1. Point-Slope Form of a Line as a Graph Transformation

2. You should be familiar with the point-slope form of a line and with graph transformations. We will now look at the point-slope form of a line as a graph transformation.

3. (a) We will think of the point-slope form of a line by starting with a standard line, $y = x$ and transforming it by moving it horizontally and vertically, and stretching it vertically. First, let's look at the translations beginning with the line $y = 3x$.

   (b) Suppose we wish to find the equation of the line with slope $m = 3$ through the point $(4, 2)$. We begin with the line through the origin with slope 3.

   (c) We can then shift it 4 to the right. This gives us the equation
   $y = 3(x - 4)$

   (d) We can then shift the graph up 2. This gives us the point-slope equation of the line.
   $y - 2 = 3(x - 4)$

4. (a) By stretching the line vertically, we can always begin with the line $y = x$

   (b) To get the line with slope $\dfrac{1}{2}$, make the graph half as tall.

   (c) Now if we want the equation of the line with slope $\dfrac{1}{2}$, through the point $(-3, 1)$, we start with the line $y = x$, make it half as tall.

   (d) Move it left 3

   (e) And up 1