

## Exercise 20

The monthly cost of driving a car depends on the number of miles driven. Lynn found that in May it cost her \$380 to drive 480 mi and in June it cost her \$460 to drive 800 mi.

- Express the monthly cost  $C$  as a function of the distance driven  $d$ , assuming that a linear relationship gives a suitable model.
- Use part (a) to predict the cost of driving 1500 miles per month.
- Draw the graph of the linear function. What does the slope represent?
- What does the  $C$ -intercept represent?
- Why does a linear function give a suitable model in this situation?

---

### Solution

The desired line goes through the two points,  $(480, 380)$  and  $(800, 460)$ . A general linear function has the form,

$$y = mx + b.$$

Determine the two unknowns,  $m$  and  $b$ .

$$380 = m(480) + b$$

$$460 = m(800) + b$$

Solving this system of equations yields

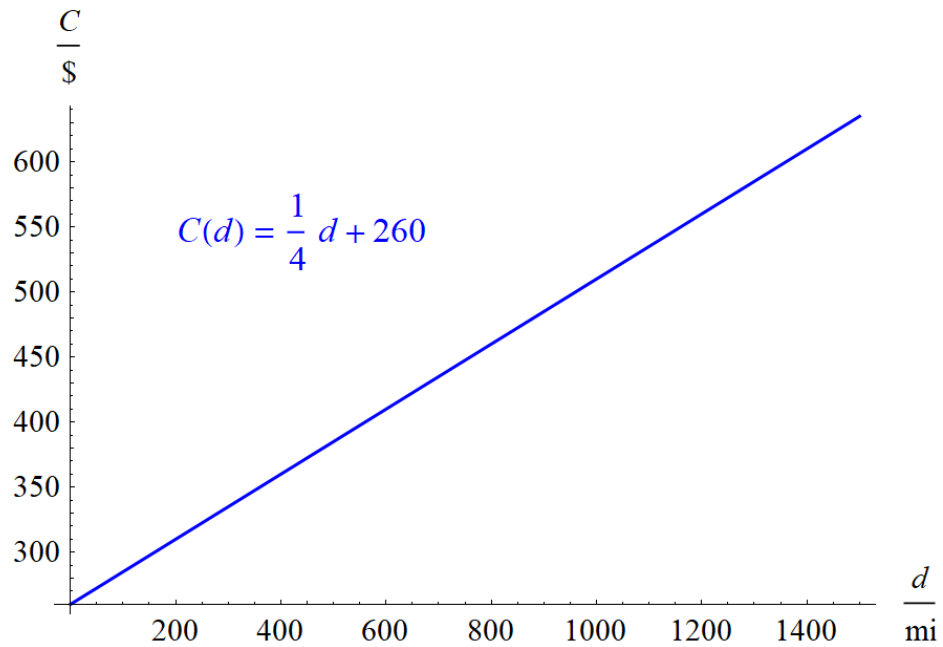
$$m = \frac{1}{4} \quad \text{and} \quad b = 260.$$

Therefore, the monthly cost  $C$  as a function of the distance driven  $d$  is

$$C(d) = \frac{1}{4}d + 260.$$

The cost of driving 1500 miles per month is predicted to be

$$C(1500) = \frac{1}{4}(1500) + 260 = \$635.$$



The slope represents how expensive it is to drive a mile. The  $C$ -intercept represents the base cost for owning a car. A linear function gives a suitable model because the values it predicts are realistic.