

HOTS (Higher Order Thinking Skills)

Que 1. A die is thrown twice. What is the probability that

(i) 5 will not come up either time?

(ii) 5 will come up at least once?

Sol. Let E be the event that first throw shows 5
and F be the event that second throw shows 5.

$$\therefore P(E) = \frac{1}{6} \text{ and } P(F) = \frac{1}{6}$$

$$\text{Also, } P(\overline{E}) = 1 - P(E) = 1 - \frac{1}{6} = \frac{5}{6} \quad \text{and} \quad P(\overline{F}) = 1 - P(F) = 1 - \frac{1}{6} = \frac{5}{6}.$$

$$(i) \text{ Probability that 5 will not come up either time} = P(\overline{E}) \times P(\overline{F}) = \frac{5}{6} \times \frac{5}{6} = \frac{25}{36}.$$

$$(ii) \text{ Probability that 5 will come up at least once} = 1 - P(\overline{E}) \times P(\overline{F})$$

$$= 1 - \frac{25}{36} = \frac{36-25}{36} = \frac{11}{36}$$

Que 2. Find the probability of getting 53 Fridays in a leap year.

Sol. Leap year = 366 days = $(52 \times 7 + 2)$ days = 52 weeks and 2 days.

Thus, a leap year always has 52 Fridays.

The remaining 2 days can be:

(i) Sunday and Monday

(ii) Monday and Tuesday

(iii) Tuesday and Wednesday

(iv) Wednesday and Thursday

(v) Thursday and Friday

(vi) Friday and Saturday

(vii) Saturday and Sunday

Out of there 7 cases, we have Fridays in two cases

$$\therefore P(53 \text{ Fridays}) = \frac{2}{7}.$$

Que 3. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.

Sol. Let there be x blue balls in the bag.

$$\therefore \text{Total number of balls in bag} = (5 + x)$$

$$\text{Now, } P_1 = \text{Probability of drawing a blue ball} = \frac{x}{5+x}$$

$$P_2 = \text{Probability of drawing a red ball} = \frac{5}{5+x}$$

We are given that,

$$P_1 = 3 \times P_2 \quad \Rightarrow \quad \frac{x}{5+x} = 3 \times \frac{5}{5+x}$$

$$\Rightarrow x(5 + x) = 15(5 + x)$$

$$\Rightarrow x = 15$$

Hence, there are 15 blue balls in the bag.

Que 4. Apoorv throws two dice once and computes the product of the numbers appearing on the dice. Peehu throws one die and squares the number that appear on it. Who has the better chance of getting the number 36? Why?

Sol. Apoorv throws two dice once.

So, total number of outcomes, $n(S) = 36$.

Number of outcomes for getting product 36.

$$n(E_1) = 1(6 \times 6)$$

$$\therefore \text{Probability for Apoorv} = \frac{n(E_1)}{n(S)} = \frac{1}{36}$$

Also, Peehu throw one die.

So, total number of outcomes $n(S) = 6$

Number of outcomes for getting square of a number is 36.

$$n(E_2) = 1 \quad (\because 6^2 = 36)$$

$$\therefore \text{Probability for Peehu} = \frac{n(E_2)}{n(S)} = \frac{1}{6} = \frac{6}{36}$$

Hence, Peehu has better chance of getting the number 36.