

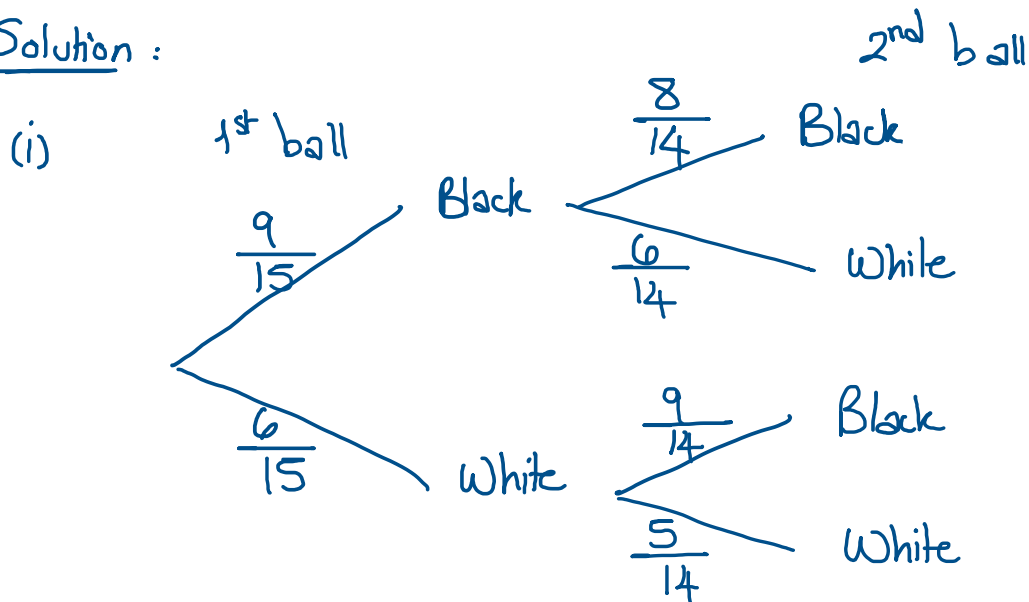
II, Tree Diagram :

Worked Example :

A box contains 9 black beads and 6 white beads. Two beads are selected at random without replacement.

- (i) Draw a tree diagram to represent the above and write the associated probabilities.
- (ii) Find the probability that the two beads are of different colors.
- (iii) Find the probability that they are of the same color.
- (iv) Find the probability that the second bead is white.
- (v) Given that the second bead is white, find the probability that the first bead is also white.

Solution :



(ii) Possible Scenarios:

B&W or W&B

$$\left(\frac{9}{15} \times \frac{6}{14}\right) + \left(\frac{6}{15} \times \frac{9}{14}\right) = \frac{18}{35}$$

(iii) Possible Scenarios:

B&B or W&W

$$\left(\frac{9}{15} \times \frac{8}{14}\right) + \left(\frac{6}{15} \times \frac{5}{14}\right) = \frac{17}{35}$$

(iv) Possible Scenarios:

B&W or W&W

$$\left(\frac{9}{15} \times \frac{6}{14}\right) + \left(\frac{6}{15} \times \frac{5}{14}\right) = \frac{2}{5}$$

$$\begin{aligned} \text{(v)} \quad P(1^{\text{st}} \text{ white} \mid 2^{\text{nd}} \text{ white}) &= \frac{P(1^{\text{st}} \text{ w \& } 2^{\text{nd}} \text{ w})}{P(2^{\text{nd}} \text{ w})} \\ &= \frac{\left(\frac{6}{15} \times \frac{5}{14}\right)}{\frac{2}{5}} = \frac{5}{14} \end{aligned}$$

Remarks: • In a tree diagram, branches from the same point add up to 1.

- Always write possible scenarios when possible
- And $\longrightarrow$ multiplication
OR $\longrightarrow$ addition