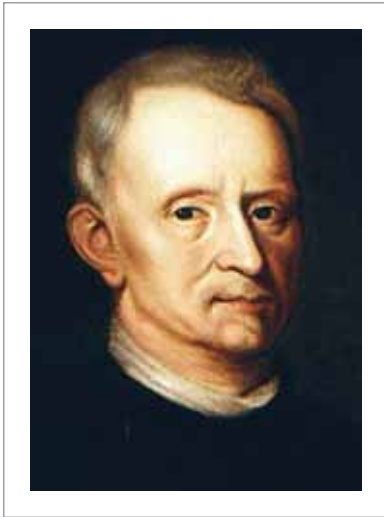## Recognizing a Proportional Pattern

A pattern with two variables is **proportional** when one of the variables is a constant multiple of the other variable. Proportional patterns are also linear.

EXAMPLE 5   Recognizing a Proportional Pattern

You hang different weights from a spring. You then measure the distance the spring stretches.

a. Describe the pattern. Is the distance the spring stretches proportional to the weight?

b. How much does the spring stretch when you hang 6 pounds from it?

0 in. $\frac{3}{2}$ in.   3 in. $\frac{9}{2}$ in.   6 in.

Throughout human history, most discoveries have occurred because humans observed patterns. From the patterns, they then formulated laws of nature. The law illustrated in Example 5 is called *Hooke's Law*, after the English scientist Robert Hooke. The law states that the distance a spring stretches is proportional to the weight hanging on the spring.
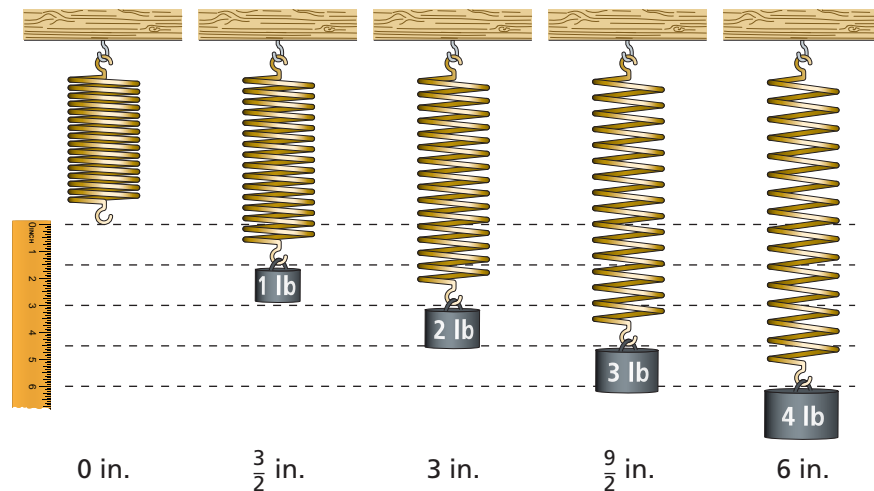
SOLUTION

a. You can see that the distance the spring stretches is 3/2 times the weight in pounds.

$$\frac{3}{2} \times 0 = 0 \qquad \frac{3}{2} \times 1 = \frac{3}{2}$$

$$\frac{3}{2} \times 2 = 3 \qquad \frac{3}{2} \times 3 = \frac{9}{2}$$

$$\frac{3}{2} \times 4 = 6$$
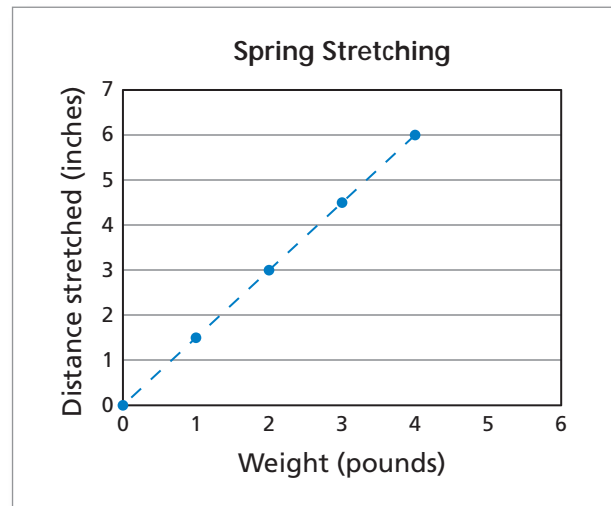
Spring Stretching

So, the distance the spring stretches *is* proportional to the weight.

b. When you hang 6 pounds from the spring, it will stretch (3/2 × 6), or 9 inches.

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The distance that a spring stretches depends on its elasticity. Data for a different spring are shown in the table.

Weight (pounds)	Distance stretched (inches)
0	0
1	$\frac{3}{4}$
2	$\frac{3}{2}$
3	$\frac{9}{4}$
4	3

c. Is this spring more or less elastic than the spring in Example 5? Explain.

d. How much will this spring stretch when you hang 7 pounds from it?