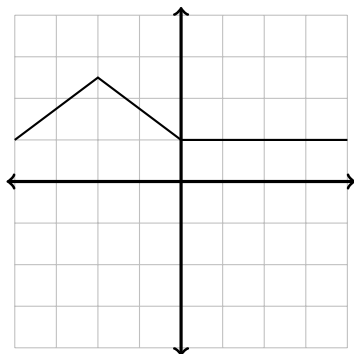# Combining Transformations Handout

Tips:
- Vertical and horizontal transformations can happen independently, so choose do them in groups.

- Follow order of operations for vertical

- For horizontal, write the "guts" of the function in the form
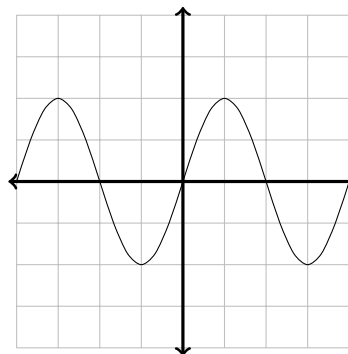
$$f(B(x+h))$$

then do stretches/squishes, then reflections, then shifts.

1. Given the graphs of f below, sketch $f(\frac{1}{2}x + 1)$.
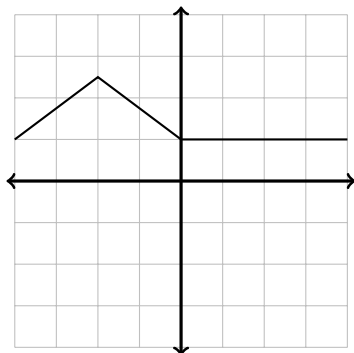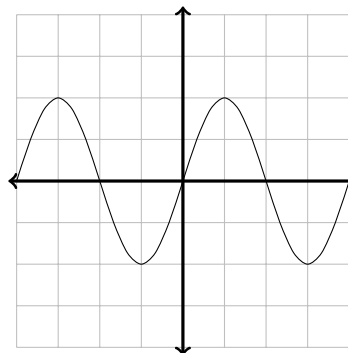
    (a)

    (b)

2. Given the graphs of f below, sketch $f(-x+1) - 2$.

    (a)

    (b)

3. For the functions below,

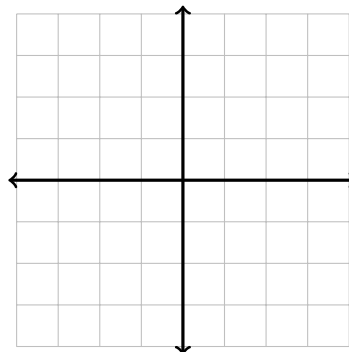   (i) identify a parent function (from our big list)

    (ii) Find values of A, B, h, and k such that

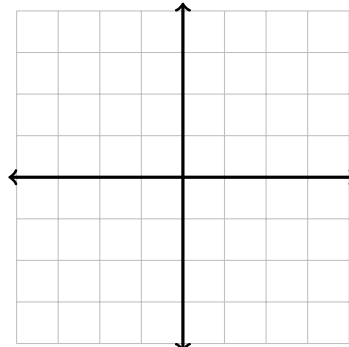$$f(x) = A \cdot p\left(B(x - h)\right) + k$$

    (iii) Write down the transformations

    (iv) Sketch a graph of $f(x)$ with as much detail as possible.
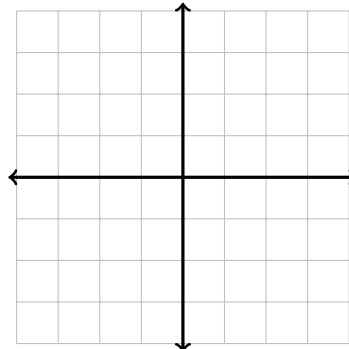
(a) $f(x) = \dfrac{2}{4x + 4}$

(b) $f(x) = x^2 - 6x + 10$
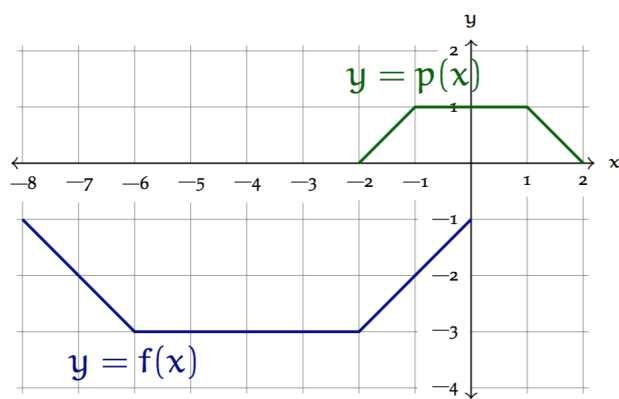
(c) $f(x) = \dfrac{x - 4}{x + 1}$

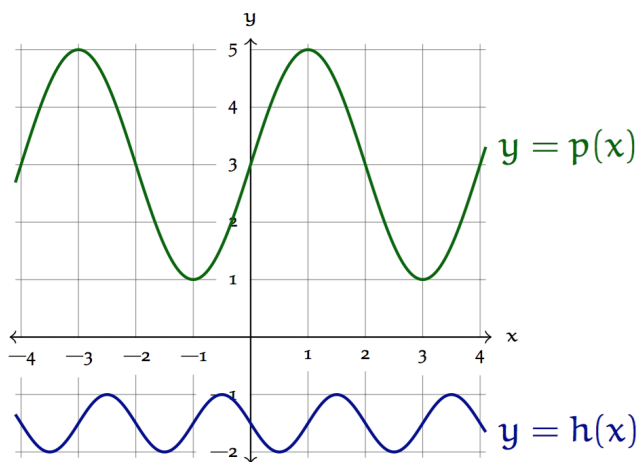4. Suppose that the point $(1, 2)$ lies on the graph of f.

    (a) Find a point on the graph of $-f(-3 - 2x)$.   (b) Find a point on the graph of $14f(-\frac{1}{2}x) - 1$.

5. Use the graphs of $y = p(x)$ and $y = f(x)$ below to write f as a transformation of p. (Assume p is the parent.)
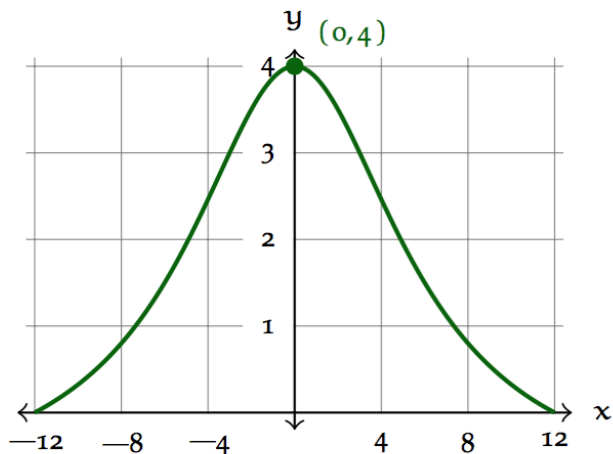
    (a)

    (b) Write h as a transformation of p.

6. A circular heating duct in a warehouse has an interior radius of 1 ft and the very middle of the pipe is 5 ft off the ground. The air inside the pipe moves faster in the middle of the duct and slower near the edges. If the air is x inches away from the center, it travels with speed $M(x)$ miles per hour. The graph of $M(x)$ is shown below.

Let $V(d)$ be the velocity (in feet per second) of the air that is d feet off of the floor. Write V as a transformation of M.