- Graphs can be translated (slid/moved) left/right and/or up/down.
- Review—from Math 11.

quadratic eqn.
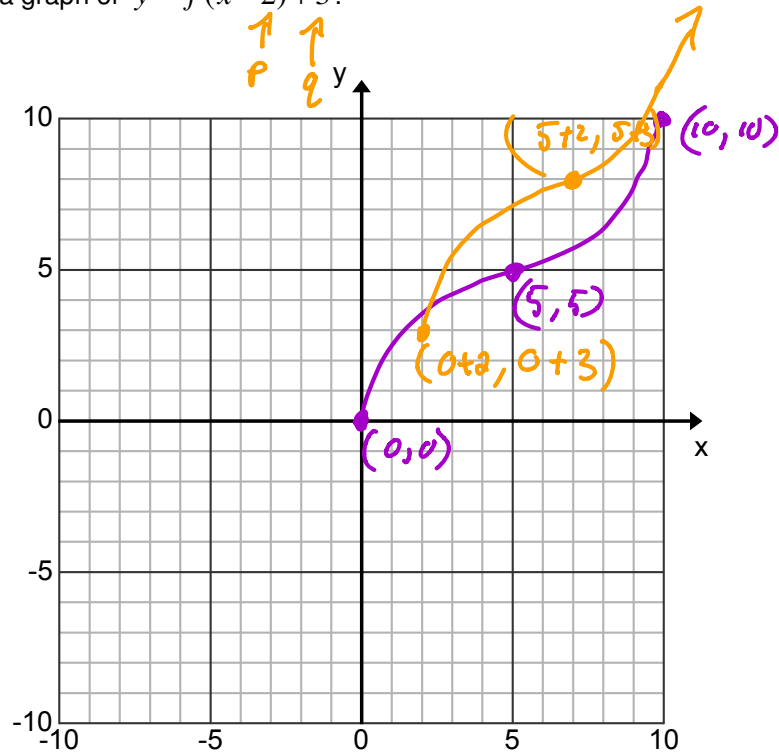
Graph:

$y = x^2$ ① power = 2

← parabola

$y = (x-2)^2 - 3$
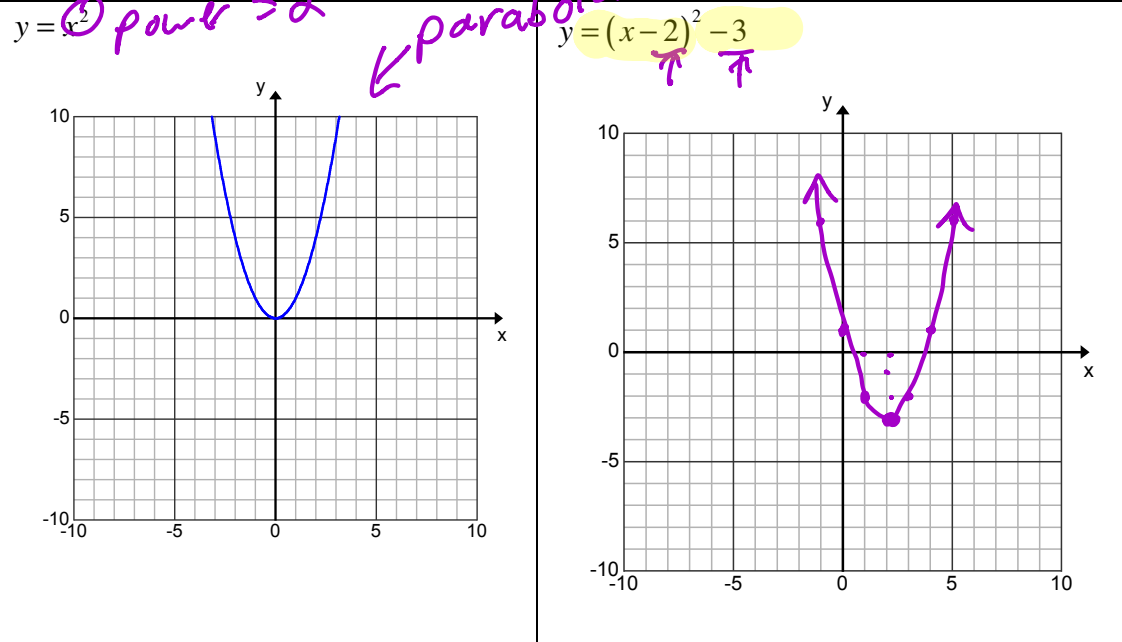
In math 11 we looked at the idea of placing the vertex and then plotting the respective points.
Another way of looking at the function is to **translate it** _2_ units _right_ and _3_ units _down_.

This process works with any function:
$y = \sqrt{x}$

$y = \sqrt{x+2} - 3$

(-2, 3)

3
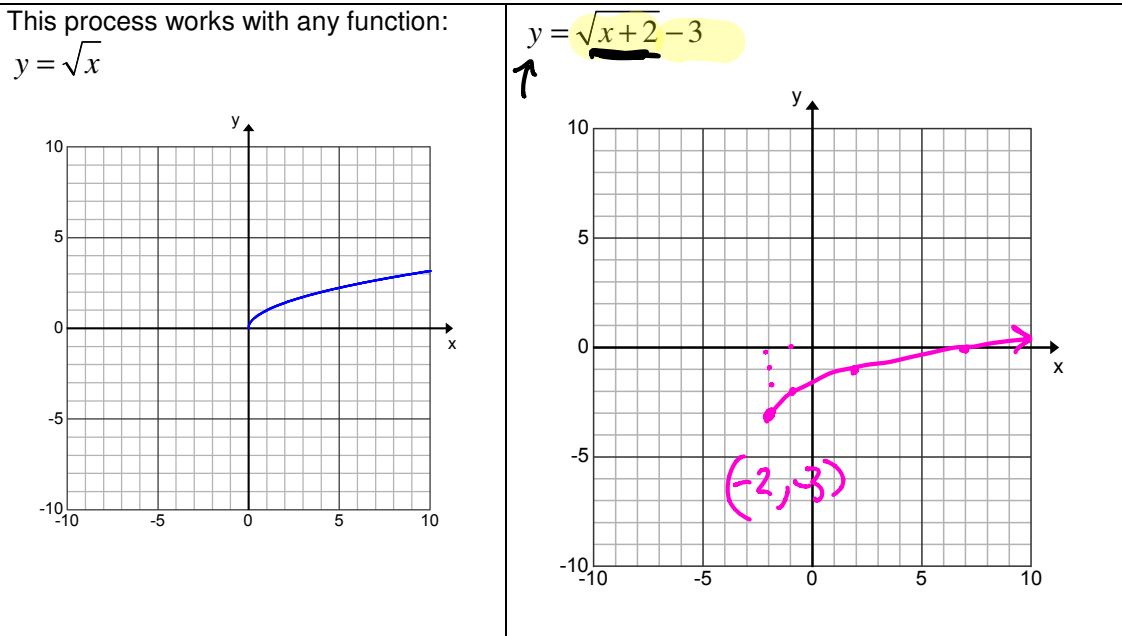
This also works for general functions (f(x), g(x), k(x)…). For example, given the graph of $y = f(x)$ sketch a graph of $y = f(x-2)+3$.

Points on graphs can be moved as well.

Ex. The point (2, 3) is on the graph of $y = f(x)$ then what point must be on the graph of $y = f(x+4)-2$?

$$(-2, 1)$$

> In general:
> The function $y = f(x)$ with the function $y = f(x \pm h) \pm k$ has been translated h units left/right and k units up/down. This process affects: domain/range, the graph itself, individual points.

$$\{x \mid 0 \le x \le 10, \ x \in \mathbb{R}\}$$

$$\{x \mid 2 \le x \le 12, \ x \in \mathbb{R}\}$$

$$y = (x-p)^2 + q \quad \nearrow \ \text{up/down}$$

$$\text{left/right}$$