

Horizontal Translation

Horizontal Translation

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

- In this chapter we will be looking at the different transformations of $y = x^2$. The first transformation we are going to look at is called a **Horizontal Translation**. The Horizontal Translation (**HT**) affects the base graph $y = x^2$ by **translating or shifting the graph to the left or right**.
- Example:
Let's look at the following functions. We will use a mapping rule to generate a table of values for the image function and then graph all three functions on the same axes.

(a.) $y = x^2$

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

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

$(x, y) \rightarrow (x + 2, y)$

$(x, y) \rightarrow (x - 6, y)$

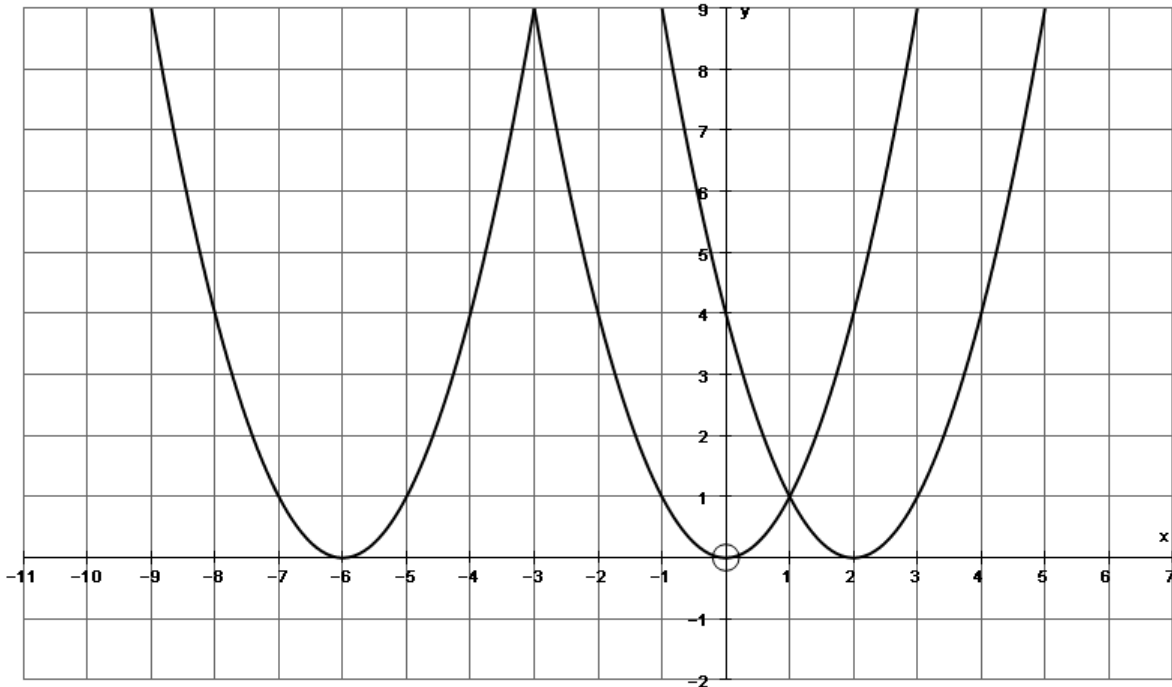
x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

x	y
-1	9
0	4
1	1
2	0
3	1
4	4
5	9

x	y
-9	9
-8	4
-7	1
-6	0
-5	1
-4	4
-3	9

|----- add 2 -----|

|----- subtract 6 -----|



When there is $(x - 2)^2$ in the equation, then there is a HT of 2 units. This will result in a graph that is shifted 2 units to the right of $y = x^2$.

When there is $(x + 6)^2$ in the equation, then there is a HT of -6 units. This will result in a graph that is shifted 6 units to the left of $y = x^2$.

Summary

Equation:

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

$$\boxed{\text{HT} = h}$$

Mapping Rule:

$$(x, y) \rightarrow (x + h, y)$$

- The Horizontal Translation is the **OPPOSITE** of the value added to x in the equation.
- The Horizontal Translation is the **SAME** as the value added to x in the mapping rule.
- When $\text{HT} > 0$, the graph is shifted h units to the **RIGHT** of $y = x^2$.
- When $\text{HT} < 0$, the graph is shifted h units to the **LEFT** of $y = x^2$.