SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

PROBABLITY

Exercise- 15.1

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

Ans. Number of times the batswoman hits a boundary = 6

Total number of balls played = 30

∴ Number of times that the batswoman does not hit a boundary = 30 − 6 = 24

$$P(\text{she not hit a boundary}) = \frac{\text{Number of times when she does not hit boundary}}{\text{Total number of balls played}}$$

$$= \frac{24}{30} = \frac{4}{5}$$

Q.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.

Ans. Total number of families = 475 + 814 + 211= 1500

(i) Number of families having 2 girls = 475

$$P_1(\text{a randomly chosen has 2 girls}) = \frac{\text{Number of families having 2 girls}}{\text{Total number of families}}$$

$$= \frac{475}{1500} = \frac{19}{60}$$

(ii) Number of families having 1 girl = 814

$$P_2(\text{a randomly chosen has 1 girls}) = \frac{\text{Number of families having 1 girls}}{\text{Total number of families}}$$

$$= \frac{814}{1500} = \frac{407}{750}$$

(iii) Number of families having no girl = 211

$$P_3(\text{a randomly chosen has no girls}) = \frac{\text{Number of families having no girls}}{\text{Total number of families}}$$

$$= \frac{211}{1500}$$

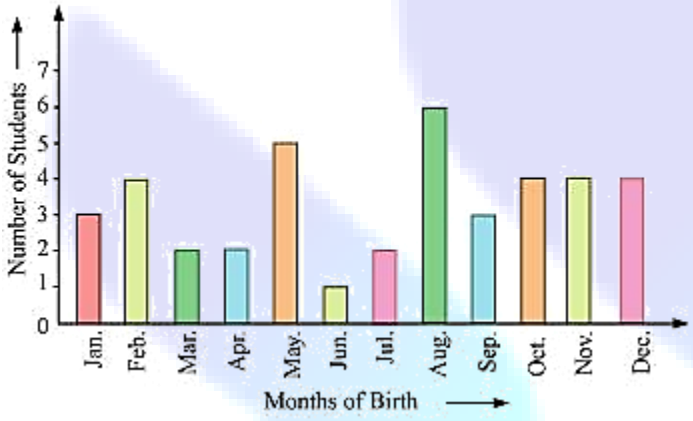
$$\text{Sum of all these probabilities} = \frac{19}{60} + \frac{407}{750} + \frac{211}{1500}$$

$$= \frac{475 + 407 + 211}{1500}$$

$$\frac{1500}{1500} = 1$$

Therefore, the sum of all these probabilities is 1.

Q.2 In a particular section of Class IX, 40 students were asked about the months of their birth and the following graph was prepared for the data so obtained:



Find the probability that a student of the class was born in August.

Ans. Number of students born in the month of August = 6

Total number of students = 40

$$P(\text{Student born in the month of august}) = \frac{\text{Number of student born in August}}{\text{Total number of student}}$$

$$= \frac{6}{40} = \frac{3}{20}$$

Q.4 Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes:

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

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

Number of times 2 heads come up = 72

Total number of times the coins were tossed = 200

$$P(2 \text{ heads will come up}) = \frac{\text{Number of times 2 heads come up}}{\text{Total number of times the coins were tossed}}$$

$$= \frac{7}{200} = \frac{9}{25}$$

Q.5 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 then 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.

(v) Owning not more than 1 vehicle.

Ans. Number of total families surveyed = 10 + 160 + 25 + 0 + 0 + 305 + 27 + 2 + 1 + 535 + 29 + 1 + 2 + 469 + 59 + 25 + 1 + 579 + 82 + 88 = 2400

(i) Number of families earning Rs 10000 -− 13000 per month and owning exactly 2 vehicles = $P = \frac{29}{2400}$

Hence, required probability, $P = \frac{29}{2400}$

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

Hence, required probability, $P = \frac{29}{2400}$

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

Hence, required probability, $P = \frac{29}{2400} = \frac{1}{240}$

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

Hence, required probability, $P = \frac{29}{2400} = \frac{1}{96}$

(v) Number of families owning not more than 1 vehicle = 10 + 160 + 0 + 305 + 1 + 535 + 2 + 469 + 1 + 579 = 2062

Hence, required probability, $P = \frac{2062}{2400} = \frac{1031}{1200}$

Q.6 A teacher wanted to analyses 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.

Ans. Total number of students $= 90$

(i) Number of students getting less than 20 % marks in the test $= 7$

Hence, required probability, $P = \frac{7}{90}$

(ii) Number of students obtaining marks 60 or above $= 15 + 8 = 23$

Hence, required probability, $P = \frac{23}{90}$

Q.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

Ans. Total number of students $= 135 + 65 = 200$

(i) Number of students liking statistics $= 135$

$$P(\text{student liking statistics}) = \frac{135}{200} = \frac{27}{40}$$

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

$$P(\text{student not liking statistics}) = \frac{65}{200} = \frac{13}{40}$$

Q.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 $\frac{1}{2}$ km from her place of work?

Ans. **(i)** Total number of engineers = 40

Number of engineers living less than 7 km from their place of work = 9

Hence, required probability that an engineer lives less than 7 km from her place of work, $P = \frac{9}{40}$

(ii) Number of engineers living more than or equal to 7 km from their place of work = $40 - 9 = 31$

Hence, required probability that an engineer lives more than or equal to 7 km from her place of work,

$$P = \frac{31}{40}$$

(iii) Number of engineers living within $\frac{1}{2}$ km from her place of work = 0

Hence, required probability that an engineer lives within $\frac{1}{2}$ km from her place of work, P = 0

Q.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.

Ans. Number of total bags = 11

Number of bags containing more than 5 kg of flour = 7

Hence, required probability, $P = \frac{7}{11}$

Q.10

Concentration of SO_2 (in 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

The above frequency distribution table represents 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.

Ans. Number days for which the concentration of Sulphur dioxide was in the interval of $0.12 - 0.16 = 2$

Total number of days $= 30$

Hence, required probability, $P = \frac{2}{30} = \frac{1}{15}$

Q.11

Blood group	Number of students
A	9
B	6
AB	3
O	12
Total	30

The above frequency distribution table represents the blood groups of 30 students of a class. Use this table to determine the probability that a student of this class, selected at random, has blood group AB.

Ans. Number of students having blood group AB $= 3$

Total number of students $= 30$

Hence, required probability, $P = \frac{3}{30} = \frac{1}{10}$