n(A)= 1

Therefore, the probability of getting a tail = $\frac{n(A)}{n(s)} = \frac{1}{2}$

(ii) Not getting a tail means getting a heads.

Event of getting a heads = {H}

n(A) = 1

Therefore, the probability of getting a tail = $\frac{n(A)}{n(s)} = \frac{1}{2}$

tion 2.

A bag contains 3 white, 5 black and 2 red balls, all of the same shape and size. A ball is drawn from the bag without looking into it, find the probability that the ball drawn is:

(i) a black ball.

(ii) a red ball.

(iii) a white ball.

(iv) not a red ball.

(v) not a black ball.

Solution:

Total number of balls = 3 + 5 + 2 = 10

Total number of events = P(n) = 10

(i) There are 5 black balls

Favourable number of events = P(A) = 5

Hence, P(getting a black ball) = $\frac{P(A)}{P(n)} = \frac{5}{10} = \frac{1}{2}$

(ii) There are 2 red balls

Favourable number of events = P(A) = 2

Hence, P(getting a red ball) = $\frac{P(A)}{P(n)} = \frac{2}{10} = \frac{1}{5}$

(iii) There are 3 white balls

Favourable number of events = P(A) = 3

Hence, P(getting a white ball) = $\frac{P(A)}{P(n)} = \frac{3}{10}$

(iv) There are 3 + 5 = 8 balls which are not red

Favourable number of events = P(A) = 8

here are 3 + 5 = 8 balls which are not red

Favourable number of events = P(A) = 8

Hence, P(not getting a red ball) = $\frac{P(A)}{P(n)} = \frac{8}{10} = \frac{4}{5}$

(v) There are 3 + 2 = 5 balls which are not black

Favourable number of events = P(A) = 5

Hence, P(not getting a black ball) = $\frac{P(A)}{P(n)} = \frac{5}{10} = \frac{1}{2}$

Question 3.

In a single throw of a die, find the probability of getting a number:

(i) greater than 4.

(ii) less than or equal to 4.

(iii) not greater than 4.

Solution:

Sample space = {1, 2, 3, 4, 5, 6}

n(s) = 6

(i) E = event of getting a number greater than 4 = {5, 6}

n (E) = 2

Probability of a number greater than 4 = $\frac{n(E)}{n(s)} = \frac{2}{6} = \frac{1}{3}$

(ii) E=event of getting a number less than or equal to 4={1, 2, 3, 4}

n(E) = 4

Probability of a number less than or equal to 4 = $\frac{n(E)}{n(s)} = \frac{4}{6} = \frac{2}{3}$

Probability of a number greater than 4 = $\frac{n(E)}{n(s)} = \frac{2}{6} = \frac{1}{3}$

(ii) E=event of getting a number less than or equal to 4={1, 2, 3, 4}
n(E) = 4

Probability of a number less than or equal to 4 = $\frac{n(E)}{n(s)} = \frac{4}{6} = \frac{2}{3}$

(iii) E=event of getting a number not greater than 4={1, 2, 3, 4}
n(E) = 4

Probability of a number not greater than 4 = $\frac{n(E)}{n(s)} = \frac{4}{6} = \frac{2}{3}$

Question 4.

In a single throw of a die, find the probability that the number:

(i) will be an even number.

(ii) will not be an even number.

(iii) will be an odd number.

Solution:

Sample space = {1, 2, 3, 4, 5, 6}
n(s) = 6

(i) E = event of getting an even number = {2, 4, 6}
n(E) = 3

Probability of a getting an even number = $\frac{n(E)}{n(s)} = \frac{3}{6} = \frac{1}{2}$

(ii) E = event of not getting an even number = {1, 3, 5}
n(E) = 3

Probability of a not getting an even number = $\frac{n(E)}{n(s)} = \frac{3}{6} = \frac{1}{2}$

(iii) E = event of getting an odd number = {1, 3, 5}

^

Question 4.

In a single throw of a die, find the probability that the number:

(i) will be an even number.

(ii) will not be an even number.

(iii) will be an odd number.

Solution:

Sample space = {1, 2, 3, 4, 5, 6}

$n(s) = 6$

(i) E = event of getting an even number = {2, 4, 6}

$n(E) = 3$

Probability of a getting an even number $= \frac{n(E)}{n(s)} = \frac{3}{6} = \frac{1}{2}$

(ii) E = event of not getting an even number = {1, 3, 5}

$n(E) = 3$

Probability of a not getting an even number $= \frac{n(E)}{n(s)} = \frac{3}{6} = \frac{1}{2}$

(iii) E = event of getting an odd number = {1, 3, 5}

$n(E) = 3$

Probability of a getting an odd number $= \frac{n(E)}{n(s)} = \frac{3}{6} = \frac{1}{2}$

Question 5.

From a well shuffled deck of 52 cards, one card is drawn. Find the probability that the card drawn will:

(i) be a black card.

(ii) not be a red card.

(iii) be a red card.

(iv) be a face card.

(v) be a face card of red colour.

Solution:

Total number of cards = 52

Total number of outcomes = P(s) = 52

There are 13 cards of each type. The cards of heart and diamond are red in colour. Spade and diamond are black. So, there are 26 red cards and 26 black cards.

(i) Number of black cards in a deck = 26

P(E) = favourable outcomes for the event of drawing a black card = 26

Probability of drawing a black card = $\frac{P(E)}{P(s)} = \frac{26}{52} = \frac{1}{2}$

(ii) Number of red cards in a deck = 26

Therefore, number of non-red cards = 52 - 26 = 26

P(E) = favourable outcomes for the event of not drawing a red card = 26

Probability of not drawing a red card = $\frac{P(E)}{P(s)} = \frac{26}{52} = \frac{1}{2}$

ore, number of non-red cards = 52 - 26 = 26

P(E) = favourable outcomes for the event of not drawing a red card = 26

Probability of not drawing a red card = $\frac{P(E)}{P(s)} = \frac{26}{52} = \frac{1}{2}$

(iii) Number of red cards in a deck = 26

P(E) = favourable outcomes for the event of drawing a red card = 26

Probability of drawing a red card = $\frac{P(E)}{P(s)} = \frac{26}{52} = \frac{1}{2}$

(iv) There are 52 cards in a deck of cards, and 12 of these cards are face cards (4 kings, 4 queens, and 4 jacks).

P(E) = 12

Probability of drawing a face card = $\frac{P(E)}{P(s)} = \frac{12}{52} = \frac{3}{13}$

(v) There are 26 red cards in a deck, and 6 of these cards are face cards (2 kings, 2 queens, and 2 jacks).

P(E) = 6

Probability of drawing a red face card = $\frac{P(E)}{P(s)} = \frac{6}{52} = \frac{3}{26}$

Question 6.

(i) If A and B are two complementary events then what is the relation between P(A) and P(B)?

(ii) If the probability of happening an event A is 0.46. What will be the probability of not happening of the event A?

Solution:

(i) Two complementary events, taken together, include all the outcomes for an experiment and the on:

(i) Two complementary events, taken together, include all the outcomes for an experiment and the sum of the probabilities of all outcomes is 1.

P(A) + P(B) = 1

(ii) P(A) = 0.46

Let P(B) be the probability of not happening of event A

We know,

P(A) + P(B) = 1

P(B) = 1 − P(A)

P(B) = 1 − 0.46

P(B) = 0.54

Hence the probability of not happening of event A is 0.54

Question 7.

In a T.T. match between Geeta and Ritu, the probability of the winning of Ritu is 0.73. Find the probability of:

(i) winning of Geeta

(ii) not winning of Ritu

Solution:

Question 7.

In a T.T. match between Geeta and Ritu, the probability of the winning of Ritu is 0.73. Find the probability of:

(i) winning of Geeta

(ii) not winning of Ritu

Solution:

(i) Winning of Geeta is a complementary event to winning of Ritu

Therefore,

P(winning of Ritu) + P(winning of Geeta) = 1

P(winning of Geeta) = 1 – P(winning of Ritu)

P(winning of Geeta) = 1 – 0.73

P(winning of Geeta) = 0.27

(ii) Not winning of Ritu is a complementary event to winning of Ritu

Therefore,

P(winning of Ritu) + P(not winning of Ritu) = 1

P(not winning of Ritu) = 1 – P(winning of Ritu)

P(not winning of Ritu) = 1 – 0.73

P(not winning of Ritu) = 0.27

winning of Ritu) = 0.27

Question 8.

In a race between Mahesh and John, the probability that John will lose the race is 0.54. Find the probability of:

(i) winning of Mahesh

(ii) winning of John

Solution:

(i) But if John looses, Mahesh wins

Hence, probability of John losing the race = Probability of Mahesh winning the race since it is a race between these two only

Therefore, P(winning of Mahesh) = 0.54

(ii) P(winning of Mahesh) + P(winning of John) = 1

0.54 + P(winning of John) = 1

P(winning of John) = 1 − 0.54

P(winning of John) = 0.46

Question 9.

(i) Write the probability of a sure event

(ii) Write the probability of an event when impossible

Question 9.

(i) Write the probability of a sure event

(ii) Write the probability of an event when impossible

(iii) For an event E, write a relation representing the range of values of P(E)

Solution:

(i) The probability of a sure event is 1 i.e. P(S) = 1 where 'S' is the sure event.

Proof: In a sure event n(E) = n(S)

[Since Number of elements in Event 'E' will be equal to the number of element in sample-space.]

By definition of Probability :

P(S) = n (E)/ n (S) = 1

P(S) = 1

(ii) The probability of an impossible event is '0' i.e. P (S) = 0

Proof: Since E has no element, n(E) = 0

From def...

tion 10.

In a single throw of die, find the probability of getting:

(i) 5

(ii) 8

(iii) a number less than 8

(iv) a prime number

Solution:

Sample space = {1, 2, 3, 4, 5, 6}

$n(S) = 6$

(i) E = event of getting a 5 on a throw of die = {5}

$n(E) = 1$

Probability of getting a 5 = $P(S) = \frac{n(E)}{n(S)} = \frac{1}{6}$

(ii) There are only six possible outcomes in a single throw of a die. If we want to find probability of 8 to come up, then in that case number of possible or favourable outcome is 0 (zero)

$n(E) = 0$

Probability of getting a 8 = $P(S) = \frac{n(E)}{n(S)} = \frac{0}{6} = 0$

(iii) If we consider to find the probability of number less than 8, then all six cases are favourable

$n(E) = 6$

Consider to find the probability of number less than 8, then all six cases are favourable

n(E) = 6

Probability of getting a number less than8 = $P(S) = \frac{n(E)}{n(S)} = \frac{6}{6} = 1$

(iv) E = event of getting a prime number = {2, 3, 5,}

n(E) = 3

Probability of getting a prime number = $P(S) = \frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

Question 11.

A die is thrown once. Find the probability of getting:

(i) an even number

(ii) a number between 3 and 8

(iii) an even number or a multiple of 3

Solution:

Sample space = {1, 2, 3, 4, 5, 6}

n(S) = 6

(i) E = the possible even numbers = {2, 4, 6}

n(E) = 3

Probability of getting an even number = $P(S) = \frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

(ii) E = the possible even numbers between 3 and 8 = {4, 5, 6}

n(E) = 3

Probability of getting an even number between 3 and 8 =

$P(S) = \frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

(iii) E = the event of getting an even number or a multiple of 3 = {2, 3, 4, 6}

Probability of getting an even number or a multiple of 3 = $P(S) = \frac{n(E)}{n(S)} = \frac{4}{6} = \frac{2}{3}$

Question 12.

Which of the following cannot be the probability of an event?

(i) 3/5

(ii) 2.7

(iii) 43%

(iv) −0.6

(v) −3.2

(vi) 0.35

Solution:

The probability of an event lies between '0' and '1' i.e. $0 \leq P(E) \leq 1$.

(i) $\frac{3}{5} = 0.6$

$\because 0 \leq 0.6 \leq 1$

Hence, it can be the probability of an event.

(ii) 2.7

$\because 0 \leq 1 \leq 2.7$

Hence, it cannot be the probability of an event.

(iii) $43\% = \frac{43}{100} = 0.43$

it cannot be the probability of an event.

(iii) $43\% = \frac{43}{100} = 0.43$

$0 \le 0.43 \le 1$

Hence, it can be the probability of an event.

(iv) -0.6

$-0.6 \le 0 \le 1$

Hence, it cannot be the probability of an event.

(v) -3.2

$-3.2 \le 0 \le 1$

Hence, it cannot be the probability of an event.

(vi) 0.35

$0 \le 0.35 \le 1$

Hence, it can be the probability of an event.

Question 13.

A bag contains six identical black balls. A child withdraws one ball from the bag without looking into it. What is the probability that he takes out:

(i) a white ball

(ii) a black ball

Solution:

Possible number of outcomes = 6 = number of balls in the bag

$n(S) = 6$

Question 13.

A bag contains six identical black balls. A child withdraws one ball from the bag without looking into it. What is the probability that he takes out:

(i) a white ball

(ii) a black ball

Solution:

Possible number of outcomes = 6 = number of balls in the bag

n(S) = 6

(i) E = event of drawing a white ball = number of white balls in the bag = 0

n(E) = 0

Probability of drawing a white ball = $P(S) = \frac{n(E)}{n(S)} = \frac{0}{6} = 0$

(ii) E = event of drawing a black ball = number of black balls in the bag = 6

n(E) = 6

Probability of drawing a black ball = $P(S) = \frac{n(E)}{n(S)} = \frac{6}{6} = 1$

Question 14.

A single letter is selected at random from the word 'Probability'. Find the probability that it is a vowel.

Solution:

Possible outcomes = S = {'P', 'r', 'o', 'b', 'a', 'b', 'i', 'l', 'i', 't', 'y'}

^

Question 14.

A single letter is selected at random from the word 'Probability'. Find the probability that it is a vowel.

Solution:

Possible outcomes = S = {'P', 'r', 'o', 'b', 'a', 'b', 'i', 'l', 'i', 't', 'y'}

n(S) = 11

Event of selection of vowels = E = {'o', 'a', 'i', 'i'}

n(E) = 4

Probability of selection of a vowel = $P(S) = \frac{n(E)}{n(S)} = \frac{4}{11}$

Question 15.

Ramesh chooses a date at random in January for a party.

January					
Mon		6	13	20	27
Tue		7	14	21	28
Wed	1	8	15	22	29
Thurs	2	9	16	23	30
Fri	3	10	17	24	31
Sat	4	11	18	25	
Sun	5	12	19	26	

Find the probability that he chooses:

January					
Mon		6	13	20	27
Tue		7	14	21	28
Wed	1	8	15	22	29
Thurs	2	9	16	23	30
Fri	3	10	17	24	31
Sat	4	11	18	25	
Sun	5	12	19	26	

Find the probability that he chooses:

(i) a Wednesday.

(ii) a Friday.

(iii) a Tuesday or a Saturday.

Solution:

Number of possible outcomes = number of days in the month =31

$n(S) = 31$

(i) E = event of selection of a Wednesday = {1, 8, 15, 22, 29}

$n(E) = 5$

Probability of selection of a Wednesday = $P(S) = \frac{n(E)}{n(S)} = \frac{5}{31}$

(ii) E = event of selection of a Friday = {3, 10, 17, 24, 31}

$n(E) = 5$

Probability of selection of a Friday = $P(S) = \frac{n(E)}{n(S)} = \frac{5}{31}$

(iii) E = event of selection of a Tuesday or a Saturday = {4, 7, 11, 14, 18, 21, 25, 28}

$n(E) = 8$

Probability of selection of a Tuesday or a Saturday = $P(S) = \frac{n(E)}{n(S)} = \frac{8}{31}$

Probability Exercise 25(B) – Selina Concise Mathematics Class 10 ICSE Solutions

Question 1.

Nine cards (identical in all respects) are numbered 2 to 10. A card is selected from them at random. Find the probability that the card selected will be:

(i) an even number

(ii) a multiple of 3

(iii) an even number and a multiple of 3

(iv) an even number or a multiple of 3

Solution:

There are 9 cards from which one card is drawn.

Total number of elementary events = n(S) = 9

(i) From numbers 2 to 10, there are 5 even numbers i.e. 2, 4, 6, 8, 10

Favorable number of events = n(E) = 5

Probability of selecting a card with an even number = $\frac{n(E)}{n(S)} = \frac{5}{9}$

(ii) From numbers 2 to 10, there are 3 numbers which are multiples of 3 i.e. 3, 6, 9

Favorable number of events = n(E) = 3

Probability of selecting a card with a multiple of 3 =

$\frac{n(E)}{n(S)} = \frac{3}{9} = \frac{1}{3}$

(iii) From numbers 2 to 10, there is one number which is an even number as well as multiple of 3 i.e. 6

multiple of 3

(iii) an even number and a multiple of 3

(iv) an even number or a multiple of 3

Solution:

There are 9 cards from which one card is drawn.

Total number of elementary events = n(S) = 9

(i) From numbers 2 to 10, there are 5 even numbers i.e. 2, 4, 6, 8, 10

Favorable number of events = n(E) = 5

Probability of selecting a card with an even number = $\frac{n(E)}{n(S)} = \frac{5}{9}$

(ii) From numbers 2 to 10, there are 3 numbers which are multiples of 3 i.e. 3, 6, 9

Favorable number of events = n(E) = 3

Probability of selecting a card with a multiple of 3=

$\frac{n(E)}{n(S)} = \frac{3}{9} = \frac{1}{3}$

(iii) From numbers 2 to 10, there is one number which is an even number as well as multiple of 3 i.e. 6

Favorable number of events = n(E) = 1

Probability of selecting a card with a number which is an even number as well as multiple of 3 = $\frac{n(E)}{n(S)} = \frac{1}{9}$

(iv) From numbers 2 to 10, there are 7 numbers which are even numbers or a multiple of 3 i.e. 2, 3, 4, 6, 8, 9, 10

Favorable number of events = n(E) = 7

Probability of selecting a card with a number which is an even number or a multiple of 3 = $\frac{n(E)}{n(S)} = \frac{7}{9}$

hundred identical cards are numbered from 1 to 100. The cards The cards are well shuffled and then a card is drawn. Find the probability that the number on card drawn is:

(i) a multiple of 5

(ii) a multiple of 6

(iii) between 40 and 60

(iv) greater than 85

(v) less than 48

Solution:

There are 100 cards from which one card is drawn.

Total number of elementary events = n(S) = 100

(i) From numbers 1 to 100, there are 20 numbers which are multiple of 5 i.e. {5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100} Favorable number of events = n(E) = 20

Probability of selecting a card with a multiple of 5 =

$$\frac{n(E)}{n(S)} = \frac{20}{100} = \frac{1}{5}$$

(ii) From numbers 1 to 100, there are 16 numbers which are multiple of 6 i.e. {6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96} Favorable number of events = n(E) = 16

Probability of selecting a card with a multiple of 6 =

$$\frac{n(E)}{n(S)} = \frac{16}{100} = \frac{4}{25}$$

(iii) From numbers 1 to 100, there are 19 numbers which are between 40 and 60 i.e. {41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59} Favorable number of events = n(E) = 19

Probability of selecting a card between 40 and 60=

$$\frac{n(E)}{n(S)} = \frac{19}{100}$$

(iv) From numbers 1 to 100, there are 15 numbers which are greater than 85 i.e. {86, 87, ... 98, 99, 100} Favorable number of events = n(E) = 15

Probability of selecting a card with a number greater than 85 =

$$\frac{n(E)}{n(S)} = \frac{15}{100} = \frac{3}{20}$$

v) From numbers 1 to 100, there are 47 numbers which are less than 48 i.e. {1, 2, ..., 46, 47} Favorable number of events = n(E) = 47

Probability of selecting a card with a number less than 48 =

(i) From numbers 1 to 100, there are 20 numbers which are multiple of 5 i.e. [5, 10, 15, 20, 25, 30, ... 100] Favorable number of events = n(E) = 20

Probability of selecting a card with a multiple of 5 =

$$\frac{n(E)}{n(S)} = \frac{20}{100} = \frac{1}{5}$$

(ii) From numbers 1 to 100, there are 16 numbers which are multiple of 6 i.e. [6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96] Favorable number of events = n(E) = 16

Probability of selecting a card with a multiple of 6 =

$$\frac{n(E)}{n(S)} = \frac{16}{100} = \frac{4}{25}$$

(iii) From numbers 1 to 100, there are 19 numbers which are ...

Question 3.

From 25 identical cards, numbered 1, 2, 3, 4, 5, ..., 24, 25: one card is drawn at random. Find the probability that the number on the card drawn is a multiple of:

(i) 3

(ii) 5

(iii) 3 and 5

(iv) 3 or 5

Solution:

There are 25 cards from which one card is drawn.

Total number of elementary events = n(S) = 25

(i) From numbers 1 to 25, there are 8 numbers which are multiple of 3 i.e. [3, 6, 9, 12, 15, 18, 21, 24] Favorable number of events = n(E) = 8

Probability of selecting a card with a multiple of 3 =

$\frac{n(E)}{n(S)} = \frac{8}{25}$

(ii) From numbers 1 to 25, there are 5 numbers which are multiple of 5 i.e. [5, 10, 15, 20, 25] Favorable number of events = n(E) = 5

Probability of selecting a card with a multiple of 5 =

$\frac{n(E)}{n(S)} = \frac{5}{25} = \frac{1}{5}$

(iii) From numbers 1 to 25, there is only one number which is multiple of 3 and 5 i.e. [15] Favorable number of events = n(E) = 1

Probability of selecting a card with a multiple of 3 and 5 =

$\frac{n(E)}{n(S)} = \frac{1}{25}$

(iv) From numbers 1 to 25, there are 12 numbers which are multiple of 3 or 5 i.e. [3, 5, 6, 9, 10, 12, 15, 18, 20,21, 24, 25] Favorable number of events = n(E) = 12

Probability of selecting a card with a multiple of 3 or 5 =

$\frac{n(E)}{n(S)} = \frac{12}{25}$

Question 4.

A die is thrown once. Find the probability of getting a number:

(i) less than 3

n(E) = 2

Probability of getting a number less than 3 = $\frac{n(E)}{n(S)} = \frac{2}{6} = \frac{1}{3}$

(ii) On a dice, numbers greater than or equal to 4 = {4, 5, 6}

n(E) = 3

Probability of getting a number greater than or equal to 4 =

$$\frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$$

(iii) On a dice, numbers less than 8 = {1, 2, 3, 4, 5, 6}

n(E) = 6

Probability of getting a number less than 8 = $\frac{n(E)}{n(S)} = \frac{6}{6} = 1$

Probability of getting a number less than 8 = $\frac{n(E)}{n(S)} = \frac{6}{6} = 1$

(iv) On a dice, numbers greater than 6 = 0

n(E) = 0

Probability of getting a number greater than 6 = $\frac{n(E)}{n(S)} = \frac{0}{6} = 0$

Question 5.

A book contains 85 pages. A page is chosen at random. What is the probability that the sum of the digits on the page is 8?

Solution:

Number of pages in the book = 85

Number of possible outcomes = n(S) = 85

Out of 85 pages, pages that sum up to 8 = {8, 17, 26, 35, 44, 53, 62, 71, 80}

pages that sum up to 8 = n(E) = 9

n(E) 9