

OBJECTIVE 1: Vertical & Horizontal Shifting

Any changes from the parent function are called transformation. Shifting is sliding a graph left and right or up and down.

- Parent function for a line: $y = x$; line increasing from left to right through the origin
- Parent function for a quadratic: $y = x^2$; parabola with the vertex at the origin, opens up
- Parent function for absolute value: $y = |x|$; V shape with the vertex at the origin, opens up
- Parent function for square root: $y = \sqrt{x}$; positive half a parabola opening right

Vertical Shift:

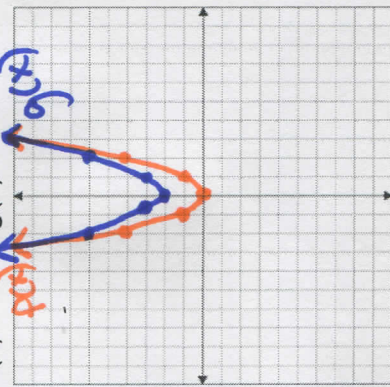
- $f(x) + k$: the + k moves the entire function up "k" units
- $f(x) - k$: the - k moves the entire function down "k" units

Horizontal Shift:

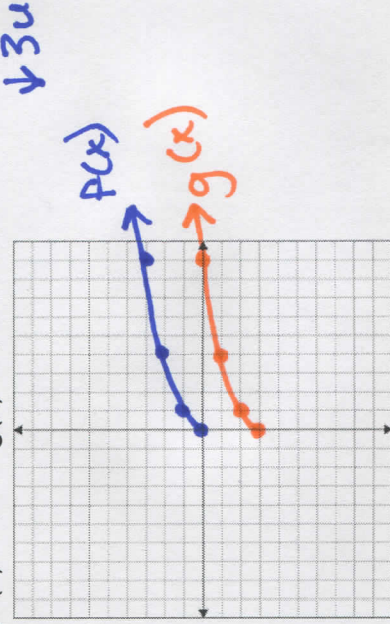
- $f(x - (+h))$: the + h moves the entire function right "h" units
- $f(x - (-h))$: the - h moves the entire function left "h" units"

TASK 1: Describe the transformations. Then sketch the graph of each pair of functions on the same set of axes. Label each function.

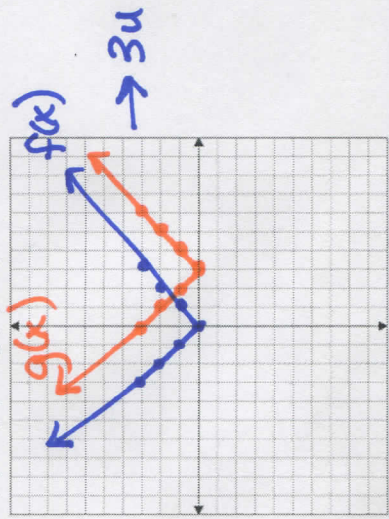
a) $f(x) = x^2 + 2$ & $g(x) = x^2 + 2$



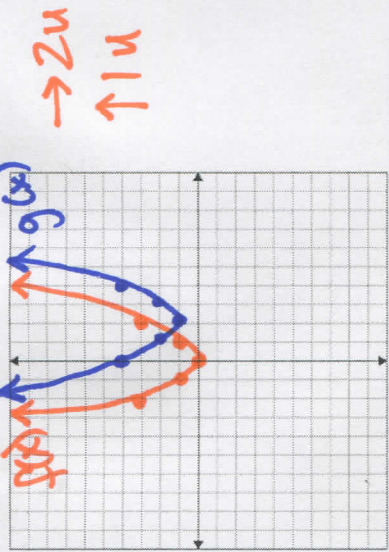
b) $f(x) = \sqrt{x}$ & $g(x) = \sqrt{x} - 3$



c) $f(x) = |x|$ & $g(x) = |x - 3|$



d) $f(x) = x^2$ & $g(x) = (x - 2)^2 + 1$



OBJECTIVE 2: Reflecting Graphs

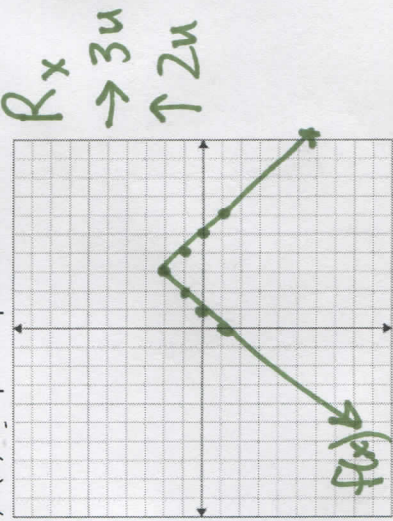
Another transformation is called a reflection. This is similar to mirror images. We reflect, or flip, over axes, lines, or objects.

Reflections:

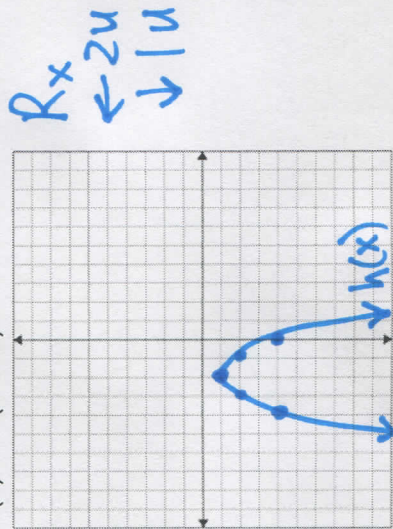
- o $-f(x)$: a reflection over the x-axis, R_x , you literally multiply everything by -1
- o $f(-x)$: a reflection over the y-axis, R_y , you multiply inside the () by -1 only.

TASK 2: Describe the transformations. Then sketch the function.

a) $f(x) = -|x - 3| + 2$



b) $h(x) = -(x + 2)^2 - 1$



Still need help with: