Chapter 8 Probability

Very Short Answer Type Questions

Q1. A box contains 50 bolts and 150 nuts. On checking the box, it was found that half of the bolts and half of the nuts are rusted. If one item is chosen at random, find the probability that it is rusted. [CBSE-15-NS72LP7]

Answer.

$$\text{Total number of nuts and bolts in the box} = 150 + 50 = 200$$

$$\text{Number of nuts and bolts rusted} = \frac{1}{2} \times 200 = 100$$

$$\text{P(a rusted nut or bolt)} = \frac{100}{200} = \frac{1}{2}$$

Q2. A dice is rolled number of times and its outcomes are recorded as below :

Outcome	*1*	*2*	*3*	*4*	*5*	*6*
Frequency	*35*	*45*	*50*	*38*	*53*	*29*

Find the probability of getting an odd number. [CBSE-15-NS72LP7]

Answer. Total number of outcomes = 250
Total number of outcomes of getting odd numbers = 35 + 50 + 53 = 138
.-. P(getting an odd number) = 138/250=69/125

Q3. IfP (event E) = 0.47, then find P(not E).

Answer. P(not E) = 1 – P(E)
=> 1 – 0.47 = 0.53

Q4. The probability of guessing the correct answer to a certain question is x/ 2.If probability of not guessing the correct answer is 2 /3 then find x. [CBSE-14-ERFKZ8H], [CBSE-14-17DIG1U]

Answer.

Here, probability of guessing the correct answer $= \frac{x}{2}$

And probability of not guessing the correct answer $= \frac{2}{3}$

Now, $\frac{x}{2} + \frac{2}{3} = 1$

$\Rightarrow \quad 3x + 4 = 6$

$\Rightarrow \quad 3x = 2$

$\Rightarrow \quad x = \frac{2}{3}$

Q5. A die is thrown six times and number on it is noted as given below :

Number on die	***1***	***2***	***3***	***4***	***5***	***6***
Frequency	***1***	***1***	***1***	***1***	***1***	***1***

Compute the probability of getting a prime number. [NCERT Exemplar Problem]

Answer. Here, in 6 trials, each number occur once and total prime numbers i.e., 2, 3, 5 occur one time each
Hence, the number of prime occur = 3
Probability of getting a prime = 3/6 =1/2

Q6. In a survey of 364 children aged 19-36 months, it was found that 91 liked to eat potato chips. If a child is selected at random, compute the probability that he/she does not like to eat potato chips. [NCERT Exemplar Problem]

Answer. Total children = 364
Number of children like potato chips = 91
.-. Number of children do not like potato chips = 364 – 91 = 273 273
Required probability = 273 / 364 =0.75

Q7. In a medical examination of students of a class, the following blood groups are recorded :

Blood group	***A***	***AB***	***B***	***O***
Number of Students	***10***	***13***	***12***	***5***

A student is selected at random from the class. Find the probability that he/she has blood group B. [NCERT Exemplar Problem]

Answer. Total number of students = 10 + 13 + 12 + 5 = 40
Number of students having blood group 'B' = 12
Required probability =12 / 40 = 3 / 10

Q8. Two coins are tossed 1000 times and the outcomes are recorded as below :

No. of heads	2	1	0
Frequency	200	550	250

Based on this information, find the probability for at most one head.

Answer. Required probability = P(0 heads) + P(1 head)
= 250/1000 + 550 / 1000 = 800/ 1000 =4 / 5 =0.8

Q9. A bag contains x white, y red and z blue balls. A ball is drawn at the random, then what is the probability of drawing a blue ball.

Answer. Number of blue balls = z
Total balls = x + y + z
therefore P(ablueball)= z /(x+y+z)

Q10. In a throw of a die, find the probability of not getting 4 or 5.

Answer. Required probability = 1 – P(4) – P(5)
No formula provided=1- 1 / 6 - 1 / 6 = 4 / 6 = 2 / 3

Q11. In a sample study of 642 people, it was found that 514 people have a high school certificate. If a person is selected at random, find the probability that the person has a high school certificate.

Answer. Total number of persons = 642
Number of persons with high school certificate = 514
therefore Required probability=514 /642 =0.80

Q12. In a class, there are x girls and y boys, a student is selected at random, then find the probability of selecting a boy.

Answer. Number of boys = y
Total students = (x + y)
Thus,P(aboy)= y/(x+y)

Q13. 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. [CBSE March 2012]

Answer. Total number of chances = 23 + 72 + 77 + 28 = 200
Number of chances of coming 2 heads = 72
therefore P(coming 2 heads)= 514 / 642 = 9/ 25

Short Answer Questions Type-I

Q14. 750 families with 3 children were selected randomly and the following data recorded If a family member is chosen at random, compute the probability that it has :

Number of girls in a family	0	1	2	3
Number of families	120	220	310	100

(i) no boy child
(ii) no girl child [CBSE-15-6DWMW5A]

Answer. (i) P(no boy child) =100 / 750 = 2/15
(ii) P (no girl child) = 120 /750 =4 /25

Q15.If the probability of winning a race of an athlete is 1 / 6 less than the twice the probability of losing the race. Find the probability of winning the race. [CBSE-15-6DWMW5A]

Answer. Let probability of winning the race be p Probability of losing the race = 1 - p According to the statement of question, we have
p = 2 (1 - p) - 1/6
=>6p=12-12p-1
=>18p=11
=>p=11 / 18
Hence, probability of winning the race is 11 / 18 .

Q16. Two coins are tossed simultaneously for 360 times. The number of times '2 Tails' appeared was three times 'No Tail' appeared and number of times '1 tail' appeared is double the number of times 'No Tail' appeared. Find the probabiliy of getting 'Two tails'. [CBSE-14-ERFKZ8H], [CBSE-14-17DIG1U]

Answer. Total number of outcomes = 360
Let the number of times 'No Tail' appeared be x
Then, number of times '2 Tails' appeared =3x
Number of times '1 Tail' appeared =2x
Now, x + 2x + 3x =360
=>6x=360
=>x=60
P(of getting two tails)=(3 x 60)/360 =1 /2

Q17. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes :

Outcome	*3 tails*	*2 tails*	*1 tail*	*no tail*
Frequency	*20*	*68*	*82*	*30*

If the three coins are simultaneously tossed again, compute the probability of getting less than 3 tails. [NCERT Exemplar Problem].

Answer. It is given that coin is tossed 200 times Total number of trials = 200
Number of events for getting less than three tails = 68 + 82 + 30 = 180
Probability of getting less than 3 tails =180 / 200 =9 / 10

Q18. A die was rolled 100 times and the number of times, 6 came up was noted. If the experimental probability calculated from this information is 2 /5 then how many times 6 came up ? Justify your answer. [CBSE March 2013]

Answer.

Here, total number of trials = 100

Let x be the number of times occuring 6.

We know, Probability of an event $= \dfrac{\text{Frequency of the event occuring}}{\text{Total number of trials}}$

$\Rightarrow \quad \dfrac{x}{100} = \dfrac{2}{5}$ [$\because$ Probability is given]

$\Rightarrow \quad x = 40$

SHORT ANSWER QUESTIONS TYPE-II

Q19. The table shows the marks obtained by a student in unit tests out of 50 :

Unit Test	***I***	***II***	***III***	***IV***	***V***
Marks (Out of 50)	***34***	***35***	***36***	***34***	***37***

Find the probability that the student get 70% or more in the next unit test. Also, the probability that student get less than 70%. [CBSE-14-GDQNI3W]

Answer.

Here, the marks are out of 50, so we first find its percentage (i.e., out of 100)

Unit Test	I	II	III	IV	V
Marks (Out of 100)	68	70	72	68	74

Total number of outcomes = 5

Probability of getting 70% or more marks $= \dfrac{3}{5}$

Probability of getting less than 70% $= \dfrac{2}{5}$

Q20. Books are packed in piles each containing 20 books. Thirty five piles were examined for defective books and the results are given in the following table :

Number of defective books	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***Above 6***
Frequency	***400***	***180***	***48***	***41***	***18***	***8***	***3***	***2***

One pile was selected at random. What is the probability that it has :
(i) no defective books ?
(ii) more than 0 but less than 4 defective books ?
(iii) more than 4 defective books ? [CBSE-15-NS72LP7]

Answer.

Total number of books = 700

(*i*) P(no defective books) = $\frac{400}{700} = \frac{4}{7}$

(*ii*) P(more than 0 but less than 4 defective books) = $\frac{269}{700}$

(*iii*) P(more than 4 defective books) = $\frac{13}{700}$

Q21. The given table shows the month of birth of 40 students of class IX of a particular section in a school.

Month of Birth	*Number of Students*
January	*3*
February	*4*
March	*2*
April	*2*
May	*5*
June	*1*
July	*2*
August	*6*
September	*3*
October	*4*
November	*4*
December	*4*

If one student is chosen at random, find the probability that the student is born :
(a) in the later half of the year
(b) in the month having 31 days
(c) in the month having 30 days [CBSE-14-17DIG1U]

Answer.

(*a*) P (later half of the year) = $\frac{23}{40}$

(*b*) P (month having 31 days) = $\frac{26}{40} = \frac{13}{20}$

(*c*) P (month having 30 days) = $\frac{10}{40} = \frac{1}{4}$

Q22. Two dice are thrown simultaneously 500 times. Each time the sum of two numbers appearing on them is noted and recorded in the following table :

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	14	30	42	55	72	75	70	53	46	28	15

From the above data, what is the probability of getting a sum :
(i) more than 10 (ii) between 8 and 12. [NCERT Exemplar Problem]

Answer.

Total number of trials = 500

(*i*) Number of trials of getting a sum more than 10 = 28 + 15 = 43

$\therefore$ Required probability $= \frac{43}{500} = 0.086$

(*ii*) Number of trials of getting a sum between 8 and 12

$= 53 + 46 + 28 = 127$

$\therefore$ Required probability $= \frac{127}{500} = 0.254$

LONG ANSWER TYPE QUESTIONS

Q23. The daily cost of milk (in Rs) supplied to 25 houses in a locality are given below :

Cost (in ₹)	Number of Houses
40 – 50	4
50 – 60	5
60 – 70	3
70 – 80	5
80 – 90	2
90 – 100	6

If one house is chosen at random, find the probability that ;
(a) the milk bill of the house lies between Rs 60 and Rs 80.
(b) house is paying at the most Rs 69, for the milk bill.
(c) the milk bill of the house is below Rs 50. [CBSE-14-ERFKZ8H]

Answer.

Total number of houses = 25

(a) Total number of houses paying milk bill between ₹ 60 and ₹ 80 = 3 + 5 = 8

$\therefore$ P (milk bill between ₹ 60 and ₹ 80) = $\frac{8}{25}$

(b) Total number of houses paying milk bill at the most ₹ 69 = 4 + 5 + 3 = 12

$\therefore$ P (milk bill at the most ₹ 69) = $\frac{12}{25}$

(c) Total number of houses paying milk bill below ₹ 50 = 4

$\therefore$ P (milk bill below ₹ 50) = $\frac{4}{25}$

Q24. A travel company has 100 drivers for driving buses to various tourist destination. Given below is a table showing the resting time of the drivers after covering a certain distance (in km).

Distance (in km)	*After 80 km*	*After 115 km*	*After 155 km*	*After 200 km*
No. of drivers	*13*	*47*	*30*	*10*

What is the probability that the driver chosen at random
(a) takes a halt after covering 80 km ?
(b) takes a halt after covering 115 km ?
(c) takes a halt after covering 155 km ?
(d) takes a halt after crossing 200 km ? [CBSE-15-6DWMW5A]

Answer.

Total number of drivers = 100

(a) P (takes a halt after covering 80 km) = $\frac{13}{100}$

(b) P (takes a halt after covering 115 km) = $\frac{60}{100} = \frac{3}{5}$

(c) P (takes a halt after covering 155 km) = $\frac{90}{100} = \frac{9}{10}$

(d) P (takes a halt after crossing 200 km) = $\frac{10}{100} = \frac{1}{10}$

Q25. A survey of 2000 people of different age groups was conducted to find out their preference in watching different types of movies :
Type I —> Family
Type II —> Comedy and Family
Type III —> Romantic, Comedy and Family
Type IV —> Action, Romantic, Comedy and Family

Age group	Type I	Type II	Type III	Type IV	All
18 – 29	440	160	110	61	35
30 – 50	505	125	60	22	18
Above 50	360	45	35	15	9

Find the probability that a person chosen at random is :
(a) in 18-29 years of age and likes type II movies
(b) above 50 years of age and likes all types of movies
(c) in 30-50 years and likes type I movies. [CBSE-14-GDQNI3W]

Answer.

(a) Let E_1 be the event, between age group (18 – 29) years and liking type II movies
Favourable outcomes to event $E_1 = 160$

$$\therefore \quad P(E_1) = \frac{160}{2000}$$

$$= \frac{2}{25}$$

(b) Let E_2 be the event, of age group above 50 years and liking all types movies
Favourable outcomes to event $E_2 = 9$

$$\therefore \quad P(E_2) = \frac{9}{2000}$$

(c) Let E_3 be the event, between age group (30 – 50) years and liking type I movies
Favourable outcomes to event $E_3 = 505$

$$\therefore \quad P(E_3) = \frac{505}{2000}$$

$$= \frac{101}{400}$$

Value Based Questions

Q1. An insurance company selected 2000 drivers at random (i.e., without any preference of one driver over another) in a particular city to find a relationship between age and accidents. The data obtained are given in the following table :

Age group of drivers (in years)	Number of accidents in one year				
	0	1	2	3	more than 3
18 – 28	395	155	105	70	29
29 – 50	520	118	65	20	21
Above 50	390	57	35	8	12

Find the probability of the following events for a driver selected at random from the city:
(i) being 18-29 years of age and having exactly 3 accidents in one year.
(ii) being 30-50 years of age and having one or more accidents in a year.
(iii) having no accident in one year.
(iv) Which value would you like to remember from this data ?

Answer.

Here, total number of drivers = 2000

(*i*) The number of drivers in the age group 18 – 29 having exactly 3 accidents = 70

So, P (driver in age group 18 – 29 having exactly 3 accidents in one year) $= \frac{70}{2000}$
$= 0.035$

(*ii*) The number of drivers in the age group 30 – 50 and having one or more than one accidents in one year = 118 + 65 + 20 + 21 = 224

P (driver in age group 30 – 50 having one or more accidents in one year) $= \frac{224}{2000}$
$= 0.112$

(*iii*) The number of drivers having no accident in one year = 395 + 520 + 390
= 1305

So, P (driver having no accident) $= \frac{1305}{2000} = 0.6525$

(iv) Most number of people in India died or injured due to accidents as compared to any other country. So, we should obey the traffic rules as life is very precious.

Q2.There is a group of 130 people who are patriotic, 50 people believe in violence. What is the probability of people who believe in non-violence 7 Which value you will develop in your character ?

Answer.

Here, total number of people =130

Number of people believe in violence = 50

Number of people believe in non-violence =130 – 50 = 80

$\therefore$ Probability of people believe in non-violence $= \frac{80}{130} = \frac{8}{13}$

Thus, the required probability is $\frac{8}{13}$.

In order to have a peaceful environment both values are required patriotism and non-violence. Only

patriotism with violence is very dangerous.

Q3. 100 plants were sown in six different colonies A, B, C, D, E, and E After 31 days, the number of plants survived as follows ;

Colony	A	B	C	D	E	F
No. of Plants survived	80	90	84	76	82	92

What is the probability of:
(i) more than 80 plants survived in a colony ?
(ii) less than 82 plants survived in a colony ?
(iii) which value are depicted from above data ?

Answer.

Here, we have total number of colonies = 6

(*i*) Number of colonies in which more than 80 plants survived = 4 (*i.e.*, B, C, E and F)

$\therefore$ P(more than 80 plants survived in a colony) $= \frac{4}{6} = \frac{2}{3}$

(*ii*) Number of colonies in which less than 82 plants survived = 2 (*i.e.*, A and D)

$\therefore$ P (less than 82 plants survived in a colony) $= \frac{2}{6} = \frac{1}{3}$

(*iii*) In order to keep environment safe, clean and green, we should grow more and more plants.

Q4. For travelling, different mode of transport used by 1500 people are as follows:
Find the probability of number of people :

Mode of Transport	No. of People
Cycle	250
Scooter	400
Car	270
Bus	220
Train	260
No mode of Transport	100

(i) used car and scooter only ?
(ii) used only cycle ?
(iii) used at least one kind of mode of transport ?
(iv) which value would you learn from above data ?

Answer.

Here, total number of people = 1500

(*i*) Number of people used car and scooter only

= 270 + 400 = 670

$\therefore$ P(no. of people used car and scooter) = $\frac{670}{1500} = \frac{67}{150}$

(*ii*) Number of people used cycle only = 250

$\therefore$ P(no. of people used cycle only) = $\frac{250}{1500} = \frac{1}{6}$

(*iii*) Number of people used at least one kind of transport = 1500 – 100 = 1400

$\therefore$ P(no. of people used at least one kind of transport) = $\frac{1400}{1500} = \frac{14}{15}$

(*iv*) Keeping save environment factor, save energy and good health, cycle should be promoted as a mode of transport.

Q5. There is a group of 75 people who are patriotic, 35 people believe in violence. What is the probability of people who believe in non-violence ? Which value you will develop in your character ?

Answer.

Total number of people = 75

Number of people believe in violence = 35

Number of people believe in non-violence = 75 – 35 = 40

Probability of people believe in non-violence = $\frac{40}{75} = \frac{8}{15}$

In order, to have a peaceful environment both values are required patriotism and non¬violence. Only patriotism with violence is very dangerous.