

### Lesson Summary

When a linear function is given by the equation of a line of the form  $y = mx + b$ , the rate of change is  $m$ , and the initial value is  $b$ . Both are easy to identify.

The rate of change of a linear function is the slope of the line it represents. It is the change in the values of  $y$  per a one-unit increase in the values of  $x$ .

- A positive rate of change indicates that a linear function is increasing.
- A negative rate of change indicates that a linear function is decreasing.
- Given two lines each with positive slope, the function represented by the steeper line has a greater rate of change.

The initial value of a linear function is the value of the  $y$ -variable when the  $x$ -value is zero.

### Problem Set

1. A rental car company offers the following two pricing methods for its customers to choose from for a one-month rental:

Method 1: Pay \$400 for the month, or

Method 2: Pay \$0.30 per mile plus a standard maintenance fee of \$35.

- a. Construct a linear function that models the relationship between the miles driven and the total rental cost for Method 2. Let  $x$  represent the number of miles driven and  $y$  represent the rental cost (in dollars).
  - b. If you plan to drive 1,100 miles for the month, which method would you choose? Explain your reasoning.
2. Recall from a previous lesson that Kelly wants to add new music to her MP3 player. She was interested in a monthly subscription site that offered its MP3 downloading service for a monthly subscription fee *plus* a fee per song. The linear function that modeled the total monthly cost in dollars ( $y$ ) based on the number of songs downloaded ( $x$ ) is  $y = 5.25 + 0.30x$ .

The site has suddenly changed its monthly price structure. The linear function that models the new total monthly cost in dollars ( $y$ ) based on the number of songs downloaded ( $x$ ) is  $y = 0.35x + 4.50$ .

- a. Explain the meaning of the value 4.50 in the new equation. Is this a better situation for Kelly than before?
- b. Explain the meaning of the value 0.35 in the new equation. Is this a better situation for Kelly than before?
- c. If you were to graph the two equations (old versus new), which line would have the steeper slope? What does this mean in the context of the problem?
- d. Which subscription plan provides the better value if Kelly downloads fewer than 15 songs per month?