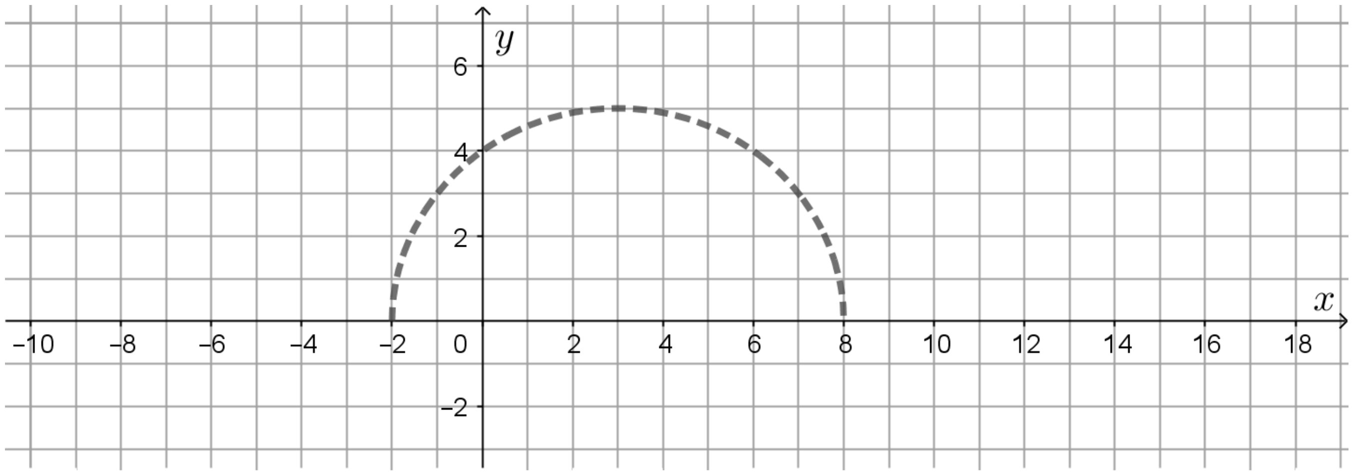
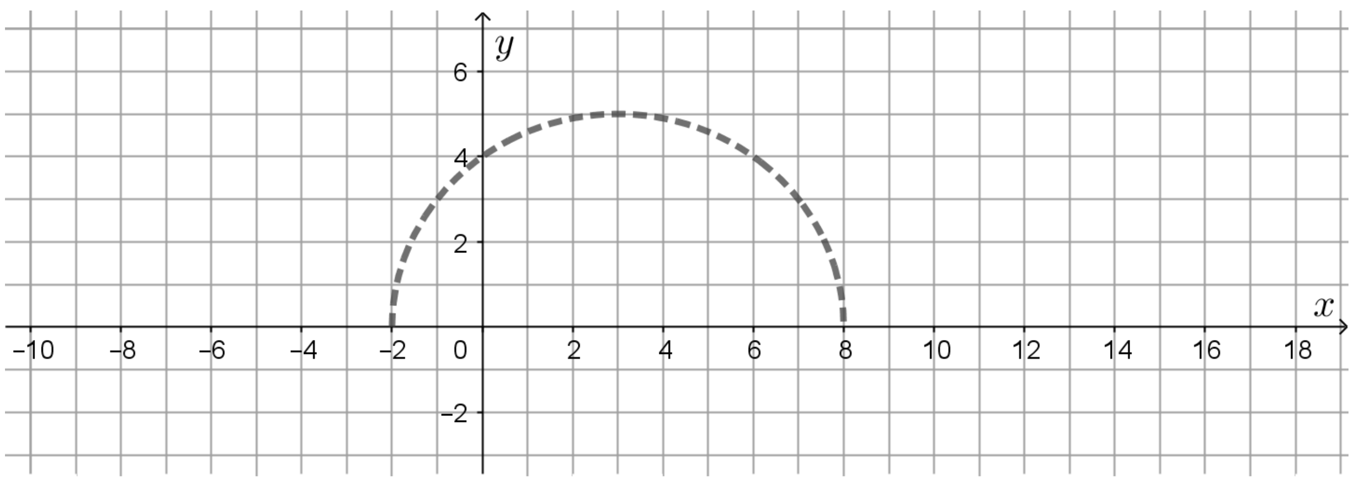
Horizontal (and Vertical) Transformations

Given that $y = f(x)$ is drawn, draw the following functions:

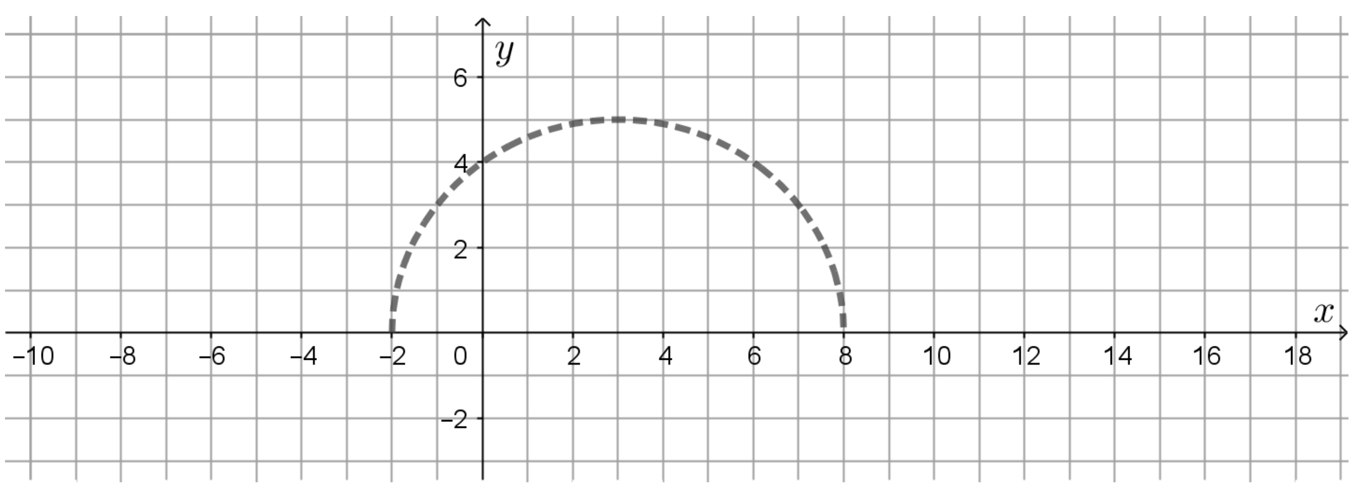
$y = f(x - 4)$



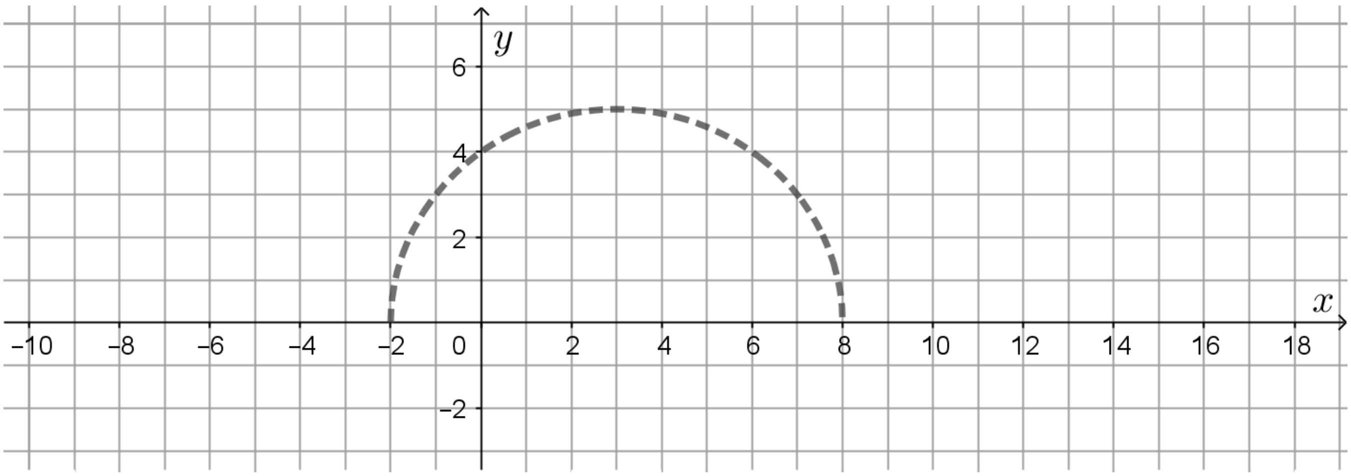
$y = f(x + 6)$



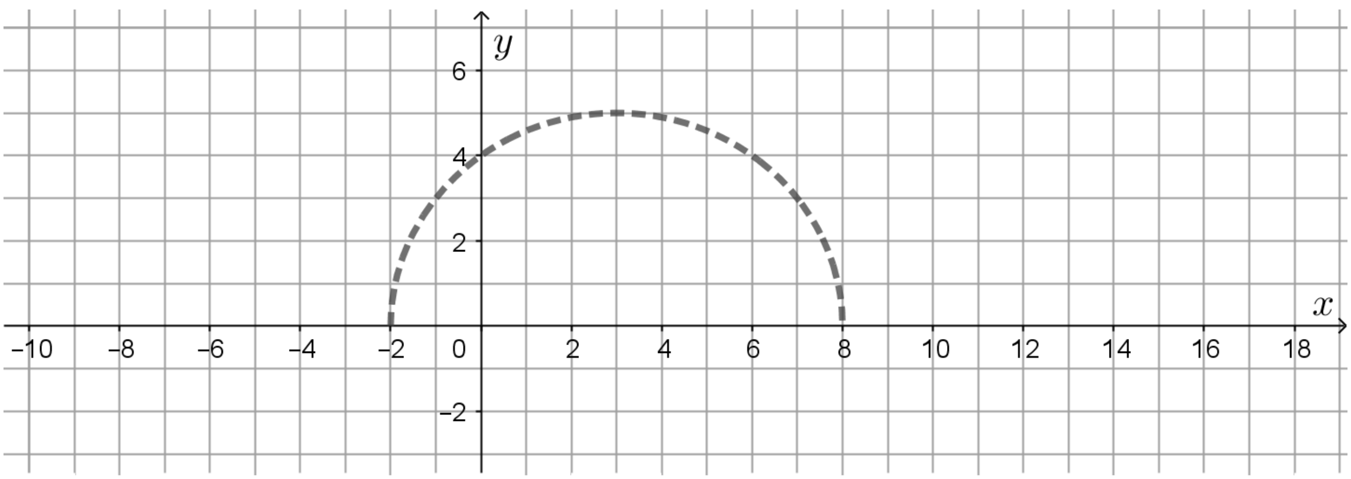
$y = f(-x)$



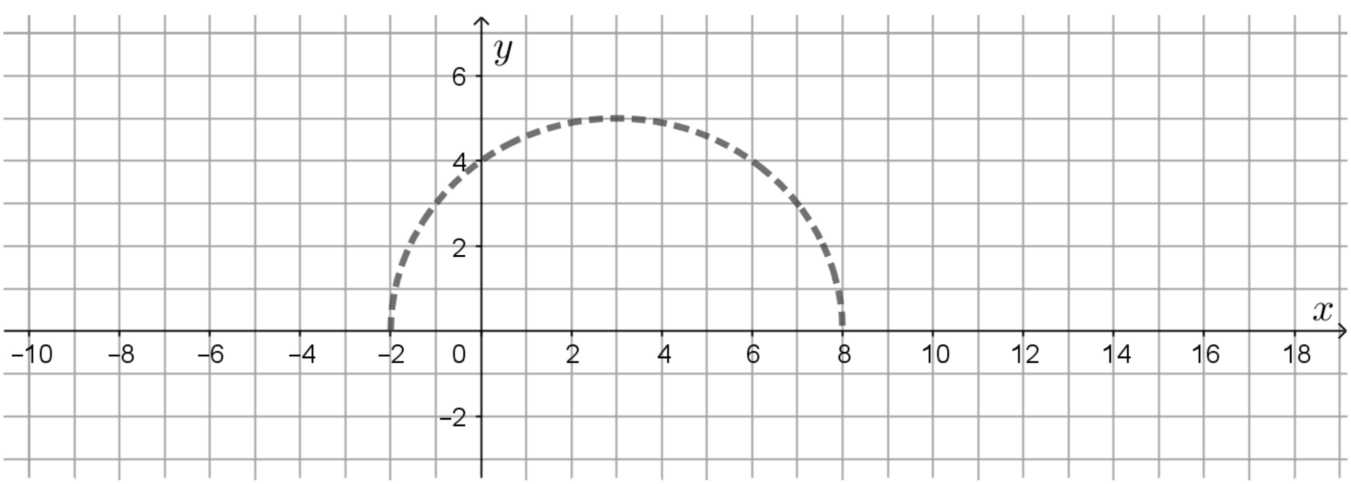
$y = f(2x)$



$y = f(0.5x)$



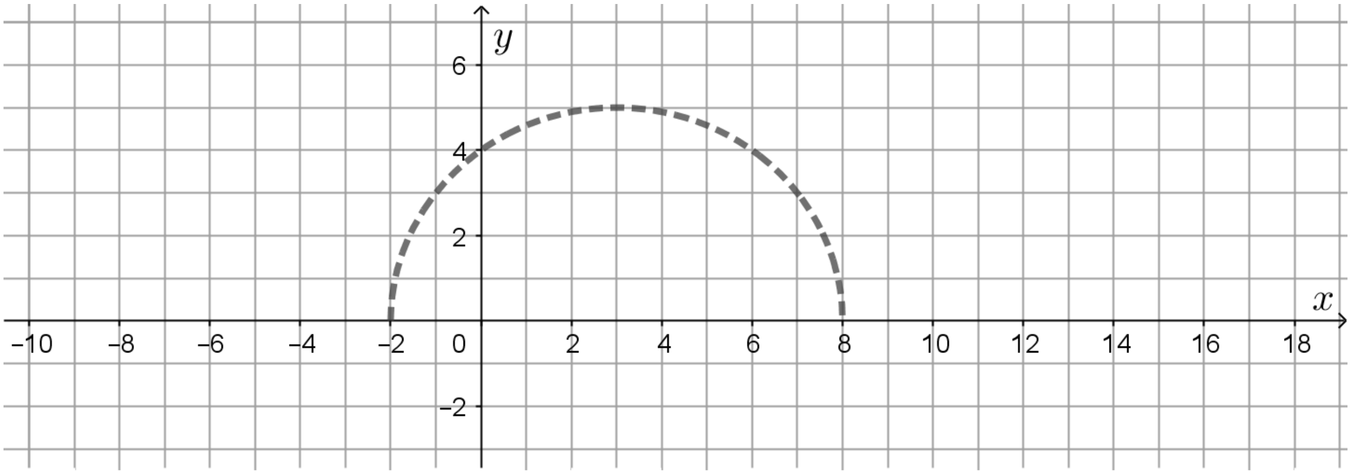
$y = f(2(x-5))$ Compress first, then slide.



For horizontal transformations, use https://www.geogebra.org/m/dnzhaphu to check answers.

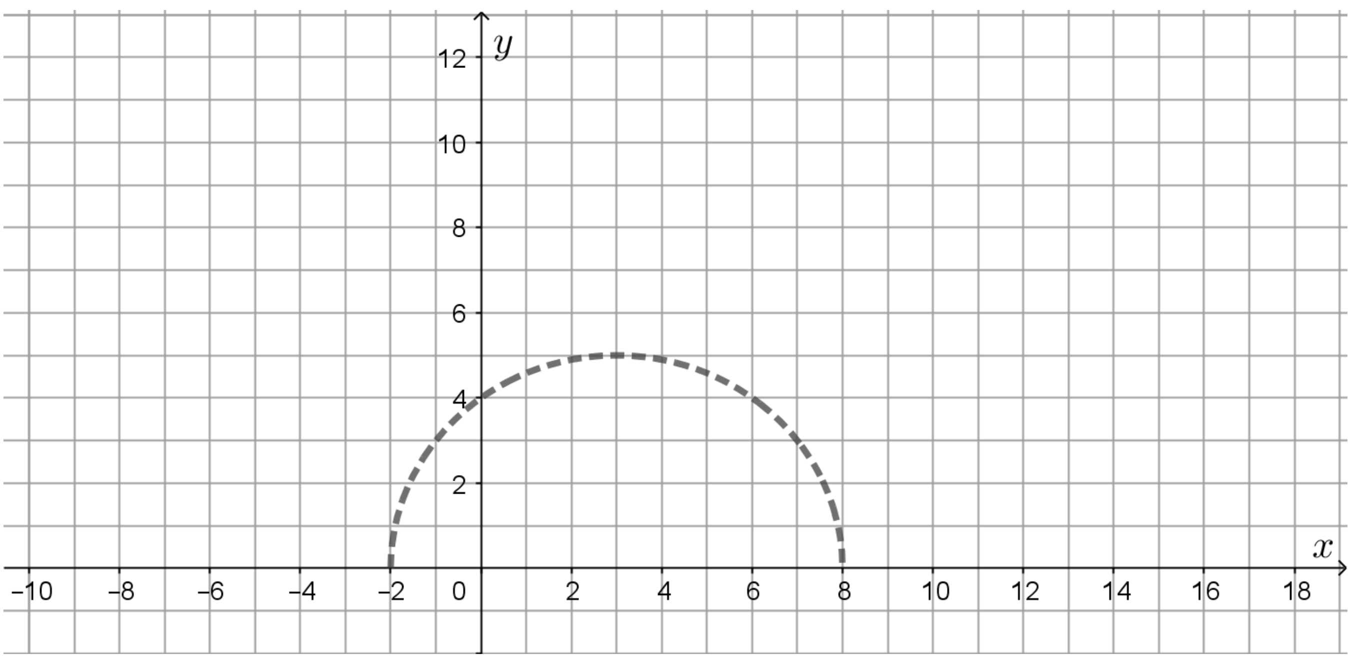
For both vertical and horizontal transformations, use https://www.geogebra.org/m/abhfcyms to check answers.

$y = f(x - 3) + 2$

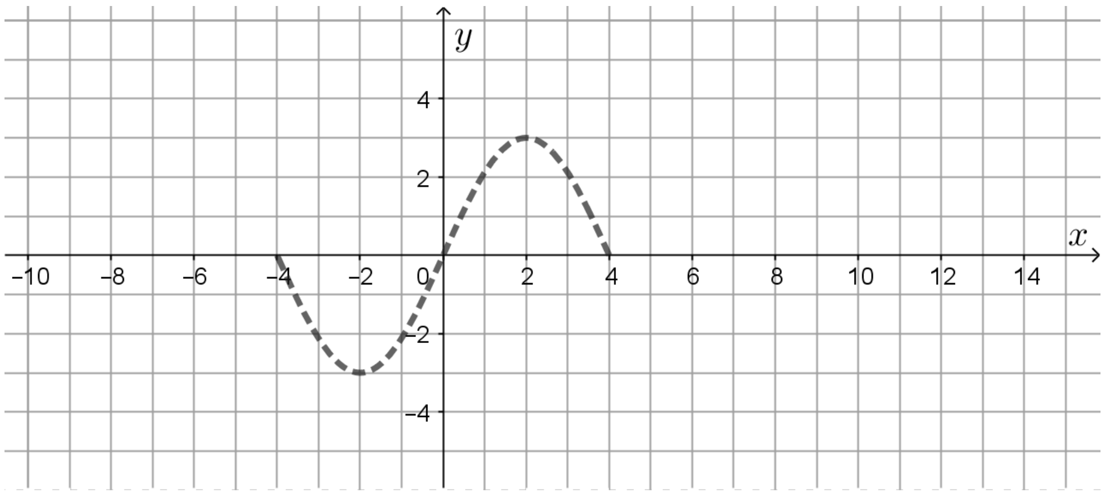


$y = 2f\big(2(x - 2)\big) + 2$

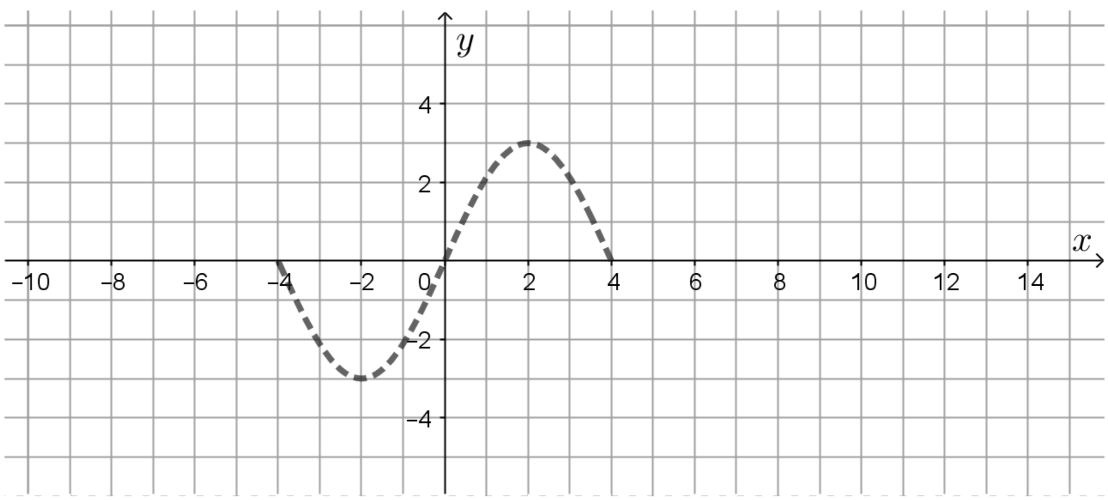
Begin with horizontal, then vertical. Horizontal compress then slide. Vertical stretch then slide.



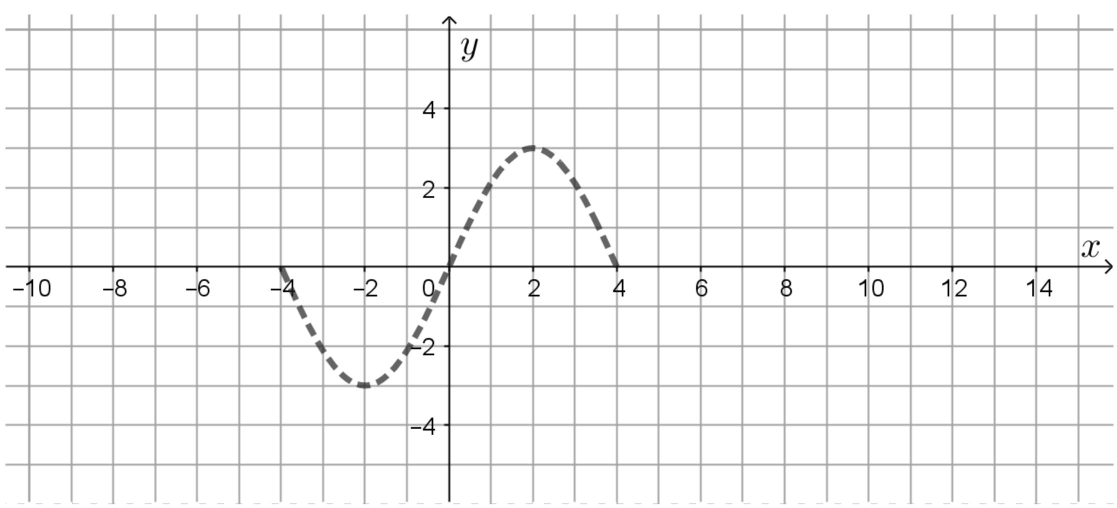
$y = f(x - 8)$



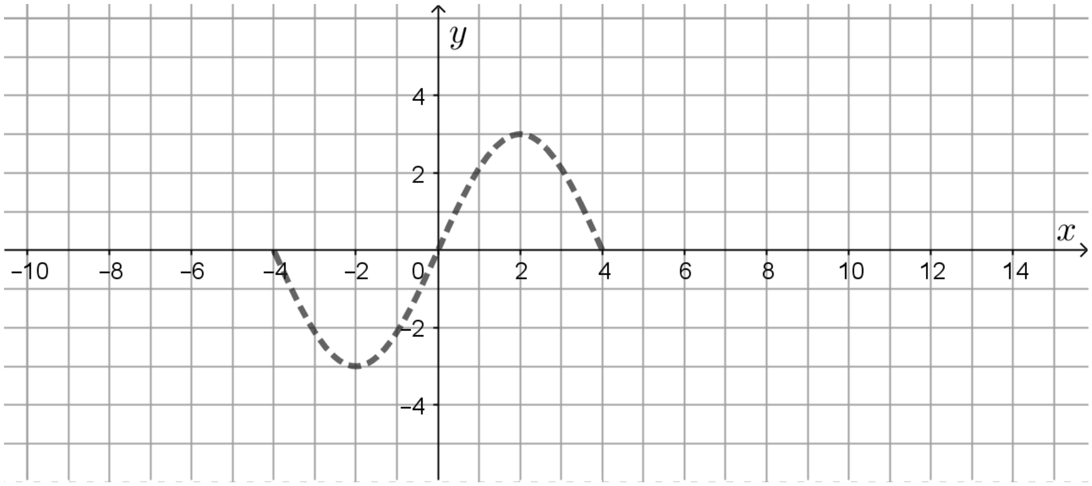
$y = f(2x)$



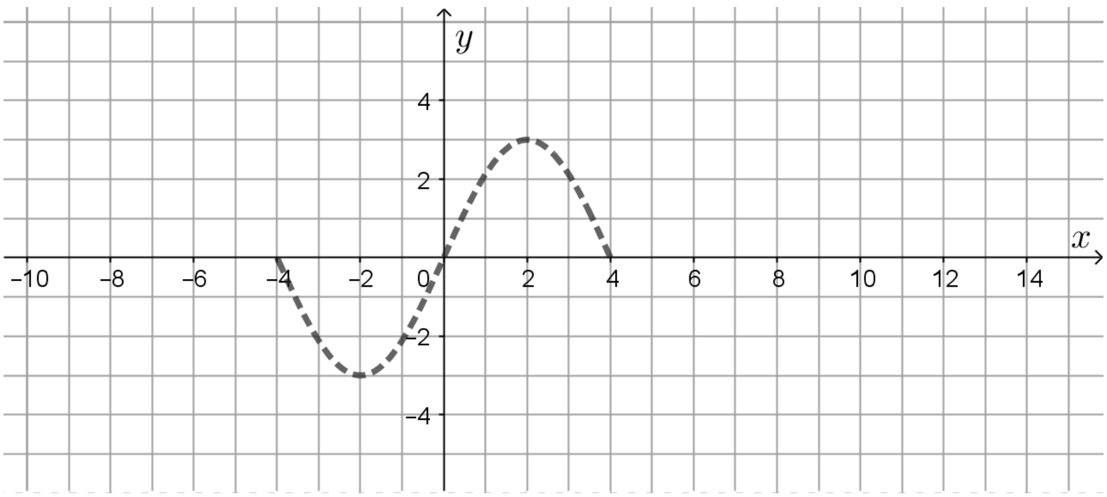
$y = f(0.5x)$



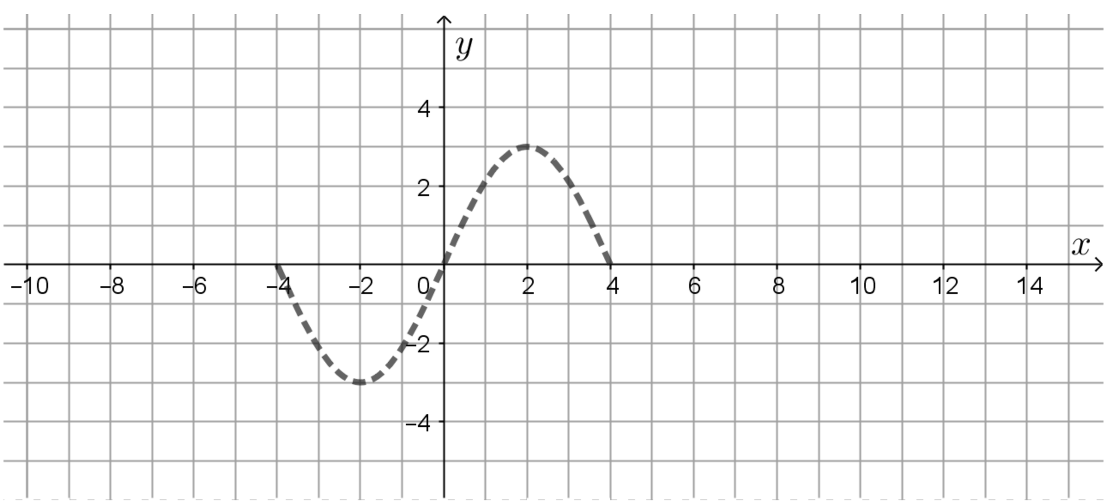
$y = f(-x)$



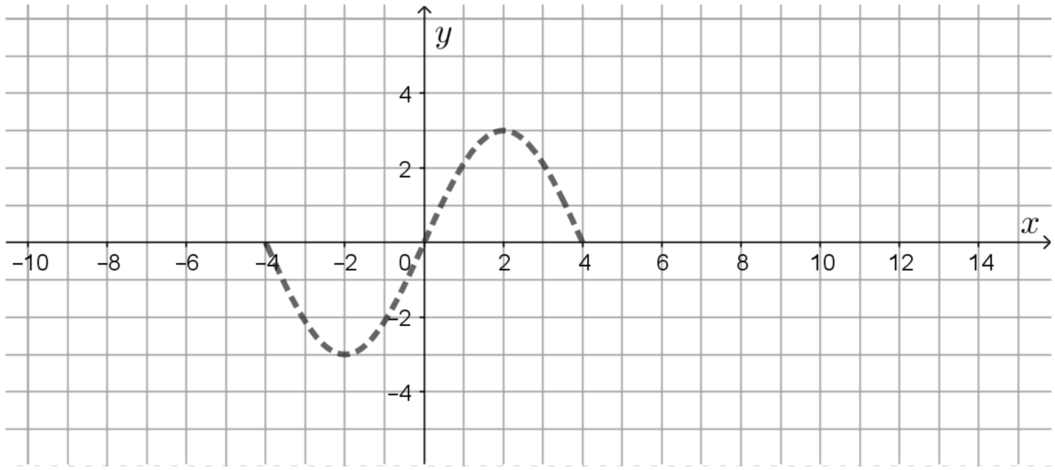
$y = -f(x)$



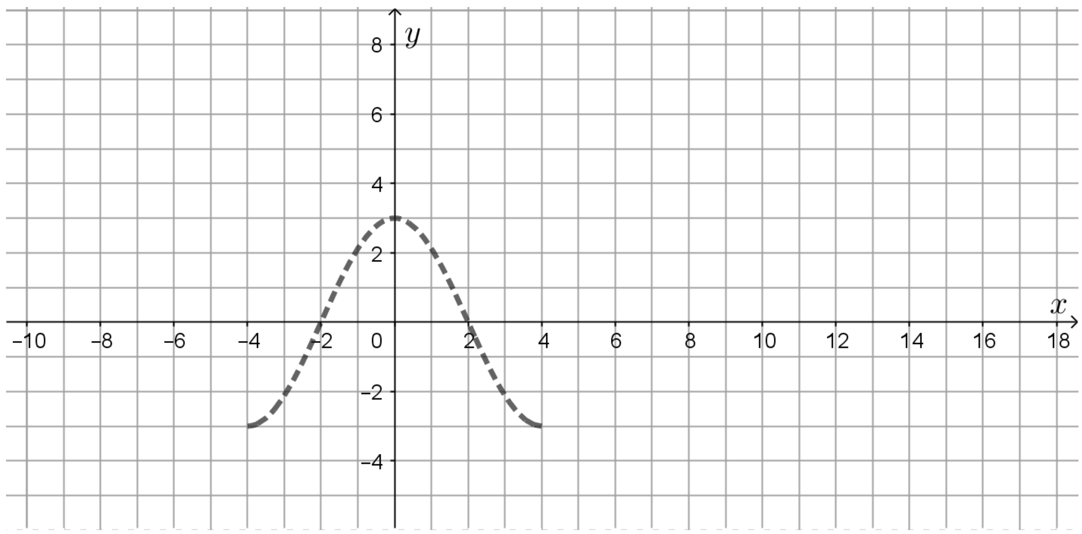
$f\left(0.5(x-7)\right) + 2$. Horizontal first (stretch then slide); vertical second (no stretch, just slide).



$y = 2f(2(x-2)) + 2$: horizontal first, compress then slide. Vertical second; stretch then slide.



New graph. $y = -f\big(2(x-8)\big) + 5$. Horizontal: Compress, slide. Vertical: reflect, slide.



<table>
<tr><td>Vertical
$y = f(x) + d$ Translation. Slide d Units upwards.
$y = af(x)$ Stretch. Scale factor a, parallel to the y-axis.
$y = -f(x)$ Reflect over the x-axis.</td><td>Horizontal
$y = f(x-c)$ Translation. Slide c units to the right.
$y = f(bx)$ Stretch. Scale factor $\frac{1}{b}$, parallel to the x-axis.
$y = f(-x)$ Reflect over the y-axis.</td></tr>
<tr><td colspan="2">Order
$y = af\big(b(x-c)\big) + d$
Horizontal stretch then slide, followed by vertical stretch then slide. Or: stretch-stretch-slide-slide.</td></tr>
<tr><td>Even Function
If $f(-x) = f(x)$, the function is called an even function. It has reflection symmetry over the y −axis. There is one example on this worksheet.
$y = x^2$ is another example of an even function.</td><td>Odd Function
If $-f(x) = -f(x)$, the function is called an odd function. It has rotational symmetry 180 degrees around the origin. There is one example on this worksheet. $y = x^3$ is another example of an odd function.</td></tr>
<tr><td colspan="2">Not odd or even: most functions are neither odd nor even. To be odd or even is pretty special.</td></tr>
</table>