

Let u_1 and u_2 be two urns such that u_1 contains 3 white, 2 red balls and u_2 contains only 1 white ball. A fair coin is tossed. If head appears, then 1 ball is drawn at random from urn u_1 and put into u_2 . However, if tail appears, then 2 balls are drawn at random from u_1 and put into u_2 . Now, 1 ball is drawn at random from u_2 . Then, probability of the drawn ball from u_2 being white is

A $\frac{13}{30}$

B $\frac{23}{30}$

C $\frac{19}{30}$

D $\frac{11}{30}$

Correct option is B)

Case 1: head, white from U_1 , white from $U_2 = (1/2)(3/5)(2/2) = 3/10$

Case 2: head, red from U_1 , white from $U_2 = (1/2)(2/5)(1/2) = 1/10$

Case 3: tail, 2 white from U_1 , white from $U_2 = (1/2)({}^3C_2/{}^5C_2)(3/3) = 3/20$

Case 4: tail, white and red from U_1 , white from $U_2 = (1/2)({}^3C_1 * {}^2C_1/{}^5C_2)(2/3) = 1/5$

case 5: tail, 2 red from U_2 , white from $U_1 = (1/2)({}^2C_2/{}^5C_2)(1/3) = 1/60$

Required Probability = sum of probabilities of above cases = $(3/10) + (1/10) + (3/20) + (1/5) + (1/60) = 46/60 = 23/30$