15. Probability

Exercise 15A

1. Question

A coin is tossed 500 times and we get

head : 285 times, tail :215 times.

When a coin is tossed at random, what is the probability of getting

(i) a head? (ii) a tail?

Answer

Total number times coin tossed: 500

Number of times head occurred: 285

Number of times tail occurred: 215

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i). Let p(H) be probability of head

P (H) = $\frac{\text{Number of times head occurred}}{\text{Total number of times coin tossed}}$

P (H) = $\frac{285}{500}$ = 0.57

(ii). Let p(T) be probability of tale

P (T) = $\frac{\text{Number of times tale occurred}}{\text{Total number of times coin tossed}}$

P (T) = $\frac{215}{500} = 0.43$

2. Question

Two coins are tossed 400 times and we get

Two heads:112 times; one head 160 times ;0 times; 0 head :128 times.

When two coins are tossed at random, what is the probability of getting

(i) 2 heads? (ii) 1 heads? (iii) 0 head?

Answer

Total number times coin tossed: 400

Number of times Two heads occurred: 112

Number of times One head occurred: 160

Number of times No head (zero head) occurred: 128

Probability P()= $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i). Let p(H_1) be probability of getting Two heads

P (H_1) = $\frac{\text{Number of times Two heads occurred}}{\text{Total number of times coins tossed}}$

P (H_1) = $\frac{112}{400}$ = 0.28

(ii). Let p(H_2) be probability of getting One head

P (H_2) = $\frac{\text{Number of times One head occurred}}{\text{Total number of times coins tossed}}$

P (H_2) = $\frac{160}{400}$ = 0.4

(iii). Let p(H_3) be probability of getting No head

P (H_3) = $\frac{\text{Number of times No head occurred}}{\text{Total number of times coins tossed}}$

P (H_3) = $\frac{128}{400}$ = 0.32

3. Question

Three coins are tossed 200 times and we get

three heads:39 times; two heads: 58 times;

one head :67 times: 0 head: 36 times.

When there coins are tossed at random, what is the probability of getting

(i) 3 heads? (ii) 1 head? (iii) 0 head (iv) 2 heads?

Answer

Total number times coins tossed: 200

Number of times Three heads occurred: 39

Number of times Two head occurred: 58

Number of times One heads occurred: 67

Number of times No(Zero) head occurred: 36

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i). Let P(H_1) be probability of getting Three heads

P (H_1) = $\frac{\text{Number of times Three heads occurred}}{\text{Total number of times coins tossed}}$

$P(H_1) = \frac{39}{200} = 0.195$

(ii). Let $P(H_2)$ be probability of getting One head

$$P(H_2) = \frac{\text{Number of times One head occurred}}{\text{Total number of times coins tossed}}$$

$P(H_2) = \frac{67}{200} = 0.335$

(iii). Let $P(H_3)$ be probability of getting No heads (zero heads)

$$P(H_3) = \frac{\text{Number of times Zero heads occurred}}{\text{Total number of times coins tossed}}$$

$P(H_3) = \frac{36}{200} = 0.18$

(iv). Let $P(H_4)$ be probability of getting Two heads

$$P(H_4) = \frac{\text{Number of times Two heads occurred}}{\text{Total number of times coins tossed}}$$

$P(H_4) = \frac{58}{200} = 0.29$

4. Question

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?

Answer

Total number times a Die Rolled: 300

Number of times 3 occurred on die: 54

Number of times 6 occurred on die: 33

Number of times 5 occurred on die: 39

Number of times 1 occurred in die: 60

$$\text{Probability} = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

(i). Let p(3) be probability of getting 3 on die

$$P(3) = \frac{\text{Number of times 3 occurred on die}}{\text{Total number of times a die is rolled}}$$

$$P(3) = \frac{54}{300} = 0.18$$

(ii). Let p(6) be probability of getting 6 on die

$$P(6) = \frac{\text{Number of times 6 occurred on die}}{\text{Total number of times a die is rolled}}$$

$$P(6) = \frac{33}{300} = 0.11$$

(iii). Let p(5) be probability of getting 5 on die

$$P(5) = \frac{\text{Number of times 5 occurred on die}}{\text{Total number of times a die is rolled}}$$

$$P(5) = \frac{39}{300} = 0.13$$

(iv). Let p(1) be probability of getting 1 on die

$$P(1) = \frac{\text{Number of times 1 occurred on die}}{\text{Total number of times a die is rolled}}$$

$$P(1) = \frac{60}{300} = 0.2$$

5. Question

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.

Answer

Total number of ladies: 200

Number of ladies who like coffee: 142

Number of ladies who dislike coffee: 58

$$\text{Probability } P() = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

(i). Let p(Coffee) be probability of ladies who like coffee

$$P(\text{Coffee}) = \frac{\text{Number of ladies who like coffee}}{\text{Total number ladies}}$$

$$P(\text{Coffee}) = \frac{142}{200} = 0.71$$

(ii). Let p(No Coffee) be probability of ladies who dislikes coffee

$$P(\text{No Coffee}) = \frac{\text{Number of ladies who dislike coffee}}{\text{Total number of ladies}}$$

P (No Coffee) = $\frac{58}{200}$ = 0.29

6. Question

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 mark 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 ?

Answer

Total number of unit tests: 6

Number of Unit tests in which, the student got more than 60%: 2

That includes 1.) unit test II and

2.) unit test V

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

1.Let P(U) be probability of Student scoring more than 60% in unit tests

P (U) = $\frac{\text{Number of unit tests a student scored more than 60\%}}{\text{Total number of unit tests}}$

P (U) = $\frac{2}{6} = \frac{1}{3}$

7. Question

On a particular day, at a crossing in a city, the various types of 240 vehicles going past during a time interval were observed as under:

Type 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?

Answer

Total number of vehicles observed: 240

Number of Two wheeler vehicles: 84

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

1.Let P(Two) be probability of Two wheelers

P (Two) = $\frac{\text{Number of Two wheeler vehicles}}{\text{Total number of vehicals}}$

P (Two) = $\frac{84}{240}$ = 0.35

8. Question

On one page of a telephone directory, there are 200 phone number. The frequency distribution of their units digits is given below:

Units 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 number is chosen at random from the page. What is the probability that the units digit of the chosen number is (i) 5? (8)?

Answer

Total number of Numbers on a page: 200

Number of telephone Numbers which have 5 in its units place: 24

Number of telephone Numbers which have 8 in its units place: 16

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

1.Let P(5) be probability of telephone number having 5 in the units place

P (5) = $\frac{\text{Number of telephone Numbers having 5 in units place}}{\text{Total number of telephone Numbers}}$

P (5) = $\frac{24}{200}$ = 0.12

2.Let P(8) be probability of telephone number having 8 in units place P (8) = $\frac{\text{Number of telephone Numbers having 8 in units place}}{\text{Total number of telephone Numbers}}$

P (8) = $\frac{16}{200}$ = 0.08

9. Question

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?

Answer

Total number of Students: 40

Number of Students having blood group O: 14

Number of Students having blood group AB: 6

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

1.Let P(O) be probability of selecting a student with Blood group O

P (O) = $\frac{\text{Number of Students having blood group O}}{\text{Total number Students}}$

P (O) = $\frac{14}{40}$ = 0.35

2.Let P(AB) be probability of selecting a student with Blood group AB

P (AB) = $\frac{\text{Number of Students having blood group AB}}{\text{Total number Students}}$

P (AB) = $\frac{6}{40}$ = 0.15

10. Question

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

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

Out of these students, one is chosen at random. What is the probability that his marks lie in the interval 21-30?

Answer

Total number of Students: 30

Number of Students having marks in the range 21-30: 6

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

1.Let P(S) be probability of selecting a student having marks in the range 21-30

P (S) = $\frac{\text{Number of Students having marks in the range } 21-31}{\text{Total number Students}}$

P (S) = $\frac{6}{30}$ = 0.2

11. Question

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

One of the patients is selected at random.

Find the probability that his age is

(i) 30 Year or more but less than 40 years.

(ii) 50 year or more but less than 70 years

(iii) Less than 10 years.

(iv) 10 years or more.

Answer

Total number of Patients: 360

Number of Patients who are 30 Years or more but less than 40 years: 60

(This include age groups between 30-40)

Number of Patients who are 50 Years or more but less than 70 years: 80

(This include patients of age groups 50-60 and 60-70 therefore 50+30=80)

Number of Patients who are less than 10 years: 0 (No patients below 10 years)

Number of Patients who are 10 years or more: 360 (this include all age -

groups admitted in the hospital)

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i). Let P(P_1) be probability of patients between age groups 30-40

P (P_1) = $\frac{\text{Number of patients between age group } 30-40}{\text{Total number of patients}}$

P (P_2) = $\frac{60}{360} = \frac{1}{6}$

(ii). Let P(P_2) be probability of patients between age groups 50-70

P (P_2) = $\frac{\text{Number of patients between age groups } 50-70}{\text{Total numberof patients}}$

P (P_2) = $\frac{80}{360} = \frac{2}{9}$

(iii). Let P(P_3) be probability of patients who are less than 10 years

$$P(P_3) = \frac{\text{Number of patients who are less than 10 years}}{\text{Total numberof patients}}$$

$$P(P_3) = \frac{0}{360} = 0$$

(iv). Let P(P_4) be probability of patients whose age is more than 10 years

$$P(P_4) = \frac{\text{Number of patients with age more than 10 years}}{\text{Total number of patients}}$$

$$P(P_4) = \frac{360}{360} = 1$$

CCE Questions

1. Question

A coin is tossed 100 times with following outcomes:

Head 43 times and tail 57 times.

In a single throw of a coin, what is the probability of getting a head?

A. $\frac{43}{57}$

B. $\frac{57}{43}$

C. $\frac{43}{100}$

D. $\frac{7}{50}$

Answer

Total number times a coin is tossed = 100

Number of times head occurred = 43

Number of times tail occurred = 57

$$\text{Probability P()} = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

$$\text{Probability of getting a head is P(head)} = \frac{\text{Number of heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{43}{100}$$

2. Question

A coin is tossed 200 times with following outcomes:

Head 112 times and tail 88 times.

In a single throw of a coin, what is the probability of getting a head?

A. $\frac{11}{25}$

B. $\frac{14}{25}$

C. $\frac{11}{14}$

D. $\frac{14}{11}$

Answer

Total number times a coin is tossed = 200

Number of times head occurred = 112

Number of times tail occurred = 88

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a head is P(head) = $\frac{\text{Number of times head occurred}}{\text{Total number of times coin is tossed}} = \frac{112}{200} = \frac{14}{25}$

3. Question

A survey of 200 persons of a locality shows the liking and disliking of tea.

No of persons who like tea	148
No of persons who dislike tea	52

Out of these one was chosen at random. What is the probability that the chosen person likes tea?

A. $\frac{14}{11}$

B. $\frac{37}{13}$

C. $\frac{13}{50}$

D. $\frac{37}{50}$

Answer

Total number of persons: 200

Number of persons who like tea: 148

Number of persons who dislike tea: 52

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Let p(Tea) be probability of person who like tea

P (Tea) = $\frac{\text{Number of persons who like tea}}{\text{Total number persons}}$

P (Tea) = $\frac{148}{200} = \frac{37}{50}$

4. Question

In a locality, 1000 families were chosen at random and the following data was collected:

Number of children in each family	0	1	2	3	4 or more
Number of families	6	184	672	127	11

Out of these families, a family was chosen at random. What is the probability that the chosen family has 2 children?

A. $\frac{1}{336}$

B. $\frac{84}{125}$

C. $\frac{41}{125}$

D. $\frac{164}{375}$

Answer

Total number of families: 1000

Number of families having no children: 6

Number of families having 1 child: 184

Number of families having 2 children: 672

Number of families having 3 children: 127

Number of families having 4 or more children: 11

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Let p(2) be probability of families having 2 children

P (2) = $\frac{\text{Number of families having 2 children}}{\text{Total number families}}$

P (2) = $\frac{672}{1000} = \frac{84}{125}$

5. Question

The table given below shows the month of birth of 36 students of a class:

Month of birth	Jan.	Feb.	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
No. of students	4	3	5	0	1	6	1	3	4	3	4	2

A students is chosen at random from the class. What is the probability that the chosen student was born in October?

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{4}$

D. $\frac{1}{12}$

Answer

Total number of students: 36

Number of students born in October: 3

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Let p(Oct.) be probability of students born in October.

P (Oct.) = $\frac{\text{Number of students born in october}}{\text{Total number students}}$

P (Oct.) = $\frac{3}{36} = \frac{1}{12}$

6. Question

In 50 tosses of a coin, tail appears 32 times. If a coin is tossed at random, what is the probability of getting a head?

A. $\frac{1}{32}$

B. $\frac{1}{18}$

C. $\frac{16}{25}$

D. $\frac{9}{25}$

Answer

Total number times a coin is tossed = 50

Number of times tail occurred = 32

Number of times tail occurred = 50 – 32 = 18

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a head is P(head) = $\frac{\text{Number of heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{18}{50} = \frac{9}{25}$

7. Question

In a cricket match, a batsman hits a boundary 6 times out of 30 balls he plays. What is the probability that in a given throw, the ball does not hit the boundary?

A. $\frac{1}{4}$

B. $\frac{1}{5}$

C. $\frac{4}{5}$

D. $\frac{3}{4}$

Answer

Total number balls batsman played = 30

Number of batsman hits a boundary = 6

Number of batsman doesn't hit a boundary = 30 – 6 = 24

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of batsman not hitting a boundary is

P(no boundary) = $\frac{\text{Number of times batsman didn't hit boundary}}{\text{Total number of balls batsman played}} = \frac{24}{30} = \frac{4}{5}$

8. Question

A die is thrown 40 times and each time the number on the uppermost face is noted. It was recorded as under:

Outcome	1	2	3	4	5	6
Number of times	5	6	8	10	7	6

A die is thrown at random, What is the probability of getting a 5?

A. $\frac{5}{7}$

B. $\frac{7}{5}$

C. $\frac{1}{8}$

D. $\frac{7}{40}$

Answer

Total number of times die is thrown: 40

Number of times 5 noted on the uppermost face: 7

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting 5 on uppermost face die is

P(5) = $\frac{\text{Number of time 5 occured on uppermost face of die}}{\text{Total number of times die is rolled}} = \frac{7}{40}$

9. Question

In 50 throws of a die, the outcomes were noted as under:

Outcome	1	2	3	4	5	6
Number of times	8	9	6	7	12	8

A die is the at random. What is the probability of getting an even number?

A. $\frac{12}{25}$

B. $\frac{3}{50}$

C. $\frac{1}{8}$

D. $\frac{1}{2}$

Answer

Total number of times die is thrown: 50

Number of times 2 noted on the uppermost face: 9

Number of times 4 noted on the uppermost face: 7

Number of times 6 noted on the uppermost face: 8

Number of times even number noted on the uppermost face: 9+7+8 = 24

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting even number on uppermost face of die is

$$P(\text{even}) = \frac{\text{Number of times even number noted on the uppermost face}}{\text{Total number of times die is rolled}} = \frac{24}{50} = \frac{12}{25}$$

10. Question

In 65 thrown of a die, the outcomes were noted as under:

Outcome	1	2	3	4	5	6
Number of times	8	10	12	16	9	10

A die is thrown at random. What is the probability of getting a prime number?

A. $\frac{3}{35}$

B. $\frac{3}{5}$

C. $\frac{31}{65}$

D. $\frac{36}{65}$

Answer

Total number of times die is thrown: 65

Number of times 2 noted on the uppermost face: 10

Number of times 3 noted on the uppermost face: 12

Number of times 5 noted on the uppermost face: 9

Number of times prime number noted on the uppermost face: 10+12+9 = 31

$$\text{Probability } P() = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

Probability of getting even number on uppermost face of die is

$$P(\text{prime}) = \frac{\text{Number of times prime number noted on the uppermost face}}{\text{Total number of times die is rolled}} = \frac{31}{65}$$

11. Question

On one page of a directory, there are 160 telephone numbers. The frequency distribution of the unit place digit is given as under:

Units place digit	0	1	2	3	4	5	6	7	8	9
Frequency	19	16	18	21	14	11	15	16	13	17

From this page, one of the numbers is chosen at random. What is the probability that the unit place digit in the chosen number is 6?

A. $\frac{2}{5}$

B. $\frac{3}{32}$

C. $\frac{3}{80}$

D. $\frac{29}{32}$

Answer

Total number of telephone numbers on the page: 160

Number of telephone numbers which have 6 in units place is: 15

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting 6 in unit place of a telephone number.

P(6) = $\frac{\text{Number of time 6 occured units place of a telephone number}}{\text{Total number of telephone numbers on the page}} = \frac{15}{160} = \frac{3}{32}$

12. Question

Two coins are tossed 1000 times and the outcomes are recorded as under:

Number of heads	2	1	0
Frequency	266	540	194

A coin is thrown at random. What is the probability of getting at most one head?

A. $\frac{403}{500}$

B. $\frac{27}{50}$

C. $\frac{367}{500}$

D. $\frac{97}{500}$

Answer

Total number times a coin is tossed = 1000

Number of times no heads occurred = 194

Number of times one head occurred = 540

Number of times two head occurred = 266

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting at most one head is

P(at most one head) = $\frac{\text{Number of times at most one head occurred}}{\text{Total number of times a coin is tossed}} = \frac{194+540}{1000} = \frac{734}{1000} = \frac{367}{500}$

13. Question

80 bulbs are selected at random from a lot and their lifetime is recorded in the from of a frequency table given below:

Lifetimes(in hours)	300	500	700	900	1100
Frequency	10	15	23	25	7

A bulb is chosen at random from the lot. What is the probability that the bulb chosen has lifetime less than 900 hours?

A. $\frac{73}{80}$

B. $\frac{3}{5}$

C. $\frac{5}{16}$

D. $\frac{23}{80}$

Answer

Total number bulbs= 80

Number of bulbs, which have lifetime of 300 hrs = 10

Number of bulbs, which have lifetime of 500 hrs = 15

Number of bulbs, which have lifetime of 700 hrs = 23

Number of bulbs, which have lifetime of 900 hrs = 25

Number of bulbs, which have lifetime of 1100 hrs = 7

Number of bulbs , having lifetime less than 900 hrs = 10 + 15 +23 = 48

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of selecting a bulb which have a lifetime of 900 hrs

P(900) = $\frac{\text{Number of bulbs having the lifetime of 900 hrs}}{\text{Total number of bulbs}} = \frac{48}{80} = \frac{3}{5}$

14. Question

In a medical examination of 40 students of a class, the following blood, groups are recorded:

Blood group	A	B	AB	O
No of students	11	15	9	5

From this class, a student is chosen at random, What is the probability that the chosen student has blood group B?

A. $\frac{3}{8}$

B. $\frac{5}{8}$

C. $\frac{3}{5}$

D. $\frac{8}{3}$

Answer

Total number students= 40

Number of students with blood group 'A' = 11

Number of students with blood group 'B' = 15

Number of students with blood group 'AB' = 9

Number of students with blood group 'O' = 5

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of selecting a student with blood group 'B'

P(B) = $\frac{\text{Number of students with blood group 'B'}}{\text{Total number of students}} = \frac{15}{40} = \frac{3}{8}$

15. Question

In a group of 60 persons , 35 like coffee. Out of this group , If one person is chosen at random. What is the probability that he or she does not like coffee?

A. $\frac{7}{12}$

B. $\frac{5}{12}$

C. $\frac{5}{7}$

D. $\frac{3}{12}$

Answer

Total number of members in a group: 60

Number of members who like coffee in the group: 35

Number of members who dislike coffee in the group: 60 – 35 = 25

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Let p(No coffee) be probability of a member who dislikes the coffee

P (No coffee) = $\frac{\text{Number of members in the group who dislike coffee}}{\text{Total number members in the group}}$

P (No coffee) = $\frac{25}{60} = \frac{5}{12}$

16. Question

A die is thrown 50 times and the outcomes are recorded as under.

Outcome	1	2	3	4	5	6
No of times	11	9	8	5	7	10

If a die is thrown at random, what is the probability of getting 8?

A. $\frac{1}{5}$

B. $\frac{3}{50}$

C. $\frac{1}{3}$

D. 0

Answer

Total number times a die is thrown: 50

We know that a die contains only 6 sides (1,2,3,4,5,6) and there is no 8 on any side of the die

Therefore, probability of getting 8 when a die is thrown is : 0

That is P(8) = 0

17. Question

It is given that the probability of winning a game is 0.7. What is the probability of losing the game?

A. 0.8

B. 0.3

C. 0.7

D. 0.07

Answer

Given: P(winning) = 0.7

We know that if P(favorable) is the probability of favorable outcomes, then

P(unfavorable) , is probability of unfavorable outcomes Is given by

P(unfavorable) = 1 – P(favorable)

Therefore,

P(losing) = 1 – P(winning) = 1 – 0.7 = 0.3

18. Question

A coin is tossed 60 times and the tail appears 35 times. What is the probability of getting a head?

A. $\frac{7}{12}$

B. $\frac{12}{7}$

C. $\frac{5}{12}$

D. $\frac{1}{25}$

Answer

Total number times a coin is tossed = 60

Number of times tail occurred = 35

Number of times tail occurred = 60 – 35 = 25

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a head is P(head) = $\frac{\text{Number of heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{25}{60} = \frac{5}{12}$

19. Question

Each question consists of two statements, namely, Assertion(A) and Reason (R). Choose the correct options.

Assertion (A)	**Reason (R)**
In a cricket match a batsman hits a boundary 9 times out of 45 balls he plays. The probability that in a given throw he does not hit the boundary is $\frac{4}{5}$	P (E) +P (not E) =1

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion(A).

B. Both Assertion (A) and Reason (R) are true and Reason (R) is a Not explanation of Assertion(A).

C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is false.

Answer

Here P(boundary) = $\frac{9}{45} = \frac{1}{5}$

P(no boundary) = $1 - \frac{1}{5} = \frac{4}{5}$

20. Question

Each question consists of two statements, namely, Assertion(A) and Reason (R) . Choose the correct options.

Assertion (A)	**Reason (R)**
The probability of a sure event is 1.	Let E be an event. Then $0<P(E)<1$.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion(A).

B. Both Assertion (A) and Reason (R) are true and Reason (R) is a Not explanation of Assertion(A).

C. Assertion (A) is true and Reason (R) is false.

D. Assertion (A) is false and Reason (R) is false.

Answer

Here always the probability of a sure event is 1

and

P(E), where E is some event, always ranges between $0 \leq P(E) \leq 1$.

21. Question

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) lies between _____ and _____

Answer

(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(event)

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

(V) P (E) lies between 0 and 1

22. Question

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
No of students	7	8	12	25	19	10	9

From these students, a students is chosen at random.

What is the probability that the chosen student

(i) gets 20% or less marks?

(ii) gets 60% or more marks?

Answer

Total number of students : 90

Number of students who scored less than 20% : 7

Number of students who scored more than 60% : 19

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Let P($\leq$20) be probability of students who scored less than 20%

P($\leq$20) = $\frac{\text{Number of students who scored less than 20\%}}{\text{Total number of students}} = \frac{7}{90}$

(ii) Let P($\geq$60) be probability of students who scored more than 60%

P($\geq$60) = $\frac{\text{Number of students who scored more than 60\%}}{\text{Total number of students}} = \frac{19}{90}$

23. Question

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 nondefective?

Answer

Total number of electric bulbs = 800

Number of Non-defective bulbs = 800-36 = 764

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

$\therefore$ Probability a Non- defective bulbs P(bulbs) = $\frac{\text{Number of non-defective balls}}{\text{Total number of electric bubls}} = \frac{764}{800} = \frac{191}{200}$

24. Question

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

Age (in years)	18-29	30-39	40-49	50-59
No of teachers	5	25	35	10

Note Here 18-29 means from 18 to 29 including both. A teacher from the school is chosen at ramdom. What is the probability that the teacher chosen is

(i) 40 years or more then 40 years old?

(ii) 49 years or less then 49 years old?

(iii) 60 years or more then 60 years old?

Answer

Total number of teachers: 75

Number of teachers having age 40 years or more than 40 years old: 45

Number of teachers having age 49 years or less than 40 years old: 65 (5+25+35)

Number of teachers having age 60 years or more than 60 years old: 0

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Let P(more than 40) be probability of teachers having age 40 years or more than 40 years old

P(more than 40) = $\frac{\text{Number of teachers whose age is more than 40}}{\text{Total number of teachers}} = \frac{45}{75} = \frac{3}{5}$

(ii) Let P(less than 49) of teachers having age 49 years or less than 40 years old

P(less than 49) = $\frac{\text{Number of teachers whose age is less than 49}}{\text{Total number of teachers}} = \frac{65}{75} = \frac{13}{15}$

(iii) Let P(more than 60) be probability 60 years or more then 60 years old

P(more than 60) = $\frac{\text{Number of teachers whose age is more than 60}}{\text{Total number of teachers}} = \frac{0}{75} = 0$

Formative Assessment (Unit Test)

1. Question

There are 600 electric bulbs in a box out of which 20 bulbs are defective. If one bulb is chosen at random from the box. What is the probability that the chosen bulb is defective?

A. $\frac{1}{19}$

B. $\frac{1}{20}$

C. $\frac{1}{30}$

D. $\frac{29}{30}$

Answer

Total number of electric bulbs = 600

Number of bulbs which are defective: 20

Number of Non-defective bulbs = 600-20 = 580

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

∴ Probability of getting a Non-defective bulbs P(bulbs) = $\frac{\text{Number of non-defective balls}}{\text{Total number of electric bubls}} = \frac{580}{600} = \frac{29}{30}$

2. Question

A bag contains 5 red, 8 black and 7 white balls. Is chosen at random. What is the probability that the chosen ball is black?

A. $\frac{2}{3}$

B. $\frac{2}{5}$

C. $\frac{3}{5}$

D. $\frac{1}{3}$

Answer

Total number of balls bag containing is: 5 red + 8 black + 7 white = 20 balls

Number of red balls = 8

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

∴ Probability of getting a black ball P(black) = $\frac{\text{Number of black balls}}{\text{Total number of balls}} = \frac{8}{20} = \frac{2}{5}$

3. Question

A bag contains 16 cards bearing number1,2,3…, 16 respectively. one card is chosen at random. What is the probability that the chosen card bears a number which is divisible by 3?

A. $\frac{3}{16}$

B. $\frac{5}{16}$

C. $\frac{11}{16}$

D. $\frac{13}{16}$

Answer

Total number of cards = 16

Chances of drawing a numbered card which is divisible by 3 = 5 (They are 3,6,9,12,15)

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

∴ Probability of drawing a numbered cards which is divisible by 3

P(card divisible by 3) = $\frac{\text{possible chances of drawing a numbered card which is divisible by 3}}{\text{Total number of cards}} = \frac{5}{16}$

4. Question

In a cricket match a batsmen hits a boundary 4 times out of the 32 balls he plays. In a given ball. What is the probability that he does not hit the ball?

A. $\frac{1}{8}$

B. $\frac{7}{8}$

C. $\frac{1}{7}$

D. $\frac{6}{7}$

Answer

Total number balls batsman played = 32

Number of batsman hits a boundary = 4

Number of batsman doesn't hit a boundary = 32 – 4 = 28

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of batsman not hitting a boundary is

P(no boundary) = $\frac{\text{Number of times batsman didn't hit boundary}}{\text{Total number of balls batsman played}} = \frac{28}{32} = \frac{7}{8}$

5. Question

Define the probability of an event E.

Answer

The probability of event E is defined as number of outcomes favorable to E divided by total numbers of equally likely outcomes in the sample space S of the experiment.

That is

P(E) = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

6. Question

A coin is tossed 60 times with the following outcomes:

Head 28 times and tail 32 times.

In a single throw of a coin, find the probability of getting a head.

Answer

Total number times a coin is tossed = 60

Number of times head occurred = 28

Number of times tail occurred = 32

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a head is P(head) = $\frac{\text{Number of heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{28}{60} = \frac{7}{15}$

7. Question

When a die is thrown, write down all possible outcomes.

Answer

A die has total of 6 sides.

Therefore,

Total possible outcomes area : 6

They are {1,2,3,4,5,6}

8. Question

Fill in the blanks:

(i) Probability of a sure event = _____

(ii) probability of an impossible event = _____

(iii) If E be an event, then p (E) +p (not E) = _____

(iv) If E is an event, then _____ <p (E)< _____

Answer

(i) Probability of a sure event = 1

(ii) probability of an impossible event = 0

(iii) If E be an event, then p (E) +p (not E) = 1

(iv) If E is an event, then 0 <p (E)< 1

9. Question

A die is thrown 80 times and the outcomes were noted as under:

Outcomes	1	2	3	4	5	6
Frequency	14	11	9	13	18	15

If the die is thrown at random, What is the probability of getting a 2?

Answer

Total number of outcomes: 80

Number of times 2 occurred : 11

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a 2 on die is P(2) = $\frac{\text{Number of 2 occurred}}{\text{Total number of times a a die is rolled}} = \frac{11}{80}$

10. Question

The probability of losing a game is 0.6 What is the probability of winning the game?

Answer

Given: P(winning) = 0.6

We know that if P(favorable) is the probability of favorable outcomes, then

P(unfavorable), is probability of unfavorable outcomes It given by

P(unfavorable) = 1 – P(favorable)

Therefore,

P(losing) = 1 – P(winning) = 1 – 0.6 = 0.4

11. Question

A coin is tossed 50 times and the tail appears 28 times. In a single throw of a coin. What is the probability of getting a head?

Answer

Total number times a coin is tossed = 50

Number of times tail occurred = 28

Number of times tail occurred = 50 – 28 = 22

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a head is P(head) = $\frac{\text{Number of heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{22}{50} = \frac{11}{25}$

12. Question

In a one day cricket match, a batsman hits the boundary 8 times out of 48 balls he plays. Find the probability that he does not hit the boundary.

Answer

Total number balls batsman played = 48

Number of batsman hits a boundary = 8

Number of batsman doesn't hit a boundary = 48 – 8 = 40

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of batsman not hitting a boundary is

P(no boundary) = $\frac{\text{Number of times batsman didn't hit boundary}}{\text{Total number of balls batsman played}} = \frac{40}{48} = \frac{5}{6}$

13. Question

Two coins are tossed simultaneously 80 times and the outcomes were recorded as under:

Outcome	Two heads	One head	No head
Frequency	24	36	20

If two coins are tossed at random,find the probability of getting

(i) Two heads (ii) one head (iii) no head

Answer

Total number times a coin is tossed = 80

Number of times two heads occurred = 24

Number of times one head occurred = 36

Number of times no head occurred = 20

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Probability of getting two heads is

P(Two heads) = $\frac{\text{Number of times two heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{24}{80} = \frac{3}{10}$

(ii) Probability of getting one head is

P(one heads) = $\frac{\text{Number of times one head occurred}}{\text{Total number of times a coin is tossed}} = \frac{36}{80} = \frac{9}{20}$

(iii) Probability of getting no head is

P(no head) = $\frac{\text{Number of times head occurred}}{\text{Total number of times a coin is tossed}} = \frac{20}{80} = \frac{1}{4}$

14. Question

Marks obtained by 90 students of Class IX in a test are given below:

Marks	0-20	20-40	40-60	60-80	80-100
No of students	8	15	32	26	9

Out of these students one is chosen at random. Find the probability that the chosen student obtains

(i) less than 20% marks (ii) 80% of more marks

(iii) 60% or more marks

Answer

Total number of students : 90

Number of students who scored less than 20% : 8

Number of students who scored more than 80% : 9

Number of students who scored more than 60% : 35

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Let P($\leq$20) be probability of students who scored less than 20%

P($\leq$20) = $\frac{\text{Number of students who scored less than 20\%}}{\text{Total number of students}} = \frac{8}{90} = \frac{4}{45}$

(ii) Let P($\geq$80) be probability of students who scored more than 80%

P($\geq$80) = $\frac{\text{Number of students who scored more than 80\%}}{\text{Total number of students}} = \frac{9}{90} = \frac{1}{10}$

(iii) Let P($\geq$60) be probability of students who scored more than 60%

P($\geq$60) = $\frac{\text{Number of students who scored more then 60\%}}{\text{Total number of students}} = \frac{35}{90} = \frac{7}{18}$

15. Question

The blood group of 30 students of a class were recorded as under:

Blood Group	A	B	AB	O
No of students	9	11	4	6

If a students of this class is chosen at random, What is the probability that the chosen students has blood group

(i)0? (ii) A? (iii) AB?

Answer

(i) O

Total number students= 30

Number of students with blood group 'A' = 9

Number of students with blood group 'B' = 11

Number of students with blood group 'AB' = 4

Number of students with blood group 'O' = 6

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Probability of selecting a student with blood group 'o'

P(B) = $\frac{\text{Number of students with blood group 'o'}}{\text{Total number of students}} = \frac{6}{30} = \frac{1}{5}$

(ii) Probability of selecting a student with blood group 'A'

$$P(B) = \frac{\text{Number of students with blood group 'A'}}{\text{Total number of students}} = \frac{9}{30} = \frac{3}{10}$$

(iii) Probability of selecting a student with blood group 'AB'

$$P(B) = \frac{\text{Number of students with blood group 'AB'}}{\text{Total number of students}} = \frac{4}{30} = \frac{2}{15}$$

16. Question

In a survey of 100 families having 2 or less boys. The following data was obtained:

Number of boys in a family	0	1	2
Number of families	18	46	36

If one of the given families is chosen at random, what is the probability that the chosen family has

(i) 1 boy? (ii) 2 boys? (iii) no boy?

Answer

Total number families surveyed = 100

Number of families having no boys = 18

Number of families having one boy = 46

Number of families having two boys = 36

$$\text{Probability P()} = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

(i) Probability of family having one boy

$$P(\text{one boy}) = \frac{\text{Number of having one boy}}{\text{Total number of families surveyed}} = \frac{46}{100} = \frac{23}{50}$$

(ii) Probability of family having 2 boys

$$P(\text{two boy}) = \frac{\text{Number of having two boys}}{\text{Total number of families surveyed}} = \frac{36}{100} = \frac{9}{25}$$

(iii) Probability of family having no boy

$$P(\text{no boy}) = \frac{\text{Number of having no boy}}{\text{Total number of families surveyed}} = \frac{18}{100} = \frac{9}{50}$$

17. Question

A die is thrown 100 times and following observations were recorded:

Outcomes	1	2	3	4	5	6
Frequency	12	18	14	26	14	16

If a die is thrown at random, find the probability of getting

(i) a number less than 3? (ii) a number greater than 4 (iii) an even number

Answer

Total number of outcomes : 100

(i) Chances of getting a number less than 3 on the die = 2 (They are 1,2)

Its frequency is: 12+18 = 30

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

∴ Probability of getting a number less than 3 on die P(less than 3)

$= \frac{\text{possible chances of getting a number less than 3}}{\text{Total number of outcomes}} = \frac{30}{100} = \frac{3}{10}$

(ii) Chances of getting a even number on the die = 3 (They are 2,4,6)

Frequency : 18+26+16 = 60

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

∴ Probability of getting a composite number on die the P(even number)

$= \frac{\text{possible chances of getting a even number}}{\text{Total number of outcomes}} = \frac{60}{100} = \frac{3}{5}$

(iii) Chances of getting a number greater than 4 on the die = 2 (They are 5,6)

Frequence : 14+16 = 30

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

∴ Probability of getting a number not less than 4 on die P(greater than 4)

$= \frac{\text{possible chances of getting a number greater than 4}}{\text{Total number of outcomes}} = \frac{30}{100} = \frac{3}{10}$

18. Question

A survey of 600 students about their liking on coffee was conducted and recoded as under:

Opinion	Like	Dislike
No of students	360	140

Out of these students one is chosen at random. What is the probability that the chosen student

(i) likes coffee? (ii) dislikes coffee?

Answer

Total number of students: 600

Number of students who like coffee: 360

Number of students who dislike coffee: 140

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Let p(like) be probability of ladies who dislike coffee

P (like) = $\frac{\text{Number of students who like coffee}}{\text{Total number students}}$

P (like) = $\frac{360}{600} = \frac{3}{5}$

(ii) Let p(dislike) be probability of ladies who dislike coffee

P (dislike) = $\frac{\text{Number of students who dislike coffee}}{\text{Total number students}}$

P (dislike) = $\frac{140}{600} = \frac{7}{30}$

19. Question

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

Number of heads	0	1	2
Frequency	240	450	310

In a simple throw of two coins, what is the probability of getting

(i) at most one head? (ii) At least one head?

Answer

Total number times a coin is tossed = 1000

Number of times no heads occurred = 240

Number of times one head occurred = 450

Number of times two head occurred = 310

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

(i) Probability of getting at most one head is (that is Probability of no head and one head)

P(at most one head) = $\frac{\text{Number of times at most one head occurred}}{\text{Total number of times a coin is tossed}} = \frac{240+450}{1000} = \frac{690}{1000} = \frac{69}{100}$

(ii) Probability of getting at least one head is (that is Probability of one head and two head)

P(at least one head) = $\frac{\text{Number of times at least one head occurred}}{\text{Total number of times a coin is tossed}} = \frac{450+310}{1000} = \frac{760}{1000} = \frac{19}{25}$

20. Question

A coin is tossed 80 times with following outcomes:

Head: 35 times and tail: 45 times.

In a single throw of a coin, if E be the event of getting a head, verify that p (E) +P(not E)=1.

Answer

Total number times a coin is tossed = 80

Number of times head occurred = 35

Number of times tail occurred = 45

Probability P() = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Probability of getting a head is P(head) = $\frac{\text{Number of heads occurred}}{\text{Total number of times a coin is tossed}} = \frac{35}{80} = \frac{7}{16}$

Probability of getting a tails is P(tail) = $\frac{\text{Number of tails occurred}}{\text{Total number of times a coin is tossed}} = \frac{45}{80} = \frac{9}{16}$

Here P(head) = $\frac{7}{16}$ and P(tail) = $\frac{9}{16}$

Now, P(head) + P(tail) = $\frac{7}{16} + \frac{9}{16} = \frac{16}{16} = 1$

Hence proved.