Unit 1: Transformations

Introduction

In grade 11, you studied quadratic functions in great detail. Recall that a quadratic function has the general form:

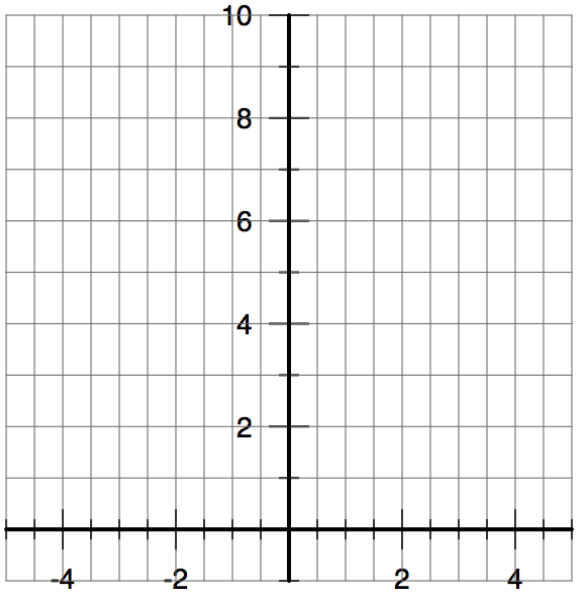
$$y = a(x-h)^2 + k$$

Also, recall that the graph of a quadratic function is a parabola, where the point (h,k) is the **vertex**, and the sign of a determines whether the parabola opens up (if a is +) or down (if a is –).

In grade 11, you graphed quadratic functions by finding the vertex and plotting several points on either side of the **axis of symmetry** (a vertical line passing through the vertex that divides the parabola into two symmetrical halves). For example:

Draw the graph of $f(x) = x^2$.

x	y



Now draw the graph of $g(x) = (x-2)^2 + 1$ on the same axes.

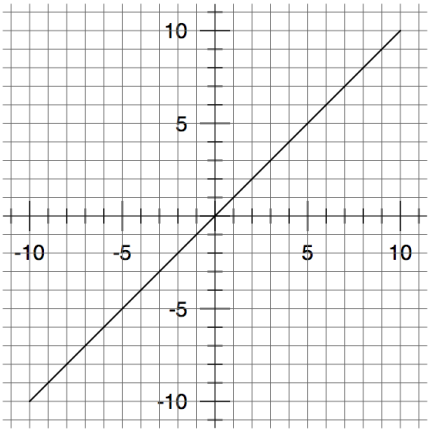
x	y

Note that the graph of $g(x)$ has the exact same shape as the graph of $f(x)$, but is located 2 units to the right and 1 unit up. In fact, you could think of the graph of $g(x)$ as the graph of $f(x)$ moved 2 units right and 1 unit up.

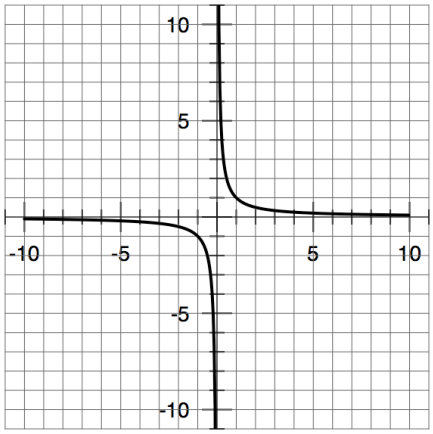
In grade 12, instead of graphing $g(x)=(x-2)^2+1$ by finding its vertex and plotting several ordered pairs, we are going to learn to draw the graph by **transforming** (or moving) the parent graph $f(x)=x^2$ 2 units to the right and 1 unit up.

By the end of this unit, you will have learned how to **translate** (move), **stretch/compress**, and **reflect** parent graphs. Below are some examples of parent graphs, most of which you should be familiar with from past courses.

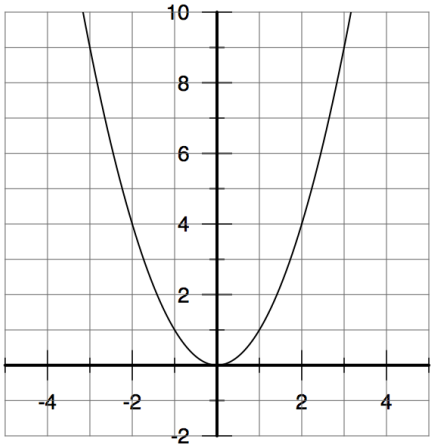
$y=x$



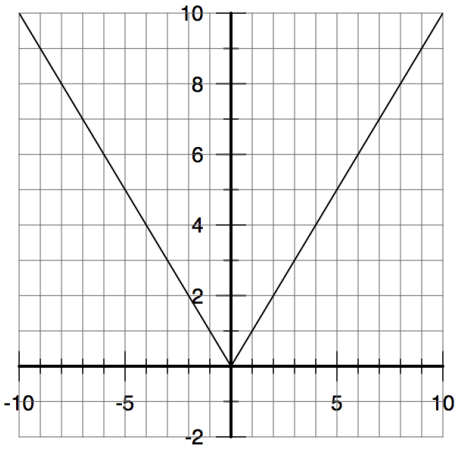
$y=\frac{1}{x}$



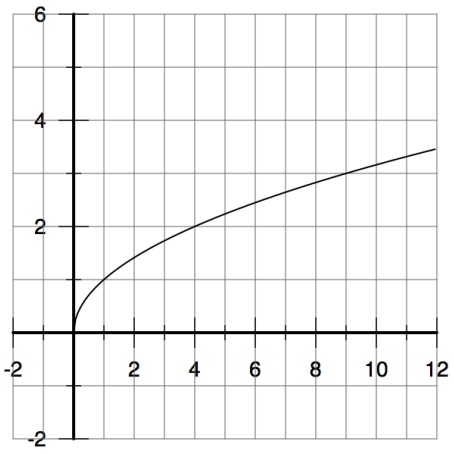
$y=x^2$



$y=|x|$



$y = \sqrt{x}$



$y = x^3$