15. Probability

Q 1 Tom draws a marble from a bag containing 12 marbles.There are 3 red marbles, 4 blue marbles and 5 green marbles, find the probability that he will draw a blue marble.

Marks (2)

Q 2 A basket has 5 apples, 10 oranges and 5 bananas. Find the probability of getting out an apple.

Marks (2)

Q 3 One card is drawn from a well-shuffled deck of 52 cards then find the probability that the card will be a king.

Marks (2)

Q 4 Mr. And Mrs. X stays in a house along with their seven children. The female to male ratio in the family is 1:2. Find the probability that all the children are either boy or girl.

Marks (2)

Q 5 The record of a weather station shows that out of the past 200 consecutives days, its weather forecasts were correct 150 times then find the probability that on a given day it was correct .

Marks (2)

Q 6 The record of a weather station shows that out of the past 200 consecutives days, its weather forecasts were correct 150 times then find the probability that on a given day it was not correct.

Marks (2)

Q 7 A drawer contains 8 red socks, 3 white socks and 5 blue socks. Without looking, Mayank draws out a pair of socks. Find the probability that the pair of socks is white.

Marks (2)

Q 8 Two coins are tossed simultaneously 100 times and we get the following outcomes:(i) One head = 20 (ii) Two heads = 50. Find the probability that there is no head.

Marks (2)

Q 9 Two coins are tossed simultaneously 100 times and we get the following outcomes:(i) No head = 30 (ii) Two heads = 50. Find the probability that there is only one head.

Marks (2)

Q 10 Two coins are tossed simultaneously 100 times and we get the following outcomes:(i) No head = 30 (ii) One head = 20. Find the probability of getting two heads.

Marks (2)

Q 11 A coin is tossed 23 times and observed that 10 times head comes up. Find the probability that a tail comes up.

Marks (2)

Q 12 A coin is tossed 100 times. It is observed that 60 times head comes up and 40 times tail comes up then find the probability that neither a head nor a tail comes up.

Marks (2)

Q 13 A coin is tossed 100 times with the following frequencies:

Head: 45, tail: 55.

Compute the probability for each event.

Marks (3)

Q 14 The percentage of marks obtained by a student in monthly unit tests is given below:

Unit test	I	II	III	IV	V
Percentage	69	71	73	68	76

Find the probability that the student gets more than 68% marks. Marks (3)

Q 15 A die is thrown 200 times with the following frequency, for the outcomes 1,2,3,4,5,6 , as given below:

Outcomes :	1	2	3	4	5	6
Frequency:	30	40	50	20	30	30

Find the probability that the outcome is less than 5. Marks (3)

Q 16 1000 families with 2 children were selected randomly and the following data was recorded:

Number of girls in a family:	0	1	2
Number of families :	200	500	300

If a family is chosen at random, compute the probability that it has

1. no girl, 2. at least one girl. Marks (3)

Q 17 To know the opinion of students about mathematics, a survey of 100 students was conducted. The data is recorded in the following table:

Opinion:	Like	Dislike
Number of Students:	70	30

Find the probability that a student chosen at random

1. likes mathematics,

2. dislikes mathematics. Marks (3)

Q 18 8 bags of wheat flour, each marked 10 kg, actually contained the following weights of flour(in kg)

10.01, 9.97, 10.03, 9.96, 10.04, 10.06, 10.02, 9.98

Find the probability that any of these bags chosen at random contain less than 10 kg of wheat.

Marks (3)

Q 19 A cycle manufacturing company kept a record of recycling of tyres and maintained the record of distance covered by it. Table given below shows the record of 100 tyres:

Distance (in km):	0-2000	2000-5000	5000-7000	7000-10000
Frequency:	30	50	10	10

What will be the probability to replace a tyre less than 5000 km ?

Marks (3)

Q 20 In a match, a batsman hits a boundary 6 times out of 30 balls he plays. Find the probability that he did not hit a boundary.

Marks (3)

Q 21 On one page of a telephone directory, there were 210 telephone numbers. The frequency distribution of their unit place is given as follows:

Digits:	0	1	2	3	4	5	6	7	8	9
Frequency:	10	20	30	40	10	20	30	5	30	15

Without looking at the page, the pencil is placed on one of these number and the number is chosen at random.What is the probability that the digit in its unit place is multiple of 3?

Marks (3)

Q 22 The record of a weather station shows that out of the past 200 consecutive days,its weather forecasts were correct 180 times. What is the probability that on a given day it was correct and also find the probability on a given day it was not correct?

Marks (3)

Q 23 A die is thrown, find the probability of getting (i) a prime number (ii) an even number.

Marks (3)

Q 24 10 bags of rice, each marked 6 kg, actually contained the following weights of rice (in kg):

5.96 6.06 6.09 6.04 6.00
6.07 5.99 6.11 5.93 6.00

Then find the probability that any of these bags chosen at random contains more than 6 kg.

Marks (3)

Q 25 The distance (in km) of 40 engineers from their residence to their place of work were found as follows.

5	3	10	20	25	11	13	7	12	31
19	10	12	17	18	11	32	17	16	2
7	9	7	8	3	5	12	15	18	3
12	14	2	9	6	15	15	7	6	12

What is the empirical probability that an engineer lives:
(i) less than 7 km from her place of work?
(ii) more than or equal to 7 km from her place of work?
(iii) within ½ km from her place of work?

Marks (4)

Q 26 In Cherrapunji, it rains for 200 days in an ordinary year, find the probability that (i) there will not be rain in that year, (ii) there will be rain in that year.

Marks (4)

Q 27 In a cricket match, a batsman hits the ball 24 times out of 72 balls he plays. Find the probability that he did not hit the ball.

Marks (4)

Q 28 100 plants each, were planted in 100 schools during *Van Mahotsava*. After one month, the no. of plants that survived were recorded as in data below:

No. of plants survived	less than 25	26-50	51-60	61-70	more than 70	total no. of schools
No. of schools = frequency	15	20	30	30	5	100

When a school is selected of random for inspection what is the probability of (i) more than 25 plants survived in school?

(ii)less than 61 plants survived in the school?

Marks (4)

Q 29 A teacher wanted to analyse the performance of two sections of students in a mathematics test of 100 marks. Looking at their performances, she found that a few students got under 20 marks and a few got 70 marks or above. So she decided to group them into intervals of varying sizes as follows: 0 − 20, 20 − 30… 60 − 70, 70 − 100. Then she formed the following table:

Marks	Number of student
0 − 20	7
20 − 30	10
30 − 40	10
40 − 50	20
50 − 60	20
60 − 70	15
70 − above	8
Total	90

(i) Find the probability that a student obtained less than 20 % in the mathematics test.

(ii) Find the probability that a student obtained marks 60 or above.

Marks (4)

Q 30 To know the opinion of the students about the subject Maths, a survey of 200 students was conducted. The data is recorded in the following table.

Opinion	Number of students
like	135
dislike	65

Find the probability that a student chosen at random

(i) likes Maths, (ii) does not like it.

Marks (4)

Q 31 An organization selected 2400 families at random and surveyed them to determine a relationship between income level and the number of vehicles in a family. The information gathered is listed in the table below:

Monthly income (in Rs)	Vehicles per family			
	0	1	2	Above 2
Less than 7000	10	160	25	0
7000 − 10000	0	305	27	2
10000 − 13000	1	535	29	1
13000 − 16000	2	469	59	25
16000 or more	1	579	82	88

Suppose a family is chosen, find the probability that the family chosen is
(i) earning Rs 10000 − 13000 per month and owning exactly 2 vehicles.
(ii) earning Rs 16000 or more per month and owning exactly 1 vehicle.
(iii) earning less than Rs 7000 per month and does not own any vehicle.
(iv) earning Rs 13000 − 16000 per month and owning more than 2 vehicles.

Marks (4)

Q 32 1500 families with 2 children were selected randomly, and the following data were recorded:

Number of girls in a family	2	1	0
Number of families	475	814	211

Compute the probability of a family, chosen at random, having
(i) 2 girls (ii) 1 girls (iii) No girl.

Marks (4)

Q 33 50 seeds were selected at random from each of 5 bags of seeds, and were kept under stadardised conditions favourable to germination. After 20 days, the number of seeds which had germinated in each collection were counted and recorded as follows:

Bag	1	2	3	4	5
Number of seeds germinated	40	48	42	29	41

What is the probability of germination of
(i)more than 40 seeds in a bag?
(ii)49 seeds in a bag?
(iii)more that 35 seeds in a bag?

Marks (4)

Q 34 A tyre manufacturing company kept a record of the distance covered before a tyre needed to bereplaced. The table shows the results of 1000 cases.

Distance (in km)	less than 4000	4000 to 9000	9001 to 14000	more than 14000
Frequency	20	210	325	445

If you buy a tyre of this company, what is the probability that:
(i) it will need to be replaced before it has covered before it has covered 4000 km?
(ii) it will last more than 9000 km?
(iii) it will need to be replaced after it has covered somewhere between 4000 km and 14000 km?

Marks (4)

Q 35 Two coins are tossed simultaneously 500 times, and we get two heads:105 times; One head:275;No head:120 times, find the probability of occurrence of each of these events. And check the sum of Probabilities of all events.

Marks (4)

Most Important Questions

Q 1 Write the formula of finding the probability of an event.

Q 2 Name the various approaches to probability.

Q 3 In a cricket match, a batsman hits a boundary 5 times out of the 25 balls he plays. Find the probability that he didn't hit a boundary.

Q 4 The percentage of marks obtained by a student in the monthly unit tests are given below

Unit test :	I	II	III	IV	V
Percentage of marks obtained :	69	67	73	68	74

Based on this data, find the probability that the student gets more than 70% marks in a unit test.

Q 5 Two coins are tossed simultaneously 1000 times with the following frequencies of different outcomes :

Two heads : 210 times

One head : 550 times

No head : 240 times

Find the probability of occurrence of each of these events.

Q 6 To know the opinion of the students about Mathematics, a survey of 200 students was conducted. The data is recorded in the following table :

Opinion	Like	Dislike
Number of Students	135	65

Find the probability that a student chosen at random

(a) like Maths.

(b) Does not like Maths.

Q 7 The record of a weather station shows that out of the past 400 consecutive days, its weather forecasts were correct 175 times.

(i) What is the probability that on a given day it was correct?

(ii) What is the probability that it was not correct on a given day?

Q 8 A die is thrown 2000 times with the following frequencies for the outcomes 1, 2, 3, 4, 5 and 6 as shown below:

Outcome :	1	2	3	4	5	6
Frequency :	358	300	314	298	350	380

Find the probability of happening of each outcome.

Q 9 Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes :

Outcome :	3 heads	2 heads	1 head	No head
Frequency:	22	80	70	28

Find the probability of getting

(a) Three heads

(b) Two heads and one tail

(c) At least two heads

Q 10 A tyre manufacturing company kept a record of the distance covered before a tyre needed to be replaced. The table shows the results of 1000 cases.

Distance (in km)	Less than 4000	4000 t0 9000	9000 t0 14000	More than 14000
Frequency	20	210	325	445

If you buy a tyre of this company, what is the probability that :

(i) it will need to be replaced before it has covered 4000 km?

(ii) it will last more than 9000 km?

Q 11 Fifty seeds were selected at random from each of 5 bags of seeds, and were kept under standardized conditions favorable to germination. After 20 days, the number of seeds which had germinated in each collection were counted and recorded as follows:

Bag : 1 2 3 4 5

Number of seeds germinated : 50 38 40 41 41

What is the probability of germination of

(i) more than 40 seeds in a bag?

(ii) 50 seeds in a bag?

(iii) more that 36 seeds in a bag?

Q 12 Following frequency distirbution gives the weight of 38 students of a class

Weigh (in kg)	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70
Number of Student	9	5	14	3	1	2	2	2

Find the probability that the weight of the student of a class is :

(i) not more than 45 kg? (ii) at least 45 kg.

Q 13 1000 families with 2 children were selected randomly, and the

following data was recorded :

No. of girls in a family :	0	1	2
Frequency :	300	560	140

If a family is chosen at random, find the probability that it has

(a) No girl

(b) One girl

(c) Two girls

Q 14 On one page of a telephone directory, there are 400 telephone numbers. The frequency distribution of their unit place digit (for example : in the number 2441150, the unit place digit is 0) is given in the table below:

Digit :	0	1	2	3	4	5	6	7	8	9
Frequency :	44	52	44	44	40	20	28	56	32	40

A number is chosen at random, find the probability that the digit at its unit's place is :

(i) 6.

(ii) a non-zero multiple of 3.

(iii) an odd number.

(iv) a non-zero even number.

Q 15 The percentage of marks obtained by a student in the monthly unit tests are given below :

Unit Test :	I	II	III	IV	V
Percentage of marks obtained :	58	64	76	62	85

Find the probability that the student gets :

(i) a first class i.e. at least 60% marks

(ii) marks between 70% and 80%.

(iii) a distinction i.e. 75% or above.

(iv) a second class i.e. between 50% and 60%.

Q 16 The distances (in km) of 20 female engineers from their residence to their place of work were found as follows:

5	3	10	15	7
28	10	12	22	2
9	21	1	11	14
17	31	7	8	22

Find the probability that the distance of the work place female engineers is :

(i) Less than 20 km. from her place of work?

(ii) At least 10 km. from her place of work?

(iii) Within 2.5 km. from her place of work?

(iv) At most 25 km. from her place of work.

Q 17 An insurance company selected 2000 drivers at random (i.e., without any preference of one driver over another) in a particular city to find a relationship between age and accidents. The data obtained are given in the following table:

Age of Drivers (in year)	Accidents in one year					
	0	1	2	3	4	Over 4
18 - 29	440	160	110	61	35	20
30-50	505	125	60	22	18	9
Above 50	360	45	35	15	9	4

Find the probabilities of the following events for a driver chosen at random from the city:

(i) being 18-29 years of age and having exactly 4 accidents in one year.

(ii) being 30-50 years of age and having one or more accidents in a year.

(iii) having no accidents in one year.