Lesson 9-4

Example 1

A bag contains 2 white softballs, 4 yellow softballs, 3 green softballs and 3 red softballs. You read into the bag without looking and take out a ball. You replace it and then take out another ball at random. Find the probability that the first ball is red and the second ball is white.

Solution

Because the first ball is replaced before the second is taken, the sample space of 12 balls is the same for each event. The two events are independent. Multiply to find the probability that both will occur.

$$
\begin{aligned}
P(\text{red, then white}) &= P(\text{red}) \cdot P(\text{white}) \\
&= \frac{\text{number of red balls}}{\text{total number of balls}} \cdot \frac{\text{number of white balls}}{\text{total number of balls}} \\
&= \frac{1}{4} \cdot \frac{1}{6} \\
&= \frac{1}{24}
\end{aligned}
$$

The probability of picking red, then white, is $\frac{1}{24}$.

Example 2

SPORTS Five teams-the Wildcats, Cheetahs, Tigers, Lions, and Snakes-are in the lottery round for this year's draft picks. The name of each team is written on a card and placed in a box.

To determine who gets the first lottery pick, one card will be drawn at random and not replaced. Then a second card will be drawn at random to determine the second pick. What is the probability that the Snakes get the first draft choice and the Wildcats get the second draft choice?

Solution

Because the first card is not replaced, the sample space for the second drawing has been changed. The second event is dependent on the first event.

Probability of first event.

$$P(\text{Snakes}) = \frac{\text{number of Snakes cards}}{\text{total number of cards}} = \frac{1}{5}$$

Probability of second event

$$P(\text{Wildcats, after Snakes}) = \frac{\text{number of Wildcats cards}}{\text{total number of cards}} = \frac{1}{4}$$

Multiply the probabilities.

$$P(\text{Wildcats, after Snakes}) = \frac{1}{5} \cdot \frac{1}{4}$$
$$= \frac{1}{20}$$

The probability of drawing the Snakes first and the Wildcats second is $\frac{1}{20}$.

Example 3

A bag contains 5 green marbles, 3 red marbles, 3 yellow marbles and 1 blue marble. Two are taken at random from the bag. Find P(green then green).

Solution

$$P(\text{first green marble}) = \frac{\text{number of green marbles}}{\text{total number of marbles}} = \frac{5}{12}$$

$$P(\text{second green marble}) = \frac{\text{number of green marbles}}{\text{total number of marbles}} = \frac{5 - 1}{12 - 1} = \frac{4}{11}$$

Multiply the probabilities.

$$P(\text{green, then green}) = \frac{5}{12} \cdot \frac{4}{11}$$
$$= \frac{20}{132} = \frac{5}{33}$$

The probability of picking green, then green is $\frac{5}{33}$.