Exercise 15.1 Page: 283

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.

Solution:

According to the question,

Total number of balls = 30

Numbers of boundary = 6

Number of time batswoman didn't hit boundary = 30 - 6 = 24

Probability she did not hit a boundary = 24/30 = 4/5

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.

Solution:

Total numbers of families = 1500

(i) Numbers of families having 2 girls = 475

Probability = Numbers of families having 2 girls/Total numbers of families

= 475/1500 = 19/60

(ii) Numbers of families having 1 girl = 814

Probability = Numbers of families having 1 girl/Total numbers of families

= 814/1500 = 407/750

(iii) Numbers of families having 0 girls = 211

Probability = Numbers of families having 0 girls/Total numbers of families

= 211/1500

Sum of the probability = (19/60)+(407/750)+(211/1500)

= (475+814+211)/1500

= 1500/1500 = 1

Yes, the sum of these probabilities is 1.

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

Solution:

Fig. 14.1

Total numbers of students in the class = 40
Numbers of students born in August = 6
The probability that a student of the class was born in August, = 6/40 = 3/20

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:

Number of times 2 heads come up = 72
Total number of times the coins were tossed = 200
∴, the probability of 2 heads coming up = 72/200 = 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 ₹)	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:

Total number of families = 2400

(i) Numbers of families earning ₹10000 –13000 per month and owning exactly 2 vehicles = 29
∴, the probability that the family chosen is earning ₹10000 – 13000 per month and owning exactly 2 vehicles = 29/2400

(ii) Number of families earning ₹16000 or more per month and owning exactly 1 vehicle = 579
∴, the probability that the family chosen is earning₹16000 or more per month and owning exactly 1 vehicle = 579/2400

(iii) Number of families earning less than ₹7000 per month and does not own any vehicle = 10
∴, the probability that the family chosen is earning less than ₹7000 per month and does not own any vehicle = 10/2400 = 1/240

(iv) Number of families earning ₹13000-16000 per month and owning more than 2 vehicles = 25
∴, the probability that the family chosen is earning ₹13000 – 16000 per month and owning more than 2 vehicles = 25/2400 = 1/96

(v) Number of families owning not more than 1 vehicle = 10+160+0+305+1+535+2+469+1+579 = 2062
∴, the probability that the family chosen owns not more than 1 vehicle = 2062/2400 = 1031/1200

6. Refer to Table 14.7, Chapter 14.
(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:

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

Total number of students = 90

(i) Number of students who obtained less than 20% in the mathematics test = 7
∴, the probability that a student obtained less than 20% in the mathematics test = 7/90

(ii) Number of students who obtained marks 60 or above = 15+8 = 23
∴, the probability that a student obtained marks 60 or above = 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.

Solution:

Total number of students = 135+65 = 200

(i) Number of students who like statistics = 135
∴, the probability that a student likes statistics = 135/200 = 27/40

(ii) Number of students who do not like statistics = 65
∴, the probability that a student does not like statistics = 65/200 = 13/40

8. Refer to Q.2, Exercise 14.2. 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?

Solution:

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 3 2
17 16 2 7 9 7 8 3 5 12 15 18 3 12 14 2 9 6
15 15 7 6 12

Total numbers of engineers = 40

(i) Number of engineers living less than 7 km from their place of work = 9
∴,the probability that an engineer lives less than 7 km from her place of work = 9/40

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

∴,probability that an engineer lives more than or equal to 7 km from her place of work = 31/40

(iii) Number of engineers living within ½ km from their place of work = 0
∴, the probability that an engineer lives within ½ km from her place of work = 0/40 = 0

9. 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.

Solution:

The question is an activity to be performed by the students.
Hence, perform the activity by yourself and note down your inference.

10. Activity : Ask all the students in your class to write a 3-digit number. Choose any student from the room at random. What is the probability that the number written by her/him is divisible by 3? Remember that a number is divisible by 3, if the sum of its digits is divisible by 3.

Solution:

The question is an activity to be performed by the students.

Hence, perform the activity by yourself and note down your inference.

11. 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.

Solution:

Total number of bags present = 11
Number of bags containing more than 5 kg of flour = 7
∴, the probability that any of the bags chosen at random contains more than 5 kg of flour = 7/11

12. In Q.5, Exercise 14.2, 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.

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**						

Solution:

Total number of days in which the data was recorded = 30 days
Numbers of days in which sulphur dioxide was present in between the interval 0.12-0.16 = 2
∴, the probability of the concentration of sulphur dioxide in the interval 0.12-0.16 on any of these days = 2/30 = 1/15

13. In Q.1, Exercise 14.2, you were asked to prepare a frequency distribution table regarding 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.
The blood groups of 30 students of Class VIII are recorded as follows:
A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O, A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O.

Solution:

Total numbers of students = 30
Number of students having blood group AB = 3
∴, the probability that a student of this class, selected at random, has blood group AB = 3/30 = 1/10