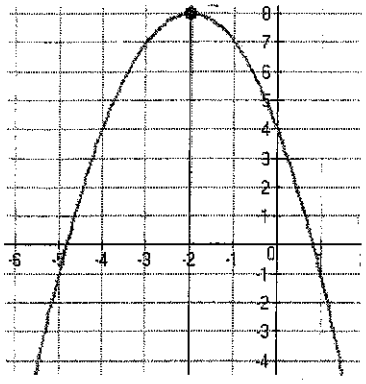
Domain: $\mathbb{R}$ Range: $y \geq -4$

a > 0 Y-Intercept: (0, −4)

X-Intercepts: (−2, 0) (2, 0) Zeros: $x = -2, 2$

End Behavior: As x → −∞, y → $+\infty$

As x → ∞, y → $+\infty$



Vertex: (−2, 8) Axis of Symmetry: $x = -2$

Extrema: max Max/Min Value: $y = 8$

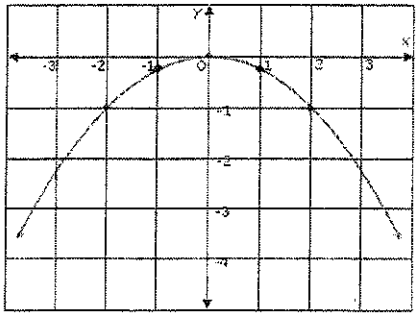
Domain: $\mathbb{R}$ Range: $y \leq 8$

a < 0 (1.8, 0) Y-Intercept: (0, 4)

X-Intercepts: (−4.8, 0) Zeros: $x = .8, -4.8$

End Behavior: As x → −∞, y → $-\infty$

As x → ∞, y → $-\infty$



Vertex: (0, 0) Axis of Symmetry: $x = 0$

Extrema: max Max/Min Value: $y = 0$

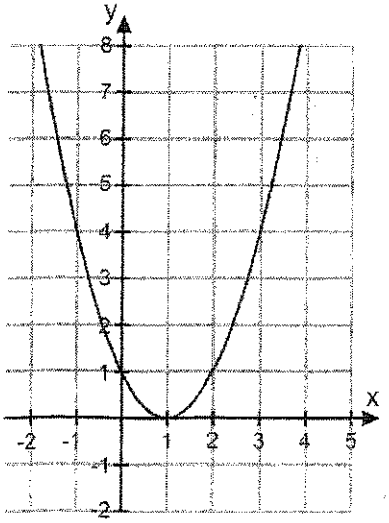
Domain: $\mathbb{R}$ Range: $y \leq 0$

a < 0 Y-Intercept: (0, 0)

X-Intercepts: (0, 0) Zeros: $x = 0$

End Behavior: As x → −∞, y → $-\infty$

As x → ∞, y → $-\infty$



Vertex: (1, 0) Axis of Symmetry: $x = 1$

Extrema: min Max/Min Value: $y = 0$

Domain: $\mathbb{R}$ Range: $y \geq 0$

a > 0 Y-Intercept: (0, 1)

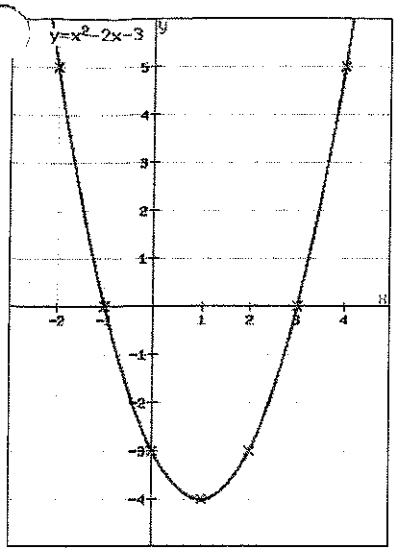
X-Intercepts: (1, 0) Zeros: $x = 1$

End Behavior: As x → −∞, y → ∞

As x → ∞, y → ∞

GSE Algebra I Name: _____

Practice on Characteristics of Quadratics Date:_____ Block:_____



Vertex: (1, −4) **Axis of Symmetry:** x = 1

Extrema: min **Max/Min Value:** y = −4

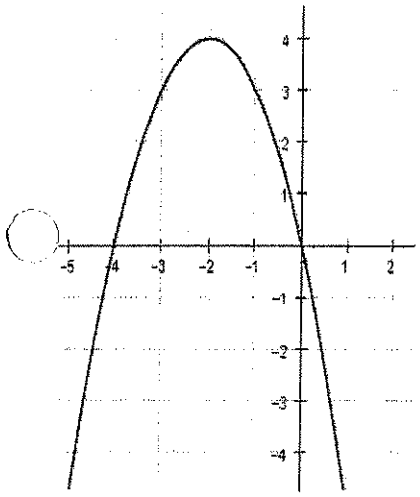
Domain: ℝ **Range:** y ≥ −4

a > 0 **Y-Intercept:** (0, −3)

X-Intercepts: (−1, 0) (3, 0) **Zeros:** x = −1, 3

End Behavior: As x → −∞, y → +∞

As x → ∞, y → +∞



Vertex: (−2, 4) **Axis of Symmetry:** x = −2

Extrema: max **Max/Min Value:** y = 4

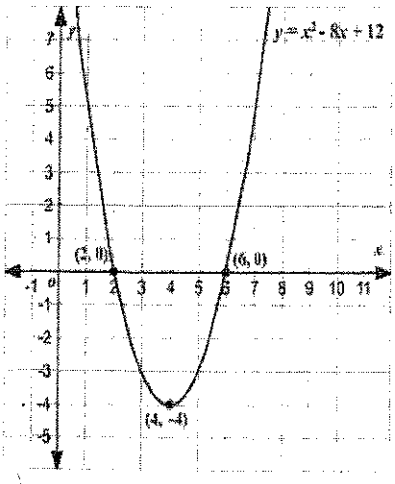
Domain: ℝ **Range:** y ≤ 4

a < 0 **Y-Intercept:** (0, 0)

X-Intercepts: (−4, 0) (0, 0) **Zeros:** x = −4, 0

End Behavior: As x → −∞, y → −∞

As x → ∞, y → −∞



Vertex: (4, −4) **Axis of Symmetry:** x = 4

Extrema: min **Max/Min Value:** y = −4

Domain: ℝ **Range:** y ≥ −4

a > 0 **Y-Intercept:** (0, 12)

X-Intercepts: (2, 0) (6, 0) **Zeros:** x = 2, 6

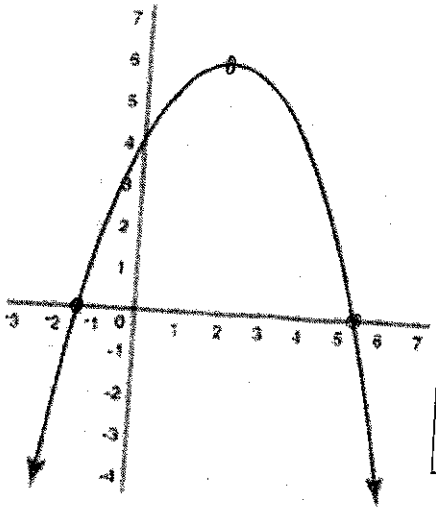
End Behavior: As x → −∞, y → ∞

As x → ∞, y → ∞

$y = (0)^2 - 8(0) + 12$

$= 0 - 0 + 12$

$= 12$



Vertex: (2, 6) Axis of Symmetry: $x = 2$

Extrema: max Max/Min Value: $y = 6$

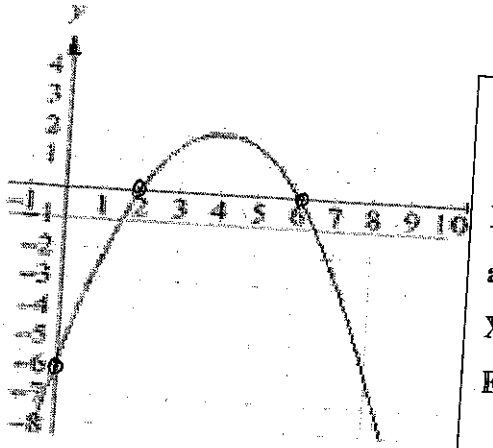
Domain: $\mathbb{R}$ Range: $y \leq 6$

a < 0 (5.4, 0) Y-Intercept: (0, 6)

X-Intercepts: (−1.4, 0) Zeros: $x = -1.4, 5.4$

End Behavior: As $x \to -\infty$, $y \to -\infty$

As $x \to \infty$, $y \to -\infty$



Vertex: (4, 2) Axis of Symmetry: $x = 4$

Extrema: max Max/Min Value: $y = 2$

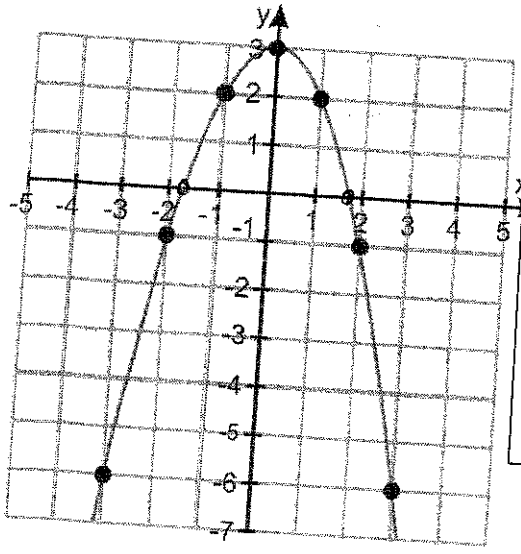
Domain: $\mathbb{R}$ Range: $y \leq 2$

a < 0 Y-Intercept: (0, −6)

X-Intercepts: (2, 0) (6, 0) Zeros: $x = 2, 6$

End Behavior: As $x \to -\infty$, $y \to -\infty$

As $x \to \infty$, $y \to -\infty$



Vertex: (0, 3) Axis of Symmetry: $x = 0$

Extrema: max Max/Min Value: $y = 3$

Domain: $\mathbb{R}$ Range: $y \leq 3$

a < 0 (−1.8, 0) Y-Intercept: (0, 3)

X-Intercepts: (1.8, 0) Zeros: $x = \pm 1.8$

End Behavior: As $x \to -\infty$, $y \to -\infty$

As $x \to \infty$, $y \to -\infty$

Name: _____

HW Characteristics of Quadratics

1. Are the following quadratic equations in standard, factored, or vertex form?

a) $y = 19x^2 + 4x + 1$ Standard

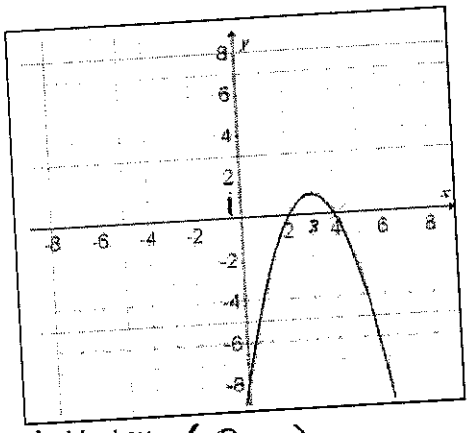
b) $y = 4(x-2)^2 + 1$ Vertex

c) $y = (x-3)(x+8)$ factored

d) $y = x^2 + 5x - 92$ standard

2. For the following parabolas, state the key features:

a)



a) Vertex (3, 1)

b) Min/max value max @ y = 1

c) Axis of symmetry x = 3

d) Zeros x = 2, 4

e) Direction of opening down

f) y-intercept (0, -8)

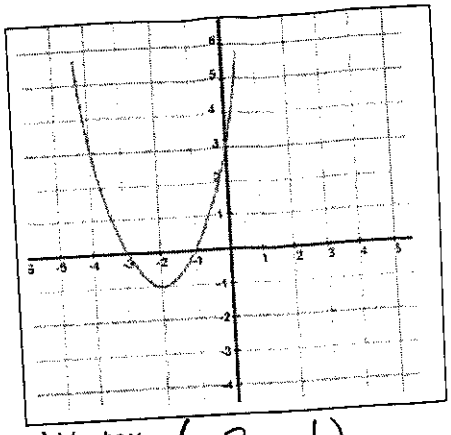
g) Domain ℝ

h) Range $y \leq 1$

i) End Behavior

$x \to -\infty$ $y \to -\infty$

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



a) Vertex (-2, -1)

b) Min/max value min y = -1

c) Axis of symmetry x = -2

d) Zeros x = -3, -1

e) Direction of opening up

f) y-intercept (0, 3)

g) Domain ℝ

h) Range $y \geq -1$

i) End Behavior

$x \to -\infty$ $y \to \infty$

$x \to +\infty$ $y \to \infty$

3. Label each equation as either: linear, quadratic or neither.

a) $y = 6x - 1$ Linear

b) $y = 3x^2 + 10x$ Quad

c) $y = 9x^2 - 4x + 100$ Quad

d) $19x - 4y + 1 = 0$ Linear

e) $y = 11x^3 + 8$ neither

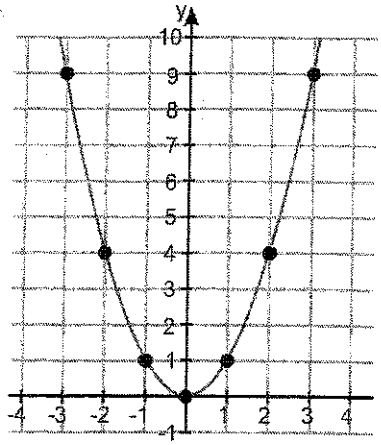
f) $y = 4x^5 + 6x$ neither

GSE Algebra I

Name: _____

HW2 on Characteristics of Quadratics

Date: _____ Block: _____



Vertex: (0,0) **Axis of Symmetry:** $x=0$

Extrema: min **Max/Min Value:** $y=0$

Domain: $\mathbb{R}$ **Range:** $y \geq 0$

a >0 **Y-Intercept:** (0,0)

X-Intercepts: (0,0) **Zeros:** $x=0$

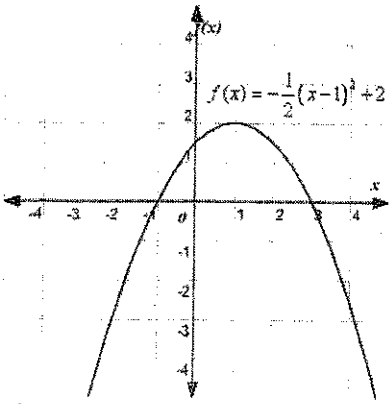
Int. of Increase: $0 < x < \infty$

Int. of Decrease: $-\infty < x < 0$

End Behavior: As x → -∞, y → $+\infty$

As x → ∞, y → $+\infty$

$-\infty$ dec 0 inc ∞



Vertex: (1,2) **Axis of Symmetry:** $x=1$

Extrema: max **Max/Min Value:** $y=2$

Domain: $\mathbb{R}$ **Range:** $y \leq 2$

a <0 **Y-Intercept:** (0,1.5)

X-Intercepts: (-1,0) (3,0) **Zeros:** $x=-1, 3$

Int. of Increase: $-\infty < x < 1$

Int. of Decrease: $1 < x < \infty$

End Behavior: As x → -∞, y → $-\infty$

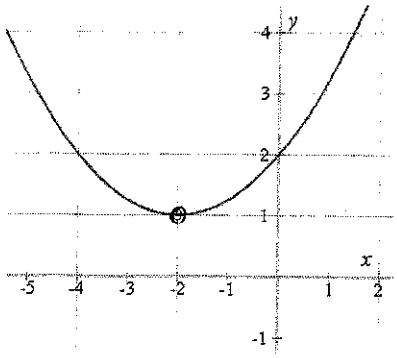
As x → ∞, y → $-\infty$

$f(0) = -\frac{1}{2}(0-1)^2+2$

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

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

$-\infty$ inc 1 dec ∞



Vertex: (-2, 1) **Axis of Symmetry:** $x=-2$

Extrema: min **Max/Min Value:** $y=1$

Domain: $\mathbb{R}$ **Range:** $y \geq 1$

a >1 **Y-Intercept:** (0, 2)

X-Intercepts: none **Zeros:** none

Int. of Increase: $-2 < x < \infty$

Int. of Decrease: $-\infty < x < -2$

End Behavior: As x → -∞, y → $+\infty$

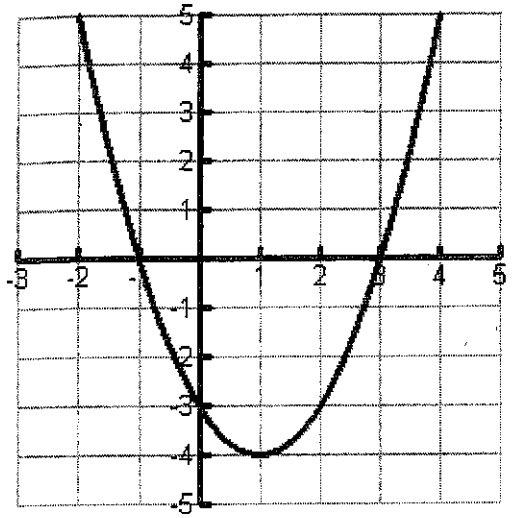
As x → ∞, y → $+\infty$

$-\infty$ dec -2 inc ∞

GSE Algebra I
Classwork: Characteristics of Quadratics

Name: _____
Date: _____ Period: _____

1.)



a.) Vertex: (1, -4)

b.) Axis of Symmetry: $x = 1$

c.) y-intercept: (0, -3) zeros: $x = -1, 3$

d.) Domain: $\mathbb{R}$ e.) Range: $y \geq -4$

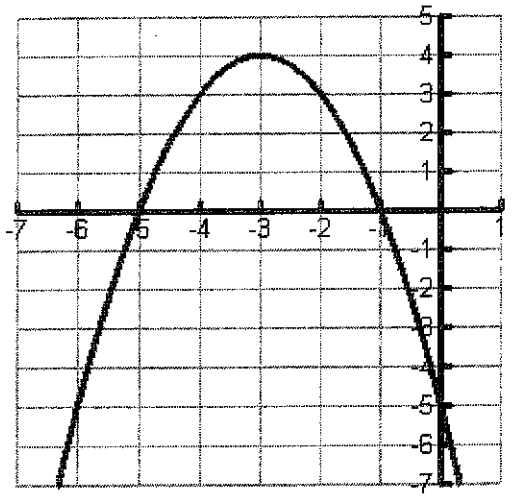
f.) a is: negative/positive

g.) Extrema: min Value: $y = -4$

h.) Intervals of increase and decrease:
inc $1 < x \leq \infty$
dec $-\infty < x < 1$

i.) Average rate of change on: $-1 < x < 2$ (-1)
(-1, 0) (2, -3) $\frac{-3-0}{2-(-1)} = \frac{-3}{3} = -1$

2.)



a.) Vertex: (-3, 4)

b.) Axis of Symmetry: $x = -3$

c.) y-intercept: (0, -5) zeros: $x = -1, -5$

d.) Domain: $\mathbb{R}$ e.) Range: $y \leq 4$

f.) a is: negative/positive

g.) Extrema: max Value: $y = 4$

h.) Intervals of increase and decrease:
inc $-\infty < x < -3$
dec $-3 < x < \infty$

i.) Average rate of change on: $-6 < x < -1$ (1)
(-6, -5) (-1, 0) $\frac{0-(-5)}{-1-(-6)} = \frac{5}{5} = 1$

Calculate the average rate of change of the following functions on the interval: $-2 < x < 1$

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

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

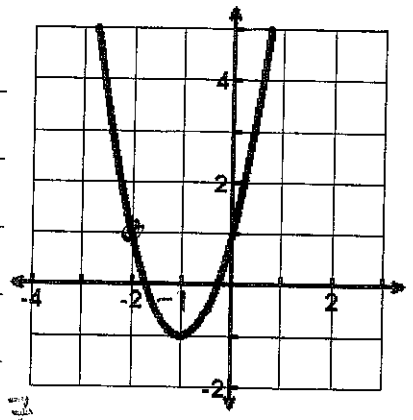
5. $y = (x+2)^2 - 4$

GSE Algebra I
Characteristics of Quadratics Practice

Name: _____
Date: _____ Period: ____

Characteristics of Functions

1. $f(x) = 2x^2 + 4x + 1$



Vertex: $(-1,-1)$ Axis of Symmetry: $x = -1$

Interval of Increase: $-1 < x < \infty$

Interval of Decrease: $-\infty < x < -1$

Extrema: min Max/Min Value: $y = -1$

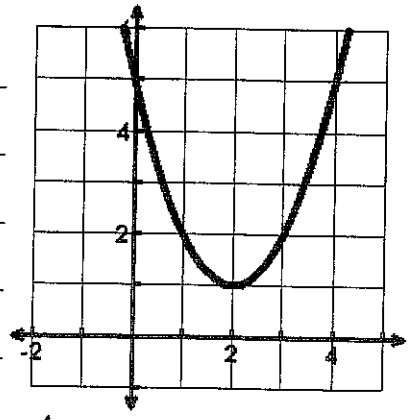
Domain: $\mathbb{R}$ Range: $y \geq -1$

Y-Intercept: $(0,1)$ Zeroes: $x = -0.3, -1.7$

Rate of change on the interval $-2 \leq x \leq -1$: $\frac{1-1}{-1-(-2)} = \frac{3}{1} = 2$ $(-2,1)$ $(-1,-1)$

$-\infty$ dec -1 inc ∞

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



Vertex: $(2,1)$ Axis of Symmetry: $x = 2$

Interval of Increase: $2 < x < \infty$

Interval of Decrease: $-\infty < x < 2$

Extrema: min Max/Min Value: $y = 1$

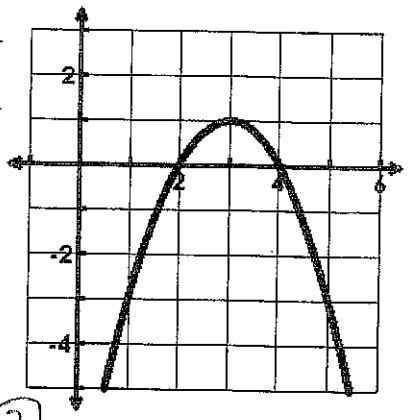
Domain: $\mathbb{R}$ Range: $y \geq 1$

Y-Intercept: $(0,5)$ Zeroes: none

Rate of change on the interval $0 \leq x \leq 2$: $\frac{1-5}{2-0} = \frac{-4}{2} = -2$ $(0,5)(2,1)$

$-\infty$ dec 2 inc ∞

3. $f(x) = -(x-2)(x-4)$



Vertex: $(3,1)$ Axis of Symmetry: $x = 3$

Interval of Increase: $-\infty < x < 3$

Interval of Decrease: $3 < x < \infty$

Extrema: max Max/Min Value: $y = 1$

Domain: $\mathbb{R}$ Range: $y \leq 1$

Y-Intercept: $(0,-8)$ Zeroes: $x = 2, 4$

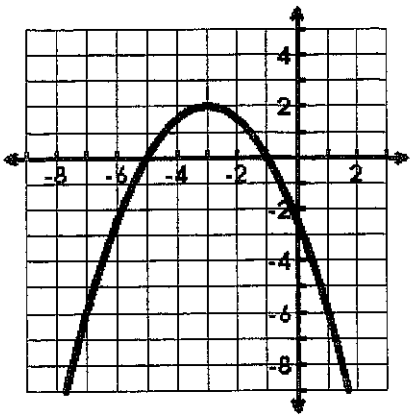
plug in 0 for x $-(0-2)(0-4)$ $-(-2)(-4) = -8$

Rate of change on the interval $1 \leq x \leq 3$: $\frac{1-(-3)}{3-1} = \frac{4}{2} = 2$ $(1,-3)(3,1)$

$-\infty$ inc 3 dec ∞

GSE Algebra I
Characteristics of Quadratics Practice

4. This graph represents a quadratic function.



Vertex: _____ Axis of Symmetry: _____

Interval of Increase: _____

Interval of Decrease: _____

Extrema: _____ Max/Min Value: _____

Domain: _____ Range: _____

Y-Intercept: _____ Zeroes: _____

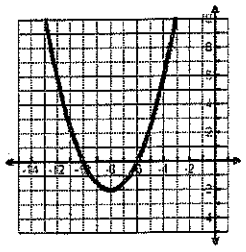
Rate of change on the interval $-3 \leq x \leq 1$: _____

5. The quadratic function $f(x)$ has these characteristics:

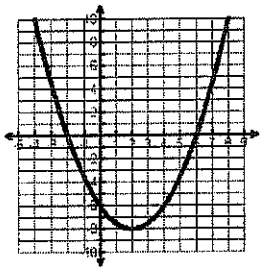
- The vertex is located at $(8, -2)$.
- The range is $y \geq -2$.

Which graph could be $f(x)$?

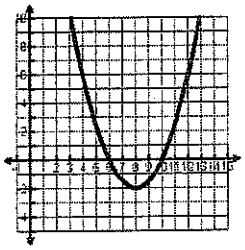
a)



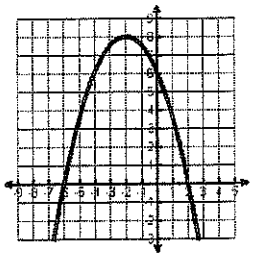
b)



c)



d)



For each of the following functions, write the function in all spaces for the transformations it has.

Reflections over x-axis

f(x) h(x)

k(x) p(x)

Stretches and Shrinks

f(x) h(x)

j(x) m(x)

n(x) p(x)

Quadratic Functions

$f(x) = -2(x - 3)^2 + 5$

$g(x) = (x + 5)^2 - 7$

$h(x) = -1/2(x + 6)^2$

$j(x) = 3x^2 - 8$

$k(x) = -(x - 9)^2$

$m(x) = 2/5(x + 8)^2 - 1$

$n(x) = 5/2(x - 2)^2$

$p(x) = -5.5(x + 3)^2 + 6$

Shifts Left and Right

f(x) g(x)

h(x) k(x)

m(x) n(x) p(x)

Shifts Up and Down

f(x) g(x)

j(x) m(x)

p(x)

Write the equation for a quadratic function with the following characteristics. REMEMBER, IT NEEDS AN X^2 OR AN $(X \pm h)^2$ TO BE A QUADRATIC.

1. Reflects over x-axis
   Shifts left 3

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

2. Stretches by 6
   Shifts up 2
   Shifts right 12

$y = 6(x-12)^2+2$

3. Reflects over the x-axis
   Compresses by 3/5
   Shifts down 8

$y = -\frac{3}{5}x^2 - 8$

4. Reflects over the x-axis
   Stretches by 5
   Shifts left 8 and down 2

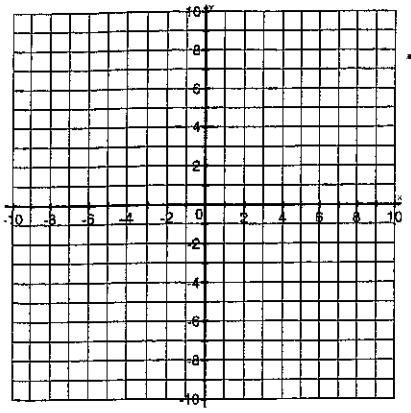
$y = -5(x+8)^2 - 2$

GSE Algebra I
Homework: Graphing in Vertex Form and Converting Practice

Name: _____
Date: _____ Period: _____

Graphing Quadratics from Vertex Form Practice

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



X	Y

Vertex: _____ Axis of Symmetry: _____

Interval of Increase: _____

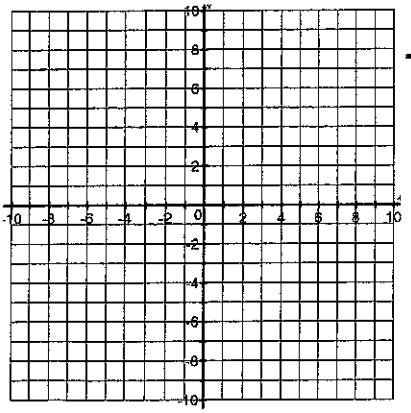
Interval of Decrease: _____

Extrema: _____ Max/Min Value: _____

Domain: _____ Range: _____

Y-Intercept: _____ Zeroes: _____

$f(x) = (x+2)^2 - 1$



X	Y

Vertex: _____ Axis of Symmetry: _____

Interval of Increase: _____

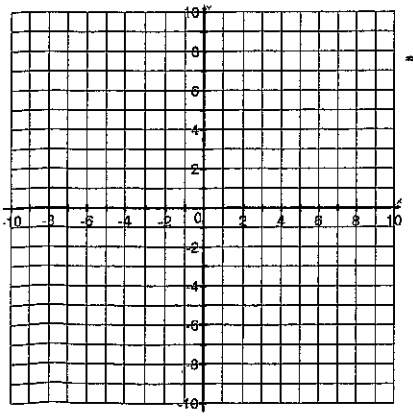
Interval of Decrease: _____

Extrema: _____ Max/Min Value: _____

Domain: _____ Range: _____

Y-Intercept: _____ Zeroes: _____

$f(x) = -2(x+5)^2 - 3$



X	Y

Vertex: _____ Axis of Symmetry: _____

Interval of Increase: _____

Interval of Decrease: _____

Extrema: _____ Max/Min Value: _____

Domain: _____ Range: _____

Y-Intercept: _____ Zeroes: _____