Name:_____ Date:_____

Notes
Algebra Section 10.1
Pages 628-634

Goal: "You will graph simple quadratic functions"

Vocabulary:

quadratic function: **A** nonlinear function that can be written in the standard form $y = ax^2 + bx + c$

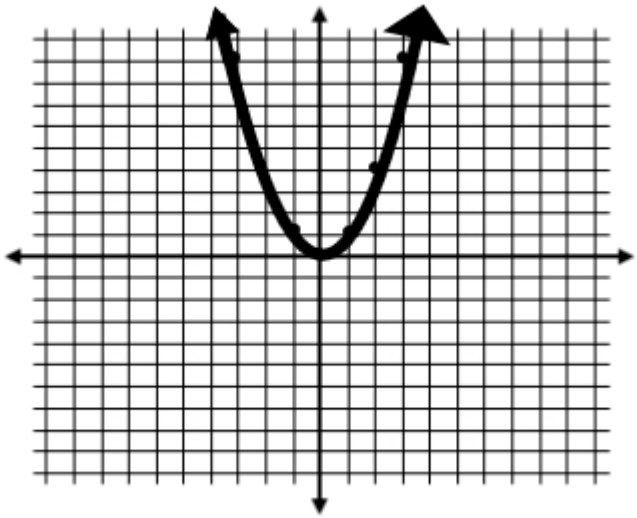
parabola: The U-shaped graph that is created from a quadratic function.

vertex: The highest (maximum) or lowest (minimum) point on a graph.

axis of symmetry: The line that passes through the vertex and divides the parabola into two symmetrical parts.

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

x	–3	–2	–1	0	1	2	3
y	9	4	1	0	1	4	9



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

OBSERVATIONS

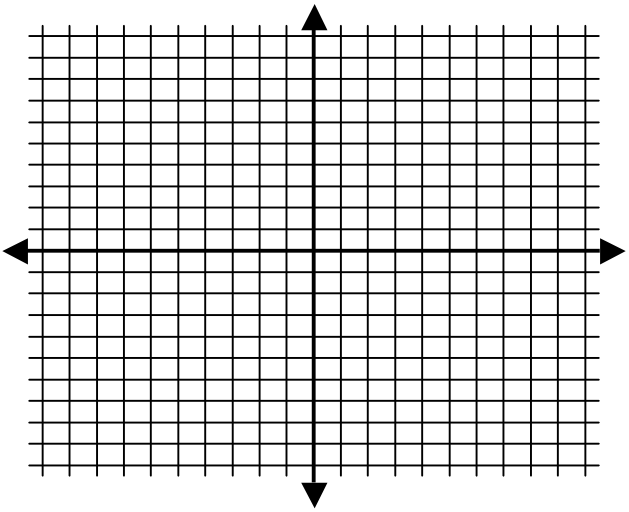
a) **Graph the following quadratic functions. Graph the odds by making a table and graph the evens by using a graphing calculator and copying it onto the graph provided.**
b) **For each parabola identify the vertex and axis of symmetry.**
c) **Compare each parabola to $y = x^2$ and begin to come up with 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	18	8	2	0	2	8	18

Vertex: __(0, 0)_____

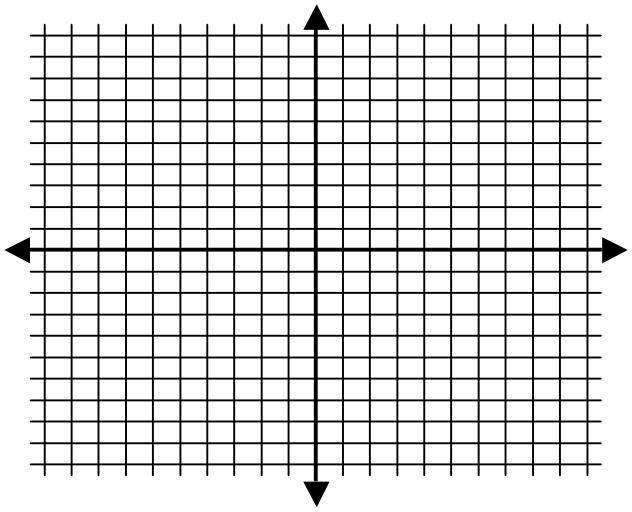
Axis of Symmetry: ____$x = 0$_____



2. $y = 3x^2$

Vertex: __(0, 0)_____

Axis of Symmetry: ___ $x = 0$_____

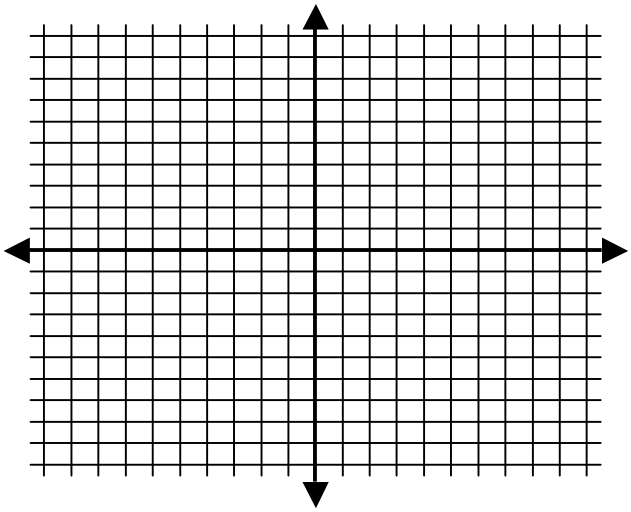


3. $y = -2x^2$

x	–3	–2	–1	0	1	2	3
y	–18	–8	–2	0	–2	–8	–18

Vertex: ___(0, 0)_____

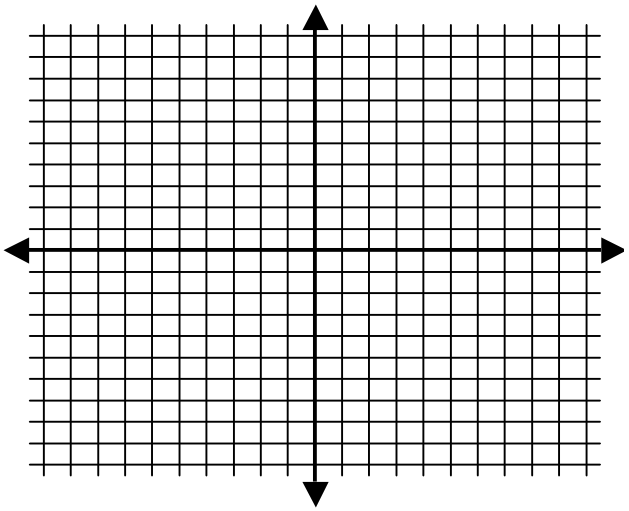
Axis of Symmetry: ___$x = 0$_____



4. $y = -3x^2$

Vertex: _____(0, 0)_____

Axis of Symmetry: _$x = 0$_____

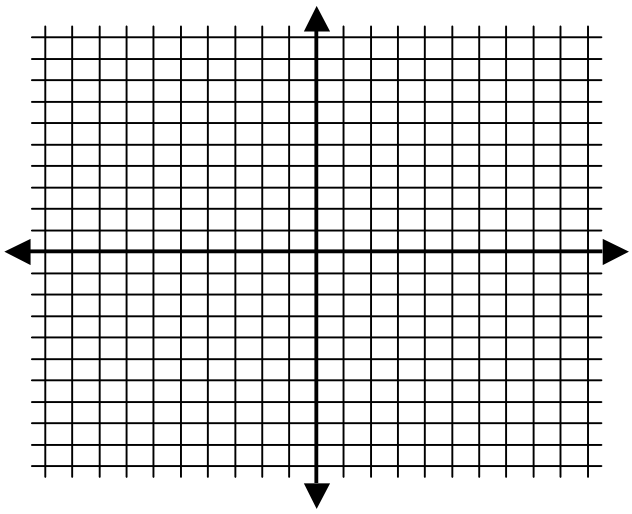


5. $y = \frac{1}{2}x^2$

x	–6	–4	–2	0	2	4	6
y	18	8	2	0	2	8	18

Vertex: ___(0, 0)_____

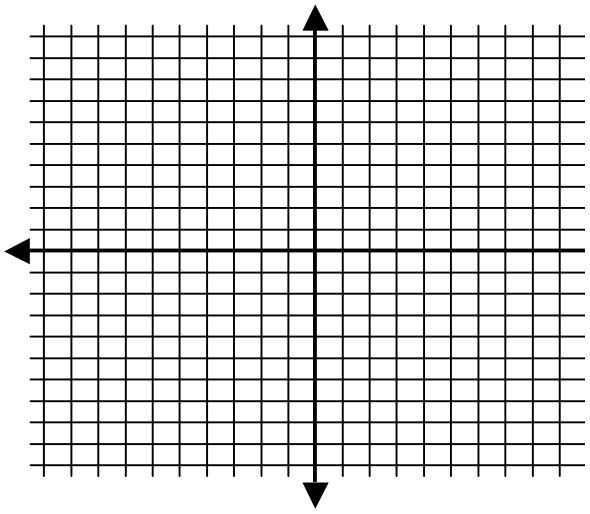
Axis of Symmetry: ___$x = 0$_____



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

Vertex: _____(0, 0)_____

Axis of Symmetry: _$x = 0$_____

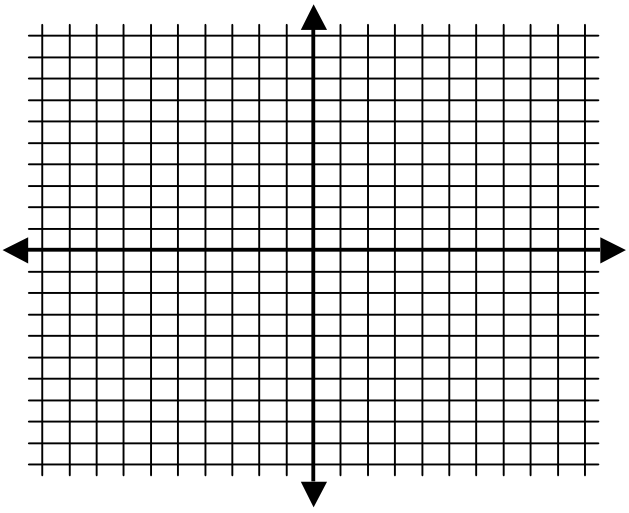


7. $y = 5x^2$

x	–3	–2	–1	0	1	2	3
y	45	20	5	0	5	20	45

Vertex: ___(0, 0)_____

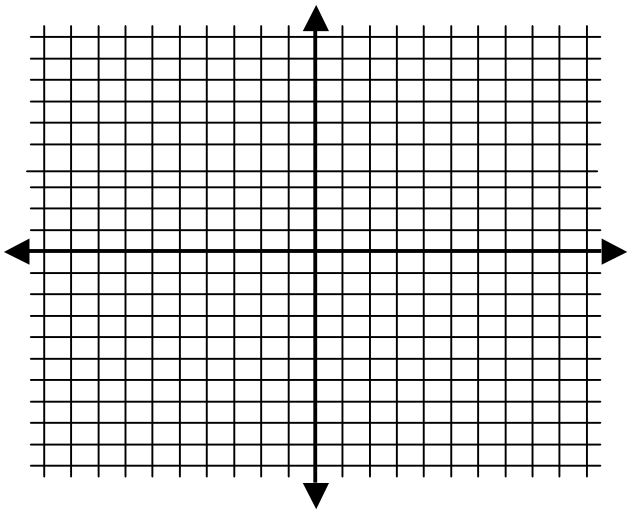
Axis of Symmetry: ___$x = 0$_____



8. $y = -4x^2$

Vertex: _____(0, 0)_____

Axis of Symmetry: _$x = 0$_____

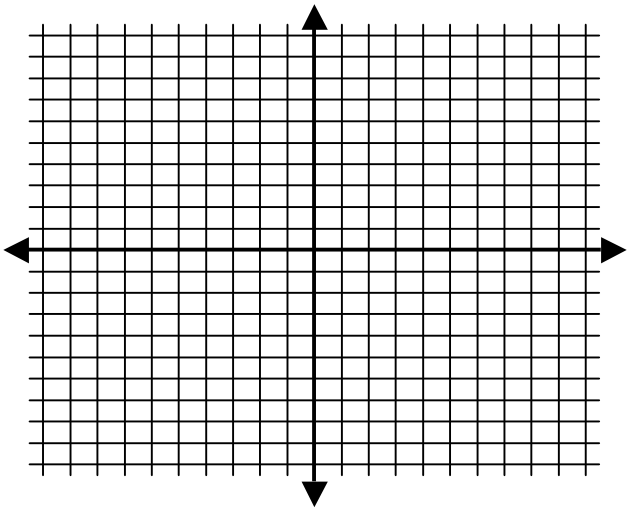


9. $y = x^2 + 5$

x	–3	–2	–1	0	1	2	3
y	14	9	6	5	6	9	14

Vertex: ___(0, 5)_____

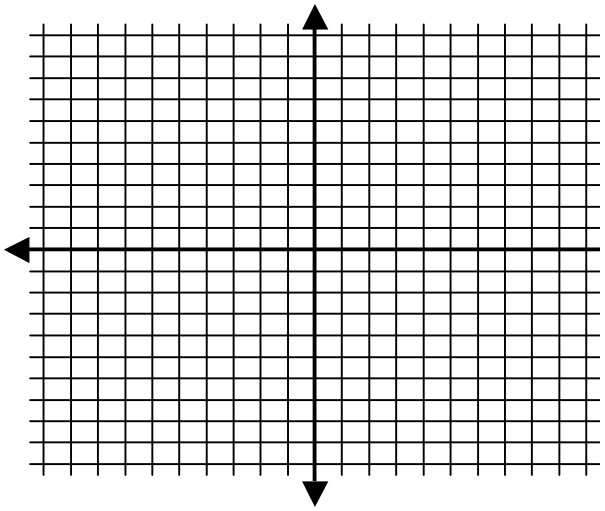
Axis of Symmetry: ____$x = 0$_____



10. $y = x^2 - 1$

Vertex: __(0, –1)_____

Axis of Symmetry: ____$x = 0$_____

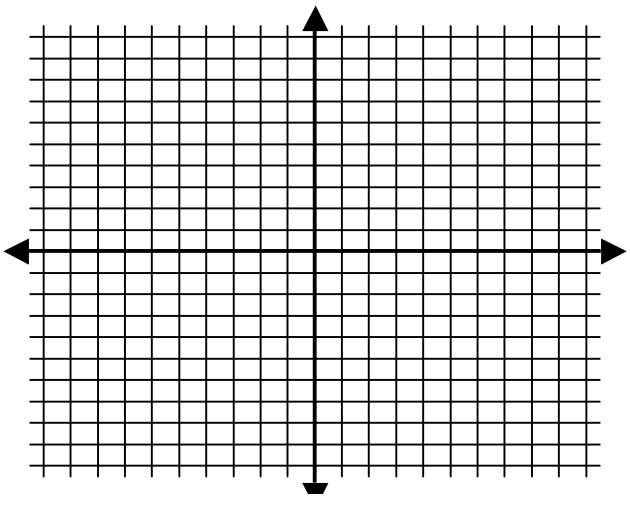


11. $y = x^2 + 4$

x	–3	–2	–1	0	1	2	3
y	13	8	5	4	5	8	13

Vertex: __(0, 4)_____

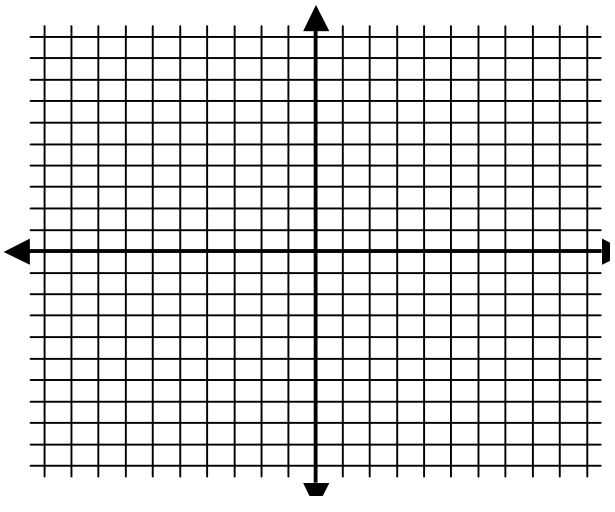
Axis of Symmetry: ___$x = 0$_____



12. $y = x^2 - 2$

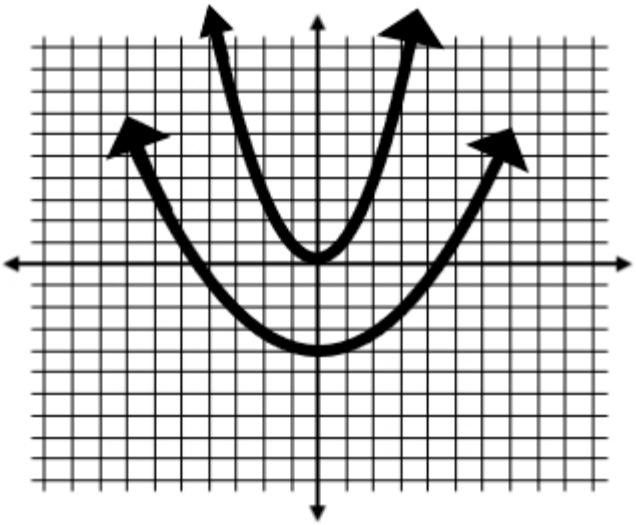
Vertex: __(0, –2)_____

Axis of Symmetry: _____$x = 0$____

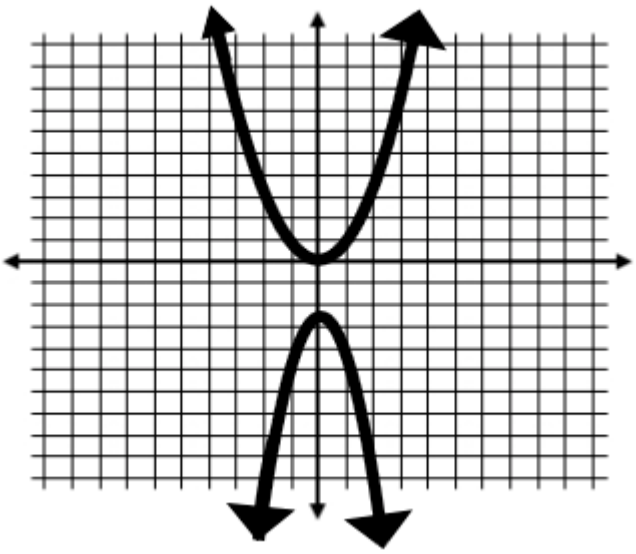


Now use your observations to <u>sketch</u> the graphs of the following quadratic functions:

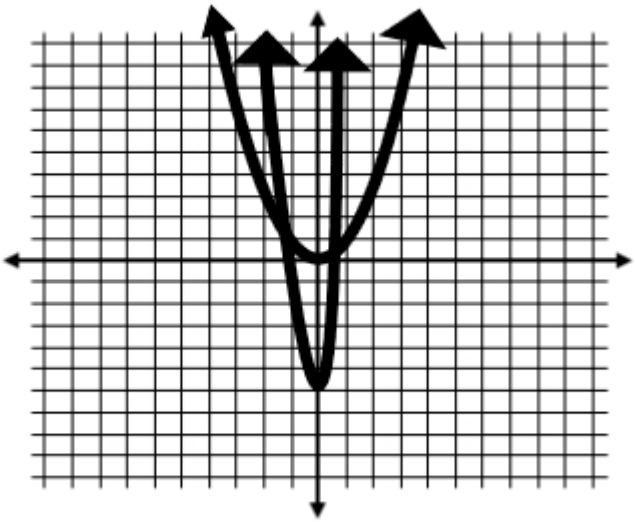
1. $y = \frac{1}{2}x^2 - 4$



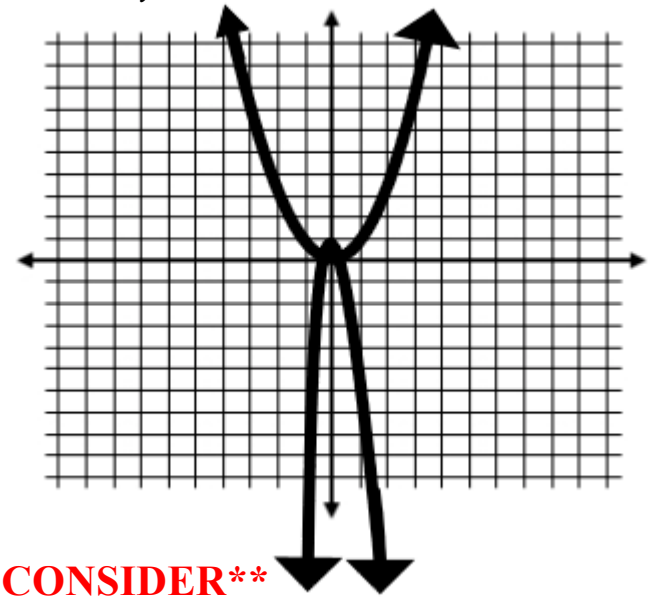
2. $y = -\frac{3}{2}x^2 - 2$



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



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



****THOUGHTS TO CONSIDER****

- **What makes a parabola narrower? If $|a| > 1$, then the parabola will be narrower**
- **What makes a parabola wider? If $|a| < 1$, then the parabola will be wider**
- **What makes a parabola open facing upward (U- shaped)? If $a > 0$, the parabola opens upward**
- **What makes a parabola open facing downward (∩ -shaped)? If $a < 0$, the parabola opens downward**

- **What shifts a parabola up on the *y*-axis? If *c* is being added (positive), then the parabola shifts up**

- **What shifts a parabola down on the *y*-axis? If *c* is being subtracted (negative) then the parabola shifts down**