

1. In a cricket match, a batswoman hits a boundary 6 times out of 30 balls she plays. Find the probability that she did not hit a boundary.

Sol. Total number of balls = 30

Number of balls having boundary = 6

Therefore, the number of balls not having boundary = $30 - 6 = 24$

$$P(\text{She did not hit a boundary}) = \frac{24}{30} = \frac{4}{5} = 0.8$$

Hence, the probability of not hitting a boundary by her is 0.8.

2. 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 girl (iii) No girl

Also check whether the sum of these probabilities is 1.

Sol. (i) Total number of families = 1500

Number of families with 2 girls = 475

Therefore,

$$P(2 \text{ girls}) = \frac{475}{1500} = \frac{19}{60}$$

Hence, the probability of family having two girls is $\frac{19}{60}$.

(ii) Number of families with 1 girl = 814

Therefore,

$$P(1 \text{ girl}) = \frac{814}{1500} = \frac{407}{750}$$

Hence, the probability of family having 1 girl is $\frac{407}{750}$.

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(iii) Number of families with no girl = 211

Therefore,

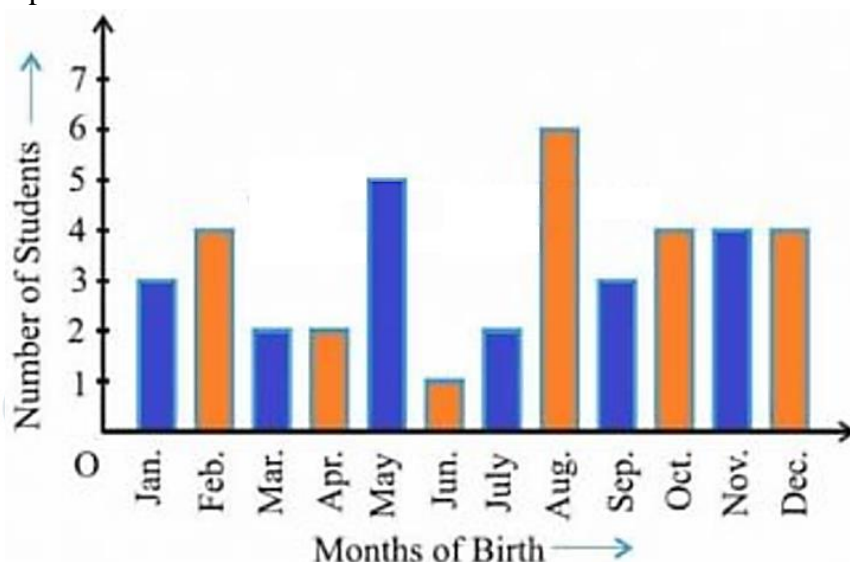
$$P(\text{No girl}) = \frac{211}{1500}$$

Hence, the probability of family having no girl is $\frac{211}{1500}$.

3. Refer to Example 5, Section 14.4, Chapter 14. Find the probability that a student of the class was born in August.

Sol. Example 5, Section 14.4, Chapter 14 is given below:

In a particular section of Class IX, 40 students were asked about the month of their birth and the following graph was prepared for the data so obtained:



Total number of students = 40

Number of students born in August = 6

Therefore,

$$P(\text{Student born in August}) = \frac{6}{40} = \frac{3}{20}$$

Hence, the probability that the student born in August is $\frac{3}{20}$.

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I still wonder how one man has such a deep understanding of an examination. It becomes the truth what ever Vipin Sir says about NTSE.

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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.

Sol. Total number of tosses = 200

Number of getting 2 Heads = 72

Therefore,

$$P(2 \text{ Head}) = \frac{72}{200} = \frac{9}{25}$$

Hence, the probability of getting 2 Heads is $\frac{9}{25}$.

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 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

- earning Rs. 10000 – 13000 per month and owning exactly 2 vehicles.
- earning Rs. 16000 or more per month and owning exactly 1 vehicle.
- earning less than Rs. 7000 per month and does not own any vehicle.
- earning Rs. 13000 – 16000 per month and owning more than 2 vehicles.
- owning not more than 1 vehicle.

Sol. (i) Total number of families = 2400

Number of families who has earning Rs. 10000 – 13000 per month and owning exactly 2 vehicles = 29

Therefore,

$$\text{Probability} = \frac{29}{2400}$$

Hence, the probability of families earning Rs. 10000 – 13000 per month and owning exactly 2 vehicles

is $\frac{29}{2400}$.

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(ii) Total number of families = 2400

Number of families who has earning Rs. 16000 or more per month and owning exactly 1 vehicle = 579

Therefore, Probability = $\frac{579}{2400} = \frac{193}{800}$

(iii) Total number of families = 2400

Number of families who has earning less than Rs.7000 per month and does not own any vehicle = 10

Therefore, Probability = $\frac{10}{2400} = \frac{1}{240}$

Hence, the probability of earning less than Rs.7000 per month and does not own any vehicle is $\frac{1}{240}$.

(iv) Total number of families = 2400

Number of families who are earning Rs.13000 – 16000 per month and owning more than 2 vehicles = 25

Therefore, Probability = $\frac{25}{2400} = \frac{1}{96}$

Hence, the probability of earning Rs.13000 – 16000 per month and owning more than 2 vehicles is $\frac{1}{96}$.

(v) Total number of families = 2400

Number of families who are owning not more than 1 vehicle

= 10 + 0 + 1 + 2 + 1 + 160 + 305 + 535 + 469 + 579 = 2062

Therefore, Probability = $\frac{2062}{2400} = \frac{1031}{1200}$

Hence, the probability of owning not more than 1 vehicle is $\frac{1031}{1200}$.

6. Refer to Table 14.7, Chapter 14.

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

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

Marks	Number of students
0 – 20	7
20 – 30	10
30 – 40	10
40 – 50	20
50 – 60	20
60 – 70	15
70 – and above	8
Total	90

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Sol. Table 14.7, Chapter 14:

Marks	Number of students
0 – 20	7
20 – 30	10
30 – 40	10
40 – 50	20
50 – 60	20
60 – 70	15
70 – and above	8
Total	90

(i) Total number of students = 90

Numbers of students obtaining less than 20 marks in the mathematics test 20marks = 7

Therefore,

$$\text{Probability} = \frac{7}{90}$$

Hence, the probability that a student obtained less than 20marks in the mathematics test is $\frac{7}{90}$.

(ii) Total number of students = 90

Number of students obtaining marks 60 or above = 15 + 8 = 23.

Therefore,

$$\text{Probability} = \frac{23}{90}$$

Hence, the probability that a student obtained marks 60 or above is $\frac{23}{90}$.

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.

Sol. (i) Total number of students = 200

Number of students who like Statistics = 135

Therefore,

$$P(\text{student likes Statistics}) = \frac{135}{200} = \frac{27}{40}$$

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Hence, the probability that a student likes Statistics is $\frac{27}{40}$.

(ii) Total number of students = 200

Number of students who dislike Statistics = 65

Therefore,

$$P(\text{students dislike Statistics}) = \frac{65}{200} = \frac{13}{40}$$

Hence, the probability that a student dislike is $\frac{13}{40}$.

- 8. Activity:** Note the frequency of two-wheelers, three-wheelers and four-wheelers going past during a time interval, in front of your school gate. Find the probability that any one vehicle out of the total vehicles you have observed is a two-wheeler.

The frequency table of the two-wheelers, three-wheelers and four-wheelers going past during 2 : 30 pm to 3 : 30 pm in front of our school is given below:

Vehicle	Two-wheelers	Three-wheelers	Four-wheelers	Total
Frequency	12	7	9	28

Sol. Total number of vehicles = 28 and number of two-wheelers = 12

Therefore,

$$P(\text{two-wheelers}) = \frac{12}{28} = \frac{3}{7}$$

Hence, the probability of two-wheelers is $\frac{3}{7}$.

- 9.** Eleven bags of wheat flour, each marked 5 kg, actually contained the following weights of flour (in kg):

4.97 5.05 5.08 5.03 5.00 5.06 5.08 4.98 5.04 5.07 5.00

Find the probability that any of these bags chosen at random contains more than 5 kg of flour.

Sol. Arranging the data in ascending order: 4.97, 4.98, 5.00, 5.00, 5.03, 5.04, 5.05, 5.06, 5.07, 5.08, 5.08

Total number of flour bags = 11 and number of bags containing more than 5 kg of flour = 7

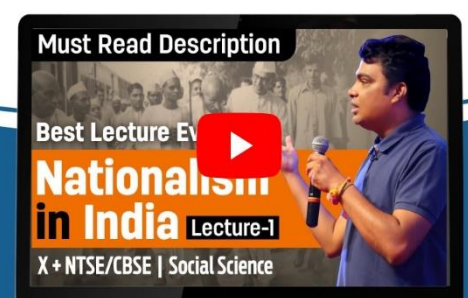
$$P(\text{a bag contains more than 5 kg of flour}) = \frac{7}{11}$$

Hence, the probability that any of these bags chosen at random contains more than 5 kg of flour is $\frac{7}{11}$.

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- 10.** In you were asked to prepare a frequency distribution table, regarding the concentration of sulphur dioxide in the air in parts per million of a certain city for 30 days. Using this table, find the probability of the concentration of sulphur dioxide in the interval 0.12 - 0.16 on any of these days.

A study was conducted to find out the concentration of sulphur dioxide in the air in parts per million (ppm) of a certain city. The data obtained for 30 days is as follows:

0.03	0.08	0.08	0.09	0.04	0.17
0.16	0.05	0.02	0.06	0.18	0.20
0.11	0.08	0.12	0.13	0.22	0.07
0.08	0.01	0.10	0.06	0.09	0.18
0.11	0.07	0.05	0.07	0.01	0.04

Sol. A study was conducted to find out the concentration of sulphur dioxide in the air in parts per million (ppm) of a certain city. The data obtained for 30 days is as follows:

0.03	0.08	0.08	0.09	0.04	0.17
0.16	0.05	0.02	0.06	0.18	0.20
0.11	0.08	0.12	0.13	0.22	0.07
0.08	0.01	0.10	0.06	0.09	0.18
0.11	0.07	0.05	0.07	0.01	0.04

The grouped frequency distribution table for this data is as follows:

Sulphur dioxide in parts per million (ppm) –	Number of days (Frequency)
0.00 – 0.04	4
0.04 – 0.08	9
0.08 – 0.12	9
0.12 – 0.16	2
0.16 – 0.20	4
0.20 – 0.24	2
Total	30

$$P(\text{Concentration of sulphur dioxide in the interval } 0.12 - 0.16) = \frac{2}{30} = \frac{1}{15}$$

Hence, the probability of the concentration of sulphur dioxide in the interval 0.12 – 0.16 on any of day is $\frac{1}{15}$.

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