

Exercise 35

For the following exercises, given each set of information, find a linear equation satisfying the conditions, if possible.

Passes through $(-2, 8)$ and $(4, 6)$

Solution

The general formula for the equation of a line is

$$y = mx + b.$$

The first condition says that when $x = -2$, $y = 8$.

$$8 = m(-2) + b$$

The second condition says that when $x = 4$, $y = 6$.

$$6 = m(4) + b$$

This is a system of two equations with two unknowns that can be solved.

$$\begin{cases} -2m + b = 8 \\ 4m + b = 6 \end{cases}$$

Subtract the respective sides of these two equations to eliminate b .

$$-2m - 4m = 8 - 6 \quad \rightarrow \quad -6m = 2 \quad \rightarrow \quad m = -\frac{1}{3}$$

Multiply both sides of the first equation by 2

$$\begin{cases} -4m + 2b = 16 \\ 4m + b = 6 \end{cases}$$

and then add the respective sides of these two equations to eliminate m .

$$2b + b = 16 + 6 \quad \rightarrow \quad 3b = 22 \quad \rightarrow \quad b = \frac{22}{3}$$

Now that m and b are solved for, the equation of the line is known.

$$y = -\frac{1}{3}x + \frac{22}{3}$$