Q A box B_1 contains 1 white ball, 3 red balls and 2 black balls. Another box B_2 contains 2 white balls, 3 red balls and 4 black balls. A third box B_3 contains 3 white balls, 4 red balls and 5 black balls.

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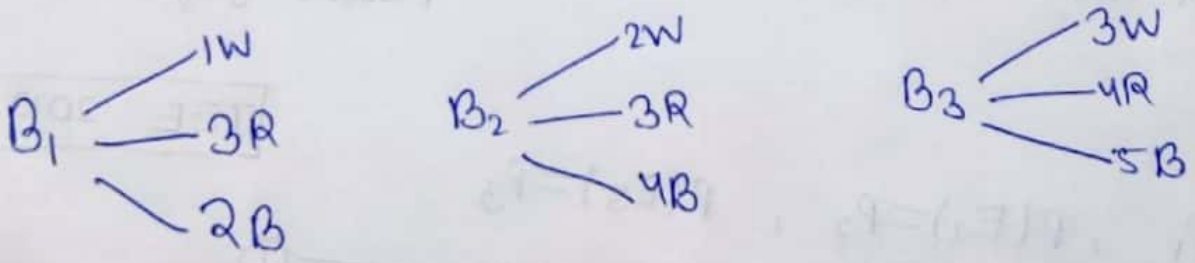
(a) If 2 balls are drawn (without replacement) from a randomly selected box and one of the balls is white and other ball is red, the probability that these 2 balls are drawn from box B_2 is

(A) $\frac{116}{181}$ (B) $\frac{126}{181}$ (C) $\frac{65}{181}$ (D) $\frac{55}{181}$



$$P(B_1) = P(B_2) = P(B_3) = \frac{1}{3}$$

$$P(A|B_1) = \frac{{}^1C_1 \times {}^3C_1}{{}^6C_2} \quad , P(A|B_2) = \frac{{}^2C_1 \times {}^3C_1}{{}^9C_2}$$

$$P(A|B_3) = \frac{{}^3C_1 \times {}^4C_1}{{}^9C_2}$$

$$P(B_2|A) = \frac{P(A|B_2)\,P(B_2)}{P(A|B_1)P(B_1) + P(A|B_2)P(B_2) + P(A|B_3)P(B_3)}$$

$$= \frac{55}{181}$$

(D) ✓

(b) If 1 ball is drawn from each of the boxes B_1, B_2 and B_3, the probability that all 3 drawn balls are of the same colour is

(A) $\frac{82}{648}$ (B) $\frac{90}{648}$ (C) $\frac{558}{648}$ (D) $\frac{5586}{648}$

– Probability of 3 drawn balls of same colour

$$= \frac{1}{6} \times \frac{2}{9} \times \frac{3}{12} + \frac{3}{6} \times \frac{3}{9} \times \frac{4}{12} + \frac{2}{6} \times \frac{4}{9} \times \frac{5}{12}$$

$$= \frac{82}{648}$$