2.5 Transformations of Functions

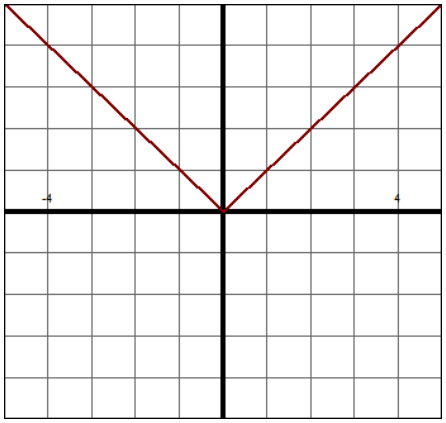
Transformations and Graph Sketches

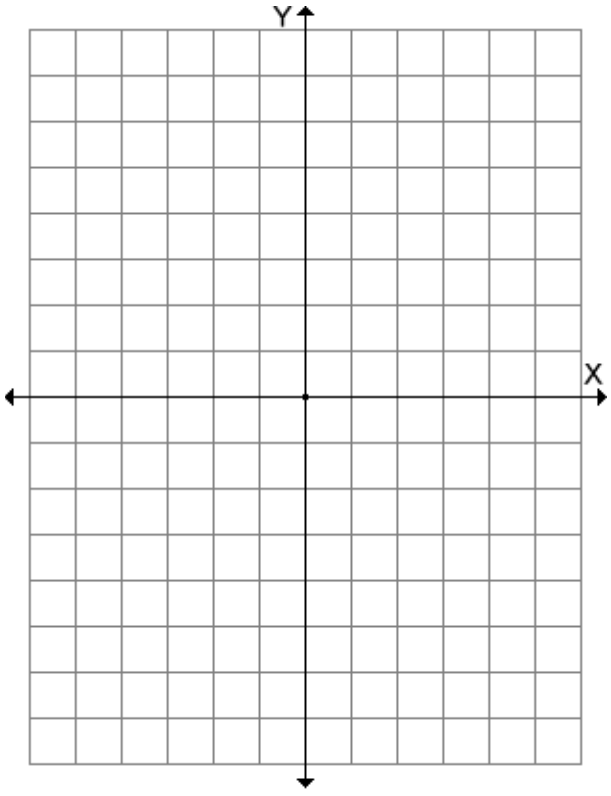
Suppose $y = f(x)$ is the original function (one we looked at in a previous section)

$y = f(x) + k$ moves $f(x)$ k units up
$y = f(x) - k$ moves $f(x)$ k units down
$y = f(x - h)$ moves $f(x)$ h units to the right
$y = f(x + h)$ moves $f(x)$ h units to the left
$y = -f(x)$ flips the graph over the horizontal axis
$y = f(-x)$ flips the graph over the vertical axis
$y = a \cdot f(x)$ If $|a| > 1$ then there is a vertical stretch. If $0 < |a| < 1$, then there is a vertical compression.

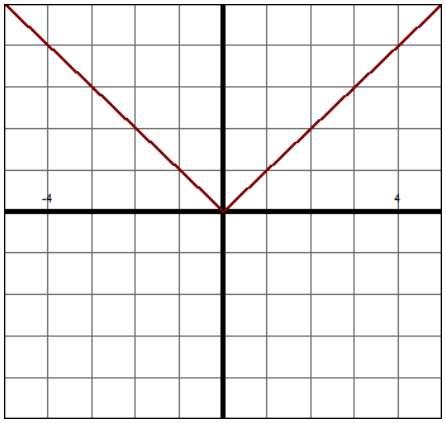
Let's look at some examples. For all of these we are just making a sketch of the function.

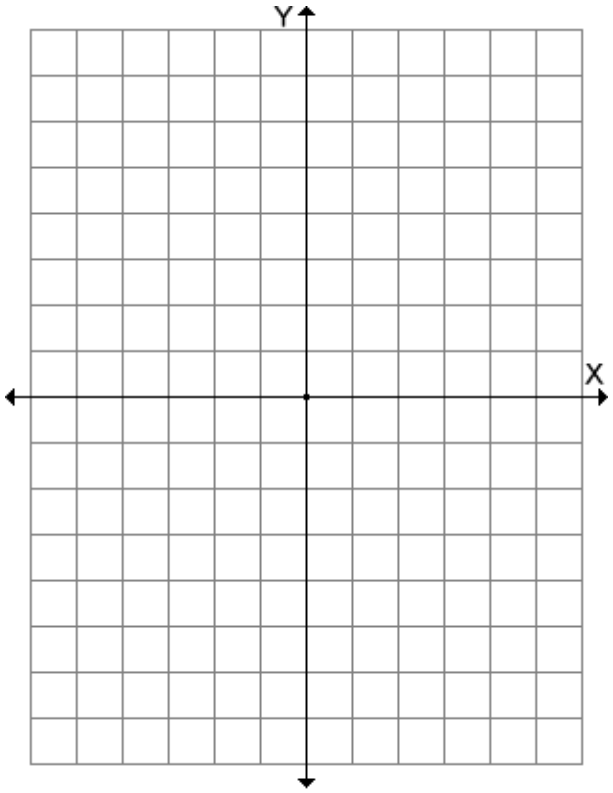
EXAMPLE: Sketch $y = |x + 1|$ by using transformations.



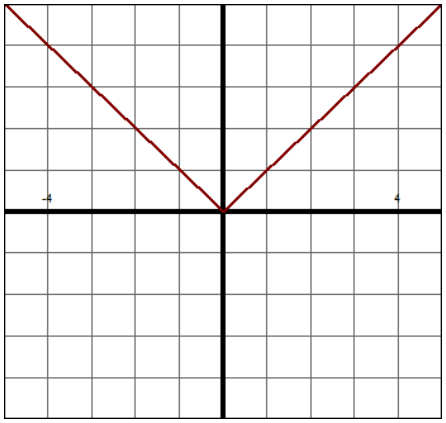


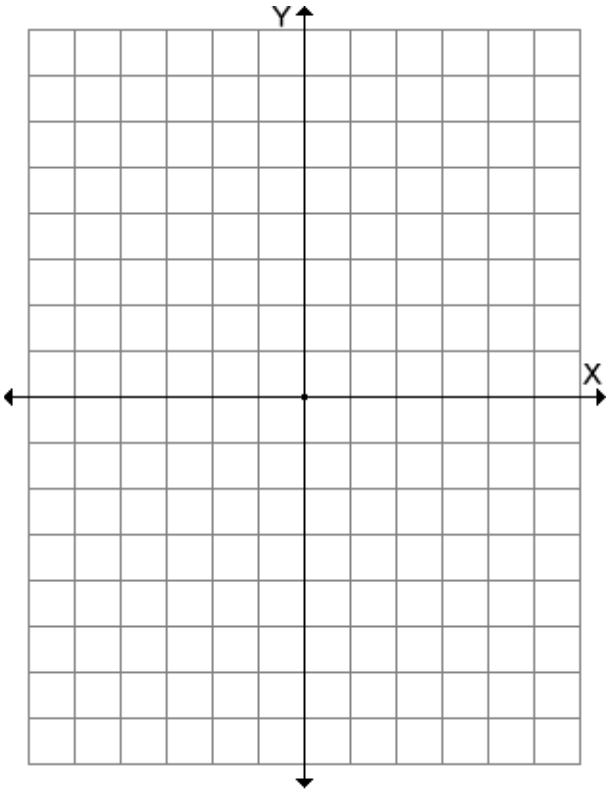
EXAMPLE: Sketch $y = |x| + 2$ by using transformations.



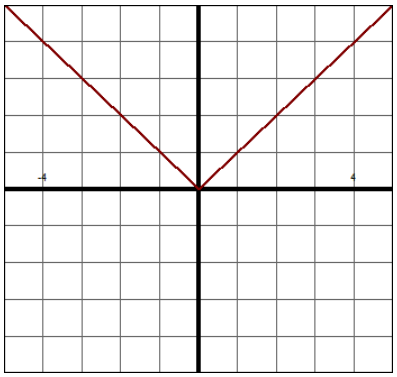


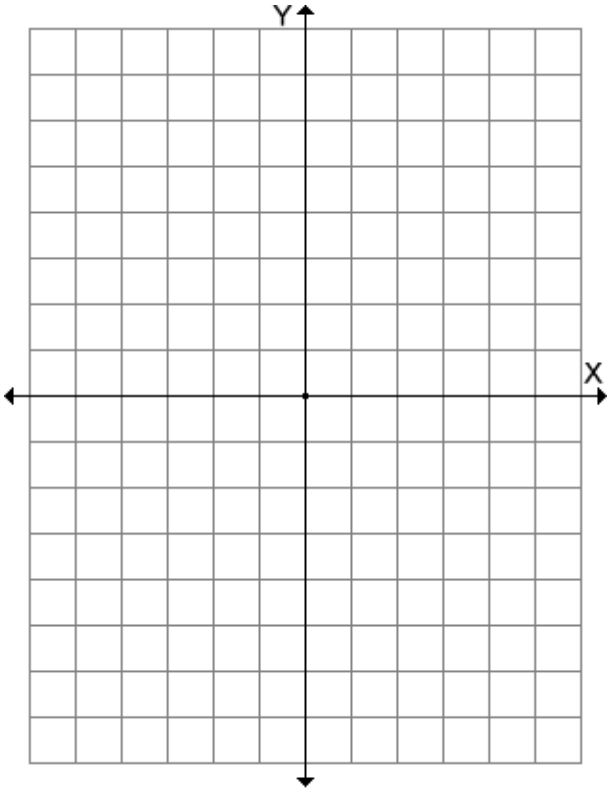
EXAMPLE: Sketch $y = -|x|$ by using transformations.



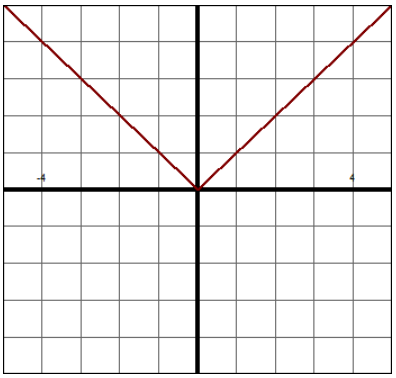


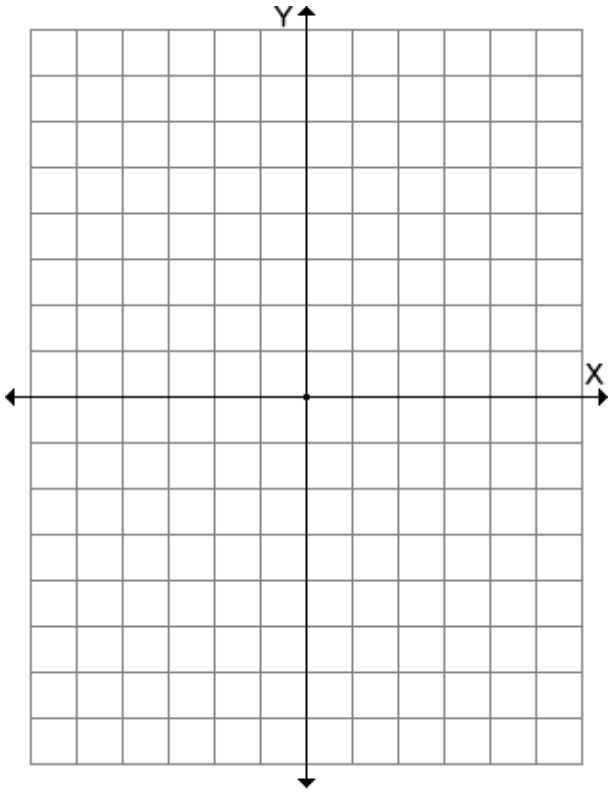
EXAMPLE: Sketch $y = -|x+1|+2$ by using transformations.



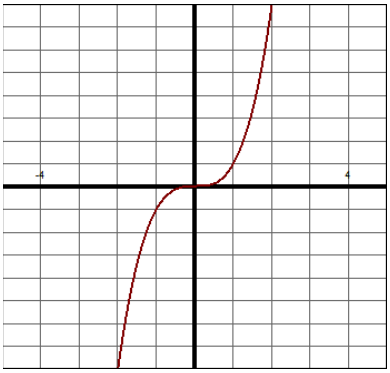


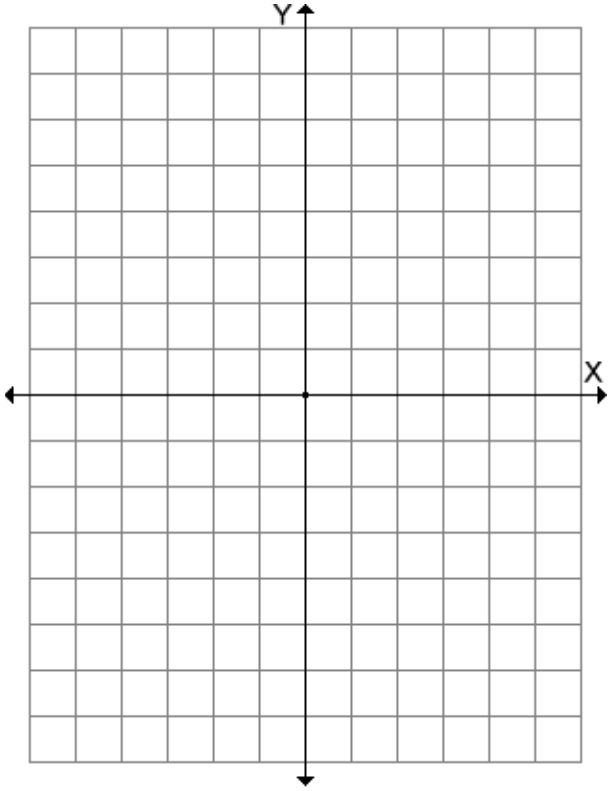
EXAMPLE: Sketch $y = |2x|$ by using transformations.



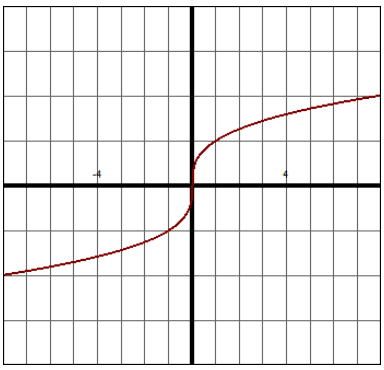


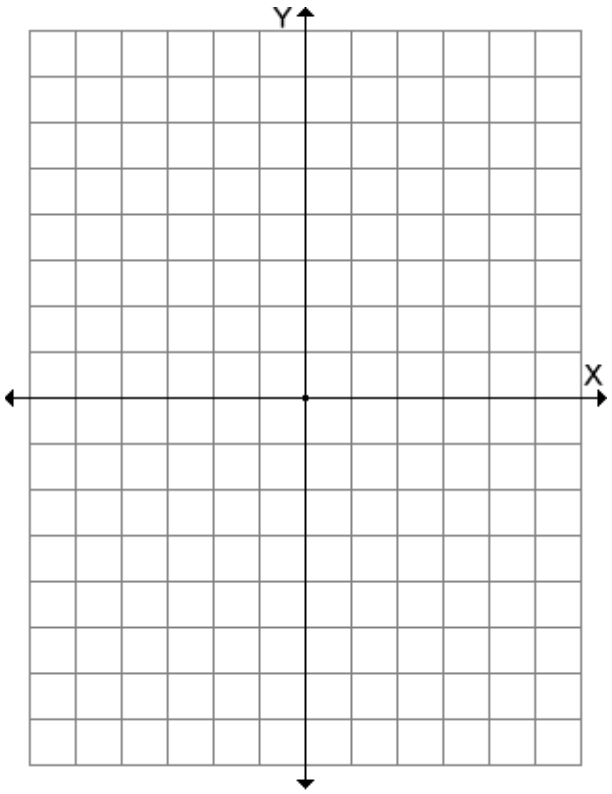
EXAMPLE: Sketch $y = \frac{1}{2}x^3$ by using transformations.



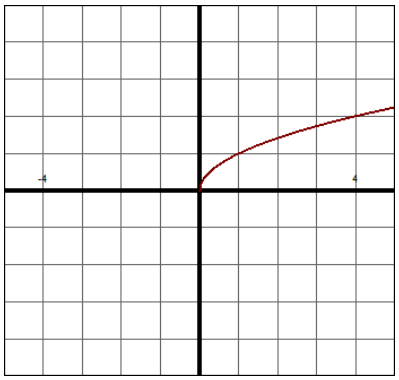


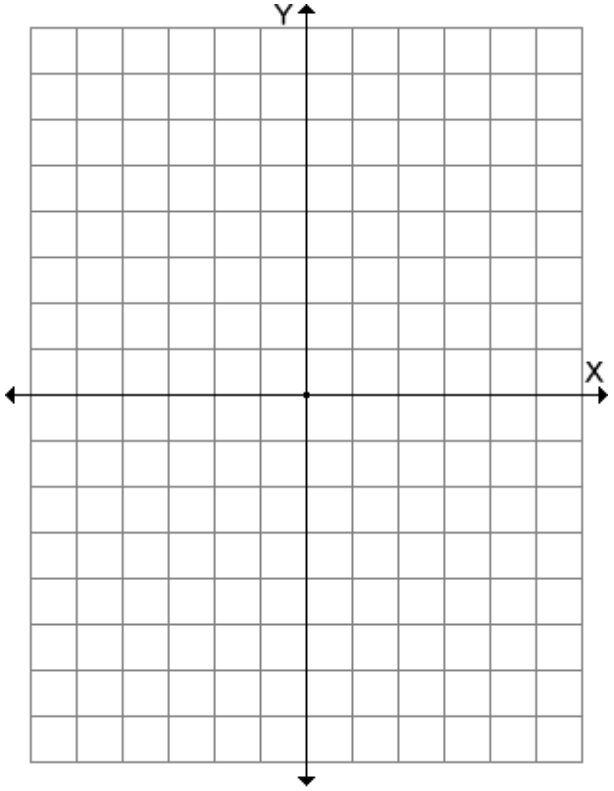
EXAMPLE: Sketch $y = 3 \cdot \sqrt[3]{x}$ by using transformations.



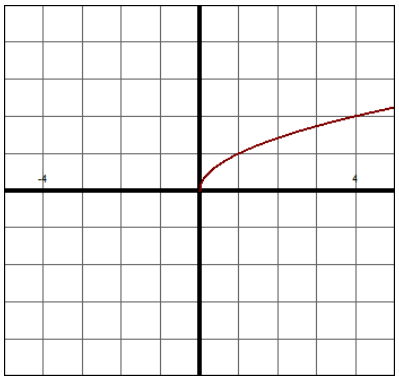


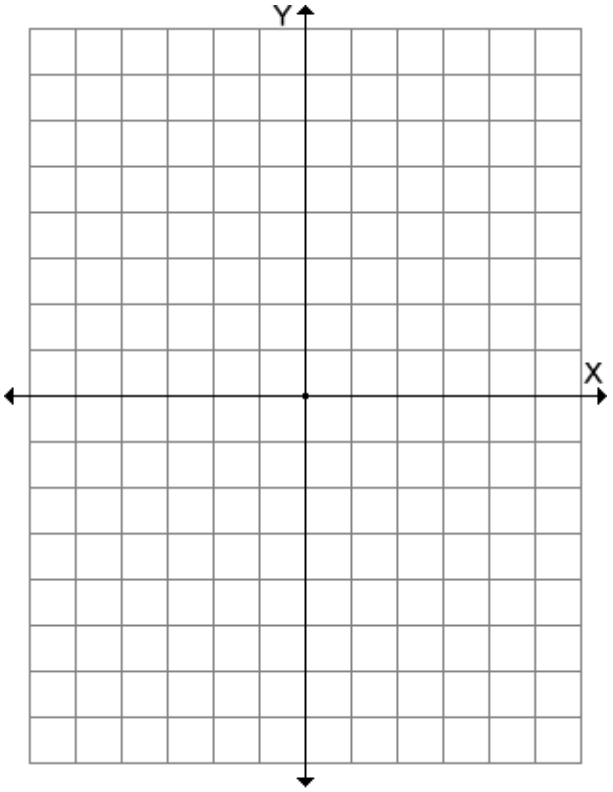
EXAMPLE: Sketch $y = \sqrt{x-2} - 1$ by using transformations.



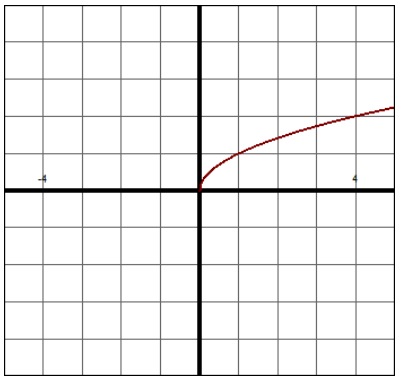


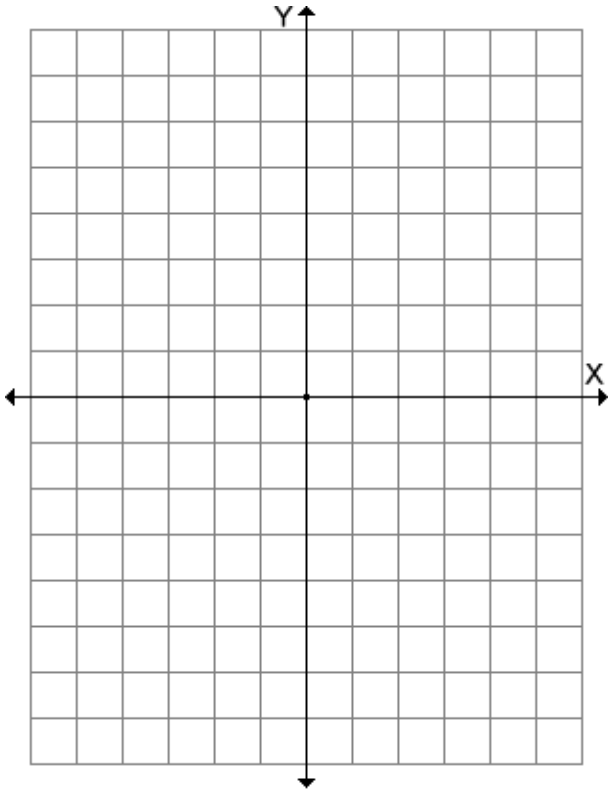
EXAMPLE: Sketch $y = -\sqrt{x+1} - 2$ by using transformations.





EXAMPLE: Sketch $y = \sqrt{4 - x} + 2$ by using transformations.





EXAMPLE: Sketch $y = -\frac{1}{2}(x-2)^2 - 1$ by using transformations.