

Chapter 14: Probability

NCERT · Class 10 · Maths

Exercise 14.1

Question 1

Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on:

- (i) The same day?
- (ii) Consecutive Days?
- (ii) Consecutive days?
- (iii) Different days?

Solution

Ans: If Shyam and Ekta are visiting a particular shop on the same week which starts from Tuesday and ends on Saturday then the total days in the week = 5

Now, if each of them visiting the shop is equally likely then,

(The outcome of the event of Shyam visiting the shop) = 5

(The outcome of the event of Ekta visiting the shop) = 5

Thus, the total outcome of events

$$\begin{aligned}\Rightarrow P(\text{Total outcome}) &= 5 \times 5 \\ &= 25\end{aligned}$$

Ans: Probability of both of them reaching the shop on the same day:

$P(\text{Same day}) = (T, T), (W, W), (Th, Th), (F, F), (S, S).$

$= 5$

$$\begin{aligned}
 P(\text{reaching on the same day}) &= \frac{P(\text{sameday})}{P(\text{Total outcomes})} \\
 &= \frac{5}{25} \\
 &= \frac{1}{5}
 \end{aligned}$$

$$\text{Answer} = \frac{1}{5}$$

Ans: The probability of both of them reaching on consecutive days:

$$\begin{aligned}
 P(\text{Consecutive days}) &= (T, W), (W, Th), (Th, F), (F, S), (W, T), (Th, W), (F, Th), (S, F) \\
 &= 8
 \end{aligned}$$

$$\begin{aligned}
 P(\text{reaching on consecutive days}) &= \frac{P(\text{consecutive days})}{P(\text{Total outcomes})} \\
 &= \frac{8}{25}
 \end{aligned}$$

$$\text{Answer} = \frac{8}{25}$$

$$\begin{aligned}
 \text{Ans: Let } P(\text{both of them reaching on same days}) + P(\text{both of them not reaching on the same days}) \\
 &= 1
 \end{aligned}$$

$$\frac{1}{5} + P(\text{both of them reaching not on same days}) = 1$$

$$\begin{aligned}
 P(\text{both of them reaching not on same days}) &= 1 - \frac{1}{5} \\
 &= \frac{4}{5}
 \end{aligned}$$

$$\text{Answer} = \frac{4}{5}$$

Question 2

A die is numbered in such a way that its faces show the numbers 1, 2, 2, 3, 3, 6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws:

Solution

Ans:

$$\begin{aligned} \text{i) } P(\text{getting the total score as even}) &= \frac{\text{ways of getting even sum}}{\text{total ways}} \\ &= \frac{18}{36} \end{aligned}$$

$$\begin{aligned} \text{ii) } P(\text{getting total as 6}) &= \frac{\text{ways of getting total as 6}}{\text{total ways}} \\ &= \frac{5}{36} \end{aligned}$$

iii) $P(\text{getting total sum as 6 or less than 6}) = \text{ways of getting sum equal or less than 6}$

$$\text{total ways} = \frac{15}{36}$$

Question 3

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

Solution

Ans: A bag of 5 red balls and x blue balls (assume) will be having total $5 + x$ balls.

$$P(\text{getting a blue ball}) = \frac{x}{5+x}$$

$$P(\text{getting a red ball}) = \frac{5}{5+x}$$

If the probability of getting a blue ball is double the probability of getting a red ball then

$$2P(\text{getting a blue ball}) = P(\text{getting a red ball})$$

$$2 \left(\frac{x}{5+x} \right) = \frac{5}{5+x}$$

$$2x^2 + 5x - 25 = 0$$

On solving the following equation

$$x = 10, -5$$

Number of blue balls cannot be negative thus $x = 10$.

$$\text{Answer} = 10$$

Question 4

A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball? If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x .

Solution

Ans:

i) If a box of 12 balls has x black balls and $12 - x$ Other balls then

$$P(\text{getting a black ball}) = \frac{\text{number of black balls}}{\text{total balls}}$$

$$= \frac{x}{12}$$

ii) If 6 more balls are added then the total number of black balls $= x + 6$

$$\text{And the total number of balls} = 12 + 6 = 18$$

$$\text{So, } P(\text{getting a black ball}) = \frac{\text{number of black balls}}{\text{total balls}}$$

$$= \frac{x+6}{18}$$

Now, if the probability of getting a black ball is double of before then, $2P(\text{getting a black ball before}) = P(\text{getting a black ball})$

$$\text{Therefore, } 2 \left(\frac{x}{12} \right) = \frac{x+6}{18}$$

$$36x - 12x = 72$$

$$24x = 72$$

$$x = 3$$

Thus, the number of black balls before was 3 .

$$\text{Answer} = 3$$

Question 5

A jar contains 24 marbles, some are green, and others are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. Find the number of blue marbles in the jar.

Solution

Answer: The total number of marbles = 24

Let the total number of green marbles be x then

The total number of blue marbles = $24 - x$

$$\begin{aligned} P(\text{getting a green marble}) &= \frac{\text{number of green marbles}}{\text{total number of marbles}} \\ &= \frac{x}{24} \end{aligned}$$

$$\text{Given, } P(\text{getting a green marble}) = \frac{2}{3}$$

$$\text{Putting the value, } \frac{x}{24} = \frac{2}{3}$$

$$3x = 48$$

$$x = 16$$

Therefore, if the number of green marbles is 16 then, the number of blue marbles is, $24 - 16 = 8$

$$\text{Answer} = 8$$