Important Questions & Answers For Class 10 Maths

Chapter 15 Probability

Q. 1: Two dice are thrown at the same time. Find the probability of getting

(i) the same number on both dice.

(ii) different numbers on both dice.

Solution:

Given that, Two dice are thrown at the same time.

So, the total number of possible outcomes n(S) = 6^2 = 36

(i) Getting the same number on both dice:

Let A be the event of getting the same number on both dice.

Possible outcomes are (1,1), (2,2), (3, 3), (4, 4), (5, 5) and (6, 6).

Number of possible outcomes = n(A) = 6

Hence, the required probability =P(A) = n(A)/n(S)

= 6/36

= 1/6

(ii) Getting a different number on both dice.

Let B be the event of getting a different number on both dice.

Number of possible outcomes n(B) = 36 – Number of possible outcomes for the same number on both dice

= 36 – 6 = 30

Hence, the required probability = P(B) = n(B)/n(S)

= 30/36

= 5/6

Q. 2: A bag contains a red ball, a blue ball and a yellow ball, all the balls being of the same size. Kritika takes out a ball from the bag without looking into it. What is the probability that she takes out the

(i) yellow ball?

(ii) red ball?

(iii) blue ball?

Solution:

Kritika takes out a ball from the bag without looking into it. So, it is equally likely that she takes out any one of them from the bag.

Let Y be the event 'the ball taken out is yellow', B be the event 'the ball taken out is blue', and R be the event 'the ball taken out is red'.

The number of possible outcomes = Number of balls in the bag = n(S) = 3.

(i) The number of outcomes favourable to the event Y = n(Y) = 1.

So, P(Y) = n(Y)/n(S) =1/3

Similarly, (ii) P(R) = 1/3

and (iii) P(B) = ⅓

Q.3: One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will

(i) be an ace,

(ii) not be an ace.

Solution:

Well-shuffling ensures equally likely outcomes.

(i) Card drawn is an ace

There are 4 aces in a deck.

Let E be the event 'the card is an ace'.

The number of outcomes favourable to E = n(E) = 4

The number of possible outcomes = Total number of cards = n(S) = 52

Therefore, P(E) = n(E)/n(S) = 4/52 = 1/13

(ii) Card drawn is not an ace

Let F be the event 'card drawn is not an ace'.

The number of outcomes favourable to the event F = n(F) = 52 – 4 = 48

Therefore, P(F) = n(F)/n(S) = 48/52 = 12/13

Q.4: Two dice are numbered 1, 2, 3, 4, 5, 6 and 1, 1, 2, 2, 3, 3, respectively. They are thrown, and the sum of the numbers on them is noted. Find the probability of getting each sum from 2 to 9 separately.

Solution:

Number of total outcome = n(S) = 36

(i) Let E_1 be the event 'getting sum 2'

Favourable outcomes for the event E_1 = {(1,1),(1,1)}

$n(E_1) = 2$

P(E1) = n(E1)/n(S) = 2/36 = 1/18

(ii) Let E_2 be the event 'getting sum 3'

Favourable outcomes for the event E_2 = {(1,2),(1,2),(2,1),(2,1)}

$n(E_2) = 4$

$P(E_2) = n(E_2)/n(S) = 4/36 = 1/9$

(iii) Let E_3 be the event 'getting sum 4'

Favourable outcomes for the event E_3 = {(2,2)(2,2),(3,1),(3,1),(1,3),(1,3)}

$n(E_3) = 6$

$P(E_3) = n(E_3)/n(S) = 6/36 = 1/6$

(iv) Let E_4 be the event 'getting sum 5'

Favourable outcomes for the event E_4 = {(2,3),(2,3),(4,1),(4,1),(3,2),(3,2)}

$n(E_4) = 6$

$P(E_4) = n(E_4)/n(S) = 6/36 = 1/6$

(v) Let E_5 be the event 'getting sum 6'

Favourable outcomes for the event E_5 = {(3,3),(3,3),(4,2),(4,2),(5,1),(5,1)}

$n(E_5) = 6$

$P(E_5) = n(E_5)/n(S) = 6/36 = 1/6$

(vi) Let E_6 be the event 'getting sum 7'

Favourable outcomes for the event E_6 = {(4,3),(4,3),(5,2),(5,2),(6,1),(6,1)}

$n(E_6) = 6$

$P(E_6) = n(E_6)/n(S) = 6/36 = 1/6$

(vii) Let E_7 be the event 'getting sum 8'

Favourable outcomes for the event E_7 = {(5,3),(5,3),(6,2),(6,2)}

$n(E_7) = 4$

$P(E_7) = n(E_7)/n(S) = 4/36 = 1/9$

(viii) Let E_8 be the event 'getting sum 9'

Favourable outcomes for the event E_8 = {(6,3),(6,3)}

$n(E_8) = 2$

$P(E_8) = n(E_8)/n(S) = 2/36 = 1/18$

Q.5: A coin is tossed two times. Find the probability of getting at most one head.

Solution:

When two coins are tossed, the total no of outcomes = $2^2 = 4$

i.e. (H, H) (H, T), (T, H), (T, T)

Where,

H represents head

T represents the tail

We need at most one head, which means we need one head only otherwise no head.

Possible outcomes = (H, T), (T, H), (T, T)

Number of possible outcomes = 3

Hence, the required probability = ¾

Q.6: An integer is chosen between 0 and 100. What is the probability that it is

(i) divisible by 7?

(ii) not divisible by 7?

Solution:

Number of integers between 0 and 100 = n(S) = 99

(i) Let E be the event 'integer divisible by 7'

Favourable outcomes to the event E = 7, 14, 21,…., 98

Number of favourable outcomes = n(E) = 14

Probability = P(E) = n(E)/n(S) = 14/99

(ii) Let F be the event 'integer not divisible by 7'

Number of favourable outcomes to the event F = 99 – Number of integers divisible by 7

= 99-14 = 85

Hence, the required probability = P(F) = n(F)/n(S) = 85/99

Q. 7: If P(E) = 0.05, what is the probability of 'not E'?

Solution:

We know that,

P(E) + P(not E) = 1

It is given that, P(E) = 0.05

So, P(not E) = 1 – P(E)

P(not E) = 1 – 0.05

∴ P(not E) = 0.95

Q. 8: 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen is taken out is a good one.

Solution:

Numbers of pens = Numbers of defective pens + Numbers of good pens

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

P(E) = (Number of favourable outcomes) / (Total number of outcomes)

P(picking a good pen) = 132/144 = 11/12 = 0.916

Q. 9: 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?

[**Hint**: Throwing a die twice and throwing two dice simultaneously are treated as the same experiment]

Solution:

Outcomes are:

(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)

(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)

(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)

(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)

(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)

(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)

So, the total number of outcomes = 6 × 6 = 36

(i) Method 1:

Consider the following events.

A = 5 comes in the first throw,

B = 5 comes in second throw

P(A) = 6/36,

P(B) = 6/36 and

P(not B) = 5/6

So, P(notA) = 1 – 6/36 = 5/6

∴ The required probability = 5/6 × 5/6 = 25/36

Method 2:

Let E be the event in which 5 does not come up either time.

So, the favourable outcomes are [36 – (5 + 6)] = 25

∴ P(E) = 25/36

(ii) Number of events when 5 comes at least once = 11 (5 + 6)

∴ The required probability = 11/36

Q.10: A die is thrown once. What is the probability of getting a number less than 3?

Solution:

Given that a die is thrown once.

Total number of outcomes = n(S) = 6

i.e. S = {1, 2, 3, 4, 5, 6}

Let E be the event of getting a number less than 3.

n(E) = Number of outcomes favourable to the event E = 2

Since E = {1, 2}

Hence, the required probability = P(E) = n(E)/n(S)

= 2/6

= 1/3

Q.11: If the probability of winning a game is 0.07, what is the probability of losing it?

Solution:

Given that the probability of winning a game = 0.07

We know that the events of winning a game and losing the game are complementary events.

Thus, P(winning a game) + P(losing the game) = 1

So, P(losing the game) = 1 – 0.07 = 0.93

Q.12: The probability of selecting a blue marble at random from a jar that contains only blue, black and green marbles is 1/5. The probability of selecting a black marble at random from the same jar is 1/4. If the jar contains 11 green marbles, find the total number of marbles in the jar.

Solution:

Given that,

P(selecting a blue marble) = 1/5

P(selecting a black marble) = 1/4

We know that the sum of all probabilities of events associated with a random experiment is equal to 1.

So, P(selecting a blue marble) + P(selecting a black marble) + P(selecting a green marble) = 1

(1/5) + (1/4) + P(selecting a green marble) = 1

P(selecting a green marble) = 1 – (1/4) – (1/5)

= (20 – 5 – 4)/20

= 11/20

P(selecting a green marble) = Number of green marbles/Total number of marbles

11/20 = 11/Total number of marbles {since the number of green marbles in the jar = 11}

Therefore, the total number of marbles = 20

Q.13: The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

Solution:

Given,

Total number of apples in the heap = n(S) = 900

Let E be the event of selecting a rotten apple from the heap.

Number of outcomes favourable to E = n(E)

P(E) = n(E)/n(S)

0.18 = n(E)/900

⇒ n(E) = 900 × 0.18

⇒ n(E) = 162

Therefore, the number of rotten apples in the heap = 162

Q.14: A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag.

Solution:

Given,

Number of white balls = 15

Let x be the number of black balls.

Total number of balls in the bag = 15 + x

Also, the probability of drawing a black ball from the bag is thrice that of drawing a white ball.

$\Rightarrow x/(15 + x) = 3[15/(15 + x)]$

$\Rightarrow x = 3 \times 15 = 45$

Hence, the number of black balls in the bag = 45.