Allguidesite -
- Arjun
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Practice Set 5.1 Algebra 10th Std Maths Part 1 Answers Chapter 5 Probability

Question 1.
How many possibilities are there in each of the following?
i. Vanita knows the following sites in Maharashtra. She is planning to visit one of them in her summer vacation. Ajintha, Mahabaleshwar, Lonar Sarovar, Tadoba wild life sanctuary, Amboli, Raigad, Matheran, Anandavan.
ii. Any day of a week is to be selected randomly.
iii. Select one card from the pack of 52 cards.
iv. One number from 10 to 20 is written on each card. Select one card randomly.
Solution:
i. Here, 8 sites of Maharashtra are given.
∴ There are 8 possibilities in a random experiment of visiting a site out of 8 sites in Maharashtra.

ii. There are 7 days in a week.
∴ There are 7 possibilities in a random experiment of selecting a day of the week.

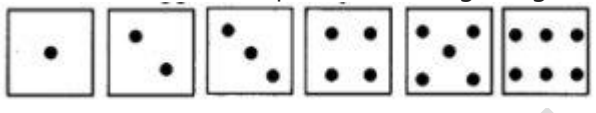
iii. There are 52 cards in a pack of cards.
∴ There are 52 possibilities in a random experiment of selecting one card from the pack of 52 cards.

iv. There are 11 cards numbered from 10 to 20.
∴ There are 11 possibilities in a random experiment of selecting one card from the given set of cards.

Question 1.
In which of the following experiments possibility of expected outcome is more? (Textbook pg, no. 116)
i. Getting 1 on the upper face when a die is thrown.
ii. Getting head by tossing a coin.
Solution:
i. On a die there are 6 numbers.
∴ There are 6 possibilities of getting any one number from 1 to 6 on the upper face i.e. 16 is the possibility.

ii. There are two possibilities (H or T) on tossing a coin i.e. 12 possibility.
∴ In the second experiment, the possibility of expected outcome is more.

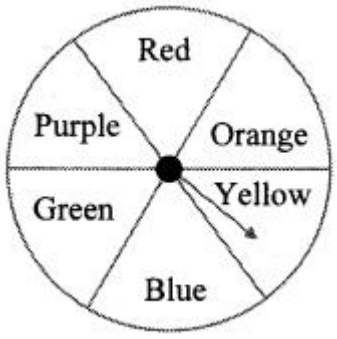
Question 2.
Throw a die, once. What are the different possibilities of getting dots on the upper face? (Textbook pg. no. 114)
Answer:
There are six different possibilities of getting dots on the upper face. They are



Practice Set 5.2 Algebra 10th Std Maths Part 1 Answers Chapter 5 Probability

Question 1.
For each of the following experiments write sample space 'S' and number of sample Point n(S)
i. One coin and one die are thrown simultaneously.
ii. Two digit numbers are formed using digits 2,3 and 5 without repeating a digit.
Solution:
i. Sample space,
S = {(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)}
∴ n(S) =12
ii. Sample space,
S = {23,25,32, 35, 52, 53}
∴ n(S) = 6

Question 2.
The arrow is rotated and it stops randomly on the disc. Find out on which colour it may stop.



Solution:
There are total six colours on the disc.
Sample space,
S = {Red, Orange, Yellow, Blue, Green, Purple}
∴ n(S) = 6
∴ Arrow may stop on any one of the six colours.

Question 3.
In the month of March 2019, find the days on which the date is a multiple of 5. (see the given page of the calendar).

MARCH - 2019						
M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Solution:
Dates which are multiple of 5:
5,10, 15,20,25,30
∴ S = {Tuesday, Sunday, Friday, Wednesday, Monday, Saturday}
∴ n(S) = 6
∴ The days on which the date will be a multiple of 5 are Tuesday, Sunday, Friday, Wednesday, Monday and Saturday.

Question 4.
Form a 'Road safety committee' of two, from 2 boys (B_1 B_2) and 2 girls (G_1, G_2). Complete the following activity to write the sample space.
Solution:

i. Committee of 2 boys = $\boxed{B_1B_2}$

ii. Committee of 2 girls = $\boxed{G_1G_2}$

iii. Committee of one boy and one girl
= $\boxed{B_1G_1}$ $\boxed{B_1G_2}$ $\boxed{B_2G_1}$ $\boxed{B_2G_2}$

∴ Sample space
= $\{B_1B_2, G_1G_2, B_1G_1, B_1G_2, B_2G_1, B_2G_2\}$

Question 1.
Sample Space

- The set of all possible outcomes of a random experiment is called sample space.
- It is denoted by 'S' or 'Ω' (omega).
- Each element of a sample space is called a sample point.
- The number of elements in the set S is denoted by n(S).
- If n(S) is finite, then the sample space is called a finite sample space.

Some examples of finite sample space. (Textbook pg. no, 117)
Solution:

Sr. No.	Random experiment	Sample space	Number of sample points in S
1.	One coin is tossed.	S = {H,T}	n(S) = 2
2.	Two coins are tossed.	S = {HH, HT, TH, TT}	n(S) = 4
3.	Three coins are tossed.	S = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}	n(S) = 8
4.	A die is thrown.	S = {1, 2, 3, 4, 5, 6}	n(S) = 6
5.	Two dice are thrown.	S = {(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)}	n(S) = 36
6.	A card is drawn from a pack bearing numbers from 1 to 25.	S = {1, 2, 3, 4, ……,25}	n(S) = 25
7.	A card is drawn from a well shuffled pack of 52 playing cards.	**Diamond:** Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King **Spade:** Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King **Heart:** Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King **Club:** Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King	n(S) = 52

Practice Set 5.3 Algebra 10th Std Maths Part 1 Answers Chapter 5 Probability

Question 1.
Write sample space 'S' and number of sample points n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

i. One die is rolled,
Event A: Even number on the upper face.
Event B: Odd number on the upper face.
Event C: Prime number on the upper face.

ii. Two dice are rolled simultaneously,
Event A: The sum of the digits on upper faces is a multiple of 6.
Event B: The sum of the digits on the upper faces is minimum 10.
Event C: The same digit on both the upper faces.

iii. Three coins are tossed simultaneously.
Condition for event A: To get at least two heads.
Condition for event B: To get no head.
Condition for event C: To get head on the second coin.

iv. Two digit numbers are formed using digits 0, 1, 2, 3, 4, 5 without repetition of the digits.
Condition for event A: The number formed is even.
Condition for event B: The number is divisible by 3.
Condition for event C: The number formed is greater than 50.

v. From three men and two women, environment committee of two persons is to be formed.
Condition for event A: There must be at least one woman member.
Condition for event B: One man, one woman committee to be formed.
Condition for event C: There should not be a woman member.

vi. One coin and one die are thrown simultaneously.
Condition for event A: To get head and an odd number.
Condition for event B: To get a head or tail and an even number.
Condition for event C: Number on the upper face is greater than 7 and tail on the coin.
Solution:
i. Sample space (S) = {1, 2, 3, 4, 5, 6}
∴ n(S) = 6
Condition for event A: Even number on the upper face.
∴ A = {2,4,6}
∴ n(A) = 3
Condition for event B: Odd number on the upper face.
∴ B = {1, 3, 5}

∴ n(B) = 3
Condition for event C: Prime number on the upper face.
∴ C = {2, 3, 5}
∴ n(C) = 3

ii. Sample space,
S = {(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)}
∴ n(S) = 36
Condition for event A: The sum of the digits on the upper faces is a multiple of 6.
A = {(1, 5), (2, 4), (3, 3), (4, 2), (5, 1), (6, 6)}
∴ n(A) = 6

Condition for event B: The sum of the digits on the upper faces is minimum 10.
B = {(4, 6), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6)}
∴ n(B) = 6

Condition for event C: The same digit on both the upper faces.
C = {(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)}
∴ n(C) = 6

iii. Sample space,
S = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}
∴ n(S) = 8

Condition for event A: To get at least two heads.
∴ A = {HHT, HTH, THH, HHH}
∴ n(A) = 4

Condition for event B: To get no head.
∴ B = {TTT}
∴ n(B) = 1

Condition for event C: To get head on the second coin.
∴ C = {HHH, HHT, THH, THT}
∴ n(C) = 4

iv. Sample space (S) = {10, 12, 13, 14, 15,
20, 21, 23, 24, 25,
30, 31, 32, 34, 35,
40, 41, 42, 43,
45, 50, 51, 52, 53, 54}
∴ n(S) = 25
Condition for event A: The number formed is even
∴ A = {10, 12, 14, 20, 24, 30, 32, 34, 40, 42, 50, 52, 54)
∴ n(A) = 13
Condition for event B: The number formed is divisible by 3.
∴ B = {12, 15, 21, 24, 30, 42, 45, 51, 54}
∴ n(B) = 9
Condition for event C: The number formed is greater than 50.
∴ C = {51,52, 53,54}
∴ n(C) = 4

v. Let the three men be M_1, M_2, M_3 and the two women be W_1, W_2.
Out of these men and women, a environment committee of two persons is to be formed.
∴ Sample space,
S = {M_1M_2, M_1M_3, M_1W_1, M_1W_2, M_2M_3, M_2W_1, M_2W_2, M_3W_1, M_3W_2, W_1W_2}
∴ n(S) = 10
Condition for event A: There must be at least one woman member.
∴ A = {M_1W_1, M_1W_2, M_2W_1, M_2W_2, M_3W_1, M_3W_2, W_1W_2}
∴ n(A) = 7
Condition for event B: One man, one woman committee to be formed.
∴ B = {M_1W_1, M_1W_2, M_2W_1, M_2W_2, M_3W_2, M_3W_2}
∴ n(B) = 6
Condition for event C: There should not be a woman member.
∴ C = {M_1M_2, M_1M_3, M_2M_3}
∴ n(C) = 3

vi. Sample space,
S = {(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)}
∴ n(S) = 12
Condition for event A: To get head and an odd number.
∴ A = {(H, 1), (H, 3), (H, 5)}
∴ n(A) = 3
Condition for event B: To get a head or tail and an even number.
∴ B = {(H, 2), (H, 4), (H, 6), (T, 2), (T, 4), (T, 6)}
∴ n(B) = 6
Condition for event C: Number on the upper face is greater than 7 and tail on the coin.
The greatest number on the upper face of a die is 6.
∴ Event C is an impossible event.
∴ C = { }
∴ n(C) = 0

Practice Set 5.4 Algebra 10th Std Maths Part 1 Answers Chapter 5 Probability

Question 1.
If two coins are tossed, find the probability of the following events.
i. Getting at least one head.
ii. Getting no head.
Solution:
Sample space,
S = {HH, HT, TH, TT}
∴ n(S) = 4

i. Let A be the event of getting at least one head.
∴ A = {HT, TH, HH}
∴ n(A) = 3
∴ P(A) = $n(A)n(S)$
∴ P(A) = 34

ii. Let B be the event of getting no head.
∴ B = {TT}
∴ n(B) = 1
∴ P(B) = $n(B)n(S)$
∴ P(B) = 14
∴ P(A) = 34; P(B) = 14

Question 2.
If two dice are rolled simultaneously, find the probability of the following events.
i. The sum of the digits on the upper faces is at least 10.
ii. The sum of the digits on the upper faces is 33.
iii. The digit on the first die is greater than the digit on second die.
Solution:
Sample space,
s = {(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)}
∴ n(S) = 36

i. Let A be the event that the sum of the digits on the upper faces is at least 10.
∴ A = {(4, 6), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6)}
∴ n(A) = 6
∴ P(A) = $n(A)n(S) = 636$
∴ P(A) = 16

ii. Let B be the event that the sum of the digits on the upper faces is 33.
The sum of the digits on the upper faces can be maximum 12.
∴ Event B is an impossible event.
∴ B = { }
∴ n(B) = 0
∴ P(B) = $n(B)n(S) = 036$
∴ P(B) = 0

iii. Let C be the event that the digit on the first die is greater than the digit on the second die.
C = {(2, 1), (3, 1), (3,2), (4,1), (4,2), (4, 3), (5, 1), (5,2), (5,3), (5,4), (6,1), (6,2), (6, 3), (6, 4), (6, 5),
∴ n(C) = 15
∴ P(C) = $n(c)n(S) = 1536$
∴ P(C) = 512
∴ P(A) = 16 ; P(B) = 0; P(C) = 512

Question 3.
There are 15 tickets in a box, each bearing one of the numbers from 1 to 15. One ticket is drawn at random from the box. Find the probability of event that the ticket drawn:
i. shows an even number.
ii. shows a number which is a multiple of 5.
Solution:
Sample space,
S = {1,2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,14, 15}
∴ n(S) = 15

i. Let A be the event that the ticket drawn shows an even number.
∴ A = {2, 4, 6, 8, 10, 12, 14}
∴ n(A) = 7
∴ P(A) = $n(A)n(S)$
∴ P(A) = 715

ii. Let B be the event that the ticket drawn shows a number which is a multiple of 5.
∴ B = {5, 10, 15}
∴ n(B) = 3
∴ P(B) = $n(B)n(S) = 315$
∴ P(B) = 15
∴ P(A) = 715 ; P(B) = 15

Question 4.
A two digit number is formed with digits 2, 3, 5, 7, 9 without repetition. What is the probability that the number formed is
i. an odd number?
ii. a multiple of 5?
Solution:
Sample space
(S) = {23, 25, 27, 29,
32, 35, 37, 39,
52, 53, 57, 59,
72, 73, 75, 79,
92, 93, 95, 97}
∴ n(S) = 20
i. Let A be the event that the number formed is an odd number.
∴ A = {23, 25, 27, 29, 35, 37, 39, 53, 57, 59, 73, 75,79,93,95,97}
∴ n(A) = 16
∴ P(A) = $n(A)n(S) = 1620$
∴ P(A) = 45

ii. Let B be the event that the number formed is a multiple of 5.
∴ B = {25,35,75,95}
∴ n(B) = 4
∴ P(B) = $n(B)n(S) = 420$
∴ P(B) = 15
∴ P(A) = 45 ; P(B) = 15

Question 5.
A card is drawn at random from a pack of well shuffled 52 playing cards. Find the probability that the card drawn is
i. an ace.
ii. a spade.
Solution:
There are 52 playing cards.
∴ n(S) = 52
i. Let A be the event that the card drawn is an ace.
∴ n(A) = 4
∴ P(A) = $n(A)n(S) = 452$
∴ P(A) = 113

ii. Let B be the event that the card drawn is a spade.
∴ n(B) = 13
∴ P(B) = $n(B)n(S) = 1352$
∴ P(B) = 14
∴ P(A) = 113 ; P(B) = 14

Problem Set 5 Algebra 10th Std Maths Part 1 Answers Chapter 5 Probability

Question 1.
Choose the correct alternative answer for each of the following questions.

i. Which number cannot represent a probability?
(A) 23
(B) 1.5
(C) 15%
(D) 0.7
Answer:
The probability of any 0 to 1 or 0% to 100%. event is from
(B)

ii. A die is rolled. What is the probability that the number appearing on upper face is less than 3?
(A) 16
(B) 13
(C) 12
(D) 0
Answer:
(B)

iii. What is the probability of the event that a number chosen from 1 to 100 is a prime number?
(A) 15
(B) 625
(C) 14
(D) 1350
Answer:
n(S) = 100
Let A be the event that the number chosen is a prime number.
∴ A = {2, 3, 5. , 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97}
∴ n(A) = 25
∴ P(A) = $n(A)n(S) = 25100 = 14$
(C)

iv. There are 40 cards in a bag. Each bears a number from 1 to 40. One card is drawn at random. What is the probability that the card bears a number which is a multiple of 5?
(A) 15
(B) 35
(C) 45
(D) 13
Answer:
(A)

v. If n(A) = 2, P(A) = 15, then n(S) = ?
(A) 10
(B) 52
(C) 25
(D) 13
Answer:
(A)

Question 2.
Basketball players John, Vasim, Akash were practising the ball drop in the basket. The probabilities of success for John, Vasim and Akash are 45, 0.83 and 58% respectively. Who had the greatest probability of success ?
Solution:
The probability that the ball is dropped in the basket by John = 45 = 0.80
The probability that the ball is dropped in the basket by Vasim = 0.83
The probability that the ball is dropped in the basket by Akash = 58% = 58100 = 0.58
0.83 > 0.80 > 0.58
∴ Vasim has the greatest probability of success.

Question 3.
In a hockey team there are 6 defenders , 4 offenders and 1 goalie. Out of these, one player is to be selected randomly as a captain. Find the probability of the selection that:
i. The goalie will be selected.
ii. A defender will be selected.
Solution:
Total number of players in the hockey team

= 6 + 4 + 1 = 11
∴ n(S) = 11

i. Let A be the event that the captain selected will be a goalie.
There is only one goalie in the hockey team.

$$\therefore \quad n(A) = 1$$

$$\therefore \quad P(A) = \frac{n(A)}{n(S)}$$

$$\therefore \quad P(A) = \frac{1}{11}$$

ii. Let B be the event that the captain selected will be a defender.
There are 6 defenders in the hockey team.

$$\therefore \quad n(B) = 6$$

$$\therefore \quad P(B) = \frac{n(B)}{n(S)}$$

$$\therefore \quad P(B) = \frac{6}{11}$$

$$\therefore \quad \mathbf{P(A) = \frac{1}{11}\ ;\ P(B) = \frac{6}{11}}$$

Question 4.
Joseph kept 26 cards in a cap, bearing one English alphabet on each card. One card is drawn at random. What is the probability that the card drawn is a vowel card ?
Solution:
Each card bears an English alphabet.
∴ n(S) = 26
Let A be the event that the card drawn is a vowel card.
There are 5 vowels in English alphabets.
∴ A = {a, e, i, o, u}
∴ n(A) = 5

$$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{5}{26}$$

∴ The probability that the card drawn is a vowel card is $\frac{5}{26}$.

Question 5.
A balloon vendor has 2 red, 3 blue and 4 green balloons. He wants to choose one of them at random to give it to Pranali. What is the probability of the event that Pranali gets,
i. a red balloon.
ii. a blue balloon,
iii. a green balloon.
Solution:
Let the 2 red balloon be R_1, R_2,
3 blue balloons be B_1, B_2, B_3, and
4 green balloons be G_1, G_2, G_3, G_4.
∴ Sample space
S = {R_1, R_2, B_1, B_2, B_3, G_1, G_2, G_3, G_4}
∴ n(S) = 9

i. Let A be the event that Pranali gets a red balloon.

$$\therefore \quad A = \{R_1, R_2\}$$

$$\therefore \quad n(A) = 2$$

$$\therefore \quad P(A) = \frac{n(A)}{n(S)}$$

$$\therefore \quad P(A) = \frac{2}{9}$$

∴ The probability that Pranali gets a red balloon is $\frac{2}{9}$

ii. Let B be the event that Pranali gets a blue balloon.

$$\therefore \quad B = \{B_1, B_2, B_3\}$$

$$\therefore \quad n(B) = 3$$

$$\therefore \quad P(B) = \frac{n(B)}{n(S)} = \frac{3}{9}$$

$$\therefore \quad P(B) = \frac{1}{3}$$

∴ The probability that Pranali gets a blue balloon is $\frac{1}{3}$.

iii. Let C be the event that Pranali gets a green balloon.

$\therefore \quad C = \{G_1, G_2, G_3, G_4\}$

$\therefore \quad n(C) = 4$

$\therefore \quad P(C) = \frac{n(C)}{n(S)}$

$\therefore \quad P(C) = \frac{4}{9}$

∴ The probability that Pranali gets a green balloon is $\frac{4}{9}$.

Question 6.
A box contains 5 red, 8 blue and 3 green pens. Rutuja wants to pick a pen at random. What is the probability that the pen is blue?
Solution:
Let 5 red pens be R_1, R_2, R_3, R_4, R_5.
8 blue pens be $B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8$. and
3 green pens be G_1, G_2, G_3.
∴ Sample space
$S = \{R_1, R_2, R_3, R_4, R_5, B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, G_1, G_2, G_3\}$
∴ n(S) = 16
Let A be the event that Rutuja picks a blue pen.
∴ $A = \{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8\}$

$\therefore \quad n(A) = 8$

$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{8}{16}$

$\therefore \quad P(A) = \frac{1}{2}$

∴ The probability that Rutuja picks a blue pen is $\frac{1}{2}$.

Question 7.
Six faces of a die are as shown below.

If the die is rolled once, find the probability of
i. 'A' appears on upper face.
ii. 'D' appears on upper face.
Solution:
Sample space
S = {A, B, C, D, E, A}
∴ n (S) = 6
i. Let R be the event that 'A' appears on the upper face.
∴ R = {A, A}
∴ n(R) = 2

$\therefore \quad P(R) = \frac{n(R)}{n(S)} = \frac{2}{6}$

$\therefore \quad P(R) = \frac{1}{3}$

ii. Let Q be the event that 'D' appears on the upper face.
Total number of faces having 'D' on it = 1
Q = {D}
∴ n(Q) = 1

$\therefore \quad P(Q) = \frac{n(Q)}{n(S)}$

$\therefore \quad P(Q) = \frac{1}{6}$

$\therefore \quad \mathbf{P(R) = \frac{1}{3}\ ;\ P(Q) = \frac{1}{6}}$

Question 8.
A box contains 30 tickets, bearing only one number from 1 to 30 on each. If one ticket is drawn at random, find the probability of an event that the ticket drawn bears
i. an odd number.
ii. a complete square number.
Solution:
Sample space,
S = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30}
∴ n(S) = 30

i. Let A be the event that the ticket drawn bears an odd number.
∴ A = {1,3,5,7,9,11,13,15,17,19,21, 23,25,27,29}
∴ n(A) =15

$$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{15}{30}$$

$$\therefore \quad P(A) = \frac{1}{2}$$

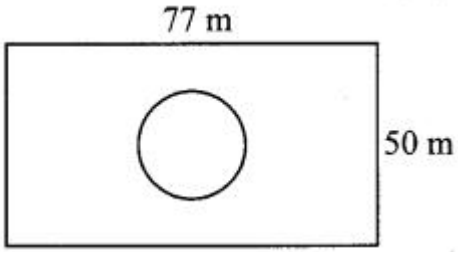
ii. Let B be the event that the ticket drawn bears a complete square number.
∴ B = {1,4,9,16,25}
∴ n(B) = 5

$$\therefore \quad P(B) = \frac{n(B)}{n(S)} = \frac{5}{30}$$

$$\therefore \quad P(B) = \frac{1}{6}$$

$$\therefore \quad \mathbf{P(A) = \frac{1}{2}\,;\, P(B) = \frac{1}{6}}$$

Question 9.
Length and breadth of a rectangular garden are 77 m and 50 m. There is a circular lake in the garden having diameter 14 m. Due to wind, a towel from a terrace on a nearby building fell into the garden. Then find the probability of the event that it fell in the lake.



Solution:
Area of the rectangular garden
= length × breadth
= 77 × 50
∴ Area of the rectangular garden = 3850 sq.m
Radius of the lake = 142 = 7 m

$$\text{Area of circular lake} = \pi r^2 = \frac{22}{7} \times 7 \times 7$$

$$\therefore \quad \text{Area of circular lake} = 154 \text{ sq.m}$$

$$\therefore \quad \text{Probability that the towel fell in the lake} = \frac{\text{Area of the lake}}{\text{Area of the garden}} = \frac{154}{3850} = \frac{1}{25}$$

∴ The probability of the event that the towel tell in the lake is 125.

Question 10.
In a game of chance, a spinning arrow comes to rest at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8. All these are equally likely outcomes. Find the probability that it will rest at
i. 8.
ii. an odd number.
iii. a number greater than 2.
iv. a number less than 9.

Solution:
Sample space (S) = {1,2, 3, 4, 5, 6, 7, 8}
∴ n(S) = 8
i. Let A be the event that the spinning arrow comes to rest at 8.

$$\therefore \quad A = \{8\}$$

$$\therefore \quad n(A) = 1$$

$$\therefore \quad P(A) = \frac{n(A)}{n(S)}$$

$$\therefore \quad P(A) = \frac{1}{8}$$

ii. Let B be the event that the spinning arrow comes to rest at an odd number.

$\therefore \quad B = \{1, 3, 5, 7\}$

$\therefore \quad n(B) = 4$

$\therefore \quad P(B) = \frac{n(B)}{n(S)} = \frac{4}{8}$

$\therefore \quad P(B) = \frac{1}{2}$

iii. Let C be the event that the spinning arrow comes to rest at a number greater than 2.

$\therefore \quad C = \{3, 4, 5, 6, 7, 8\}$

$\therefore \quad n(C) = 6$

$\therefore \quad P(C) = \frac{n(C)}{n(S)} = \frac{6}{8}$

$\therefore \quad P(C) = \frac{3}{4}$

iv. Let D be the event that the spinning arrow comes to rest at a number less than 9.

$\therefore$ D = {1,2, 3, 4, 5, 6, 7, 8}

$\therefore \quad n(D) = 8$

$\therefore \quad P(D) = \frac{n(D)}{n(S)} = \frac{8}{8}$

$\therefore \quad P(D) = 1$

$\therefore \quad \mathbf{P(A) = \frac{1}{8}; P(B) = \frac{1}{2}; P(C) = \frac{3}{4}; P(D) = 1}$

Question 11.
There are six cards in a box, each bearing a number from 0 to 5. Find the probability of each of the following events, that a card drawn shows,
i. a natural number.
ii. a number less than 1.
iii. a whole number.
iv. a number greater than 5.
Solution:
Sample space (S) = {0, 1, 2, 3, 4, 5}
$\therefore$ n(S) = 6

i. Let A be the event that the card drawn shows a natural number.
$\therefore$ A = {1,2,3,4,5}
$\therefore$ n(A) = 5

$\therefore \quad P(A) = \frac{n(A)}{n(S)}$

$\therefore \quad P(A) = \frac{5}{6}$

ii. Let B be the event that the card drawn shows a number less than 1.
$\therefore$ B = {0}
$\therefore$ n(B) = 1

$\therefore \quad P(B) = \frac{n(B)}{n(S)}$

$\therefore \quad P(B) = \frac{1}{6}$

iii. Let C be the event that the card drawn shows a whole number.
$\therefore$ C = {0,1, 2, 3, 4, 5}
$\therefore$ n(C) = 6

$\therefore \quad P(C) = \frac{n(C)}{n(S)} = \frac{6}{6}$

$\therefore \quad P(C) = 1$

iv. Let D be the event that the card drawn shows a number greater than 5.
Here, the greatest number is 5.
$\therefore$ Event D is an impossible event.
$\therefore$ D = { }
$\therefore$ n(D) = 0

$\therefore \quad P(D) = \frac{n(D)}{n(S)} = \frac{0}{6}$

$\therefore \quad P(D) = 0$

$\therefore \quad \mathbf{P(A) = \frac{5}{6}; P(B) = \frac{1}{6}; P(C) = 1; P(D) = 0}$

Question 12.
A bag contains 3 red, 3 white and 3 green balls. One ball is taken out of the bag at random. What is the probability that the ball drawn is:
i. red.
ii. not red.
iii. either red or white.
Solution:
Let the three red balls be R_1, R_2, R_3, three white balls be W_1, W_2, W_3 and three green balls be G_1, G_2, G_3.
∴ Sample space,
S = {R_1, R_2, R_3, W_1, W_2, W_3, G_1, G_2, G_3}
∴ n(S) = 9

i. Let A be the event that the ball drawn is red.
∴ A = {R_1, R_2, R_3}
∴ n(A) = 3

$$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{3}{9} \qquad \therefore \quad P(A) = \frac{1}{3}$$

ii. Let B be the event that the ball drawn is not red.
B = {W_1,W_2,W_3,G_1,G_2,G_3}
∴ n(B) = 6

$$\therefore \quad P(B) = \frac{n(B)}{n(S)} = \frac{6}{9}$$

$$\therefore \quad P(B) = \frac{2}{3}$$

iii. Let C be the event that the ball drawn is red or white.
∴ C = {R_1, R_2, R_3, W_1, W_2, W_3}
∴ n(C) = 6

$$\therefore \quad P(C) = \frac{n(C)}{n(S)} = \frac{6}{9}$$

$$\therefore \quad P(C) = \frac{2}{3}$$

$$\therefore \quad P(A) = \frac{1}{3}\ ;\ P(B) = \frac{2}{3}\ ;\ P(C) = \frac{2}{3}$$

Question 13.
Each card bears one letter from the word 'mathematics'. The cards are placed on a table upside down. Find the probability that a card drawn bears the letter 'm'.
Solution:
Sample space
= {m, a, t, h, e, m, a, t, i, c, s}
∴ n(S) = 11
Let A be the event that the card drawn bears the letter 'm'
∴ A = {m, m}
∴ n(A) = 2

$$\therefore \quad P(A) = \frac{n(A)}{n(S)}$$

$$\therefore \quad P(A) = \frac{2}{11}$$

∴ The probability that a card drawn bears letter 'm' is $\frac{2}{11}$.

Question 14.
Out of 200 students from a school, 135 like Kabaddi and the remaining students do not like the game. If one student is selected at random from all the students, find the probability that the student selected dosen't like Kabaddi.
Solution:
Total number of students in the school = 200
∴ n(S) = 200
Number of students who like Kabaddi = 135
∴ Number of students who do not like Kabaddi
= 200 – 135 = 65
Let A be the event that the student selected does not like Kabaddi.
∴ n(A) = 65

$$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{65}{200}$$

$$\therefore \quad P(A) = \frac{13}{40}$$

∴ The probability that the student selected doesn't like kabaddi is $\frac{13}{40}$.

Question 15.
A two digit number is to be formed from the digits 0, 1, 2, 3, 4. Repetition of the digits is allowed. Find the probability that the number so formed is a:
i. prime number.
ii. multiple of 4.
iii multiple of 11.
Solution:
Sample space
(S) = {10, 11, 12, 13, 14,
20, 21, 22, 23, 24,
30, 31, 32, 33, 34,
40, 41, 42, 43, 44}
∴ n(S) = 20

i. Let A be the event that the number so formed is a prime number.
∴ A = {11,13,23,31,41,43}
∴ n(A) = 6

$$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{6}{20}$$

$$\therefore \quad P(A) = \frac{3}{10}$$

ii. Let B be the event that the number so formed is a multiple of 4.
∴ B = {12,20,24,32,40,44}
∴ n(B) = 6

$$\therefore \quad P(B) = \frac{n(B)}{n(S)} = \frac{6}{20}$$

$$\therefore \quad P(B) = \frac{3}{10}$$

iii. Let C be the event that the number so formed is a multiple of 11.
∴ C = {11,22,33,44}
∴ n(C) = 4

$$\therefore \quad P(C) = \frac{n(C)}{n(S)} = \frac{4}{20}$$

$$\therefore \quad P(C) = \frac{1}{5}$$

$$\therefore \quad \mathbf{P(A) = \frac{3}{10}, P(B) = \frac{3}{10}, P(C) = \frac{1}{5}}$$

Question 16.
The faces of a die bear numbers 0,1, 2, 3,4, 5. If the die is rolled twice, then find the probability that the product of digits on the upper face is zero.
Solution:
Sample space,
S = {(0, 0), (0,1), (0,2),
(1,0), (1,1), (1,2),
(2,0), (2,1), (2,2),
(3.0), (3,1), (3,2),
(4.0), (4,1), (4,2),
(5.0), (5,1), (5,2),
∴ n(S) = 36
Let A be the event that the product of digits on the upper face is zero.
∴ A = {(0, 0), (0, 1), (0, 2), (0, 3), (0, 4), (0, 5), (1,0), (2, 0), (3,0), (4, 0), (5,0)}
∴ n(A) = 11

$$\therefore \quad P(A) = \frac{n(A)}{n(S)}$$

$$\therefore \quad P(A) = \frac{11}{36}$$

∴ The probability that the product of the digits on the upper face is zero is $\frac{11}{36}$.