# Probability

## Combination Based Examples

# Combination Based examples of Probability

- **Example 1:** A bag contains 6 white and 4 red and 10 black balls. 2 balls are drawn at random. What is the probability that both of them are black?

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- **Solution:**
- Total number of balls = 6 + 4 + 10 = 20

2 balls can be drawn from 20 balls in $20_{C_2}$ ways $= \frac{20!}{2!\times(20-2)!}$

$= \frac{20\times19\times18!}{2\times18!} = 190\ ways$ (**Total No. of possible Events**)

Similarly, 2 ball from 10 black balls can be drawn in $10_{C_2}$ ways $= \frac{10!}{2!\times(10-2)!}$

$= \frac{10\times9\times8!}{2\times8!} = 45\ ways$ (No. of Favourable Events)

Therefore, the probability that two balls drawn are black = 45/190 = **0.24 Ans**

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➢ **Example 2:** A bag contains 8 white and 4 red balls. 5 balls are drawn at random. What is the probability that 2 of them are red and 3 are white?

- **Solution:**
- Total number of balls = 8 + 4 = 12

5 balls can be drawn from 12 balls in $12_{C_5}$ ways $= \frac{12!}{5! \times (12-5)!}$

$= \frac{12 \times 11 \times 10 \times 9 \times 8 \times 7!}{5 \times 4 \times 3 \times 2 \times 7!} = 792\ ways$ (Total No. of possible Cases)

Similarly, 2 ball from 4 red balls can be drawn in $4_{C_2}$ ways $= \frac{4!}{2! \times (4-2)!}$

$= \frac{4 \times 3 \times 2!}{2 \times 2!} = 6\ ways$

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Similarly, 3 ball from 8 white balls can be drawn in ${}^{8}C_{3}$ ways $= \frac{8!}{3!\times(8-3)!}$

$$= \frac{8\times7\times6\times5!}{3\times2\times5!} = 56\ ways$$

Therefore, the probability that two balls drawn are red and 3 black

$$\frac{\text{No. of Favourable Cases}}{\text{Total No. of possible Cases}} = \frac{{}^{4}C_{2}\times{}^{8}C_{3}}{{}^{12}C_{5}}$$

$$= \frac{6\times56}{792} = \frac{14}{33} = \mathbf{0.424\ Ans}$$