Chapter : 15. PROBABILITY

Exercise : 15A

Question: 1

Fill in the blank

Solution:

(i) 0

The probability of an impossible event is zero because probability is likelihood of a given event's occurrence, which is expressed as a number between 0 and 1.

(ii) 1

The probability of a sure event is always 1 as the event may occur or may not occur and if its sure to occur there is only 1 probability for same.

(iii) 1

P(E) = 1/2 and P(not E) = 1/2 adding the two gives 1 because P(not E) is complement of event E.

(iv) 0, 1

The probability of a possible but not a sure event lies between 0 and 1 as an event is possible but not sure to occur. It may occur and may not occur.

(v) 1

The probability of the outcome of an experiment is one because an experiment may succeed or fail. P (E) + P(not E) = 1

Question: 2

A coin is tossed

Solution:

P(E) = number of favourable outcome /total number of outcome.

When a coin is tossed, the possible outcomes are:

P(E) = { H, T}

So, P(T), the probability of getting tail is 1/2.

Question: 3

Two coins are tos

Solution:

When two coins are tossed simultaneously, all possible outcomes are HH, HT, TH, TT.

Total number of outcomes = 4

(i) Let E be the event for getting exactly 1 head

Then, the favourable outcomes are: HT, TH

Number of favourable outcomes = 2

$\therefore$ P(getting exactly one head) = P(E) = 2/4 = 1/2 or 50%

(ii) Let E be the event for getting atmost one head

Then, the favourable outcomes are: HT, TH, HH

Number of favourable outcomes = 3

$\therefore$ P(getting atmost one head) = P(E) = 3/4 or 75%

Note: Atmost one means maximum one head can come. So, we will also consider the outcome in which no head is obtained.

Atleast one means minimum one head will come. So, the outcome with two heads will also be counted.

(iii) Let E be the event for getting atleast one head

Then, the favourable outcomes are: HT, TH, HH

Number of favourable outcomes = 3

∴ P(getting atleast one head) = P(E) = 3/4 or 75%

Question: 4

A die is thrown o

Solution:

When a die is thrown, all the possible outcomes are: 1, 2, 3, 4, 5, 6

Total number of outcomes = 6

(i) Let E be the event of getting an even number

Then, the favourable outcomes are: 2, 4, 6

Number of favourable outcomes = 3

∴ P (getting exactly one head) = P(E) = 3/6 = 1/2 or 50%

(ii) Let E be the event of getting a number less than 5

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

Number of favourable outcomes =4

∴ P (getting number less than 5) =P (E) =4/6=2/3 or about 66.67%

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

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

Number of favourable outcomes are =4

∴ P (getting number greater than 2) = P (E) =4/6= 2/3 or 66.67%

(iv) Let E be the event of getting number between 3 and 6

Then, the favourable outcomes are: 4, 5,

Number of outcomes are = 2

∴ P (getting number between 3 and 6) = P (E) = 2/6 =1/3 or 33%

(v) Let A be the event of getting number other than 3

Then, the favourable outcomes are: 1, 2, 4, 5, 6

Number of outcomes are = 5

∴ P (getting number other than 3) = P (E) =5/6 or 83.33%

(vi) Let E be the event of getting number 5

Then, the favourable outcome is: 1

∴ P (getting exactly number 5) = P (E) = 1/6 or 16.67%

Question: 5

A letter of Engli

Solution:

Let E be the event of choosing an alphabet

Total numbers of alphabets are 26

Then, the favourable outcomes are: B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z

The number of outcomes are =21

∴ P (choosing a consonant) =P (E) = 21/26

Question: 6

A child has a die

Solution:

(i) Total letter on the dice are: 6

Let E be the event of getting letter 'A'

Then, the numbers of favourable outcomes are = 3

∴ P (getting letter 'A') = P (E) = 3/6 = 1/2 or 50%

(ii) Total letter on the dice are: 6

Let E be the event of getting letter 'D'

Then, the number of favourable outcomes is= 1

∴ P (getting letter 'D') = P (E) = 1/6 or 16. 67%

Question: 7

It is known that

Solution:

(i) Total numbers of bulbs are: 200

Let E be the event of drawing defective bulb

Then, the numbers of favourable outcomes are= 16

P (drawing defective bulb) = P (E) = 16/200= 2/25

(ii) Total numbers of bulbs are: 200

Let E be the event of drawing non defective bulb

Then, the numbers of favourable outcomes are: 200 -16 =184 non defective bulbs out of which one can be chosen in 184 ways

P (drawing non defective bulb) = P (E) = 184/200 = 23/25 or 92%

Question: 8

If the probabilit

Solution:

Let E be the event of winning the game

P(E) + P(not E)= 1 where P(E) denotes probability of occurrence E and P(not E) denotes probability of non-occurrence of E

∴ Then, P (losing the game) = P (not E) = 1- 0.7 = 0.3

Question: 9

There are 35 stud

Solution:

Total numbers of students are: 35

(i) Let E be the event of choosing a boy at random

Then, the numbers of favourable outcome are: 20

∴ P (choosing a boy) = P (E) = 20/35 = 4/7 or 57%

(ii) Let E be the event of choosing a girl at random

Then, the numbers of favourable outcome are= 15

∴ P (choosing a girl) = P (E) = 15/35 =3/7 or 43%

Question: 10

In a lottery ther

Solution:

Total numbers of outcome in a draw of lottery are: 10 + 25= 35 being lottery Draw a prize or a blank

Let E be the event of getting a prize at draw

Then, the numbers of favourable events are= 10

∴ P (getting a prize) = P (E) = 10/35 = 2/7

Question: 11

250 lottery ticke

Solution:

Total numbers of elementary events are: 250

Let E be the event of winning a prize

Then, the numbers of favourable event are= 5 being number of prizes

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

Question: 12

17 cards numbered

Solution:

Total numbers of elementary events are: 17

(i) Let E be the event of getting an old number

The favourable odd numbers are: 1, 3, 5, 7, 9, 11, 13, 15, 17

Then, the numbers of favourable odd numbers are= 9

∴ P (getting an old number) = P (E) = 9/17

(ii) Let E be the event of getting a number divisible by 5

The favourable outcomes are: 5, 10, 15

Then, the number of favourable outcome are= 3

∴ P (getting a number divisible by 5) = 3/17

Question: 13

A game of chance

Solution:

Total numbers of elementary events are: 8

Let E be the event of getting the arrow pointing at any factor of 8

The favourable outcomes are: 1, 2, 4,

Then, the number of favourable events are = 3

∴ P (getting a factor of 8) = P (E) = 3/8

Question: 14

In a family of 3

Solution:

Let E be the event of having at least one boy

The probability that each child will be a boy is 1/2.

The probability that each child will be a girl is 1/2.

The probability of no boys = 1/2 × 1/2 × 1/2 = 1/8

Then, the number of favourable outcome is P(E) –P(not E)=1 where P(E) is probability of having at least one boy and P(not E) means the probability of having no boy at all.

∴ Probability (at least 1 boy) = 1 - probability (no boys)= 1 - 1/8 = 7/8

Question: 15

A bag contains 5

Solution:

Total numbers of elementary events are: 5 + 4 + 2 + 4 = 15

(i) Let E be the event of getting a black ball at the random draw

Then, numbers of favourable outcomes are: 2

∴ P (getting a black ball) = P (E) = 2/15

(ii) Let E be the event of getting non green ball at the random draw

Then, the numbers of unfavourable outcomes are: 4

Probability of getting a green ball = P (green ball) = 4/15

Then, the number of favourable outcome P (not green ball) = 1- P (green ball)

∴ (P non green ball)= P (E) = 1- 4/15 =11/15

(iii) Let E be the event of getting a red or white ball

Let A be the event of getting a red ball

Then, favourable outcomes are: 5

Probability (getting a red ball) = P (A) = 5/15

Let B be the event of getting a white ball

Then, the numbers of favourable outcomes are: 4

Probability (getting white ball) = P (B) = 4/15

P (E) = P (A) + P (B)

∴ P(red ball or white ball) = P (E) = 5/15 + 4/15 = 9/15 = 3/5

(iv) Let E be the event of getting neither red nor green

Let A be the probability of getting a red ball

Then, the favourable outcomes are: 5

∴ P (getting red ball) =P (A) = 5/15

Let B be the event of getting a green ball

Then, the favourable outcomes are: 4

P (getting green ball) = 4/15

Let C be the getting red or green ball

P (getting red or green ball) = P(C) = 5/15 + 4/15 = 9/15 = 3/5

P (getting neither Red nor green ball) = P (E) = 1- P (C) = 1-3/5 = 2/5

Question: 16

A card is drawn a

Solution:

Total numbers of elementary events are: 52

(i) Let E be the event of drawing a card from pack of 52 card

Then, numbers of favourable outcomes are: 2 being hearts card or diamond cards being king in red colour.

∴ P (a red king) =P (E) = 2/52 = 1/26

(ii) Let E be the event of getting a queen or a jack

Let A be the event of getting a queen

Then, numbers of favourable events are: 4

P (queen) = P (A) = 4/52

Let B be the event of getting a jack

Then, the numbers of favourable event are: 4

P (jack) = P (B) = 4/52

∴ P (queen or jack) = P (E) = 4/52 + 4/52 = 8/52 = 2/13

Question: 17

A card is drawn a

Solution:

Total numbers of elementary events are: 52

Let E be the event of drawing neither a king or a queen

Let A be the event of drawing a king

Then, the numbers of favourable outcomes are: 4

P (king) = P (A) = 4/52

Let B be the event of drawing a queen

Then, the numbers of favourable outcomes are: 4

P (queen) = P (B) = 4/52

Let C be the event of getting either a king or a queen

Then, the numbers of favourable events are: 4 + 4 = 8

P (either king or queen) = P (C) = 4/52 + 4/52 = 8/52 = 2/13

∴ P (neither king or queen) = P (E) = 1- P (C) = 1- 2/13 = 11/ 13

Question: 18

A card is drawn f

Solution:

Total numbers of elementary events are: 52

(i) Let E be the event of getting a red face card

Then, the numbers of favourable outcomes are: 6

Being 2 red cards of jack, 2 red cards of queen and 2 red cards of King

∴ P (red card) = P (E) = 6/52 = 3/26

(ii) Let E be the event of getting a black king

Then, the numbers of favourable outcomes are: 2

Being only 2 card of king are of black colour in pack of 52

∴ P (black king) = P (E) = 2/52 = 1/26

Question: 19

Two different dic

Solution:

Total numbers of elementary events are: 6 x 6 = 36

(i) Let E be the event of getting an even number on each die

The favourable combinations are: (2, 2), (2, 4), (2, 6), (4, 2), (4, 4), (4, 6), (6, 2), (6, 4), (6, 6)

Then, the number of favourable outcomes are = 9

∴ P (getting even number on both dice) =P (E) = 9/36 = 1/4

(ii) Let E be the event of getting the sum of the numbers appearing on two dice is 5

The favourable combinations for event are: (1, 4), (2, 3), (3, 2), (4, 1)

Then, the numbers of favourable combinations = 4

∴ P (sum of numbers appearing on two dice is 5) =P (E) = 4/36 = 1/9

Question: 20

Two difference di

Solution:

Total numbers of elementary events are: 6 x6 = 36

Let E be the event of getting the sum of the numbers on the two dice is 10

The favourable combination is: (5, 5), (4, 6), (6, 4)

The numbers of favourable combinations are: 3

∴ P (getting sum of numbers on the dice is 10) = P (E) = 3/36 = 1/12

Question: 21

When two dice are

Solution:

Total numbers of elementary events are: 6x6 = 36

Let E be the event of getting the sum of numbers on top is less than 7

The favourable combinations are: (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (2, 1), (2, 3), (2, 2),

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

Then, the number of favourable events = 15

∴ P (sum of numbers on top is less than 7) = P (E) = 15/36 = 5/12

Question: 22

Two dice are roll

Solution:

Total numbers of elementary events are: 6 x 6 = 36

Let E be the event of getting such number on the two dice whose product is a perfect square

The favourable combinations are: (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6), (1, 4), (4, 1)

Then, the numbers of favourable combinations = 8

∴ P (getting such number on the two dice whose product is a perfect square)

= P (E) = 8/36 = 2/9

Question: 23

Two dice are roll

Solution:

Total numbers of elementary events are: 6x6 = 36

Let E be the elementary event of getting numbers on the two dice whose product is 12

The favourable outcomes are: (2, 6), (3, 4), (4, 3), (6, 2)

Then, the numbers of favourable outcomes = 4

∴ P (numbers on the two dice whose product is 12) = P (E) = 4/36 = 1/9

Question: 24

Cards marked with

Solution:

Total numbers of elementary events are: 46

(i) Let E be the event of getting a prime number less than 10

The favourable numbers are: 5, 7

Then, numbers of favourable outcomes = 2

∴ P (getting a prime number less than 10) = P (E) = 2/46 = 1/23

(ii) Let E be the event of getting a perfect square number

The favourable numbers are: 9, 16, 25, 36, 49

Then, the numbers of favourable outcomes = 5

∴ P (getting a perfect square number) = P (E) = 5/46

Question: 25

A game of chance

Solution:

Total numbers of elementary events are: 12

(i) Let E be the event of getting arrow pointed to 6

Then, the favourable outcome is: 1

∴ P (getting 6) =P (E) = 1/12

(ii) Let E be the event of getting an even number

The favourable numbers are: 2, 4, 6, 8, 10, 12

Then, the number of favourable outcomes are = 6

∴ P (an even number) = P (E) = 6/12 = 1/2

(iii) Let E be the elementary event of getting a prime number

The favourable numbers are: 2, 3, 5, 7, 11

Then, the number of favourable outcomes = 5

∴ P (prime number) = P (E) = 5/12

(iv) Let E be the event of getting a number which is perfect square

The favourable numbers are: 4, 9

Then, the favourable outcomes = 2

∴ P (perfect square number) = P (E) = 2/12 = 1/6

Question: 26

12 defective pens

Solution:

Total numbers of elementary events are: good pen + defective pens = 132 + 12 =144

Let E be the event of taking out a good pen

The numbers favourable events are: 132 being the good pens

∴ P (good pen) =P (E) = 132 /144 = 11/12

Question: 27

A lot consists of

Solution:

Total numbers of elementary events are: 144

Defective pens = 20

Good pens = 144 – 20 = 124

(i) Let E be the event of Tanvy buying the pen

The numbers of favourable outcome are: 124 being only good pens worth buying

∴ P (buy pen) = P (E) = 124/ 144 = 31/ 36

(ii) Let E be the event of Tanvy not buying the pen

The favourable outcomes are: 20

∴ P (not buying a pen) = P (E)= 20/144 = 10/72 = 5/ 36

Question: 28

A box contains 90

Solution:

Total numbers of elementary events are: 90

(i) Let E be the event of getting two digit number at a draw

The favourable numbers are: 10, 11, 12, 13, 14 …….. 90

Since the common difference between the consecutive number is same

It forms an A.P.

First number = a = 10

d = common difference = 11- 10 = 1

Last number = a_n = 90

a_n = a + (n-1) d

90 = 10 + (n-1) 1

90-10 = (n-1)

80 + 1 = n

81 = n, being number of terms

Then, the favourable numbers of outcome = 81

∴ P (two digit number) = P (E) = 81/90 = 9/10

(ii) Let E be the event of getting a perfect square number

The favourable numbers are: 1, 4, 9, 16, 25, 36, 49, 64, 81

Then, the number of favourable outcomes = 9

∴ P (perfect square number) = P (E) = 9/90 = 1/10

(iii) Let E be the event of getting a number divisible by 5

The favourable numbers are: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90

Then, the number of favourable outcomes = 18

∴ P (number divisible by 5) = P (E) = 18/90 = 1/5

Question: 29 A

A lot of 20 bulbs

Solution:

Total numbers of elementary events are: 20

Let E be the event of drawing defective bulb

The number of defective bulbs in a lot = 4

Then, the favourable outcome =4

∴ P (defective bulb) = P (E) = 4/20 = 1/5

Question: 29 B

Suppose the bulb

Solution:

Total numbers of elementary events are: 20 – 1 = 19

Let E be the event of getting not defective bulb and not replacing the bulb already drawn

The favourable outcomes = 19 - 4 = 15

∴ P (not defective bulb drawn after not replacing the already drawn bulb) = P (E) = 15/19

Question: 30

A bag contains le

Solution:

Total number of elementary events is: 1

(i) Let E be the event of taking orange –flavoured candy

The favourable number of outcomes = 0

Because bag has lemon flavoured candies only

∴ P (E) = 0/1 =0

(ii) Let E be the event of getting a lemon flavoured candy

The favourable number of outcomes = 1

Probability of sure event is: 1

∴ P (lemon-flavoured candy) = P (E) = 1/1 = 1

Question: 31

There are 40 stud

Solution:

Total numbers of elementary events are: 40

(i) Let E be the event of drawing a card with girl`s name written on it

The numbers of favourable outcomes are: 25

∴ P (girl`s name) = P (E)= 25/40 = 5/8

(ii) Let E be the event of drawing a card with boy`s name written on it

The numbers of favourable outcomes are: 15

∴ P (boy`s name) = P (E) = 15/40 = 3/8

Question: 32

One card is drawn

Solution:

Total numbers of elementary events are: 52

(i) Let E be the event of drawing an ace

The favourable outcomes are: 4

∴ P (an ace) = P (E) = 4/52 = 1/13

(ii) Let E be the event of drawing '4' of a spade

The number of favourable outcomes is: 1

∴ P ('4' of spade) = P (E) = 1/52

(iii) Let E be the event of drawing '9' of a black suit

The numbers of favourable outcomes are: 2

∴ P ('9' of a black suit) = P (E) = 2/52 =1/26

(iv) Let E be the event of drawing a red king

The numbers of favourable outcome are: 2

∴ P (red king) = P (E) = 2/52 = 1/26

Question: 33

A card is drawn a

Solution:

Total numbers of elementary events are: 52

(i) Let E be the event of drawing a queen

The numbers of favourable outcomes are: 4

∴ P (queen) = P (E) = 4/52 = 1/13

(ii) Let E be the event of drawing a diamond card

The numbers of favourable outcomes are: 13

∴ P (diamond card) = P (E) = 13/52 = 1/4

(iii) Let E be the event of getting a king or an ace

Let A be the event of drawing a king

The numbers of favourable outcomes are: 4

P (king) = P (A) = 4/52 = 1/13

Let B be the event of drawing an ace

The numbers of favourable outcomes are: 4

P (an ace) = P (E) = 4/52 = 1/13

∴ P (king or an ace) = P (E) = P (A) + P (B) =1/13 + 1/13 = 2/13

(iv) Let E be the event of drawing a red ace

The numbers of favourable events are: 2

∴ P (red ace) = P (E) = 2/52 = 1/26

Question: 34

One card is drawn

Solution:

Total numbers of elementary events are: 52

(i) Let E be the event of getting a king of red suit

Then, the favourable numbers of outcomes are: 2

∴ P (king of red suit) = P (E) = 2/52 = 1/26

(ii) Let E be the event of drawing a face card

The favourable outcomes are: 4 cards of jack, 4 cards of queen and 4 cards of king

Then, the numbers of favourable outcomes are = 12

∴ P (face card) = P (E) = 12/52 = 6/26 = 3/13

(iii) Let E be the event of drawing a red face card

The favourable outcomes are: 2 red cards of jack, 2 red cards of queen and 2 red cards of king

The number of favourable outcomes = 6

∴ P (red face card) = P (E) = 6/52 = 3/26

(iv) Let E be the favourable event of drawing a queen of black suit

The numbers of favourable outcomes are: 2

∴ P (black suit queen) = P (E) = 2/52 = 1/26

(v) Let E be the event of drawing a jack of heart

The number of favourable outcome is: 1

∴ P (jack of heart) = P (E) = 1/52

(vi) Let E be the event of drawing a spade

The numbers of favourable outcomes are: 13

∴ P (spade) = P (E) = 13/52 = 1/4

Question: 35

A card is drawn a

Solution:

Total numbers of elementary events are: 52

(i) Let E be the event of drawing a card of spade or an ace

Let A be the event of drawing a card of spade

The favourable numbers of drawing a card of spade are: 13

P (spade) = P (E) = 13/52

Let B be the event of drawing an ace

The numbers of favourable outcomes are: 3 one ace being spade card already been counted

P (ace) = P (B) = 3/52

∴ P (spade or ace) = P (E) = P (A) + P(B) = 13/52 + 3/52 = 16/52 = 8/26 =4/13

(ii) Let E be the event of drawing a red king

The numbers of favourable outcomes are: 2

∴ P (red king) = P (E) = 2/52 = 1/26

(iii) Let E be the event of drawing either a king or a queen

Let A be the event of drawing a king

Then, the numbers of favourable outcome are: 4

P (king) = P (A) = 4/52

Let B be the event of drawing a queen

Then, the numbers of favourable outcome are: 4

P (queen) = P (B) = 4/52

∴ P (king or queen) = 4/52 + 4/52 = 8/52 = 2/13 -----@

(iv) Let E be the event of drawing neither a king nor a queen

P (getting either king or a queen) = 2/13 (part c above ----@)

∴ P (neither king nor queen) = P (E) = 1 – P (either king or queen) = 1 – 2/13 = 11/13

Exercise : 15B

Question: 1

A box contains 25

Solution:

Total numbers of elementary events are 25

(i) Let E be the event of drawing number divisible by 2 or 3

Let A be the event of drawing number divisible by 2

The favourable numbers are: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

Then, numbers of favourable outcomes are: 12

P (number divisible by 2) = P (A) = 12/25

Let B be the event of drawing a number divisible by 3

The favourable numbers are: 3, 6, 9, 12, 15, 18, 21, 24

Then, numbers of favourable outcomes are: 8

P (getting number divisible by 3) = P (B) = 8/25

∴ P (number divisible by 2 or 3) = P (A) + P (B) = 12/25 + 8/25 = 20/25 = 4/5

(ii) Let E be the event of drawing a prime number

The favourable numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23

Then, numbers are favourable outcome are: 9

∴ P (prime number) = P (E) = 9/25

Question: 2

A box contains ca

Solution:

Total numbers of elementary events are: 18

(3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, , 27, 29, 31, 33, 35, 37)

The favourable prime number cards in the box are: 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

The numbers of favourable outcomes = 11

∴ P (prime number) = P (E) = 11/18

Question: 3

Cards numbered 1

Solution:

Total numbers of elementary events are: 30

(i) Let E be the event of drawing a number not divisible by 3

The favourable numbers are: 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22, 23, 26, 28, 29

Then, the numbers of favourable events = 19

∴ P (not divisible by 3) = P (E) = 19/30

(ii) Let E be the event of getting a prime number greater than 7

The favourable numbers are: 11, 13, 17, 19, 23, 29

Then, the number of favourable outcome = 6

∴ P (prime number greater than 7) = P (E) = 6/30 = 1/5

(iii) Let E be the event of drawing not a perfect square number

Let A be the event of getting a perfect square number

The favourable numbers are: 1, 4, 9, 16, 25

Then, the number of favourable = 5

P (perfect square) = P (A) = 5/30 = 1/6

∴ P (not perfect square number) = 1 – P (A) = 1- 1/6 = 5/6

Question: 4

Cards bearing num

Solution:

Total numbers of elementary events are: 35

(i) Let E be the event of getting a prime number less than 15

The favorable numbers are: 3, 5, 7, 11, 13

Total numbers = 18 [odd numbers between 1 and 36]

Then, the numbers of favorable events = 5

∴ P (prime number less than 15) = P (E) = 5/18

(ii) Let E be the event of drawing a number divisible by 3 and 5

Numbers divisible by 3 and 5 is: 15, 30 but 30 is not odd, hence only 15 is in the bag

∴ P (getting a prime number divisible by 3 and 5) = P (E) = 1/18

Question: 5

A box contains ca

Solution:

Total numbers of elementary events are: 75

(i) Let E be the event of drawing one-digit number

The favourable numbers are: 6, 7, 8, 9

Then, the favourable number of outcomes are = 4

∴ P (one-digit number) = P (E) = 4/75

(ii) Let E be the event of drawing number divisible by 5

The favourable numbers are: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70

The number of favourable events are = 13

∴ P (number divisible by 5) = P (E) = 13/75

(iii) Let E be the event of getting an odd number less than 30

The favourable numbers are: 3, 5, 7, 11, 13, 17, 19, 23, and 29

Then, the number of favourable outcomes = 9

∴ P (odd number less than 30) = P (E) = 9/75 = 3/25

(iv) Let E be the event of drawing composite number between 50 and 70

The favourable number are: 50, 51, 52, 54, 55, 56, 57, 58, 60, 62, 63, 64, 65, 66, 68, 69, 70

The number of favourable outcomes = 17

∴ P (composite number between 50 and 70) = P (E) = 17/75

Question: 6

Cards marked with

Solution:

Total numbers of elementary events are: 51

Since the common difference between the consecutive number is same: 2

It forms an A.P.

First number = a = 1

d = common difference = 3 -1 = 2

Last number = a_n = 90

a_n = a + (n-1) d

101 = 1 + (n-1)2

101 -1 = (n-1)2

100/2 = n-1

50 + 1 = n

51 = n, being number of terms

(i) Let E be the event of drawing a number less than 19

The favourable numbers are: 1, 3, 5, 7, 9, 11, 13, 15, 17,

The numbers of favourable outcomes = 9

∴ P (number less than 19) = P (E) = 9/51

(ii) Let E be the event of getting a prime number less than 20

The favourable numbers are: 2, 3, 5, 7, 11, 13, 17, 19

Then, the numbers of favourable outcomes = 8

∴ P (prime number less than 20) = P (E)= 8/51

Question: 7

Tickets numbered

Solution:

Total numbers of elementary events are: 100

(i) Let E be the event of drawing even number ticket

The favourable numbers are: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, ...100

This forms an A.P where a= 2, d= 2 and a_n = 100

a_n= a + (n -1) d

100 = 2 + (n -1) 2

98/2 = n -1

49 + 1 = n

n = 50, being number of term

Then, the numbers of favourable outcomes = 50

∴ P (even number) = P (E) = 50/100 =1/2

(ii) Let E be the event of drawing number less than 16

The favourable numbers are: 2, 3, 4, 5, 6, ... 15

Then, the number of favourable outcomes = 14

∴ P (number > 6) = P (E)= 14/100 = 7/50

(iii) let E be the event of drawing a perfect square number

The favourable numbers are: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

The numbers of favourable outcomes = 10

∴ P (perfect square number) = P (E) = 10/ 100 = 1/10

(iv) let E be the event of drawing prime number less than 40

The favourable numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

Then, the numbers of favourable outcomes = 12

∴ P (prime number less than 40) = P (E) = 12/100 = 3/25

Question: 8

A box contains 80

Solution:

Total numbers of elementary events are: 80

The favourable numbers are: 1, 4, 9, 16, 25, 36, 49, 64

Then, the numbers of favourable outcomes = 8

∴ P (perfect square number) = P (E) = 8/80 = 1/10

Question: 9

A piggy bank cont

Solution:

Total numbers of elementary events are: 100 + 70 + 50 + 30 = 250 being number of coins of each denomination added to find total number of coins

(i) let E be the event of getting Rs. 1 coin

Then, numbers of favourable events = 70

∴ P (Rs 1 coin) = P (E) = 70/250 = 7/25

(ii) Let E be the event of not getting Rs 5 coin

Let A be the event of getting Rs 5 coin

Then, the numbers of favourable events = 30

P (Rs 5 coin) = P (A) = 30/250 = 3/25

∴ P (not Rs 5 coin) = P (E) = 1 – P (A) = 1 – 3/25 = 22/25

(iii) Let E be the event of getting 50-p or Rs2 coin

Let A be the event of getting 50-p coin

Then numbers of favourable outcomes = 100

P (50-p coin) = P (A) = 100/250 = 1/25

Let B be the event of getting Rs2 coin

Then numbers of favourable outcomes = 50

P (Rs2 coin) = P (B) = 50/250 = 5/25

∴ P (50-p coin or Rs2 coin) = P (E) = P (A) + P (B) = 1/25 + 5/25= 6/25

Question: 10

The probability o

Solution:

Let the total number of elementary events that is total number of balls in the jar be x

Then, 1/4 x + 1/3 x + 10 = x

120 + 7x = 12 x

120 = 5x

X = 24, being total number of balls in jar

Question: 11

A bag contains 18

Solution:

(i) Total numbers of elementary events are 18

Let E be the event of getting not red ball

Let A be the event of getting a red ball

The number of favourable events are x

P (red ball) =P (A) = x/18

∴ P (not red ball) = P (E) = 1 – x/18

(ii) Two ball are added to the existing 18 balls

Total numbers of elementary events are: 18 + 2 = 20

Let E be the event of getting a red ball

P (red ball) = P (E) = (x + 2) /20

According to the given condition

(X + 2) /20 = 9/8 x (x/18)

(x + 2) /20 = x/16

4x + 8 = 5x

X = 8 being the initial numbers of red ball.

Question: 12

A jar contains 24

Solution:

Total numbers of elementary events are 24

Let E be the event of getting a green ball

Let number of green ball be x

P (green ball) = P (E) = 2/3 (given)

But 2/3 = x/24

X = 16

Hence number of blue ball = 24 – 16 = 8

Question: 13

A jar contains 54

Solution:

Total numbers of elementary events are: 54

Probability of drawing a blue marble = 1/3

Number of blue marbles = 54 x 1/3 = 18

Probability of drawing a green marble = 4/9

Number of green marbles = 54 x 4/9 = 24

Number of white marbles = 54 - (18 + 24) = 54 - 42 = 12.

Question: 14

A carton consists

Solution:

Total numbers of elementary events are: 100

The number of good shirts = 88.

The number of shirts with minor defects = 8.

Number of shirts with major defects = 100 – 88 – 8 = 4.

(i) Let E be the event of shirt getting accepting by Rohit

The numbers of favourable outcomes = 88

∴ P (the drawn shirt is acceptable to Rohit) = P (E) = 88/ 100 = 22/25

(ii) Let E be the event of shirts getting accepted by kamal

The number of favourable outcomes = 88 + 8 = 96

∴ P (the drawn shirt is acceptable to Kamal) = P (E) = 96/100 = 24/25

Question: 15

A group consists

Solution:

The total number of persons = 12.

The number of persons who are extremely patient = 3.

The number of persons who are extremely honest = 6.

Number of persons who are extremely kind = 12 – 3 – 6 = 3.

(i) Let E be the event of selecting extremely patient person

Numbers of favourable outcomes = 3

∴ P (selecting a person who is extremely patient) = P (E) = 3/12 =1/4

(ii) Let E be the event of selecting extremely kind or honest

Let A be the event of selecting extremely kind person

The numbers of favourable event are 3

P (extremely kind) =P (A)= 3/12

Let B be the event of selecting extremely honest person

The numbers of favourable outcomes = 6

P (extremely honest) = P (B) = 6/12

∴ P (selecting extremely kind and honest) = P (E)= P (A) + P(B) = 9/12 = 3/4

From the three given values, we prefer honesty more.

Question: 16

A die is rolled t

Solution:

Total numbers of elementary events are: 6 x 6 = 36

(i) Let E be the event of getting number other than 5 on both dices

The Cases where 5 comes up on at least one time are (1, 5), (2, 5), (3, 5), (4, 5), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6) and (6, 5).

The number of cases = 11 being combinations with 5 on at least one dice

The number of favourable cases where 5 will not come up either time = 36 – 11 = 25.

∴ P (5 will not come up either time) = P (E) = 25/36

(ii) Let E be the event of getting one number as 5 on either of dice

The favourale outcomes where 5 comes up on exactly one time are: (1, 5), (2, 5), (3, 5), (4, 5), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6) and (6, 5).

The number of favourable such cases = 10.

∴ P (5 will come up exactly one time) = P (E) = 10/36 =5/18

(iii) Favourable event when 5 come up on exactly two times is (5, 5).

The number of such cases = 1.

∴ P (5 will come up both the times) = P (E) = 1/36

Question: 17

Two dice are roll

Solution:

Total Number of elementary events are = 36

Let E be the event of getting two numbers whose product is a perfect square.

The favourable outcomes are (1, 1), (1, 4), (4, 1), (2, 2), (3, 3), (4, 4), (5, 5) and (6, 6).

The number of favourable outcomes = 8.

∴ P (getting numbers whose product is a perfect square) = P (E) = 8/36 = 2/9

Question: 18

A letter is chose

Solution:

Total numbers of letters in the given word ASSOCIATION = 11

(i) Let E be the event of getting a vowel

The favourable outcomes are: (A, O, I, A, I, O)

Number of vowels in the given word = 6

∴ P (getting a vowel) = P (E) = 6/11

(ii) Let E be the event of getting a consonant

Favourable consonants in the given word = (S, S, C, T, N)

The numbers of favourable outcomes = 5

∴ P (getting a consonant) = P (E) = 5/11

(iii) Let E be the event of getting S

Number of S in the given word or number of favourable outcomes = 2

∴ P (getting an S) = P (E) = 2/11

Question: 19

Five cards-the te

Solution:

Total numbers elementary events are: 5.

(a) Number of favourable event = 1.

∴ P (getting a queen) = P (E) = 1/5

(b) When the queen has put aside, number of remaining cards = 4.

(i) Let E be the event of getting an ace

The number of favourable outcome is = 1.

∴ P (getting an ace) = P (E) = 1/4

(ii) Let E be the event of getting queen

Number of favourable event is = 0 being queen card already withdrawn

∴ P (getting a queen now) = P (E) = 0

Question: 20

A card is drawn a

Solution:

Total number of all elementary events = 52

There are 26 red cards (including 2 queens) and apart from these, there are 2 more queens.

Number of cards, each one of which is either a red card or a queen = 26 + 2 = 28

Let E be the event that the card drawn is neither a red card nor a queen.

Then, the number of favourable outcomes = (52 – 28) = 24

∴ P (getting neither a red card nor a queen) = P (E) = 24/52 = 6/13

Question: 21

What is the proba

Solution:

An ordinary year has 365 days consisting of 52 weeks and 1 day.

Let E be the event of that one day being Monday

This day can be any day of the week.

∴ P (of this day to be Monday) = P (E) = 1/7

Question: 22

All red face card

Solution:

There are 6 red face cards which are removed.

Thus, remaining number of card = 52 – 6 = 46.

Total numbers of elementary events are: 46

(i) Let E be the event of getting a red card

Number of favourable outcomes now = 26 – 6 = 20.

∴ P (getting a red card) = P (E)= 20/46 = 10/23

(ii) Let E be the elementary event of getting a face card

Number of face cards now = 12 – 6 = 6.

Number of favourable events = 6

∴ P (getting a face card) = P (E) = 6/46 = 3/23.

(iii) Let E be the event of getting a card of clubs

The number of card of clubs = number of favourable event = 12.

∴ P (getting a card of clubs) = P (E) = 12/46 = 6/23

Question: 23

All kings, queens

Solution:

The 4 kings, 4 queens, and 4 aces are removed.

Thus, remaining number of cards = 52 – 4 – 4 – 4 = Total number of elementary event = 40.

(i) Let E be the event of getting a black face card

Number of black face cards = 2 (only black jacks) = number of favourable event

∴ P (getting a black face card) = P (E) = 2/40 = 1/20

(ii) Let E be the event of getting a red card

Number of favourable events = Number of red cards now = 26 – 6 = 20 being total red cards 26 out of which 6 are withdrawn

∴ P (getting a red card) = P (E) = 20/ 40 = 1/2

Question: 24

A game consists o

Solution:

When a coin is tossed three times, all possible outcomes are

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

The total number of elementary outcomes = 8.

(i) Let E be the event of getting three heads

The favourable outcome with three heads is HHH.

The number of outcomes with three heads = 1.

Therefore, P (getting three heads) = P (E) = 1/8

(ii) let E be the event of getting at least two tails

Favourable Outcomes with at least two tails are TTH, THT, HTT and TTT.

Note: - at least two tails means there could be two or more than two tail so we will not consider the outcome with all head or less than two tales.

The number of favourable outcomes = 4.

∴ P (getting at least two tails) = P (E) = 4/8 = 1/2

Question: 25

Find the probabil

Solution:

A leap year has 366 days with 52 weeks and 2 days.

Now, 52 weeks contains 52 Sundays.

The remaining two 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 of getting a leap year with 53 Sundays

Total cases = 7

Number of favorable case, i.e. getting 53rd sunday = 2 [Sunday and Monday / Saturday and sunday]

∴ P (a leap year having 53 Sundays) = P (E) = 2/7

Exercise : MULTIPLE CHOICE QUESTIONS (MCQ)

Question: 1

If P(E) denotes t

Solution:

The probability of any event is always positive. It could be at the least equal to zero but not less than that. The probability of sure event at the maximum could be equal to 1 so probability lies between 0 and 1 both included.

Question: 2

If the probabilit

Solution:

Probability of event P + probability of event not P = 1

P (non –happening of event P) = (1-P)

Question: 3

What is the proba

Solution:

The probability of impossible event is always zero because such event can never happen.

Question: 4

What is the proba

Solution:

The probability of sure event or event which is certain to happen is always 1.

Question: 5

Which of the foll

Solution:

The probability of event is always less than or equal to 1. 1.5 being greater than 1 can never be the probability of an event.

Question: 6

A number is selec

Solution:

Let E be the event of selecting a prime number

Total numbers of elementary events are 30

Favourable numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

Number of favourable outcome = 10

P (E) = 10/30 =1/3

Question: 7

The probability t

Solution:

Total numbers of elementary event are 15

Let E be the event of selecting a multiple of 4

Favourable outcomes are: 4, 8, 12,

Numbers of favourable outcomes are 3

P (E) = 3/15 = 1/5

Question: 8

A box contains ca

Solution:

Total numbers of elementary events are: 50 – 5 = 45 number 6 is included

Let E be the event of drawing a perfect square

The favourable outcomes are: 9, 16, 25, 36, 49

Numbers of favourable outcomes = 5

P (E) = 5/45 = 1/9

Question: 9

A box contains 90

Solution:

Total numbers of elementary events are: 90

Let E be the event of getting a prime number less than 23

Favourable numbers are: **2**, **3**, **5**, **7**, **11**, **13**, **17**, **19**

Numbers of favourable outcomes = 8

P (E) = 8/90 = 4/45

4/45

Question: 10

Cards bearing num

Solution:

Total numbers of elementary events are 10

Let E be the event of getting a prime number

Favourable numbers are: 2, 3, 5, 7, 11

Numbers of favourable outcomes = 5

P (E) = 5/10 =1/2

Question: 11

One ticket is dra

Solution:

Total numbers of elementary events are: 40

Let E be the event of getting multiple of 7

Favourable outcomes are: 7, 14, 21, 28, 35

Number of favourable outcome = 5

P(E) = 5/40 = 1/8

1/8

Question: 12

Which of the foll

Solution:

On actual division 7/6 comes out to be 1.67 which is greater than 1. The probability can be less than or equal to 1.

Question: 13

If the probabilit

Solution:

Probability of winning a game + probability of losing a game = 1

So probability of losing the game = 1- probability of winning = 1 – 0.4 = 0.6

Question: 14

If an event canno

Solution:

The probability of event which can not occur or impossible event is always zero

Question: 15

There are 20 tick

Solution:

Total numbers of elementary events are: 20

Let E be the event of getting a multiple of 5

Favourable numbers are: 5, 10, 15, 20

Number of favourable events are= 4

P (E) = 4/20 = 1/5

Question: 16

There are 25 tick

Solution:

Total numbers of elementary events are: 25

Let E be the event of getting a multiple of 3 or 5

The favourable numbers are: 3, 6, 9, 12, 15, 18, 21, 24, 5, 10, 15, 20, 25

Numbers of favourable events = 13

P (E) = 13/25

Question: 17

Cards, each marke

Solution:

Total numbers of elementary events are 15 – 5 = 10

Let E be the event of drawing card less than 10

Favourable numbers are: 6, 7, 8, 9

Numbers of favourable outcomes = 4

P (E = 4/10 =2/5

Question: 18

A die is thrown o

Solution:

Total numbers of elementary events are: 6

Let E be the event of getting an even number

Favourable numbers are: 2, 4, 6

Number of favourable outcomes = 3

P (E) = 3/6 = 1/2

Question: 19

The probability o

Solution:

Total numbers of elementary events are: 6

Let E be the event of getting number greater than 2

Favourable numbers are: 3, 4, 5, 6

Numbers of favourable outcomes = 4

P (E) = 4/6 = 2/3

Question: 20

A die is thrown o

Solution:

Total numbers of elementary events are: 6

Let E be the event of getting an odd number greater than 3

Favourable number: 5

Number of favourable outcome =1

P (E) = 1/6

Question: 21

A die thrown once

Solution:

Total numbers of elementary events are: 6

Let E be the event of getting a prime number

Favourable numbers are: 2, 3, 5

Numbers of favourable outcomes are = 3As we know,

$$Probability = \frac{no.\ of\ favorable\ outcomes}{Total\ outcomes}$$

P (E) = 3/6 = 1/2

Question: 22

Two dice are thro

Solution:

Total numbers of elementary events are: 6 x6 = 36

Let E be the event of getting the same number on both the dice

Favourable events are: (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)

Numbers of favourable outcomes are: 6

P (E) = 6/36 = 1/6

Question: 23

The probability o

Solution:

Total numbers of elementary events are: 2 x 2 = 4

Let E be the event of getting 2 heads

Favourable event is HH

Number of favourable outcome = 1

P (E) = 1/4

Question: 24

Two dice are thro

Solution:

Total numbers of elementary events are: 6 x 6 = 36

Let E be the event of getting a doublet

Favourable outcomes are: (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)

Number of favourable outcomes = 6

$$Probability = \frac{no.\ of\ favorable\ outcomes}{Total\ outcomes}$$

P (E) = 6/36 =1/6

Question: 25

Two coins are tos

Solution:

Total numbers of elementary events are: 2 x 2 = 4

Let E be the event of getting at most one head

Note: atmost one head means one head or no head at all, outcomes are considerable

Favourable events are: TT, HT, TH

Numbers of favourable outcomes = 3

P (E) = 3/4

Question: 26

Three coins are t

Solution:

Total numbers of elementary events are: 2 x 2 x 2 = 8

Let E be the event of getting exactly two head

Favourable outcomes are: HHT, THH, HTH

Numbers of favourable outcomes = 3

P (E) = 3/8

Question: 27

In a lottery, the

Solution:

Total numbers of elementary events are : 24

Let E be the event of getting a prize

Favourable outcomes = 8

P (E) = 8/24 = 1/3

Question: 28

In a lottery, the

Solution:

Total numbers of elementary events are: 30

Let E be the probability of not getting a prize

Numbers of Favourable outcomes= 24

P (E) = 24/30 = 12 /15 = 4/ 5

Question: 29

A box contains 3

Solution:

Total numbers of elementary events are: 3 + 2 + 4 = 9

Let E be the event of not white ball drawn

Numbers of non-favourable outcomes = numbers of white ball drawn = 2

P (white ball) = 2/9

P (E) = 1- 2/9 = 7/9

Question: 30

A bag contains 4

Solution:

Total numbers of elementary events are: 4 + 6 = 10

Let E be the event of drawing black ball

Numbers of favourable events are: 6

P (E) = 6/10 = 3/5

Question: 31

A bag contains 8

Solution:

Total numbers of elementary events are: 8 + 2 + 5 = 15

Let E be the event of drawing not black ball

Number of non-favourable events = numbers of outcome with white ball drawn = 2/15

P(non- black drawn) = 1 – 2/15 = 13/15

Question: 32

A bag contains 3

Solution:

Total numbers of elementary events are: 3 + 4 + 5 = 12

Let E be the event of drawing neither black ball nor white ball

Number of outcomes of drawing a black ball or white ball = 5/ 12 + 3/12 = 8/12 = 2/3

Number of favourable outcomes are = 1-2/3 = 1/3

Question: 33

A card is drawn a

Solution:

Total numbers of elementary events are: 52

Let E be the event of drawing black king

Favourable outcomes are: 2

P (E) = 2/52 = 1/26

Question: 34

From a well- shuf

Solution:

Total numbers of elementary events are: 52

Let E be the event of getting a queen

Numbers of Favourable outcomes are : 4

P (E) = 4/52 = 2/ 26 = 1/13

Question: 35

One card is drawn

Solution:

Total numbers of elementary events are: 52

Let E be the event of drawing face card

Favourable events are: 4 cards of jack, 4 cards of queen and 4 cards of king

Number of favourable events = 12

P (E) = 12/ 52 = 6/26 = 3/13

Question: 36

One card is drawn

Solution:

Total numbers of elementary events are: 52

Let E be the event of drawing black face card

Favourable events are: 2 black face cards of jack, 2 black face cards of queen and 2 black face cards of king = 6

P (E) = 6/52 = 3/ 26

Question: 37

One card is drawn

Solution:

Total numbers of elementary events are: 52

Let E be the event of getting a ‘6’ number card

Numbers of Favourable events are: 4

P (E) = 4/52 = 1/13