

# Slanted Lines

*Drawing Mathematics with Desmos | Justin Skycak*

**Setup.** Navigate to <https://www.desmos.com/calculator>. Be sure to sign in so that you can save your graph.

**Demonstration - Slope.** Observe the graph as you type each of the following inputs. In general, the line  $y = mx$  goes  $m$  units up per unit it goes right.

$$y = 10x$$

$$y = 1x$$

$$y = 0.1x$$

$$y = 0x$$

$$y = -0.1x$$

$$y = -1x$$

$$y = -10x$$

**Demonstration - Intercept.** Observe the graph as you type each of the following inputs. In general, the graph  $y = mx + b$  crosses the y-axis at the point  $(0, b)$ .

$$y = x + 5$$

$$y = x + 2$$

$$y = x + 1$$

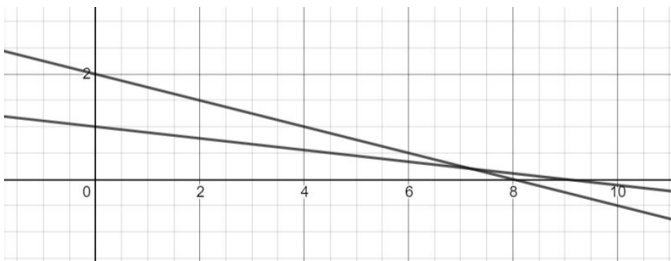
$$y = x + 0$$

$$y = x - 1$$

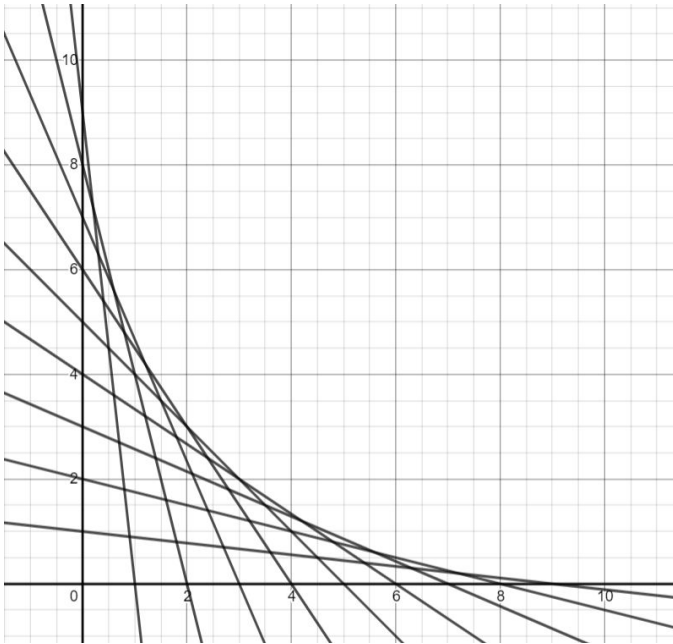
$$y = x - 2$$

$$y = x - 5$$

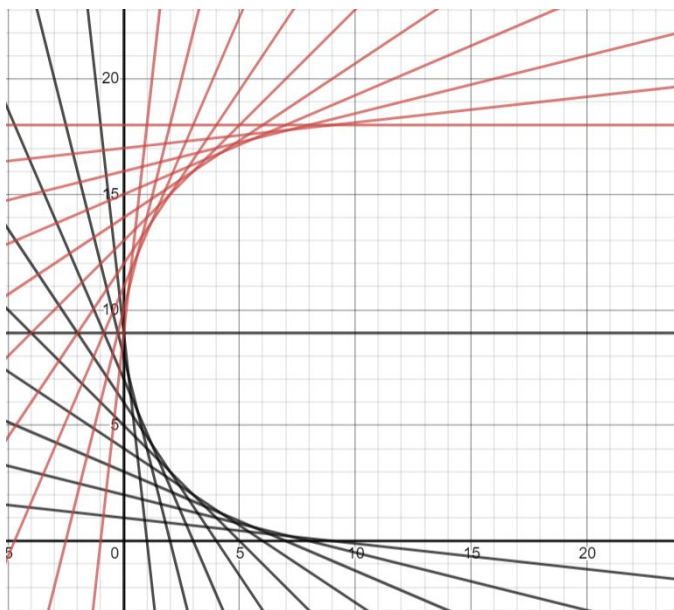
**Exercise.** Draw the two lines shown below. (Hint: one of the lines is given by  $y = 1 - \frac{1}{9}x$ )



**Exercise.** Draw more lines to reproduce the “spider web” graph shown below.



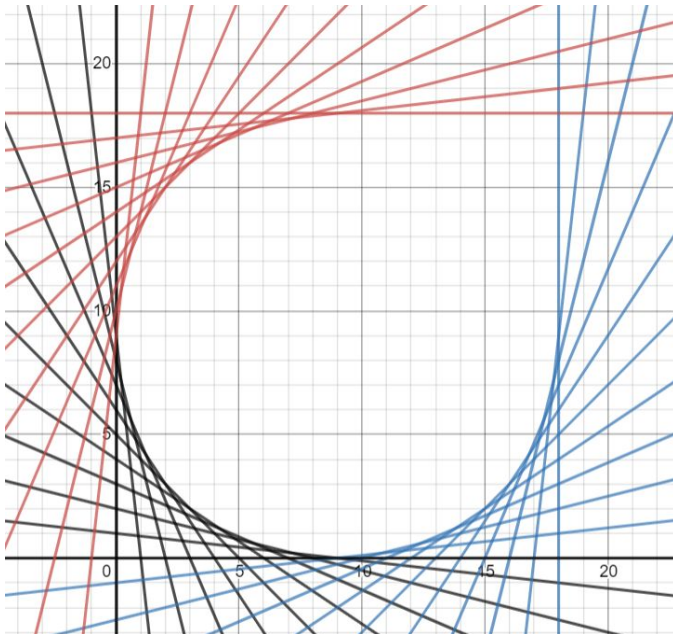
**Exercise.** Draw more lines to reflect the spider web upwards. (Hint: starting with the lines you drew previously, you can make the slopes positive, and adjust the intercepts as needed.)



**Demonstration.** The equation  $y = m(x - a) + b$  creates a line with slope  $m$  through the point  $(a, b)$ .

- The line through  $(9, 0)$  with slope  $\frac{1}{9}$  is given by  $y = \frac{1}{9}(x - 9) + 0$ .
- The line through  $(10, 0)$  with slope  $\frac{2}{8}$  is given by  $y = \frac{2}{8}(x - 9) + 0$ .

**Exercise.** Draw more lines to complete the bottom-right portion of your spider web. Two of the lines are given in the previous demonstration.



**Exercise.** Using the equation  $y = m(x - a) + b$ , complete the top-right corner of your spider web. Two lines are provided below.

- The line through  $(18, 17)$  with slope  $-\frac{1}{9}$  is given by  $y = -\frac{1}{9}(x - 18) + 17$ .
- The line through  $(18, 16)$  with slope  $-\frac{2}{8}$  is given by  $y = -\frac{2}{8}(x - 18) + 16$ .

