C12 - 1.1 - HT Translations Theory

$y = x^2$

Let's take the function $f(x) = x^2$

$y = f(x) = x^2$

(2,4)

Let's take the point $(2,4)$

4

$y = 4$

Remember: The function doesn't change

$y = (x + 2)^2$

Now, let's take the function $y = x^2$ / $y = (x + 2)^2$

$g(x) = (x + 2)^2$

Let's call it $g(x)$

$x \rightarrow x + 2$ Put $x + 2$ in for x

(? ,4)

If $y = 4$, What does x have to be?
What plus two all squared equals four?

$y = (x + 2)^2$
$4 = (x + 2)^2$
$\sqrt{4} = \sqrt{(x + 2)^2}$
$2 = x + 2$
$x = 0$

$x = 0$

$x = 0$

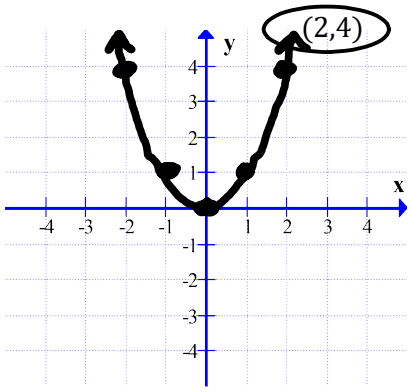
(0,4)

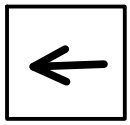
The $x - value$ was 2
Now the $x - value\ is$ 0
The $x - value$ minus 2

$x - 2$ *Left 2*

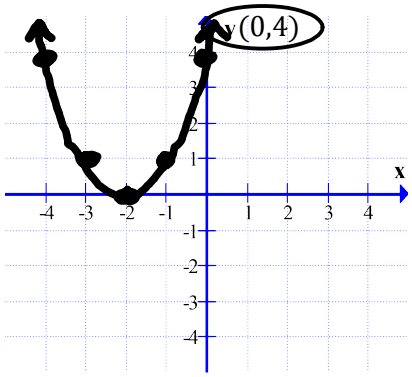
They are all equal to each other

$y = x^2$
$y = f(x)$
$f(x) = x^2$





$y = (x + 2)^2$
$g(x) = f(x + 2)$
$g(x) = (x + 2)^2$



$HT = -2$

Horizontal Translation

General Form

$y = f(x - h)$

$y = f(x + 2)$

Left 2

Horizontal Translations are the **Opposite** of what you see inside the brackets to the **x-value**. Attached to the variable.

C12 - 1.1 - VT Translations Theory

$y = x^2$

(2,4)

2

↓

$y = x^2 - 2$

↑

(2, ?)

$y = 2$

(2,2)

Let's take the function $f(x) = x^2$

$y = f(x) = x^2$

Let's take the point (2,4)

$x = 2$

Now, let's take the function

$y = x^2$
$y + 2 = x^2$
$y = x^2 - 2$

$y \to y + 2$ Put $y + 2$ in for y

$m(x) = x^2 - 2$

Let's call it m(x)

If $x = 2$, What does y equal?
2 squared minus 2 equals 2?

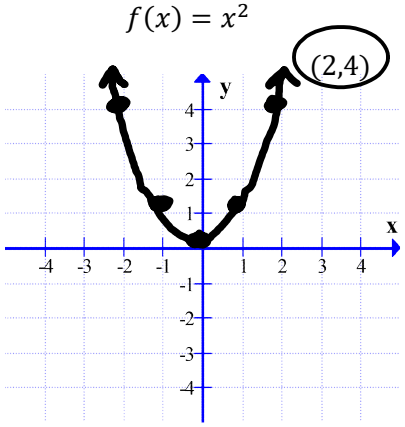
$y = 2$

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

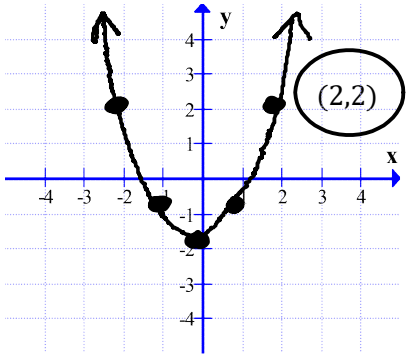
The y$-value$ was 4
Now the y$-value\ is$ 2
The $y - value$ minus 2

$y - 2$ *Down 2*

$y = x^2$
$y = f(x)$
$f(x) = x^2$



$y = x^2 - 2$
$m(x) = f(x) - 2$
$m(x) = x^2 - 2$



$VT = -2$

Vertical Translation

General Form

$y - k = f(x)$
$y = f(x) + k$

$y + 2 = f(x)$
$y = f(x) - 2$

Down 2

Vertical Translations are the **Opposite** of what you see on the left hand side to the y-**value**. Attached to the variable.
"k" may be on the left hand side of the equation: $y - k = f(x)$. So add or subtract "k" to both sides.
Do exactly what you see outside of the brackets on the right-hand side to the **y-value**

C12 - 1.2 - HCE Transformations Theory

$y = x^2$

Let's take the function $f(x) = x^2$

$y = f(x) = x^2$

(2,4)

Let's take the point (2,4)

4

$y = 4$

$y = (2x)^2$

Now, let's take the function

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

$m(x) = (2x)^2$

$x \to 2x$ Put $2x$ in for x

Let's call it m(x)

(? ,4)

If $y = 4$, What does x have to be?
What times two all squared equals four?

$x = 1$

$y = (2x)^2$
$4 = (2x)^2$
$\sqrt{4} = \sqrt{(2x)^2}$
$2 = 2x$
$x = 1$

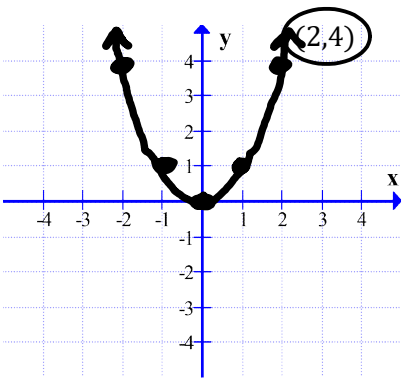
$x = 1$

(1,4)

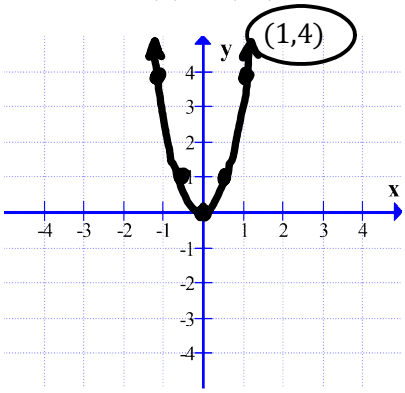
The $x - value$ was 2
Now the $x - value\ is$ 1
The $x - value$ divided by 2

$x \div 2$

$y = x^2$
$y = f(x)$
$f(x) = x^2$



$y = (2x)^2$
$m(x) = f(2x)$
$m(x) = (2x)^2$



$HC = \frac{1}{2}$

Horizontal Compression

General Form

$y = f(bx)$

$y = f(2x)$

Horizontal Expansions and Compressions are the **Reciprocal** of what you see inside the brackets to the **x-value**

C12 - 1.2 - VCE Transformations Theory

$y = x^2$

(1,1)

1

↓

$y = 2x^2$

↑

(1, ?)

$y = 2$

(1,2)

Let's take the function $f(x) = x^2$

$y = f(x) = x^2$

Let's take the point (1,1)

$x = 1$

Now, let's take the function

$y = x^2$

$\frac{1}{2}y = x^2$

$y = 2x^2$

$p(x) = 2x^2$

Let's call it p(x)

$y \to \frac{1}{2}y$ Put $\frac{1}{2}y$ in for y

If $x = 1$, What does y equal?
1 squared times 2 equals 2?

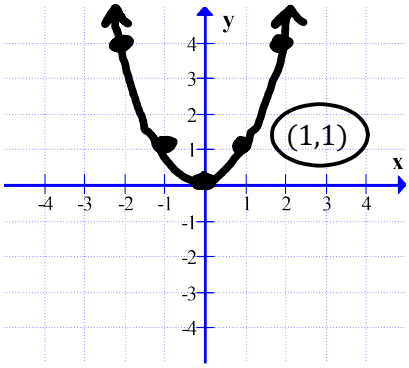
$y = 2$

$y = 2x^2$
$y = 2(1)^2$
$y = 2$

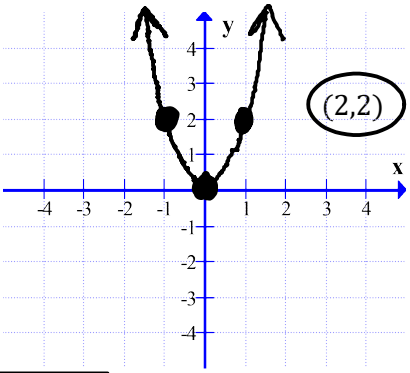
The y$-value$ was 1
Now the y$-value\ is$ 2
The $y-value$ times 2

$y \times 2$

$y = x^2$
$y = f(x)$
$f(x) = x^2$



$y = 2x^2$
$p(x) = 2f(x)$
$p(x) = 2x^2$



General Form

$VE = 2$

Vertical Expansion

$ay = f(x)$
$y = af(x)$

$\frac{1}{2}y = f(x)$
$y = 2f(x)$

Vertical Expansions and Compressions are the **Reciprocal** of what you see on the left hand side to the **y-value.**
"a" may be on the left side of the equation: $ay = f(x)$. So multiply or divide by "a" to both sides.
Do exactly what you see outside of the brackets on the right-hand side to the **y-value**