Chapter 15. Probability

Question-1

Find the probability of getting a number less than 5 in a single throw of a die.

Solution:

Possible outcomes={1, 2, 3, 4, 5, 6}

Favorable outcomes = Getting a number less than 5 = {1, 2, 3, 4}

$\therefore$ P(Getting a number < 5) = $\frac{4}{6} = \frac{2}{3}$

Question-2

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of drawing:
(i) an ace.
(ii) `2' of spades.
(iii) `10' of a black suit

Solution:

One card is drawn from a well-shuffled deck of 52 cards.

(i) An ace is drawn.

Number of possible outcomes = 52
Number of favorable outcomes = 4
\ P(Drawing an ace) = $\frac{4}{52} = \frac{1}{13}$

(ii) A`2' of spades is drawn.

Number of possible outcomes = 52
Number of favorable outcomes = 1
\ P(Drawing a`2' of spades) = $\frac{1}{52}$

(iii) A `10' of a black suit is drawn.

Number of possible outcomes = 52
Number of favorable outcomes = 2
$\therefore$ P(Drawing a `10' of a black suit) = $\frac{2}{52} = \frac{1}{26}$

Question-3

17 cards numbered 1, 2, 3, ..., 16, 17 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is
(i) odd.
(ii) a prime
(iii) divisible by 3
(iv) divisible by 3 and 2 both

Solution:

17 cards numbered 1, 2, 3, ..., 16, 17 are put in a box and mixed thoroughly. One person draws a card from the box.

(i) The number on the card is odd

Number of possible outcomes = 17
Number of favorable outcomes = 9 [i.e 1, 3, 5, 7, 9, 11, 13, 15, 17]

$\therefore$P(Getting an odd number on the card) = $\frac{9}{17}$

(ii) The number on the card is a prime.

Number of possible outcomes = 17
Number of favorable outcomes = 7 [i.e 2, 3, 5, 7, 11, 13, 17]

$\therefore$ P(Getting a prime on the card) = $\frac{7}{17}$

(iii) The number on the card is divisible by 3

Number of possible outcomes = 17
Number of favorable outcomes = 5 [i.e 3, 6, 9, 12, 15]

$\therefore$ P(Getting a number divisible by 3) = $\frac{5}{17}$

(iv) The number on the card is divisible by 3 and 2.

Number of possible outcomes = 17
Number of favorable outcomes = 2 [i.e 6, 12]

$\therefore$ P(Getting a number divisible by 3 and 2) = $\frac{2}{17}$

Question-4

A die is thrown once. Find the probability of getting
(i) an even number
(ii) a number greater than 3
(iii) a number between 3 and 6

Solution:
A die is thrown once.

(i) An even number

Number of possible outcomes = 6 [i.e 1, 2, 3, 4, 5, 6]
Number of favorable outcomes = 3 [i.e 2, 4, 6]
∴ P(Getting a even number) = $\frac{3}{6} = \frac{1}{2}$

(ii) A number greater than 3

Number of possible outcomes = 6 [i.e 1, 2, 3, 4, 5, 6]
Number of favorable outcomes = 3 [i.e 4, 5, 6]
∴ P(Getting a number greater than 3) = $\frac{3}{6} = \frac{1}{2}$

(iii) A number between 3 and 6
Number of possible outcomes = 6 [i.e 1, 2, 3, 4, 5, 6]
Number of favorable outcomes = 2 [i.e 4, 5]
\ P(Getting a number between 3 and 6) = $\frac{2}{6} = \frac{1}{3}$

Question-5

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

Solution:
Let the number of blue balls in the bag be x.
The number of red balls in the bag is 5.
P(Drawing a blue ball) = $\frac{x}{5+x}$
P(Drawing a red ball) = $\frac{5}{5+x}$
P(Drawing a blue ball) = 2 × P(Drawing a red ball) ⇒ $\frac{x}{5+x} = 2 \times \frac{5}{5+x}$
i.e x = 10
\ The number of blue balls in the bag is 10.

Question-6

A bag contains 12 balls out of which x are white.
(i) If one ball is drawn at random, what is the probability that it will be a white ball?

(ii) If 6 more white balls are put in the bag, the probability of drawing a white ball will be double than that in (I case). Find x.

Solution:

A bag contains 12 balls out of which x are white.

(i) If one ball is drawn at random;

P (Drawing a white ball) = $\frac{x}{12}$

(ii) 6 more white balls are put in the bag.

Hence the number of balls in the bag = 12 + 6 = 18

Number of white balls = x + 6

P (Drawing a white ball)= $\frac{x+6}{18}$

P (Drawing a white ball in II case) = 2 × P (Drawing a white ball in I case)

$\Rightarrow \frac{x+6}{18} = 2 \times \frac{x}{12}$

i.e x = 3

Question-7

Five male and three female candidates are available for selection as on manager in a company. Find the probability that male is selected.

Solution:

Number of male candidates available = 5

Number of female candidates available = 3∴ Total number of candidates available = 8∴ Total outcomes = 8

Number of outcomes for a male getting selected = 5∴ Probability of a male getting selected = $\frac{5}{8}$

Question-8

Cards marked with the numbers 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from this box. Find the probability of a number which is a perfect cube.

Solution:

Outcome of getting a perfect cube = {8, 27, 64}⇒ Number of outcomes of getting a perfect cube = 3∴ Probability of getting a perfect cube = $\frac{3}{100}$

Question-9

A card is drawn from an ordinary pack and a gambler bets that it is a spade or an ace. What are the odds against his winning this bet?

Solution:

Total number of cards = 52

⇒ Total number of possible outcomes = 52

Number of favourable outcomes of getting a spade or an ace = 13 + 3 = 16

∴ Probability of getting a spade or an ace if a card is drawn at random = $\frac{16}{52}$

= $\frac{4}{13}$

Question-10

17 cards numbered 1, 2, 3, ..., 16, 17 are put into a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is a prime.

Solution:

Prime numbers = {2, 3, 5, 7, 11, 13, 17}⇒ Number of favourable outcomes = 7∴ Probability of getting a card with a prime number = $\frac{7}{17}$.

Question-11

Tickets numbered 1 to 20 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a multiple of 3 or 7?

Solution:

Number of ticket that bear numbers multiple of 3 or 7 is 3, 6, 7, 9, 12, 14, 15 and 18.

Hence probability = $\frac{8}{20} = \frac{2}{5}$.

Question-12

Two dice are thrown. What is the probability of obtaining a total of 10 or 11?

Solution:

Let A be the event of getting a total of 10.

Let B be the event of getting a total of 11.

A = {(4, 6), (5, 5), (6,4)}

B = {(5, 6), (6, 5)}

n(A) = 3

n(B) = 2