Exercise 18

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 $(8, -10)$ and $(0, -26)$
- Line 2: Passes through $(2, 5)$ and $(4, 4)$

Solution

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

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-26 - (-10)}{0 - 8} = \frac{-16}{-8} = 2.$$

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

$$y - (-26) = 2(x - 0)$$

$$y + 26 = 2x$$

$$y = 2x - 26$$

Now write the equation of Line 2. Its slope is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 5}{4 - 2} = \frac{-1}{2} = -\frac{1}{2}$$

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

$$y - 4 = -\frac{1}{2}(x - 4)$$

$$y - 4 = -\frac{1}{2}x + 2$$

$$y = -\frac{1}{2}x + 6$$

Because one of the slopes is the negative reciprocal of the other, the lines are perpendicular.