NCERT Solutions for Class 10 Maths Chapter 15 - Probability

Chapter 15 - Probability Exercise Ex. 15.1

Solution 1

(i) 1
(ii) 0, impossible event
(iii) 1, sure event or certain event
(iv) 1
(v) 0, 1

Solution 2

(i) It is not equally likely event, as it depends on various factors and factors for both the conditions are not same.
(ii) It is not equally likely event, as it depends on the ability of a player.
(iii) It is an equally likely event.
(iv) It is an equally likely event.

Solution 3

When a coin is tossed, there are only two possible equally likely outcomes. So, tossing of a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game.

Solution 4

It is known that the probability of an event is always greater than or equal to 0 and it is always less than or equal to one. Hence, out of the given alternatives −1.5 can not be a probability of an event.

Solution 5

$P(\bar{E}) = 1 - P(E) = 1 - 0.05 = 0.95$

So, the probability of 'not E' is 0.95.

Solution 6

(i) The bag contains lemon flavoured candies only. So, event that Malini will take out a orange flavoured candy, is an impossible event.

∴ P (an orange flavoured candy) = 0

(ii) The bag contains lemon flavoured candies only. So, the event that Malini will take out a lemon flavoured candy, is a sure event.
∴ P (a lemon flavoured candy) = 1

Solution 7

Probability that two students are not having same birthday = P (E) = 0.992
∴ Probability that two students are having same birthday P (E') = 1 − P (E) =1 − 0.992 = 0.008

Solution 8

Total number of balls in the bag = 3 + 5 = 8
Number of red balls = 3

(i) Probability of getting a red ball $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{8}$

(ii) Probability of not getting red ball
= 1 − probability of getting a red ball

$= 1 - \frac{3}{8}$

$= \frac{5}{8}$

Solution 9

Total number of marbles = 5 + 8 + 4 = 17

(i) Number of red marbles = 5

Probability of getting a red marble $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{5}{17}$

(ii) Number of white marbles = 8

Probability of getting a white marble $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{8}{17}$

(iii) Number of green marbles = 4

Probability of getting a green marble $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{4}{17}$

Probability of not getting a green marble $= 1 - \frac{4}{17} = \frac{13}{17}$

Solution 10

Total number of coins in a piggy bank = 100 + 50 + 20 + 10 = 180
(i) Number of 50 p coins = 100

Probability that the coin will be a 50p coin $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$

$= \frac{100}{180} = \frac{5}{9}$

(ii) Number of Rs 5 coins = 10

Probability that the coin will be a Rs 5coin $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$

$= \frac{10}{180} = \frac{1}{18}$

Probability that the coin will not be a Rs 5 coin $= 1 - \frac{1}{18} = \frac{17}{18}$

Solution 11

Total number of fishes in the tank = 5 + 8 = 13

Probability that a male fish is taken out $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{5}{13}$

Solution 12

Total number of possible outcomes = 8

(i) Probability of getting 8 $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{8}$

(ii) Total odd numbers on spinner = 4

Probability of getting an odd number $= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$

$= \frac{4}{8} = \frac{1}{2}$

(iii) Total numbers that are greater than 2 = 6

Probability of getting a number greater than 2 =

$= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{6}{8} = \frac{3}{4}$

(iv) Total numbers less than 9 = 8

Probability of getting a numbers less than 9 $= \frac{8}{8} = 1$

Solution 13

When a die is thrown, the possible outcomes are 1, 2, 3, 4, 5, 6.

Number of possible outcomes = 6

(i) Prime numbers are 2, 3 and 5.

Probability of getting a prime number $= \frac{3}{6} = \frac{1}{2}$

(ii) Numbers lying between 2 and 6 are 3, 4 and 5.

Probability of getting a number lying between 2 and 6 $= \frac{3}{6} = \frac{1}{2}$

(iii) Odd numbers are 1, 3 and 5.

Probability of getting an odd number $= \frac{3}{6} = \frac{1}{2}$

Solution 14

Total number of cards = 52

(i) Total number of kings of red colour = 2

$$P(\text{getting a king of red colour}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{2}{52} = \frac{1}{26}$$

(ii) Total number of face cards = 12

$$P(\text{getting a face card}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{12}{52} = \frac{3}{13}$$

(iii) Total number of red face cards = 6

$$P(\text{getting a red face card}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{6}{52} = \frac{3}{26}$$

(iv) Total number of Jack of hearts = 1

$$P(\text{getting a Jack of hearts}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{1}{52}$$

(v) Total number of spade cards = 13

$$P(\text{getting a spade card}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{13}{52} = \frac{1}{4}$$

(vi) Total number of queen of diamonds = 1

$$P(\text{getting a queen of diamond}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{1}{52}$$

Solution 15

(i) Total number of cards = 5
Total number of queen = 1

$$P(\text{getting a queen}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{5}$$

(ii) When the queen is drawn and put aside, the total number of remaining cards will be 4.
(a) Total number of ace = 1

$$P(\text{getting an ace}) = \frac{1}{4}$$

(b) As queen is already drawn out, $P(\text{getting a queen}) = \frac{0}{4} = 0$

Solution 16

Total number of pens = 12 + 132 = 144
Total number of good pens = 132

$$P(\text{getting a good pen}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{132}{144} = \frac{11}{12}$$

Solution 17

(i)Total number of bulbs = 20
Total number of defective bulb = 4

$$P(\text{getting a defective bulb}) = \frac{\text{Number of defective bulbs}}{\text{Total number of bulbs}} = \frac{4}{20} = \frac{1}{5}$$

(ii) Remaining number of bulbs = 19

Remaining total number of non-defective bulbs = 16 − 1 = 15

$$P(\text{getting a not defective bulb}) = \frac{15}{19}$$

Solution 18

Total number of discs = 90

(i) Total number of two digit numbers between 1 and 90 = 81

$$P(\text{getting a two digit number}) = \frac{81}{90} = \frac{9}{10}$$

(ii) Perfect squares between 1 and 90 are 1, 4, 9, 16, 25, 36, 49, 64, and 81.
∴ Total number of perfect squares between 1 and 90 is 9.

$$P(\text{getting a perfect square}) = \frac{9}{90} = \frac{1}{10}$$

(iii) Numbers between 1 and 90 that are divisible by 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, and 90.
∴ Total numbers divisible by 5 = 18

$$\text{Probability of getting a number divisible by 5} = \frac{18}{90} = \frac{1}{5}$$

Solution 19

Total number of possible outcomes on die = 6

(i) Total number of faces having A on it = 2

P (getting A) $= \frac{2}{6} = \frac{1}{3}$

(ii) Total number of faces having D on it = 1

P (getting D) $= \frac{1}{6}$

Solution 20

Area of the rectangle = $l \times b$ = 3 m × 2 m = 6 m²

Diameter of the circle = 1

$\therefore$ Radius of the circle $= \frac{1}{2}$

Area of the circle $= \pi r^2 = \pi\left(\frac{1}{2}\right)^2 = \frac{\pi}{4}$ m²

P (die will land inside the circle) $= \frac{\frac{\pi}{4}}{6} = \frac{\pi}{24}$

Solution 21

Total number of pens = 144

Total number of defective pens = 20

Total number of good pens = 144 – 20 = 124

(i) P (Nuri buys a pen) = Probability of getting a good pen $= \frac{124}{144} = \frac{31}{36}$

(ii) P (Nuri will not buy a pen) $= 1 - \frac{31}{36} = \frac{5}{36}$

Solution 22

(i) To get sum as 2, possible outcome is (1, 1).
To get sum as 3, possible outcomes are (2, 1) and (1, 2).
To get sum as 4, possible outcomes are (3, 1), (1, 3), (2, 2).
To get sum as 5, possible outcomes are (4, 1), (1, 4), (2, 3), (3, 2).
To get sum as 6, possible outcomes are (5, 1), (1, 5), (2, 4), (4, 2), (3, 3).
To get sum as 7, possible outcomes are (6, 1), (1, 6), (2, 5), (5, 2), (3, 4) (4, 3).
To get sum as 8, possible outcomes are (6, 2), (2, 6), (3, 5), (5, 3), (4, 4).
To get sum as 9, possible outcomes are (3, 6), (6, 3), (4, 5), (5, 4).
To get sum as 10, possible outcomes are (4, 6), (6, 4), (5, 5).
To get sum as 11, possible outcomes are (5, 6), (6, 5).
To get sum as 12, possible outcome is (6, 6).

Event: Sum of two dice	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

(ii) Since, the sums 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 are not equally likely, so the probability of each of the sums will not be $\frac{1}{11}$.

Solution 23

There are 8 possible outcomes, which are {HHH, TTT, HHT, HTH, THH, TTH, THT, HTT}.

Number of favourable outcomes = 2 (TTT and HHH)

$$P(\text{Hanif will win the game}) = \frac{2}{8} = \frac{1}{4}$$

$$\therefore P(\text{Hanif will lose the game}) = 1 - \frac{1}{4} = \frac{3}{4}$$

Solution 24

Total number of outcomes = $6 \times 6 = 36$

(i) Number of outcomes when 5 comes up either time are (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (1, 5), (2, 5), (3, 5), (4, 5), (6, 5).

Number of favourable cases = 11

$$P(\text{5 will come up either time}) = \frac{11}{36}$$

$$P(\text{5 will not come up either time}) = 1 - \frac{11}{36} = \frac{25}{36}$$

(ii) Number of cases when 5 can come at least once = 11

$$P(\text{5 will come at least once}) = \frac{11}{36}$$

Solution 25

(i) The given statement is incorrect.

When two coins are tossed simultaneously, the possible outcomes are (H, H), (H, T), (T, H), and (T, T).

So, the probability of getting two heads is $\frac{1}{4}$; Probability of getting two tails is $\frac{1}{4}$ and Probability of getting one of each is $\frac{2}{4} = \frac{1}{2}$.

(ii) The given statement is correct.

When a die is thrown possible outcomes are 1, 2, 3, 4, 5, and 6. Out of which 1, 3, 5 are odd and 2, 4, 6 are even numbers.

In other words, it can be said that when a die is thrown, there are two possible outcomes – an odd number or an even number as these outcomes are equally likely.

So, the probability of getting an odd number is $\frac{3}{6} = \frac{1}{2}$.

Chapter 15 - Probability Exercise Ex. 15.2

Solution 1

There are a total 5 days (Tuesday to Saturday). Shyam can go to the shop on any of 5 days and Ekta can also go to the shop on 5 days
So total number of outcomes = $5 \times 5 = 25$

(i) They can reach on same day in 5 ways, i.e. (T, T), (W, W), (Th, Th), (F, F), (S, S).

$\therefore$ P (both will reach on same day) $= \frac{5}{25} = \frac{1}{5}$

(ii) They can reach on consecutive day in 8 ways, i.e, (T, W), (W, Th), (Th, F), (F, S) (W, T), (Th, W), (F, Th), (S, F).

$\therefore$ P (both will reach on consecutive days)$= \frac{8}{25}$

(iii) From (i), P (both will reach on same day) $= \frac{1}{5}$

$\therefore$ P (both will reach on different days)$= 1 - \frac{1}{5} = \frac{4}{5}$

Solution 2

The given table can be completed as below:

+	1	2	2	3	3	6
1	2	3	3	4	4	7
2	3	4	4	5	5	8
2	3	4	4	5	5	8
3	4	5	5	6	6	9
3	4	5	5	6	6	9
6	7	8	8	9	9	12

Total number of possible outcomes when two dice are thrown $= 6 \times 6 = 36$

(i) Total times when the sum is even = 18

P (getting an even number) $= \frac{18}{36} = \frac{1}{2}$

(ii) Total times when the sum is 6 = 4

P (getting sum as 6) $= \frac{4}{36} = \frac{1}{9}$

(iii) Total times when the sum is at least 6 = 15

P (getting sum at least 6)$= \frac{15}{36} = \frac{5}{12}$

Solution 3

Let the number of blue balls be x.
Number of red balls = 5
Total number of balls = $x + 5$

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

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

According to the given information,

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

$$x = 10$$

Therefore, the number of blue balls in the bag is 10.

Solution 4

Total number of balls = 12
Total number of black balls = x

$$P(\text{getting a black ball}) = \frac{x}{12}$$

Now, 6 more black balls are put in the box.
Total number of balls = 12 + 6 = 18
Total number of black balls = $x + 6$

$$P(\text{getting a black ball now}) = \frac{x+6}{18}$$

According to the given information,

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

$$3x = x + 6$$

$$2x = 6$$

$$x = 3$$

Solution 5

Total number of marbles = 24
Let the total number of green marbles be x.
∴ Total number of blue marbles = $24 - x$

$$P(\text{getting a green marble}) = \frac{x}{24}$$

According to the given information,

$$\frac{x}{24} = \frac{2}{3}$$

$$x = 16$$

Thus, the total number of green marbles in the jar is 16.
Hence, total number of blue marbles = 24 – 16 = 8

Other Chapters for CBSE Class 10 Mathematics