Answer on Question #84598 – Math – Statistics and Probability

Question

A bag contains 6 white and 4 red balls. One ball is drawn at random and put aside without noticing its colour. Now another ball is drawn from the bag at random. What is the probability that the second ball is white?

Solution

Let event $E_1 =$ 'white ball is drawn from the bag' and event $E_2 =$ 'red ball is drawn from the bag', then

$$P(E_1) = \frac{6}{6+4} = \frac{6}{10}\ , P(E_2) = \frac{4}{6+4} = \frac{4}{10}$$

(Note that E_1 and E_2 are exhaustive events and mutually exclusive)

Let event A: the second ball is white.

$$P(A|E_1) = \frac{6-1}{10-1} = \frac{5}{9}\ , P(A|E_2) = \frac{6}{10-1} = \frac{6}{9}$$

Therefore, the required probability is

$$P(\text{the second ball is white}) = P(A) = P(A \cap E_1) + P(A \cap E_2) =$$

$$= P(E_1)P(A|E_1) + P(E_2)P(A|E_2) = \frac{6}{10}\left(\frac{5}{9}\right) + \frac{4}{10}\left(\frac{6}{9}\right) = \frac{54}{90} = \frac{3}{5}$$

Answer: $\frac{3}{5}$.