

There are three bags B_1 , B_2 and B_3 . The bag B_1 contains 5 red and 5 green balls. B_2 contains 3 red and 5 green balls and B_3 contains 5 red and 3 green balls. Bags B_1 , B_2 and B_3 have probabilities $\frac{3}{10}$, $\frac{3}{10}$ and $\frac{4}{10}$ respectively of being chosen. A bag is selected at random and a ball is chosen at random from the bag. Then which of the following options is/are correct?

This question has multiple correct options

A Probability that the chosen ball is green, given that the selected bag is B_3 , equal $\frac{3}{8}$

B Probability that the selected bag is B_3 , given that the chosen ball is green, equals $\frac{5}{13}$

C Probability that the chosen ball is green equals $\frac{39}{80}$

D Probability that the selected bag is B_3 , given that the chosen ball is green, equals $\frac{3}{10}$

Correct options are A) and C)

$$P(B_1) = \frac{3}{10}$$

$$P(B_2) = \frac{3}{10}$$

$$P(B_3) = \frac{4}{10}$$

| | Bag ₁ | Bag ₂ | Bag ₃ |
|-------------|------------------|------------------|------------------|
| Red Balls | 5 | 3 | 5 |
| Green Balls | 5 | 5 | 3 |
| Total | 10 | 8 | 8 |

$$((1) P(\text{Ball is Green}) = P(B_1)P(G/B_1) + P(B_2)P(G/B_2) + P(B_3)P(G/B_3)$$

$$= \frac{3}{10} \times \frac{5}{10} + \frac{3}{10} \times \frac{5}{8} + \frac{4}{10} \times \frac{3}{8} = \frac{39}{80}$$

$$(2) P(\text{Ball chosen in Green/ Ball is from 3rd Bag}) = \frac{3}{8}$$

$$P(\text{Ball is from 3rd Bag/ Ball chosen in Green}) =$$

$$\frac{P(B_3)P(G/B_3)}{P(B_1)P(G/B_1) + P(B_2)P(G/B_2) + P(B_3)P(G/B_3)}$$

$$P(B_3) = \frac{4}{10} = \frac{\frac{4}{10} \times \frac{3}{8}}{\frac{3}{10} \times \frac{5}{10} + \frac{3}{10} \times \frac{5}{8} + \frac{4}{10} \times \frac{3}{8}} = \frac{4}{13}$$