

Transformations of Quadratic Function

= changes made to the graph of the original parabola $y = x^2$

3 Ways to Describe Transformations of Quadratic Function

- Equation in vertex form
- Word descriptions
- Mapping notation

Equation in Vertex Form

$$y = \pm a (x - h)^2 + k$$

Word Descriptions

- Horizontal translation: left or right by _____
- Vertical translation: up or down by _____
- Reflection in x-axis: _____ reflection (flipping upside down)
- Vertical stretch (expansion): by a factor of **a** where $a > 1$
 - Graph looks narrower than the original
- Vertical stretch (compression): by a factor of **a** where $0 < a < 1$
 - Graph looks wider than the original

Mapping Notation

$$(x, y) \rightarrow (x \mp h, \pm ay \pm k)$$

Ex-1) Describe all transformations in “Word Descriptions”

a. $y = -x^2 + 3$

- reflection in x-axis
- vertical translation up by 3 units

b. $y = x^2 - 5$

c. $y = (x + 6)^2$

d. $y = (x - 8)^2$

e. $y = (x + 0.5)^2 - 1.5$

f. $y = (x - 2.4)^2 + 3.6$

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

h. $y = -x^2 - 12$

Ex-2) Describe all vertical stretches in “Word Descriptions”

a. $y = 2x^2$

- vertical stretch expansion by a factor of 2

b. $y = 0.4x^2$

c. $f(x) = 3.5x^2$

d. $y = 0.02x^2$

e. $f(x) = 25x^2$

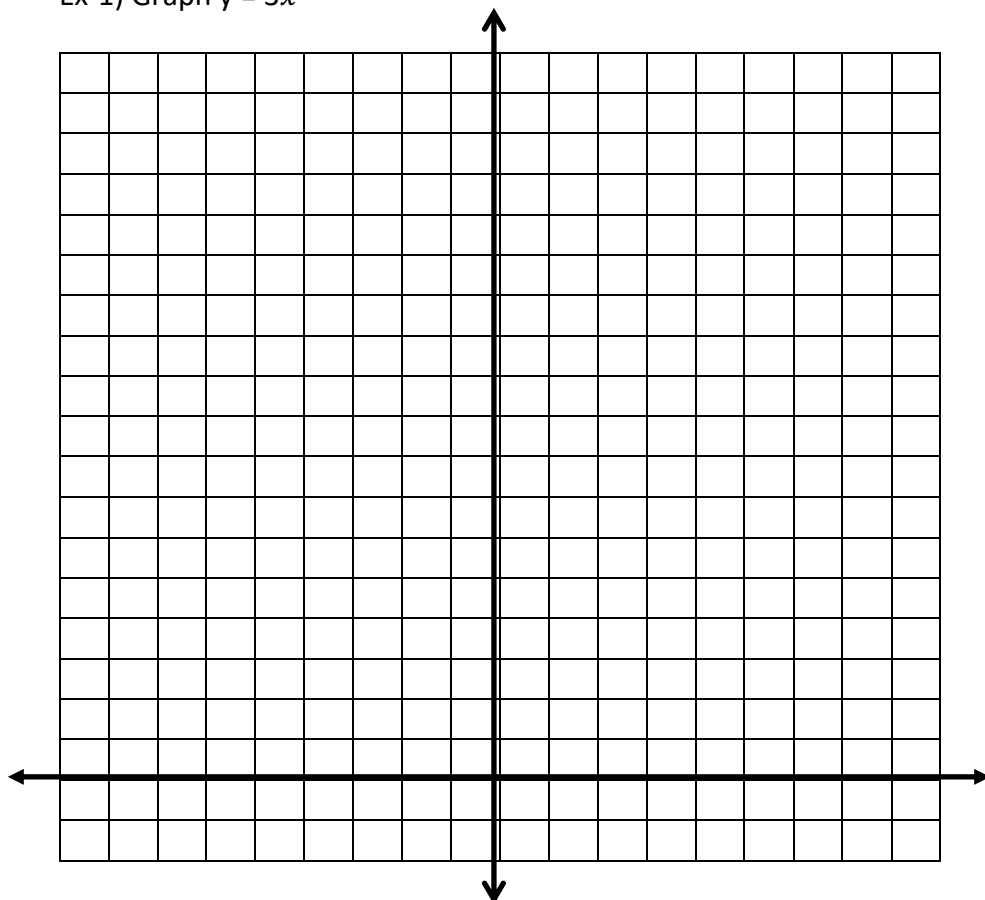
f. $y = 1.01x^2$

g. $f(x) = x^2$

h. $y = 0.2x^2$

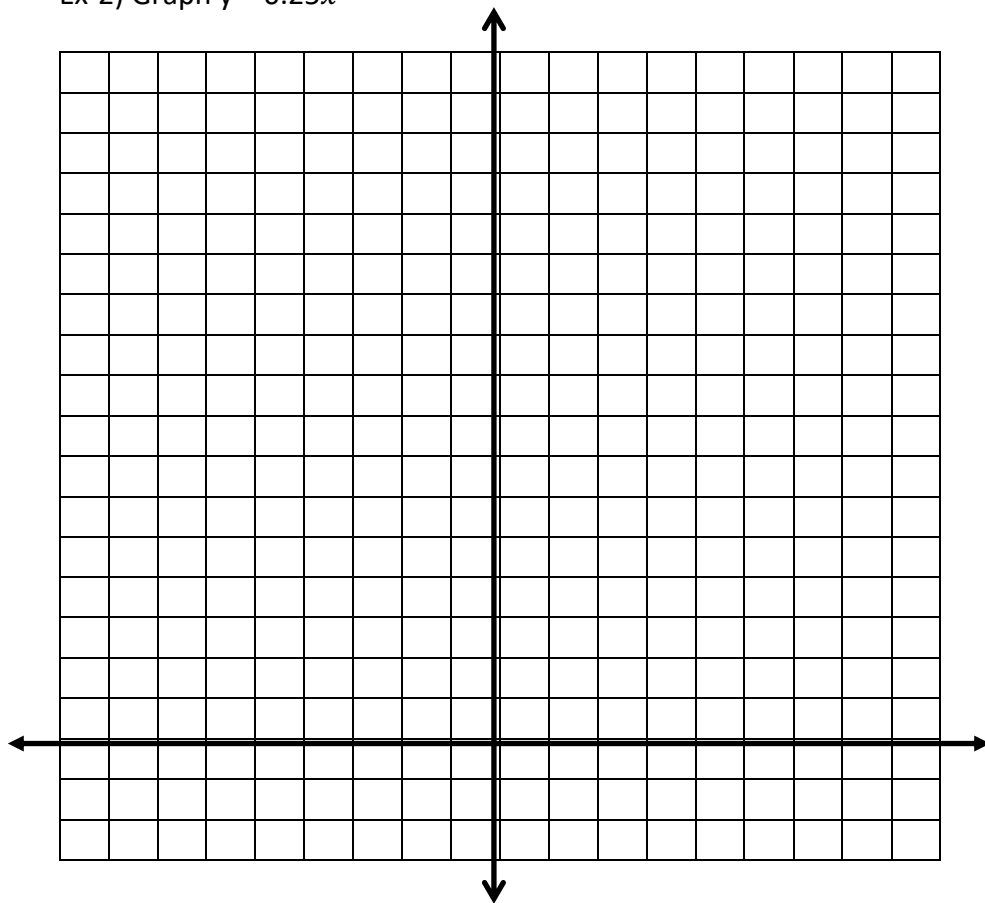
Graphing Quadratic Functions

Ex-1) Graph $y = 3x^2$



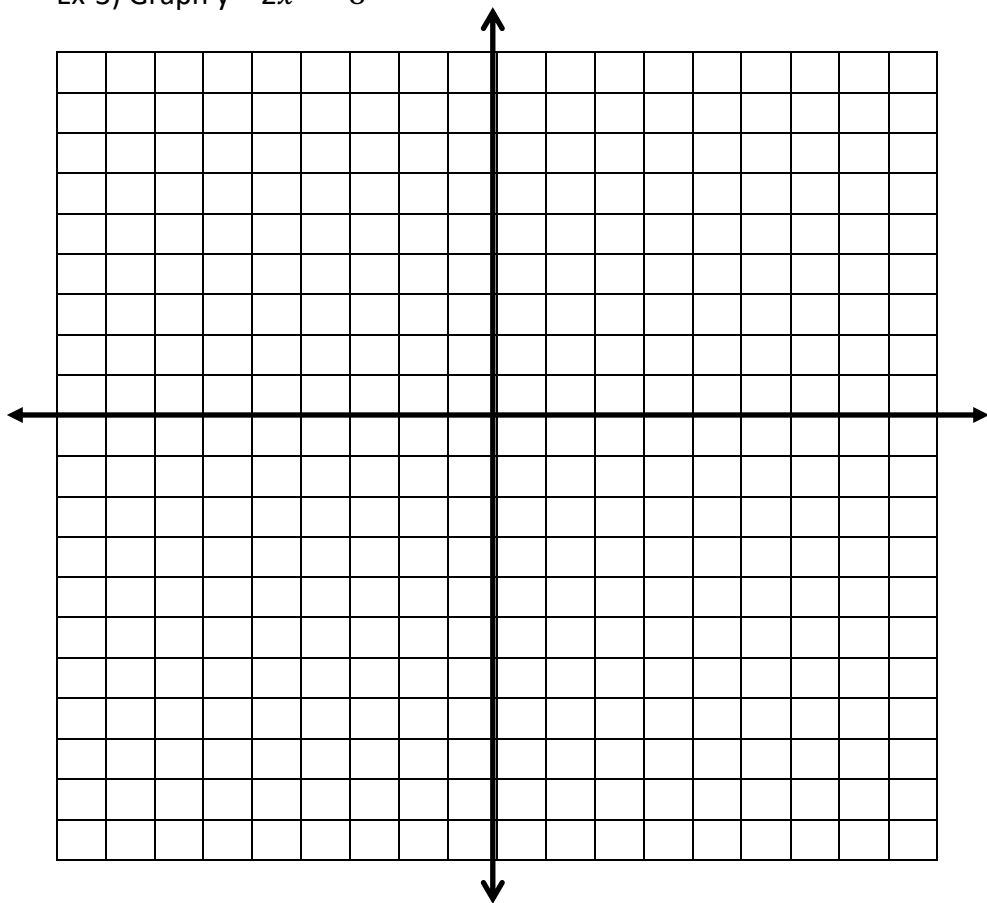
Domain		Vertex	
Range		Axis of Symmetry	
x-intercept		End behavior	
y-intercept		Transformations	

Ex-2) Graph $y = 0.25x^2$



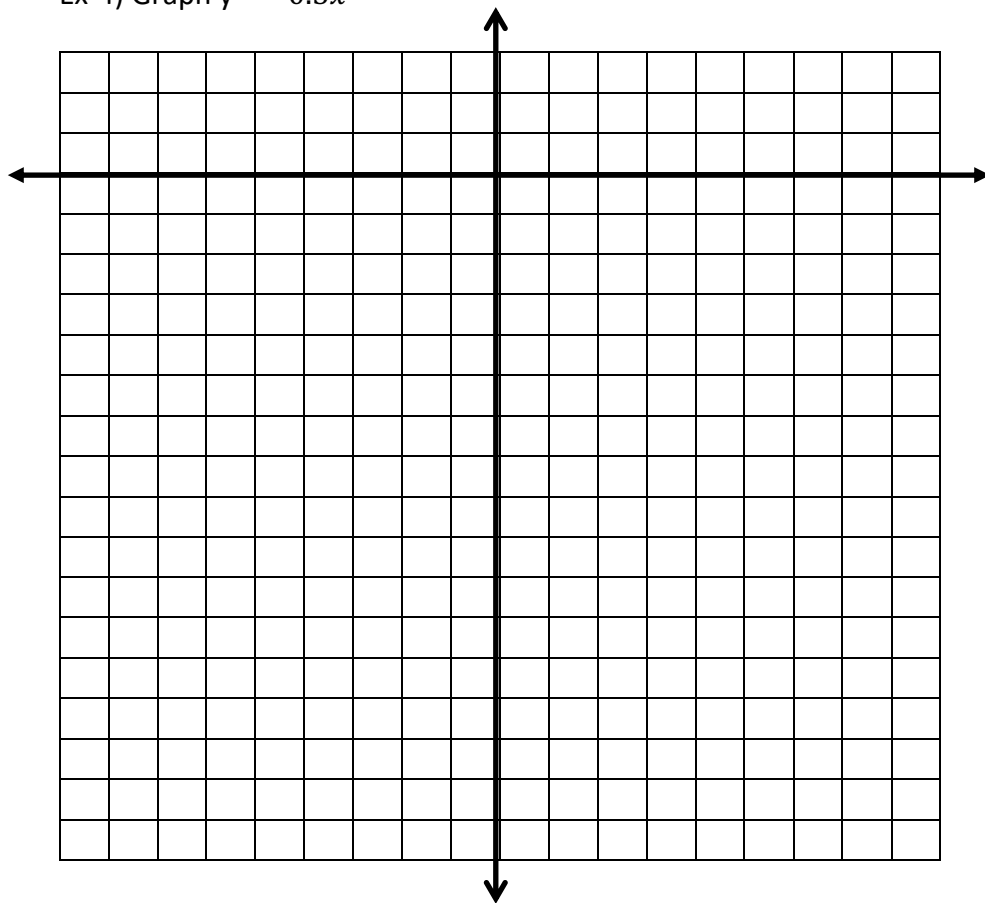
Domain		Vertex	
Range		Axis of Symmetry	
x-intercept		End behavior	
y-intercept		Transformations	

Ex-3) Graph $y = 2x^2 - 8$



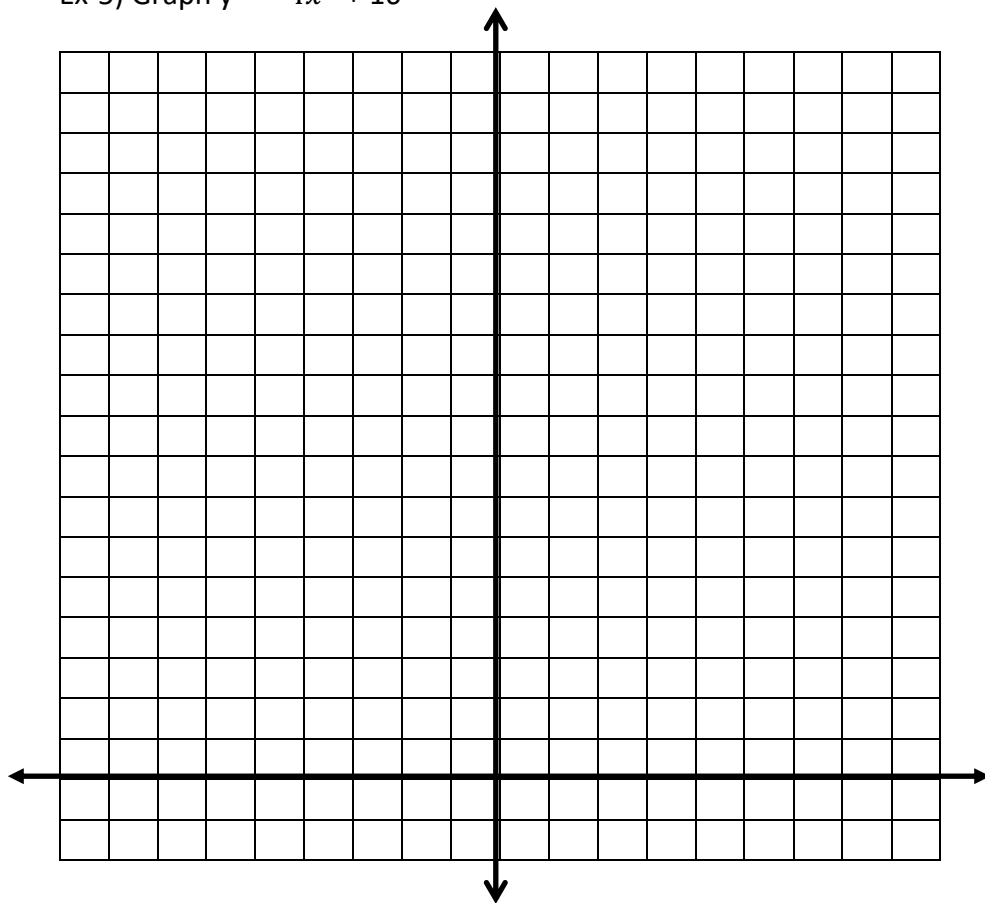
Domain		Vertex	
Range		Axis of Symmetry	
x-intercept		End behavior	
y-intercept		Transformations	

Ex-4) Graph $y = -0.5x^2$



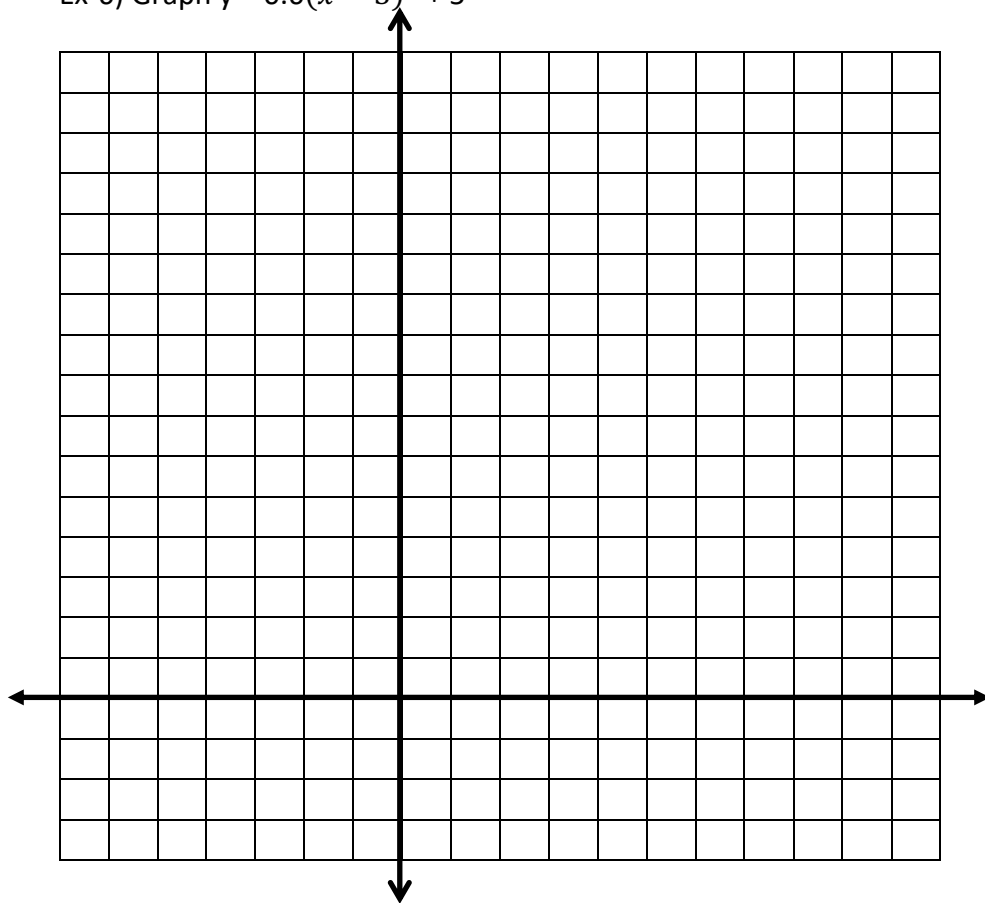
Domain		Vertex	
Range		Axis of Symmetry	
x-intercept		End behavior	
y-intercept		Transformations	

Ex-5) Graph $y = -4x^2 + 16$



Domain		Vertex	
Range		Axis of Symmetry	
x-intercept		End behavior	
y-intercept		Transformations	

Ex-6) Graph $y = 0.6(x - 3)^2 + 5$



Domain		Vertex	
Range		Axis of Symmetry	
x-intercept		End behavior	
y-intercept		Transformations	