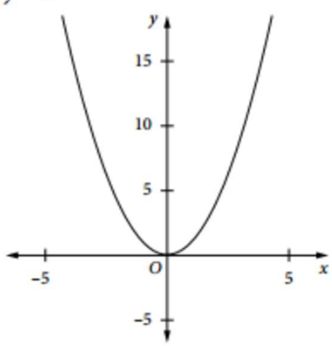
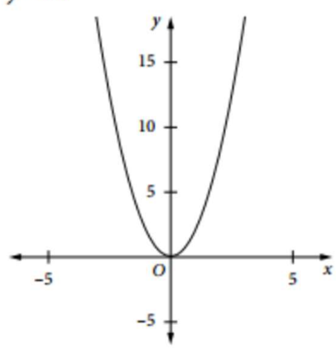
TRANSFORMATIONS OF GRAPHS USING $y = k\,f(x)$ AND $y = k\,f(x+b)$

Consider the following graphs:

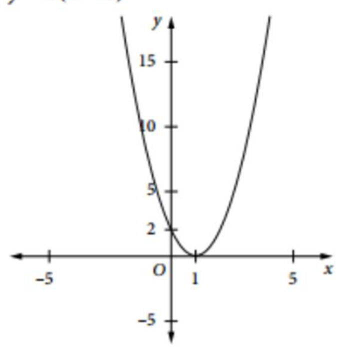
$y = x^2$



$y = 2x^2$



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



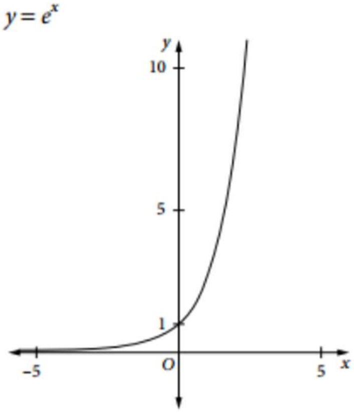
If $y = x^2$ is written as $y = f(x)$ then $y = 2x^2$ becomes $y = 2f(x)$ and $y = 2(x-1)^2$ becomes $y = 2f(x-1)$.

In $y = 2f(x)$ the curve for $y = f(x)$ has stretched (dilated) by a factor of 2 from the x-axis.

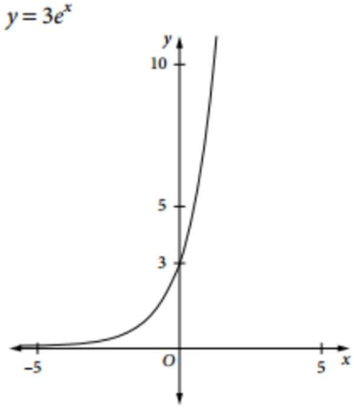
In $y = 2f(x-1)$ the curve for $y = f(x)$ has been moved 1 unit to the right and then stretched by a factor of 2 from the x-axis.

Now consider the following exponential graphs:

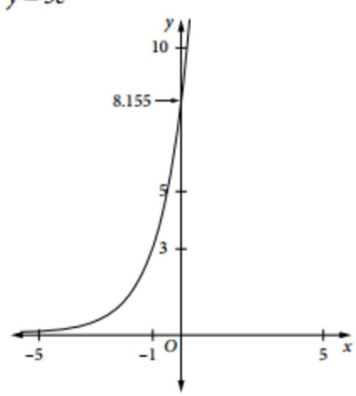
$y = e^x$



$y = 3e^x$



$y = 3e^{x+1}$



If $y = e^x$ is written as $y = f(x)$ then $y = 3e^x$ becomes $y = 3f(x)$ and $y = 3e^{x+1}$ becomes $y = 3f(x+1)$.

In $y = 3f(x)$ the curve for $y = f(x)$ has stretched (dilated) by a factor of 3 from the x-axis.

In $y = 3f(x+1)$ the curve for $y = f(x)$ has been moved 1 unit to the left and then been stretched by a factor of 3 from the x-axis.

In all these cases, the graph of $y = kf(x)$ is just the graph of $y = f(x)$ stretched (dilated) by a factor of k.

As for the cases in the previous section, the graph of $y = kf(x+b)$ is just the graph of $y = f(x)$ stretched (dilated) by a factor of k and also translated horizontally b units to the left.