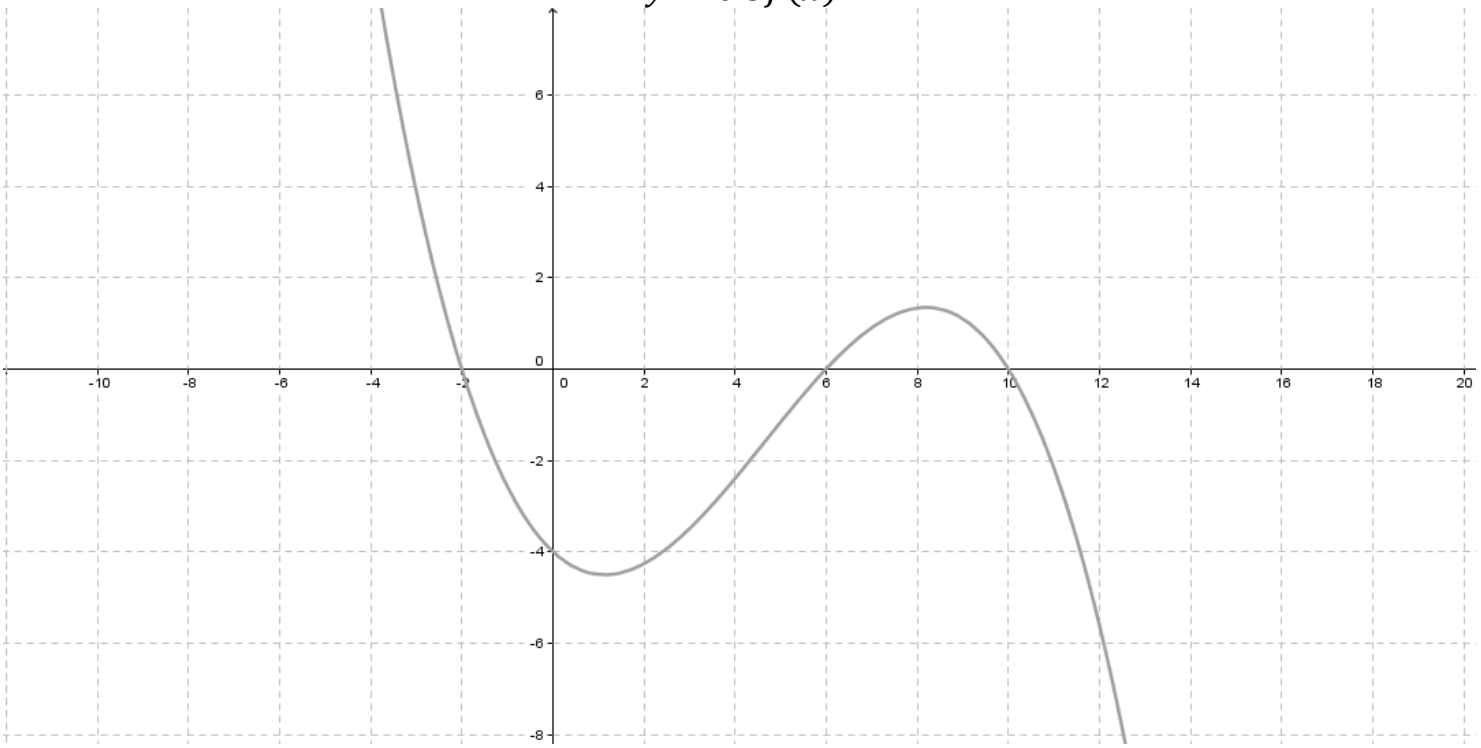
Graph Transformations

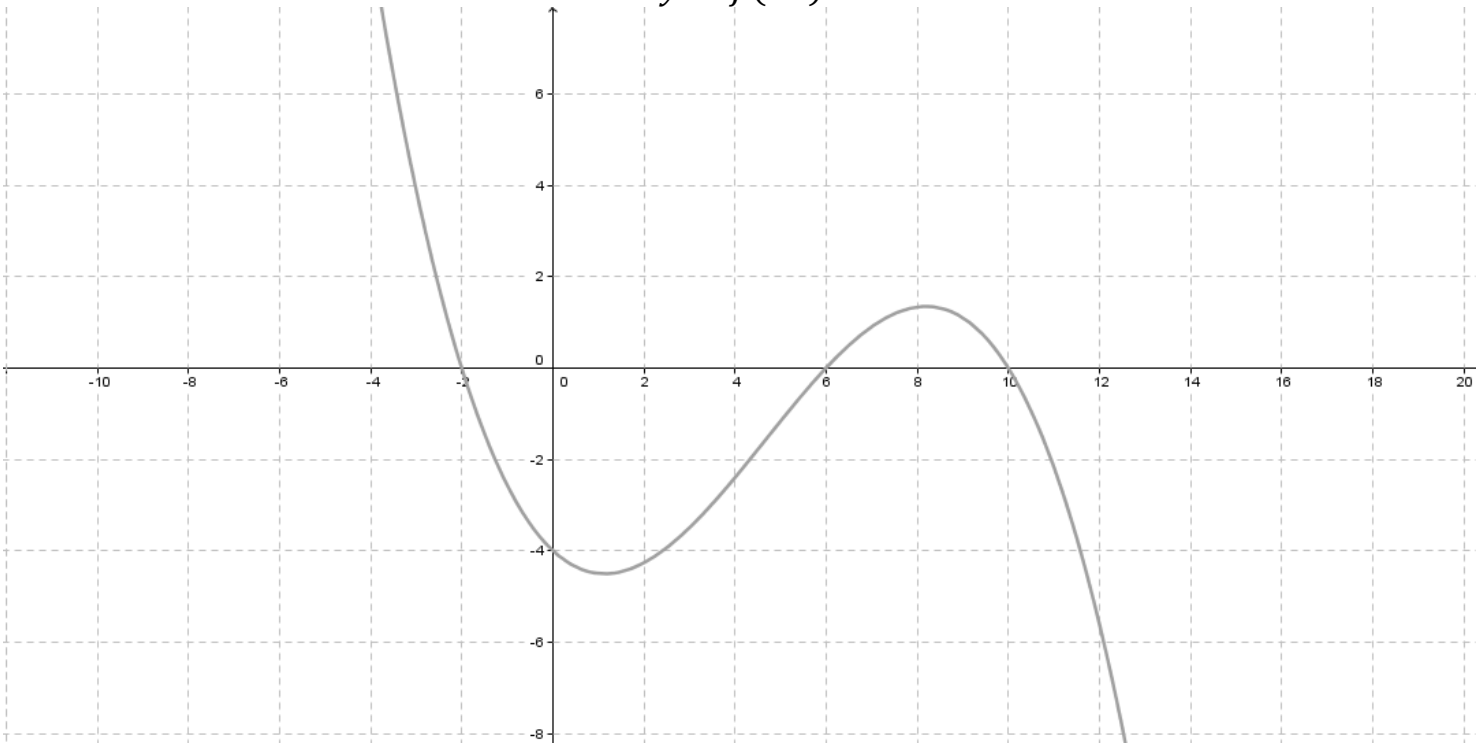
The function $y = f(x)$ is to be transformed. Sketch the resulting curve for each transformation. A copy of the original curve is shown on each set of axes. Sketch the transformed curve on top.

$y = 0.5f(x)$



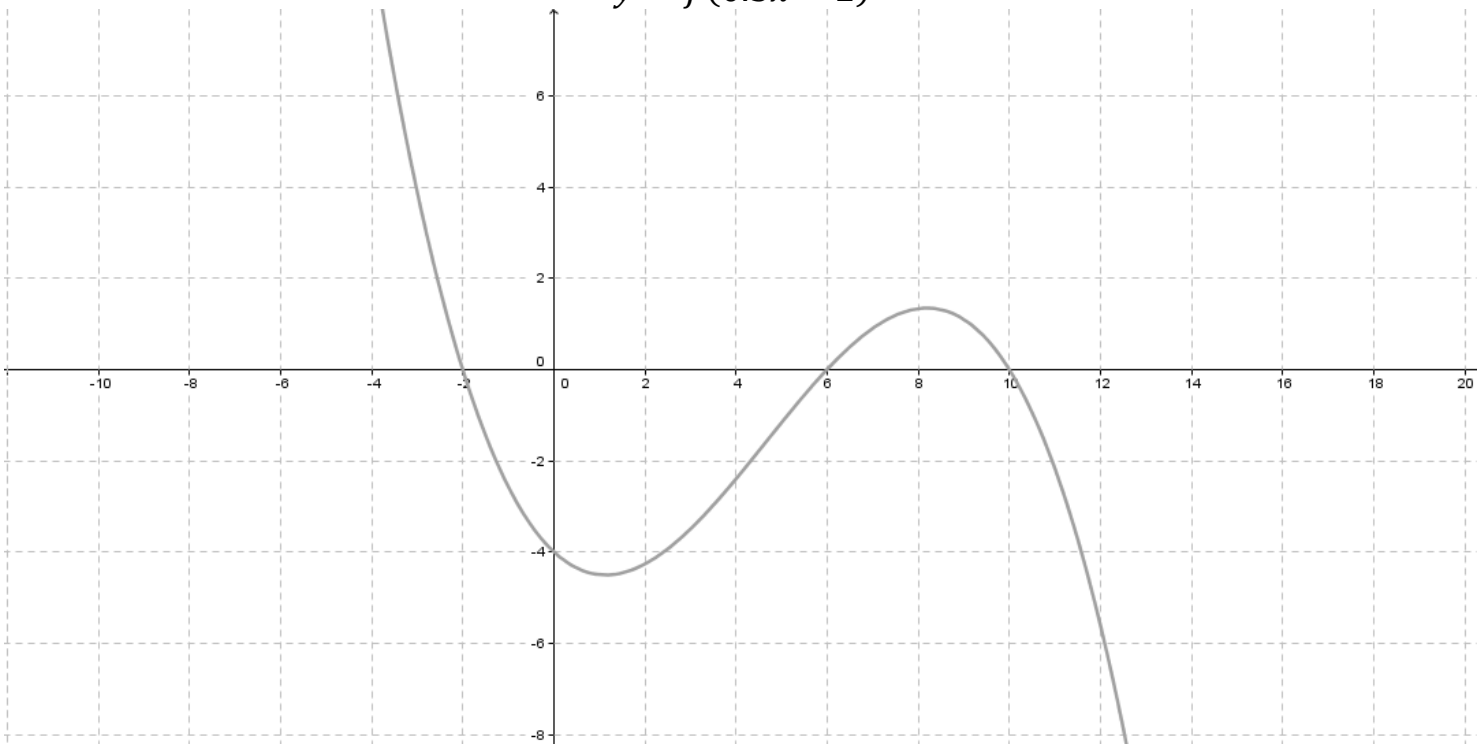
Notes:

$y = f(2x)$



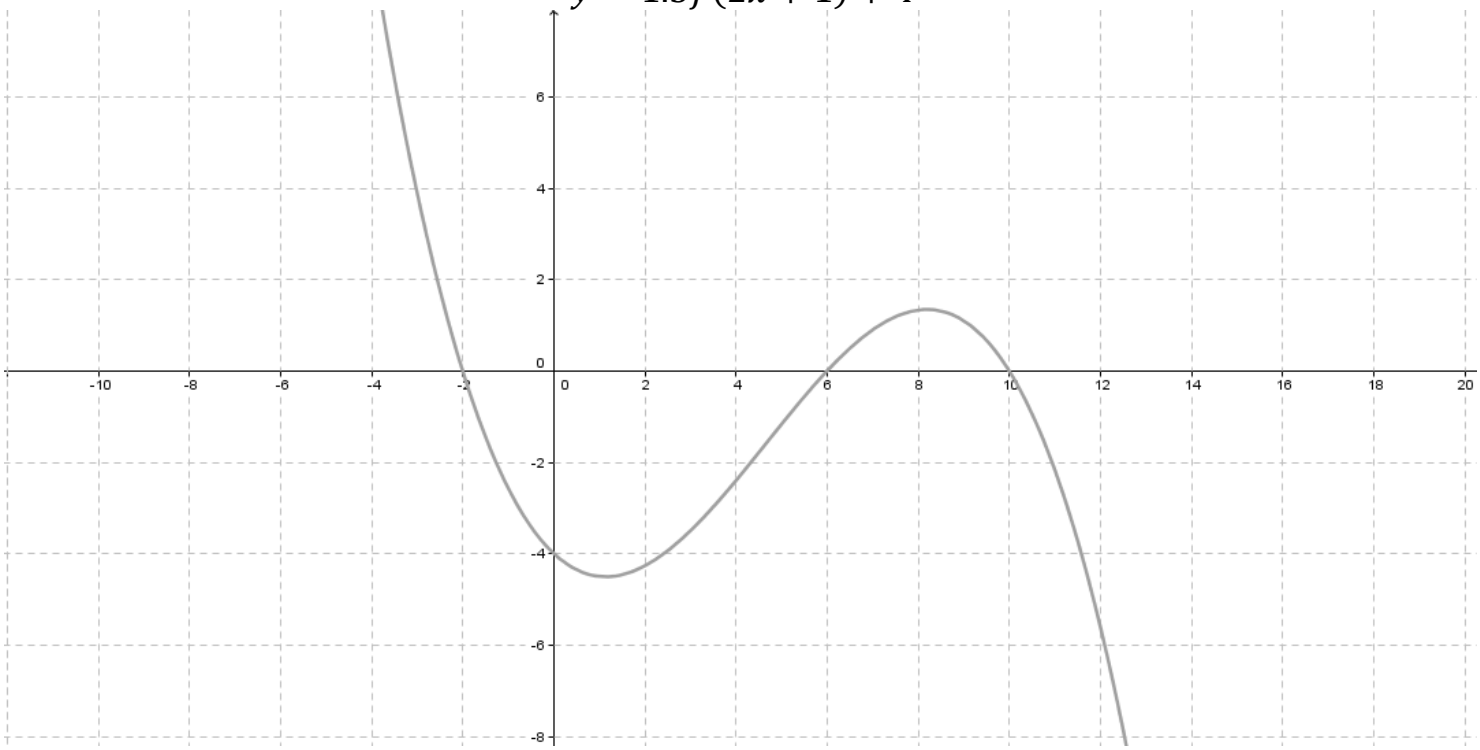
Notes:

$y = f(0.5x - 2)$



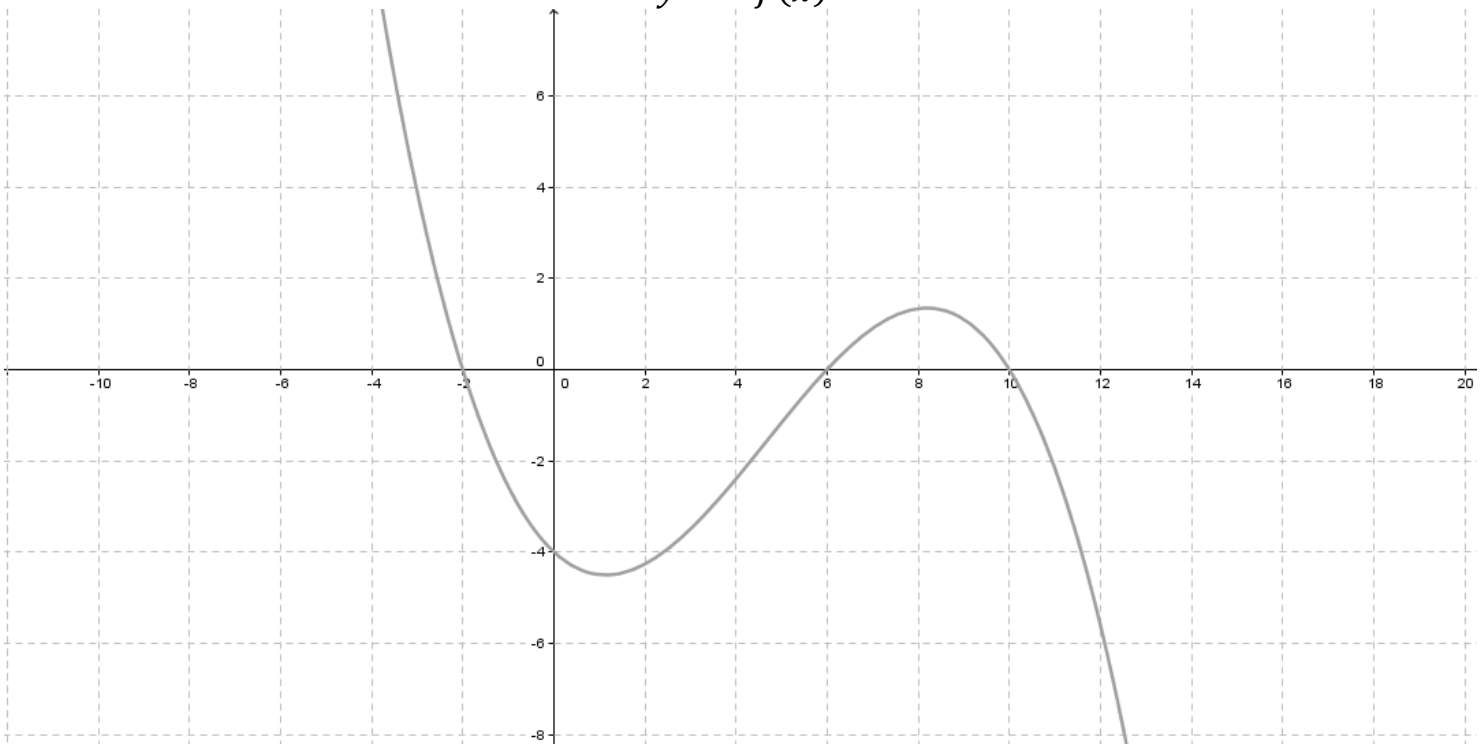
Notes:

$y = 1.5f(2x + 1) + 4$



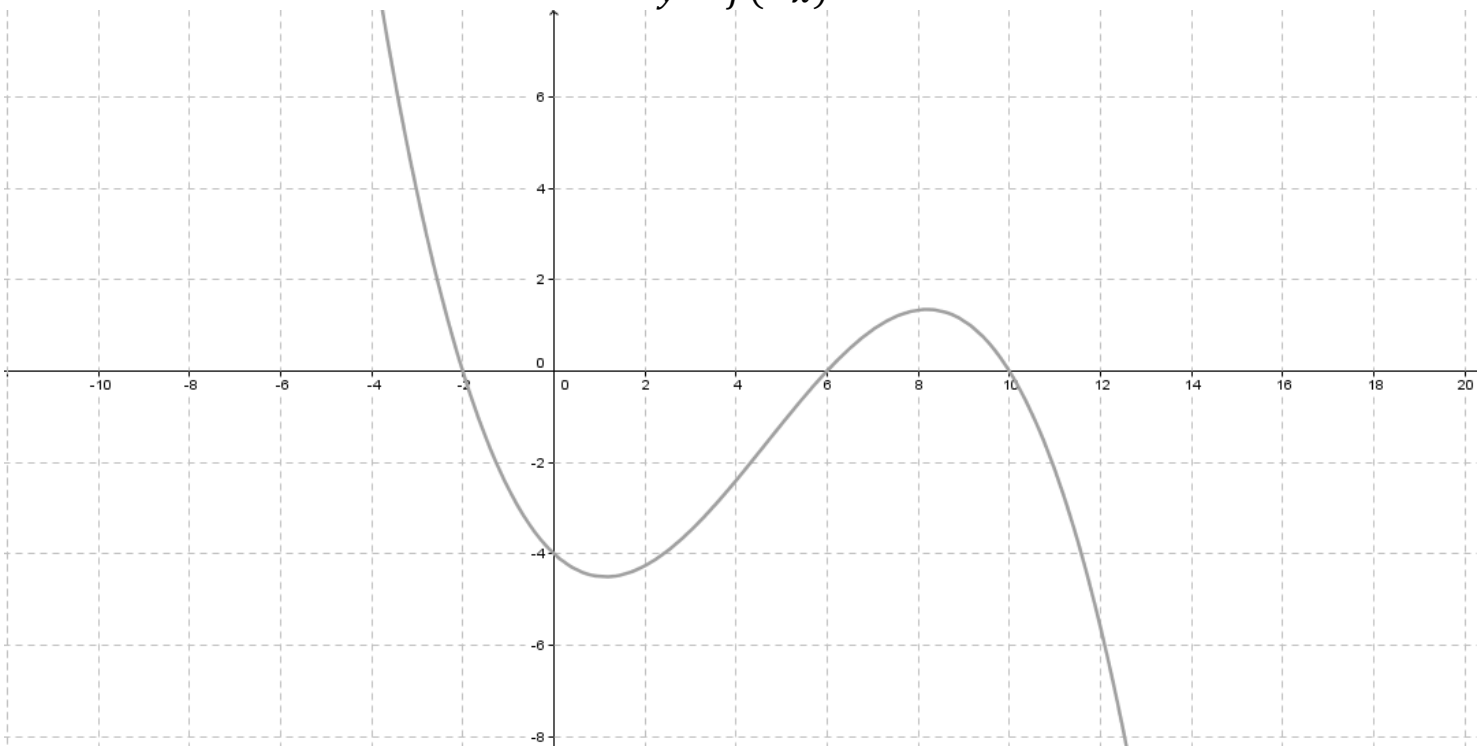
Notes:

$y = -f(x)$



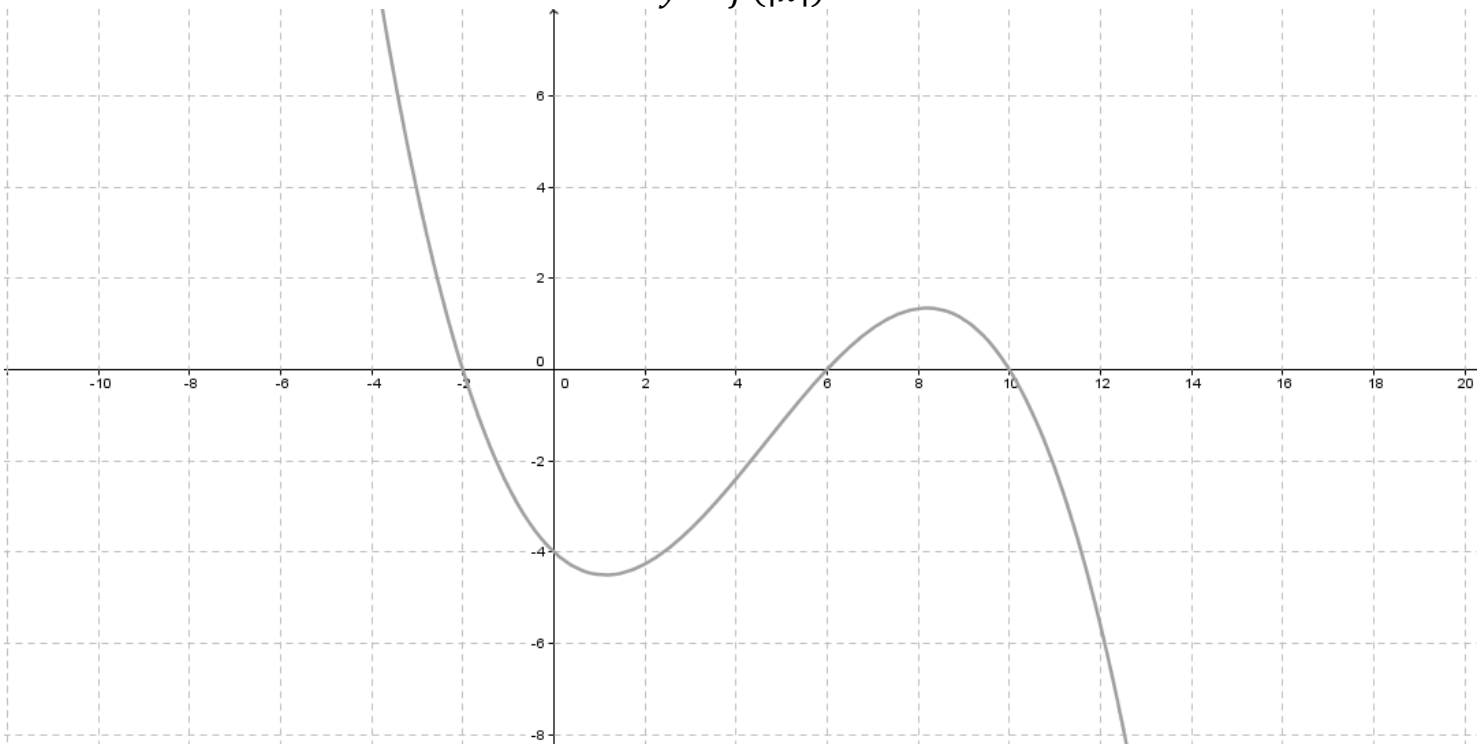
Notes:

$y = f(-x)$



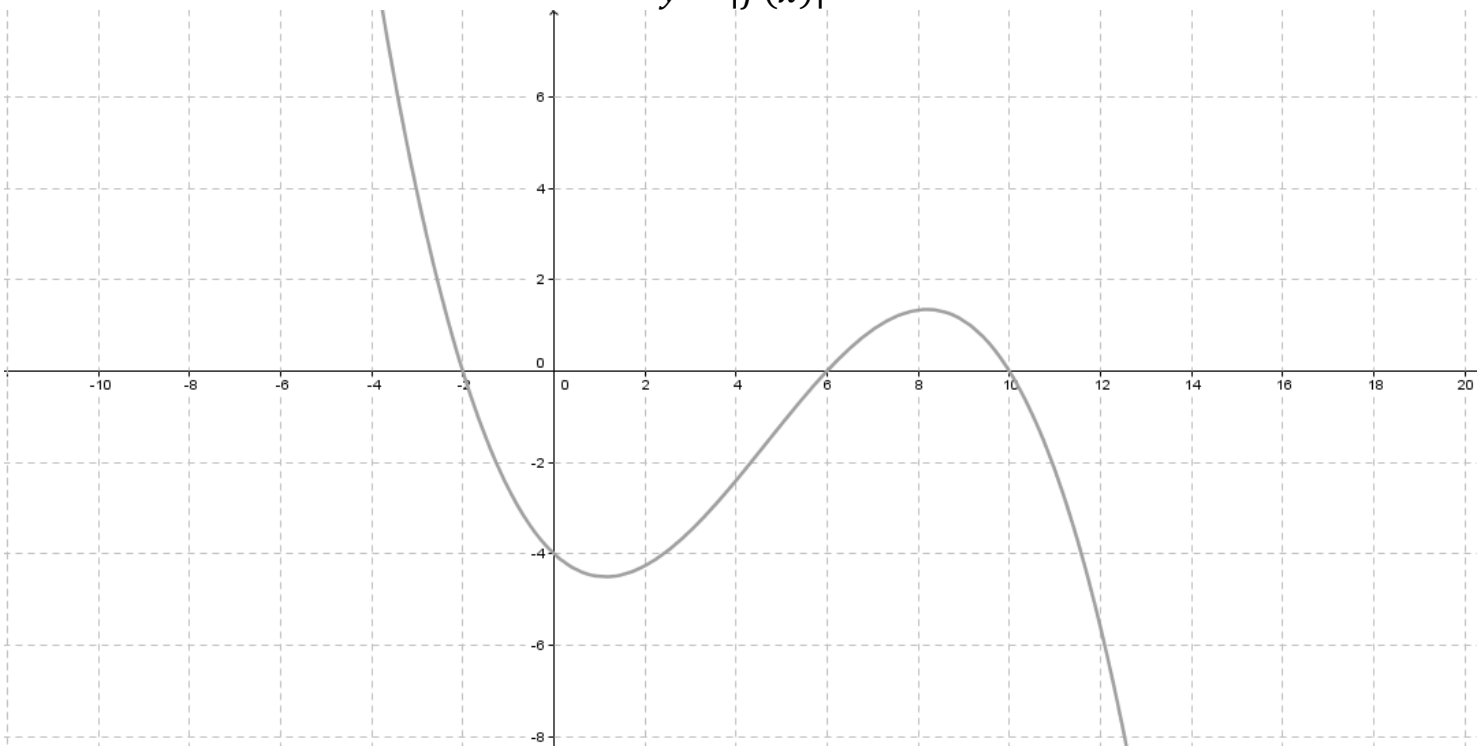
Notes:

$y = f(|x|)$



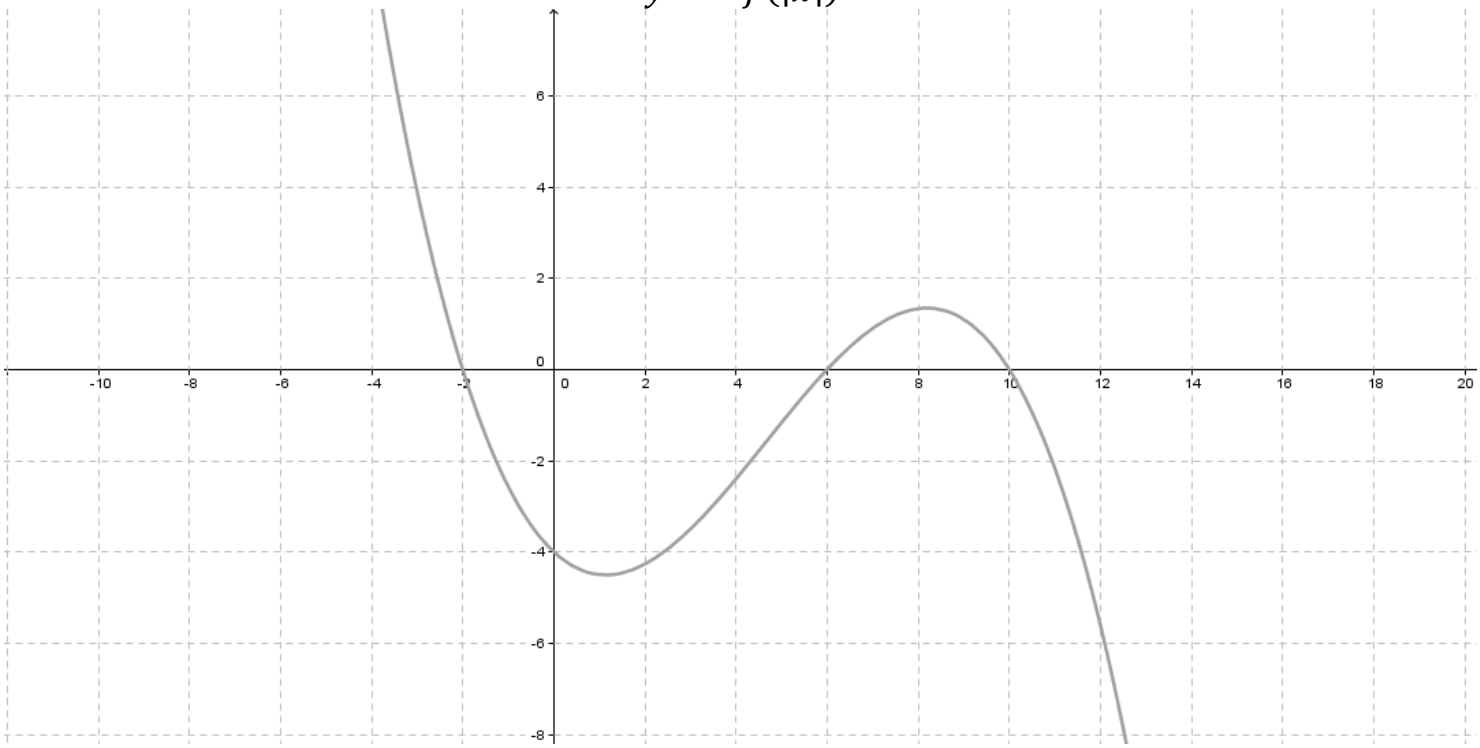
Notes:

$y = |f(x)|$



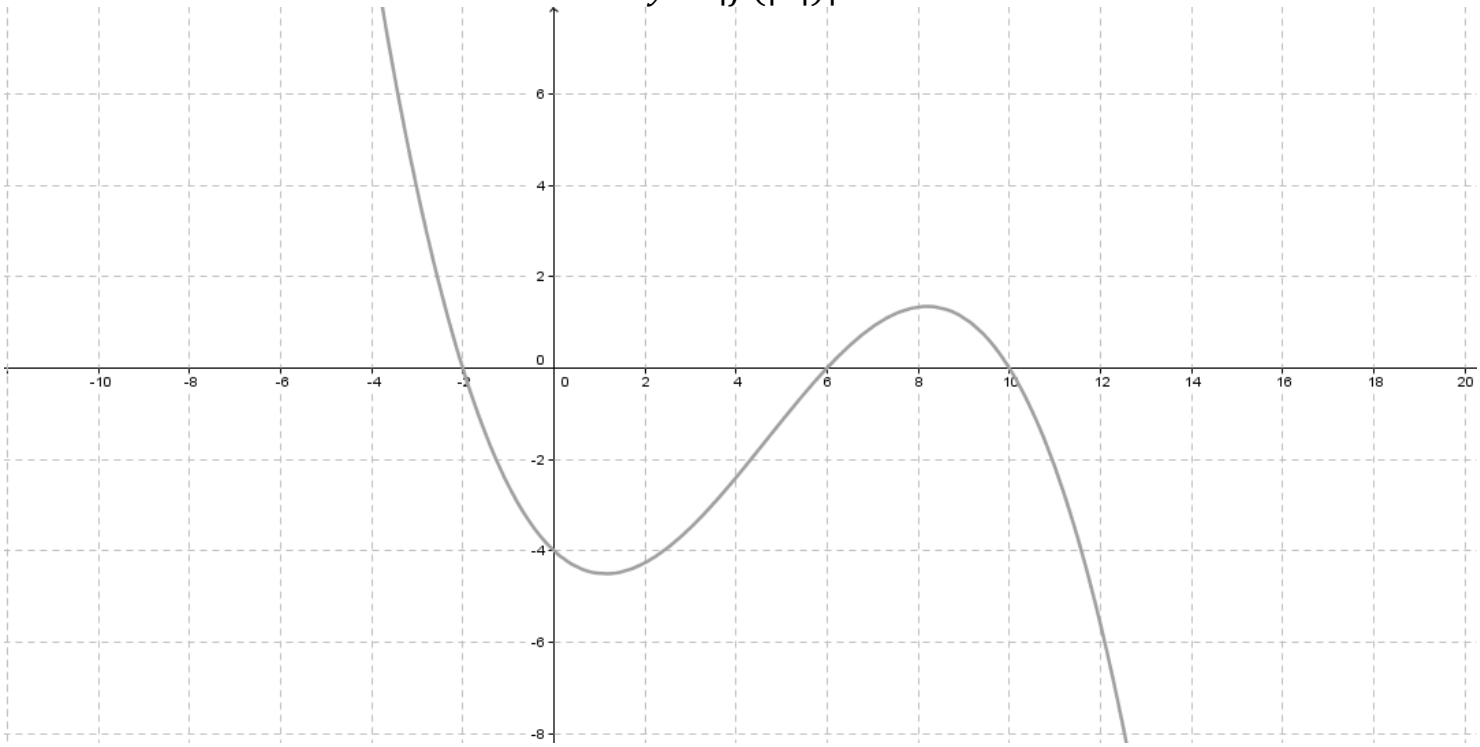
Notes:

$y = -f(|x|)$



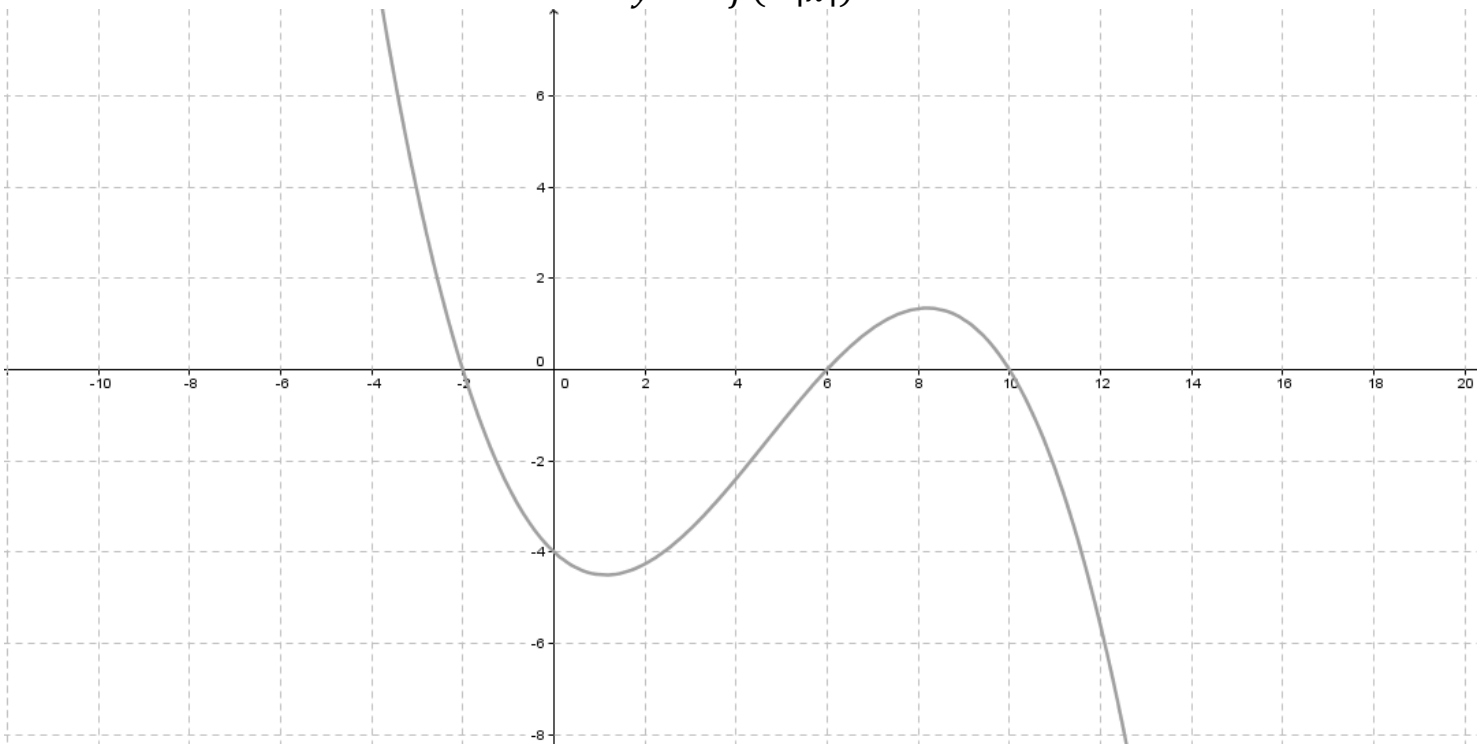
Notes:

$y = |f(|x|)|$



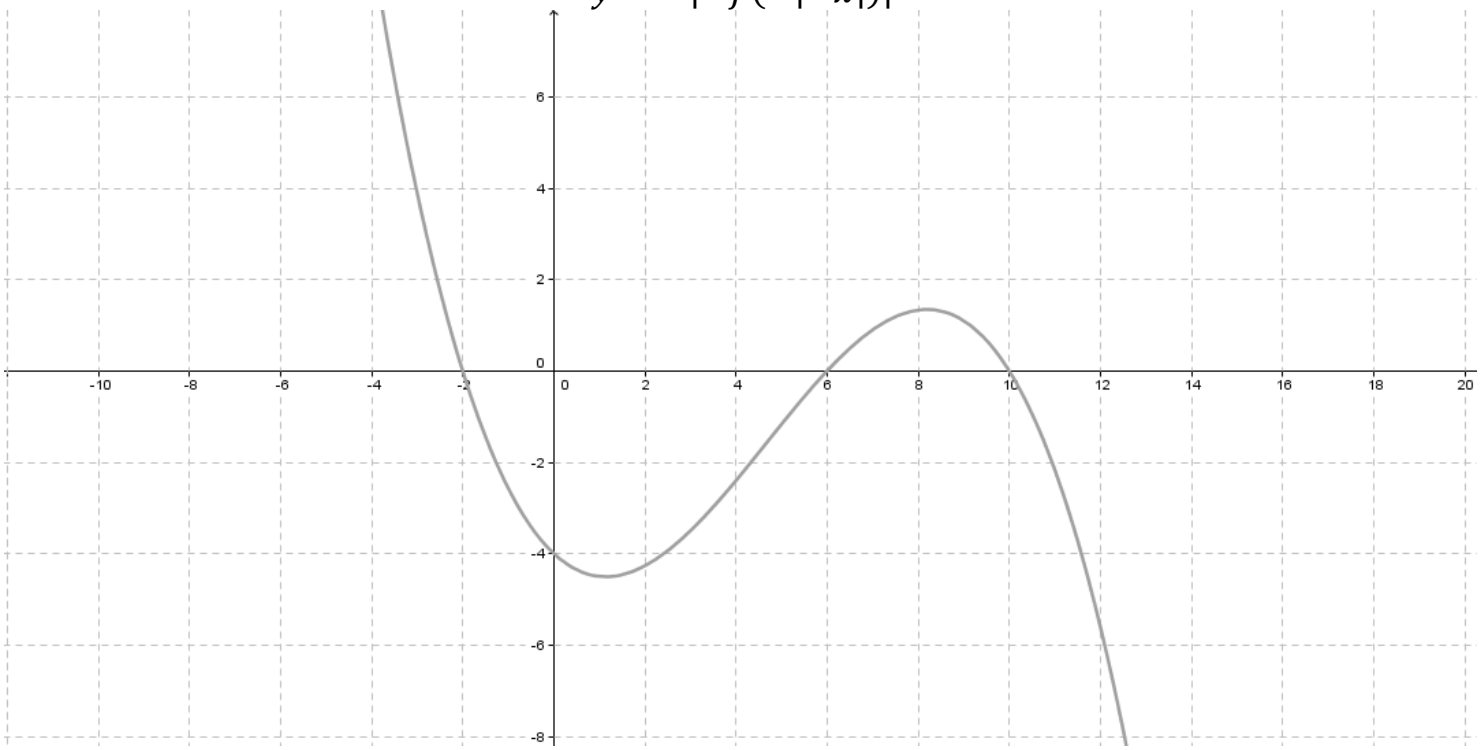
Notes:

$y = -f(-|x|)$



Notes:

$y = -|-f(-|-x|)|$

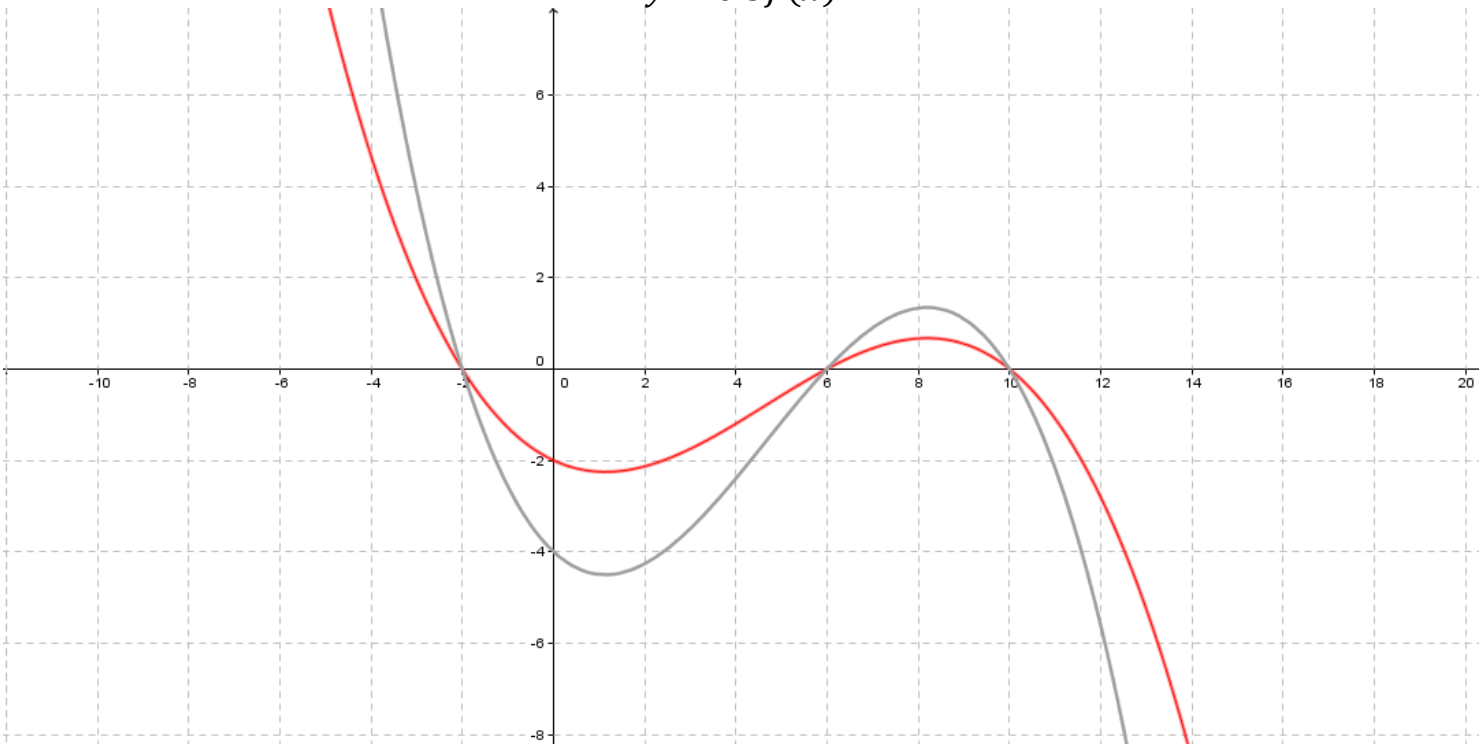


Notes:

Graph Transformations SOLUTIONS

The function $y = f(x)$ is to be transformed. Sketch the resulting curve for each transformation. A copy of the original curve is shown on each set of axes. Sketch the transformed curve on top.

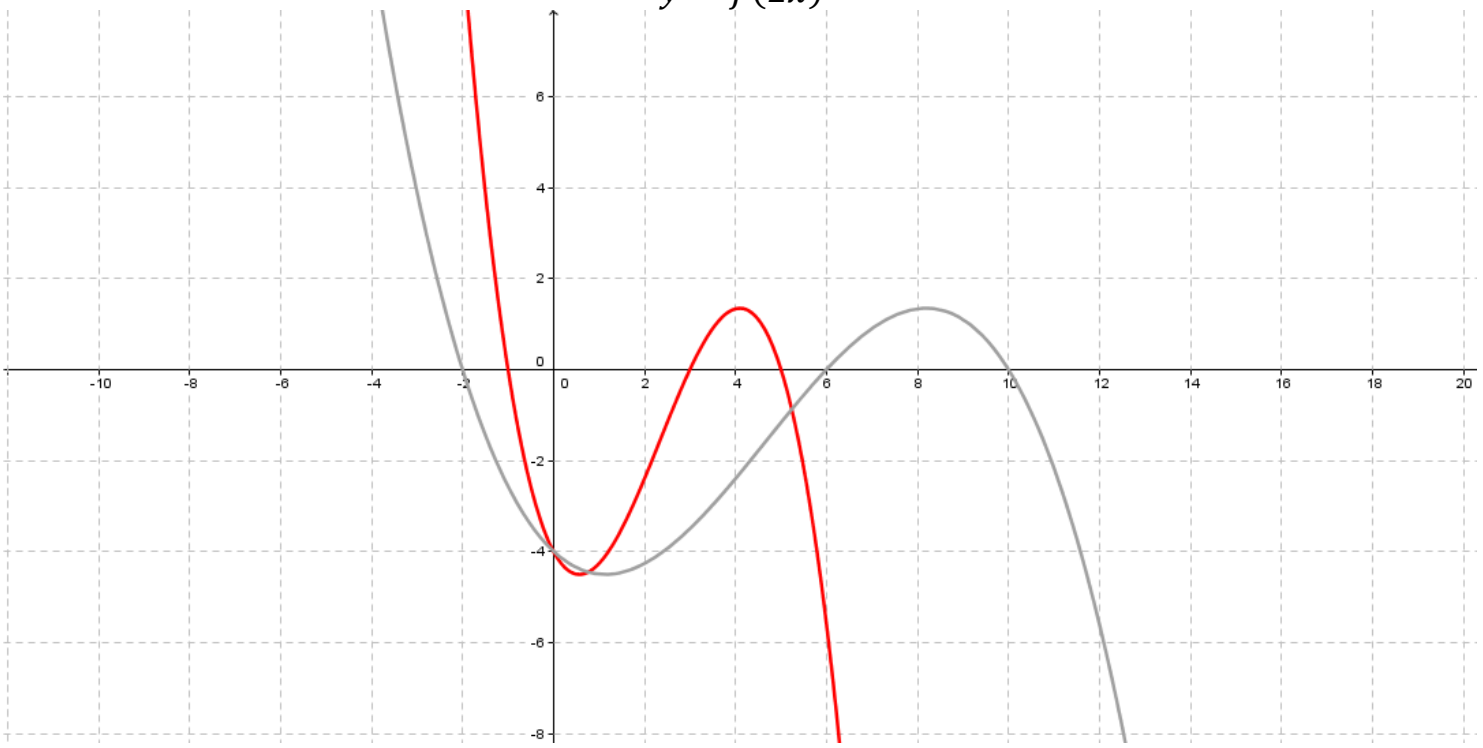
$y = 0.5f(x)$



Notes:

Stretch in the y direction by scale factor 0.5. All points 0.5 times closer to the x-axis.

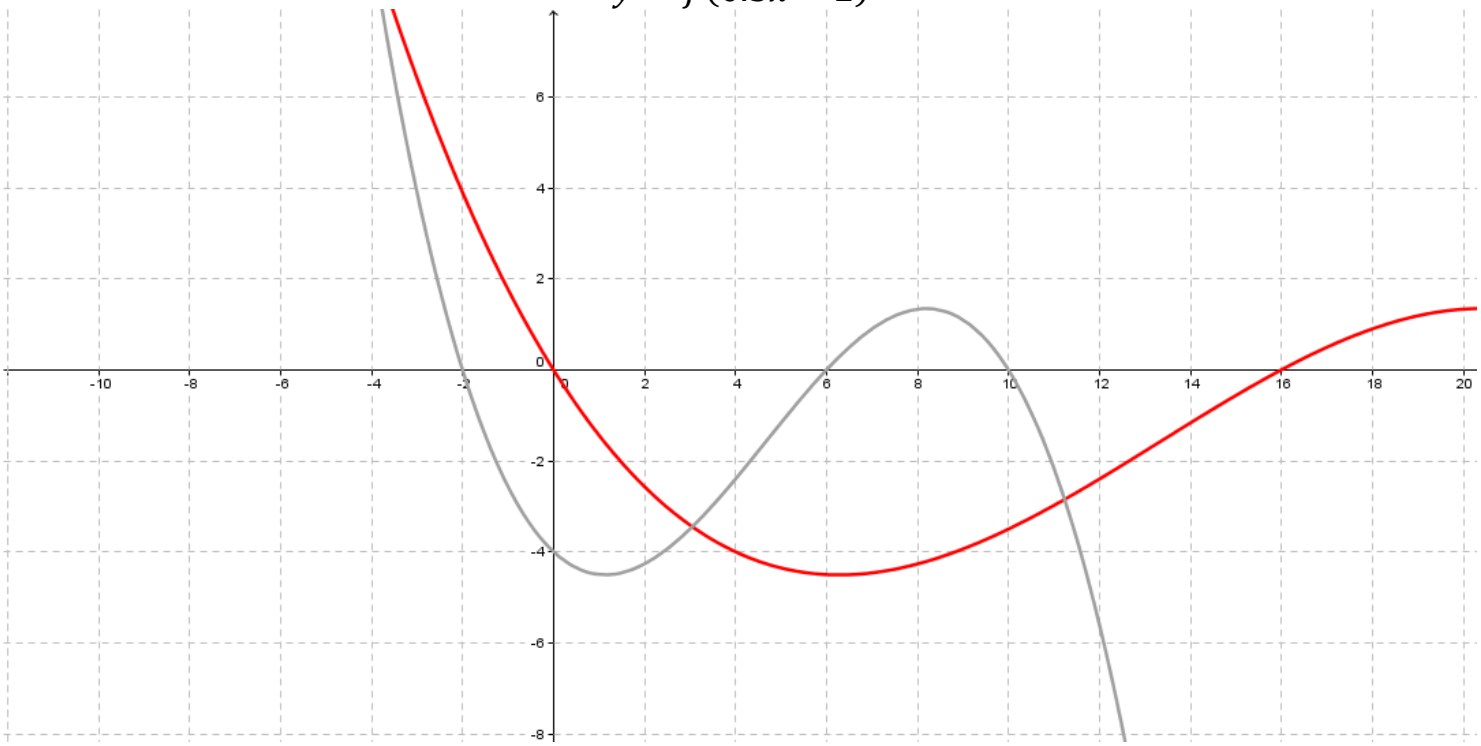
$y = f(2x)$



Notes:

Stretch in the x direction by scale factor 0.5. All points 0.5 times closer to the y-axis.

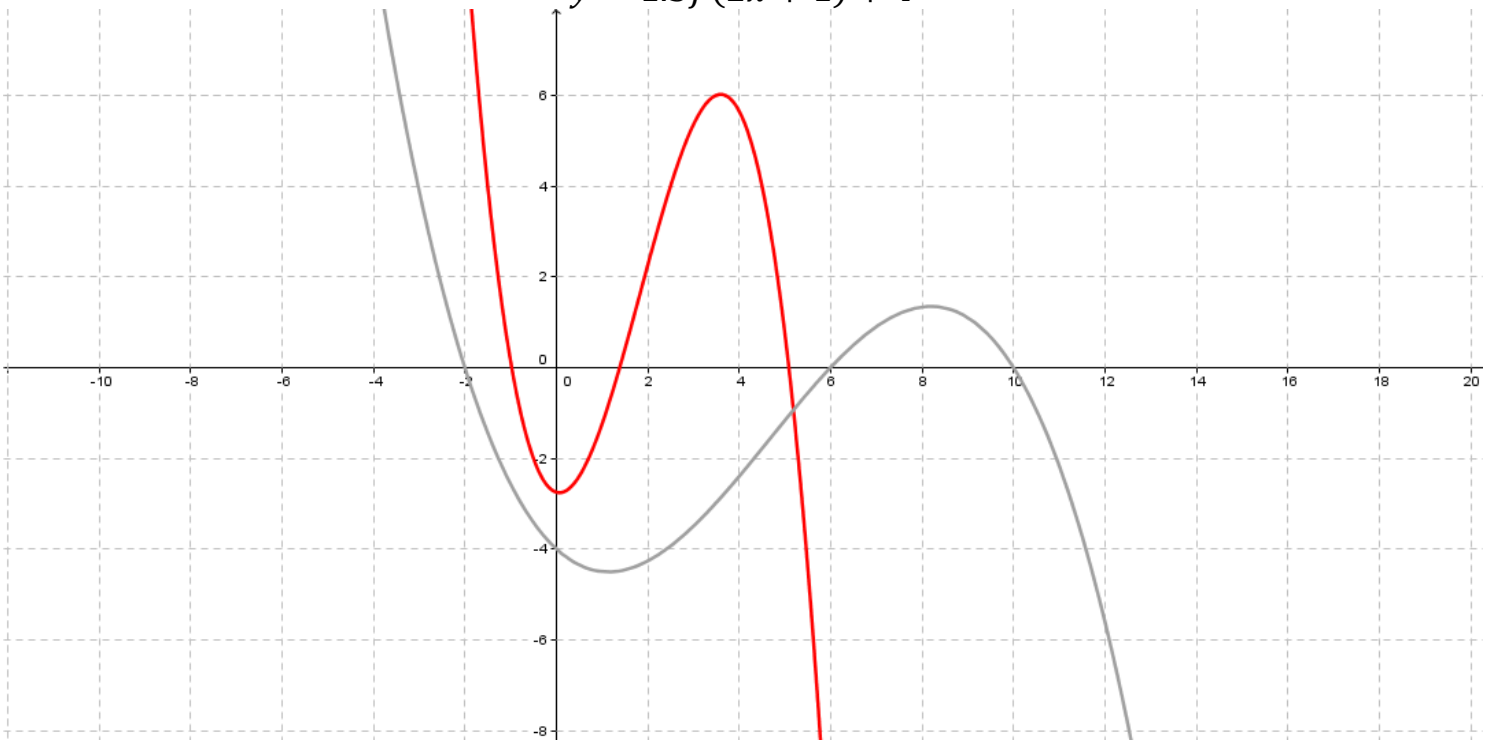
$y = f(0.5x - 2)$



Notes:

Translation of $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$ followed by a stretch in the x direction by scale factor 2. All points moved 2 places to the right, then twice as far from the y-axis.

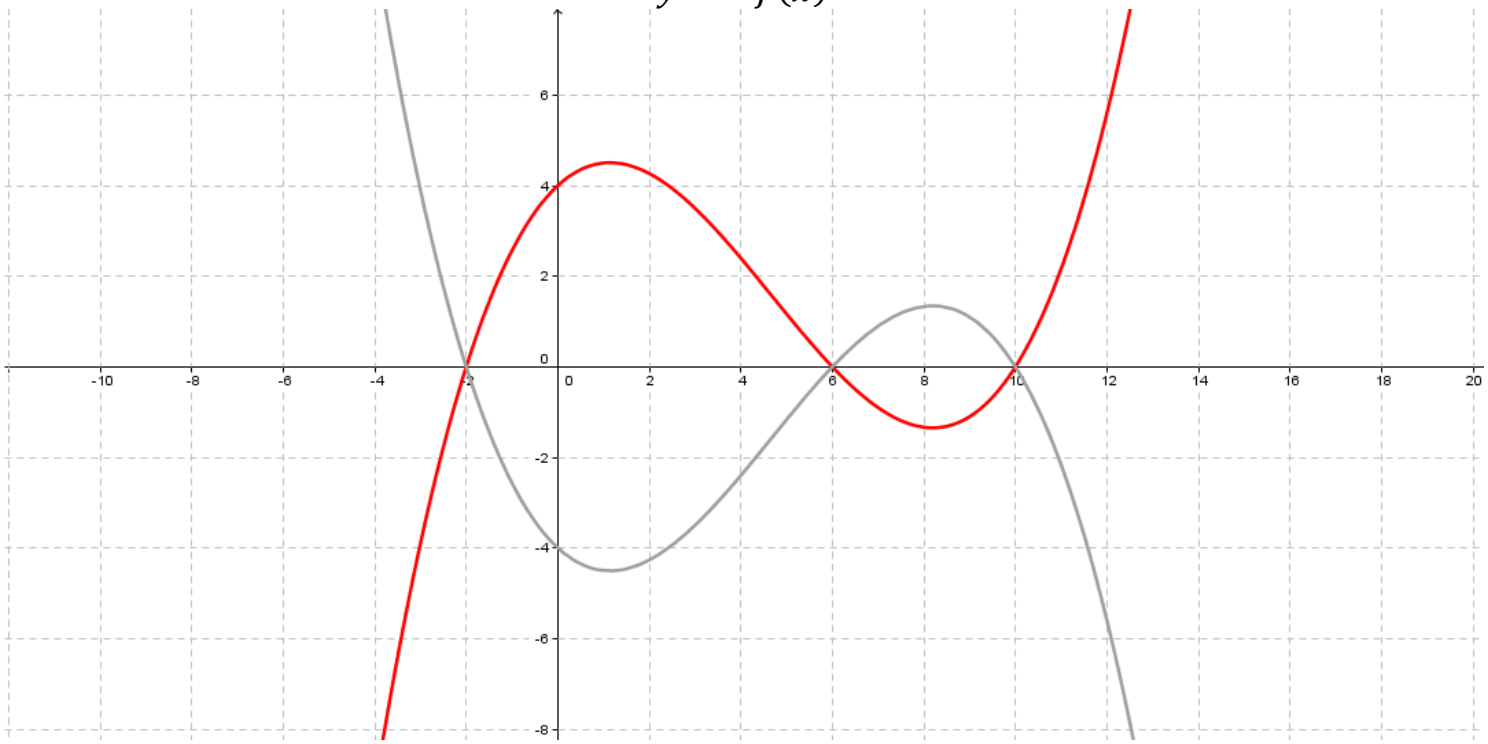
$y = 1.5f(2x + 1) + 4$



Notes:

Stretch by scale factor 1.5 in the y direction followed by a translation of $\begin{bmatrix} -1 \\ 4 \end{bmatrix}$ followed by a stretch in the x direction of scale factor 0.5. Note: provided the x translation precedes the x stretch, and the y stretch precedes the y translation, the order of transformations can vary.

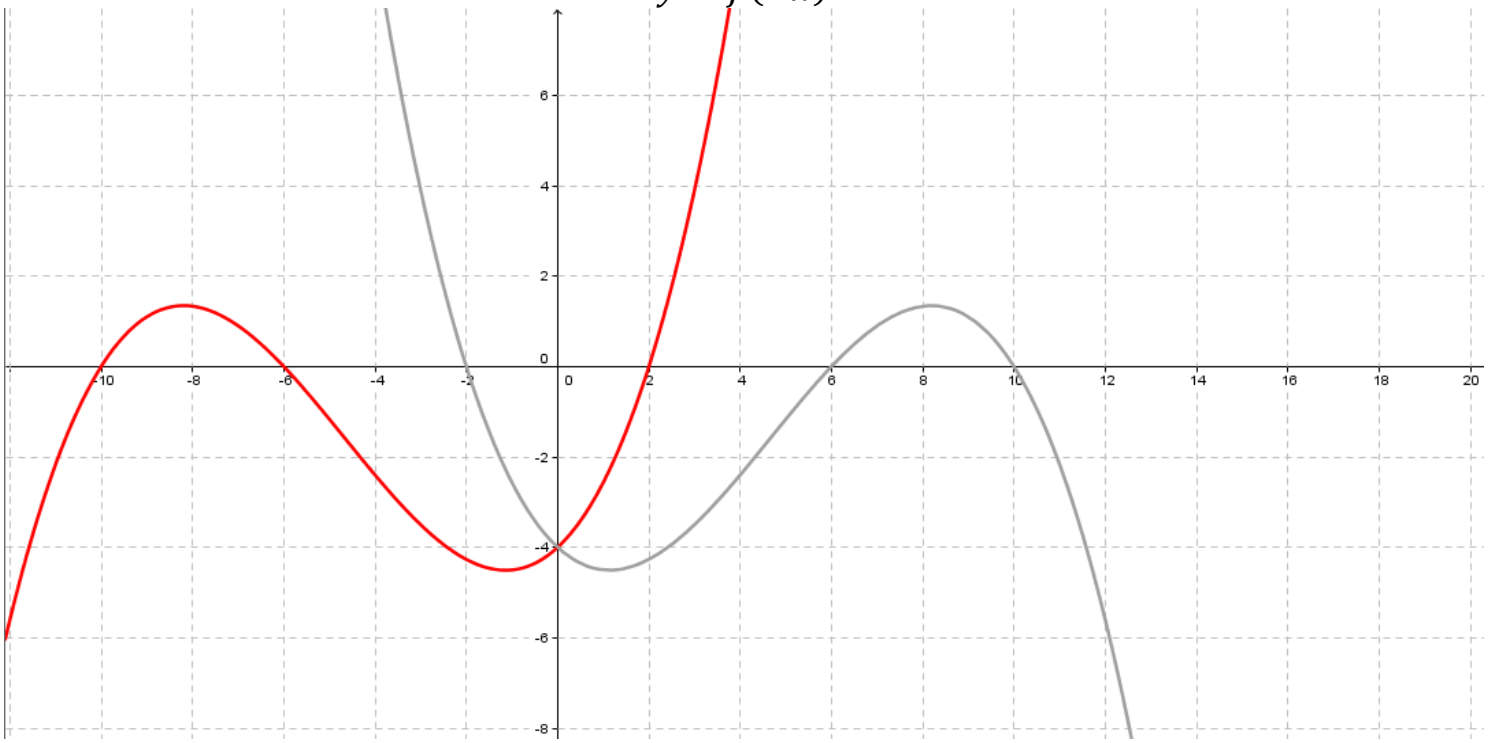
$y = -f(x)$



Notes:

Reflection in the x axis. Equivalent to a stretch by scale factor -1 in the y direction.

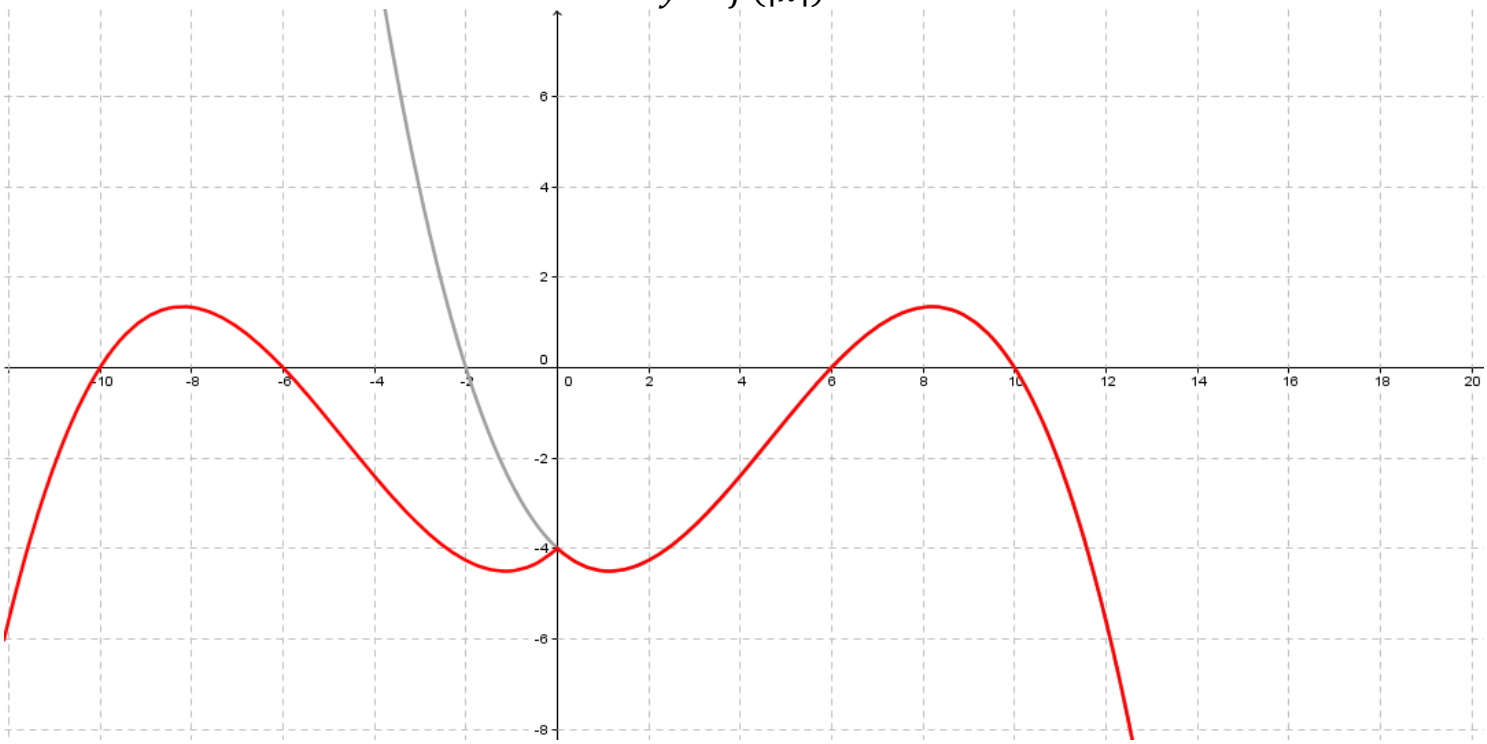
$y = f(-x)$



Notes:

Reflection in the y axis. Equivalent to a stretch by scale factor -1 in the x direction.

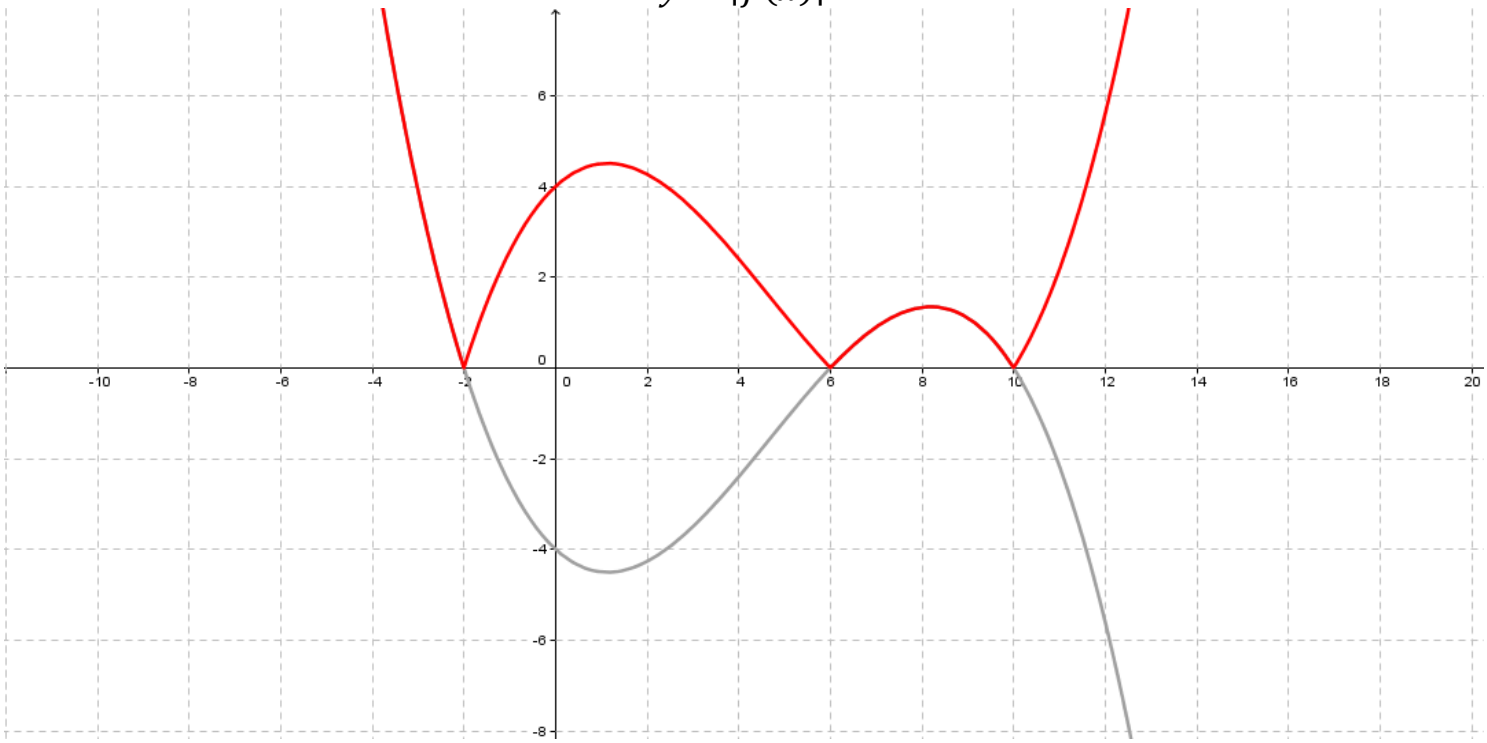
$y = f(|x|)$



Notes:

For positive x, no change. For negative x, the function plots the same as for positive x.

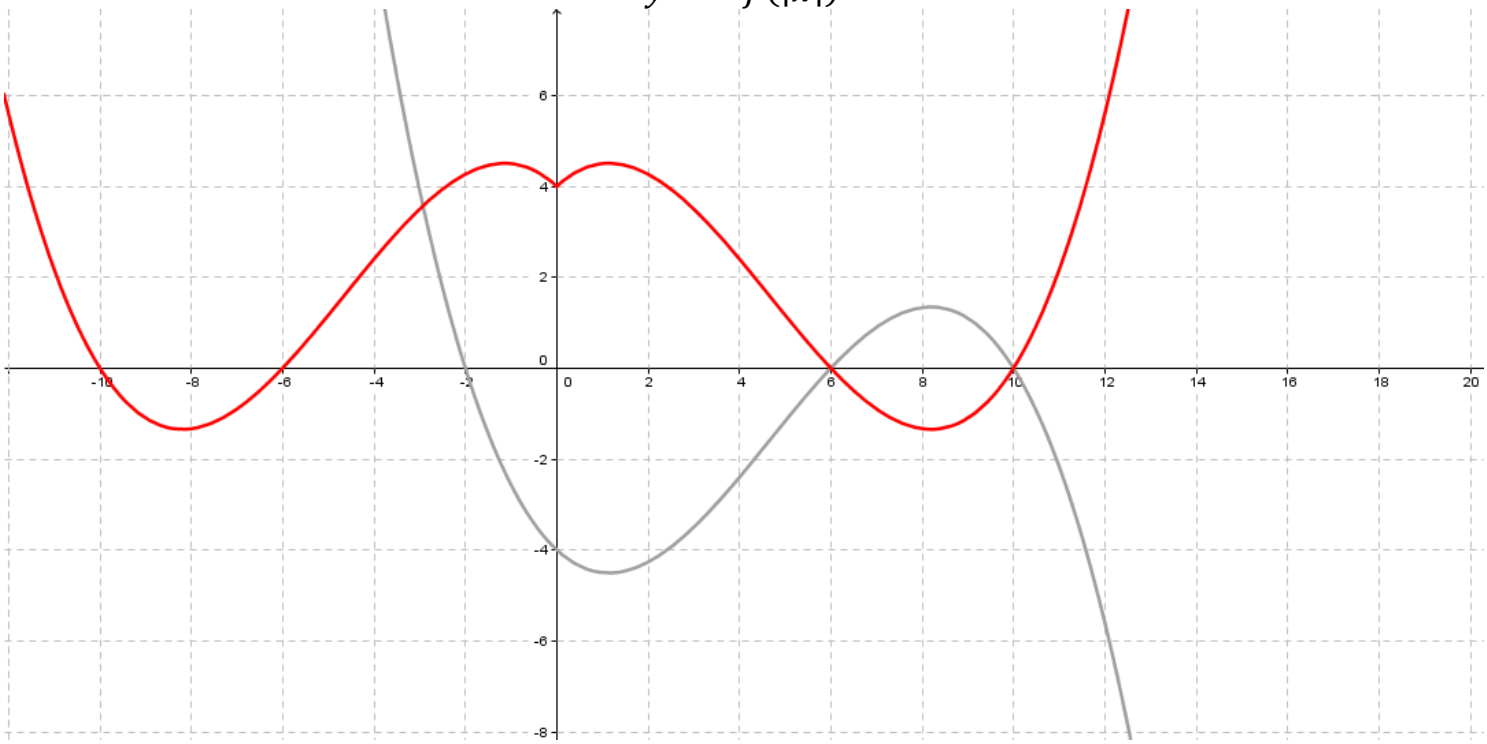
$y = |f(x)|$



Notes:

For a positive output, no change. For a negative output, the function is converted to positive.

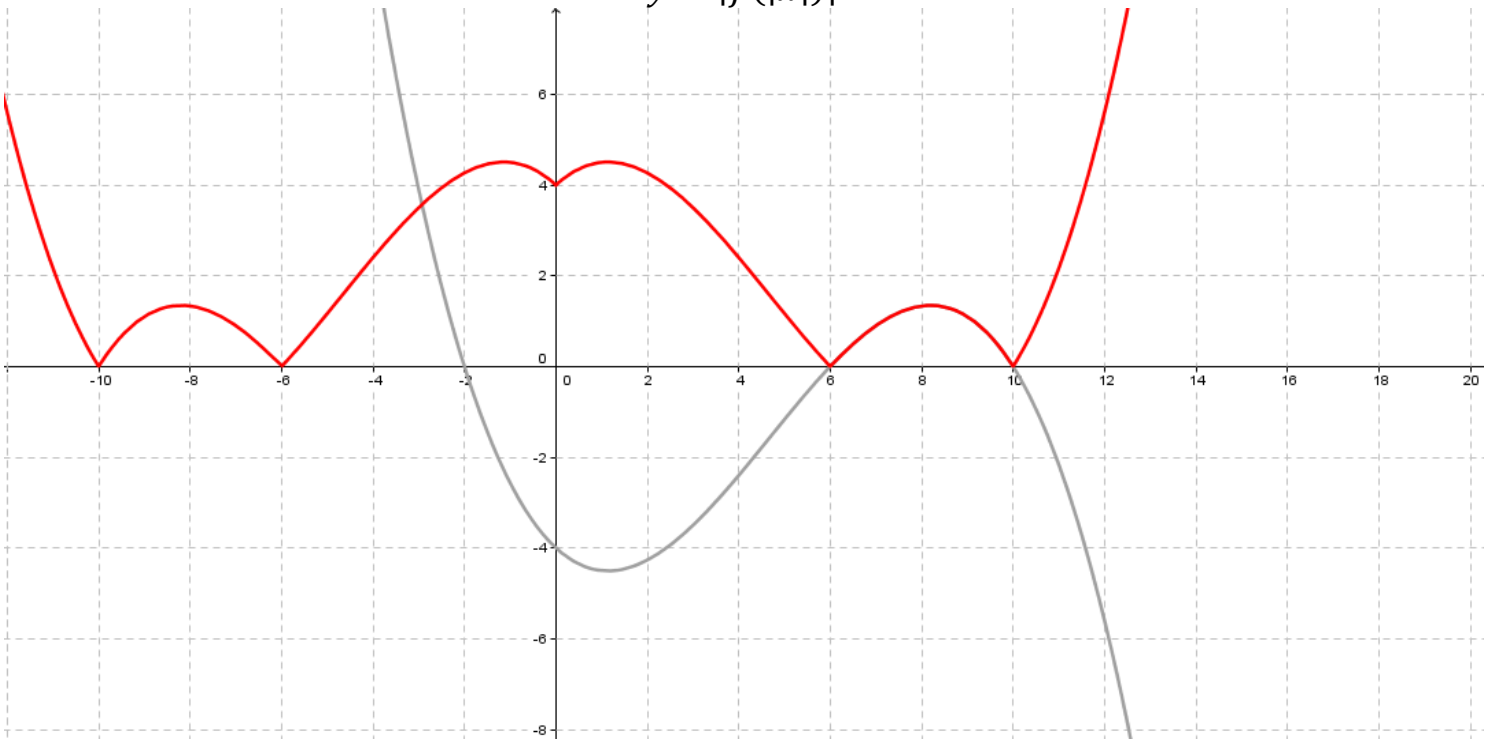
$y = -f(|x|)$



Notes:

This is a reflection in the x axis of the function $f(|x|)$.

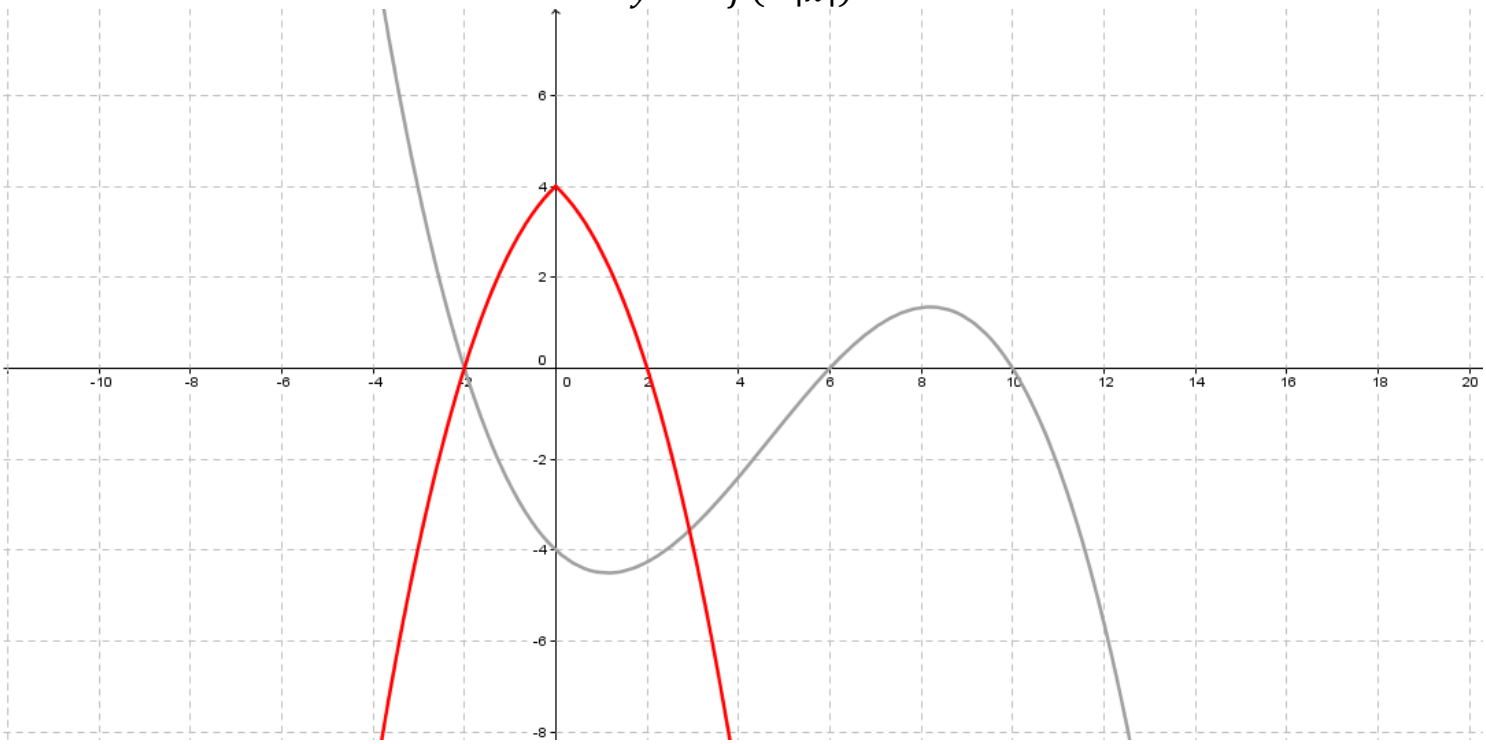
$y = |f(|x|)|$



Notes:

If the input is negative, the function takes the corresponding positive values for x. And then, if the output is negative, this is changed to positive.

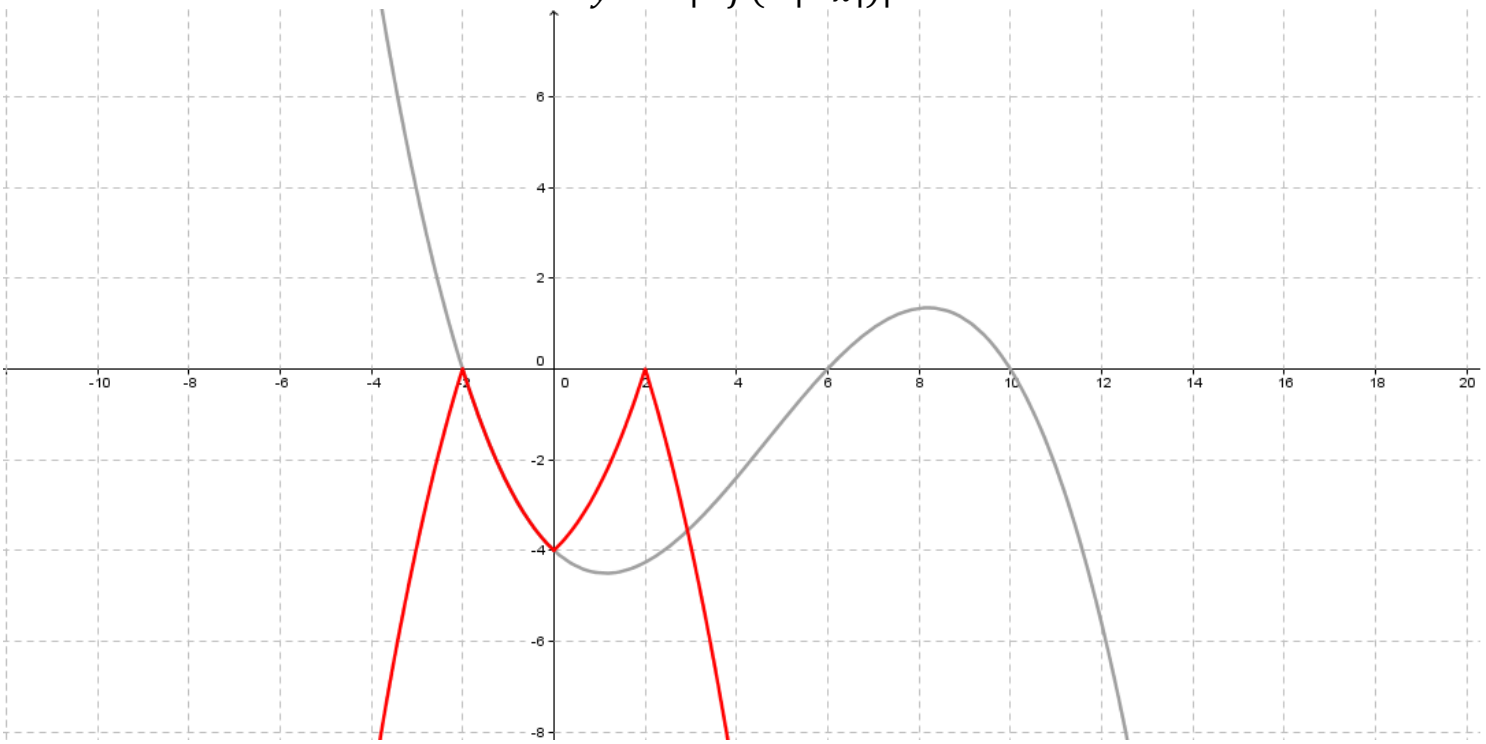
$y = -f(-|x|)$



Notes:

This function keeps negative inputs negative, but converts positive inputs to negative, so the negative x part of the curve is preserved (and repeated in the positive x direction. Finally, the entire curve is reflected in the x-axis.

$y = -|-f(-|-x|)|$



Notes:

Since $|-k| = |k|$, the negative signs in the modulus functions have no effect. This is equivalent to $y = -|f(-|x|)|$ which preserves negative x values (and repeats the same for positive x values), then, since $-|k| \leq 0$ for all k just as $|k| \geq 0$, reflects any positive outputs in the x-axis.