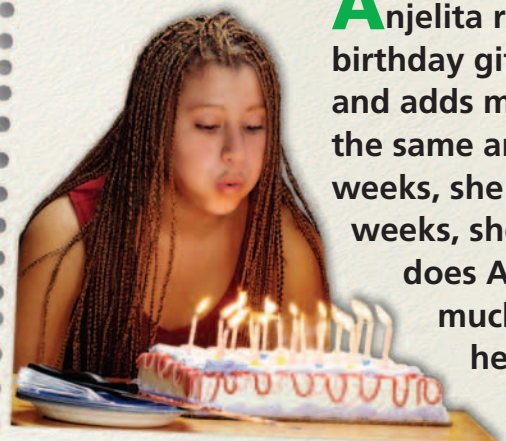
Moving Straight Ahead

Linear Relationships

Henri challenges his older brother Emile to a walking race. Emile walks 2.5 meters per second, and Henri walks 1 meter per second. Emile gives Henri a 45-meter head start. What distance wll allow Henri to win in a close race?

You can estimate the temperature outside by counting cricket chirps. Suppose a cricket chirps n times in one minute. The temperature t in degrees Fahrenheit can be computed with the formula $t = \frac{1}{4}n + 40$. What is the temperature if a cricket chirps 150 times in a minute?

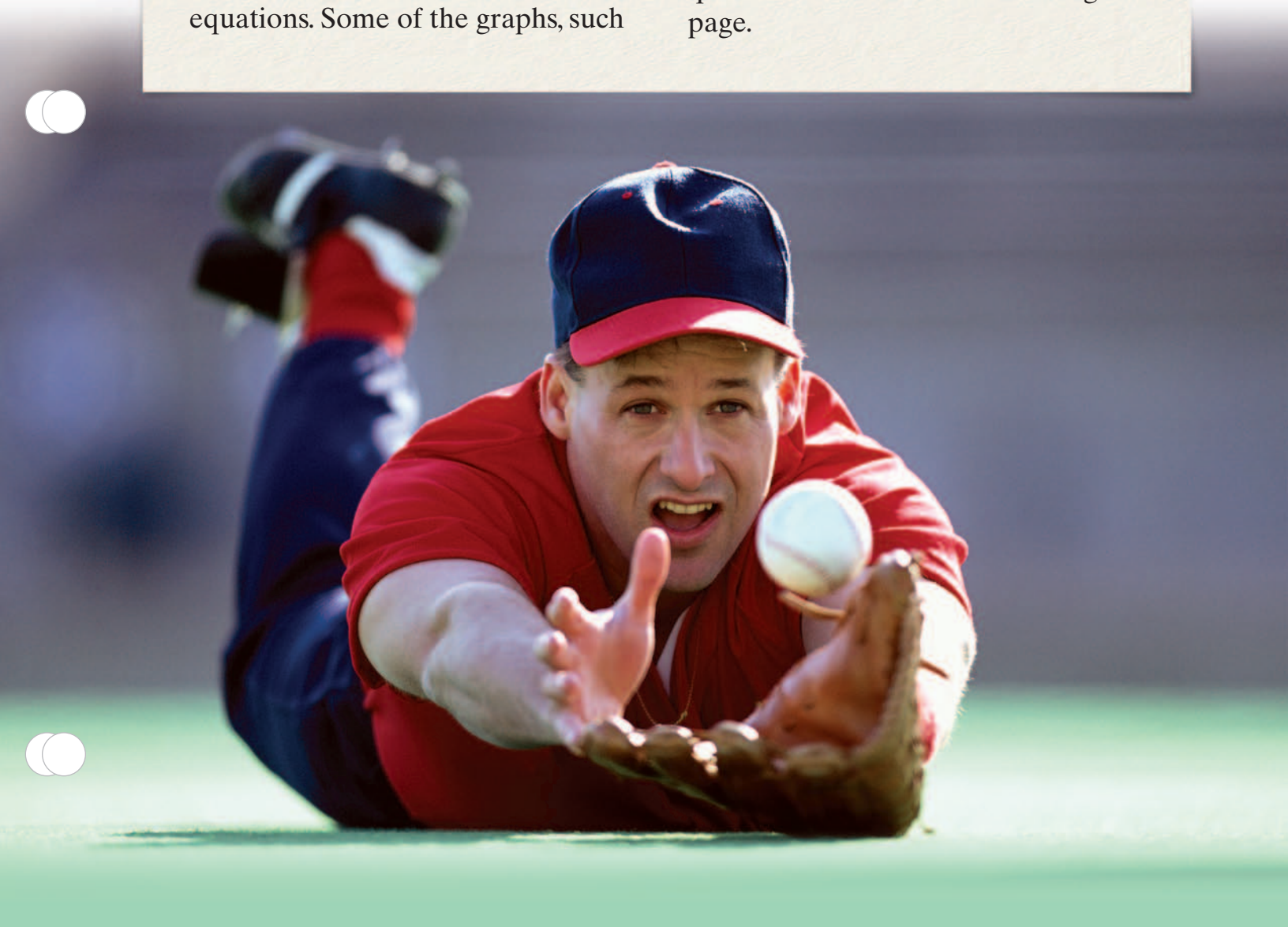


Anjelita receives some money as a birthday gift. She saves the money and adds more to it each week. She adds the same amount each week. After five weeks, she has saved $175. After eight weeks, she has saved $190. How much does Anjelita save each week? How much money did she receive for her birthday?

All around you, things occur in patterns. Once you observe a pattern, you can use the pattern to predict information beyond and between the data observed. The ability to use patterns to make predictions makes it possible for a baseball player to run to the right position to catch a fly ball or for a pilot to estimate the flying time for a trip.

In *Variables and Patterns,* you investigated relationships between variables. The relationships were displayed as tables, graphs, and equations. Some of the graphs, such as the graph of distance and time for a van traveling at a steady rate, were straight lines. Relationships with graphs that are straight lines are called *linear relationships*.

In this unit, you will study linear relationships. You will learn about the characteristics of a linear relationship and how to determine whether a relationship is linear by looking at its equation or at a table of values. You will use what you learn about linear relationships to answer questions like those on the facing page.



Mathematical Highlights

Linear Relationships

In *Moving Straight Ahead*, you will explore properties of linearity.

You will learn how to

- Recognize problem situations in which two or more variables have a linear relationship to each other
- Construct tables, graphs, and symbolic equations that express linear relationships
- Translate information about linear relations given in a table, a graph, or an equation to one of the other forms
- Understand the connections between linear equations and the patterns in the tables and graphs of those equations: rate of change, slope, and *y*-intercept
- Solve linear equations
- Solve problems and make decisions about linear relationships using information given in tables, graphs, and symbolic expressions
- Use tables, graphs, and equations of linear relations to answer questions

As you work on the problems in this unit, ask yourself questions about problem situations that involve related quantities:

What are the variables in the problem?

Do the variables in this problem have a linear relationship to each other?

What patterns in the problem suggest that it is linear?

How can the linear relationship be represented in a problem, in a table, in a graph, or with an equation?

How do changes in one variable affect changes in a related variable?

How are these changes captured in a table, graph, or equation?

How can tables, graphs, and equations of linear relationships be used to answer questions?