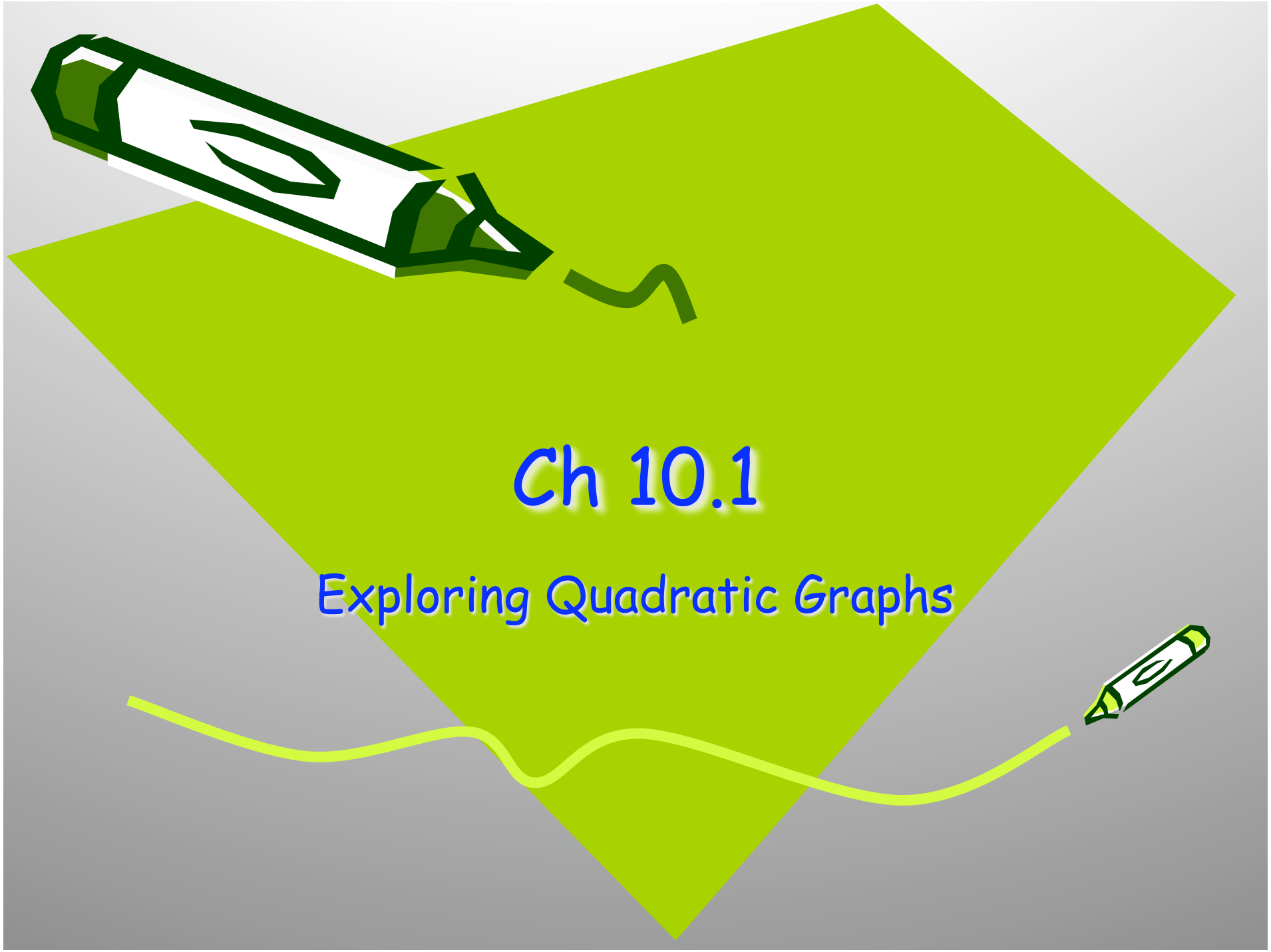

Ch 10.1
Exploring Quadratic Graphs

Quadratic Functions & their Graphs

A quadratic function is written: $y = ax^2 + bx + c$, where $a \neq 0$.
This is standard form. Ex. $y = 2x^2 - 5x + 9$

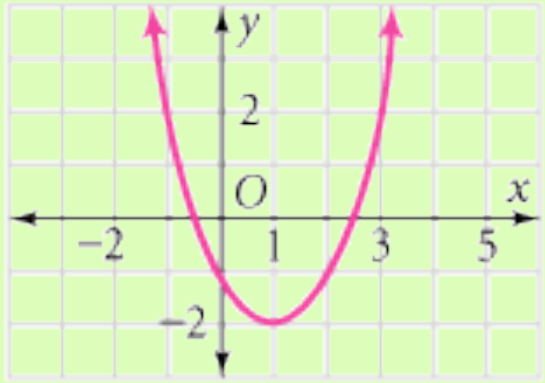
Quad. Graphs-

- U-shaped -*parabolas*. If **a** is positive, graph opens up; if **a** is negative, graph opens down.
- The *axis of symmetry* is the fold or line that divides parabola into two matching halves.
- Vertex-highest or lowest pt of parabola. If **a** is positive, vertex-minimum pt; if **a** is negative vertex- maximum pt.
- If **b** & **c** both = 0, then the vertex of the graph is at (0,0) Ex. $y = 3x^2$
- If only b = 0, the **c** moves graph up or down y-axis. Vertex will be (0, **c**) Ex. $y = 6x^2 - 11$ (0, -11)
- **a** determines width of parabola. The bigger the (abs. val) #, the narrower; the smaller the #, the wider. So $y = -3x^2$ is narrower than $y = \frac{1}{2} x^2$

The Vertex

- To identify the vertex, find it's x & y coordinates, then determine if it is the min or max pt.

a.

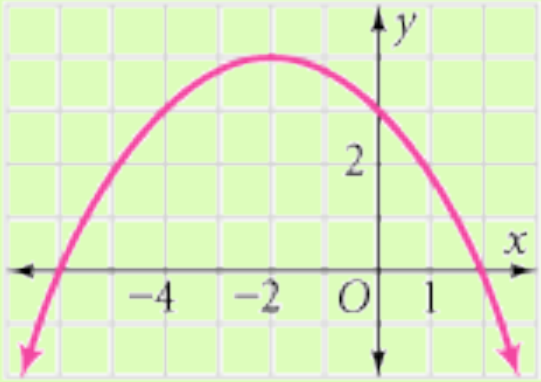


The vertex is $(1, -2)$. It is a minimum.

Parabola opens up, vertex is a min.

a is positive.

b.



The vertex is $(-2, 4)$. It is a maximum.

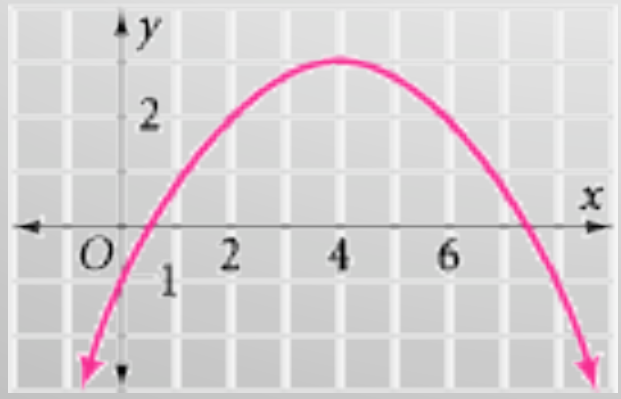
Parabola opens down, vertex is a max.

a is negative.

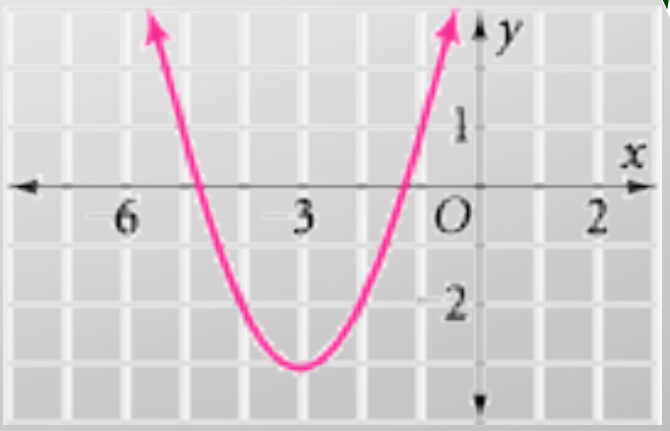
Try some

Identify the vertex and tell if min or max. .

1.



2.



Try some

Order quad. functions from widest to narrowest.

*Bigger #- narrower, Smaller #- wider

1. $y = x^2$, $y = 1/2x^2$, $y = -2x^2$

2. $y = -x^2$, $y = 1/2x^2$, $y = -3x^2$

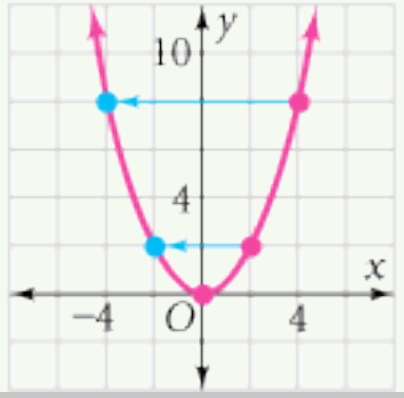
3. $y = 1/4x^2$, $y = 7x^2$, $y = -4x^2$

Graphing

To graph- 1st plot the vertex, then pick a few x values from one side of the vertex, plug into function and solve for y & plot. Lastly, reflect points over axis of symmetry. (Count)

$y = ax^2$ *vertex is (0,0) Graph $y = 1/2x^2$

x	$y = \frac{1}{2}x^2$	(x, y)
0	$\frac{1}{2}(0)^2 = 0$	$(0, 0)$
2	$\frac{1}{2}(2)^2 = 2$	$(2, 2)$
4	$\frac{1}{2}(4)^2 = 8$	$(4, 8)$

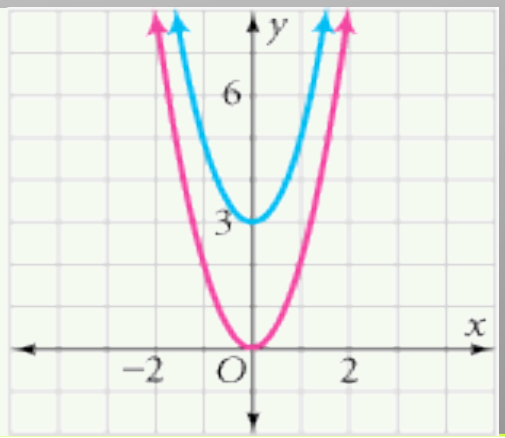


Find the corresponding points on the other side of the axis of symmetry.

*Use multiples of the denom. when a is a fraction

$y = ax^2 + c$ *vertex is (0,c) Graph $y = 2x^2$ v(0,0) & $y = 2x^2 + 3$ v(0, 3)

x	$y = 2x^2$	$y = 2x^2 + 3$
−2	8	11
−1	2	5
0	0	3
−1	2	5
−2	8	11



Try some

Graph each function.

1. $Y = 1/3x^2$

2. $Y = -2x^2$

3. $Y = x^2 + 3$

4. $Y = 2x^2 - 2$