

➤ Review: Graph the following quadratic function and find the following information.

Graph:  $y = (x - 1)^2 - 4$

1. Vertex:  $(1, -4)$
2. Maximum or Minimum: Minimum
3. Axis of Symmetry:  $x = 1$
4. y – intercept:  $(0, -3)$
5. x – intercepts:  $(-1, 0), (3, 0)$
6. Domain:  $\mathbb{R}$  or  $(-\infty, \infty)$
7. Range:  $[-4, \infty)$

I. Writing quadratic equations using x – intercept form:  $y = a(x - int.) (x - int.)$

A) Let's use the above information to help write the same equation in x – intercept form

✓ Step 1:  $y = a(x - (-1))(x - (3))$ ,  $y = a(x+1)(x-3)$   $y = 1(x+1)(x-3)$   
 $y = (x+1)(x-3)$

✓ Step 2: Now we need to find  $a$ . We can do this by substituting in any other ordered pair that lies on the parabola. (For example try using either the vertex or the y – intercept)

✓ Step 3: Now write the final equation using the  $a$  and the intercepts together:  $y = (x+1)(x-3)$

➤ Think back to MATH 1 and let's prove why  $y = (x - 1)^2 - 4$  and  $y = (x+1)(x-3)$  are the same equations, just in different forms.

A.O.S

$$y = x^2 - 2x + 1 - 4$$

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

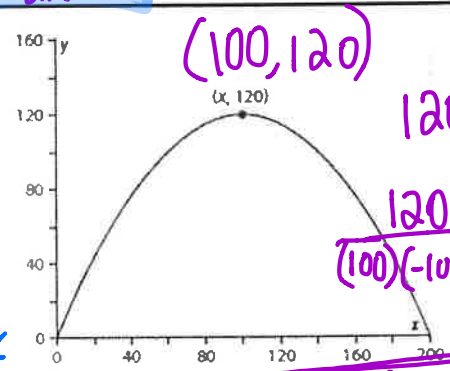
$$y = (x+1)(x-3)$$

B) Given the following graph, write a quadratic function in x – intercept form that describes the graph.

Remember:  $y = a(x - int.) (x - int.)$

$y = a(x - 0)(x - 200)$

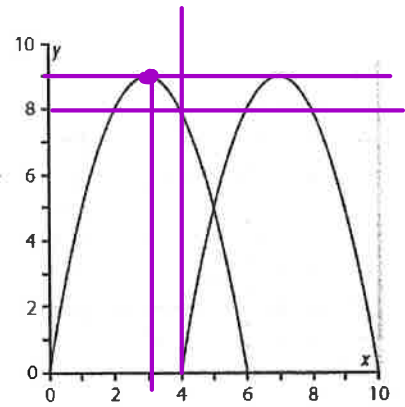
$y = a(x)(x - 200)$  Plug in vertex to find  $a$   $(100, 120)$



$(100, 120)$   
 $120 = a(100)(100 - 200)$   
 $120 = (100)(-100)a$   
 $\frac{120}{(100)(-100)} = \frac{a}{(100)(-100)}$

$y = -.012(x)(x - 200)$

C) The logo chosen for Magic Moments uses a parabola theme with a large letter M drawn using two intersecting parabolas. The idea of the logo is shown on the graph.



1. What are the x – intercepts of the parabola on the left?

$(0,0) (6,0)$

2. What is the vertex of the parabola on the left?

$(3,9)$

3. Write an equation in x – intercept form that describes the parabola on the left? (Don't forget to find a).

$y = a(x - \text{int})(x - \text{int})$   
 $V: (3,9)$

$9 = a(x-0)(x-6)$

$9 = a(3-0)(3-6)$   $\frac{9}{-9} = \frac{-9a}{-9}$

$a = -1$   $y = -1(x)(x-6)$

4. What are the x – intercepts of the parabola on the right?

$(4,0) (10,0)$

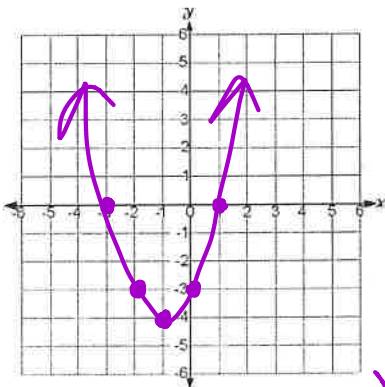
5. What is the vertex of the parabola on the right?

6. Write an equation in x – intercept form that describes the parabola on the right? (Don't forget to find a).

$y = -1(x-4)(x-10)$

II. Graphing equations using x – intercept form: Use the information you have learned to sketch the following graphs. As you are graphing, make a list of the key points of each graph and write the vertex form of the equation.

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



x – intercepts:  $(-3,0)(1,0)$

y – intercept:  $(0,-3)$

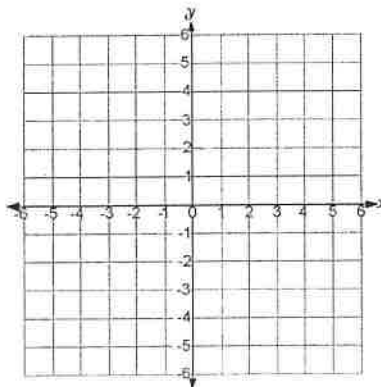
Axis of Symmetry:  $x = -1$

Vertex  $(-1,-4)$

Vertex form of the equation:

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

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



x – intercepts: \_\_\_\_\_

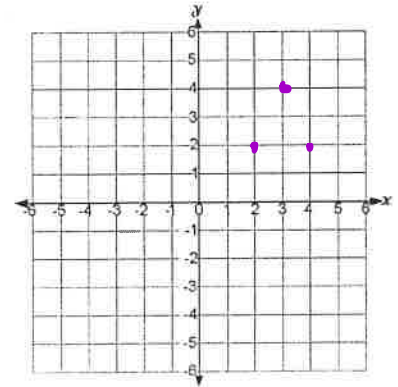
y – intercept: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

Vertex \_\_\_\_\_

Vertex form of the equation:

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



x – intercepts: \_\_\_\_\_

y – intercept: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

Vertex \_\_\_\_\_

Vertex form of the equation:

III. Write a quadratic function in  $x$  - intercept form whose graphs have the following properties.  
 If possible, find  $a$ . If it is not possible to find  $a$ , then describe  $a$  as:  $a > 0$ ,  $a < 0$ , or  $a = \text{All Real Numbers}$ .

1. $x$ - intercepts at $(4, 0)$ and $(-1, 0)$	$y = (x-4)(x+1)$
2. $x$ - intercepts at $(7, 0)$ and $(1, 0)$ and the graph opening upward	$y = (x-7)(x-1)$
3. $x$ - intercepts at $(7, 0)$ and $(1, 0)$ and a minimum point at $(4, -10)$	$y = (x-7)(x-1) - 1$ $(4, -9)$
4. $x$ - intercepts at $(-5, 0)$ and $(0, 0)$ and the graph opening downward	
5. $x$ - intercepts at $(3, 0)$ and $(-5, 0)$ and a maximum point at $(-1, 8)$	
6. $x$ - intercepts at $(3.5, 0)$ and $(0, 0)$ and the graph opening upward	
7. $x$ - intercepts at $(4.5, 0)$ and $(1, 0)$ and $y$ - intercept at $(0, 9)$	
8. $x$ - intercepts at $(m, 0)$ and $(n, 0)$	$y = (x-m)(x-n)$
9. only one $x$ - intercept at $(0, 0)$	
10. only one $x$ - intercept at $(2, 0)$ and $y$ - intercept at $(0, 6)$	

I. Given the following graphs, write an equation in x – intercept form that best describes it.

1.

x – intercepts: \_\_\_\_\_  
 a = \_\_\_\_\_  
 Equation: \_\_\_\_\_

2.

x – intercepts: \_\_\_\_\_  
 a = -1  
 Equation: \_\_\_\_\_

*A.O.S.  
 Max or min  
 Dom  
 Range*

3.

x – intercepts: \_\_\_\_\_  
 a = \_\_\_\_\_  
 Equation: \_\_\_\_\_

II. Make a sketch of the following graphs. Make a list of the key points of each graph.

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

x – intercepts: \_\_\_\_\_  
 y – intercept: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 Vertex \_\_\_\_\_  
 Vertex form of the equation: \_\_\_\_\_

2.  $y = -(x)(x + 6)$

x – intercepts: \_\_\_\_\_  
 y – intercept: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 Vertex \_\_\_\_\_  
 Vertex form of the equation: \_\_\_\_\_

3.  $y = 2(x + 1)(x - 4)$

x – intercepts: \_\_\_\_\_  
 y – intercept: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 Vertex \_\_\_\_\_  
 Vertex form of the equation: \_\_\_\_\_