Probability

Practice Set 5.1

Q. 1. How many possibilities are there in each of the following?

(1) Vanita knows the following sites in Maharashtra. She is planning to visit one of them in her summer vacation.
Ajintha, Mahabaleshwar, Lonar Sarovar, Tadoba wild life sanctuary, Amboli, Raigad, Matheran, Anandavan.
(2) Any day of a week is to be selected randomly.
(3) Select one card from the pack of 52 cards.
(4) One number from 10 to 20 is written on each card. Select one card randomly.

Answer : (1) 8

Count the number of sites.

(2) 7

In a week comprising of 7 days, there are 7 ways to select any day .

(3) 52

From a deck of 52 cards, we can select any one card in 52 ways.

(4) 11

There are 11 total ways of selecting a card randomly .

Practice Set 5.2

Q. 1. For each of the following experiments write sample space 'S' and number of sample points n(S).

(1) One coin and one die are thrown simultaneously.
(2) Two digit numbers are formed using digits 2, 3 and 5 without repeating a digits.

Answer :

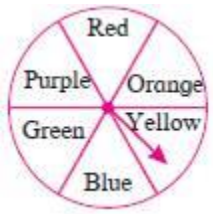
(1) Sample Space, S = {1H, 1T, 2H, 2T, 3H, 3T, 4H, 4T, 5H, 5T, 6H, 6T}

∴ Number of events in Sample Space S, n(S) = 12

(2) Sample Space, S = {23, 25, 32, 35, 52, 53}

∴ Number of events in Sample Space S, n(S) = 6

Q. 2. The arrow is rotated and it stops randomly on the disc. Find out on which colour it may stop.



Answer : Sample Space, S = {Red, Purple, Orange, Yellow, Blue, Green}

∴ Number of events in Sample Space S, n(S) = 6

Q. 3. In the month of March 2019, find the days on which the date is a multiple of 5. (see the given page of the calendar)

MARCH - 2019

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Answer : The days on which the date is a multiple of 5 are as follows:

Multiples of 5 are 5, 10, 15, 20, 25, 30
So,

a) Tuesday (5 March 2019)

b) Sunday (10 March 2019)

c) Friday (15 March 2019)

d) Wednesday (20 March 2019)

e) Monday (25 March 2019)

f) Saturday(30 March 2019)

Q. 4. Form a 'Road safety commitee' of two, from 2 boys (B_1, B_2) and 2 girls(G_1, G_2). Complete the following activity to write the sample space.

(a) Committee of 2 boys = ☐

(b) Committee of 2 girls = ☐

(c) Committee of one boy and one girl = B_1G_1 ☐ ☐ ☐

∴ Sample space = {..., ..., ..., ..., ..., ...}

Answer : a) Committee of 2 boys = B_1, B_2

b) Committee of 2 girls= G_1, G_2

c) Committee of one boy and one girl=Any of the event given in sample space given below is possible

Sample Space, S={B_1G_1, B_1G_2, B_2G_1, B_2G_2}

Practice Set 5.3

Q. 1 A. Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

One die is rolled,
Event A : Even number on the upper face.
Event B : Odd number on the upper face.
Event C : Prime number on the upper face.

Answer :

Sample space, S = {1, 2, 3, 4, 5, 6}

Number of sample points, n(S) = 6

A = {2, 4, 6} , n(A) = 3

B = {1, 3, 5} , n(B) = 3

C = {2, 3, 5} , n(C) = 3

Q. 1 B. Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

Two dice are rolled simultaneously,
Event A : The sum of the digits on upper faces is a multiple of 6.
Event B : The sum of the digits on the upper faces is minimum 10.
Event C : The same digit on both the upper faces.

Answer : 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)}

Number of sample points, n(S) = 36

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

B = {(4, 6) (5, 5) (5, 6) (6, 4) (6, 5) (6, 6)} , n(B) = 6

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

Q. 1 C. Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

Three coins are tossed simultaneously.
Condition for event A : To get at least two heads.
Condition for event B : To get no head.
Condition for event C : To get head on the second coin.

Answer : Sample Space, S = {HHH, HHT, HTT, HTH, THT, TTH, THH, TTT}

Number of sample points, n(S) = 8

To get at least two heads ,A = {HHH, HHT, HTH, THH}

n(A) = 4

To get no head, B = {TTT}

n(B) = 1

To get head on the second coin ,C = {HHH, HHT, THH}

n(C) = 3

Q. 1 D. Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

Two digit numbers are formed using digits 0, 1, 2, 3, 4, 5 without repetition of the digits.
Condition for event A : The number formed is even
Condition for event B : The number formed is divisible by 3.
Condition for event C : The number formed is greater than 50.

Answer : Sample Space, S= {10, 12, 13, 14, 15, 20, 21, 23, 24, 25, 30, 31, 32, 34, 35, 40, 41, 42, 43,45, 50, 51, 52, 53, 54}

Number of sample points, n(S) = 25

The number formed is even , A = {10, 12, 14, 20, 24, 30, 32, 34, 40, 42, 50, 52, 54}

n(A) = 13

The number formed is divisible by 3, B = {12, 15, 21, 24, 30, 42, 45, 51, 54}

n(B) = 9

The number formed is greater than 50,C = {51, 52, 53, 54} n(C) = 4

Q. 1 E. Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

From three men and two women, environment committee of two persons is to be formed.
Condition for event A : There must be at least one woman member.
Condition for event B : One man, one woman committee to be formed
Condition for event C : There should not be a woman member.

Answer : Sample Space, S = {M_1M_2, M_1M_3, M_1F_1, M_1F_2, M_2M_3, M_2F_1, M_2F_2, M_3F_1, M_3F_2, F_1F_2}

Number of sample points, n(S) = 10

There must be at least one woman member , A = {M_1F_1, M_1F_2, M_2F_1, M_2F_2, M_3F_1, M_3F_2, F_1F_2}

n(A) = 7

One man, one woman committee to be formed , B = {M_1F_1, M_1F_2, M_2F_1, M_2F_2, M_3F_1, M_3F_2}

n(B) = 6

There should not be a woman member , C = {M_1M_2, M_1M_3, M_2M_3}

n(C) = 3

Q. 1 F. Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).

One coin and one die are thrown simultaneously.
Condition for event A : To get head and an odd number.
Condition for event B : To get a head or tail and an even number.
Condition for event C : Number on the upper face is greater than 7 and tail on the coin.

Answer : Sample Space, S = {H1, H2, H3, H4, H5, H6 T1, T2, T3, T4, T5, T6}

Number of sample points, n(S) = 12

To get head and an odd number , A = {H1, H3, H5}

n(A) = 3

To get a head or tail and an even number , B = {H2, H4, H6, T2, T4, T6}

n(B) = 6

Number on the upper face is greater than 7 and tail on the coin= No Sample space exists for this event as dice does not have numbers greater than or equal to 7

n(C)=0

Practice Set 5.4

Q. 1. If two coins are tossed, find the probability of the following events.

(1) Getting at least one head.
(2) Getting no head.

Answer : Sample Space, S=(HH,HT,TH,TT)

(1)Probability of getting at least one head, $p(A)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

$\therefore p(A)=\frac{3}{4}$

(3) Probability of getting no head, $p(B)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

$\therefore p(B)=\frac{1}{4}$

Q. 2. If two dice are rolled simultaneously, find the probability of the following events.

(1) The sum of the digits on the upper faces is at least 10.
(2) The sum of the digits on the upper faces is 33.
(3) The digit on the first die is greater than the digit on second die.

Answer :

(1) Probability of getting the sum of the digits on the upper faces is at least 10, $p(A)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$
We know the Favourable Cases are (Where the Sum of digits on the upper faces is at least 10):- (4,6), (5,5), (5,6), (6,4), (6,5), (6,6)- 6 casesTotal Number of Outcomes:- 36

$\therefore p(A)=\frac{6}{36}=\frac{1}{6}$

(2) Probability of getting the sum of the digits on the upper faces is 33, $p(B)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$
Favorable Outcomes(Getting the sum of Digits on the upper Faces is 33)= 0 as the maximum sum could be 12

$\therefore p(B)=0$

(3) (3) Probability of getting the digit on the first die is greater than the digit on second die, $p(C)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

Favorable Outcomes are as follow:- (2,1), (3,1), (3,2), (4,1), (4,2), (4,3), (5,1), (5,2), (5,3), (5,4), (6,1), (6,2), (6,3),(6,4), (6,5)= 15 cases

$$\therefore p(C)= \frac{15}{36}=\frac{5}{12}$$

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 the probability of event that the ticket drawn -

(1) shows an even number.
(2) shows a number which is a multiple of 5.

Answer : (1) Probability of event that the ticket drawn shows an even number, p(E) =

$$\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$

$$\therefore p(E)=\frac{7}{15}$$

(2) Probability of event that the ticket drawn shows a number which is a multiple of 5,

$$p(X) =\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$

$$\therefore p(X)=\frac{1}{5}$$

Q. 4. A two digit number is formed with digits 2, 3, 5, 7, 9 without repetition. What is the probability that the number formed is

(1) an odd number ?
(2) a multiple of 5 ?

Answer : (1) Probability that the number formed is an odd number,

$$p(X) =\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$

$\therefore p(X)=\frac{4}{5}$

(2) Probability that the number formed is an odd number,

$$p(X)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$

$\therefore p(X)=\frac{1}{5}$

Q. 5. A card is drawn at random from a pack of well shuffled 52 playing cards. Find the probability that the card drawn is -

(1) an ace. (2) a spade.

Answer :

(1) Probability that the card drawn is an ace, $p(A)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

$\therefore p(A)=\frac{1}{13}$

(2) Probability that the card drawn is a spade, $p(B)=\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

$\therefore p(B)=\frac{1}{4}$

Problem Set 5

Q. 1 A. Choose the correct alternative answer for each of the following question.

Which number cannot represent a probability?

A. 2/3
B. 1.5

C. 15%
D. 0.7

Answer : As probability of any event lies between 0 and 1 , the answer is option B = 1.5 ,which is greater than 1.

Q. 1 B. Choose the correct alternative answer for each of the following question.

A die is rolled. What is the probability that the number appearing on upper face is less than 3?

A. 1/6
B. 1/3
C. 1/2
D. 0

Answer : Favourable outcomes=(1,2)=2

Total number of outcomes=6

$\therefore$ Probability that the number appearing on upper face is less than $3=\frac{2}{6}=\frac{1}{3}$

Q. 1 C. Choose the correct alternative answer for each of the following question.

What is the probability of the event that a number chosen from 1 to 100 is a prime number?

A. 1/5
B. 6/25
C. 1/4
D. 13/50

Answer : Favourable outcomes=24

Total number of outcomes=100

$\therefore$ Probability that the number a number chosen from 1 to 100 is a prime number=

$\frac{24}{100}=\frac{6}{25}$

Q. 1 D. Choose the correct alternative answer for each of the following question.

There are 40 cards in a bag. Each bears a number from 1 to 40. One card is drawn

at random. What is the probability that the card bears a number which is a multiple of 5?

A. 1/5
B. 3/5
C. 4/5
D. 1/3

Answer :

Favourable outcomes=8

Total number of outcomes=40

∴ Probability that the the card bears a number which is a multiple of 5=

$$\frac{8}{40} = \frac{1}{5}$$

Q. 1 E. Choose the correct alternative answer for each of the following question.

If n(A) = 2, P(A) = 1/5, then n(S) = ?

A. 10
B. 5/2
C. 2/5
D. 1/3

Answer :

$$\text{Probability, } P(A)=\frac{n(A)}{n(s)}$$

$$\Rightarrow \frac{1}{5}=\frac{2}{n(s)}$$

$$\therefore n(S)=10$$

Q. 2. Basketball players John, Vasim, Akash were practising the ball drop in the basket. The probabilities of success for John, Vasim and Akash are 4/5 0.83 and 58% respectively. Who had the greatest probability of success?

Answer :

Probability of success for John$=\frac{4}{5}=0.8$

Probability of success for Vasim = 0.83

Probability of success for Akash = 0.58

$\therefore$ Probability of success is highest for = Vasim

Q. 3. In a hockey team there are 6 defenders , 4 offenders and 1 goalee. Out of these, one player is to be selected randomly as a captain. Find the probability of the selection that -

(1) The goalee will be selected.
(2) A defender will be selected.

Answer :

(1) Probability of the selection that the goalee will be selected, p(G)$=\frac{\text{Number of goalee}}{\text{Total number of players}}$

$\therefore p(G)=\frac{1}{11}$

(2) Probability of the selection that the goalee will be selected, p(D)$=\frac{\text{Number of goalee}}{\text{Total number of players}}$

$\therefore p(D)=\frac{6}{11}$

Q. 4. Joseph kept 26 cards in a cap, bearing one English alphabet on each card. One card is drawn at random. What is the probability that the card drawn is a vowel card?

Answer :

Probability of the selection that the card drawn is a vowel card, $p(V)=\frac{\text{Number of vowels}}{\text{Total number of alphabets}}$

$\therefore p(V)=\frac{5}{26}$

Q. 5. A balloon vendor has 2 red, 3 blue and 4 green balloons. He wants to choose one of them at random to give it to Pranali. What is the probability of the event that Pranali gets,

(1) a red balloon
(2) a blue balloon
(3) a green balloon.

Answer :

(1) Probability that Pranali gets a red balloon, $p(R)=\frac{\text{Number of red balloons}}{\text{Total number of balloons}}$

$\therefore p(V)=\frac{4}{9}$

(2) Probability that Pranali gets a blue balloon, $p(B)=\frac{\text{Number of blue balloons}}{\text{Total number of balloons}}$

$\therefore p(B)=\frac{1}{3}$

(3) Probability that Pranali gets a green balloon, $p(G)=\frac{\text{Number of green balloons}}{\text{Total number of balloons}}$

$\therefore p(G)=\frac{4}{9}$

Q. 6. A box contains 5 red, 8 blue and 3 green pens. Rutuja wants to pick a pen at random. What is the probability that the pen is blue?

Answer :

Probability that Rutuja picks blue pen, $p(B)=\frac{\text{Number of blue pen}}{\text{Total number of pens}}$

$\therefore p(B)=\frac{8}{16}=\frac{1}{2}$

Q. 7. Six faces of a die are as shown below.

If the die is rolled once, find the probability of -
(1) 'A' appears on upper face.
(2) 'D' appears on upper face.

Answer :

(1) Probability that A appears on upper face, $p(A)=\frac{\text{Number of faces with A}}{\text{Total number of faces}}$

$\therefore p(A)=\frac{2}{6}=\frac{1}{3}$

(2) Probability that D appears on upper face, $p(D)=\frac{\text{Number of faces with D}}{\text{Total number of faces}}$

$\therefore p(D)=\frac{1}{6}$

Q. 8. A box contains 30 tickets, bearing only one number from 1 to 30 on each. If one ticket is drawn at random, find the probability of an event that the ticket drawn bears

(1) an odd number
(2) a complete square number.

Answer :

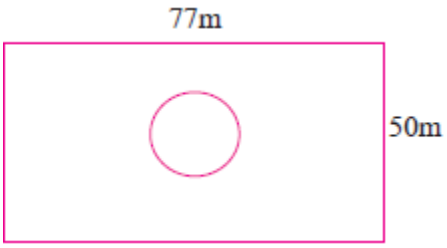
(1) Probability of an event that the ticket drawn bears an odd number, $p(O)=\frac{\text{Number of tickets with odd number}}{\text{Total number of tickets}}$

$\therefore p(O)=\frac{1}{2}$

(2) Probability of an event that the ticket drawn bears a complete square number, $p(S)=\frac{\text{Number of tickets with square number}}{\text{Total number of tickets}}$

$\therefore p(S)=\frac{5}{30}=\frac{1}{6}$

Q. 9. Length and breadth of a rectangular garden are 77 m and 50 m. There is a circular lake in the garden having diameter 14 m. Due to wind, a towel from a terrace on a nearby building fell into the garden. Then find the probability of the event that it fell in the lake.



Answer :

Probability of the event that towel fell in the lake, $p(E)=\frac{\text{Area of lake}}{\text{Total area of garden}}$

Area of lake= πr^2

$\Rightarrow =\frac{22}{7}\times\frac{14}{2}\times\frac{14}{2}$

$\Rightarrow = 154\ m^2$

Area of garden= $\text{length} \times \text{breadth}$

$\Rightarrow = 77 \times 50$

$\Rightarrow = 3850\ \text{m}^2$

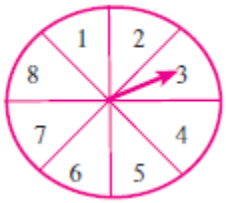
$\therefore p(E)=\frac{154}{3850}$

$=\frac{1}{25}$

Q. 10. In a game of chance, a spinning arrow comes to rest at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8.

All these are equally likely outcomes.

Find the probability that it will rest at
(1) 8.
(2) an odd number.
(3) a number greater than 2.
(4) a number less than 9.



Answer :

(1) Probability that it will rest at 8= $\frac{1}{8}$

(2) Probability that it will rest at an odd number, $p(O) = \frac{\text{Number of odd numbers}}{\text{Total number of numbers}}$

$\therefore p(O)=\frac{4}{8}=\frac{1}{2}$

(3) Probability that it will rest at a number greater than 2, $p(E) = \frac{\text{Number of numbers greater than 2}}{\text{Total number of numbers}}$

$\therefore p(E)=\frac{6}{8}=\frac{3}{4}$

(4) Probability that it will rest at a number less than 9, $p(E) = \frac{\text{Number of numbers less than 9}}{\text{Total number of numbers}}$

$\therefore p(E)=\frac{8}{8}=1$

Q. 11. There are six cards in a box, each bearing a number from 0 to 5. Find the probability of each of the following events, that a card drawn shows,

(1) a natural number.
(2) a number less than 1.
(3) a whole number.
(4) a number is greater than 5.

Answer : (1) Probability that card drawn shows natural number,

$$p(N) = \frac{\text{Number of natural numbers}}{\text{Total number of numbers}}$$

$\therefore p(N)=\frac{5}{6}$

(2) Probability that card drawn shows a number less than 1,

$$p(L) = \frac{\text{Number of numbers less than 0}}{\text{Total number of numbers}}$$

(3) Probability that card drawn shows a whole number,

$$p(W) = \frac{\text{Number of whole numbers}}{\text{Total number of numbers}}$$

$$\therefore p(W) = \frac{6}{6} = 1$$

(4) Probability that card drawn shows a number is greater than 5,

$$p(W) = \frac{\text{Number of numbers greater than 5}}{\text{Total number of numbers}}$$

$$\therefore p(W) = \frac{0}{6} = 0$$

Q. 12. A bag contains 3 red, 3 white and 3 green balls. One ball is taken out of the bag at random. What is the probability that the ball drawn is -

(1) red.
(2) not red
(3) either red or white.

Answer :

(1) Probability that ball drawn is red, $p(R) = \frac{\text{Number of red balls}}{\text{Total number of balls}}$

$$\therefore p(R) = \frac{3}{9} = \frac{1}{3}$$

(2) Probability that ball drawn is not red, $p(N) = \frac{\text{Number of balls which are not red}}{\text{Total number of balls}}$

$$\therefore p(N) = \frac{6}{9} = \frac{2}{3}$$

(3) Probability that ball drawn is either red or white, $p(E) = \frac{\text{Number of balls which are either red or white}}{\text{Total number of balls}}$

$\therefore p(E) = \frac{6}{9} = \frac{2}{3}$

Q. 13. 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 'm'.

Answer :

Probability that a card drawn bears the letter 'm', $p(m) = \frac{\text{Number of 'm'}}{\text{Total number of alphabets}}$

$\therefore p(m) = \frac{2}{11}$

Q. 14. Out of 200 students from a school, 135 like Kabbaddi and the remaining students do not like the game. If one student is selected at random from all the students, find the probability that the student selected dosen't like Kabbaddi.

Answer : Number of students who do not like Kabbaddi=200-135=65

Probability that the student selected dosen't like Kabbaddi, $p(K) = \frac{\text{Number of students who do not like Kabbaddi}}{\text{Total number of students}}$

$\therefore p(K) = \frac{13}{40}$

Q. 15. A two digit number is to be formed from the digits 0, 1, 2, 3, 4. Repetition of the digits is allowed. Find the probability that the number so formed is a -

(1) prime number
(2) multiple of 4
(3) multiple of 11.

Answer : Sample Space, S= {10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 30, 31, 32,33, 34, 40, 41, 42, 43, 44}

Number of sample points, n(S) = 20

(1) Probability that the number so formed is a prime number , p(Prime)= 6/20 = 3/10

∴p(Prime) = 3/10

(2) Probability that the number so formed is a multiple of 4, p(M) = 6/20 = 3/10

∴p(M) = 3/10

(3) Probability that the number so formed is a multiple of 11, p(M) = 4/20 = 1/5

∴p(M) = 1/5

Q. 16. The faces of a die bear numbers 0, 1, 2, 3, 4, 5. If the die is rolled twice, then find the probability that the product of digits on the upper face is zero.

Answer :

Case 1: The face of die have number 0 when rolled twice.

$\therefore$ Probability that the product of digits on the upper face is zero$=\frac{1}{6}\times\frac{1}{6}$

$=\frac{1}{36}$

Case 2: One face of die has 0 and the other has any number from 1 to 5

$\therefore$ Probability that the product of digits on the upper face is zero$=\frac{1}{6}\times\frac{5}{6}$

$=\frac{5}{36}$

$\therefore$ Total probability that the product of digits on the upper face is zero$=\frac{1}{36}+\frac{5}{36}$

$$= \frac{6}{36}$$

$$= \frac{1}{6}$$