Answer on Question #65674, Math / Statistics and Probability

$$\frac{4}{9}$$

Question

A bag contains 8 white balls and 4 red balls. One ball is drawn from the bag and it is replaced after noting its colour. In the second draw again one ball is drawn and its color is noted. Find the probability that both the balls drawn are of different colours?

Solution

Denote: W – white ball, R – red ball.

There are 4 possible cases: $\{R,R\};\{R,W\};\{W,R\};\{W,W\}$.

As far as draws are independent we can express probabilities of cases as multiplication of separate draws:

$$p(R,R)=p(R)p(R);\ p(R,W)=p(R)p(W);p(W,R)=p(W)p(R);p(W,W)=p(W)p(W)$$

Individual probabilities:

$$p(R)=\frac{4}{8+4}=\frac{4}{12}=\frac{1}{3}$$

$$p(W)=\frac{8}{8+4}=\frac{8}{12}=\frac{2}{3}$$

Probability asked in the question:

$$p(R,W)+p(W,R)=2p(R)p(W)=2\cdot\frac{1}{3}\cdot\frac{2}{3}=\frac{4}{9}$$