Exercise 17

For the following exercises, use the descriptions of the pairs of lines to find the slopes of Line 1 and Line 2. Is each pair of lines parallel, perpendicular, or neither?

- Line 1: Passes through $(5, 11)$ and $(10, 1)$
- Line 2: Passes through $(-1, 3)$ and $(-5, 11)$

Solution

Start by writing an equation for Line 1. Its slope is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 11}{10 - 5} = \frac{-10}{5} = -2.$$

Use the point-slope formula with either of the two points to get the equation of the line.

$$y - 11 = -2(x - 5)$$

$$y - 11 = -2x + 10$$

$$y = -2x + 21$$

Now write the equation of Line 2. Its slope is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{11 - 3}{-5 - (-1)} = \frac{8}{-4} = -2$$

Use the point-slope formula with either of the two points to get the equation of the line.

$$y - 3 = -2(x - (-1))$$

$$y - 3 = -2(x + 1)$$

$$y - 3 = -2x - 2$$

$$y = -2x + 1$$

Because the lines have the same slope (-2), they are parallel.