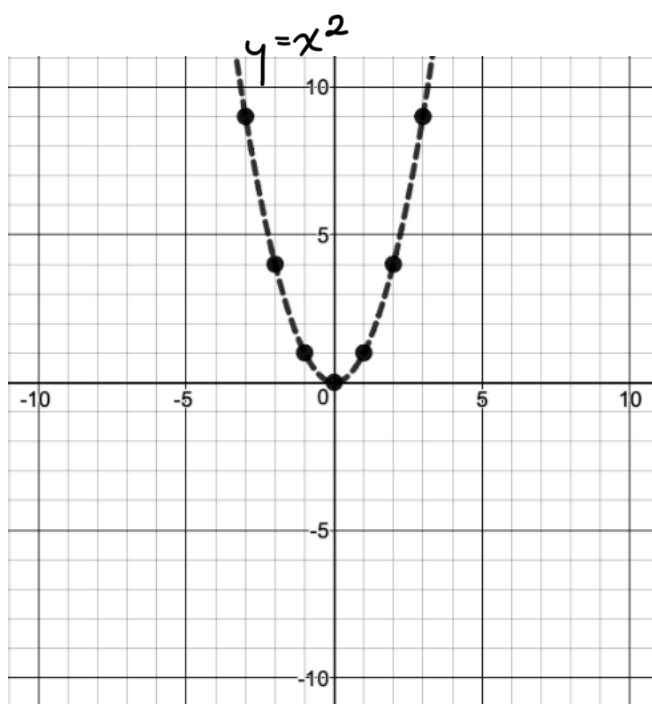# Comparing and Describing Quadratic Relations, Part II

Example 1

When the independent variable, x, is squared, and the result is multiplied by 0.5, like so:

$$y = 0.5x^2$$

a) <u>Why</u> does the new graph appear to be wider, or compressed, compared to $y = x^2$?
b) What are the characteristics of a quadratic relation when represented as a graph?
c) What are the characteristics of a quadratic relation when represented as a table?

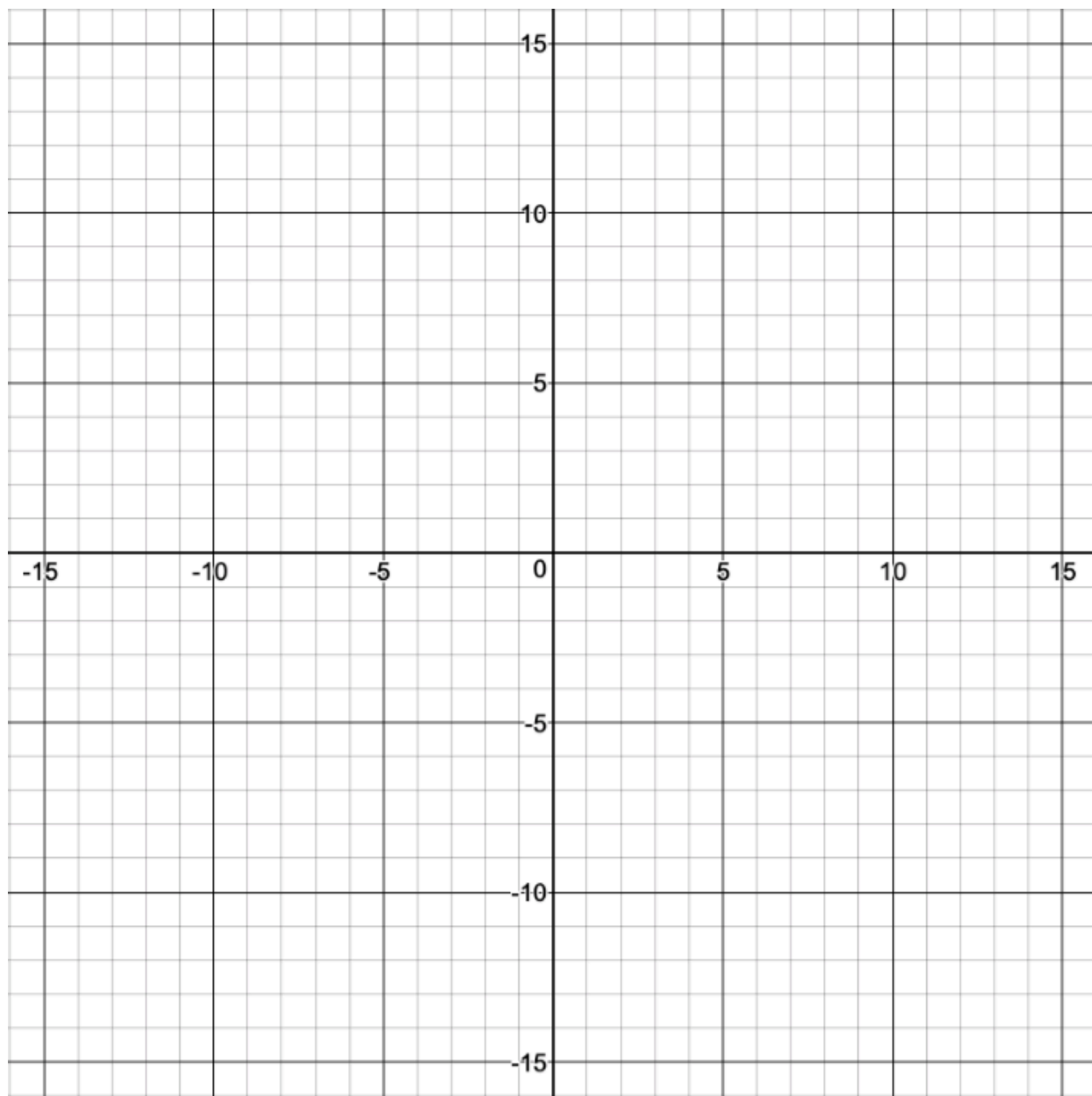| x	y	F.D.	S.D.
-6			
-4			
-2			
0			
2			
4			
6			

Name: _____

Example 2

Consider the first differences from the relations in example 1. Do you see a pattern?

Let's try applying that pattern to plot, by hand, the following relations without resorting to making a table of values first:
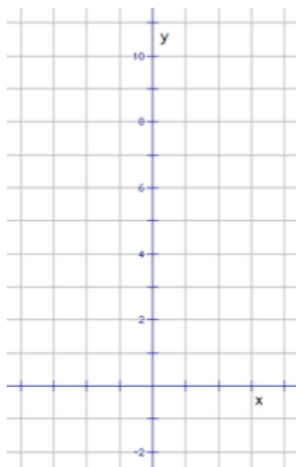
a. $y = -0.5x^2$ b. $y = 0.5x^2 + 2$ c. $y = 0.25x^2 + 2$
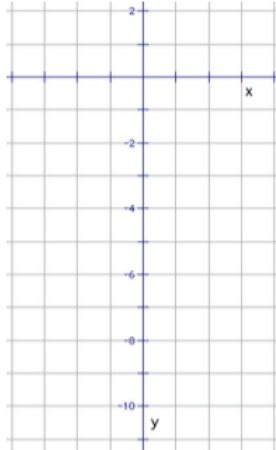
Example 3

Plot each of the following relations and analyze the relation as indicated:
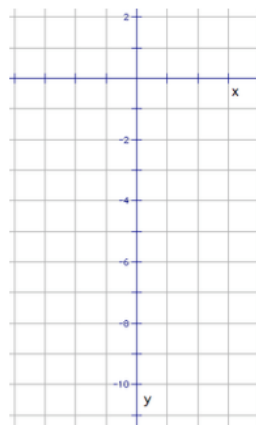
a) Graph the relation $y = x^2$.   b) Graph the relation $y = -x^2$ c) Graph the relation $y = -(x-2)^2 + 1$

i)   Direction of opening?

ii) Vertex co-ordinates?

iii) Eq'n of axis of symmetry?

iv) Max/min value is?

v)   Values x may take?

vi) Values y may take?

a)

i)   Direction of opening?

ii) Vertex co-ordinates?

iii) Eq'n of axis of symmetry?

iv) Max/min value is?

v)   Values x may take?

vi) Values y may take?

b)

i) Direction of opening?

ii) Vertex co-ordinates?

iii) Eq'n of axis of symmetry?

iv) Max/min value is?

v) Values x may take?

vi) Values y may take?

Opportunity to Learn

Part A

Given what you have summarized about how the values of a, h, and k transform a quadratic in the form:

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

… try writing an equation for each quadratic described below.

    a. A parabola with its vertex at $(2, 3)$, opening up, with no vertical stretch.

    b. A parabola with its vertex at $(-3, 0)$, opening down, with a vertical stretch of factor 2.