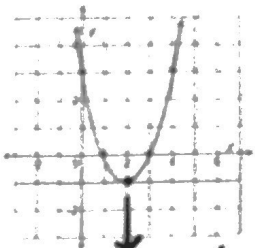
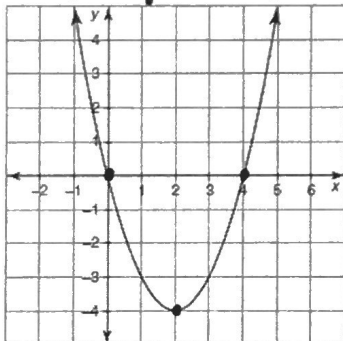
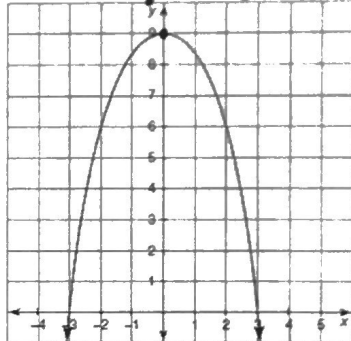


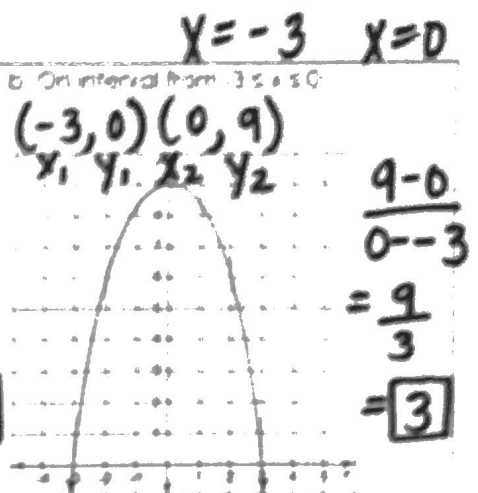
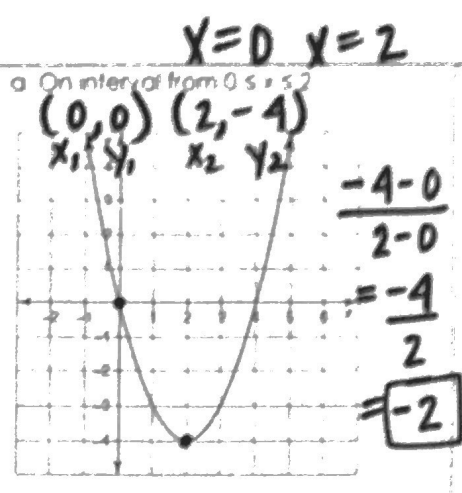
What you need to know & be able to do	Things to remember	Examples	
1. Describe transformations from an equation or graph	$y = a(x - h)^2 + k$ a: stretches/shrinks & reflects h: shifts left & right k: shifts up & down  vertex: (h, k)	a. Describe the transformations and name the vertex: $y = -2(x + 3)^2 - 9$  a: -2: reflected over x-axis, stretches by a factor of 2 h: +3: left 3 k: -9: down 9 Vertex: (-3, -9)	a. Describe the transformations and name the vertex  right 2 down 1  vertex: (2, -1)
2. Create a function using transformations	Determine your, a, h, and k values	a. Opens down, shifts up 3 units and shrinks by $\frac{1}{4}$  opens down: a is (-) up 3 units: k is +3 shrinks by $\frac{1}{4}$ : a is $\frac{1}{4}$ $y = \frac{1}{4}x^2 + 3$	b. Shifts left 5 and reflects across the x-axis  left 5 units: h is +5 reflects: a is (-) $y = -(x + 5)^2$
3. Describe the domain and range.	-Domain: all possible values for x  -Range: all possible values for y -"How far up or down does your graph go?" -written as an inequality	a. Domain: all real #'s Range: $y \geq -4$ 	b. Domain: all real #'s Range: $y \leq 9$ 
4. Describe the intercepts and zeros. <b>from the graphs in #3</b>	Zeros and x-intercepts are the same thing.  Zeros: x = ____ X-int: (p, 0) (q, 0) Y-int: (0, c)	a. x-intercepts: (0, 0) (4, 0) zeros: 0, 4 y-intercept: (0, 0)	b. x-intercepts: (-3, 0) (3, 0) zeros: -3, 3 y-intercept: (0, 9)
5. Describe the vertex, axis of symmetry, extrema, and min/max values. <b>from the graphs in #3</b>	Vertex: highest or lowest point  Axis of Symmetry: x value of the vertex; written as x =  Extrema: Max or Min?  Max/Min Value: What's the lowest or highest your graph goes; written as y =	a. Vertex: (2, -4) Axis of Sym: $x = 2$  Extrema: MIN Max/Min Value: Min: $y = -4$	b. Vertex: (0, 9) Axis of Sym: $x = 0$  Extrema: MAX Max/Min Value: Max: $y = 9$

6. Find the average rate of change given a graph

-Determine your two x-values and find their corresponding y-values on the parabola

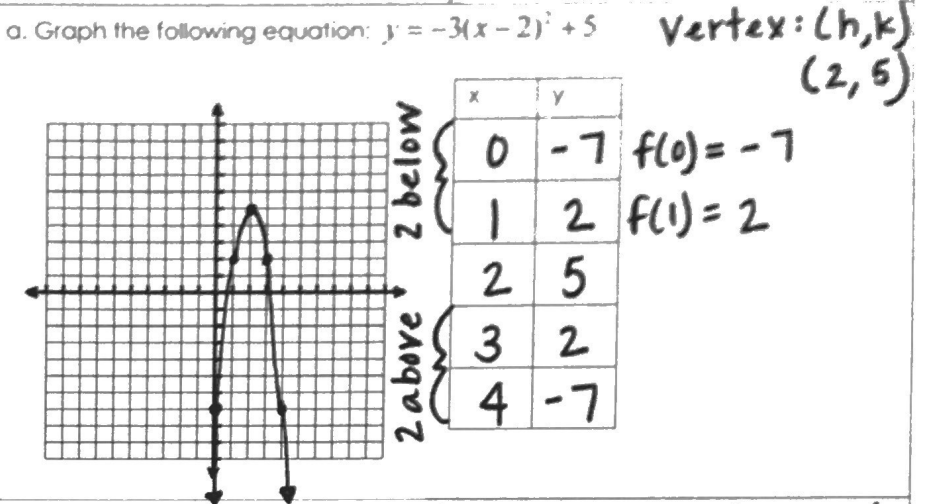
-Calculate the rate of change (rise over run)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



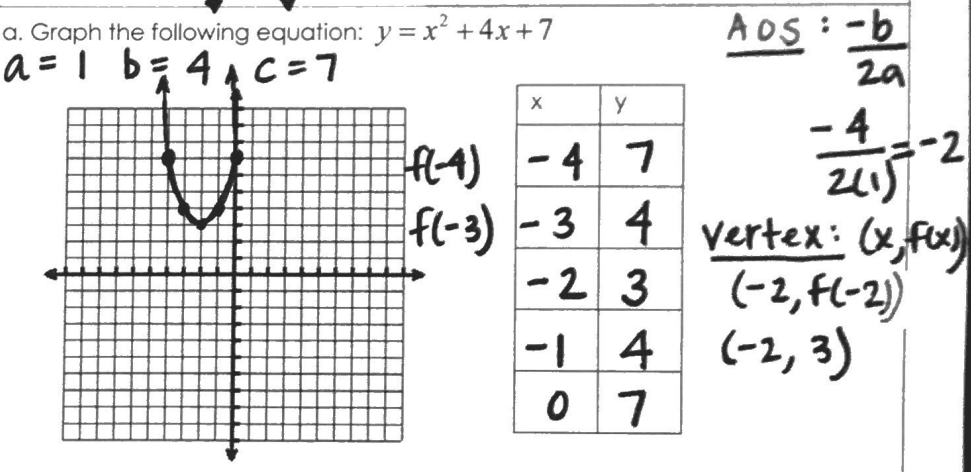
7. Graph in vertex form

1. Determine your vertex.
2. Create a table with 2 values to the left and right of the vertex.
3. Graph.



8. Graph in standard form

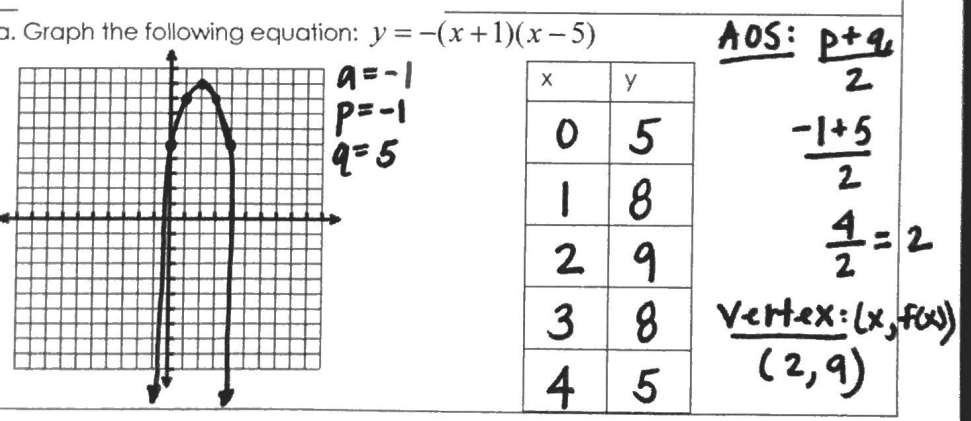
1. Determine your vertex  $(x = \frac{-b}{2a})$ .  
**Axis of symmetry**
2. Create a table with 2 values to the left and right of the vertex.  
**Vertex:  $(x, f(x))$**
3. Graph.

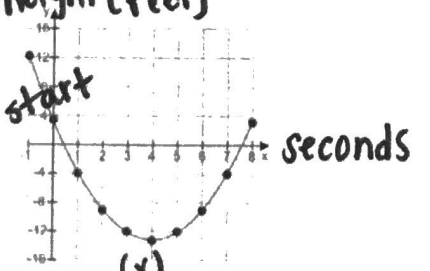
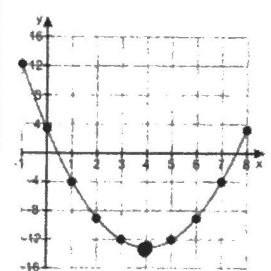


9. Graph in factored form

**Axis of symmetry**

1. Determine your x-intercepts and plot them.
2. Determine your vertex (find the middle of the two x-intercepts or use  $x = \frac{p+q}{2}$ ).  
**Vertex:  $(x, f(x))$**
3. Plot vertex and graph.



<p>10. Different Forms of Quadratics</p> <p><b>Intercept/</b></p>	<p>Vertex Form:  <math>y = a(x - h)^2 + k</math>            (h, k) is vertex</p> <p>Standard Form:  <math>y = ax^2 + bx + c</math>            (0, c) is y-intercept</p> <p>Factored Form:  <math>y = a(x - p)(x - q)</math>            (p, 0) &amp; (q, 0) are x-intercepts</p> <p>A determines if graph opens up or down</p>	<p>a. Determine the form and associated characteristics <math>y = 2(x + 4)(x - 3)</math></p> <p><b>Intercept Form opens UP</b></p> <p><math>a = 2</math> <math>p = -4</math> <math>q = 3</math></p> <p>x-intercepts: <math>(-4, 0)</math>  <math>(3, 0)</math></p>	<p>b. Determine the form and associated characteristics <math>y = (x - 5)^2 + 9</math></p> <p><b>Vertex Form</b></p> <p><math>a = 1</math> <math>h = 5</math> <math>k = 9</math></p> <p><math>(h, k) \rightarrow (5, 9)</math></p>
<p>11. Create equations given characteristics</p>	<p>Determine the best form to represent the given characteristics</p>	<p>a. Given: x-intercepts of (7, 0) and (-8, 0) and graph opens up</p> <p><b>Intercept Form</b></p> <p><math>a = +1</math> <math>p = 7</math> <math>q = -8</math></p> <p><math>y = 1(p - 7)(q + 8)</math></p>	<p>b. Given: Vertex of (-3, -6) and graph has a maximum (opens down)</p> <p><b>Vertex Form</b></p> <p><math>h = -3</math> <math>k = -6</math></p> <p><math>y = -(x + 3)^2 - 6</math></p> <p><i>a is -</i></p>
<p>12. Applications of the Vertex</p>	<p>Maximum/Minimum indicate finding the vertex.</p> <p>Describe what you know about your equation before completing any solving.</p> <p>Interpret the vertex in terms of what x and y represent.</p>	<p>a. The height in feet of a rocket after <u>x</u> second is given by <math>y = -16x^2 + 128x</math>. What is the <u>maximum</u> height reached by the rocket and how long does it take to reach that height?</p> <p><b>Standard Form</b></p> <p><math>x = \frac{-b}{2a} = \frac{-128}{2(-16)} = 4 \text{ sec.}</math></p> <p><math>y = f(x) = f(4) = \boxed{256 \text{ feet}}</math></p> <p><math>f(4) = -16(4)^2 + 128(4)</math></p>	<p>b. The arch of bridge is modeled by the equation <math>y = -\frac{1}{4}(x - 50)^2 + 95</math>, where x represent the horizontal distance (in feet) and y represents the vertical distance (in feet). What is the <u>maximum height</u> of the arch?</p> <p><b>y value of vertex</b></p> <p>Vertex <math>\rightarrow (h, k)</math>  <math>(50, 95)</math>  <math>(x, y)</math></p> <p><math>y = 95 \text{ feet}</math></p>
	<p>The following shows the path of a pelican flying to catch a fish swimming in the ocean</p> <p><b>height (Feet)</b></p>  <p>How <u>long</u> before the pelican reaches the same height he started at?</p> <p><b>8 seconds</b></p>	<p>The following shows the path of a pelican flying to catch a fish swimming in the ocean</p>  <p>At what point does the pelican reach the fish?</p> <p><b>Vertex (4, -13)</b></p>	

14. Comparing Quadratic Functions

a. Which representation has the greater y-intercept:

A.  $y = x^2 + 6x - 2$   
 y-intercept:  $(0, c)$   
 $(0, -2)$

B.

X	-3	-2	-1	0	1
Y	-2	-5	-6	-5	-2

y-intercept:  
 When  $x = 0$   
 $(0, -5)$

C.  $y = (x+3)(x-1)$

y-intercept:  
 When  $x = 0$

$f(0) = (0+3)(0-1)$   
 $f(0) = -3$   
 $(0, -3)$

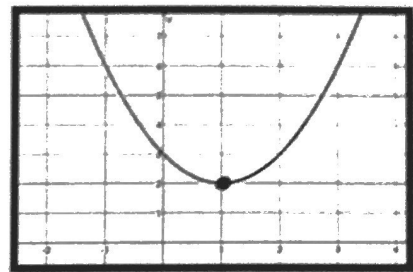
b. What representation has the smallest minimum value?

A.  $y$  value of vertex

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

$y = -3$  Vertex

B.



$y = 2$

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

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

$y = (1)^2 - 2(1) + 6 = 5$

$y = 5$