

## Exercise 110

A professor asks her class to report the amount of time  $t$  they spent writing two assignments. Most students report that it takes them about 45 minutes to type a four-page assignment and about 1.5 hours to type a nine-page assignment.

- Find the linear function  $y = N(t)$  that models this situation, where  $N$  is the number of pages typed and  $t$  is the time in minutes.
- Use part a. to determine how many pages can be typed in 2 hours.
- Use part a. to determine how long it takes to type a 20-page assignment.

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### Solution

#### Part (a)

The general equation of a line is

$$N(t) = mt + b.$$

The line in this exercise passes through  $(45, 4)$  and  $(90, 9)$ .

$$4 = m(45) + b$$

$$9 = m(90) + b$$

Solve this first equation for  $b$

$$b = 4 - 45m \tag{1}$$

and plug it into the second equation.

$$9 = 90m + (4 - 45m)$$

Solve for  $m$ .

$$9 = 90m + 4 - 45m$$

$$9 = 45m + 4$$

$$5 = 45m$$

$$1 = 9m$$

$$m = \frac{1}{9}$$

Substitute this into equation (1) to get  $b$ .

$$b = 4 - 45 \left( \frac{1}{9} \right) = -1$$

Therefore, the linear function is

$$N(t) = \frac{1}{9}t - 1.$$

**Part (b)**

2 hours is 120 minutes, so plug in  $t = 120$  to the formula for  $N(t)$ .

$$N(120) = \frac{1}{9}(120) - 1 = \frac{37}{3} \approx 12.3.$$

In 120 minutes about 12 pages can be written.

**Part (c)**

Set  $N(t) = 20$  and solve the equation for  $t$ .

$$N(t) = \frac{1}{9}t - 1 = 20$$

$$\frac{1}{9}t = 21$$

$$t = 21(9) = 189$$

It will take 189 minutes to write 20 pages.