

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

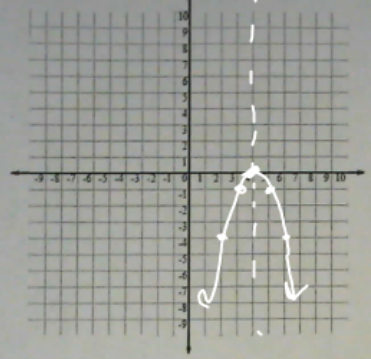
$$x = 4$$

x	y
4	0

Name: _____
Date: _____

Graphing Quadratics

1) Graph the following quadratic equation
 $f(x) = -x^2 + 8x - 16$



3) What is the axis of symmetry of the following

$$f(x) = 3x^2 - 18x + 6$$

$$\frac{-b}{2a} = \frac{-(-18)}{2(3)} = \frac{18}{6} = 3$$

$x = 3$

4) What is the vertex of the following

$$f(x) = -4x^2 + 16x - 5$$

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

$x = 2$

$$-4(2)^2 + 16(2) - 5 = -16 + 32 - 5 = 11$$

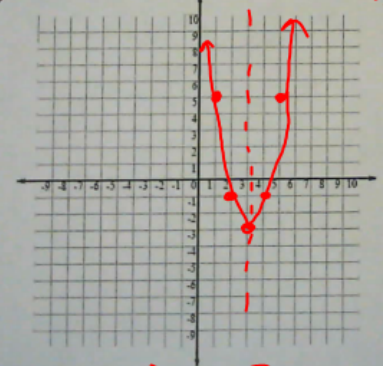
$(2, 11)$

5) What is the vertex of the following

$$f(x) = 0.4(x - 1)^2 + 31$$

$(1, 31)$

2) Graph the following quadratic equation
 $f(x) = 2(x - 3)^2 - 3$



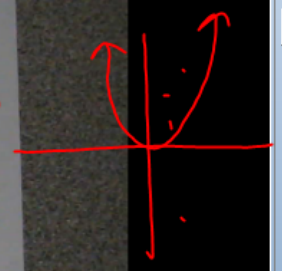
6) Describe the transformations of the following equation from the parent function $f(x) = x^2$

$$f(x) = -4(x + 11)^2 - 3$$

LEFT 11
DOWN 3
REFLECTION OVER X-AXIS
SHRINK BY A FACTOR OF 4

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

$$2(1-3)^2 - 3 = 5$$



c. $f(x) = \frac{2}{3}(x-2)^2$

(2,0)

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

(0,-4)

2) Match the graph with the equation

$f(x) = (x-3)^2 + 1$ A

$f(x) = (x+3)^2 + 1$ D

$f(x) = (x-3)^2 - 1$ H

$f(x) = (x+3)^2 - 1$ C

$f(x) = -(x-3)^2 + 1$ F

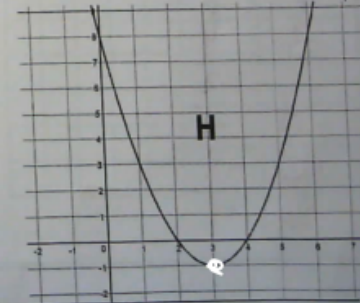
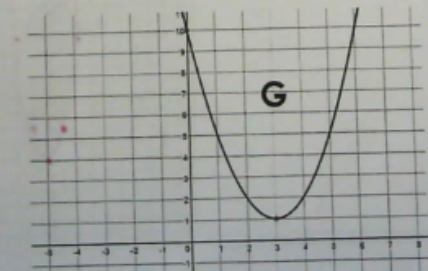
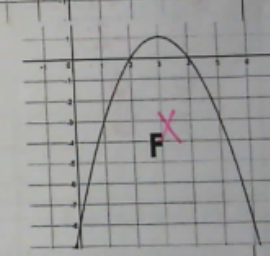
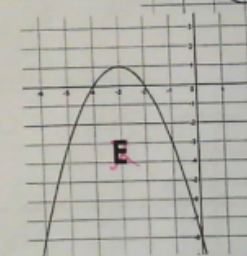
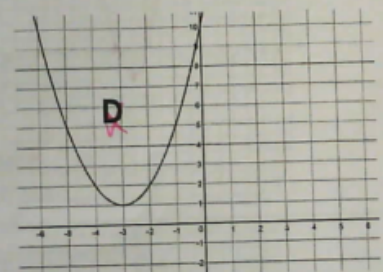
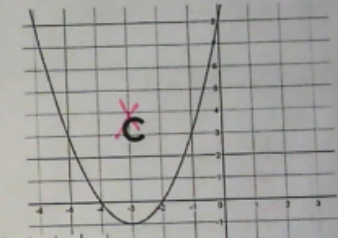
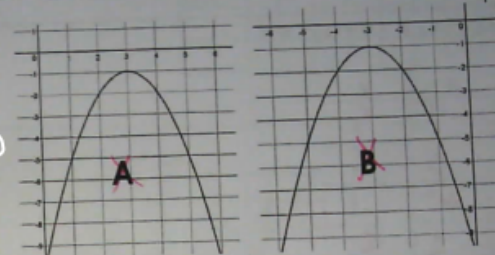
$f(x) = -(x+3)^2 + 1$ E

$f(x) = -(x-3)^2 - 1$ A

$f(x) = -(x+3)^2 - 1$ B

(3, -1)

(3, -1)



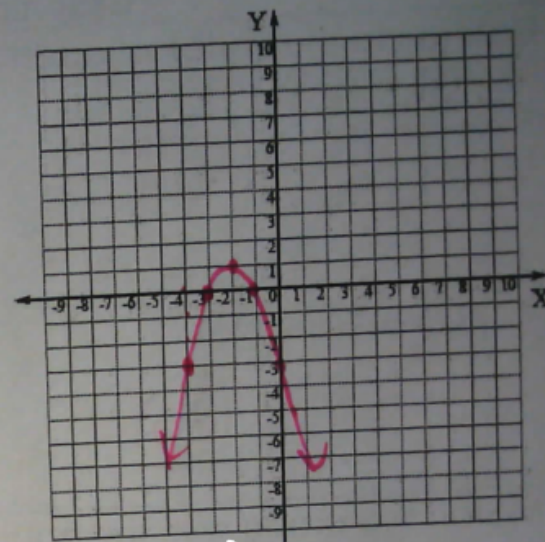
SHOW



3) Graph each of the following quadratic functions

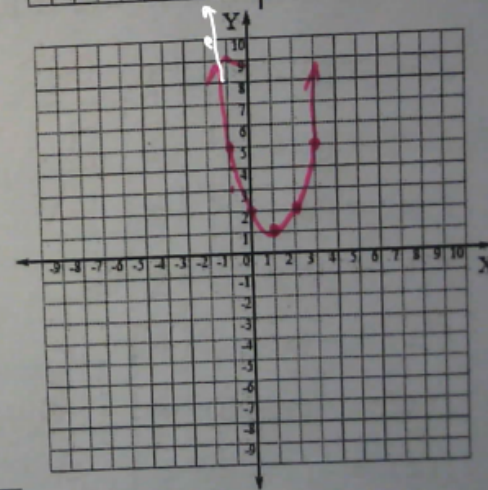
a. $f(x) = -(x + 2)^2 + 1$

x	y
-4	-3
-3	0
-2	1
-1	0
0	-3



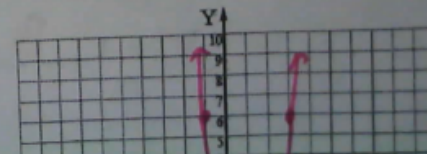
b. $f(x) = (x - 1)^2 + 1$

x	y
-1	5
0	2
1	1
2	2
3	5



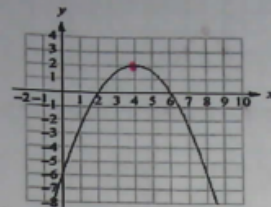
c. $f(x) = 2(x - 1)^2 - 2$

x	y
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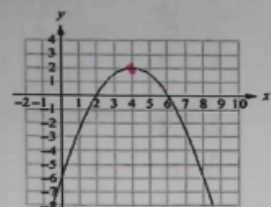
Characteristics of Quadratic Functions

Vertex: THE COORDINATE POINT WHERE THE PARABOLA CHANGES DIRECTION



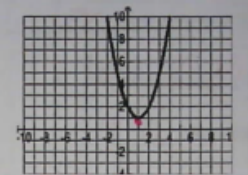
If it asks for vertex your answer will be (x, y) $(4, 2)$

Maximum: A VERTEX WHOSE THE GRAPH INCREASES THEN DECREASES (MOUNTAIN)



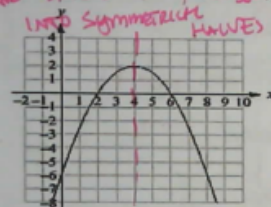
If it asks for maximum your answer will be (x, y) $(4, 2)$

Minimum: A VERTEX WHOSE GRAPH DECREASES THEN INCREASES (VALLEY)



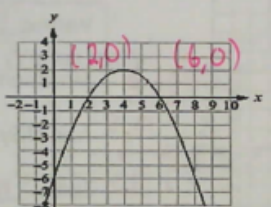
If it asks for minimum your answer will be (x, y) $(1, 1)$

Axis of symmetry: THE VERTICAL LINE THAT GOES THROUGH THE VERTEX AND DIVIDES THE PARABOLA INTO SYMMETRIC HALVES



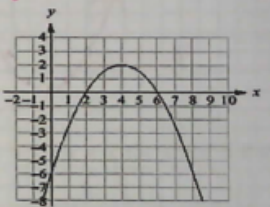
If it asks for axis of symmetry your answer will be $x = \#$ $x = 4$

Zeros: WHERE THE PARABOLA CROSSES THE X AXIS



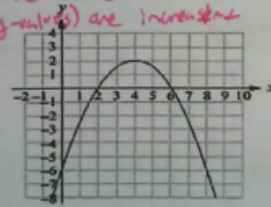
If it asks for zeros your answer will be: $(x, 0)$ and $(x, 0)$

Y-Intercept: WHERE THE PARABOLA CROSSES THE Y-AXIS



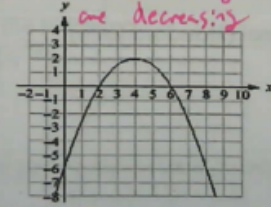
If it asks for y-intercept your answer will be $(0, y)$ $(0, -6)$

Interval of Increase: THE x-values (number line) where the parabola (y-values) are increasing



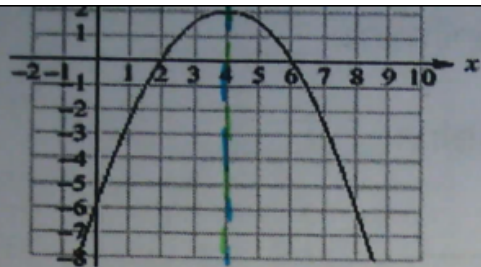
If it asks for interval of increase your answer will be $(-\infty, \#)$ or $(\#, \infty)$ $(-\infty, 4)$

Interval of Decrease: THE x-values (number line) where the parabola (y-values) are decreasing

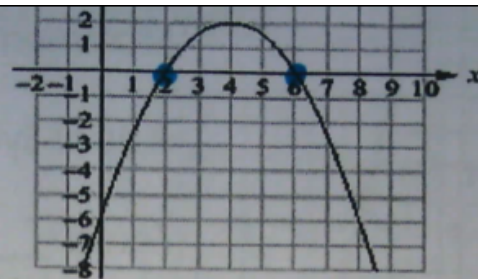


If it asks for interval of decrease your answer will be $(-\infty, \#)$ or $(\#, \infty)$ $(4, \infty)$

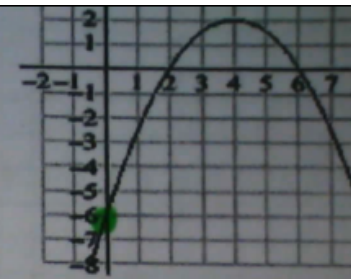




If it asks for axis of symmetry your answer will be $x = \#$ $x = 4$

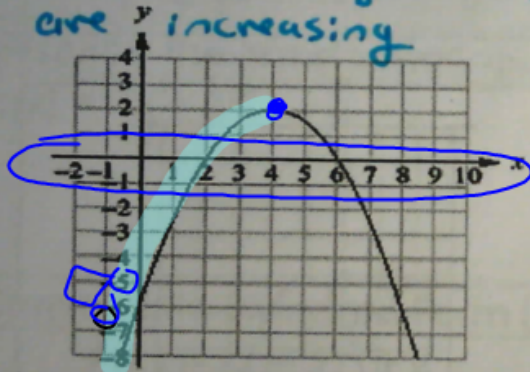


If it asks for zeros your answer will be: $(x, 0)$ and $(x, 0)$ $(2, 0)$ AND $(6, 0)$



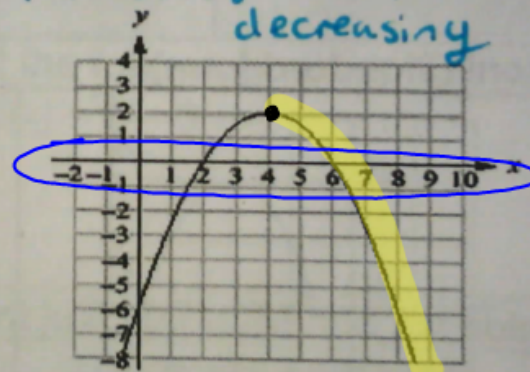
If it asks for y-intercept answer will be $(0, y)$ $(0, -6)$

Interval of Increase:
the x-values where the parabola (y-values) are increasing



If it asks for interval of increase your answer will be $(-\infty, 4)$
 $(-\infty, \#)$ or $(\#, \infty)$

Interval of Decrease:
the x-values where the parabola (y-values) are decreasing



If it asks for interval of decrease your answer will be $(4, \infty)$
 $(-\infty, \#)$ or $(\#, \infty)$



Graph and identify the following

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

$\frac{-b}{2a} = \frac{-2}{2(-1)} = 1$

Vertex: (1, 4)

Maximum/Minimum?: (1, 4)

Axis of Symmetry: x = 1

Zeros: (-1, 0) and (3, 0)

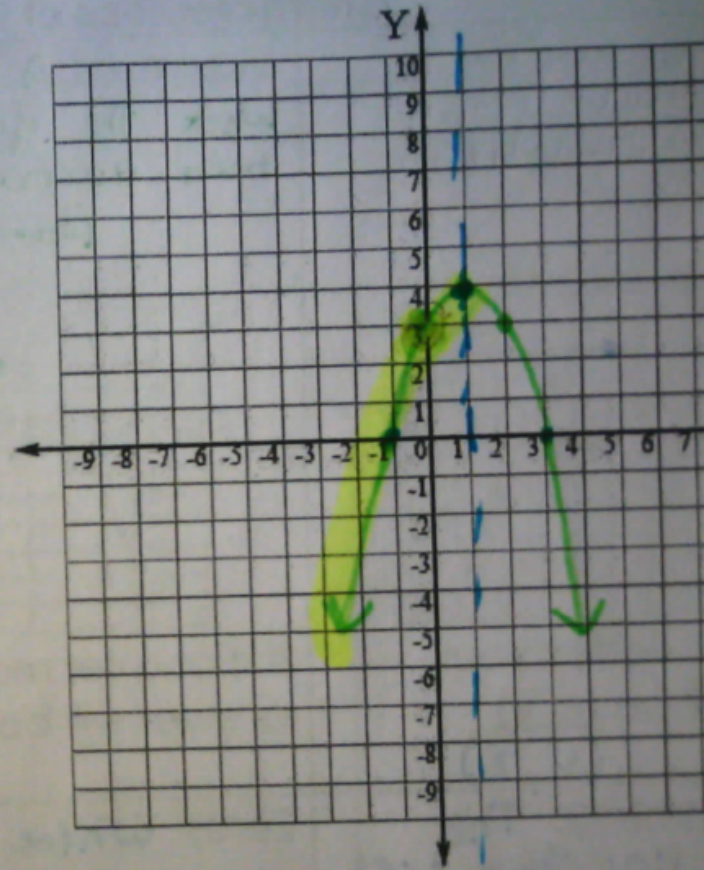
Y-intercept: (0, 3)

Interval of increase: $(-\infty, 1)$

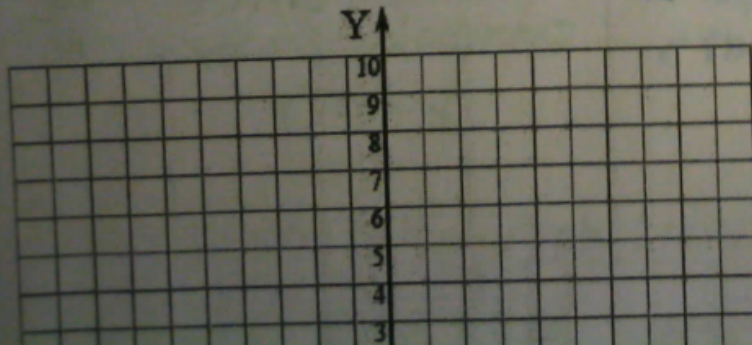
Interval of decrease: $(1, \infty)$

x	y
-1	0
0	3
1	4
2	3
3	0

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



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



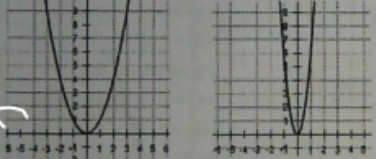
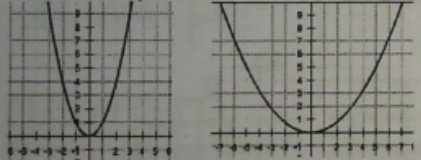
Vertex: _____

Maximum/Minimum: _____



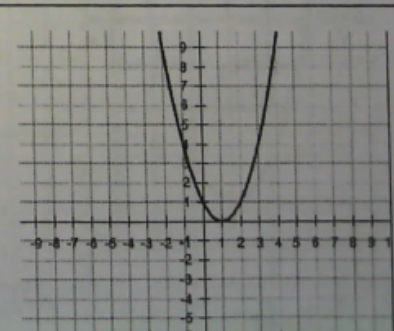
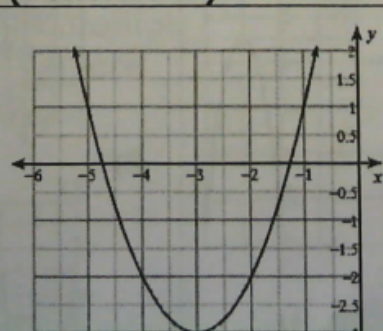
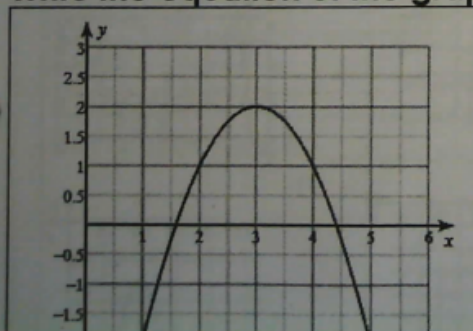
How does vertex form move?

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

a	h	k
<p>Positive: Up like a cup!</p> <ul style="list-style-type: none"> Has a minimum <p>Negative: Down like a frown</p> <ul style="list-style-type: none"> Has a maximum (reflection over the x-axis) 	<p>h = horizontal!</p> <p>$(x - h)^2$</p> <ul style="list-style-type: none"> Moves to right <p>$(x + h)^2$</p> <ul style="list-style-type: none"> Moves to left 	<p>k = vertical</p> <p>+ k</p> <ul style="list-style-type: none"> Moves up <p>- k</p> <ul style="list-style-type: none"> Moves down
<p>a > 1: The parabola stretches</p> 	<p>$5(x - 3)^2$</p> <p>$-10(x - 3)^2$</p>	
<p>a < 1: The parabola shrinks</p> 	<p>$= \frac{1}{2}(x - 3)^2$</p> <p>$= \frac{2}{3}x^2$</p>	

Negative means reflection! has nothing to do with stretch/shrink!

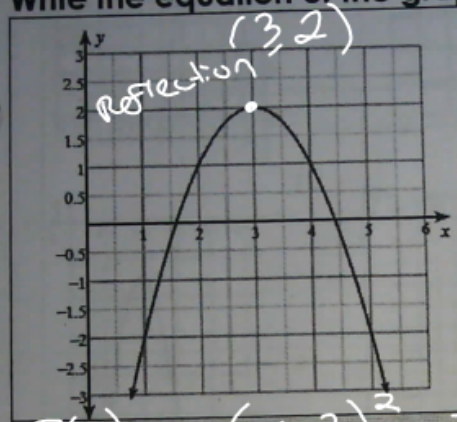
Write the equation of the graph! (Vertex form)



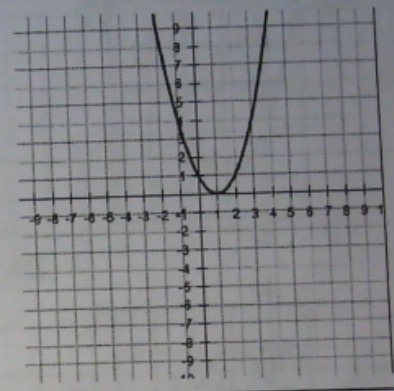
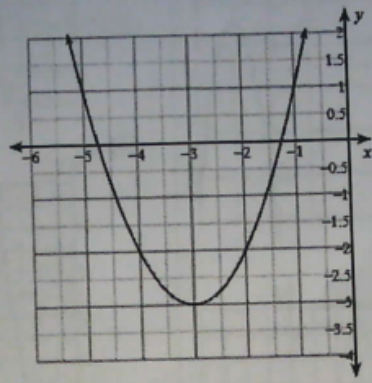
SHOW



Write the equation of the graph! (Vertex form)



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



Describe the transformations of the following

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

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

DOWN 3

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

Convert into Standard Form (hint just distribute and combine like terms!)

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

$$\begin{aligned} f(x) &= -(x-2)^2 - 1 \\ &= -(x-2)(x-2) - 1 \\ &= -(x^2 - 2x - 2x + 4) - 1 \\ &= -(x^2 - 4x + 4) - 1 \\ &= -x^2 + 4x - 4 - 1 \\ &= -x^2 + 4x - 5 \end{aligned}$$

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