10.1: Graph $y = ax^2 + c$

Goals: *Graph quadratic functions by making a table
*Identify the vertex of a parabola
*Identify whether a quadratic function will have minimum or maximum point without graphing
*Identify characteristics of a parabola based on a quadratic equation

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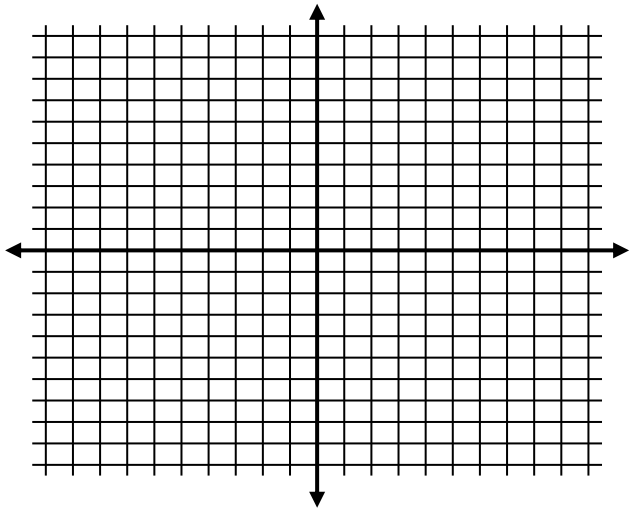
RECALL (from Ch. 9) **quadratic function:**

parabola:

Ex: Graph $y = x^2$ by making a table:

x	–3	–2	–1	0	1	2	3
y							



$y = x^2$ is called the "Parent quadratic function"
you compare all other quadratic functions to it.

vertex:

axis of symmetry:

OBSERVATIONS

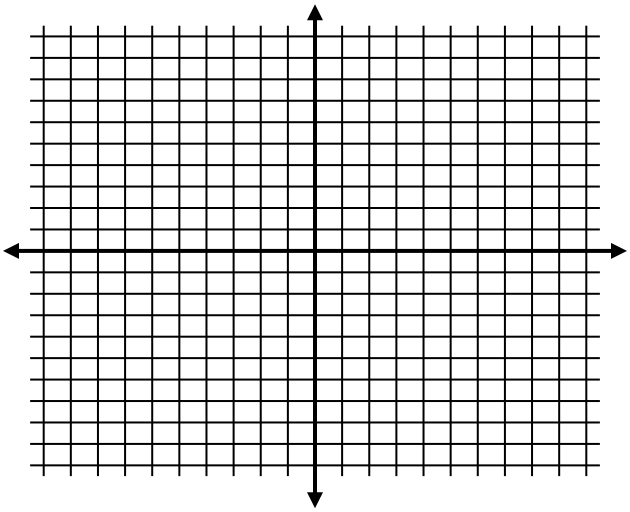
a) **Graph the following quadratic functions. Graph the odds by making a table and graph the evens by using a graphing calculator and copying it onto the graph provided.**
b) **For each parabola identify the vertex and axis of symmetry.**
c) **Compare each parabola to $y = x^2$ and begin to come up with some observations about characteristics of parabolas as they compare to their quadratic equations. (Ex: Direction it is facing/opening, narrowness/wideness, vertex)**

1. $y = 2x^2$

x	–3	–2	–1	0	1	2	3
y							

Vertex: _____

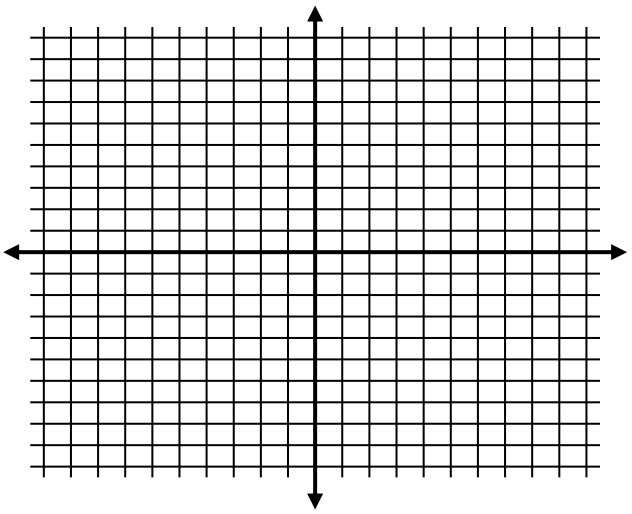
Axis of Symmetry: _____



2. $y = 3x^2$

Vertex: _____

Axis of Symmetry: _____

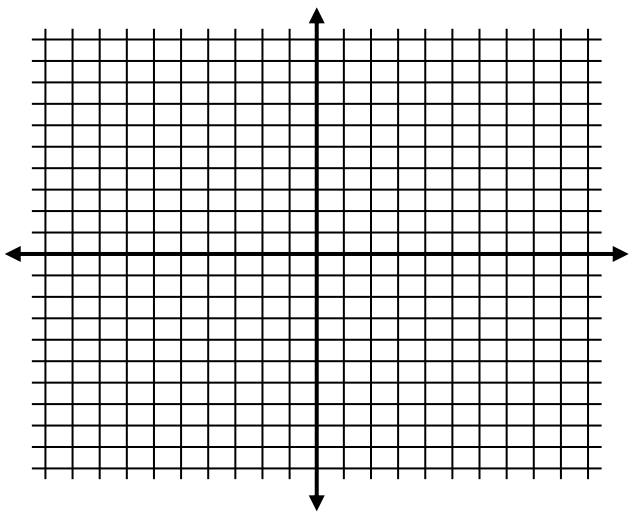


3. $y = -2x^2$

x	–3	–2	–1	0	1	2	3
y							

Vertex: _____

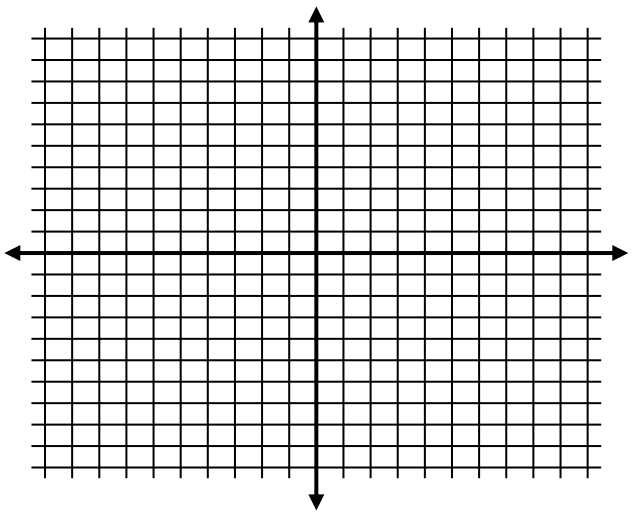
Axis of Symmetry: _____



4. $y = -3x^2$

Vertex: _____

Axis of Symmetry: _____

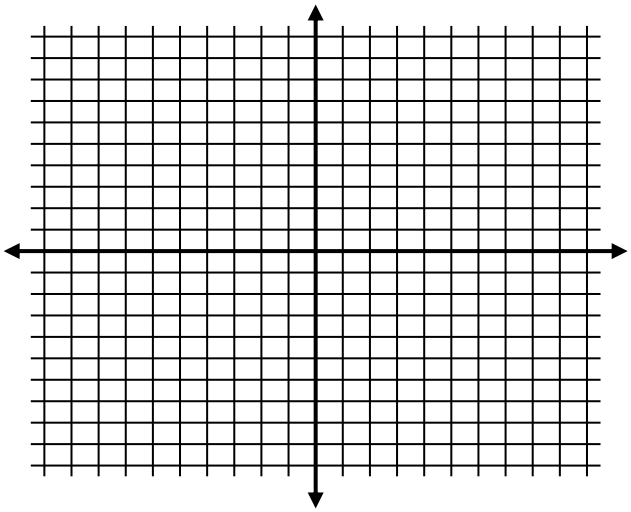


5. $y = \frac{1}{2}x^2$

x	–6	–4	–2	0	2	4	6
y							

Vertex: _____

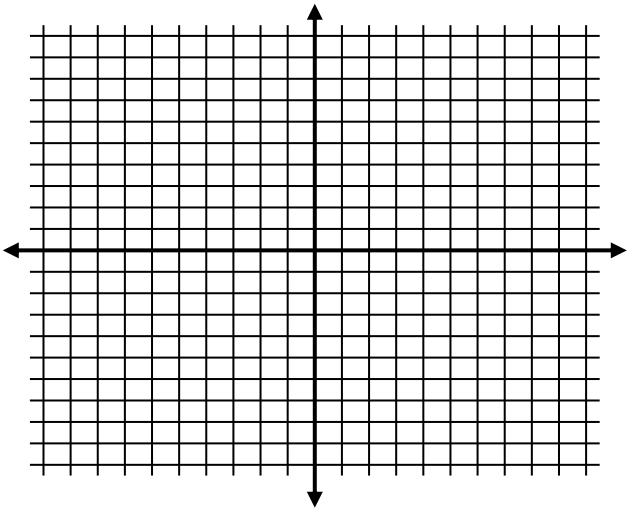
Axis of Symmetry: _____



6. $y = \frac{1}{4}x^2$

Vertex: _____

Axis of Symmetry: _____

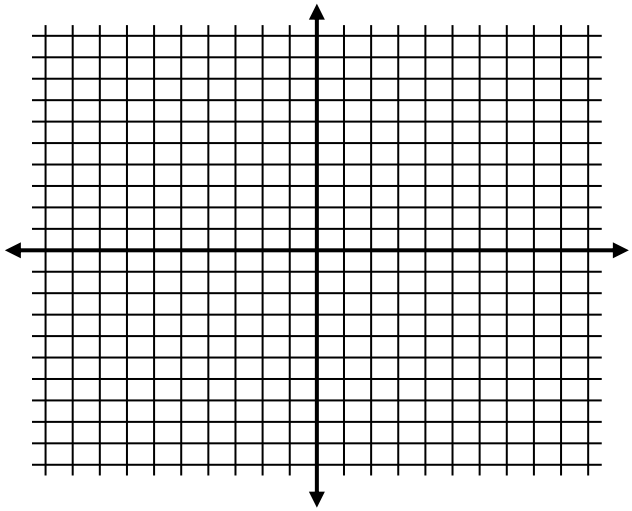


7. $y = 5x^2$

x	–3	–2	–1	0	1	2	3
y							

Vertex: _____

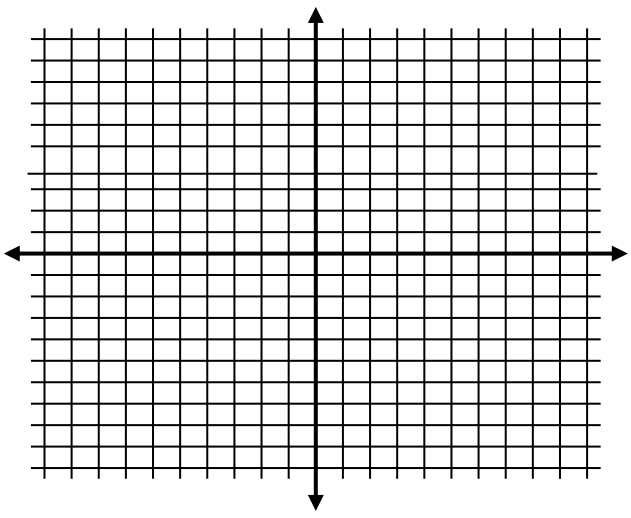
Axis of Symmetry: _____



8. $y = -4x^2$

Vertex: _____

Axis of Symmetry: _____

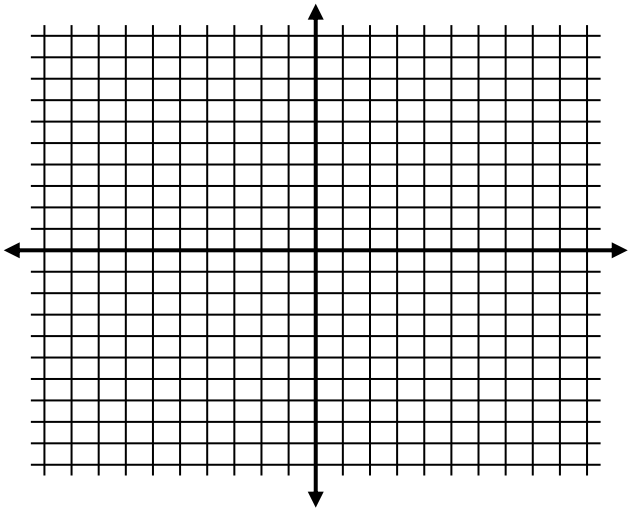


9. $y = x^2 + 5$

x	–3	–2	–1	0	1	2	3
y							

Vertex: _____

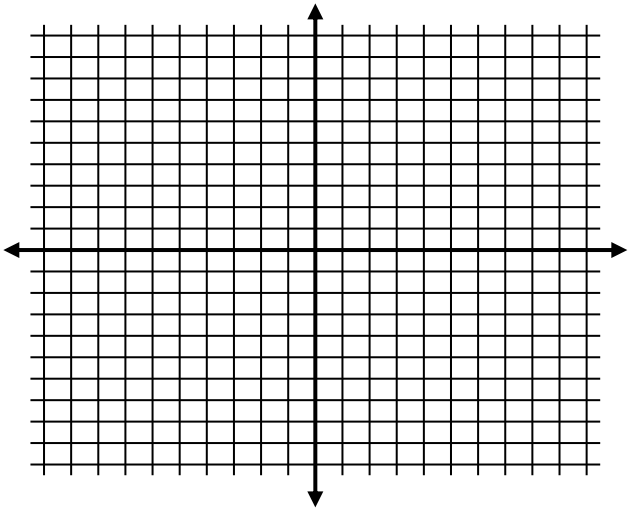
Axis of Symmetry: _____



10. $y = x^2 - 1$

Vertex: _____

Axis of Symmetry: _____

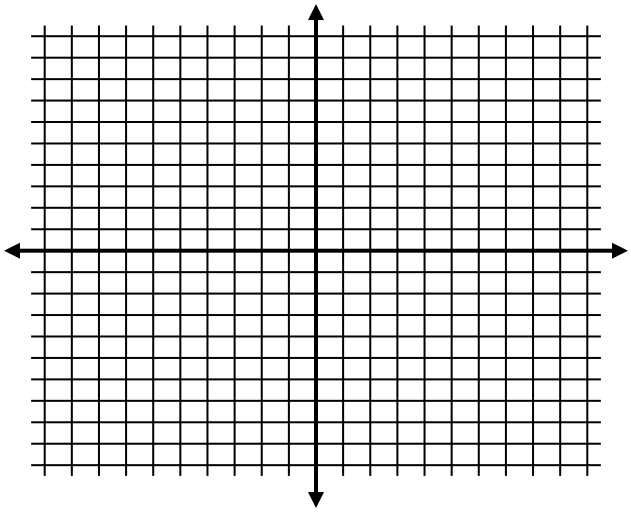


11. $y = x^2 + 4$

x	–3	–2	–1	0	1	2	3
y							

Vertex: _____

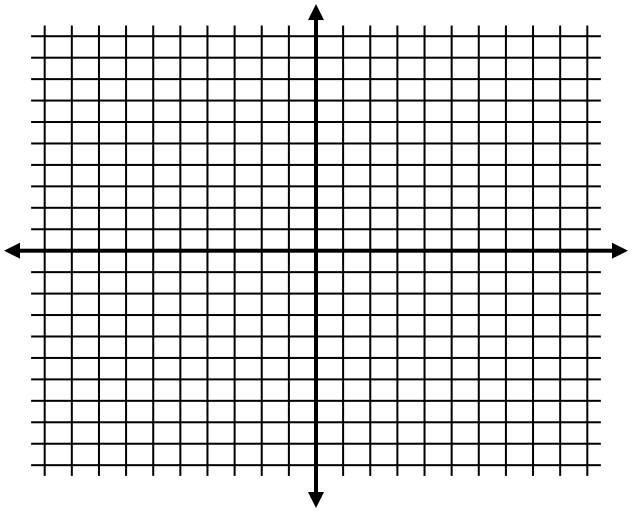
Axis of Symmetry: _____



12. $y = x^2 - 2$

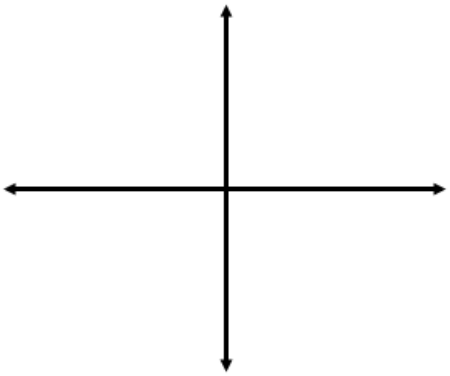
Vertex: _____

Axis of Symmetry: _____

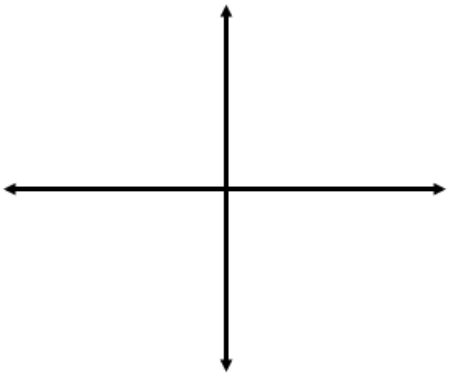


Now use your observations to <u>sketch</u> the graphs of the following quadratic functions:

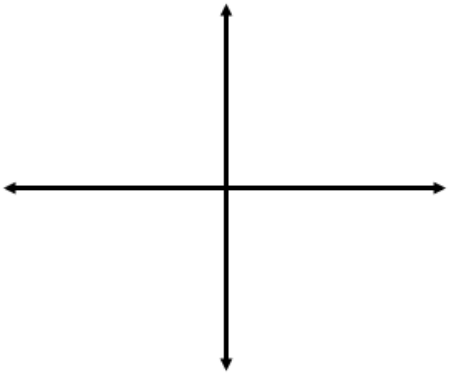
1. $y = \frac{1}{2}x^2 - 4$



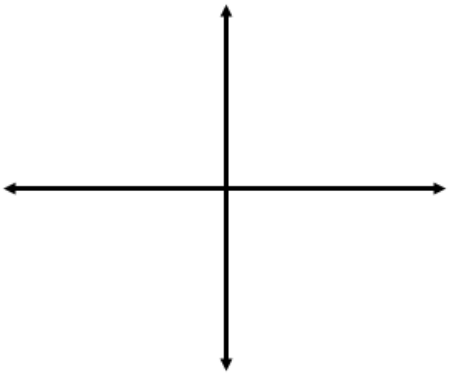
2. $y = -\frac{3}{2}x^2 - 2$



3. $y = 3x^2 - 6$



4. $y = -5x^2 + 1$



THOUGHTS TO CONSIDER

- **What makes a parabola narrower?**
- **What makes a parabola wider?**
- **What makes a parabola open facing upward (U- shaped)?**
- **What makes a parabola open facing downward (∩ -shaped)?**
- **What shifts a parabola up on the *y*-axis?**
- **What shifts a parabola down on the *y*-axis?**