



## Getting the Idea

Sometimes, you need to find the probability of two **dependent events**. Two events are dependent, or **conditional**, when the outcome of the first event affects the outcome of the second event.

You can find the probability of two dependent events using the multiplication rule:

( $P$  of first event)  $\times$  ( $P$  of second event), or  $P_1 \times P_2$ .

Be sure to remember, however, that the probability of the second event changes based on the outcome of the first event.

## EXAMPLE 1

A bag contains 9 marbles: 3 green, 3 blue, and 3 yellow. Simone will draw a marble from the bag but will not replace it. Then she will draw a second marble. What is the probability that her first draw will be a blue marble and her second draw will be a yellow marble?

**STRATEGY** Find the probability of each event. Then use the multiplication rule.

**STEP 1** Find the probability of the first draw being a blue marble.

3 of the 9 marbles are blue.

$$P_1 = \frac{\text{favorable outcomes}}{\text{total possible outcomes}} = \frac{3}{9} = \frac{1}{3}$$

**STEP 2** Find the probability of the second draw being a yellow marble.

After the first draw, only 8 marbles remain in the bag. The number of total possible outcomes has changed from the first event, so this is a dependent event.

3 of the 8 marbles left in the bag are yellow.

$$P_2 = \frac{\text{favorable outcomes}}{\text{total possible outcomes}} = \frac{3}{8}$$

**STEP 3** Use the multiplication rule.

$$P_1 \times P_2 = \frac{1}{3} \times \frac{3}{8} = \frac{3}{24} = \frac{1}{8}$$

**SOLUTION** The probability of drawing a blue marble first and a yellow marble second, with no replacement, is  $\frac{1}{8}$ . This probability can also be expressed as a decimal, 0.125, or as a percent, 12.5%.