*Problem* **1.2**  *continued*

**C** Four other friends who are part of the walkathon made the following representations of their data. Could any of these relationships be linear relationships? Explain.

### George's Walking Rate

| Time (seconds) | Distance (meters) |
|---|---|
| 0 | 0 |
| 1 | 2 |
| 2 | 9 |
| 3 | 11 |
| 4 | 20 |
| 5 | 25 |

### Elizabeth's Walking Rate

| Time (seconds) | Distance (meters) |
|---|---|
| 0 | 0 |
| 2 | 3 |
| 4 | 6 |
| 6 | 9 |
| 8 | 12 |
| 10 | 15 |

### Billie's Walking Rate

$$D = 2.25t$$

*D* represents distance
*t* represents time

### Bob's Walking Rate

$$t = \frac{100}{r}$$

*t* represents time
*r* represents walking rate

**A C E** Homework starts on page 16.

# 1.3 Raising Money
## Using Linear Relationships

In *Variables and Patterns*, you looked at situations that involved *dependent* and *independent* variables. In Problem 1.2, the distance walked depended on the time. This tells you that distance is the **dependent variable** and time is the **independent variable**. In this Problem, you will look at relationships between two other variables in a walkathon.

Each participant in the walkathon must find sponsors to pledge a certain amount of money for each kilometer the participant walks.

The students in Ms. Chang's class are trying to estimate how much money they might be able to raise. Several questions come up in their discussions:

- What variables can affect the amount of money that is collected?

- How can you use these variables to estimate the amount of money each student will collect?

- Will the amount of money collected be the same for each walker?

Each student found sponsors who are willing to pledge money according to the following descriptions.

- Leanne's sponsors will donate $10 regardless of how far she walks.

- Gilberto's sponsors will donate $2 per kilometer (km).

- Alana's sponsors will make a $5 donation plus 50¢ per kilometer.

The class refers to these as *pledge plans*.

Tables, graphs, and equations will help you predict how much money might be raised with each plan.

- What are the dependent and independent variables?

**Walkathon!**

**Pledge Sheet**

Walker: *Gilberto*
Kilometers Walked: _____

| Sponsor's Name | Donation | Amount Pledged per Kilometer | Amount Paid |
|---|---|---|---|
| | $ | $ | $ |
| | $ | $ | $ |
| | $ | $ | $ |
| | $ | $ | $ |
| | $ | $ | $ |
| | | | $ |
| | | TOTAL $ | |

**?** Who will raise the most money after *d* kilometers?

## Problem 1.3

**A**  **1.** Make a table for each student's pledge plan. Show the amount of money each of his or her sponsors would donate if he or she walked distances from 0 to 6 kilometers. What are the dependent and independent variables?

**2.** Graph the three pledge plans on the same coordinate axes. Use a different color for each plan.

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1.1   1.2   **1.3**   1.4

*Problem* **1.3**   *continued*

3. For each pledge plan, write an equation that represents the relationship between the distance walked and the amount of money donated. Explain what information each number and variable in the equations represents.

4. For each plan:

   a. What pattern of change between the two variables do you observe in the table?

   b. How does this pattern appear in the graph? In the equation?

   c. How can you determine if a relationship is linear from a table, a graph, or an equation?

   d. Does this relationship represent a proportional relationship?

**B**  1. Suppose each student walks 8 kilometers in the walkathon. How much money does each sponsor donate? Explain how you found your answer.

2. Suppose each student raises $10 from a sponsor. How many kilometers does each student walk? Explain.

3. On which graph does the point (12, 11) lie? What information does this point represent?

4. In Alana's plan, how is the fixed $5 donation represented in

   a. the table?

   b. the graph?

   c. the equation?

**C**  Gilberto decides to give a T-shirt to each of his sponsors. Each shirt costs him $4.75. He plans to pay for each shirt with some of the money he raises from each sponsor.

1. Write an equation that represents the amount of money Gilberto raises from each sponsor after he has paid for the T-shirt. Explain what information each number and variable represents.

2. Graph the equation for distances from 0 to 5 kilometers. Compare this graph to the graph of Gilberto's pledge plan in Question A, part (2).

3. Is this relationship linear? Explain.

**A C E**  Homework starts on page 16.

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