

Ex 15.1 Class 9 Maths Question 4.

Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes.

Outcome	3 heads	2 heads	1 head	No head
Frequency	23	72	77	28

If the three coins are simultaneously tossed again, compute the probability of 2 heads coming up.

Solution:

Total number of times the three coins are tossed = 200

Number of outcomes in which 2 heads coming up = 72

\therefore Probability of 2 heads coming up = $\frac{72}{200}$

\therefore Thus, the required probability = $\frac{9}{25}$

Question 5.

An organisation 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 ₹)	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 ₹ 10000-13000 per month and owning exactly 2 vehicles.

(ii) earning ₹16000 or more per month and owning exactly 1 vehicle.

(iii) earning less than ₹ 7000 per month and does not own any vehicle.

(iv) earning ₹13000-16000 per month and owning more than 2 vehicles.

(v) owning not more than 1 vehicle.

Solution:

Here, total number of families = 2400

(i) ∴ Number of families earning Rs. 10000 – Rs. 13000 per month and owning exactly 2 vehicles = 29

∴ Probability of a family earning Rs. 10000 – Rs. 13000 per month and owning exactly 2 vehicles =

$\frac{29}{2400}$

(ii) ∴ Number of families earning Rs. 16000 or more per month and owning exactly 1 vehicle = 579

∴ Probability of a family earning Rs. 16000 or more per month and owning exactly 1 vehicle = $\frac{579}{2400}$

(iii) ∴ Number of families earning less than Rs. 7000 per month and do not own any vehicle = 10

∴ Probability of a family earning less than Rs. 7000 per month and does not own any vehicle =

$$\frac{10}{2400} \\ = \frac{5}{1200} = \frac{1}{240}$$

(iv) ∴ Number of families earning Rs. 13000 – Rs. 16000 per month and owning more than 2 vehicles = 25

∴ Probability of a family earning Rs. 13000 – Rs. 16000 per month and owning more than 2 vehicles =

$$\frac{25}{2400} = \frac{5}{480}$$

(v) ∴ Number of families owning not more than 1 vehicle

= [Number of families having no vehicle] + [Number of families having only 1 vehicle]

$$= [10 + 1 + 2 + 1] + [160 + 305 + 535 + 469 + 579] = 14 + 2048 = 2062$$

∴ Probability of a family owning not more than 1 vehicle =

$$\frac{2062}{2400} = \frac{1031}{1200}$$

Question 6.

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 students
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.

Solution:

Total number of students = 90

(i) From the given table, number of students who obtained less than 20% marks = 7

Probability of a student obtaining less than 20% marks = $\frac{7}{90}$

(ii) From the given table, number of students who obtained marks 60 or above = [Number of

students in class-interval 60 – 70] + [Number of students in the class interval 70 – above]

$$= 15 + 8 = 23$$

∴ Probability of a student who obtained 23 marks 60 or above = $23/90$

Question 7.

To know the opinion of the students about the subject statistics, 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 statistics,

(ii) does not like it.

Solution:

Total number of students whose opinion is obtained = 200

(i) ∴ Number of students who like statistics = 135

∴ Probability of selecting a student who likes statistics = $135/200 = 27/40$

(ii) ∴ Number of students who do not like statistics = 65

∴ Probability of selecting a student who does not like statistics = $65/200 = 13/40$

Question 8.

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 12km from her place of work?

Solution:

Here, total number of engineers = 40

(i) ∴ Number of engineers who are living less than 7 km from their work place = 9

∴ Probability of an engineer who is living less than 7 km from her place of work = $\frac{9}{40}$

(ii) ∴ Number of engineers living at a distance more than or equal to 7 km from their work place = 31

∴ Probability of an engineer who is living at distance more than or equal to 7 km from her place of work = $\frac{31}{40}$

(iii) ∴ The number of engineers living within 12km from their work place = 0

∴ Probability of an engineer who is living within 12km from her place of work = $\frac{0}{40} = 0$

