Worked answers | Probability

With/without replacement

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. A bag has 4 red and 2 blue counters. One counter is drawn at random and is red. After it is removed, find the next-blue probability. [2 marks]

Two blue counters remain among five.

Answer: $\frac{2}{5}$

2. The bag has 4 red and 2 blue counters. Draw twice at random, replacing and mixing after the first draw. Find $P(\mathrm{RR})$. [2 marks]

$\frac{4}{6} \times \frac{4}{6} = \frac{16}{36} = \frac{4}{9}$.

Answer: $\frac{4}{9}$

3. A bag has 4 red and 2 blue counters. Draw twice at random without replacement. Find $P(\mathrm{RR})$. [2 marks]

$\frac{4}{6} \times \frac{3}{5} = \frac{12}{30} = \frac{2}{5}$.

Answer: $\frac{2}{5}$

4. A bag has 3 black and 1 white counter. Draw twice at random without replacement. Find $P(\text{one of each})$. [3 marks]

BW gives $\frac{3}{4}\times\frac{1}{3}=\frac{1}{4}$.

WB gives $\frac{1}{4}\times\frac{3}{3}=\frac{1}{4}$.

Add to obtain $\frac{1}{2}$.

Answer: $\frac{1}{2}$

5. Two cards are chosen without replacement from cards labelled 1, 2, 3. List all ordered outcomes. [2 marks]

A label cannot be chosen twice.

Each first card has two second-card choices.

Answer: $12, 13, 21, 23, 31, 32$.

6. A bag has 5 red and 3 blue counters. Is $P(\mathrm{RR})$ greater with or without replacement? Explain. [3 marks]

With replacement: $\frac{25}{64}$.

Without replacement: $\frac{5}{8}\times\frac{4}{7}=\frac{5}{14}$.

After a red is kept out, the next-red chance decreases.

Answer: Greater with replacement.