Unit 7: Quadratics

Name: _____

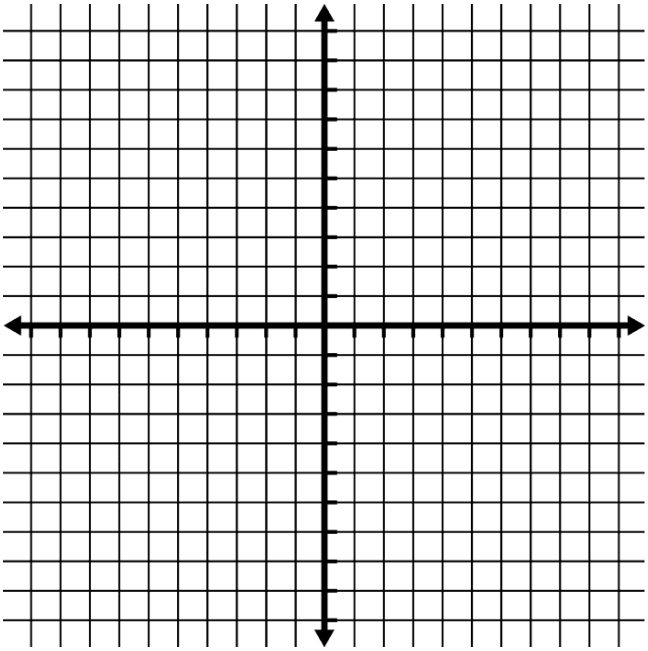
Lesson 7.1 - The Parabola

Graphing quadratic functions by hand

1) The Basic Shape

$$y = x^2$$

x	y
0	
1	
2	
3	
-1	
-2	
-3	



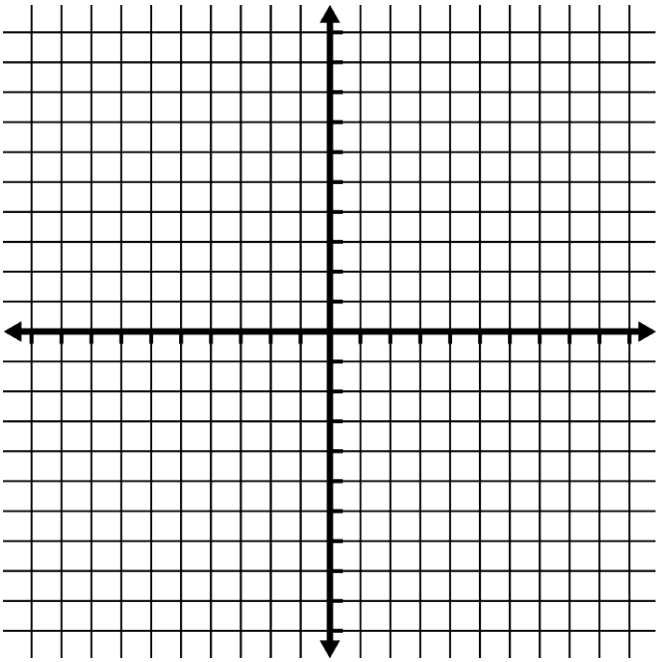
2) The Horizontal Shift

$$y = (x - p)^2$$

Example: if $p = 4$

The equation is $y = (x - 4)^2$

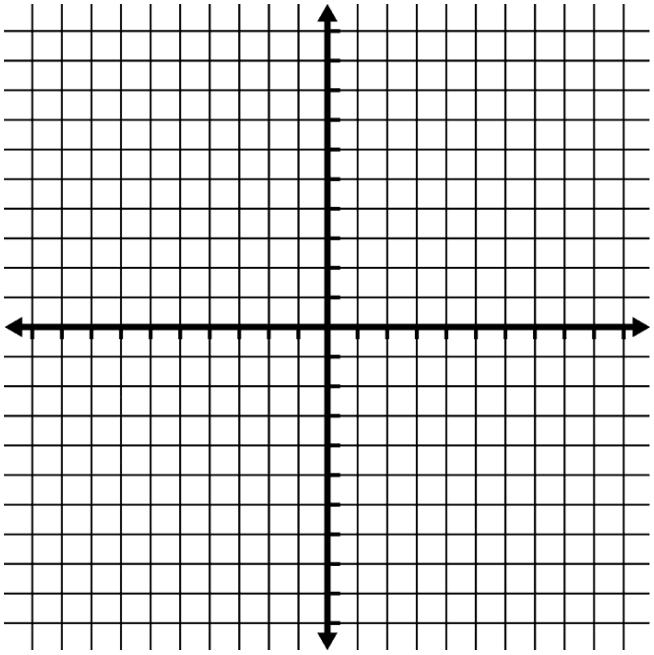
x	y



CONCLUSION: The variable p will move the parabola _____

3) The Vertical Shift

$$\boxed{y = x^2 + q}$$



Example: if $q = 4$

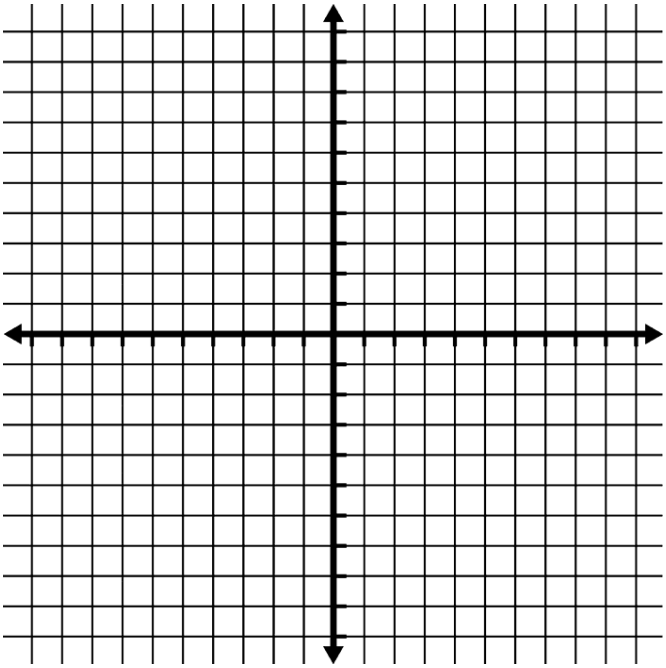
The equation is $y = x^2 + 4$

x	y

CONCLUSION: The variable q will move the parabola _____

4) The Stretch Factor

$$\boxed{y = ax^2}$$



Examples: if $a = 2,\ or\ a = \frac{1}{2}$

The equations are $y = 2x^2,\ y = \frac{1}{2}x^2$

x	y	x	y

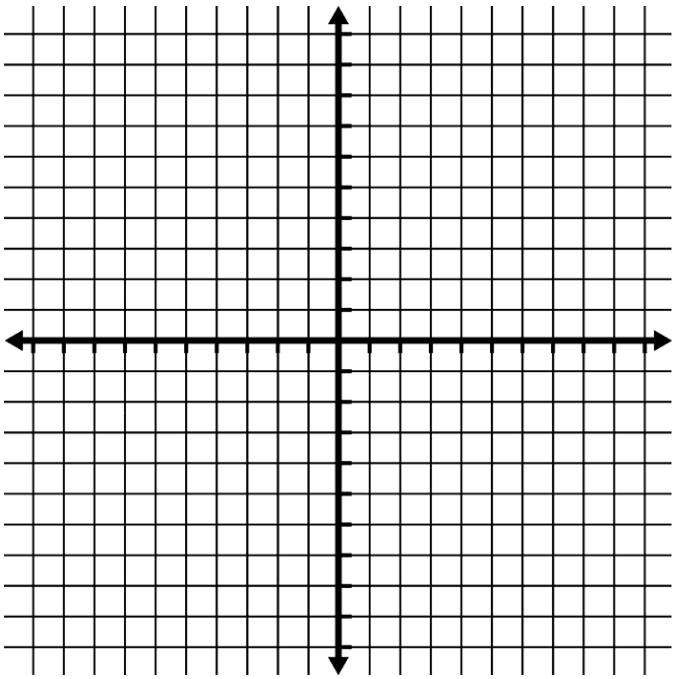
CONCLUSION: The variable a will _____ the parabola

5) Negative a

Examples: if $a = -1$

The equation is now $y = -x^2$

x	y



CONCLUSION: The negative a will _____ the parabola

Putting it all together

$$y = a(x - p)^2 + q$$

p = _____

q = _____

a = _____

(p,q) = _____

Example:

Analyze the following quadratic before graphing:

$$y = \frac{1}{2}(x - 3)^2 - 4$$

a) p = _____ q = _____

b) where will the vertex of the parabola be? _____

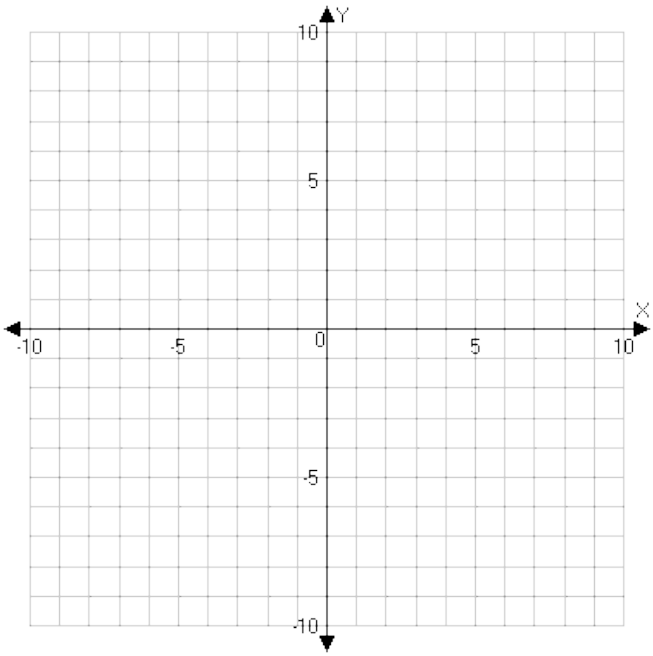
c) has the parabola been compressed vertically or stretched vertically? _____

d) does the parabola have a maximum or a minimum? _____

e) make a table of values, starting with the vertex and including three points on each side.

x	y

f) graph the parabola



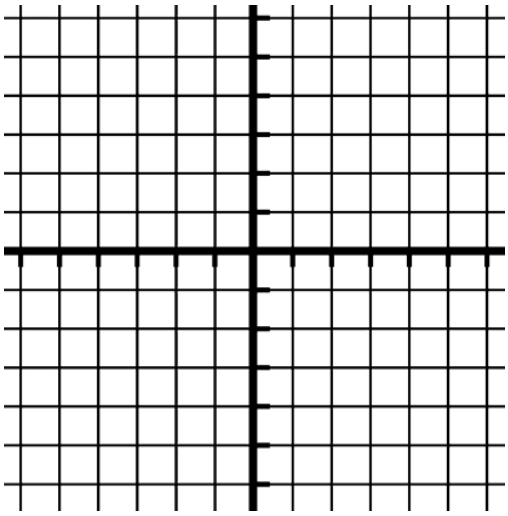
Assignment

Starting with the vertex, use *2-4 more points in each direction to accurately draw the following quadratics and fill out the chart below*

1) $y = x^2 - 2$

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

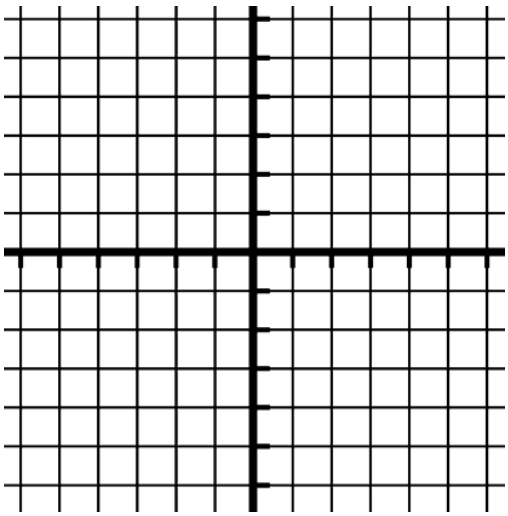
x	y



2) $y = (x - 2)^2$

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

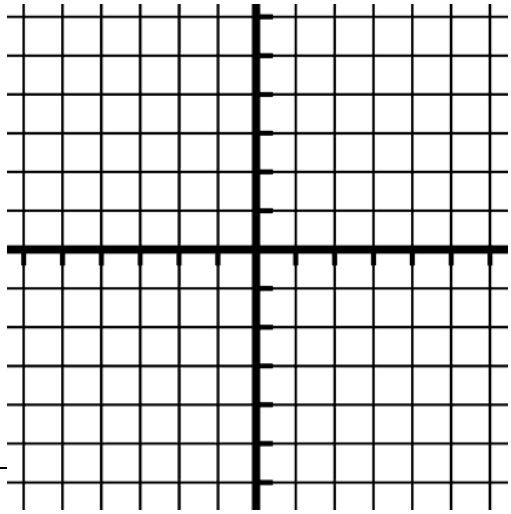
x	y



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

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

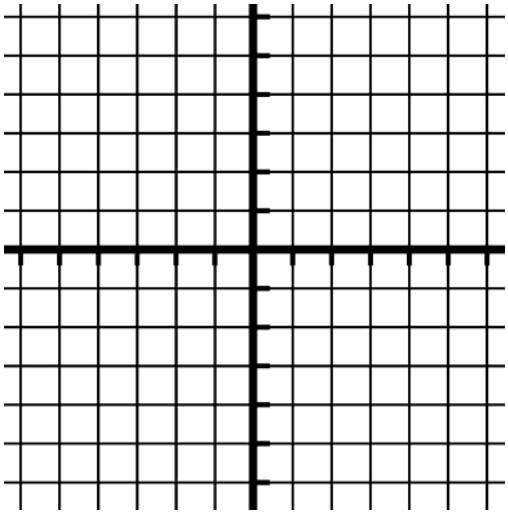
x	y



4) $y = \frac{1}{2}(x+2)^2 - 2$

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

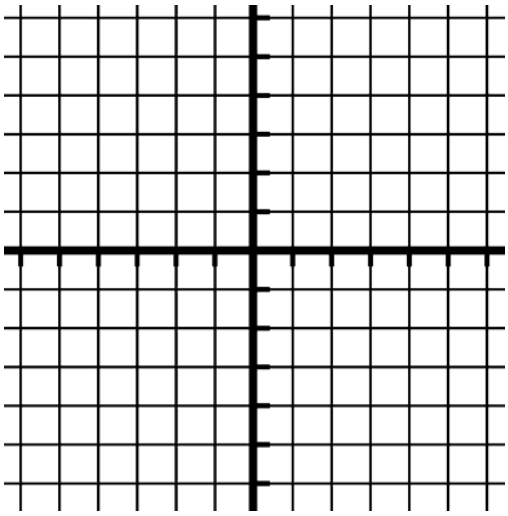
x	*y*



5) $y = -\frac{1}{2}(x-2)^2 + 3$

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

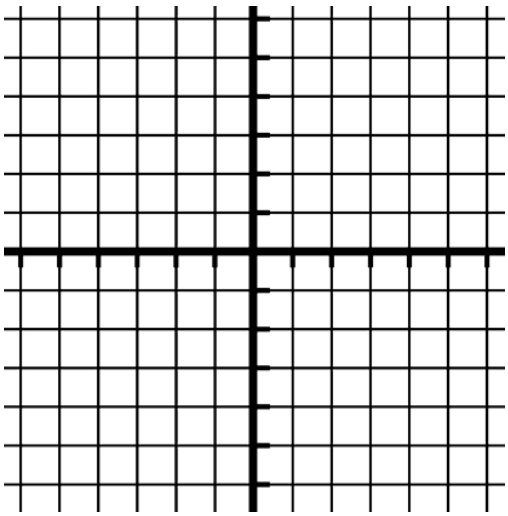
x	*y*



6) $y = -2(x-1)^2 - 2$

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

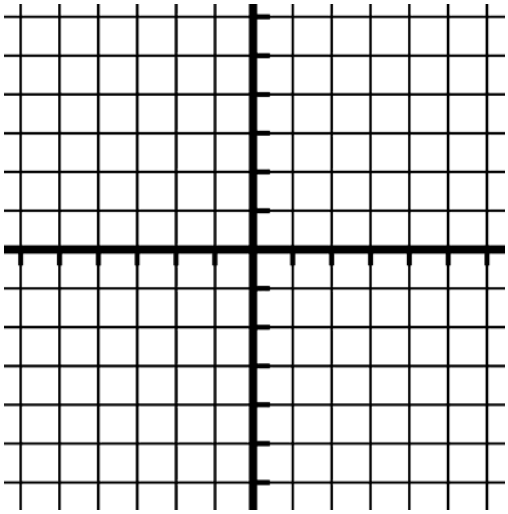
x	*y*



7) $y - 4 = -\frac{2}{3}(x + 2)^2$

Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

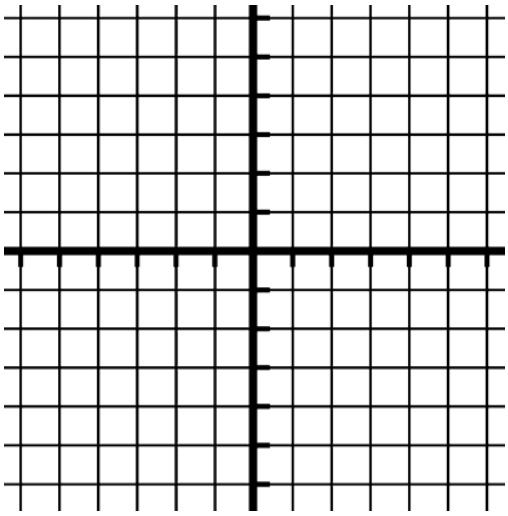
x	*y*



8) $y + 3 = \frac{3}{4}(x - 4)^2$

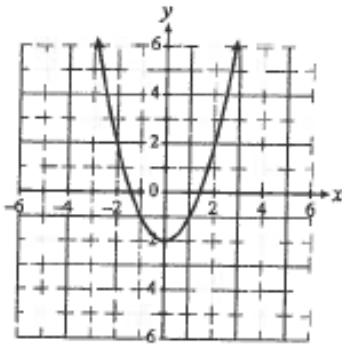
Horizontal shift (p)	
Vertical shift (q)	
Vertex	
Stretch factor (a)	
Compressed Vertically OR **Stretched** Vertically	
Minimum (opens up) OR **Maximum** (opens down)	

x	*y*



Answer Key

1)



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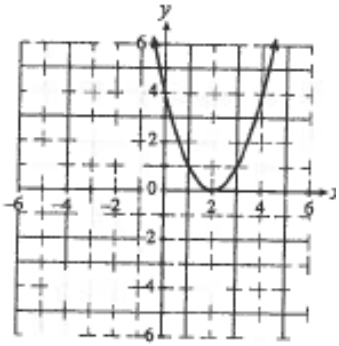
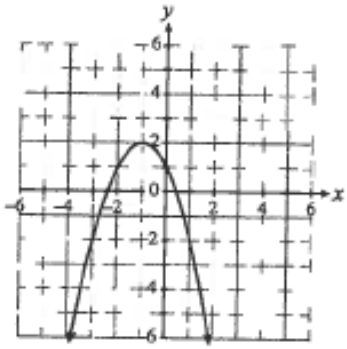
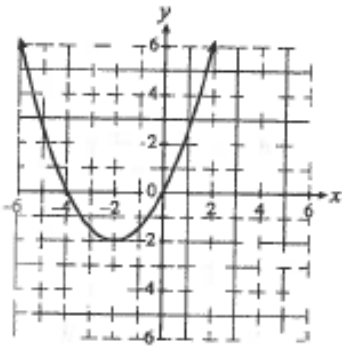


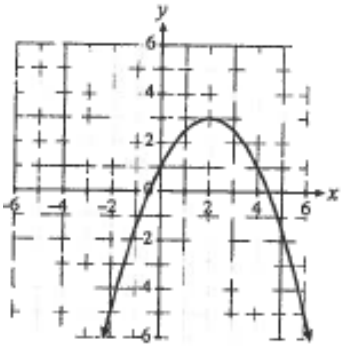
3)



4)



5)



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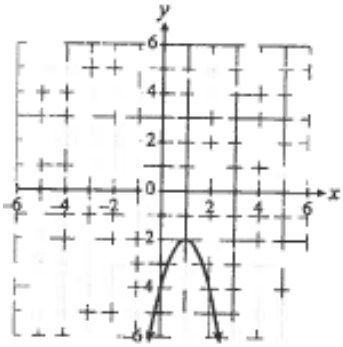

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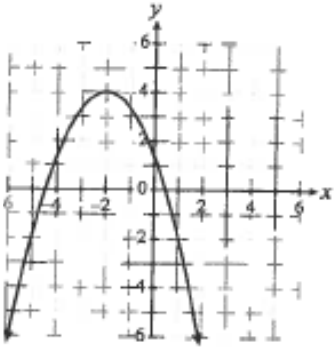

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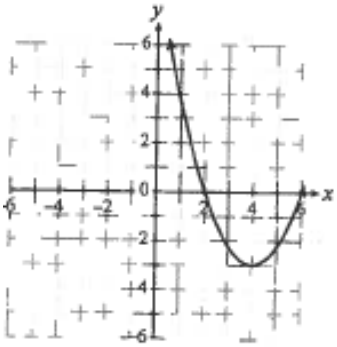
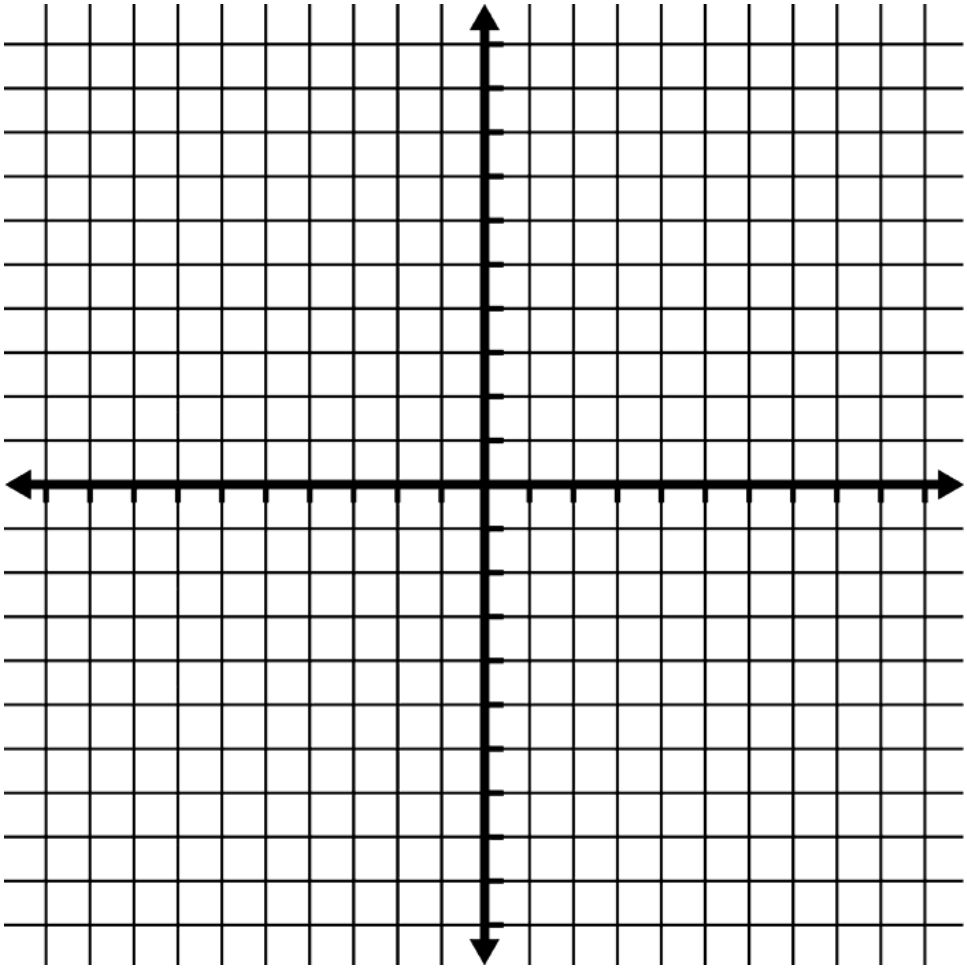


Practice Quiz

Draw the parabola using at least **seven** points:

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

x	y