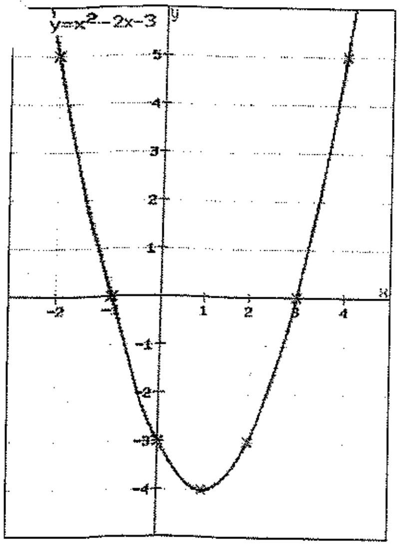
GSE Algebra I

Practice on Characteristics of Quadratics

Name: ____________

Date: ________ Block: ________



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

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

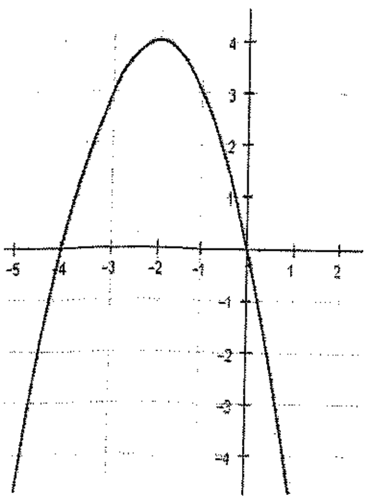
Domain: $\mathbb{R}$ Range: $y \geq -4$

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

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

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

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



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

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

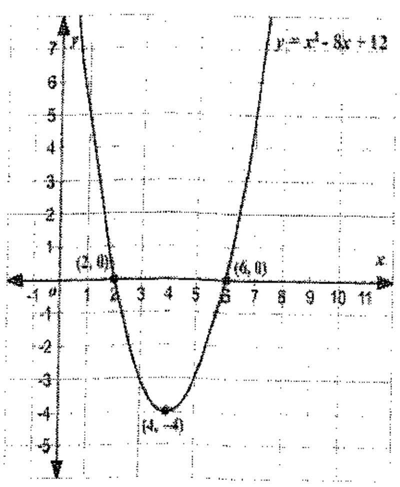
Domain: $\mathbb{R}$ Range: $y \leq 4$

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

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

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

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



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

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

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

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

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

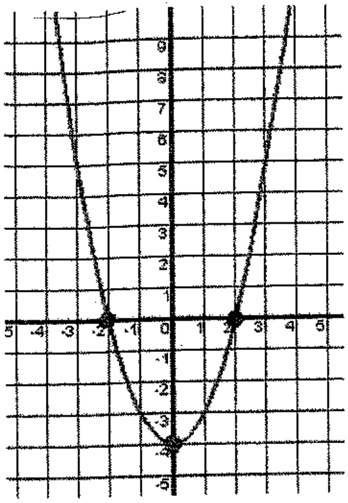
End Behavior: As $x \to -\infty$, $y \to \infty$

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

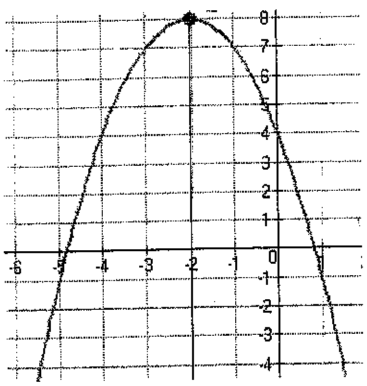
$y = (0)^2 - 8(0) + 12$

$= 0 - 0 + 12$

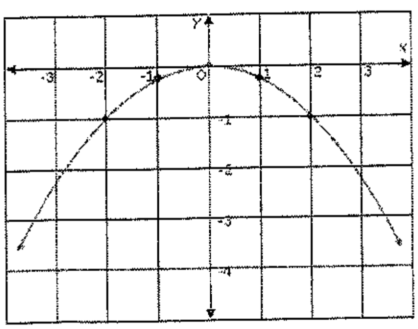
$= 12$



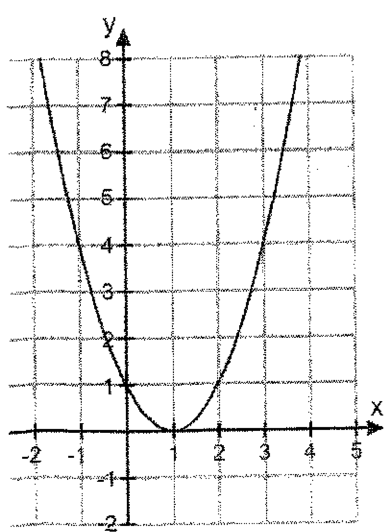
Vertex: (0,-4) **Axis of Symmetry:** x=0
Extrema: min **Max/Min Value:** y = -4
Domain: $\mathbb{R}$ **Range:** $y \geq -4$
a >0 **Y-Intercept:** (0,-4)
X-Intercepts: (-2,0)(2,0) **Zeros:** x = -2,2
End Behavior: As x → -∞, y → +∞
As x → ∞, y → +∞



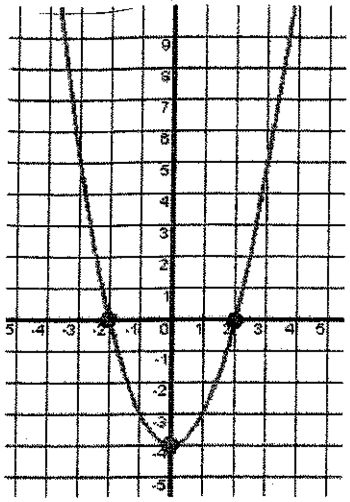
Vertex: (-2,8) **Axis of Symmetry:** x = -2
Extrema: max **Max/Min Value:** y = 8
Domain: $\mathbb{R}$ **Range:** $y \leq 8$
a <0 **Y-Intercept:** (0,4)
X-Intercepts: (.8,0) (-4.8,0) **Zeros:** x = .8, -4.8
End Behavior: As x → -∞, y → -∞
As x → ∞, y → -∞



Vertex: (0,0) **Axis of Symmetry:** x=0
Extrema: max **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
End Behavior: As x → -∞, y → -∞
As x → ∞, y → -∞



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 → ∞



Vertex: (0,-4) **Axis of Symmetry:** X=0

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

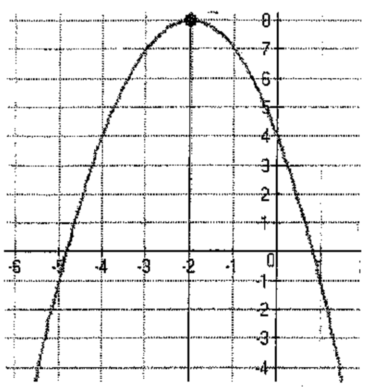
Domain: ℝ **Range:** y ≥ -4

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

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

End Behavior: As x → -∞, y → +∞

As x → ∞, y → +∞



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

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

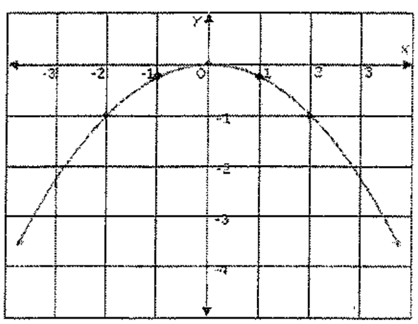
Domain: ℝ **Range:** y ≤ 8

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

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

End Behavior: As x → -∞, y → -∞

As x → ∞, y → -∞



Vertex: (0,0) **Axis of Symmetry:** X=0

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

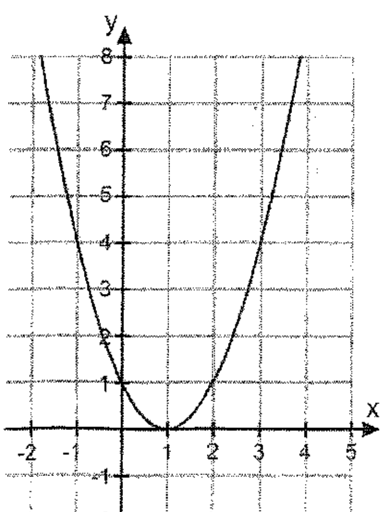
Domain: ℝ **Range:** y ≥ 0

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

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

End Behavior: As x → -∞, y → -∞

As x → ∞, y → -∞



Vertex: (1,0) **Axis of Symmetry:** X = 1

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

Domain: ℝ **Range:** y ≥ 0

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

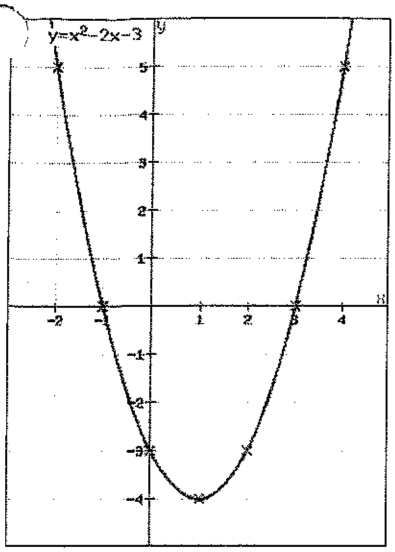
X-Intercepts: (1,0) **Zeros:** X = 1

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

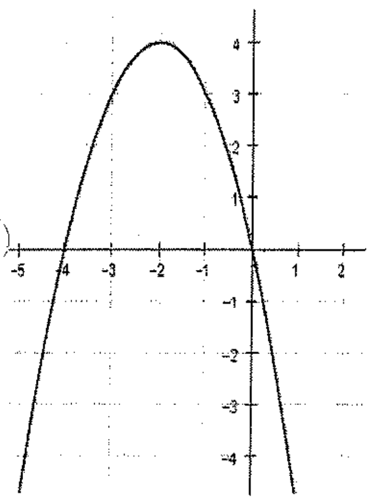
Domain: ℝ Range: y ≥ -4

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

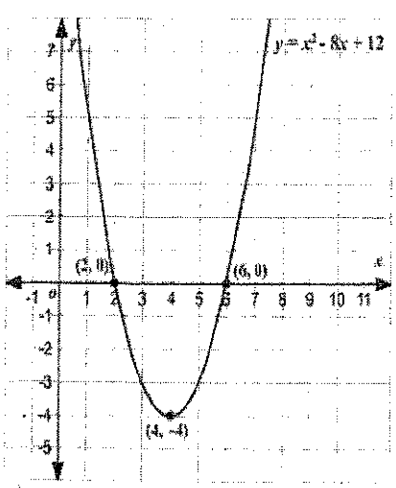
Domain: ℝ Range: y ≤ 4

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

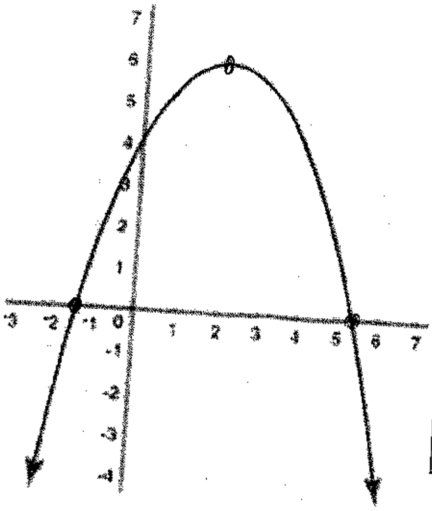
a > 0 Y-Intercept: (0, 12)

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: $y = 6$

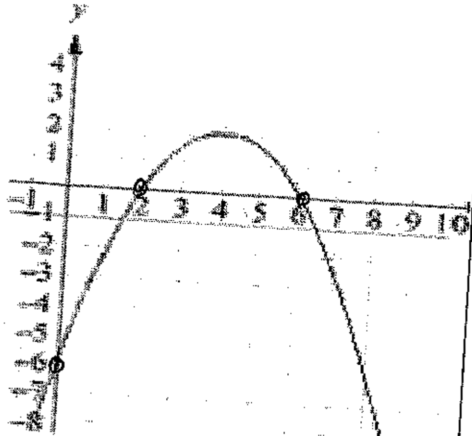
Domain: $\mathbb{R}$ Range: $y \leq 6$

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

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

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

As x → ∞, y → $-\infty$



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

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

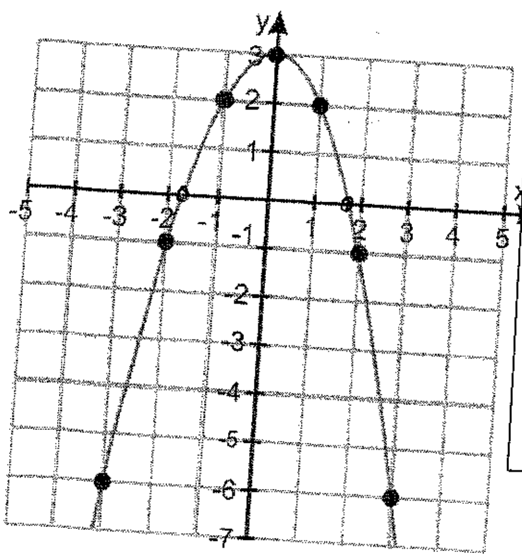
Domain: $\mathbb{R}$ Range: $y \leq 2$

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

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

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

As x → ∞, y → $-\infty$



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

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

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

a < 0 Y-Intercept: (0,3)

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

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

As x → ∞, y → $-\infty$

Name: ____________

HW Characteristics of Quadratics

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

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

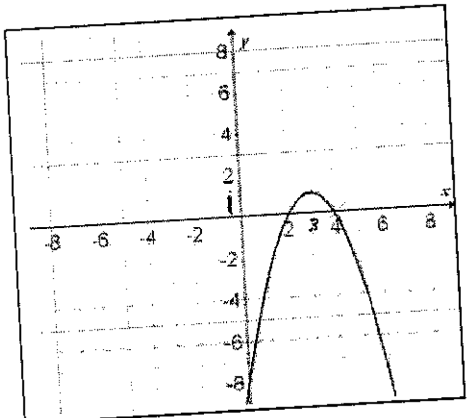
b) $y = 4(x-2)^2 + 1$ Vertex

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)

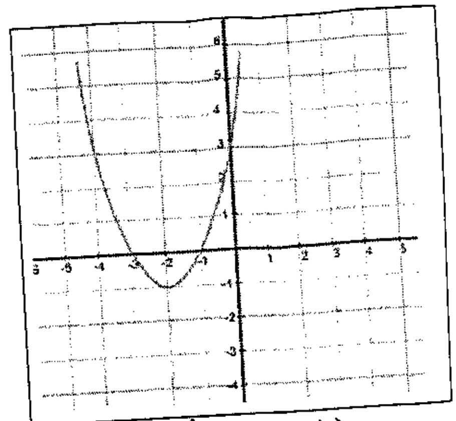
g) Domain $\mathbb{R}$

h) Range $y \leq 1$

i) End Behavior

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

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



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 $\mathbb{R}$

h) Range $y \geq -1$

i) End Behavior

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

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

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

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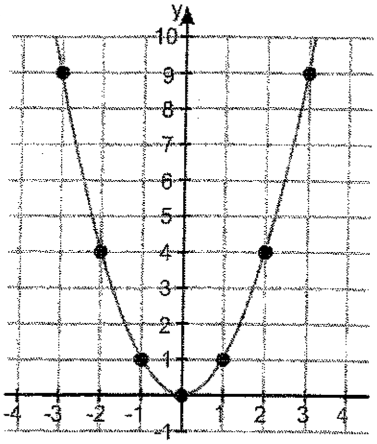
Name: ____________________

HW2 on Characteristics of Quadratics

Date:________ Block:______



-∞ dec 0 inc ∞

Vertex: (0,0)

Extrema: min

Domain: ℝ

a >0

X-Intercepts: (0,0)

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

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

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

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

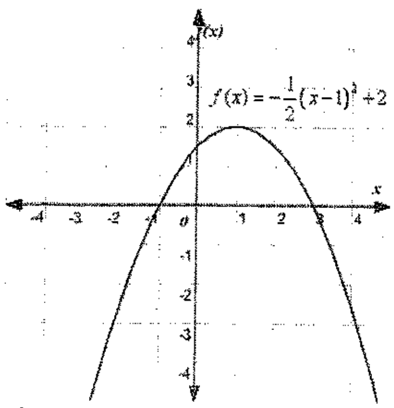
Axis of Symmetry: $x=0$

Max/Min Value: $y=0$

Range: $y \geq 0$

Y-Intercept: (0,0)

Zeros: $x=0$



-∞ inc 1 dec ∞

Vertex: (1,2)

Extrema: max

Domain: ℝ

a <0

X-Intercepts: (-1,0) (3,0)

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

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

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

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

Axis of Symmetry: $x=1$

Max/Min Value: $y=2$

Range: $y \leq 2$

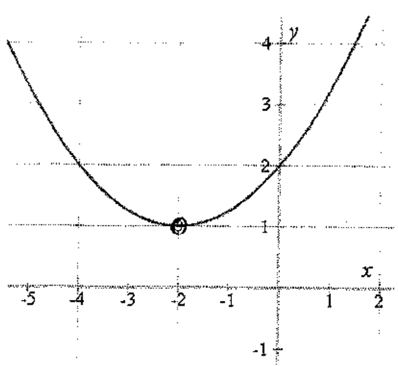
Y-Intercept: (0,1.5)

Zeros: $x=-1,3$

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

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

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



-∞ dec -2 inc ∞

Vertex: (-2, 1)

Extrema: min

Domain: ℝ

a >1

X-Intercepts: none

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

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

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

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

Axis of Symmetry: $x=-2$

Max/Min Value: $y=1$

Range: $y \geq 1$

Y-Intercept: (0,2)

Zeros: none

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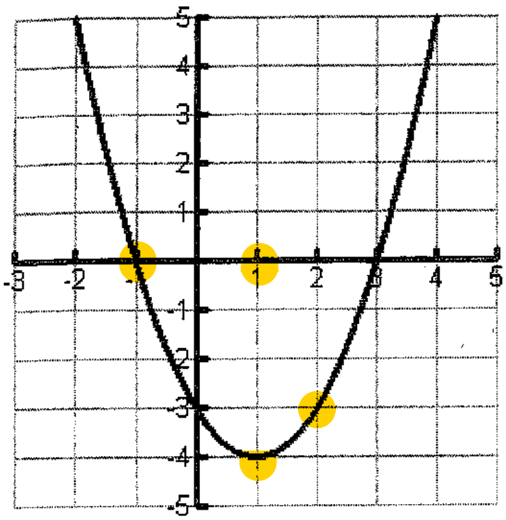
GSE Algebra I
Classwork: Characteristics of Quadratics

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: ℝ e.) Range: y ≥ -4

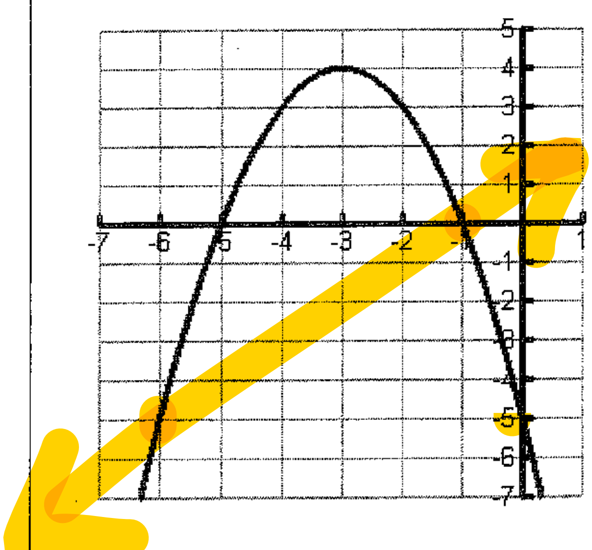
f.) a is: negative/positive

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

h.) Intervals of increase and decrease:
inc $1 < x < \infty$
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: ℝ e.) Range: y ≤ 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. $y = \frac{1}{3}(x+5)^2 + 1$

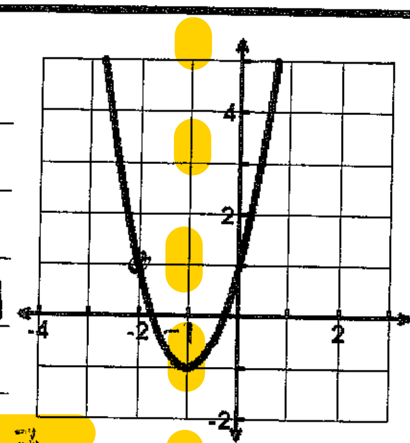
5. $y = (x+2)^2 - 4$

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: ℝ Range: $y \geq -1$

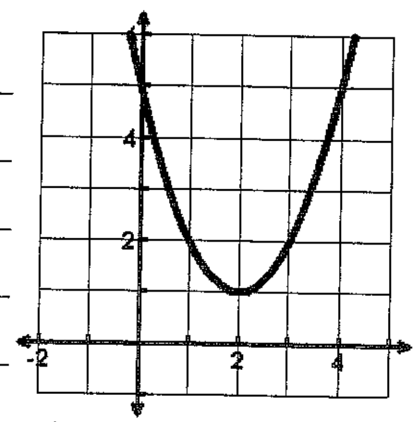
Y-Intercept: (0, 1) Zeroes: x = -0.3, -1.7

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

(-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: ℝ Range: $y \geq 1$

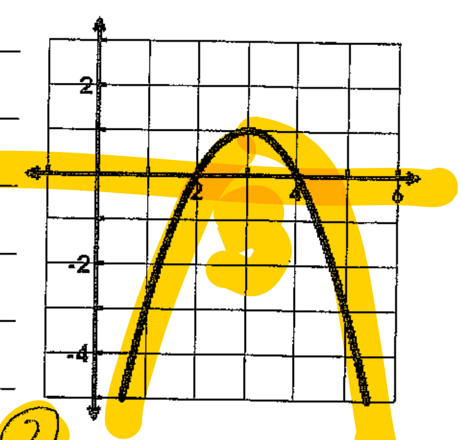
Y-Intercept: (0, 5) Zeroes: none

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: ℝ Range: $y \leq 1$

plug 0 in for x Y-Intercept: (0, -8) Zeroes: x = 2, 4

$-(0-2)(0-4)$ $-(-2)(-4) = -8$

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 ∞

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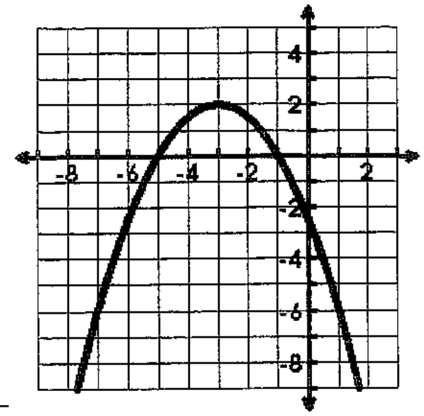
4. This graph represents a quadratic function.



Vertex: ____________ Axis of Symmetry: ______________

Interval of Increase: ______________________________

Interval of Decrease: ______________________________

Extrema: ______________ Max/Min Value: __________

Domain: _______________ Range: _______________

Y-Intercept: ____________ Zeroes: _______________

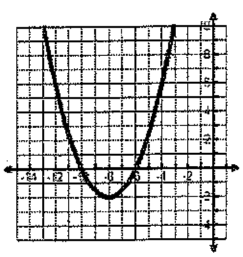
Rate of change on the interval $-3 \leq x \leq 1$: ______________

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

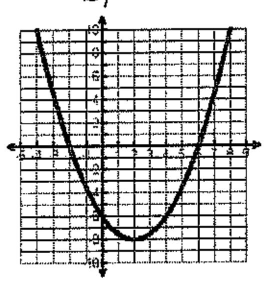
- The vertex is located at $(8, -2)$.
- The range is $y \geq -2$.

Which graph could be $f(x)$?

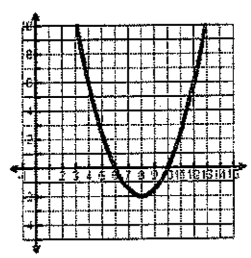
a)



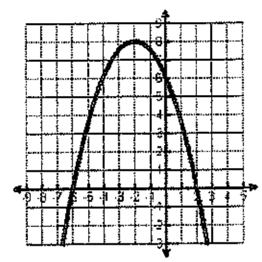
b)



c)



d)



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

Reflections over x-axis	Stretches and Shrinks
f(x) h(x) k(x) p(x)	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	Shifts Up and Down
f(x) g(x) h(x) k(x) m(x) n(x) p(x)	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

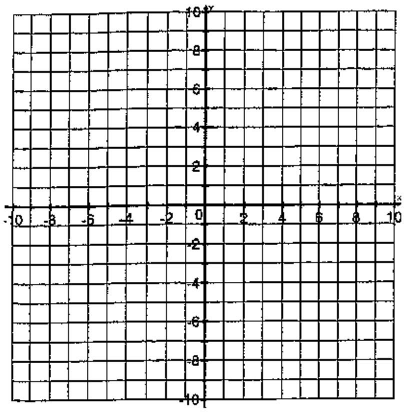
   $y = -5(x+8)^2-2$

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: ______________________

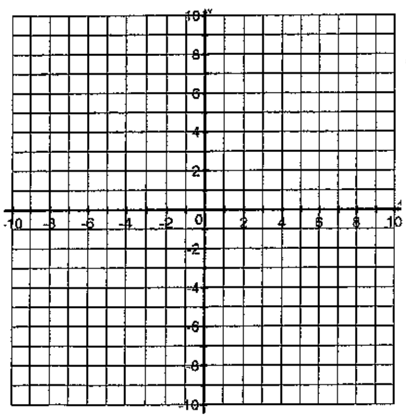
Interval of Decrease: ______________________

Extrema: ____________ Max/Min Value: ____________

Domain: ____________ Range: ____________

Y-Intercept: ____________ Zeroes: ____________

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



X	Y

Vertex: ____________ Axis of Symmetry: ____________

Interval of Increase: ______________________

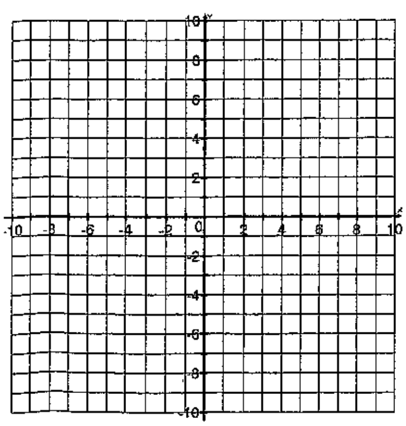
Interval of Decrease: ______________________

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: ____________