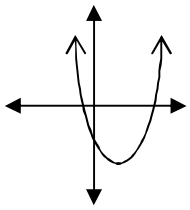
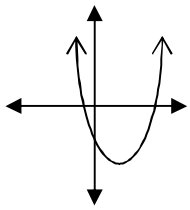
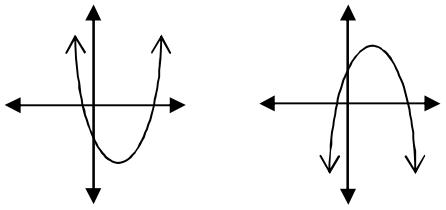
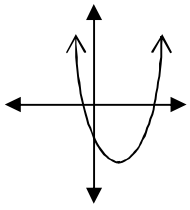
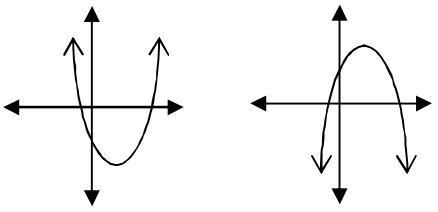
MBF 3C1 Name: _____

Changing Quadratic Relations: The Value of 'a'

Quadratic Vocabulary:

A quadratic relation is modeled by a smooth symmetrical curve, known as a _____.

The **key features** of a parabola are:

zeros		
y-intercept		
vertex		
axis of symmetry		
optimal value		

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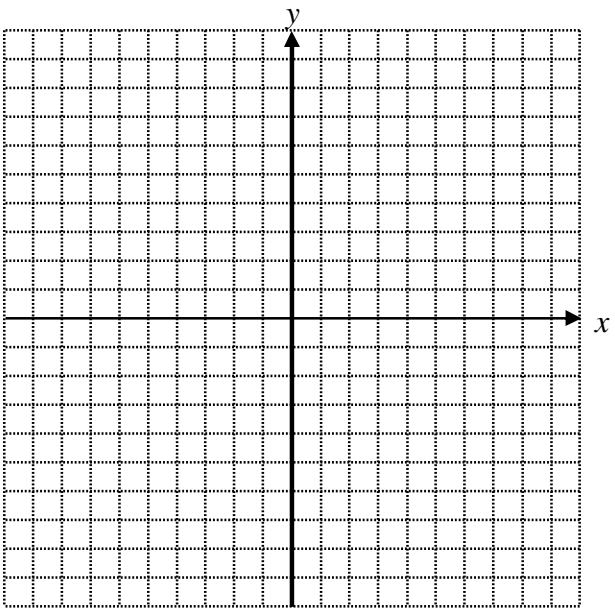
The Basic Parabola:

1. Complete the table of values for the relation $y = x^2$, including finite differences.

x	x^2	y	1st	2nd
-4				
-3				
-2				
-1				
0				
1				
2				
3				
4				

2. Plot the data on the coordinate grid. Draw a curve of best fit.



Summarize the properties of the basic quadratic relation $y = x^2$.

1. The vertex is _____ and is also known as the _____.
2. The optimum value is _____ and it is a _____ because _____.
3. The axis of symmetry is _____. The graph is symmetrical about _____.
4. The zeros of the relation are _____.
5. To graph the basic parabola without creating a table of values first:
   - Start at the vertex: $(0,0)$.
   - Go right 1 and up 1, plot a point.
     Go right 1 and up 3, plot a point.
     Go right 1 and up 5, plot a point.
     These points are located on the right side of the y-axis.
   - Find the points on the left side using symmetry.
     OR repeat the pattern going left rather than right.
   - Draw a curve of best fit.

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Investigate $y = ax^2$

Function	Value of a in $y = ax^2$	Direction of Opening	Vertex	Axis of Symmetry	Same shape as $y = x^2$?
a. $y = x^2$	1	up	(0, 0)	$x = 0$	
b. $y = 2x^2$					
c. $y = 0.5x^2$					
d. $y = -2x^2$					
e. $y = -0.5x^2$					

How does the value of *a* affect the basic parabola?

The **sign** of *a* indicates _____:

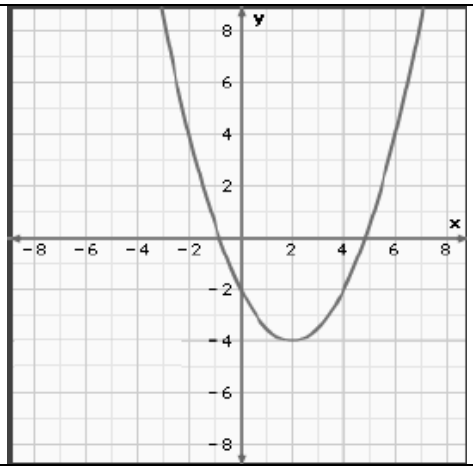
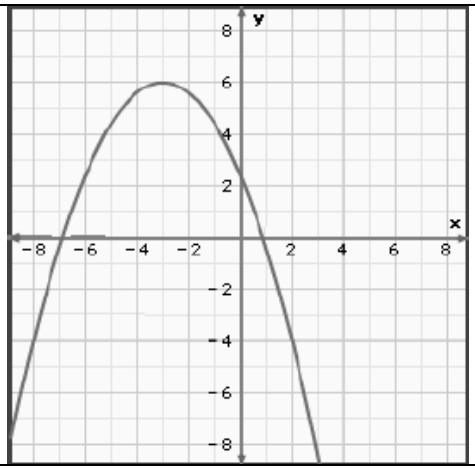
- when *a* is positive, the parabola _____ and has a _____
- when *a* is negative, the parabola _____ and has a _____ ; this is known as a _____

The **value** of *a* describes _____:

- when *a* is between 0 and 1, the parabola is _____ than $y = x^2$; known as a _____
- when *a* is greater than 1, the parabola is _____ than $y = x^2$, known as a _____

Example 1

State the key features of each graph. *(Round answers to the nearest 0.5.)*

		
zeros		
y-intercept		
vertex		
axis of symmetry		
optimal value		

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Example 2

For each of the following, (i) state the transformations, and (ii) graph the parabola.

	$y = -2x^2$	$y = {}^1/_4x^2$
(I) TRANSFORMATIONS		
(II) GRAPH