Class 10 Mathematics
RS Aggarwal Solutions
Chapter 15 Probability

Question 1.

Fill in the blanks:

(i) The probability of an impossible event is ……. .

(ii) The probability of a sure event is …….. .

(iii) For any event E, P(E) + P (not E) = …….. .

(iv) The probability of a possible but not a sure event lies between …… and …….. .

(v) The sum of probabilities of all the outcomes of an experiment is ……. .

Solution:

(i) The probability of an impossible event is **zero**.

(ii) The probability of a sure event is **one**.

(iii) For any event E, P(E) + P(not E)= **one** .

(iv) The probability of a possible but not a sure event lies between **zero** and **one**.

(v) The sum of probabilities of all the outcomes of an experiment is **one**.

Question 2.

A coin is tossed once. What is the probability of getting a tail?

Solution:

When a coin is tossed the outcomes are: {H,T}

So, the number of outcomes= 2

P(getting a tail) = 1/2.

Question 3.

Two coins are tossed simultaneously. Find the probability of getting

(i) exactly 1 head

(ii) at most 1 head

(iii) at least 1 head

Solution:

When two coins are tossed the outcomes are:
{HH, HT, TH, TT}
Total number of outomes = 4

(i) P(getting exactly 1 head) $= \frac{2}{4} = \frac{1}{2}$

(ii) P(getting atmost 1 head) $= \frac{3}{4}$

(iii) P(getting atleast 1 head) $= \frac{3}{4}$

Question 4.

A die is thrown once. Find the probability of getting

(i) an even number

(ii) a number greater than 2

(iii) a number greater than 2

(iv) a number between 3 and 6

(v) a number other than 3

(vi) the number 5

Solution:

In a throw of a dice, all possible outcomes are 1, 2, 3, 4, 5, 6

Total number of possible outcomes = 6

(i) Let E be event of getting even number

Then, the favourable outcomes are 2, 4, 6

Number of favourable outcomes= 3

∴ P(getting a even number)= P(E) = 3/6 = 1/2.

(ii)Let R be the number less than 5

Then, the favourable outcomes are 1, 2, 3, 4

Number of favourable outcomes = 4

∴ P(getting a number less than 5)= P(R) = 4/6 = 2/3.

(iii)Let M be the event of getting a number greater than 2

Then, the favourable outcomes are 3, 4, 5, 6

Number of favorable outcomes = 4

∴ P(getting a number greater than 2)= P(M) = 4/6 = 2/3.

(iv)Let N be the number lying between 3 and 6

Then the favorable outcomes are 4, 5

Number of favorable outcomes = 2

∴ P(getting a number 3 and 6)= P(N) = 2/6 = 1/3.

(v)Let G be event of getting a number other than 3

Then the favorable outcomes are 1, 2, 4, 5, 6

Number of favorable outcomes = 5

∴ P(getting a number other than 5)=P(G) = 5/6.

(vi)Let T be event of getting a number 5

Then the favorable outcome is 5

Number of favorable outcomes = 1

∴ P(getting a number 5)=P(T) = 1/6.

Question 5.

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

Solution:

There are 26 letters in the English alphabet.
Total number of outomes = 26
The vowels are A, E, I, O and U
So, there are 26 – 5 = 21 consonants

$$P(\text{getting a consonant}) = \frac{21}{26}$$

Question 6.

A child has a die whose 6 faces show the letters given below:

A	B	C	A	A	B

The die is thrown once. What is the probability of getting (i) A and (ii) B?

Solution:

Since there are 6 letters on the die,
the total number of outcomes = 26
(i) The number of times A appears = 3

$P(\text{getting an A}) = \frac{3}{6} = \frac{1}{2}$

(ii) The number of times D appears = 1

$P(\text{getting a D}) = \frac{1}{6}$

Question 7.

It is known that a box of 200 electric bulbs contains 16 defective bulbs. One bulb is taken out at random from the box. What is the probability that the bulb drawn is

(i) defective

(ii) non-defective

Solution:

Total number of bulbs = 200

Number of defective bulbs = 16

(i)Let E_1 be the event of getting a defective bulb

Total number of defective bulbs = 16

∴P(getting defective bulbs) = $P(E_1)$ = 16/200 = 2/25.

(ii)Let E_2be the event of "getting non – defective bulb"

∴P(getting non defective bulb) = $P(E_2) = 1 - \frac{16}{200} = \frac{184}{200} = \frac{23}{25}$.

Question 8.

If the probability of winning a game is 0.7, what is the probability of losing it?

Solution:

Let E be an event of winning the game, then E' will be losing it.

$P(E) + P(E') = 1$

$\Rightarrow 0.7 + P(E') = 1$

$\Rightarrow P(E') = 0.3$

Hence, the probability of losing the game is 0.3.

Question 9.

There are 35 students in a class of whom 20 are boys and 15 are girls. From these students one is chosen at random. What is the probability that the chosen student is a (i) boy, (ii) girl?

Solution:

There are 35 students in a class of whom 20 are boys and 15 are girls.

(i) $P(\text{choosing a boy}) = \frac{20}{35} = \frac{4}{7}$

(ii) $P(\text{choosing a girl}) = \frac{15}{35} = \frac{3}{7}$

Question 10.

In a lottery there are 10 prizes and 25 blanks. What is the probability of getting a prize?

Solution:

The number of prizes = 10

The number of blanks = 25

So, the total number of tickets = 10 + 25 = 35

$P(\text{getting a prize}) = \frac{10}{35} = \frac{2}{7}$

Question 11.

250 lottery tickets were sold and there are 5 prizes on these tickets. If Kunal has purchased one lottery ticket, what is the probability that he wins a prize?

Solution:

Total number of tickets sold = 250

Number of prizes = 5

Let E be the event getting a prize

Number of favorable outcomes = 5

∴P(getting a prize) = P(E) = 5/250 = 1/50

Question 12.

17 cards numbered 1, 2, 3, 4, …. ,17 are put in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the card drawn bears (i) an odd number (ii) a number divisible by 5.

Solution:

Total number of outcomes = 17
(i) The odd number numbers on the cards are
1, 3, 5 ,7, 9, 11, 13, 15 and 17
So, there are 9 possible outcomes.
P(getting an odd number)
$= \frac{9}{17}$
(ii) The numbers divisible by 5 are:
5, 10 and 15
So, there are 3 possible outcomes.
P(getting a number divisible by 5)
$= \frac{3}{17}$

Question 13.

A game of chance consists of spinning an arrow, which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8.

Solution:

Total number of outcomes = 8
The factors of 8 are 1, 2, 4 and 8.
So, there are 4 possible outcomes.
P(getting a factor of 8)
$= \frac{4}{8} = \frac{1}{2}$

Note : The answer given in the text in incorrect.
The correct answer is as shown above.

Question 14.

In a family of 3 children, find the probability of having at least one boy.

Solution:

The number of outcomes is:

{GGG, BGG, GBG, GGB, 55G, 5GB, GBB, BBB}

Total number of outcomes = 8

The possible outcomes of having at least one boy are:

{BGG, GBG, GGB, 56G, 6GB, GBB, BBB}

So, there are 7 possible outcomes,

P(getting at least one boy) = 7/8.

Question 15.

A bag contains 4 white balls, 5 red balls, 2 black balls and 4 green balls. A ball is drawn at random from the bag. Find the probability that it is

(i) black,

(ii) not green,

(iii) red or white,

(iv) neither red nor green.

Solution:

The bag has 4 white balls, 5 red balls, 2 blacks balls and 4 green balls.

So, total number of balls in the bag = 4 + 5 + 2 + 4 = 15

(i) The number of black balls = 2

P(getting a black ball)

$= \frac{2}{15}$

(ii) The number of green balls = 4

So, there are 15 – 4 = 11 non-green balls

P(getting a non-green ball)

$= \frac{11}{15}$

(iii) The number of red and white balls = 5 + 4 = 9

P(getting a red or white ball)

$= \frac{9}{15} = \frac{3}{5}$

(iv) The number of red and green balls = 5 + 4 = 9

So, there are 15 – 9 = 6 balls which are neither red nor green.

P(getting a ball which is neither red nor green)

$= \frac{6}{15} = \frac{2}{5}$

Question 16.

A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability of getting

(i) a red king,

(ii) a queen or a jack.

Solution:

There are 52 cards in the pack.

(i) There are 2 red kings

P(getting a red king)

$= \frac{2}{52} = \frac{1}{26}$

(ii) There are 4 queens and 4 jacks

So, there are 8 possible outcomes.

P(getting a queen or jack)

$= \frac{8}{52} = \frac{2}{13}$

Question 17.

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

Solution:

There are 26 red cards containing a 2 queens and 2 more black queens are there in a pack of cards

∴ P(getting a red card or a queen) = 28/52 = 7/13

∴ P(getting neither a red card nor a queen) = $\left[1 - \frac{7}{13} = \frac{6}{13}\right]$

Question 18.

A card is drawn from a well-shuffled pack of 52 cards. Find the probability of getting

(i) a red face card

(ii) a black king.

Solution:

There are 52 cards in the pack.
(i) There are 6 red face cards.
P(getting a red face card)
$= \frac{6}{52} = \frac{3}{26}$
(ii) There are 2 black kings
P(getting a black king)
$= \frac{2}{52} = \frac{1}{26}$

Question 19.

Two different dice are tossed together. Find the probability that

(i) the number on each die is even,

(ii) the sum of the numbers appearing on the two dice is 5.

Solution:

If two dice are rolled together, the possible outcomes are:
(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)
So, there are 36 outcomes.
(i) The following outcomes have an even number on each dice.
(2,2), (2,4), (2,6), (4,2), (4,4), (4,6), (6,2), (6,4), (6,6)
So, there are 9 possible outcomes.
P(getting even numbers on each dice)

$$= \frac{9}{36} = \frac{1}{4}$$

(ii) The following outcomes give the sum 5.
(1,4), (4,1), (2,3), (3,2)
So, there are 4 possible outcomes.
P(getting a sum of 5)

$$= \frac{4}{36} = \frac{1}{9}$$

Question 20.

Two different dice are rolled simultaneously. Find the probability that the sum of the numbers on the two dice is 10.

Solution:

If two dice are rolled together, the possible outcomes are:
(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)
So, there are 36 outcomes.
The following outcomes will give sum of numbers on the two dice to be 10:
(2,5), (5,2) and (5,5)
So, there are 3 possible outcomes.
P(getting numbers whose sum is 10)

$$= \frac{3}{36} = \frac{1}{12}$$

Question 21.

When two dice are tossed together, find the probability that the sum of numbers on their tops is less than 7.

Solution:

If two dice are rolled together, the possible outcomes are:
(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)
So, there are 36 outcomes.
The following outcomes will give sum of numbers
on their tops to be less than 7.
(1, 1), (1,2), (1,3), (1,4), (1,5), (2, 1), (2,2), (2,3),
(2,4), (3, 1), (3,2), (3,3), (4, 1), (4,2), (5, 1).
So, there are 15 possible outcomes.
P(getting numbers whose sum of the tops to be less than 7)
$= \frac{15}{36} = \frac{5}{12}$

Question 22.

Two dice are rolled together. Find the probability of getting such numbers on two dice whose product is a perfect square.

Solution:

If two dice are rolled together, the possible outcomes are:
(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)
So, there are 36 outcomes.
The following outcomes will give the product
to be a perfect square.
(1, 1), (1,4), (2,2), (3,3), (4, 1), (4,4), (5,5), (6,6)
So, there are 8 possible outcomes.
P(getting numbers whose product is a perfect square)
$= \frac{8}{36} = \frac{2}{9}$

Question 23.

Two dice are rolled together. Find the probability of getting such numbers on the two dice whose product is 12.

Solution:

If two dice are rolled together, the possible outcomes are:
(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)
So, there are 36 outcomes.
The following outcomes will give the product 12.
(2,6), (6,2), (3,4), (4,3)
So, there are 4 possible outcomes.

$$P(\text{getting numbers whose product is } 12) = \frac{4}{36} = \frac{1}{9}$$

Question 24.

Cards, marked with numbers 5 to 50, are placed in a box and mixed thoroughly. A card is drawn from the box at random. Find the probability that the number on the card is (i) a prime number less than 10 (ii) a perfect square.

Solution:

There are 46 cards in total.
(i) The primes less than 10 are 5 and 7.

$$P(\text{getting a prime less than } 10) = \frac{2}{46} = \frac{1}{23}$$

(ii) The perfect squares are 9, 16, 25, 36 and 49.
So, there are 5 possible outcomes.

$$P(\text{getting a perfect square}) = \frac{5}{46}$$

Question 25.

A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3,..., 12 as shown in the figure. What is the probability that it will point to

(i) 6?

(ii) an even number?

(iii) a prime number?

(iv) a number which is a multiple of 5?

Solution:

Spinning arrow may come to rest at one of the 12 numbers

∴ total number of outcomes = 12

(i) Probability that it will point at 6 = 1/12

(ii) Even numbers are 2, 4, 6, 8, 10 and 12. There are 6 numbers.

∴ Probability that it points at even numbers = 6/12 = 1/2

(iii) The prime numbers are 2,3 5, 7 and 11. There are 5 prime numbers.

∴ Probability that it points at prime number = 5/12

(iv) There are 2 numbers divisible by 5. These are 5 and 10.

∴ Probability that a number is a multiple of 5 = 2/12 = 1/6

Question 26.

12 defective pens are accidently mixed with 132 good ones. It is not possible to just look at pen and tell whether or not it is defective. One pen is taken out at random from this lot. Find the probability that the pen taken out is good one.

Solution:

There are 12 defective pens, which are accidentally mixed with 132 good ones.

So, there are total $12 + 132 = 144$ pens

$$P(\text{that the pen taken out is good}) = \frac{132}{144} = \frac{11}{12}$$

Question 27.

A lot consists of 144 ballpoint pens of which 20 are defective and others good. Tanvy will buy a

pen if it is good, but will not buy it if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that

(i) she will buy it,

(ii) she will not buy it?

Solution:

Total number of ballpoint pens = 144
There are 20 defective pens, so there are
144 – 20 = 124 good pens.

$$\text{(i) P(that she will buy it)} = \frac{124}{144} = \frac{31}{36}$$

$$\text{(ii) P(that she will not buy it)} = \frac{20}{144} = \frac{5}{36}$$

Question 28.

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears

(i) a two-digit number,

(ii) a perfect square number,

(iii) a number divisible by 5.

Solution:

(i) Total number of discs = 90
The two-digit numbers would be 10, 11, 12, ...90.
So, there are 81 two-digit numbers.

$$\text{P(getting a two-digit number)} = \frac{81}{90} = \frac{9}{10}$$

(ii) The perfect squares from 1 to 90 are
1, 4, 9, 16, 25, 36, 49, 64 and 81.
So, there are 9 perfect squares.

$$\text{P(getting a perfect square)} = \frac{9}{90} = \frac{1}{10}$$

(iii) The numbers divisible by 5 are
5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65,
70, 75, 80, 85 and 90.

$$\text{P(getting a number divisible by 5)} = \frac{18}{90} = \frac{1}{5}$$

Question 29.

(i) A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective?

(ii) Suppose the bulb drawn in (i) is not defective and not replaced. Now, bulb is drawn at random from the rest. What is the probability that this bulb is not defective?

Solution:

(i) Total number of bulbs = 20

There are 4 defective bulbs.

$$P(\text{getting a defective bulb}) = \frac{4}{20} = \frac{1}{5}$$

(ii) Given that the bulb drawn in (i) is not defective and not replaced.

So, there are 4 defective bulbs left from a total of 19 bulbs.

$\Rightarrow$ there are 15 non-defective bulbs

$$P(\text{getting a non-defective bulb}) = \frac{15}{19}$$

Question 30.

A bag contains lemon-flavoured candies only. Hema takes out one candy without looking into the bag. What is the probability that she takes out

(i) an orange-flavoured candy?

(ii) a lemon-flavoured candy?

Solution:

(i) P(that she takes out an orange-flavoured candy) = O

(Since there are no orange-flavoured candies in the bag)

(ii) P(that she takes out a lemon-flavoured candy) = 1

(Since there are only lemon-flavoured candies in the bag)

Question 31.

There are 40 students in a class of whom 25 are girls and 15 are boys. The class teacher has to select one student as a class representative. He writes the name of each student on a separate card, the cards being identical. Then she puts cards in a bag and stirs them thoroughly. She then

draws one card from the bag. What is the probability that the name written on the card is the name of

(i) a girl?

(ii) a boy?

Solution:

Total number of students = 40

(i) The number of girls = 25

$$P(\text{that the name written is a girl}) = \frac{25}{40} = \frac{5}{8}$$

(ii) The number of boys = 15

$$P(\text{that the name written is a boy}) = \frac{15}{40} = \frac{3}{8}$$

Question 32.

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of drawing

(i) an ace

(ii) a 4 of spades

(iii) a 9 of a black suit

(iv) a red king

Solution:

Total number of all possible outcomes = 52

$$\text{(i)P(getting an ace)} = \frac{4}{52} = \frac{1}{13}$$

$$\text{(ii)P(getting a '4' of spades)} = \frac{1}{52}$$

$$\text{(iii)P(a '9' of a black suit)} = \frac{2}{52} = \frac{1}{26}$$

$$\text{(iv)P(getting a red king)} = \frac{2}{52} = \frac{1}{26}$$

Question 33.

A card is drawn at random from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a queen

(ii) a diamond

(iii) a king or an ace

(iv) a red ace

Solution:

Total numbers of cards = 52

(i)There are 4 queen cards in a pack of cards

$\therefore$ Probability of getting a queen card = $\frac{4}{52} = \frac{1}{13}$

(ii)There are 13 cards of diamond in a pack of cards

$\therefore$ probability of getting a diamond card = $\frac{13}{52} = \frac{1}{4}$

(iii)In a pack of cards there are 4 kings and 4 aces

Number of such cards = 4 + 4 = 8

Probability of getting either a king or an ace = $\frac{8}{52} = \frac{2}{13}$

(iv)There are two red aces in a pack of cards

$\therefore$ probability of getting a red ace = $\frac{2}{52} = \frac{1}{26}$

Question 34.

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red suit

(ii) a face card

(iii) a red face card

(iv) a queen of black suit

(v) a jack of hearts

(vi) a spade

Solution:

We know that there are 52 cards in all.

Total number of outomes = 52

(i) The number of red kings = 2

$$P(\text{getting a king of red suit}) = \frac{2}{52} = \frac{1}{26}$$

(ii) The number of face cards = 12

$$P(\text{getting a face card}) = \frac{12}{52} = \frac{3}{13}$$

(iii) The number of red face cards = 6

$$P(\text{getting a red face card}) = \frac{6}{52} = \frac{3}{26}$$

(iv) The number of queens of black suit = 2

$$P(\text{getting a queen of black suit}) = \frac{2}{52} = \frac{1}{26}$$

(v) The number of jack of hearts = 1

$$P(\text{getting a jack of hearts}) = \frac{1}{52}$$

(vi) The number of spade = 13

$$P(\text{getting a spade}) = \frac{13}{52} = \frac{1}{4}$$

Question 35.

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

(i) a card of spades of an ace

(ii) a red king

(iii) either a king or a queen

(iv) neither a king nor a queen.

Solution:

Total number of cards = 52

(i)There are 13 cards of spade (including 1 ace) and 3 more ace cards are there in a pack of cards

$\therefore$ P(getting a card of spades or an ace) = $\frac{16}{52} = \frac{4}{13}$

(ii)There are 2 red kings in a pack of cards

$\therefore$ P(getting a red king) = $\frac{2}{52} = \frac{1}{26}$

(iii)There are 4 kings and 4 queens in a pack of cards

$\therefore$ P(getting either a king or a queen) = $\frac{8}{52} = \frac{2}{13}$

(iv)P(getting neither a king nor a queen) = $\left(1 - \frac{2}{13}\right) = \frac{11}{13}$

Exercise 15b

Question 1.

A box contains 25 cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that the number on the drawn card is

(i) divisible by 2 or 3,

(ii) a prime number.

Solution:

There are 25 cards in total.
(i) The numbers divisible by 2 are
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24.
The numbers divisible by 3 are
3, 6, 9, 12, 15, 18, 21 and 24.
So, the total number of possible outcomes = 16
Note that 6, 12, 18 and 24 are twice.
However, we count these numbers only once.

$$P(\text{getting a number divisible by 2}) = \frac{16}{25}$$

(ii) The primes are 2, 3, 5, 7, 11, 13, 17, 19 and 23.
So, there are 9 possible outcomes.

$$P(\text{getting a prime}) = \frac{9}{25}$$

Question 2.

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 card is a prime number.

Solution:

The numbers on the cards are
3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29,
31, 33, 35 and 37.
So, there 18 cards.
The cards with primes are
3, 5, 7, 11, 13, 17, 19, 23, 29, 31 and 37.
So, there are 11 possible outcomes.

$$P(\text{getting a prime number}) = \frac{11}{18}$$

Question 3.

Cards numbered 1 to 30 are put in a bag. A card is drawn at random from the bag. Find the probability that the number on the drawn card is

(i) not divisible by 3,

(ii) a prime number greater than 7,

(iii) not a perfect square number.

Solution:

There 30 cards in the bag.
(i) The numbers divisible by 3 are
3, 6, 9, 12, 15, 18, 21, 24, 27 and 30.
So, the numbers not divisible by 3 are 30 – 10 = 20
Thus, there are 20 possible outcomes.

$$P(\text{getting a number divisible by 3}) = \frac{20}{30} = \frac{2}{3}$$

(ii) The primes greater than 7 are
11, 13, 17, 19, 23 and 29.
So, there are 6 possible outcomes.

$$P(\text{getting a prime greater than 3}) = \frac{6}{30} = \frac{1}{5}$$

(iii) The perfect squares would be
1, 4, 9, 16 and 25.
So, there are 5 perfect squares, and hence 25 non-perfect squares.

$$P(\text{getting a perfect square}) = \frac{25}{30} = \frac{5}{6}$$

Question 4.

Cards bearing numbers 1, 3, 5, …. , 35 are kept in a bag. A card is drawn at random from the bag.

Find the probability of getting a card bearing

(i) a prime number less than 15,

(ii) a number divisible by 3 and 5.

Solution:

To find the number of cards in the bag, we use the general formula for an AP since the numbers on the cards are in AP.

Here, first term, $a = 1$, common difference $= d = 2$

Let n be the number of cards in the bag.

$a_n = a + (n-1)d$

$\Rightarrow 35 = 1 + (n-1)(2)$

$\Rightarrow 34 = 2n - 2$

$\Rightarrow n = 18$

So, there 18 cards in the bag.

(i) The primes less than 15 are 3, 5, 7, 11 and 13.

So, there are 6 possible outcomes.

$$P(\text{getting a prime less than } 15) = \frac{5}{18}$$

(ii) The number divisible by 3 and 5 is 15 and 30.

$$P(\text{getting a 15 or 30}) = \frac{2}{18} = \frac{1}{9}$$

Question 5.

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

(i) a one-digit number,

(ii) a number divisible by 5,

(iii) an odd number less than 30,

(iv) a composite number between 50 and 70.

Solution:

To find the number of cards in the bag, we use the general formula for an AP since the numbers on the cards are in AP.

Here, first term, $a = 6$, common difference $= d = 1$

Let n be the number of cards in the bag.

$a_n = a + (n - 1)d$

$\Rightarrow 70 = 6 + (n - 1)(1)$

$\Rightarrow 64 = n - 1$

$\Rightarrow n = 65$

So, there 65 cards in the bag.

(i) The one-digit numbered cards are 6, 7, 8 and 9.

So, there are 4 possible outcomes.

$$P(\text{getting a one-digit numbered card}) = \frac{4}{65}$$

(ii) The numbers divisible by 5 are

10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65 and 70.

$$P(\text{getting a number divisible by 5}) = \frac{13}{65} = \frac{1}{5}$$

(iii) The odd numbers less than 30 are

7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27 and 29.

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

(iv) There are 21 numbers from 50 to 70.

The composite numbers between 50 and 70 are

51, 52, 54, 55, 56, 57, 58, 60, 62, 63, 64, 65, 66, 68 ,69

P(getting a composite number between 50 and 70)

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

Question 6.

Cards marked with numbers 1, 3, 5, …, 101 are placed in a bag and mixed thoroughly. A card is drawn at random from the bag. Find the probability that the number on the drawn card is

(i) less than 19,

(ii) a prime number less than 20.

Solution:

To find the number of cards in the bag, we use the general formula for an AP since the numbers on the cards are in AP.

Here, first term, $a = 1$, common difference $= d = 2$

Let n be the number of cards in the bag.

$a_n = a + (n - 1)d$

$\Rightarrow 101 = 1 + (n - 1)(2)$

$\Rightarrow 100 = 2n - 2$

$\Rightarrow 102 = 2n$

$\Rightarrow n = 51$

So, there 51 cards in the bag.

(i) The numbers less than 19 are

1, 3, 5, 7, 9, 11, 13, 15 and 17.

So, there are 9 possible outcomes.

$$P(\text{getting a number less than } 19) = \frac{9}{51} = \frac{3}{17}$$

(ii) The primes less than 20 are 3, 5, 7, 11, 13, 17, 19.

So, there are 7 possible outcomes.

$$P(\text{getting a prime less than } 20) = \frac{7}{51}$$

Question 7.

Tickets numbered 2, 3, 4, 5, …, 100, 101 are placed in a box and mixed thoroughly. One ticket is drawn at random from the box. Find the probability that the number on the ticket is

(i) an even number

(ii) a number less than 16

(iii) a number which is a perfect square

(iv) a prime number less than 40

Solution:

Total number of tickets = 100

(i) Even numbers are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100

Total number of even number = 50

P(getting a even number) = 50/100 = 1/2.

(ii) Numbers less than 16 are 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Total number of numbers less than 16 is 14

P(getting a number less than 16) = 14/100 = 7/50.

(iii) Numbers which are perfect square are 4, 9, 16, 25, 36, 49, 64, 81, 100

Total number of perfect squares = 9

P(getting a perfect square) = 9/100.

(iv) Prime numbers less than 40 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

Total number of prime numbers =12

P(getting a prime number less 40) = 12/100 = 3/25.

Question 8.

A box contains 80 discs, which are numbered from 1 to 80. If one disc is drawn at random from the box, find the probability that it bears a perfect square number.

Solution:

The total number of discs in the box are 80.

The numbers which are perfect squares are 1, 4, 9, 16, 25, 36, 49 and 64.

So, there are 8 possible outcomes.

P(getting a number which is a perfect square) = 8/80 = 1/10.

Question 9.

A piggy bank contains hundred 50 p coins, seventy Rs. 1 coin, fifty Rs. 2 coins and thirty Rs. 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin

(i) will be a Rs. 1 coin?

(ii) will not be a Rs. 5 coin?

(iii) will be a 50 p or a Rs. 2 coin?

Solution:

The total number of coins in the piggy bank
= 100 + 70 + 50 + 30 = 250
(i) There are seventy Re. 1 coins.
So, there are 70 possible outcomes.
P(getting a Re. 1 coin)
$= \frac{70}{250}$
$= \frac{7}{25}$
(ii) There are thirty Rs. 5 coins.
So, the number of coins that are not Rs. 5 coins are
250 – 30 = 220
So, there are 220 possible outcomes.
P(getting a coin that is not a Rs. 5 coin)
$= \frac{220}{250}$
$= \frac{22}{25}$
(iii) The number of 50-p coins are 100, and the number of Rs. 2 coins are 50.
So, there are 100 + 50 = 150 possible outcomes.
P(getting a coin that will be 50-p or a Rs. 2 coin)
$= \frac{150}{250}$
$= \frac{3}{5}$

Question 10.

The probability of selecting a red ball at random from the jar that contains only red, blue and orange balls is 1/4.The probability of selecting a blue ball at random from the same jar is 1/3. If the jar contains 10 orange balls, find the total number of balls in the jar.

Solution:

Let the total number of balls in the jar be x.

Since there are 10 orange balls in the jar,

$$P(\text{getting an orange ball}) = \frac{10}{x}$$

Since there are only three types of balls in the jar,

$$P(\text{getting a red ball}) + P(\text{getting a blue ball}) + P(\text{getting an orange ball}) = 1$$

$$\Rightarrow \frac{1}{4} + \frac{1}{3} + \frac{10}{x} = 1$$

$$\Rightarrow \frac{3x + 4x + 120}{12x} = 1$$

$$\Rightarrow 3x + 4x + 120 = 12x$$

$$\Rightarrow 120 = 5x$$

$$\Rightarrow x = 24$$

Hence, the total number of balls in the jar is 24.

Question 11.

A bag contains 18 balls out of which x balls are red.

(i) If the ball is drawn at random from the bag, what is the probability that it is not red?

(ii) If two more red balls are put in the bag, the probability of drawing a red ball will be 9/8 times the probability of drawing a red ball in the first case. Find the value of x.

Solution:

Given that there are 18 balls in the bag.

(i) Since the number of red balls is given to be x,

there are $(18-x)$ non-red balls.

$$P(\text{getting a non-red ball}) = \frac{18-x}{18}$$

(ii) If two more red balls are put in the bag,

then there are $(18+2) = 20$ total number of balls.

So, the number of red balls in this case is $(x+2)$.

According to the given condition,

$$P(\text{getting a red ball}) = \frac{9}{8} \times P(\text{getting a red ball in the first case})$$

$$\Rightarrow \frac{x+2}{20} = \frac{9}{8}\left(\frac{x}{18}\right)$$

$$\Rightarrow \frac{x+2}{20} = \frac{x}{16}$$

$$\Rightarrow 16x + 32 = 20x$$

$$\Rightarrow 4x = 32$$

$$\Rightarrow x = 8$$

So, the value of x is 8.

Question 12.

A jar contains 24 marbles. Some of these are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is 2/3. Find the number of blue marbles in the jar.

Solution:

The total number of marbles in the jar is 24.
Let the number of blue marbles in the jar be x.

$$P(\text{getting a blue marble}) = \frac{x}{24}$$

Since there are only two types of marbles in the jar,
P(getting a blue marble) + P(getting a green marble) = 1

$$\Rightarrow \frac{2}{3} + \frac{x}{24} = 1$$

$$\Rightarrow \frac{16 + 3x}{24} = 1$$

$$\Rightarrow 16 + 3x = 24$$

$$\Rightarrow 8 = 3x$$

$$\Rightarrow x = 4$$

Hence, the number of blue marbles in the jar is 4.

Question 13.

A jar contains 54 marbles, each of which some are blue, some are green and some are white. The probability of selecting a blue marble at random is 1/3 and the probability of selecting a green marble at random is 4/9. How many white marbles does the jar contain?

Solution:

The total number of marbles in the jar is 54.
Let the number of white marbles in the jar be x.

$$P(\text{getting a white marble}) = \frac{x}{54}$$

Since there are only three types of marbles in the jar,
P(getting a blue marble) + P(getting a green marble) + P(getting a white marble) = 1

$$\Rightarrow \frac{1}{3} + \frac{4}{9} + \frac{x}{54} = 1$$

$$\Rightarrow \frac{1}{3} + \frac{4}{9} = 1 - \frac{x}{54}$$

$$\Rightarrow \frac{7}{9} = \frac{54 - x}{54}$$

$$\Rightarrow 42 = 54 - x$$

$$\Rightarrow x = 12$$

Hence, the number of white marbles in the jar is 12.

Question 14.

A carton consists of 100 shirts of which 88 are good and 8 have minor defects. Rohit, a trader, will only accept the shirts which are good. But Kamal, an another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. What is the probability that it is acceptable to

(i) Rohit,

(ii) Kamal?

Solution:

The total number of shirts is 100.

(i) Since Rohit accepts only shirts which are good,

so, there are 88 possible outcomes.

P(shirt is acceptable to Rohit)

$= \frac{88}{100}$

$= \frac{22}{25}$

(ii) Given that there are 88 shirts that are good, 8 that have minor defects.

This means there are $100 - 88 - 8 = 4$ shirts with major defects.

Since Kamal only rejects shirts with major defects,

so, there are 96 possible outcomes.

P(shirt is acceptable to Kamal)

$= \frac{96}{100}$

$= \frac{24}{25}$

Question 15.

A group consists of 12 persons, of which 3 are extremely patient, other 6 are extremely honest and rest are extremely kind. A person from the group is selected at random. Assuming that each person is equally likely to be selected, find the probability of selecting a person who is

(i) extremely patient,

(ii) extremely kind or honest.

Which of the above values you prefer more?

Solution:

The total number of persons in the group is 12 out of which 3 are extremely patient, other 6 are extremely honest and 3 are extremely kind.

(i) P(selecting an extremely patient person)

$= \frac{3}{12}$

$= \frac{1}{4}$

(ii) There are 9 persons who are either extremely kind or extremely honest.

P(selecting an extremely kind or honest person)

$= \frac{9}{12}$

$= \frac{3}{4}$

Question 16.

A die is rolled twice. Find the probability that

(i) 5 will not come up either time,

(ii) 5 will come up exactly one time,

(iii) 5 will come up both the times.

Solution:

Two dice are thrown simultaneously

Total number of outcomes = 6 6 = 36

(i) Favourable cases are:

(1, 1), (1, 2), (1, 3), (1, 4), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 6) = 25.

∴ Probability that 5 will not come upon either die = 25/36.

(ii) Favourable cases are:

(1, 5), (2, 5), (3, 5), (4, 5), (5, 5), (6, 5), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6) = 11

Probability that 5 will come at least once = 11/36.

(iii) 5 will come up on both dice in 1 case = (5,5)

∴ probability that 5 will come on both dice = = 1/36.

Question 17.

Two dice are rolled once. Find the probability of getting such numbers on two dice whose product is a perfect square.

Solution:

If two dice are rolled together, the possible outcomes are:
(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)
So, there are 36 outcomes.
The following outcomes will give the product
to be a perfect square.
(1, 1), (1,4), (2,2), (3,3), (4, 1), (4,4), (5,5), (6,6)
So, there are 8 possible outcomes.
P(getting numbers whose product is a perfect square)
$= \frac{8}{36} = \frac{2}{9}$

Question 18.

A letter is chosen at random from the letters of the word ASSOCIATION. Find the probability that the chosen letter is a

(i) vowel

(ii) consonant

(iii) an S.

Solution:

There are 11 letters in the word ASSOCIATION.
Total number of outcomes = 11
The vowels are A, O and I appear twice each
So, there are 6 letters which are vowels in the given word.
So, there are 11 – 6 = 5 consonants

(i) $P(\text{getting a vowel}) = \frac{6}{11}$

(ii) $P(\text{getting a consonant}) = \frac{5}{11}$

(iii) There are two S letters.

$P(\text{getting an S}) = \frac{2}{11}$

Question 19.

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 queen?

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

Solution:

Given that there are 5 cards.
Total number of outcomes = 5
(a) There is 1 queen.

$P(\text{getting a queen}) = \frac{1}{5}$

(b) Given that a queen is drawn and put aside.
So, there will be 4 cards from where the ace will be chosen.

(i) $P(\text{getting an ace}) = \frac{1}{4}$

(ii) Since the queen is kept aside, there is no queen left.
P(getting a queen) = 0

Question 20.

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

Solution:

We know that there are 52 cards in a pack of cards.
Total number of outomes = 52
The number of red cards = 26
Out of these there are 2 red queens, and there are 2 more black queens.
So, the cards which are neither a red card nor a queen are $52-(26+2)=24$

$$P(\text{getting neither a red card nor a queen})=\frac{24}{52}=\frac{6}{13}$$

Question 21.

What is the probability that an ordinary year has 53 Mondays?

Solution:

There are 365 days in an ordinary year.
Total number of outomes = 365
Since in an ordinary year there are 52 weeks,
there will surely be 52 Mondays.
Now, $52 \times 7 = 364$ days
So, the last day could be any of the 7 days of the week.

$$\text{Thus, P(the last day is a Monday)}=\frac{1}{7}$$

Question 22.

All red face cards are removed from a pack of playing cards. The remaining cards are well shuffled and then a card is drawn at random from them. Find the probability that the drawn card is

(i) a red card,

(ii) a face card,

(iii) a card of clubs.

Solution:

There are 6 red face cards in every pack.
So, the remaining number of cards = 52 – 6 = 46
Total number of outomes = 46
(i) The remaining number of red cards = 26 – 6 = 20

$$P(\text{getting a red card}) = \frac{20}{46} = \frac{10}{23}$$

(ii) Since the red face cards are removed, the remaining number of black face cards = 6

$$P(\text{getting a face card}) = \frac{6}{46} = \frac{3}{23}$$

(iii) There are 13 dubs.

$$P(\text{getting a card of dubs}) = \frac{13}{46}$$

Note : The answer given in the text for the sub-part (iii) is incorrect.

Question 23.

All kings, queens and aces are removed from a pack of 52 cards. The remaining cards are well-shuffled and then a card is drawn from it. Find the probability that the drawn card is

(i) a black face card,

(ii) a red card.

Solution:

There are 4 kings, 4 queens and 4 aces in every pack.
So, the remaining number of cards = 52 – 12 = 40
Total number of outomes = 40
(i) The remaining number of black face cards = 2

$$P(\text{getting a black face card}) = \frac{2}{40} = \frac{1}{20}$$

(ii) There are 26 red cards in the pack.
Out of these the 2 red kings, 2 red queens and the 2 red aces are removed.
So, there are 26 – 6 = 20 possible outcomes left.

$$P(\text{getting a red card}) = \frac{20}{40} = \frac{1}{2}$$

Question 24.

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

(i) three heads,

(ii) at least two tails.

Solution:

Since the one-rupee coin is tossed thrice, its outcomes are
{HHH, HTT, THT, TTH, HHT, HTH, THH, TTT}.
So, there are 8 outcomes.

(i) P(getting three heads) $= \frac{1}{8}$

(ii) P(getting at least 2 tails) $= \frac{4}{8} = \frac{1}{2}$

Question 25.

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

Solution:

There are 366 days in a leap year.
Total number of outcomes = 366
Since in a leap year there are 52 weeks,
there will surely be 52 Sundays.
Now, $52 \times 7 = 364$ days
So, the last two days could be any of the following outcomes:
{(Saturday, Sunday), (Sunday, Monday)}

Thus, P(that there are 53 Sundays) $= \frac{2}{7}$

Multiple Choice Questions

Question 1.

If P(E) denotes the probability of an event E then [CBSE 2013C]

(a) P(E) < 0

(b) P(E) > 1

(c) $0 \leq P(E) \leq 1$

(d) $-1 \leq P(E) \leq 1$

Solution:

Correct option: (c)

We know that, the probability of an event E will always lie between O and 1, where O is the probability of an impossible event and 1 is the probability of a sure event.

Question 2.

If the probability of occurrence of an event is p then the probability of non-happening of this event is [CBSE 2013C]

(a) (p – 1)

(b) (1 – p)

(c) p

(d) (1-1/p)

Solution:

Correct option: (b)

Let E be the event.

So, the probability of the event happening will be P(E).

Thus, the probability of the event not happening will be P(E').

Given that, P(E)= p

We know that, P(E')+ P(E)= 1

p + P(E') = 1

=P(E')= 1 – p

Question 3.

What is the probability of an impossible event?

(a) 1/2

(b) 0

(c) 1

(d) none of these

Solution:

Correct option: (b)

The probability of an impossible event is always O.

Question 4.

What is the probability of a sure event?

(a) 0

(b) 1/2

(c) 1

(d) none of these

Solution:

Correct option: (c)

The probability of a sure event is always 1.

Question 5.

Which of the following cannot be the probability of an event? [CBSE 2013C]

(a) 1.5

(b) 3/5

(c) 25%

(d) 0.3

Solution:

Correct option: (a)

We know that, the probability of an event E will always lie between O and 1.

Since 1.5>1, it cannot be the probability of an event.

Question 6.

A number is selected at random from the numbers 1 to 30. What is the probability that the selected number is a prime number? [CBSE 2014]

(a) 2/3

(b) 1/6

(c) 1/3

(d) 11/30

Solution:

Correct option: (c)

The prime numbers from 1 to 30 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29.

So, there are 10 prime numbers between 1 and 30.

P(getting a prime number)

$$= \frac{\text{number of primes between 1 and 30}}{\text{Total}}$$

$$= \frac{10}{30}$$

$$= \frac{1}{3}$$

Question 7.

The probability that a number selected at random from the numbers 1, 2, 3, …, 15 is a multiple of 4, is [CBSE 2014]

(a) 4/15

(b) 2/15

(c) 1/5

(d) 1/3

Solution:

Correct option: (c)

The selected numbers would be 4, 8, and 12.

So, there are 3 number.

P(number is a multiple of 4)

$$= \frac{\text{number of multiples of 4}}{\text{Total}}$$

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

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

Question 8.

A box contains cards numbered 6 to 50. A card is drawn at random from the box. The probability

that the drawn card has a number which is a perfect square is [CBSE 2013]

(a) 1/45

(b) 2/15

(c) 4/45

(d) 1/9

Solution:

Correct option: (d)

The numbers on the card have to be perfect sqaures.

So, the numbers would be 9, 16, 25, 36, 49.

So, there are 5 numbers.

Total number of cards = $(50-6)+1 = 44+1 = 45$

P(getting a perfect square)

$= \frac{\text{number of perfect squares}}{\text{Total}}$

$= \frac{5}{45}$

$= \frac{1}{9}$

Question 9.

A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, the probability that it bears prime number less than 23 is [CBSE 2013]

(a) 7/90

(b) 1/9

(c) 4/15

(d) 8/89

Solution:

Correct option: (c)

The total number of discs = 90

The primes less than 23 are 2, 3, 5, 7, 11, 13, 17, 19.

So, there are 8 numbers.

P(getting a prime number less than 23)

$= \frac{8}{90}$

$= \frac{4}{45}$

Note : In the text, the option (c) is incorrect. It should be $\frac{4}{45}$ to go with the question asked.

Question 10.

Cards bearing numbers 2, 3, 4, …, 11 are kept in a bag. A card is drawn at random from the bag.

The probability of getting a card with a prime number is [CBSE 2012]

(a) 1/2

(b) 2/5

(c) 3/10

(d) 5/9

Solution:

Correct option: (d)

The total number of cards = 9

The primes numbers would be 2, 3, 5, 7, 11.

So, there are 5 numbers.

P(getting a prime number) = 5/9.

Question 11.

One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number, which is a multiple of 7, is [CBSE 2013C]

(a) 1/7

(b) 1/8

(c) 1/5

(d) 7/40

Solution:

Correct option: (b)

The total number of tickets = 40

The multiples of 7 between 1 and 40 are 7, 14, 21, 28 and 35.

So, there are 5 numbers,

P(getting a multiple of 7) = 5/40 = 1/8.

Question 12.

Which of the following cannot be the probability of an event?

(a) 1/3

(b) 0.3

(c) 33%

(d) 7/6

Solution:

Correct option: (d)

We know that, the probability of an event E will always lie between O and 1.

Since 7/6 >1, it cannot be the probability of an event.

Question 13.

If the probability of winning a game is 0.4, the probability of losing it is

(a) 0.96

(b) 1/0.4

(c) 0.6

(d) none of these

Solution:

Correct option: (c)

We know that, if E is an event, then $P(E) + P(E') = 1$.

Let E be the event where the game is won.

So, $0.4 + P(E') = 1$

$\Rightarrow P(E') = 1 - 0.4$

$\Rightarrow P(E') = 0.6$

So, the probability of losing the game is 0.6.

Question 14.

If an event cannot occur then its probability is

(a) 1

(b) 1/2

(c) 3/4

(d) 0

Solution:

Correct option: (d)

An event that cannot occur is called an impossible event.

The probability of an impossible event is 0.

Question 15.

There are 20 tickets numbered as 1, 2, 3,…, 20 respectively. One ticket is drawn at random. What is the probability that the number on the ticket drawn is a multiple of 5?

(a) 1/4

(b) 1/5

(c) 2/5

(d) 3/10

Solution:

Correct option: (b)

The total number of tickets = 20

The multiples of 5 between 1 and 20 are 5, 10, 15 and 20.

So, there are 4 numbers.

P(getting a multiple of 5) = 4/20 = 1/5.

Question 16.

There are 25 tickets numbered 1, 2, 3, 4,…, 25 respectively. One ticket is draw at random. What is the probability that the number on the ticket is a multiple of 3 or 5?

(a) 2/5

(b) 11/25

(c) 12/25

(d) 13/25

Solution:

Correct option: (c)
The total number of tickets = 25
The multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24.
The multiples of 5 are 5, 10, 15, 20 and 25.
Since 15 is a multiple of 3 as well as 5, it is to be calculated only once.
So, there are 12 numbers.
P(getting a multiple of 3 or 5)

$$= \frac{12}{25}$$

Question 17.

Cards, each marked with one of the numbers 6, 7, 8,…, 15, are placed in a box and mixed thoroughly. One card is drawn at random from the box. What is the probability of getting a card with a number less than 10?

(a) 3/5

(b) 1/3

(c) 1/2

(d) 2/5

Solution:

Correct option: (d)

The total number of buckets = 10

The numbers less than 10 are 6, 7, 8 and 9.

So, there are 4 numbers.

P(getting a number less than 10) = 2/5.

Question 18.

A die is thrown once. The probability of getting an even number is [CBSE 2013]

(a) 1/2

(b) 1/3

(c) 1/6

(d) 5/6

Solution:

Correct option: (a)

The numbers on a die are 1, 2, 3, 4, 5 and 6.

So, there are 6 numbers in total.

The even numbers on the die are 2, 4 and 6.

So, there are 3 numbers.

P(getting an even number) = 3/6 = 1/2.

Question 19.

The probability of throwing a number greater than 2 with a fair die is [CBSE 2011]

(a) 2/5

(b) 5/6

(c) 1/3

(d) 2/3

Solution:

Correct option: (d)

The numbers on a fair die are 1, 2, 3, 4, 5 and 6.

So, there are 6 numbers in total.

The numbers greater than 2 are 3, 4, 5 and 6.

So, there are 4 numbers.

P(getting a number greater than 2) = 4/6 = 2/3.

Question 20.

A die is thrown once. The probability of getting an odd number greater than 3 is [CBSE 2013C]

(a) 1/3

(b) 1/6

(c) 1/2

(d) 0

Solution:

Correct option: (b)

The numbers on a die are 1, 2, 3, 4, 5 and 6.

So, there are 6 numbers in total.

The odd number on a die greater than 3 is 5.

So, there is only 1 number.

P(getting an odd number greater than 3) = 1/6.

Question 21.

A die is thrown once. The probability of getting a prime number is

(a) 2/3

(b) 1/3

(c) 1/2

(d) 1/6

Solution:

Correct option: (c)

The numbers on a die are 1, 2, 3, 4, 5 and 6.

So, there are 6 numbers in total.

The prime numbers on the die are 2, 3 and 5.

So, there are 3 numbers.

P(getting a prime number on the die) = 3/6 = 1/2.

Question 22.

Two dice are thrown together. The probability of getting the same number on the both dice is [CBSE 2012]

(a) 1/2

(b) 1/3

(c) 1/6

(d) 1/12

Solution:

Correct option: (c)
The numbers on each die are 1, 2, 3, 4, 5 and 6.
So, the total possibilities are:
(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)
So, there are 36 numbers in total.
There are 6 possibilites when the two die
have the same number (1,1), (2,2), (3,3), (4,4), (5,5), (6,6)
P(getting the same number on both the die)

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

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

Question 23.

The probability of getting 2 heads, when two coins are tossed, is [CBSE 2012]

(a) 1

(b) 3/4

(c) 1/2

(d)1/4

Solution:

Correct option: (d)

When two coins are tossed the outcomes are:

{HH, HT, TH, TT}

So, there are 4 numbers in total.

P(getting one head) = 1/4.

Question 24.

Two dice are thrown simultaneously. What is the probability of getting a doublet?

(a) 1/36

(b) 5/12

(c) 1/6

(d) 2/3

Solution:

Correct option: (b)
The numbers on each die are 1, 2, 3, 4, 5 and 6.
So, the total possibilities are:
(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)
So, there are 36 numbers in total.
There are 6 possibilites when we obtain a doublet,
(1, 1), (2,2), (3,3), (4,4), (5,5), (6,6).
P(getting a doublet)

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

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

Question 25.

Two coins are tossed simultaneously. What is the probability of getting at most one head?

(a) 1/4

(b) 1/2

(c) 2/3

(d) 3/4

Solution:

Correct option: (d)

When two coins are tossed the simultaneously the outcomes are:

{HH, HT, TH, TT}

So, there are 4 outcomes.

Getting atmost one head means the possible outcomes are:

{HT, TH, TT}

So, there are 3 possible outcomes.

P(getting atmost one head) = 3/4.

Question 26.

Three coins are tossed simultaneously. What is the probability of getting exactly two heads?

(a) 1/2

(b) 1/4

(c) 3/8

(d) 3/4

Solution:

Correct option: (c)

When three coins are tossed the simultaneously the

outcomes are:

{HHH, HHT, HTH, THH, THT, HTT, TTH and TTT}

So, there are 8 possible outcomes.

P(getting exactly two heads) = 3/8.

Question 27.

In a lottery, there are 8 prizes and 16 blanks. What is the probability of getting a prize?

(a) 1/2

(b) 1/3

(c) 2/3

(d) none of these

Solution:

Correct option: (b)

The number of prizes = 8

The number of blanks = 16

So, the total number of tickets=8+ 16 = 24

P(getting a prize) = 8/24 = 1/3.

Question 28.

In a lottery, there are 6 prizes and 24 blanks. What is the probability of not getting a prize?

(a) 3/4

(b) 3/5

(c) 4/5

(d) none of these

Solution:

Correct option: (c)

The number of prizes= 6

The number of blanks = 24

So, the total number of tickets = 6+24=30

P(not getting a prize)= 24/30 = 4/5.

Question 29.

A box contains 3 blue, 2 white and 4 red marbles. If a marbles. If a marble is drawn at random from the box, what is the probability that it will not be a white marble?

(a) 1/3

(b) 4/9

(c) 7/9

(d) 2/9

Solution:

Correct option: (c)

The bag contains 3 blue, 2 white and 4 red marbles.

So, the total number of marbles = 3+2+4= 9

Since the marbles cannot be white, it can blue or red.

The number of blue or red marbles= 3+4=7

P(getting a blue or red marble)= 7/9.

Question 30.

A bag contains 4 red and 6 black balls. A ball is taken out of the bag at random. What is the probability of getting a black ball?

(a) 2/5

(b) 3/5

(c) 1/10

(d) none of these

Solution:

Correct option: (b)

The bag contains 4 red and 6 black balls.

So, the total number of balls= 4+6= 10

The number of black balls = 6

P(getting a black ball) = 6/10 = 3/5.

Question 31.

A bag contains 8 red, 2 black and 5 white balls. One ball is drawn at random. What is the probability that the ball drawn is not black?

(a) 18/15

(b) 2/15

(c) 13/15

(d) 1/3

Solution:

Correct option: (c)

The bag contains 8 red, 2 black and 5 white balls,

So, the total number of balls= 8+2+5=15

Since the ball should not be black, it can be red or white.

The number of red and white balls = 13

P(getting a red and white ball) = 13/15.

Question 32.

A bag contains 3 white, 4 red and 5 black balls. One ball is drawn at random. What is the probability that the ball drawn is neither black nor white?

(a) 1/4

(b) 1/2

(c) 1/3

(d) 3/4

Solution:

Correct option: (c)

The bag contains 3 white, 4 red and 5 black balls.

So, the total number of balls = 3+ 4+ 5= 12

For the ball that is drawn to be neither black nor white, it should be red.

The number of red balls = 4

P(getting a red ball) = 4/12 = 1/3.

Question 33.

A card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a black king?

(a) 1/13

(b) 1/26

(c) 2/39

(d) none of these

Solution:

Correct option: (b)

The total number of cards = 52

The number of black kings = 2

P(getting a black king) = 2/52 = 1/26.

Question 34.

From a well-shuffled deck of 52 cards, one card is drawn at random. What is the probability of getting a queen?

(a) 1/13

(b) 1/26

(c) 4/39

(d) none of these

Solution:

Correct option: (a)

The total number of cards = 52

The number of queens = 4

P(getting a queen) = 4/52 = 1/13.

Question 35.

One card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a face card?

(a) 1/26

(b) 3/26

(c) 3/13

(d) 4/13

Solution:

Correct option: (c)

The total number of cards = 52

The number of face cards = 12

P(getting a face card) = 12/ 52 = 3/13.

Question 36.

Once card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a black face card?

(a) 1/26

(b) 3/26

(c) 3/13

(d) 3/14

Solution:

Correct option: (b)

The total number of cards = 52

The number of black face cards = 6

P(getting a black face card) = 6/52 = 3/26.

Question 37.

One card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a 6?

(a) 3/26

(b) 1/52

(c) 1/13

(d) none of these

Solution:

Correct option: (c)

The total number of cards = 52

The number of 6 in the deck of cards = 4

P(getting a 6) = 4/52 = 1/13.