Exercise 48

A phone company has a monthly cellular data plan where a customer pays a flat monthly fee of \$10 and then a certain amount of money per megabyte (MB) of data used on the phone. If a customer uses 20 MB, the monthly cost will be \$11.20. If the customer uses 130 MB, the monthly cost will be \$17.80.

(a) Find a linear equation for the monthly cost of the data plan as a function of x, the number of MB used.

(b) Interpret the slope and y-intercept of the equation.

(c) Use your equation to find the total monthly cost if 250 MB are used.

Solution

Use the two given points, $(20, 11.20)$ and $(130, 17.80)$, to determine the equation of the line. Find the slope first.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{17.80 - 11.20}{130 - 20} = \frac{6.60}{110} = \frac{3}{50}$$

Then use the point-slope formula with either of the two points to obtain the equation of the line.

$$y - 11.20 = \frac{3}{50}(x - 20)$$

$$y - 11.20 = \frac{3}{50}x - 1.2$$

$$y = \frac{3}{50}x + 10$$

The slope, $3/50 = 0.06$, is the cost per megabyte, and the y-intercept $(0, 10)$ is the flat monthly fee. If 250 MB are used, the cost is

$$y = \frac{3}{50}(250) + 10 = 25.$$