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: 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(RR). [2 marks]

$4/6 \times 4/6 = 16/36 = 4/9$.

Answer: 4/9

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

$4/6 \times 3/5 = 12/30 = 2/5$.

Answer: 2/5

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

BW gives $3/4 \times 1/3 = 1/4$.

WB gives $1/4 \times 3/3 = 1/4$.

Add to obtain 1/2.

Answer: 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(RR) greater with or without replacement? Explain. [3 marks]

With replacement: 25/64.

Without replacement: $5/8 \times 4/7 = 5/14$.

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

Answer: Greater with replacement.