Q1. A coin is tossed 1000 times with the following sequence: Head: 455, Tail=:545. Compute the probability of each event

Answer:

It is given that the coin is tossed 1000 times. The number of trials is 1000

Let us denote the event of getting head and of getting tails be E and F respectively. Then

Number of trials in which the E happens= 455

So, Probability of E= $\frac{\text{Numberofeventheads}}{\text{Totalnooftrials}}$

i.e. P(E) = $\frac{455}{1000}$ =0.455

Similarity, the probability of the event getting a tail = $\frac{\text{Numberoftails}}{\text{Totalnooftrials}}$

i.e. P(F) = $\frac{545}{1000}$ =0.545

Q2. Two coins are tossed simultaneously 500 times with the following frequencies of different outcomes:

TWO HEADS: 95 times

ONE HEADS: 290 times

NO HEADS: 115 times

Find the probability of occurrence of each of these events

Answer:

Probability (E) = $\frac{\text{numberoftrialsinwhicheventshappen}}{\text{Totalnooftrials}}$

P(Getting two heads) = $\frac{95}{500}$ =0.19

P(Getting one tail) = $\frac{290}{500}$ =0.58

P(Getting no head) = $\frac{115}{500}$ =0.23

Q3. Three coins are tossed simultaneously 100 times with the following frequencies of different outcomes:

OUTCOME	NO HEAD	ONE HEAD	TWO HEAD	THREE HEAD
FREQUENCY	14	38	36	12

If the three coins are tossed simultaneously again, compute the probability of:

1. heads coming up

2. heads coming up

3. At least one Head coming up

4. Getting more Tails than Heads

5. Getting more heads than tails

ANS:

1: Probability of 2 Heads coming up= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{36}{100}$ =0.36

2. Probability of 3 Heads coming up= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{12}{100}$ =0.12

3. Probability of at least one head coming up= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{38+36+12}{100}$

$= \frac{86}{100}$ =0.86

4. Probability of getting more Heads than Tails= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{36+12}{100}$

$= \frac{48}{100}$

5. Probability of getting more tails than heads= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{14+38}{100}$

$= \frac{52}{100}$ =0.52

Q4. 1500 families with 2 children were selected randomly, and the following data were recorded:

No of girls in a family	0	1	2
No of girls	211	814	475

If a family is chosen at random, compute the probability that it has:

1. No girl

2. 1 girl

3. 2 girls

4. At most one girl

5. More girls than boys

Answer

1. Probability of having no girl in a family= $\frac{\text{nooffamilieshavingnogirl}}{\text{Totalnooffamilies}}$

$= \frac{211}{1500}$ =0.1406

2. Probability of having 1 girl in a family= $\frac{\text{nooffamilieshaving1girl}}{\text{Totalnooffamilies}}$

$= \frac{814}{1500}$

$= \frac{407}{750}$ =0.5426

3. Probability of having 2 girls in a family= $\frac{\text{nooffamilieshaving2girls}}{\text{Totalnooffamilies}}$

$= \frac{475}{1500}$ =0.3166

4. Probability of having at the most one girl= $\frac{\text{nooffamilieshavingatthemostonegirl}}{\text{Totalnooffamilies}}$

$= \frac{211+814}{1500}$

$= \frac{1025}{1500}$ =0.6833

5. Probability of having more girls than boys= $\frac{\text{nooffamilieshavingmoregirlsthanboys}}{\text{Totalnooffamilies}}$

$= \frac{475}{1500}$ =0.31

Q5. In a cricket match, a batsman hits a boundary 6 times out of 30 balls he plays. Find the probability that:

1. He hit a boundary

2. He did not hit a boundary.

Answer

Number of times the batsman hits a boundary= 6

Total number of balls played= 30

Number of times the batsman did not hit a boundary= 30-6= 24

1. Probability that the batsman hits a boundary= $\frac{\text{Numberoftimeshehitaboundary}}{\text{Totalnoofballs}}$

$= \frac{6}{30}$

$= \frac{1}{5}$

2. Probability that the batsman does not hit a boundary

$\frac{\text{Numberoftimehedidnothitaboundary}}{\text{Totalnoofballs}}$

$= \frac{24}{30}$

$= \frac{4}{5}$

Q6. The percentage of marks obtained by a student in the monthly unit tests are given below:

UNIT TEST	I	II	III	IV	V
PERCENTAGE OF MARK OBTAINED	69	71	73	68	76

Find the probability that the student gets

1. More than 70% marks

2. Less than 70% marks

3. A distinction

Answer:

1: Let E be the event of getting more than 70% marks

No of times E happens=3

$$\text{Probability(Getting more than 70\%)} = \frac{\text{Numberoftimesstudentgotmorethan70}}{\text{Totalnoofexamstaken}}$$

$$= \frac{3}{5} = 0.6$$

2. Let F be the event of getting less than 70% marks

No of times F happen= 2

$$\text{Probability(Getting less than 70\%)} = \frac{\text{Numberoftimesstudentgotlessthan70}}{\text{Totalnoofexamstaken}}$$

$$= \frac{2}{5} = 0.4$$

3. Let G be the event of getting distinction

No of times G happen= 1

$$\text{Probability(Getting distinction)} = \frac{\text{Numberoftimesstudentgotdistinction}}{\text{Totalnoofexamstaken}}$$

$$= \frac{1}{5} = 0.2$$

Q7. To know the opinion of the students about Mathematics, a survey of 200 students were conducted. The data was recorded in the following table

Opinion	Like	Dislike
Number of students	135	65

Find the probability that student chosen at random:

1. Likes Mathematics

2. Does not like it.

Answer

1. Probability that a student likes mathematics= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{135}{200}$ = 0.675

2. Probability that a student does not like mathematics= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{65}{200}$ = 0.325

Q8. The Blood group table of 30 students of class IX is 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

A student is selected at random from the class from blood donation. Find the probability that the blood group of the student chosen is:

1: A

2: B

3: AB

4: O

ANSWER

BLOOD GROUP	A	B	O	AB	TOTAL
NUMBER OF STUDENTS	9	6	12	3	30

1. Probability of a student having blood group A= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{9}{30}$ = 0.3

2. Probability of a student having blood group B= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{6}{30}$ = 0.2

3. Probability of a student having blood group AB= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{3}{30}$

$= \frac{1}{10}$ = 0.10

4. Probability of a student having blood group O= $\frac{\text{Favorableoutcome}}{\text{Totaloutcome}}$

$= \frac{12}{30}$ = 0.4

Q9. Eleven bags of wheat flour, each marked 5kg, 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.

ANSWER:

Number of bags weighing more than 5kgs= 7

Total no of bags= 11

Probability of having more than 10kgs of rice= $\frac{\text{noofbagsweighingmorethan5kg}}{\text{Totalnoofbags}}$

= $\frac{7}{11}$ =0.63

Q10. The following table show the birth month of 40 students in class IX:

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
3	**4**	**2**	**2**	**5**	**1**	**2**	**5**	**3**	**4**	**4**	**4**

Find the probability that a student is born in October

ANSWER:

1. Probability that a student is born in the month of October= $\frac{\text{noofstudentsborninOctober}}{\text{Totalnoofstudents}}$

= $\frac{6}{40}$

= $\frac{3}{20}$ = 0.15

Q11. Given below is the frequency distribution table regarding the concentration of SO_2 in the air in parts per million of a certain city for 30 days.

Concentration of SO_2	**0.00-0.04**	**0.04-0.08**	**0.08-0.12**	**0.12-0.16**	**0.16-0.20**	**0.20-0.24**
No of days	**4**	**8**	**9**	**2**	**4**	**3**

Find the probability of the concentration of SO_2 in the interval 0.12-0.16 on any of these days.

Answer:

Total no of days: 30

Probability of concentration of SO_2 in interval 0.12-0.16= $\frac{\text{Favorable outcome}}{\text{Total outcome}}$

= $\frac{2}{30}$

= $\frac{1}{15}$ = 0.06

Q12. A company selected 2400 families at random and surveys them to determine a relationship between income level and the number of vehicles in a home. The information gathered is listed below

VEHICLES PER FAMILY:

Monthly Income	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	29	25
16000 above	1	579	82	88

If a family is chosen at random find the probability that the family is:

1. Earning Rs 10000 – 13000 per month and owning exactly 2 vehicles.

2. Earning Rs 16000 or more per month and owning exactly 1 vehicle.

3. Earning less than Rs 7000 per month and does not own any vehicle.

4. Earning Rs 13000 – 16000 per month and owning more than 2 vehicles.

5. Owning not more than 1 vehicle.

6.Owning at least one vehicle

Answer:

1. The probability that the family is earning 10000-13000 and is having exactly 2 vehicles

= $\frac{\text{No of families having 10000–13000 income and 2 vehicles}}{\text{Total no of families}}$

= $\frac{29}{2400}$

2. The probability that the family is earning 16000 or more and is having exactly 1 vehicle

$$= \frac{\text{No of families having 16000 or more income and 1 vehicle}}{\text{Total no of families}}$$

$$= \frac{579}{2400}$$

3. The probability that the family is earning less than 7000 and is having no vehicle

$$= \frac{\text{No of families having less than 7000 income and no vehicle}}{\text{Total no of families}}$$

$$= \frac{10}{2400} = \frac{1}{240}$$

4. The probability that the family is earning 13000-16000 and is having more than 2 vehicles

$$= \frac{\text{No of families having 13000}-16000 \text{ income and more than 2 vehicles}}{\text{Total no of families}}$$

$$= \frac{25}{2400} = \frac{1}{96}$$

5. The probability that the family is having not more than one vehicle

$$= \frac{\text{No of families having not more than 1 vehicle}}{\text{Total no of families}}$$

$$= \frac{10+0+1+2+1+160+305+535+469+579}{1200}$$

$$= \frac{2062}{2400} = \frac{1031}{1200}$$

6. The probability that the family is having atleast one vehicle

$$= \frac{\text{No of families having atleast 1 vehicle}}{\text{Total no of families}}$$

$$= \frac{160+305+535+469+579+25+27+29+29+82+0+2+1+25+88}{1200}$$

$$= \frac{2356}{2400} = \frac{589}{600}$$

Q13. The following table gives the life time of 400 neon lamps:

Life time	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
bulbs	14	56	60	86	74	62	48

A bulb is selected at random. Find the probability that the lifetime of a selected bulb:

1. Less than 400 hrs

2. between 300-800 hours

3. Atleast 700 hours

Answers:

Total number of bulbs= 400

1. Probability that the life of the selected bulb is less than 400hrs

$$= \frac{\text{No of bulbs having life less than 400 hrs}}{\text{Total no of bulbs}}$$

$$= \frac{14}{400} = \frac{7}{200}$$

2. Probability that the life of the selected bulb is between 300-800hrs

$$= \frac{\text{No of bulbs having life less than 400 hrs}}{\text{Total no of bulbs}}$$

$$= \frac{14+56+60+86+74}{200}$$

$$= \frac{290}{400} = \frac{29}{40}$$

3. Probability that the life of the selected bulb is atleast 700hrs

$$= \frac{\text{No of bulbs having life atleast 700 hrs}}{\text{Total no of bulbs}}$$

$$= \frac{74+62+48}{400}$$

$$= \frac{184}{400} = \frac{23}{50}$$

Q14. Given below is the frequency distribution of wages (in Rs) of 30 workers in certain factory:

Wages	110-130	130-150	150-170	170-190	190-210	210-230	230-250
No of workers	3	4	5	6	5	4	3

A worker is selected at random. Find the probability that his wages are:

1. Less than Rs.150

2. Atleast Rs.210

3. More than or equal to 150 but less than 210

Answer

Total number of workers=30

1. Probability that the worker wages are less than Rs.150=

$$= \frac{\text{No of workers having wages below Rs.150}}{\text{Total no of workers}}$$

$$= \frac{3+4}{30} = \frac{7}{30}$$

2. Probability that the worker wages are atleast Rs.210=

$$= \frac{\text{No of workers having wages below Rs.210}}{\text{Total no of workers}}$$

$$= \frac{4+3}{30} = \frac{7}{30}$$

3. Probability that the worker wages are more than or equal to 150 but less than 210

$$= \frac{\text{No of workers having wages more than Rs. 150 but less than Rs. 210}}{\text{Total no of workers}}$$

$$= \frac{5+6+5}{30} = \frac{16}{30} = \frac{8}{15}$$