RS Aggarwal Solutions for Class 9 Maths Chapter 19 - Probability

EXERCISE 19

1. A coin is tossed 500 times and we get
Heads: 285 times and tails: 215 times.
When a coin is tossed at random, what is the probability of getting
(i) a head?
(ii) a tail?
Solution:

It is given that
Number of trials = 500
Number of heads = 285
Number of tails = 215

(i) Consider E as the event of getting a head
So we get
P (E) = number of heads coming up/ total number of trials
By substituting the values
P (E) = 285/500
We get
P (E) = 0.57

(ii) Consider F as the event of getting a tail
So we get
P (F) = number of tails coming up/ total number of trials
By substituting the values
P (F) = 215/500
We get
P (F) = 0.43

2. Two coins are tossed 400 times and we get
Two heads: 112 times; one head: 160 times; 0 head: 128 times.
When two coins are tossed at random, what is the probability of getting
(i) 2 heads?
(ii) 1 head?
(iii) 0 head?
Solution:

It is given that
Number of trials = 400
Number of times 2 head = 112
Number of times 1 head = 160
Number of times 0 head = 128

Take E_1, E_2 and E_3 as the events

(i) So we get
P (E_1) = number of times 2 head/ number of trials
By substituting the values
P (E_1) = 112/ 400

We get
P (E_1) = 0.28

(ii) So we get
P (E_2) = number of times 1 head/ number of trials
By substituting the values
P (E_2) = 160/ 400
We get
P (E_2) = 0.4

(iii) So we get
P (E_3) = number of times 0 head/ number of trials
By substituting the values
P (E_3) = 128/ 400
We get
P (E_3) = 0.32

3. Three coins are tossed 200 times and we get
Three heads: 39 times; two heads: 58 times;
One head: 67 times; o head: 36 times.
When three coins are tossed at random, what is the probability of getting
(i) 3 heads?
(ii) 1 head?
(iii) 0 head?
(iv) 2 heads?
Solution:

It is given that
Number of trials = 200
Number of times 3 heads = 39
Number of times 2 heads = 58
Number of times 1 head = 67
Number of times 0 head = 36

Consider E_1, E_2, E_3 and E_4 as the events

(i) So we get
P (E_1) = number of times 3 head/ number of trials
By substituting the values
P (E_1) = 39/ 200
We get
P (E_1) = 0.195

(ii) So we get
P (E_2) = number of times 1 head/ number of trials
By substituting the values
P (E_2) = 67/ 200
We get
P (E_2) = 0.335

(iii) So we get

P (E_3) = number of times 0 head/ number of trials

By substituting the values

P (E_3) = 36/ 200

We get

P (E_3) = 0.18

(iv) So we get

P (E_4) = number of times 2 head/ number of trials

By substituting the values

P (E_4) = 58/ 200

We get

P (E_4) = 0.29

4. A die is thrown 300 times and the outcomes are noted as given below:

Outcome	1	2	3	4	5	6
Frequency	60	72	54	42	39	33

When a die is thrown at random, what is the probability of getting a
(i) 3?
(ii) 6?
(iii) 5?
(iv) 1?
Solution:

It is given that

Number of trials = 300

Consider E_1, E_2, E_3 and E_4 as the events

(i) So we get

P (E_1) = number of times 3 head/ number of trials

By substituting the values

P (E_1) = 54/ 300

We get

P (E_1) = 0.18

(ii) So we get

P (E_2) = number of times 6 head/ number of trials

By substituting the values

P (E_2) = 33/ 300

We get

P (E_2) = 0.11

(iii) So we get

P (E_3) = number of times 5 head/ number of trials

By substituting the values

P (E_3) = 39/ 300

We get

P (E_3) = 0.13

(iv) So we get

P (E_4) = number of times 2 head/ number of trials

By substituting the values

P (E_4) = 60/ 300

We get

P (E_4) = 0.2

5. In a survey of 200 ladies, it was found that 142 like coffee, while 58 dislike it. Find the probability that a lady chosen at random

(i) likes coffee,

(ii) dislikes coffee.

Solution:

It is given that

Number of ladies = 200

Number of ladies who like coffee = 142

Number of ladies who dislike coffee = 58

Consider E_1 as the event that the selected ladies like coffee

So we get

P (E_1) = number of ladies who like coffee/ number of trials

By substituting the values

P (E_1) = 142/ 200

We get

P (E_1) = 0.71

Consider E_1 as the event that the selected ladies dislike coffee

So we get

P (E_2) = number of ladies who dislike coffee/ number of trials

By substituting the values

P (E_2) = 58/ 200

We get

P (E_2) = 0.29

6. The percentages of marks obtained by a student in six unit tests are given below:

Unit test	I	II	III	IV	V	VI
Percentage of marks obtained	53	72	28	46	67	59

A unit test is selected at random. What is the probability that the student gets more than 60% marks in the test?

Solution:

We know that

Number of tests which he gets more than 60% is 2

The total number of tests is 6

So we get

Required probability = Number of tests which he gets more than 60%/ total number of tests

By substituting the values
Required probability = 2/6
On further calculation
Required probability = 1/3

7. On a particular day, at a crossing in a city, the various types of 24 vehicles going past during a time interval were observed under:

Types of vehicle	Two-wheelers	Three-wheelers	Four-wheelers
Frequency	84	68	88

Out of these vehicles, one is chosen at random. What is the probability that the chosen vehicle is a two-wheeler?
Solution:

It is given that
Number of vehicles = 240
Number of two wheelers = 84

We know that
Required probability = number of two wheelers/ number of vehicles
By substituting the values
Required probability = 84/240
By division
Required probability = 0.35

8. On one page of a telephone directory, there are 200 phone numbers. The frequency distribution of their unit's digits is given below:

Unit's digit	0	1	2	3	4	5	6	7	8	9
Frequency	19	22	23	19	21	24	23	18	16	15

One of the numbers is chosen at random from the page. What is the probability that the unit's digit of the chosen number is (i) 5? (ii) 8?
Solution:

It is given that
Total number of phone numbers = 200

(i) We know that
Number of phone numbers with 5 = 24

So we get
Required probability = number of phone numbers with 5/ Total number of phone numbers
By substituting the values
Required probability = 24/100 = 0.12

(ii) We know that

Number of phone numbers with 8 = 16

So we get
Required probability = number of phone numbers with 8/ Total number of phone numbers
By substituting the values
Required probability = 16/200 = 0.08

9. The following table shows the blood groups of 40 students of a class.

Blood group	A	B	O	AB
Number of students	11	9	14	6

One student of the class is chosen at random. What is the probability that the chosen student has blood group (i) O? (ii) AB?
Solution:

It is given that
Total number of students = 40

(i) We know that
Number of students having blood group O = 14
So we get
Required probability = number of students having blood group O/ Total number of students
By substituting the values
Required probability = 14/40 = 0.35

(ii) We know that
Number of students having blood group AB = 6
So we get
Required probability = number of students having blood group AB/ Total number of students
By substituting the values
Required probability = 6/40 = 0.15

10. 12 packets of salt, each marked 2kg, actually contained the following weights (in kg) of salt:
1.950, 2.020, 2.060, 1.980, 2.030, 1.970, 2.040, 1.990, 1.985, 2.025, 2.000, 1.980
Out of these packets, one packet is chosen at random.
What is the probability that the chosen packet contains more than 2kg of salt?
Solution:

It is given that
Total number of salt packets = 12
Number of packets having more than 2kg of salt = 5

We know that
Probability that the chosen packet contains more than 2kg of salt = number of packets having more than 2kg of salt/ total number of salt packets
By substituting the values
Probability that the chosen packet contains more than 2kg of salt = 5/12

11. In a cricket match, a batsman hits a boundary 6 times out of 3 balls he plays. Find the probability that he did not hit a boundary.

Solution:

It is given that

Number of times boundary was hit = 6

Total number of balls played = 30

So we get

Number of times boundary was not hit = 30 – 6 = 24

We know that

Probability that the batsman did not hit a boundary = number of times boundary was not hit/ total number of balls played

By substituting the values

Probability that the batsman did not hit a boundary = 24/30

By division

Probability that the batsman did not hit a boundary = 4/5 = 0.8

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

Monthly income (in ₹)	Number of vehicles per family			
	0	1	2	3 or more
Less than ₹ 25000	10	160	25	0
₹ 25000 - ₹ 30000	0	305	27	2
₹ 30000 - ₹ 35000	1	535	29	1
₹ 35000 - ₹ 40000	2	469	59	25
₹ 40000 or more	1	579	82	88

Suppose a family is chosen at random. Find the probability that the family chosen is

(i) earning ₹ 25000 - ₹ 30000 per month and owing exactly 2 vehicles.

(ii) earning ₹ 40000 or more per month and owing exactly 1 vehicle.

(iii) earning less than ₹ 25000 per month and not owing any vehicle.

(iv) earning ₹ 35000 - ₹ 40000 per month and owing 2 or more vehicles.

(v) owing not more than 1 vehicle.

Solution:

(i) We know that

Probability that the family chosen is earning ₹ 25000 - ₹ 30000 per month and owing exactly 2 vehicles = 27/2400 = 9/800

(ii) We know that

Probability that the family chosen is earning ₹ 40000 or more per month and owing exactly 1 vehicle = 579/ 2400 = 193/ 800

(iii) We know that

Probability that the family chosen is earning less than ₹ 25000 per month and not owing

any vehicle = 10/ 2400 = 1/240

(iv) We know that
Probability that the family chosen is earning ₹ 35000 - ₹ 40000 per month and owing 2 or
more vehicles = Probability of families owing 2 vehicles + probability of families owing 3 or more vehicles
By substituting the values
Probability that the family chosen is earning ₹ 35000 - ₹ 40000 per month and owing 2 or
more vehicles = (59 + 25)/ 2400
On further calculation
Probability that the family chosen is earning ₹ 35000 - ₹ 40000 per month and owing 2 or
more vehicles = 84/2400 = 7/200

(v) We know that
Probability that the family chosen is owing not more than 1 vehicle = Probability of families owing 0 vehicle +
probability of families owing 1 vehicle
By substituting the values
Probability that the family chosen is owing not more than 1 vehicle = [10 + 0 + 1 + 2 + 1) + (160 + 305 + 535 +
469 + 579)]/2
On further calculation
Probability that the family chosen is owing not more than 1 vehicle = (14 + 2048)/2400
So we get
Probability that the family chosen is owing not more than 1 vehicle = 2062/2400 = 1031/1200

13. The table given below shows the marks obtained by 30 students in a test.

Marks (Class interval)	1 - 10	11 - 20	21 - 30	31 - 40	41 - 50
Number of students (Frequency)	7	10	6	4	3

Out of these students, one is chosen at random. What is the probability that the marks of the chosen student
(i) are 30 or less?
(ii) are 31 or more?
(iii) lie in the interval 21 – 30?
Solution:

It is given that
Total number of students = 30

(i) We know that
Probability that the marks of the chosen students are 30 or less = (7 + 10 + 6)/ 30
So we get
Probability that the marks of the chosen students are 30 or less = 23/30

(ii) We know that
Probability that the marks of the chosen students are 31 or more = (4 + 3)/30
So we get
Probability that the marks of the chosen students are 31 or more = 7/30

(iii) We know that

Probability that the marks of the chosen students lie in the interval 21 – 30 = 6/30
So we get
Probability that the marks of the chosen students lie in the interval 21 – 30 = 1/5

14. The table given below shows the ages of 75 teachers in a school.

Age (in years)	18 - 29	30 - 39	40 - 49	50 - 59
Number of teachers	3	27	37	8

A teacher from this school is chosen at random. What is the probability that the selected teacher is
(i) 40 or more than 40 years old?
(ii) of any age lying between 30-39 years (including both)?
(iii) 18 years or more and 49 years or less?
(iv) 18 years or more old?
(v) above 60 years of age?
Solution:

It is given that
Total number of teachers = 75

(i) We know that
Probability that the selected teacher is 40 or more than 40 years old = (37 + 8)/ 75
So we get
Probability that the selected teacher is 40 or more than 40 years old = 45/75 = 3/5

(ii) We know that
Probability that the selected teacher is of any age lying between 30-39 years (including both) = 27/75
So we get
Probability that the selected teacher is of any age lying between 30-39 years (including both) = 9/25

(iii) We know that
Probability that the selected teacher is 18 years or more and 49 years or less = (3 + 27 + 37)/ 75
So we get
Probability that the selected teacher is 18 years or more and 49 years or less = 67/75

(iv) We know that
Probability that the selected teacher is 18 years or more old = (3 + 27 + 37 + 8)/75
So we get
Probability that the selected teacher is 18 years or more old = 75/75 = 1

(v) We know that
Probability that the selected teacher is above 60 years of age = 0/75 = 0

15. Following are the ages (in years) of 360 patients, getting medical treatment in a hospital:

Age (in years)	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Number of patients	90	50	60	80	50	30

On of the patients is selected at random.
What is the probability that his age is
(i) 30 years or more but less than 40 years?
(ii) 50 years or more but less than 70 years?
(iii) 10 years or more but less than 40 years?
(iv) 10 years or more?
(v) less than 10 years?
Solution:

It is given that
Total number of patients = 360

(i) We know that
Probability that his age is 30 years or more but less than 40 years = 60/360 = 1/6

(ii) We know that
Probability that his age is 50 years or more but less than 70 years = (50 + 30)/360
So we get
Probability that his age is 50 years or more but less than 70 years = 80/360 = 2/9

(iii) We know that
Probability that his age is 10 years or more but less than 40 years = (90 + 50 + 60)/360
So we get
Probability that his age is 10 years or more but less than 40 years = 200/ 360 = 5/9

(iv) We know that
Probability that his age is 10 years or more = 1

(v) We know that
Probability that his age is less than 10 years = 0

16. The marks obtained by 90 students of a school in mathematics out of 100 are given as under:

Marks	0 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 and above
Number of patients	7	8	12	25	19	10	9

From these students, a student is chosen at random.
What is the probability that the chosen student
(i) gets 20% or less marks?
(ii) gets 60% or more marks?
Solution:

It is given that
Total number of patients = 90

(i) We know that
Probability that the chosen student gets 20% or less marks = 7/90

(ii) We know that

Probability that the chosen student gets 60% or more marks = (10 +9)/90
So we get
Probability that the chosen student gets 60% or more marks = 19/90

17. It is known that a box of 800 electric bulbs contains 36 defective bulbs. One bulb is taken at random out of the box. What is the probability that the bulb chosen is non-defective?
Solution:

It is given that
Total number of electric bulbs = 800
Defective bulbs = 36
So the number of non-defective bulbs = 800 – 36 = 764

We know that
Probability that the bulb chosen is non defective = number of non-defective bulbs/ total number of bulbs
By substituting the values
Probability that the bulb chosen is non defective = 764/800
So we get
Probability that the bulb chosen is non defective = 191/200

18. Fill in the blanks.
(i) Probability of an impossible event = …….
(ii) Probability of a sure event = ……..
(iii) Let E be an event. Then, P (not E) = ……..
(iv) P (E) + P (not E) = ……..
(v) …….. ≤ P (E) ≤ ……….
Solution:

(i) Probability of an impossible event = 0.

(ii) Probability of a sure event = 1.

(iii) Let E be an event. Then, P (not E) = 1 – P (E).

(iv) P (E) + P (not E) = 1.

(v) 0 ≤ P (E) ≤ 1.