CHAPTER 5

PROBABILITY

LONG QUESTIONS AND ANSWERS

Q. 1

If two coins are tossed, find the probability of getting

(i) One at least Tail

(ii) Getting No Tail

SOLUTION:

(i) Sample space

S = {HH, HT, TH, TT}

n (S) = 4

Let A be the event of getting at least one tail

A = { HT, TH, TT }

n (A) = 3

$$\mathbf{P\ (A) = \frac{n\ (A)}{n\ (S)}}$$

$$\mathbf{P\ (A) = \frac{3}{4}}$$

(ii) Sample space

B = { HH }

n (B) = 1

$$P(B) = \frac{n(B)}{n(S)}$$

$$P(B) = \frac{1}{4}$$

Ans. (i) The probability of getting at least one tail is $\frac{3}{4}$

(ii) The probability of getting no tail is $\frac{1}{4}$

Q. 2

If two dice are rolled simultaneously, find the probability of the following events:

i) The sum of the digits on the upper face is more than 10

ii) The sum of the digits on the upper faces is 13

iii) The digit on the first die is smaller than the digit on the second die

SOLUTION:

Sample space

S = { (1,1), (1,2) (1,3) (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5),

(3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3) (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6) }

n (S) = 36

(i) Let A be the event that the sum of the digits on the upper faces is more than 10

A = { (5,6),(6,5),(6,6)}

n (S) = 3

n (A) = 3

$$\mathbf{P\ (A) = \frac{n\ (A)}{n\ (S)}}$$

$$\mathbf{P\ (A) = \frac{3}{36}}$$

$$\mathbf{P\ (A) = \frac{1}{12}}$$

(ii)Let B be the event that sum of the digits on upper face is 13

The sum of the digits on the upper faces can be maximum 12

Event B is an impossible event

B = { } (empty set)

n (S) = 36

n (B) = {0}

$$P(B) = \frac{n(B)}{n(S)}$$

$$P(B) = \frac{0}{36}$$

P (B) = 0

iii) Let C be the event that the digit on the first die is lesser than the digit on the second die

C = { (1,2) (1,3) (1,4), (1,5), (1,6), (2,3) , (2,4), (2,5), (2,6), (3,4), (3,5), (3,6), (4,5), (4,6), (5,6), }

n (S) = 36

n (C) = 15

$$P(C) = \frac{n(C)}{n(S)}$$

$$P(C) = \frac{15}{36}$$

Ans :

$$P(A) = \frac{1}{12}$$

$P(B) = 0$

$P(C) = \frac{15}{36}$

Q. 3

There are 15 tickets in a box, each bearing one of the numbers from 1 to 15. One ticket is drawn at random from the box. Find probability of the event that the ticket drawn.

i) Shows an odd number

ii) Shows a number which is multiple of 3

SOLUTION:

Sample space

S = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 }

n (S) = 15

(i) Let A be the event that the ticket drawn shows odd number

A = { 1, 3, 5, 7, 9, 11, 13, 15 }

n (A) = 8

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{8}{15}$$

(ii) Let B be the event that the ticket drawn shows a number multiple of 3

B = { 3, 6, 9, 12, 15 }

n (B) = 5

$$P(B) = \frac{n(B)}{n(S)}$$

$$P(B) = \frac{5}{15}$$

$$P(B) = \frac{1}{3}$$

Ans $P(A) = \frac{8}{15}$

$P(B) = \frac{1}{3}$

Q. 4

A card is drawn at random from a pack of well shuffled 52 playing cards. Find the probability that the card drawn is (1) a king (2) a club

SOLUTION:

S is the sample space.

n(S) = 52

(1) Let a be event that card drawn is an ace.

There are four suits - spade, heart, diamond and club. Each suit has one king.

n (A) = { 4 }

P (A) = n (A) / n (S)

$$= \frac{4}{52}$$

$$= \frac{1}{13}$$

(2) Let B be the event that the cards in the suit of spade. There are 13 cards in the suit of club.

One club can be drawn out of 13 club cards in 13 ways.

n (B) = 13

P (B) = n(B) / n(S)

$$= \frac{13}{52}$$

$$= \frac{1}{4}$$

Ans: (1) P (A) =1/13 (2) P (B) = ¼

Q. 5

Basketball players Mohan, Vasant, Akshay were practicing the ball dropping in the basket. The probabilities of success for Mohan, Vasant & Akshay are 6/7, 0.92 and 78% respectively. Who had the greatest probability of success?

SOLUTION:

The probability of each player is converted into decimal fraction. The probability of success for

Mohan is 6/7 i.e. 0.85 (1)

Vasant is 0.92 (2)

Akshay is 78 % = 78/100 = 0.78 (3)

From (1), (2) & (3)

0.92 > 0.85 > 0.78

Ans: The greatest probability of success is for Vasant which is 0.92

Q. 6

Kishor kept 26 cards in a cap, bearing one English letter on each card. One card is drawn at random. What is the probability that the card drawn is not a vowel card?

SOLUTION:

There are 26 cards each bearing one English Letter.

n (S) = 26

V = Event of getting vowel card

There are 5 vowel cards a, e, i, o, u.

n (V) = 5

W = Event of getting non vowel card

Thus non vowel cards are 26 – 5 = 21

n (W) = 21

P (W) = n (W) / n (S)

= 21/26

Ans: 21/26.

Q.7

A box contains 9 red, 10 blue and 5 green pens. Shreya wants to pick a pen at random. What is the probability that the pen is blue?

SOLUTION:

Here there are 9 red pens R1, R2, R3, R4, R5, R6, R7, R8, R9

10 blue pens B1, B2, B3, B4, B5, B6, B7, B8, B9, B10

5 green pens G1, G2, G3, G4, G5

the sample space

S = {R1, R2, R3, R4, R5,R6, R7, R8, R9, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10 ,G1, G2, G3,G4,G5 }

n (S) = 24

Let A be the event that Shreya picks a blue pen.

Then A = { B1, B2, B3, B4, B5, B6, B7, B8, B9, B10}

n (A) = 10

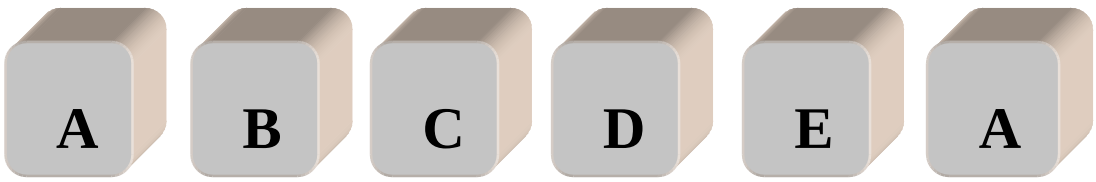
$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{10}{24}$$

$$P(A) = \frac{5}{12}$$

Q. 8

Six faces of the die are as shown below, find the probability that



1) ‘A’ appears on upper face.

2) ‘D’ appears on upper face.

SOLUTION:

The die is rolled once

S = {A, B, C, D, E, A}

n (S) = 6

1) Let ‘A’ appear on the upper face

Then A = {A, A}

n (A) = 2

$$\mathbf{P\ (A) = \frac{n\ (A)}{n\ (S)}}$$

$$\mathbf{P\ (A) = \frac{2}{6}}$$

$$\mathbf{P\ (A) = \frac{1}{3}}$$

2) Let ‘D’ appear on the upper face

Then D = { D }

n (D) = 1

$$\mathbf{P\ (D) = \frac{n\ (D)}{n\ (S)}}$$

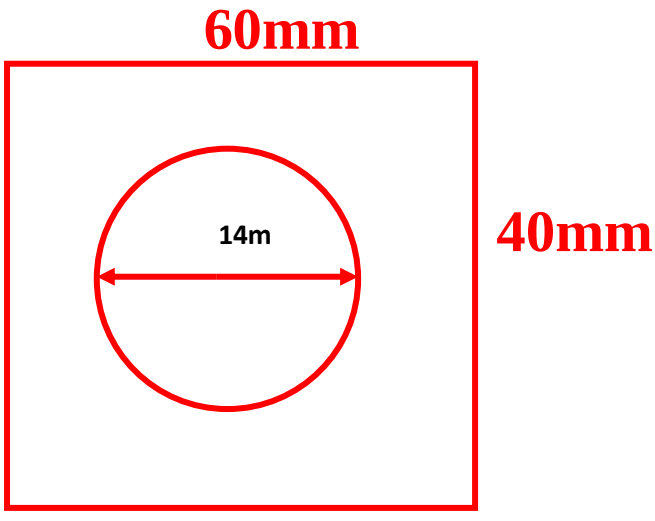
$$P(A) = \frac{1}{6}$$

$$P(A) = \frac{1}{6}$$

Ans. 1) $\frac{1}{3}$ **2)** $\frac{1}{6}$

Q. 9

Length and breadth of a rectangular garden are 60 m and 40 m. There is a circular lake in the garden having diameter 14 m. Due to wind, a towel from a terrace of a nearby fell on the into the garden. Find the probability of the event that fell into lake.



SOLUTION:

Area of rectangular garden = L x B =60 x 40 = 2400 m^2

i.e. n (S) = 2400

The diameter of the circular lake is 14 m

r = 7 m

Are of circular lake is = ¶r^2

$$= \frac{22}{7} \text{x } 7 \text{ x } 7 = 154 \text{ m}^2$$

Let A be the event that towel fell into lake

n (S) = 154

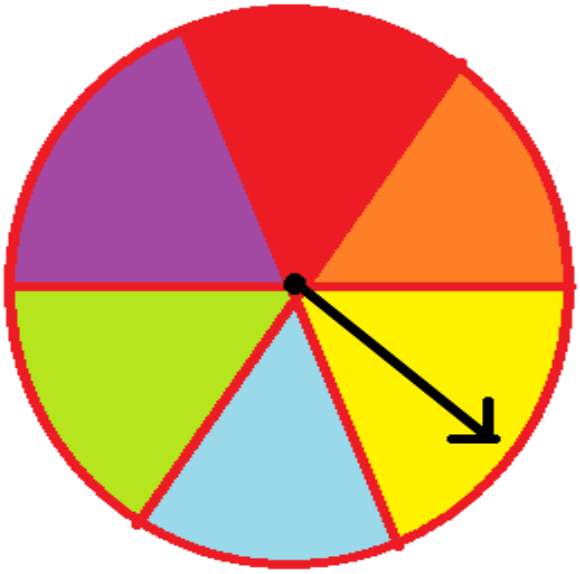
$$P(A) = \frac{154}{2400}$$

$$= \frac{77}{1200}$$

$$P(A) = \frac{77}{1200}$$

Q. 10

The arrow is rotated, and it stops randomly on the disc. Find out probability that arrow will stop on red color



SOLUTION:

There are total six colours on the disc.

Sample space

S = { Red, Orange, Yellow, Blue, Green, Purple }

∴ n (S) = 6

A = Event that arrow will stop on Red

A = { Red, }

n (A) = 1

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{1}{6}$$

Ans: $P(A) = \frac{1}{6}$

Q. 11

Arun buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 9 male fish and 6 female fish . What is the probability that the fish taken out is a female fish?

SOLUTION:

Total number of fish in the tank = 9 + 6 = 15

Number of female fish = 6

Ans: P (a female fish) = 6 /15

Q. 12

A bag contains pineapple flavored candies only. Seema takes out one candy without looking into the bag. What is the probability that she takes out

(i) an pineapple flavored candy?

(ii) a lemon-flavored candy?

SOLUTION:

(i) There is no lemon flavored candy. So the probability of lemon flavored candy

P (E) = 0 (impossible event).

(ii) All candies are pineapple flavored in the bag. So the probability of a pineapple flavored candy

P (E) = 1 (sure event).

Ans: P (lemon flavored candy) = 0

P (pineapple flavored candy) = 1

Q. 13

It is given that in a group of 3 boys, the probability of 2 boys not having the same birthday is 0.886. What is the probability that the 2 students have the same birthday?

SOLUTION:

As the probability of 2 students not having the same birthday, P (not E) = 0.886

∴ Probability of students having the same birthday,

P(E) = 1 – P(not E)

= 1 – 0.886

= 0.114

Ans: P (2 students have the same birthday) = 0.114

Q. 14

A bag contains 6 red balls and 10 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is

(i) red?

(ii) not red?

SOLUTION:

Number of red balls = 6

Number of black balls = 10

Total number of balls = 6 + 10 = 16

Ans: (i) P(red ball) = 6/16 = 3/8

(ii) P(not red ball) = 10/16 =5/8

Q. 15

A box contains 15 red marbles, 18 white marbles, and 14 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be?

(i) red?

(ii) white?

(iii) not green?

SOLUTION:

Number of red marbles = 15

Number of white marbles = 18

Number of green marbles = 14

Total number of marbles = 15 + 18 + 14 = 47

(i) P (red marble) = 15/47

(ii) P (white marble) = 18/47

(iii) P (not green) = 1 – P(green)

= 1 – (14/47)

= 33/47

Ans: P (red marble) = 15/47,

P (white marble) = 18/47,

P (not green) = 33/47

Q. 16

15 defective pens are accidentally mixed with 140 good ones. It is not possible to just look at a pen and tell whether it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

SOLUTION:

Number of good pens = 140

Number of defective pens = 15

Total number of pens = 15 + 140 = 155

Number of favorable outcomes = Number of good pens = 140

P (getting good pen) = 140/155 = 28/31

Ans: P (getting good pen) = 28/31

Q. 17

A game consists of tossing a one-rupee coin 3 times and noting its outcome each time. Prakash wins if all the tosses give the same result, i.e., three heads or three tails, and loses otherwise. Calculate the probability that Prakash will lose the game.

SOLUTION:

Total outcomes are HHH, TTT, HHT, HTH, THH, TTH, THT, HTT so, there are 8 outcomes

Prakash will lose the game if outcomes are HHT, HTH, THH, TTH, THT, HTT

So, favorable outcomes = 6

∴ P (Prakash will lose the game) = 6/8 = ¾

Ans: P (Prakash will lose the game) = ¾

Q. 18

A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

SOLUTION:

Total English alphabets = 26

Number of consonants = 21

Ans: P (letter is a consonant) = 21/26

Q. 19

A box contains cards numbered 5 to 55. A card is drawn at random from the box. Calculate the

probability that the drawn card has a number which is a perfect cube.

SOLUTION:

Total number of cards = 55 – 5 + 1 = 51

Perfect cube numbers are 9, 27 i.e., 2 numbers

∴ P(a prefect cube) = 2/51 = 2/51

Ans: P (a prefect cube) = 2/51

Q. 20

A number is chosen at random from the numbers -3, - 2, - 1, 0, 1, 2, 3. What will be the probability that square of this number is less than or equal to 3?

SOLUTION:

$(-3)^2 = 9$; $(-2)^2 = 4$; $(-1)^2 = 1$; $(0)^2 = 0$

$(1)^2 = 1$; $(2)^2 = 4$; $(3)^2 = 9$

∴ P (Sq. of the no. ≤ 1) = 3/7

Q. 21

Two different dices are tossed together. Find the probability that the product of the two numbers on the top of the dice is 4.

SOLUTION:

Total outcomes = 6^2 = 36

Possible outcomes having the product of the two numbers on the top of the dice as 4 are (2 × 2, 2 × 2,),

P(Product of two nos. is 4) = 2/36 = 1/18

Ans: P(Product of two nos. is 3) = 1/18

Q. 22

Rehman tosses two different coins simultaneously. Find the probability of getting at least one head.

SOLUTION:

S = {HH, HT, TH, TT}, i.e., 3

P (at least one head) = 3/4

Ans: P (at least one head) = 3/4

Q. 23

A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability that the drawn card is neither a king nor a queen.

SOLUTION:

Total number of cards = 52

Numbers of king = 4

Numbers of queen = 4

Card is neither a king nor a queen = 52 – 4 – 4 = 44

∴ Required probability = 44/52 = 11/13

Ans: P (neither a king nor a queen) = 11/13

Q. 24

Two dice are thrown simultaneously. Find the probability of getting a doublet.

SOLUTION:

Two dice can be thrown as 6 x 6 = 36 ways

“a doublet” can be obtained by (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)

i.e., 6 ways

P(a doublet) = 6/36 = 1/6

Ans: P(a doublet) = 1/6

Q. 25

Three distinct coins are tossed together. Find the probability of getting

(i) at least 2 tails

(ii) at most 2 tails.

SOLUTION:

Total number of possible outcomes = 2^3 = 8

(HHH, TIT, HHT, THH, THT, HTH, TTH, HTT)

(i) Possible outcomes of at least two tails = 4

(THT, TTH, TTT, HTT)

∴ P(at least two tails) = 4/8= ½

(ii) Possible outcomes of at most two tails = 7

(HHT, HHH, THH, THT, HTH, TTH, HTT)

∴ P(at most two tails) = 7/8

Ans: P (at least two tails) = ½,

P(at most two tails) = 7/8

Q. 26

Three different coins are tossed together. Find the probability of getting

(i) exactly two tails

(ii) at least two tails

(iii) at least two heads

SOLUTION:

S = {HHH, HHT, HTH, THH, TTH, THT, HTT,

TTT}

Total number of ways = 8

(i) Exactly two tails = TTH, THT, HTT, i.e., 3 ways

∴ P (exactly two tails) = 3/8

(ii) At least two tails = TTH, THT, HTT, TTT i.e., 4 ways

∴ P (at least two tails) = 4/8 = 1/2

(iii) At least two heads = HHH, HHT, HTH, THH, i.e., 4 ways

∴ P (at least two heads) = 4/8 = 1/2

Ans: P (exactly two tails) = 3/8,

P (at least two tails) =1/2,

P (at least two heads) = 1/2

Q. 27

A ticket is drawn at random from a bag containing tickets numbered from 3 to 35. Find the probability

that the selected ticket has a number which is a multiple of 3.

SOLUTION:

Total number of tickets = 35 – 3 +1 = 33

‘A multiple of 3’ are 3, 9, 12, 15, 18,21,24,27,30,33, i.e., 10 tickets

∴ P (A multiple of 3) = 10/33 = 10/33

Ans: P (A multiple of 3) = 10/33

Q. 28

In a single throw of a pair of different dice, what is the probability of getting

(i) a prime number on each dice?

(ii) a total of 8 or 10?

SOLUTION:

Two dice can be thrown in 6 × 6 = 36 ways

(i) “a prime number on each dice” can be obtained

as (2, 2), (2, 3), (2, 5), (3, 2), (3, 3), (3, 5), (5, 2), (5, 3), (5, 5), i.e., 9 ways.

∴ P (a prime no. on each dice) = 9/36 = 1/4

(ii) "a total of 8 or 10" can be obtained as (2, 6),(3, 5),(4, 4),(5, 5) (6, 4)

Total '8' or '10' i.e., 5 ways

∴ P (a total of 8 or 10) = 5/36 = 5/36

Ans: P (a prime no. on each dice) = ¼, P (a total of 8 or 10) = 5/36

Q. 29

A box consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Suresh, a shopkeeper will buy only those shirts which are good but 'Kishore another shopkeeper will not buy shirts with major defects. A shirt is taken out of the box at random. What is the

probability that:

(i) Suresh will buy the selected shirt?

(ii) 'Kishore will buy the selected shirt.

SOLUTION:

Good	Minor defects	Major defects	Total
88	8	4	100

No. of good shirts = 88

(i) P (Suresh buys a shirt) = P(good shirts) = 88/100

= 22/25

(ii) No. of shirts without major defect = 96

P (Kishore buys a shirt) = P (shirts without major defect)

= (96)/100

= 96/100

= 24/25

Ans: P (Suresh buys a shirt) = 22/25, P (Kishore buys a shirt) = 24/25

Q. 30

A box contains cards numbered 3, 5, 7, 9, …, 35, 37. A card is drawn at random from the box. Find the probability that the number on the drawn card is a multiple of 5.

SOLUTION:

Total number of cards = 18

multiple of 5 numbers are: 5, 15, 25, 35,

∴ P (multiple of 5 numbers) = 4/18

∴ P (multiple of 5 numbers) = 2/9

Ans P (multiple of 5 numbers) = 2/9

Q.31

Find the probability that a leap year selected at random, will contain 53 Mondays.

SOLUTION:

In a leap year, total number of days = 366

∴ 366 days = 52 complete weeks + 2 extra days

Thus, a leap year always has 52 Mondays and extra 2 days.

Extra 2 days can be,

(i) Sunday and Monday

(ii) Monday and Tuesday

(iii) Tuesday and Wednesday

(iv) Wednesday and Thursday

(v) Thursday and Friday

(vi) Friday and Saturday

(vii) Saturday and Sunday

Let E be the event that a leap year has 53 Mondays.

∴ E = {Sun and Mon, Mon and Tues}

∴ P(E) = 2/7

Ans: P (53 Mondays in a leap year) = 2/7

Q. 32

A number *p* is selected at random from the numbers 1, 2, 3 and 4. Another number *q* is selected at random from the numbers 5, 6, 7 and 8. Find the probability that product of *p* and *q* is less than 12.

SOLUTION:

***p* can be any one of 1, 2, 3, and 4 i.e., 4 ways**

***q* can be any one of 5, 6, 7, and 8 i.e., 4 ways**

Total no. of cases of *pq* = 4 × 4 = 16 ways

Number of cases, where product is less than 12 (1, 5), (1, 6), (1, 7), (1, 8), (2, 5), i.e., 5 ways

∴ P (product of *p* & *q* less than 12) = 5/16

Ans: P (product of *p* & *q* < 12) = 5/16

Q. 33

Cards numbered from 11 to 60 are kept in a box. If a card is drawn at random from the box, find the probability that the number on the drawn card is:

(i) an odd number

(ii) a perfect square number

(iii) divisible by 5

(iv) a prime number less than 20

SOLUTION:

Total number of cards = 60 – 11 + 1 = 50

(i) Odd nos are 11, 13, 15, 17, …. 59 i.e., 25 no.

∴ P (an odd number) = 25/50 = 1/2

(ii) Perfect square numbers are 16, 25, 36, 49 = 4 numbers

∴ P (a perfect square no.) = 4/50 = 2/25

(iii) "Divisible by 5" numbers are 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, = 10 numbers

∴ P (divisible by 5) = 10/50 = 1/5

(iv) Prime numbers less than 20 are 2, 3, 5, 7, 11, 13, 17, 19 = 8 numbers

∴ P (a prime no. less than 20) = 8/50 = 4/25

Ans: P (an odd number) = ½

P (a perfect square number) = 2/25

P (divisible by 5) = 1/5

P (a prime number less than 20) = 4/25

Q. 34

Five cards, the ten, jack, queen, king, and ace of diamonds, are well shuffled with their faces downwards. One card is then picked up at random.

(a) What is the probability that the drawn card is the king?

(b) If the king is drawn and put aside, and a second card is drawn, find the probability that the second card is (i) a ten (ii) a king.

SOLUTION:

(a) Total events = 5; P(king) = 1/5

(b) Now total events = 4

(i) P (a ten) = ¼

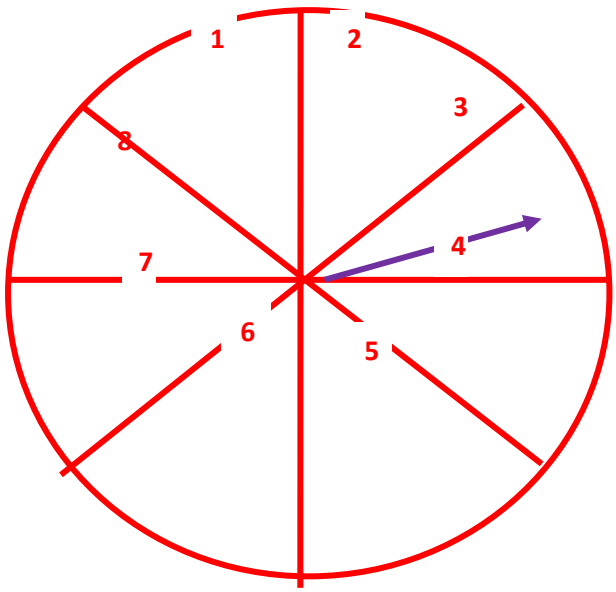
(ii) P (a king) = 0/4 = 0 …[As there is no king left]

Ans: P (king) = 1/5, P (a ten) = ¼, P (a king) = 0

Q. 35

In a game of chance, a spinning arrow comes to rest at one of the numbers 1, 2, 3, 4, 5, 6, 7

All these are equally likely outcomes



Find the probability that it will rest at

1) 7

2) an even number

3) a number greater than 2

4)a number less than 9

SOLUTION:

The disc contains 8 numbers

S = {1,2,3,4,5,6,7,8}

n (S) = 8

(1) let A be the event that the arrow comes to rest at 7

Then A= {7}

n (A) =1

$$\mathbf{P\ (A) = \frac{n(A)}{n(S)}}$$

$$= \frac{1}{8}$$

(2)Let B be the event that the arrow comes on an even number

Then B = {2, 4, 6, 8}

n (B) =4

$$\mathbf{P\ (B) = \frac{n(B)}{n(S)}}$$

$$= \frac{4}{8}$$

$$= \frac{1}{2}$$

(3)Let C be the event that the arrow comes rest on a number greater than 2

Then C = {3,4,5,6,7,8}

n (C)=6

$$\mathbf{P\ (C) = \frac{n(C)}{n(S)}}$$

$$= \frac{6}{8}$$

$$= \frac{3}{4}$$

(4)Let D be the event that the arrow comes rest at a number less than 9

Then D = {1, 2, 3, 4, 5, 6, 7, 8}

n (D) = 8

$$P(D) = \frac{n(D)}{n(S)}$$

$$= \frac{8}{8}$$

$$= 1$$

Ans (1) $\frac{1}{8}$ (2) $\frac{1}{2}$ (3) $\frac{3}{4}$ (4) 1

Q. 36

There are seven cards in a box, each bearing a number from 1 to 7. Find the probability of each of the following events, that card drawn shows

1) a number greater than 2

2) a number less than 3

3) an odd number

SOLUTION:

The numbers on the cards are from 1 to 7

S = { 1, 2, 3, 4, 5, 6,7 }

n (S)=7

1) Let B be the event that the card drawn shows a natural number greater than 2

B = {3, 4, 5, 6,7}

n (B) = 5

$$\mathbf{P\ (B) = \frac{n(B)}{n(S)}}$$

$$= \frac{5}{7}$$

2) let B be the event that the card drawn shows a natural number less than 3

A = { 1, 2, }

n (A) = 2

$$\mathbf{P\ (A) = \frac{n(A)}{n(S)}}$$

$$= \frac{2}{7}$$

3) Let C be the event that the card drawn shows an odd number

Then C = { 1, 3, 5, 7 }

n (C) = 4

$P(C) = \frac{n(C)}{n(S)}$

$= \frac{4}{7}$

Ans (1) $\frac{5}{7}$ (2) $\frac{2}{7}$ (3) $\frac{4}{7}$

Q. 37

Out of 150 hundred students from a school, 85 like Cricket and the remaining students do not like the game. If one student is selected at random from all the students, find the probability that student selected does not like Cricket.

SOLUTION:

There are 150 students

n (S) = 150

85 students like Cricket

(150 – 85) = 65 students do not like Cricket

Let A be the event that student selected does not like Cricket

n (A) = 65

$$P(C) = \frac{n(A)}{n(S)}$$

$$= \frac{65}{150}$$

$$= \frac{13}{30}$$

Q. 38

A box contains 25 tickets, bearing only one number from 1 to 25 on each. If one ticket is drawn at random, find the probability of an event that the ticket drawn bear

(1) an odd number

(2) a complete square number

SOLUTION:

n (S) = 25

(1) Let A be event that the ticket drawn bears an odd number

Then A = {1,3,5,7,9,11,13,15,17,19,21,23,25 ,}

n (A) = 13

$$\mathbf{P\ (A) = \frac{n(A)}{n(S)}}$$

$$= \frac{13}{25}$$

(2) Let B be event that the ticket drawn bears a complete square

Then B = {1, 4, 9, 16, 25}

n (B) = 5

$$\mathbf{P\ (B) = \frac{n(A)}{n(S)}}$$

$$= \frac{5}{25}$$

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

Q. 39

In a family of 3 children calculate the probability of having at least one girl.

SOLUTION:

S = {bbb, bbg, ggb, ggg}

At least 1 boy = {bbg, ggb, ggg }

∴ P (at least 1 girl) = ¾

Q. 40

Each card bears one letter from the word 'mathematics'. The cards are placed on a table upside down. Find the probability that a card drawn bears the letter 'a'.

SOLUTION:

Sample space = {m, a, t, h, e, m, a, t, i, c, s}

∴ n(S) = 11

Let A be the event that the card drawn bears the letter 'a'

∴ A = {a, a}

∴ n (A) = 2

P (A) = n (A) / n (S) = 2/11

Ans. The probability that a card drawn bears letter 'm' is 2/11

Q. 41

If the probability of a win is 0.16 and the probability of a draw is 0.4, what is the probability of a loss?

SOLUTION:

The probability of loss is = 1 - (0.4+0.16) = 1 - 0.56 = 0.44

Ans: P (losing) = 0.44

Q. 42

A number is selected at random from first 50 natural numbers. Then find the probability that it is a multiple of 3 and 4.

SOLUTION:

The numbers that are multiple of 3 (from first 50 natural numbers) are:

3, 6, 9, 12, 15, 18……..48

The numbers that are multiple of 4 (from first 50 natural numbers) are:

4, 8, 12, 16…….48

The numbers that are multiples of 3 and 4 both are the multiples of 3 × 4 = 12 as both 3 and 4 are co-prime.

So common multiples are:

12, 24, 36, 48

Therefore probability is:

P (multiple of 3 and 4) = 4/50

⇒ P (multiple of 3 and 4) = 2/25

Q. 43

A box of 500 bulbs contains 15 defective bulbs. One bulb is taken out at random from this box. Then FIND the probability that it is non-defective bulb.

SOLUTION:

P (non-defective bulb) = 1 – P (Defective bulb)

= 1 – (15/500)

= (500 – 15)/500

= 485/500

= 97/100

Ans: P (non-defective bulb) =97/100

Q. 44

A number *m* is chosen at random from the numbers -2, -1, 0, 1, 2. Then the probability that $m^2 < 4$ is?

We have 5 numbers −2, −1, 0, 1, 2

Whose squares are 4, 1, 0, 1, 4

So square of 3 numbers is less than 4

Therefore Probability is:

P ($m^2 < 4$) = 3/5

Ans : P ($m^2 < 4$) = 3/5

Q. 45

A game consists of tossing a one-rupee coin 3 times and noting its outcome each time. Prakash wins if all the tosses give the same result i.e., three heads or three tails and loses otherwise. Then the probability that Prakash will lose the game.

SOLUTION:

Total outcomes are:

HHH, HHT, HTH, THH, HTT, THT, TTH, TTT

Favorable outcomes for losing game are

HHT, HTH, THH, HTT, THT, TTH

Therefore, probability of losing the game is:

P (Losing the game) = 6/8

⇒ P (Losing the game) = ¾

Q. 46

Kumar and Swamy are friends. Find the Probability that both will have the same birthday.

SOLUTION:

Kumar may have any one of 365 days of the year as her birthday.

Similarly Swamy may have any one of 365 days as her birthday.

Total number of ways in which Kumar and Swamy may have their birthday are:

365 × 365

Then Kumar and Swamy may have same birthday on any one of 365 days.

Therefore number of ways in which Kumar and Swamy may have same birthday are:

$= \frac{365}{(365 \text{ X } 365)} = \frac{1}{(365)}$

P(both will have the same birthday)=1/365

Q. 47

A bag contains 18 balls out of which *x* balls are blue.

1. **If one ball is drawn at random from the bag, what is the probability that it is not blue?**
2. **If 2 more blue balls are put in the bag, find the probability of drawing a blue ball**
3. **SOLUTION:**

1. **Number of non-blue balls = 18 – *x* Probability that ball drawn is not blue =** $\frac{18 - x}{18}$

2. **For case II**

   When 2 more blue balls are put in the bag, then number of balls in the bag is 20.

   Now, number of blue balls = *x* + 2

Probability that ball drawn is blue = $\frac{x+2}{20}$

Q. 48

A game consists of tossing a one-rupee coin three times and noting its outcome each time. Find the probability of getting

1. Two heads.

2. At least 1 tail.

SOLUTION:

Possible outcomes

HHH, HHT, HTH, THH, TTT, TTH, THT, HTT

Total number of outcomes = 8

1. A = getting two heads, 3

[i.e. HHH]

P(A) =3/8

2. B = getting at At least 1 tail, 7

[i.e. TTT, TTH, THT, HTT]

P(B)=7/8

Ans: P (getting two heads) = 3/8

P (getting at least 1 tail) = 7/8

Q. 49

A box contains cards bearing numbers from 6 to 70. If one card is drawn at random from the box, find the probability that it bears

1. A one digit number.
2. A number divisible by 5.
3. An odd number less than 30.
4. A composite number between 50 and 70.

SOLUTION:

Number of cards in the box = 65

1. Cards bearing one digit number are 6,7,8,9 (i.e. 4 cards) Probability of card bears a one digit number = 4/65

2. Number on the cards is divisible by 5 are 10, 15,20,25,30,35,40,45,50,55,60,65,70 (i.e. 13 cards)

   $P(\text{No. of cards divisible by 5}) = \frac{13}{65} = \frac{1}{5}$

3. Cards with an odd number less than 30 are 7, 9,11,13,15,17,19,21,23,25,27,29 (i.e. 12 cards).

   $P(\text{Cards with an odd number } < 30 = \frac{12}{65}$

4. Card with composite number between 50 and 70 are 51, 52, 54, 55, 56, 57, 58, 60, 62, 63, 64, 65, 66, 68, 69 (i.e. 15 cards).

$P(\text{Card with composite number between 50 \& 70})$

$$= \frac{15}{65} = \frac{3}{13}$$

Ans: P (a one digit number) = $\frac{4}{65}$

P (a number divisible by 5) = $\frac{1}{5}$

P (an odd number less than 30) = $\frac{12}{65}$

P (a composite number between 50 & 70) = $\frac{3}{13}$

Q. 50

A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is

1. A card of heart or an ace.

2. A black queen.

3. Neither a jack nor a king

4. Either a king or a queen

SOLUTION:

Total number of outcomes = 52

1. **A = Card is heart or an ace**

   Cards favorable to A = 13 + 3 = 16

   $$P(A) = \frac{16}{52} = \frac{4}{13}$$

2. **B = Card is black queen**

   Number of black queen s = 2

   $$P(B) = \frac{2}{52} = \frac{1}{26}$$

3. **C = Card is neither a jack nor a king**

Number of favorable cards to C = 52 – 4 - 4 = 44

$$P(C) = \frac{44}{52} = \frac{11}{13}$$

4. D = Card is either a king or a queen

Number of cards favorable to D = 4 + 4 = 8

$$P(D) = \frac{8}{52} = \frac{2}{13}$$

Ans: P (a card of heart or an ace) = $\frac{4}{13}$,

P (a black queen) = $\frac{1}{26}$,

P (neither a jack nor a king) = $\frac{11}{13}$,

P (either a king or a queen) = $\frac{2}{13}$