

7.1 Linear Patterns

- ▶ Recognize and describe a linear pattern.
- ▶ Use a linear pattern to predict a future event.
- ▶ Recognize a proportional pattern.

Study Tip

Linear patterns involving two variables are called *linear* because when one variable is graphed in relationship to the other variable, the result is a line.

Recognizing a Linear Pattern

A sequence of numbers has a **linear pattern** when each successive number increases (or decreases) by the same amount.

EXAMPLE 1 Recognizing a Linear Pattern

Anthropologists use tables like those at the left to estimate the height of a person based on part of the person's skeleton.

- a. Does the table relating the length of a man's femur (upper leg bone) to the man's height represent a linear pattern?
- b. The femur length of a Roman soldier is 18 inches. What was the height of the Roman soldier?

	A	B
	Femur Length (in.)	Height (in.)
1		
2	14	58.32
3	15	60.20
4	16	62.08
5	17	63.96
6	18	65.84
7	19	67.72
8	20	69.60
9	21	71.48
10	22	73.36
11	23	75.24
12	24	77.12

SOLUTION

- a. To determine whether the table represents a linear pattern, find the *differences* between consecutive terms.

DATA

	A	B
	Femur Length (in.)	Height (in.)
1		
2	14	58.32
3	15	60.20
4	16	62.08
5	17	63.96
6	18	65.84

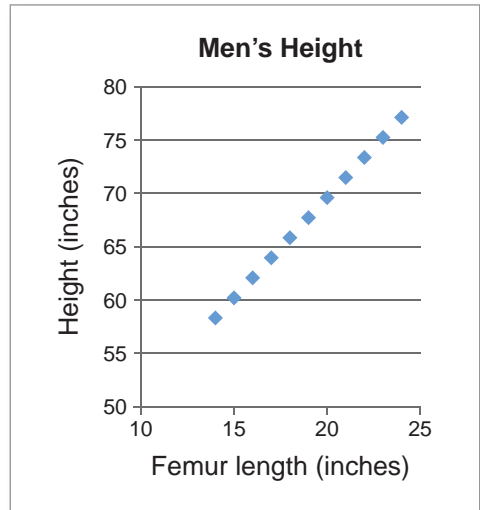
1.88

1.88

1.88

1.88

Each time the femur length increases by 1 inch, the height of the man increases by 1.88 inches. So, the pattern is linear.



- b. From the table, an 18-inch femur corresponds to a height of about 66 inches. In other words, the Roman soldier was about 5' 6".

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For women, femur length and height are related as follows.

$$\text{Height in inches} = 1.95(\text{femur length}) + 28.7$$

- c. Use a spreadsheet to make a table for this formula.
- d. Use the spreadsheet to graph the data in the table and verify that the points on the graph lie on a line.

