

Cambridge International AS & A Level

Mathematics

9709/52

Paper 5 Probability & Statistics 1

May/June 2025

Question No (3)

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Question No (3)

A bag contains 4 blue marbles and 12 red marbles. One marble is selected at random from the bag. If this marble is blue, it is replaced in the bag, but if it is red, it is not replaced. A second marble is now selected at random from the bag.

- (a) Find the probability that both marbles selected are the same colour.
 (b) Find the probability that the first marble is blue given that the second marble is red.

Solution:

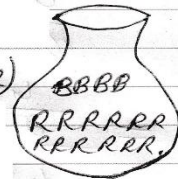
(a)

$$P(\text{same color of both}) = P(BB) + P(RR)$$

$$= \frac{4}{16} \times \frac{4}{16} + \frac{12}{16} \times \frac{11}{15}$$

$$= \frac{16}{16 \times 16} + \frac{132}{240}$$

$$= \frac{1}{16} + \frac{132}{240} = \frac{15 + 132}{240} = \frac{147}{240} = \frac{49}{80}$$



As Red are not replaced

$$P(\text{same color of both}) = \frac{49}{80}$$

(b)

It is about the conditional probability.

$$P(B|2R) = \frac{P(B \cap 2R)}{P(2R)}$$

$$= \frac{P(B \cap 2R)}{P(BR) + P(RR)}$$

$$= \frac{\frac{4}{16} \times \frac{12}{16}}{\frac{4}{16} \times \frac{12}{16} + \frac{12}{16} \times \frac{11}{15}}$$

$$\begin{aligned}
 &= \frac{4}{16} \times \frac{12}{16} \\
 &\quad \frac{4}{16} \times \frac{12}{16} + \frac{12}{16} \times \frac{11}{15} \\
 &= \frac{48}{256} \\
 &\quad \frac{48}{256} + \frac{132}{240} \\
 &= \frac{48}{256} = \frac{48/256}{\frac{720 + 2112}{3840}} = \frac{48/256}{\frac{2832}{3840}} \\
 &= \frac{48}{256} \times \frac{3840}{2832} \\
 &= \frac{15}{59}
 \end{aligned}$$

$$P(B \cap ZR) = \frac{15}{59}$$

