

5

Probability

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**Points to Remember:**

- Probability:**

The words probably, fair, likely, possibly and chance are commonly used in our day-to-day conversations.

- Terms of probability:**

Random Experiment: An experiment in which all the possible results are known in advance but none of them can be predicted with certainty and there is equal possibility for each result is known as a 'Random experiment'.

For example:

- (i) Tossing a coin.
- (ii) Picking a card from a set of cards.

Outcome : The result of a random experiment is known as an 'Outcome'.

For example:

- (i) If a coin is tossed, the two possible outcomes are Head (H) or Tail (T),
- (ii) If a die is thrown, six possible outcomes are 1 or 2 or 3 or 4 or 5 or 6.

Equally Likely Outcomes : A given number of outcomes are said to be equally likely if none of them occurs in preference to others.

If an unbiased die is rolled, each number, i.e. from 1, 2, 3, 4, 5, 6 may appear on the upper face. That means the outcomes are equally likely to happen.

If a die is so formed that a particular face occurs most often, then the die is biased and the outcomes are not likely to occur equally.

MASTER KEY QUESTION SET - 5**Practice Set - 5.1 (Textbook Page No. 116)**

- (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.

Ajintia, Mahabaleshwar, Lonar Sarovar, Tadoba wild life sanctuary, Amboli, Raigad, Matheran, Anandavan. (1 mark)

Solution:

The place to be covered during vacation: Ajanta, Mahabaleshwar, Lonar Sarovar, Tadoba Sanctuary, Amboli, Raigad, Matheran, Anandvan.

∴ There are 8 places can be chosen randomly,

Total number of ways any one place can be chosen = 8.

- (ii) Any day of a week is to be selected randomly. (1 mark)

Solution:

A week has 7 days: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday.

∴ **Total number of ways a day can be chosen randomly in a week = 7**

- (iii) Select one card from the pack of 52 cards. (1 mark)

Solution:

Total no. of cards = 52.

∴ **Total number of ways a card can be chosen among the 52 cards randomly = 52.**

- (iv) One number from 10 to 20 is written on each card. Select one card randomly. (1 mark)

Solution:

Number on cards are 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.

∴ Total number of cards = 11.

∴ Total no. of ways a card can be chosen randomly = 11.



Points to Remember:

• Sample Space:

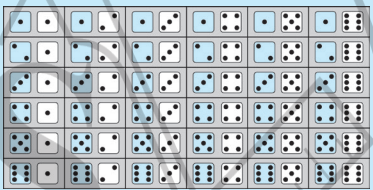
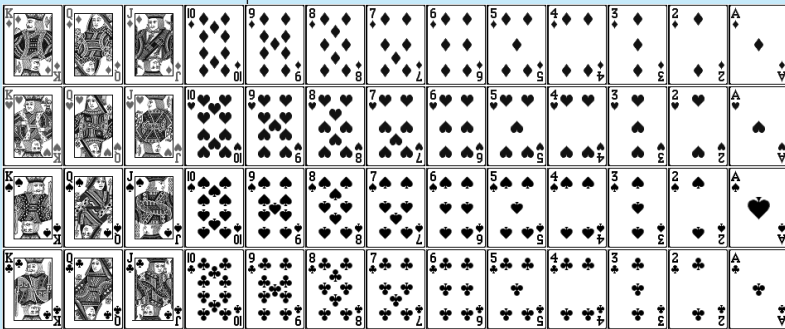
The set of all the possible outcomes of a random experiment is called the sample space. It is denoted by 'S' or 'Ω' (omega).

Each element of sample space is called a 'sample point'.

Number of elements of the set S is denoted by $n(s)$.

• Finite Sample Space:

If $n(S)$ is finite, then the sample space is called finite sample space.

No.	Random Experiment	Sample Space (S)	No. of sample points
(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	$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$	$n(S) = 8$
(4)	A die is thrown	$S = \{1, 2, 3, 4, 5, 6\}$	$n(S) = 6$
(5)	Two dice are thrown	$S = \{$  $\}$ $S = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$	$n(S) = 36$
(6)	Two digit numbers are formed using the digits 0, 1, 2, 3, 4 without repeating the digits	$S = \{10, 12, 13, 14, 20, 21, 23, 24, 30, 31, 32, 34, 40, 41, 42, 43\}$	$n(S) = 16$
(7)	Drawing a card at random from a pack of 25 cards numbered 1 to 25.	$S = \{1, 2, 3, 4, \dots, 25\}$	$n(S) = 25$
(8)	A committee of 2 is to be formed from a group of 3 boys and 2 girls	$S = \{B_1B_2, B_1B_3, B_2B_3, B_1G_1, B_1G_2, B_2G_1, B_2G_2, B_3G_1, B_3G_2, G_1G_2\}$	$n(S) = 10$
(9)	A coin is tossed and a die is thrown simultaneously	$S = \{H_1, H_2, H_3, H_4, H_5, H_6, T_1, T_2, T_3, T_4, T_5, T_6\}$	$n(S) = 12$
(10)	A card is drawn from a pack of 52 playing cards	There are 52 cards in a pack. 	$n(S) = 52$

- The sample space for a coin tossed twice is the same as that of two coins tossed simultaneously. The same is true for three coins.
- The sample space for a die rolled twice is the same as two dice rolled simultaneously.

Practice Set - 5.2 (Textbook Page No. 117)

- (1) For each of the following experiments write sample space 'S' and number of sample points $n(S)$:

- (i) One coin and one die are thrown simultaneously. (1 mark)

Solution:

When a coin and a die are thrown simultaneously
 $S = \{H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6\}$

$$\therefore n(S) = 12$$

- (ii) Two digit numbers are formed using digits 2, 3 and 5 without repeating a digits. (1 mark)

Solution:

The two digit number formed using digits 2, 3 and 5.

$$S = \{23, 25, 32, 35, 52, 53\}$$

$$\therefore n(S) = 6$$

- (2) The arrow is rotated and it stops randomly on the disc. Find out on which colour it may stop. (1 mark)

Solution:

An arrow stops on a circular disc made of six colours.

$$S = \{\text{Red, Purple, Green, Blue, Yellow, Orange}\}$$

$$\therefore n(S) = 6$$

- (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) (1 mark)

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:

The days of March 2019 which has date as multiple of 5 are:

5th March 2019 Tuesday

10th March 2019 Sunday

15th March 2019 Friday

20th March 2019 Wednesday

25th March 2019 Monday

30th March 2019 Saturday

$S = \{\text{Tuesday, Sunday, Friday, Wednesday, Monday, Saturday}\}$

$$\therefore n(S) = 6$$

- (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. (1 mark)

Solution:

- (1) Committee with 2 boys = B_1, B_2
 (2) Committee with 2 girls = G_1, G_2
 (3) Committee of one boy and one girl = $B_1, G_1, B_1, G_2, B_2, G_1, B_2, G_2$

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

**Points to Remember:**

- Event:**

A set of favourable outcomes of a given space is an 'event'.

Event is always denoted by capital letter.

Ex.: Getting at least one tail, when two coins are used is an event.

$$A = \{TT, TH, HT\} = n(A) = 3$$

- Types of Events:**

- (a) **Certain Event/Sure event:** An event is known as the Certain Event when it contains all the sample points of sample space.

e.g. **Random experiment**: A die is thrown. Let A be the event of getting a score on the upper face which is less than 7.

$$\text{Here, } S = \{1, 2, 3, 4, 5, 6\} \text{ and } A = \{1, 2, 3, 4, 5, 6\}$$

Here, event A has all the elements of S, therefore event A is a certain event.

- (b) **Impossible Event**: An event is called an Impossible Event if it does not contain any sample point of sample space.

e.g. **Random experiment**: A die is thrown. Let A be the event of getting a score on the upper face which is divisible by 7.

$$\text{Here, } S = \{1, 2, 3, 4, 5, 6\} \text{ and } A = \{\}$$

Event A is an Impossible event if $A = \phi$ or $A = \{\}$

- (c) **Simple/Elementary Event** : An event consisting of only one sample point of a sample space is called an elementary event.

e.g. **Random experiment** : A die is thrown. Let A be the event of getting a score on the upper face which is divisible by 5.

Here $S = \{1, 2, 3, 4, 5, 6\}$ and $A = \{5\}$

$\therefore n(A) = 1$

$\therefore$ Event A is an elementary event.

- (d) **Mutually exclusive Events** : Two events are called Mutually exclusive Events if they do not have any sample points in common.

Example : If $A = \{1, 2, 3\}$ and $B = \{4, 5\}$ are two events then,

A and B are Mutually exclusive events, since they do not have any sample point in common.

Mathematically : $A \cap B = \phi$ (Empty set)

- (e) **Exhaustive Event** : Two events are said to be exhaustive events if their union is sample space.

e.g. Let S be the sample space

$S = \{1, 2, 3, 4, 5, 6\}$

$A = \{1, 2, 3\}$

$B = \{3, 4, 5, 6\}$

$A \cup B = \{1, 2, 3, 4, 5, 6\}$ which is sample space.

$\therefore A \cup B = S$

$\therefore$ Events A and B are called Exhaustive events.

- (f) **Complementary Events** : Two events are said to be Complementary Events if they satisfy the following two conditions :

- (i) The events should not have any sample points in common, i.e. they should be Mutually Exclusive Events, i.e. $A \cap B = \phi$

- (ii) The Union of both the events should give us the Sample Space, i.e. $A \cup B = S$

Example : Let S be the Sample space. Two events are complementary events if they are mutually exclusive as well as exhaustive.

$S = \{1, 2, 3, 4, 5, 6\}$

If $A = \{1, 3, 5\}$

$B = \{2, 4, 6\}$

$A \cap B = \phi$ and $A \cup B = S$

In the above example, events A and B are complementary events since they do not have any sample points in common, the Union of both the events gives us the Sample Space, i.e. S.

Practice Set - 5.3 (Textbook Page No. 121)

- (1) Write sample space 'S' and number of sample point $n(S)$ 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.

(3 marks)

Solution:

When a die is thrown

$S = \{1, 2, 3, 4, 5, 6\}$

$\therefore n(S) = 6$

Event A: Even number on the upper face.

$A = \{2, 4, 6\}$

$\therefore n(A) = 3$

Event B : Odd number on the upper face.

$B = \{1, 3, 5\}$

$\therefore n(B) = 3$

Event C : Prime number on the upper face.

$C = \{2, 3, 5\}$

$\therefore n(C) = 3$

- (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.

(4 marks)

Solution :

When two dice are thrown

$S = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$

$\therefore n(S) = 36$

Event A : The sum of the digits on upper faces is a multiple of 6.

$A = \{(1, 5), (2, 4), (3, 3), (4, 2), (5, 1), (6, 6)\}$

$\therefore n(A) = 6$

Event B : The sum of the digits on the upper faces is minimum 10.

$$B = \{(4, 6), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6)\}$$

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

Event C : The same digit on both the upper faces.

$$C = \{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)\}$$

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

(iii) Three coins are tossed simultaneously :

Event A : To get at least two heads.

Event B : To get no head.

Event C : To get head on the second coin.

(3 marks)

Solution :

When three coins are tossed simultaneously.

$$S = \{HHH, HTH, THH, TTH, THT, HTT, TTT, HHT\}$$

$$\therefore n(S) = 8$$

Condition for event A : To get at least two heads.

$$A = \{HHH, HTH, THH, HHT\}$$

$$\therefore n(A) = 4$$

Condition for event B : To get no head.

$$B = \{TTT\}$$

$$\therefore n(B) = 1$$

Condition for event C : To get head on the second coin.

$$C = \{HHH, THH, HHT, THT\}$$

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

(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 formed is divisible by 3.

Condition for event C : The number formed is greater than 50.

(3 marks)

Solution :

Two digit numbers that can be formed using the digits 0, 1, 2, 3, 4, 5 without repeating digits are as follows :

$$S = \{10, 12, 13, 14, 15, 20, 21, 23, 24, 25, 30, 31, 32, 34, 35, 40, 41, 42, 43, 45, 50, 51, 52, 53, 54\}$$

$$\therefore n(S) = 25$$

Condition for event A : The number formed is even

$$A = \{10, 12, 14, 20, 24, 30, 32, 34, 40, 42, 50, 52, 54\}$$

$$\therefore n(A) = 13$$

Condition for event B : The number formed is divisible by 3.

$$B = \{12, 15, 21, 24, 30, 42, 45, 51, 54\}$$

$$\therefore n(B) = 9$$

Condition for event C : The number formed is greater than 50.

$$C = \{51, 52, 53, 54\}$$

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

(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.

(3 marks)

Solution :

Let three men be denoted by M_1, M_2 and M_3 and two women be denoted as W_1 and W_2 .

A committee of two is formed in the following ways.

$$S = \{M_1M_2, M_1M_3, M_1W_1, M_1W_2, M_2M_3, M_2W_1, M_2W_2, M_3W_1, M_3W_2, W_1W_2\}$$

$$\therefore n(S) = 10$$

Condition for event A : There must be at least one woman member.

$$A = \{M_1W_1, M_1W_2, M_2W_1, M_2W_2, M_3W_1, M_3W_2, W_1W_2\}$$

$$\therefore n(A) = 7$$

Condition for event B : One man, one woman committee to be formed.

$$B = \{M_1W_1, M_1W_2, M_2W_1, M_2W_2, M_3W_1, M_3W_2\}$$

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

Condition for event C : There should not be a woman member.

$$C = \{M_1M_2, M_1M_3, M_2M_3\}$$

$$\therefore n(C) = 3$$

(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.

(3 marks)

Solution :

A coin is tossed and a die is thrown

$$S = \{H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6\}$$

$$\therefore n(S) = 12$$

Condition for event A : To get head and an odd number.

$$A = \{H1, H3, H5\}$$

$$\therefore n(A) = 3$$

Condition for event B : To get a head or tail and an even number.

$$B = \{H2, H4, H6, T2, T4, T6\}$$

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

Condition for event C : Number on the upper face is greater than 7 and tail on the coin.

$$C = \{ \}$$

$$\therefore n(C) = 0$$

**Points to Remember:**

- Probability of an event**

In mathematical language, when possibility of an expected event is expressed in number, it is called 'probability'. It is expressed as a fraction or percentage using the following formula.

The probability of an event 'A' in finite sample space S is written as P(A) and is defined as,

$$P(A) = \frac{\text{Number of elements in event A}}{\text{Number of elements in sample space S}} = \frac{n(A)}{n(S)}$$

- Properties of P (A)**

- (1) If S is the finite sample space and A is an event of S, then $0 \leq P(A) \leq 1$ or $0\% \leq P(A) \leq 100\%$
- (2) Probability of an Impossible event is zero.
- (3) Probability of a Certain event is one.
- (4) If S is the sample space and A is an event of S then, $P(A') = 1 - P(A)$, where A' is the complement of an event A

Problem Set - 5 (Textbook Page No. 126)

- (2) Basketball players John, Vasim, Akash were practising the ball drop in the basket. The probabilities of success for John, Vasim and Akash are $\frac{4}{5}$, 0.83 and 58% respectively. Who had the greatest probability of success? (2 Marks)

Solution:

Let the probability of John throwing the ball in the basket be P(A), Vasim be P(B) and Akash be P(C)

$$\therefore P(A) = \frac{4}{5} = 0.80, P(B) = 0.83$$

$$\text{and } P(C) = 58\% = \frac{58}{100} = 0.58$$

Since $P(B) > P(A) > P(C)$

Vasim has the greatest probability of success.

Practice Set - 5.4 (Textbook Page No. 125)

- (1) If two coins are tossed, find the probability of the following events :

(i) Getting atleast one head

(ii) Getting no head

(3 marks)

Solution :

When two coins are tossed

$$S = \{HH, HT, TH, TT\}$$

$$\therefore n(S) = 4$$

- (i) Let A be the event that atleast one head.

$$A = \{HT, TH, HH\}$$

$$\therefore n(A) = 3$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{3}{4}$$

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

- (ii) Let B be event of getting no head.

$$B = \{TT\}$$

$$n(B) = 1$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{1}{4}$$

$$\therefore P(B) = \frac{1}{4}$$

- (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. (4 marks)

Solution:

When two dice are thrown

$$S = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$$

$$\therefore n(S) = 36$$

- (i) Let A be the event that the sum of the digits on the upper faces is atleast 10

$$A = \{(4, 6), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6)\}$$

$$\therefore n(A) = 6$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{6}{36} = \frac{1}{6}$$

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

- (ii) Let B is the event that the sum of the digits on the upper faces is 33.

$$B = \{ \}$$

$$\therefore n(B) = 0$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{0}{36} = 0$$

$$\therefore P(B) = 0$$

- (iii) Let C is the event that the digits on the first die is greater than the digits on second die.

$$C = \{(2, 1), (3, 1), (3, 2), (4, 1), (4, 2), (4, 3), (5, 1), (5, 2), (5, 3), (5, 4), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5)\}$$

$$\therefore n(C) = 15$$

$$P(C) = \frac{n(C)}{n(S)} = \frac{15}{36} = \frac{5}{12}$$

$$\therefore P(C) = \frac{5}{12}$$

Problem Set - 5 (Textbook Page No. 127)

- (7) Six faces of a die are as shown below.

A B C D E A

If the die is rolled once, find the probability of -

- (i) 'A' appears on upper face.

- (ii) 'D' appears on upper face. (3 marks)

Solution:

The sample space for the experiment is

$$S = \{A, B, C, D, E, A\}$$

$$\therefore n(S) = 6$$

- (i) Let A be the event that the letter appears on the uppermost face is A.

$$\therefore n(A) = 2 \quad (\text{As there are two faces with letter A})$$

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

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

- (ii) Let B be the event that the letter appearing on the uppermost face is D.

$$\therefore n(B) = 1$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{1}{6}$$

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

- * (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. (2 marks)

Solution:

The Sample space for the experiment is

$$S = \{(0, 0), (0, 1), (0, 2), (0, 3), (0, 4), (0, 5), (1, 0), (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (2, 0), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (3, 0), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (4, 0), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (5, 0), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5)\}$$

$$\therefore n(S) = 36$$

Let A be the event that the product of the digits on the upper face is zero.

$$A = \{(0, 0), (0, 1), (0, 2), (0, 3), (0, 4), (0, 5), (1, 0), (2, 0), (3, 0), (4, 0), (5, 0)\}$$

$$\therefore n(A) = 11$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{11}{36}$$

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

Practice Set - 5.4 (Textbook Page No. 125)

- (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 (3 marks)

Solution:

There are 52 cards in a pack.

$$n(S) = 52$$

- (i) Let A be the event that the card drawn is an ace.

$$\therefore n(A) = 4$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{4}{52} = \frac{1}{13}$$

$$\therefore P(A) = \frac{1}{13}$$

- (ii) Let B be the event that the card drawn is a spade.

$$\therefore n(B) = 13$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{13}{52} = \frac{1}{4}$$

$$\therefore P(B) = \frac{1}{4}$$

- (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.

(3 marks)

Solution:

The sample space for box containing 15 tickets numbered from 1 to 15 is

$$n(S) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$$

$$\therefore n(S) = 15$$

- (i) Let A be the event that the ticket drawn shows an even number.

$$A = \{2, 4, 6, 8, 10, 12, 14\}$$

$$\therefore n(A) = 7$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{7}{15}$$

$$\therefore P(A) = \frac{7}{15}$$

- (ii) Let B be the event that the ticket drawn shows a number which is a multiple of 5.

$$B = \{5, 10, 15\}$$

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

$$P(B) = \frac{n(B)}{n(S)} = \frac{3}{15} = \frac{1}{5}$$

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

Problem Set - 5 (Textbook Page No. 126)

- (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? (2 marks)

Solution:

The alphabets of English are

$$n(S) = \{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z\}$$

$$\therefore n(S) = 26$$

Let A be the event that the card is a vowel card.

$$A = \{a, e, i, o, u\}$$

$$\therefore n(A) = 5$$

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

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

- (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. (4 marks)

Solution:

The sample space for box containing tickets bearing only one number from 1 to 30 on each.

$$n(S) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$$

$$\therefore n(S) = 30$$

- (i) Let A be the event that the ticket drawn bears an odd number.

$$A = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29\}$$

$$\therefore n(A) = 15$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{15}{30} = \frac{1}{2}$$

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

- (ii) Let B be the event that the ticket drawn bears a complete square number.

$$B = \{1, 4, 9, 16, 25\}$$

$$\therefore n(B) = 5$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{5}{30} = \frac{1}{6}$$

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

- (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 is greater than 5. (4 marks)

Solution:

The sample space for the experiment is

$$n(S) = \{0, 1, 2, 3, 4, 5\}$$

$$\therefore n(S) = 6$$

- (i) Let A be the event that the card drawn shows a natural number.

$$A = \{1, 2, 3, 4, 5\}$$

$$\therefore n(A) = 5$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{5}{6}$$

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

- (ii) Let B be the event that the card drawn is shows a number less than 1

$$B = \{0\}$$

$$\therefore n(B) = 1$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{1}{6}$$

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

- (iii) Let C be the event that the card drawn shows a whole number.

$$C = \{0, 1, 2, 3, 4, 5\}$$

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

$$P(C) = \frac{n(C)}{n(S)} = \frac{6}{6} = 1$$

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

- (iv) Let D be the event that the card drawn shows a number greater than 5.

$$D = \{ \}$$

$$\therefore n(D) = 0$$

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

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

- (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'. (2 marks)

Solution:

There are 11 alphabets in the word 'mathematics'.

$$n(S) = \{m, a, t, h, e, m, a, t, i, c, s\}$$

$$\therefore n(S) = 11$$

Let A be the event that the letter is m

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

$$P(A) = \frac{n(A)}{n(S)} = \frac{2}{11}$$

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

Practice Set - 5.4 (Textbook Page No. 125)

- (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 ? (4 marks)

Solution:

The two digit numbers formed using the digits 2, 3, 5, 7, 9 without repetition.

$$S = \{23, 25, 27, 29, 32, 35, 37, 39, 52, 53, 57, 59, 72, 73, 75, 79, 92, 93, 95, 97\}$$

$$\therefore n(S) = 20$$

- (i) Let A be the event that the number formed is an odd number.

$$A = \{23, 25, 27, 29, 35, 37, 39, 53, 57, 59, 73, 75, 79, 93, 95, 97\}$$

$$\therefore n(A) = 16$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{16}{20} = \frac{4}{5}$$

$$\therefore P(A) = \frac{4}{5}$$

- (ii) Let B be the event that the number formed is a multiple of 5.

$$B = \{25, 35, 75, 95\}$$

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

$$P(B) = \frac{n(B)}{n(S)} = \frac{4}{20} = \frac{1}{5}$$

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

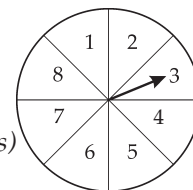
Problem Set - 5 (Textbook Page No. 127)

- (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. (4 marks)



Solution:

The Sample space for the game of chance of spinning an arrow is

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

$$\therefore n(S) = 8$$

- (i) Let A be the event that the arrow will rest at 8.

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

$$P(A) = \frac{n(A)}{n(S)} = \frac{1}{8}$$

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

- (ii) Let B be the event that the arrow will rest at an odd number.

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

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

$$P(B) = \frac{n(B)}{n(S)} = \frac{4}{8} = \frac{1}{2}$$

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

- (iii) Let C be the event that the arrow will rest at a number greater than 2.

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

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

$$P(C) = \frac{n(C)}{n(S)} = \frac{6}{8} = \frac{3}{4}$$

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

- (iv) Let D be the event that the arrow will rest at a number less than 9.

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

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

$$P(D) = \frac{n(D)}{n(S)} = \frac{8}{8} = 1$$

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

- * (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. (4 marks)

Solution:

The two digit numbers that can be formed using the digits 0, 1, 2, 3, 4 with repeating the digits is

$$S = \{10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 30, 31, 32, 33, 34, 40, 41, 42, 43, 44\}$$

$$\therefore n(S) = 20$$

- (i) Let A be the event that the number so formed is a prime number.

$$A = \{11, 13, 23, 31, 41, 43\}$$

$$\therefore n(A) = 6$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{6}{20} = \frac{3}{10}$$

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

- (ii) Let B be the event that the number so formed is a multiple of 4.

$$B = \{12, 20, 24, 32, 40, 44\}$$

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

$$P(B) = \frac{n(B)}{n(S)} = \frac{6}{20} = \frac{3}{10}$$

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

- (iii) Let C be the event that number so formed is a multiple of 11.

$$C = \{11, 22, 33, 44\}$$

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

$$P(C) = \frac{n(C)}{n(S)} = \frac{4}{20} = \frac{1}{5}$$

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

- (3) In a hockey team there are 6 defenders, 4 offenders and 1 goalee. Out of these, one player is to be selected randomly as a captain. Find the probability of the selection that -**

- (i) The goalee will be selected.

- (ii) A defender will be selected.

(4 marks)

Solution:

In a hockey team,

$$\text{No. of Defenders} = 6$$

$$\text{No. of Offenders} = 4$$

$$\text{No. of Goalee} = 1$$

$$\text{Total no. of players} = 11.$$

$$\therefore n(S) = 11$$

- (i) Let A be the event that goalee will be selected as a captain.

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

$$P(A) = \frac{n(A)}{n(S)} = \frac{1}{11}$$

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

- (ii) Let B be the event that a defender will be selected.

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

$$P(B) = \frac{n(B)}{n(S)} = \frac{6}{11}$$

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

- (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.

(4 marks)

Solution:

Let R_1, R_2 be the red balloons, B_1, B_2, B_3 be the blue balloons and G_1, G_2, G_3, G_4 be the green balloons.

$$S = \{R_1, R_2, B_1, B_2, B_3, G_1, G_2, G_3, G_4\}$$

$$\therefore n(S) = 9$$

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

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

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

$$P(A) = \frac{n(A)}{n(S)} = \frac{2}{9}$$

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

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

$$A = \{B_1, B_2, B_3\}$$

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

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

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

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

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

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

$$P(C) = \frac{n(C)}{n(S)} = \frac{4}{9}$$

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

- (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? (3 marks)

Solution:

Number of Red pens = 5,

Number of Blue pens = 8,

Number of green pens = 3

$$\therefore \text{Total no. of pens} = 16$$

$$S = \{R_1, R_2, R_3, R_4, R_5, B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, G_1, G_2, G_3\}$$

$$\therefore n(S) = 16$$

Let A be the event that the pen picked up is blue.

$$A = \{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8\}$$

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

$$P(A) = \frac{n(A)}{n(S)} = \frac{8}{16} = \frac{1}{2}$$

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

- (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.

(4 marks)

Solution:

Let three red balls be denoted as 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

$$S = \{R_1, R_2, R_3, W_1, W_2, W_3, G_1, G_2, G_3\}$$

$$\therefore n(S) = 9$$

- (i) Let A be the event that the ball drawn is red.

$$A = \{R_1, R_2, R_3\}$$

$$\therefore n(A) = 3$$

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

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

- (ii) Let B be the event that the ball drawn is not red.

$$B = \{W_1, W_2, W_3, G_1, G_2, G_3\}$$

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

$$P(B) = \frac{n(B)}{n(S)} = \frac{6}{9} = \frac{2}{3}$$

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

- (iii) Let C be the event that the ball drawn is either red or white.

$$C = \{R_1, R_2, R_3, W_1, W_2, W_3\}$$

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

$$P(C) = \frac{n(C)}{n(S)} = \frac{6}{9} = \frac{2}{3}$$

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

- (14) Out of 200 students from a school, 135 like Kabbaddi 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 doesn't like Kabbaddi.

(3 marks)

Solution:

Let S = Total no. of students.

$$\therefore n(S) = 200$$

No. of students who like to play Kabbaddi = 135

$$\therefore \text{No. of students who do not like the game} = 200 - 135 = 65$$

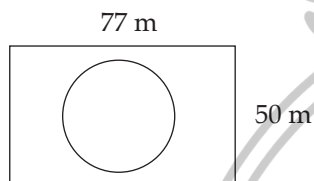
- (i) Let A be the event that the student selected doesn't like to play kabaddi.

$$\therefore n(A) = 65$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{65}{200} = \frac{13}{40}$$

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

- (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. (4 marks)



Solution:

S : Area of the garden.

Length of the garden = 77 m,

Breadth of the garden = 50 m

$$\therefore \text{Area of the garden} = 77 \times 50 = 3850 \text{ sq m.}$$

Let A be the event that the towel fell in a lake.

Diameter of the lake = 14 m

$$\therefore \text{Radius of the lake} = 7 \text{ m}$$

$$\begin{aligned} \therefore \text{Area of the lake} &= \pi r^2 \\ &= \frac{22}{7} \times 7 \times 7 \\ &= 154 \text{ sq m.} \end{aligned}$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{154}{3850} = \frac{1}{25} = 0.04$$

$$\therefore P(\text{Towel fell in the lake}) = 0.04$$

Problem Set - 5 (Textbook Page No. 126)

MCQ's

Choose the correct alternative answer for each of the following questions. (1 mark each)

- (1) Which number cannot represent a probability?
(A) $\frac{2}{3}$ (B) 1.5 (C) 15% (D) 0.7
- (2) A die is rolled. What is the probability that the number appearing on upface is less than 3?
(A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) 0
- (3) What is the probability of the event that a number chosen from 1 to 100 is a prime number?

$$(A) \frac{1}{5} \quad (B) \frac{6}{25} \quad (C) \frac{1}{4} \quad (D) \frac{13}{50}$$

- (4) 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?

$$(A) \frac{1}{5} \quad (B) \frac{3}{5} \quad (C) \frac{4}{5} \quad (D) \frac{1}{3}$$

- (5) If $n(A) = 2$, $P(A) = \frac{1}{5}$, then $n(S) = ?$

$$(A) 10 \quad (B) \frac{5}{2} \quad (C) \frac{2}{5} \quad (D) \frac{1}{3}$$

Additional MCQ's

- (6) Which of the following cannot be the probability of an event?

$$(A) \frac{3}{5} \quad (B) \frac{7}{2} \quad (C) \frac{3}{4} \quad (D) \frac{4}{5}$$

- (7) The value of probability always lie between

$$(A) 0 \text{ to } 1 \quad (B) \text{ unlimited} \\ (C) 1 \text{ to } \infty \quad (D) -\infty \text{ to } 1$$

- (8) The probability of throwing a number smaller than 2 in a fair die is

$$(A) \frac{2}{3} \quad (B) \frac{1}{6} \quad (C) \frac{2}{3} \quad (D) \frac{5}{6}$$

- (9) A card is drawn from a well shuffled pack of 52 cards. The probability that the card drawn is a black face card is

$$(A) \frac{2}{13} \quad (B) \frac{3}{13} \quad (C) \frac{3}{26} \quad (D) \frac{1}{13}$$

- (10) Three coins are tossed. Find the probability that tail does not appear.

$$(A) \frac{3}{8} \quad (B) \frac{1}{8} \quad (C) \frac{1}{4} \quad (D) \frac{7}{8}$$

ANSWERS

- (1) (B) 1.5 (2) (B) $\frac{1}{3}$ (3) (C) $\frac{1}{4}$ (4) (A) $\frac{1}{5}$
(5) (A) 10 (6) (B) $\frac{7}{2}$ (7) (A) 0 to 1 (8) (B) $\frac{1}{6}$
(9) (C) $\frac{3}{26}$ (10) (B) $\frac{1}{8}$

PROBLEMS FOR PRACTICE

Based on Practice Set 5.2

- (1) In each of the following experiments, find the sample space S and the sample points n(S)
(1 mark each)

- (i) A two digit number is to be formed from the digits 0, 2, 4, 6 without repetitions of digits.
- (ii) A ball is drawn from a bag containing 3 red, 3 green and 4 white balls.
- (iii) A day is chosen randomly for the meeting of Gram Sevaks in the month of February 2016.
- (iv) A committee of two is to be formed from 2 men and 3 women for Gram Swachhatta Abhiyan.
- (v) A card is drawn from a box containing cards numbered from 1 to 25.

Based on Practice Set 5.3

- (2) A box contains cards numbered from 1 to 30. Write the sample space S and no. of sample points $n(S)$ and if a card is drawn at random, write A and $n(A)$ if the card is divisible by 5.

(3 marks)

- (3) An urn contains 10 red and 8 white balls. Write sample space S and $n(S)$. Write the events A and B using Set and mention $n(A)$ and $n(B)$ if A is the event that ball is white, B is the event that ball is neither white nor red.

(3 marks)

- (4) A card is picked up randomly from well shuffled pack of cards. Write the $n(S)$, $n(A)$, $n(B)$ and $n(C)$

Event A: A red face card.

Event B: An ace of spade

Event C: Not a black king

(3 marks)

- (5) A box contains 3 apples, 4 oranges and 5 bananas. One fruit is drawn at random from the box. Write S , $n(S)$ and sample points of each of the following events.

Event A: Fruit is orange or banana

Event B: Fruit is not an apple.

Event C: Fruit is neither apple nor banana

Event D : Fruit is banana

(3 marks)

Based on Practice Set 5.4

- (6) Tickets numbered 1 to 30 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket drawn will be a multiple of 7?

(3 marks)

- (7) Find the probability that a leap year selected at random will have 53 sundays.

(3 marks)

- (8) A box contains 300 electrical bulbs out of which 18 are defective. What is the probability that bulb chosen will not be defective?

(3 marks)

- (9) Three coins are tossed together. Find the probability of getting exactly two heads.

(3 marks)

- (10) A card is drawn at random from a well shuffled pack of 52 cards. Find the probability that the card drawn is

- (i) neither ace nor king.

- (ii) black and a king

- (iii) 10 of spades.

(3 marks)

ANSWERS

(1)

$$(i) S = \{20, 24, 26, 40, 42, 46, 60, 62, 64\} \quad n(S) = 9$$

$$(ii) S = \{R_1, R_2, R_3, G_1, G_2, G_3, W_1, W_2, W_3, W_4\} \\ n(S) = 10$$

$$(iii) S = \{1, 2, 3, \dots, 29\} \quad n(S) = 29$$

$$(iv) S = \{M_1M_2, M_1W_1, M_1W_2, M_1W_3, M_2W_1, M_2W_2, \\ M_2W_3, W_1, W_2, W_3, W_4\} \quad n(S) = 10$$

$$(v) S = \{1, 2, 3, \dots, 24, 25\} \quad n(S) = 25$$

$$(2) S = \{1, 2, 3, 4, 5, \dots, 30\} \quad n(S) = 30$$

$$A = \{5, 10, 15, 20, 25, 30\} \quad n(A) = 6$$

$$(3) S = \{R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, W_1, W_2, \\ W_3, W_4, W_5, W_6, W_7, W_8\} \quad n(S) = 18$$

$$A = \{W_1, W_2, W_3, W_4, W_5, W_6, W_7, W_8\} = n(A) = 8$$

$$B = \{ \} = n(B) = 0$$

$$(4) n(S) = 52, n(A) = 6, n(B) = 1, n(C) = 50$$

$$(5) n(S) = 12, n(A) = 9, n(B) = 9, n(C) = 4, n(D) = 5$$

$$(6) \frac{2}{15}, (7) \frac{2}{7}, (8) \frac{141}{150}, (9) \frac{3}{8}$$

$$(10) (i) \frac{11}{13} \quad (ii) \frac{1}{26} \quad (iii) \frac{1}{52}$$

ASSIGNMENT - 5

Time : 1 Hr.

Marks : 20

Q.1. Attempt the following:

(2)

- (1) If $n(A) = 2$, $P(A) = \frac{1}{5}$, then $n(S) = ?$
 (A) 10 (B) $\frac{5}{2}$ (C) $\frac{4}{5}$ (D) $\frac{1}{3}$
- (2) One coin and one die are tossed simultaneously. Write the sample space S and $n(S)$.

Q.2. Attempt the following: (Any 2)

(4)

- (1) 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:

The sample space for the experiment is

$$S = \{ \quad \quad \quad \}$$

$$n(S) = \quad$$

- (i) Let A be the event that the letter appears on the uppermost face is A .

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

$$P(A) = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

- (ii) Let B be the event that the letter appearing on the uppermost face is D .

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

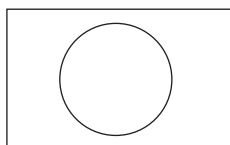
$$P(B) = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

- (2) Basketball players John, Vasim, Akash were practising the ball drop in the basket.

The probabilities of success for John, Vasim and Akash are $\frac{4}{5}$, 0.83 and 58% respectively. Who had the greatest probability of success?

- (3) 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.

77 m



50 m

Solution:

$$\text{Area of the garden} = \quad \times \quad = \quad \text{sq m.}$$

Let A be the event that the towel fell in a lake.

$$\text{Area of the lake} = \quad = \quad \times \quad \times \quad = \quad \text{sq.m.}$$

$$P(A) = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Q.3. Attempt the following: (Any 2)

(6)

- (1) 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

Solutions:

There are cards in a pack.

$$n(S) = \text{$$

- (i) Let A be the event that the card drawn is an ace.

$$n(A) = \text{$$

$$P(A) = \frac{\text{}}{\text{}} = \frac{\text{}}{\text{$$

- (ii) Let B be the event that the card drawn is a spade.

$$n(B) = \text{$$

$$P(B) = \frac{\text{}}{\text{}} = \frac{\text{}}{\text{$$

- (2) If two coins are tossed, find the probability of the following events :

(i) Getting atleast one head (ii) Getting no head

- (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:

The sample space for box containing 15 tickets numbered from 1 to 15 is

$$\therefore n(S) = \text{$$

- (i) Let A be the event that the ticket drawn shows an even number.

$$A = \{ \text{} \}$$

$$\therefore n(A) = \text{$$

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

- (ii) Let B be the event that the ticket drawn shows a number which is a multiple of 5.

$$B = \{ \text{} \}$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{3}{15} = \frac{\text{}}{\text{$$

Q.4. Attempt the following: (Any 2)

(8)

- (1) In a hockey team there are 6 defenders, 4 offenders and 1 goalee. Out of these, one player is to be selected randomly as a captain. Find the probability of the selection that -

(i) The goalee will be selected.

(ii) A defender will be selected.

- (2) 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.

- (3) 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.

