

Class – 10th

Topic – Probability

(1) Cards marked with number 3, 4, 5, 10 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number.

Solution:

Total possible outcomes when one card is drawn = 48

When the number on drawn card is a perfect square, total favorable cases are 4, 9, 16, 25, 36, 49, i.e. = 6

$$P(\text{perfect square number}) = \frac{\text{Number of total possible outcomes}}{\text{Number of favourable outcomes}} = \frac{6}{48} = \frac{1}{8}$$

(2) Two different dice are thrown together. Find the probability of:

- (i) Getting a number greater than 3 on each die.
- (ii) getting a total of 6 or 7 of the numbers on two dice

Solution :

(i) When two dice are thrown together total possible outcomes = $6 \times 6 = 36$

Favourable outcomes when both dice have number more than 3 are (4, 4), (4, 5), (4, 6), (5, 4), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6), i.e. 9 outcomes.

$$P(\text{a number greater than 3 on each die}) = \frac{\text{Number of favourable outcomes}}{\text{Number of total possible outcomes}}$$

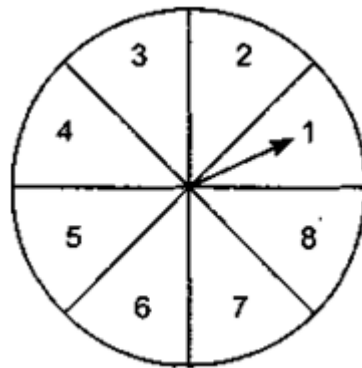
$$= \frac{9}{36} = \frac{1}{4}$$

(ii) Favourable outcomes when sum of the numbers appearing on the dice is 6 or 7 are, i.e. (1, 5), (1, 6), (2, 4), (2, 5), (3, 3), (3, 4), (4, 2), (4, 3), (5, 1), (5, 2), (6, 1), outcomes.

$$P(\text{a total of 6 or 7}) = \frac{11}{36}$$

(3) A game of chance consists of spinning an arrow on a circular board, divided into 8 equal parts, which comes to rest pointing at one of the numbers 1,2,3,..., 8 which are equally likely outcomes. What is the probability that the arrow will point at

- (i) an odd number
- (ii) a number greater than 3



- (iii) a number less than 9

Solution:

(i) Total possible outcomes when the arrow points at one of the numbers are 8.

Favourable outcomes when the required number is odd are 1, 3, 5, 7, i.e. 4 outcomes.

$$P(\text{an odd number}) = \frac{\text{Number of total possible outcomes}}{\text{Number of favourable outcomes}} = \frac{4}{8} = \frac{1}{2}$$

(ii) Favourable outcomes when the required number is more than 3 are 4,5,6,7, 8, i.e. 5 outcomes.

$$P(\text{a number is more than 3}) = \frac{\text{Number of total possible outcomes}}{\text{Number of favourable outcomes}} = \frac{5}{8}$$

(iii) Favourable outcomes when the required number is less than 9 are 1,2,3,4,5,6,7,8 i.e. 8 outcomes

$$(iv) \quad P(\text{a number less than 9}) = \frac{\text{Number of total possible outcomes}}{\text{Number of favourable outcomes}} = \frac{8}{8} = 1$$

(4) A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

Solution:

Total english alphabets = 26

Number of consonants in english alphabets = 21

$$\therefore P(\text{Choosing a consonant}) = \frac{21}{26}$$

(5) Two different dice are rolled together. Find the probability of getting:

(i) the sum of numbers on two dice to be 5.

(ii) even numbers on both dice.

Solution:

Total number of outcomes while rolling two dice = 36.

A: the sum of numbers is 5.

B: even number on both dice.

Number of favourable cases of event A = 4 [i.e. (1, 4), (4,1), (2,3), (3,2)]

$$\text{so } P(A) = \frac{4}{36} = \frac{1}{9}$$

Number of favourable cases of event B = 9 [i.e. (2, 2), (2, 4), (2, 6), (4, 2), (4, 4), (4, 6), (6, 2), (6,4), (6, 6)]

$$\text{so } P(B) = \frac{9}{36} = \frac{1}{4}$$

(6) A bag contains 25 cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that the number on the drawn card is:

(i) divisible by 3 or 5.

(ii) a perfect square number

Solution:

Number from 1 to 25 which are divisible by 3 or 5 are 3, 6, 9, 12, 15, 18, 21, 24, 5, 10, 20, 25.

$$P(\text{a number divisible by 3 or 5}) = \frac{12}{25}$$

Number from 1 to 25 which are perfect square are 1, 4, 9, 16, 25

$$P(\text{a perfect square number}) = \frac{5}{25} = \frac{1}{5}$$

(7) Rahim tosses two different coins simultaneously. Find the probability of getting at least one tail.

Solution:

Total cases are {HH, HT, TH, TT}.

Favourable cases are (HT, TH, TT).

$$\therefore \text{Required probability} = \frac{3}{4}$$

(8) A bag. Contains cards numbered from 1 to 49. A and C is drawn from the bag at random, after mixing the cards thoroughly. Find the probability that the number on the drawn card is :

(i) An odd number.

(ii) a multiple of 5.

(iii) a perfect square.

(iv) an even prime number

Solution:

Total number of cards in a bag = 49.

(i) Number of odd number cards = 25

$$\therefore \text{Required probability} = \frac{25}{49}$$

(ii) Number of multiple of 5 = 9 (i.e. 5, 10, 15, 20, 25, 30, 35, 40, 45)

$$\therefore \text{Required probability} = \frac{9}{49} = \frac{1}{9}$$

(iii) Number of perfect square = 7 (i.e. 1, 4, 9, 16, 25, 36, 49)

$$\therefore \text{Required probability} = \frac{7}{49} = \frac{1}{7}$$

(iv) Number of prime number = 1 (i.e. 2)

$$\therefore \text{Required probability} = \frac{1}{49}$$

(9) A die is tossed once. Find the probability of getting an even number or a multiple of 3.

Solution:

Even numbers on a die are 2,4, 6.

Multiple of 3 are 3, 6.

So, total favourable cases are 2, 4, 6, 3.

So, required probability = $\frac{4}{6} = \frac{2}{3}$

(10) A group consists of 12 persons, of which 3 are extremely patient, other 6 are extremely honest and rest are extremely kind. A person from the group is selected at random. Assuming that each person is equally likely to be selected, find the probability of selecting a person who is

(i) extremely patient

(ii) Extremely kind or honest.

Which of the above values you prefer more?

Solution:

Total number of persons = 12

Number of extremely patient = 3

Number of extremely honest = 6

Number of extremely kind = $12 - (6 + 3) = 3$

Probability of selecting extremely patient = $\frac{3}{12} = \frac{1}{4}$

Probability of selecting extremely kind or honest = $\frac{3+6}{12} = \frac{9}{12} = \frac{3}{4}$

We prefer one should be honest first

(11) A card is drawn at random from a well-shuffled pack of 52 playing cards. Find the probability of getting

(i) a red king

(ii) a queen or a jack

Solution:

Total cards = 52

Number of red kings = 2

$$\text{Probability (a red king)} = \frac{2}{52} = \frac{1}{26}$$

Number of queen = 4

Number of jack = 4

Number of favourable cards = 8

$$P(\text{a queen or a jack}) = \frac{8}{52} = \frac{2}{13}$$

- (12) A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting
- (i) a king of red colour
 - (ii) a face card
 - (iii) the queen of diamonds.

Solution:

Total cards = 52

$$(i) P(\text{a king of red colour}) = \frac{2}{52} = \frac{1}{26}$$

$$(ii) P(\text{a face card}) = \frac{12}{52} = \frac{3}{13}$$

$$(iii) P(\text{a queen of diamonds}) = \frac{1}{52}$$

- (13) A coin is tossed two times. Find the probability of getting at least one head.

Solution:

Total outcomes are 4, i.e. {HH, HT, TH, TT}

Favourable outcomes are 3, i.e. {HH, HT and TH}

$$P(\text{at least one head}) = \frac{3}{4}$$

- (14) A game consists of tossing a coin 3 times and noting its outcome each time. Hanif wins if he gets three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

Solution:

Total possible outcomes are 8, i.e. {HHH, TTT, HHT, HTH, HTT, THH, THT, TTH}

There are only two outcomes at which Hanif can win, i.e. {HHH, TTT}, i.e. 2

$$\therefore P(\text{Hanif will lose the game}) = \frac{6}{8} = \frac{3}{4}$$

(15) A card is drawn at random from a well-shuffled pack of 52 playing cards. Find the probability of getting a red face card.

Solution:

Total cases = 52

Favourable cases = 6 (red face cards, i.e. 2 kings, 2 queens, 2 jacks)

$$\text{Probability of getting a red face card} = \frac{6}{52} = \frac{3}{26}$$