$n(S) = 6$

For two dice, $n(S) = 6 \times 6 = 36$

Favorable cases where the sum is 10 or more with 5 on 1st die = {(5, 5), (5, 6)}

Event of getting the sum is 10 or more with 5 on 1st die = $n(E) = 2$

Probability of getting a sum of 10 or more with 5 on 1st die =

$$\frac{n(E)}{n(S)} = \frac{2}{36} = \frac{1}{18}$$

Question 7.

If two coins are tossed once, what is the probability of getting:

(i) both heads.

(ii) at least one head.

(iii) both heads or both tails.

Solution:

When two coins are tossed together possible number of outcomes = {HH, TH, HT, TT}

$n(S) = 4$

(i) E = event of getting both heads = {HH}

$n(E) = 1$

Probability of getting both heads = $\dfrac{n(E)}{n(S)} = \dfrac{1}{4}$

(ii) E = event of getting at least one head = {HH, TH, HT}

$n(E) = 3$

Probability of getting at least one head = $\dfrac{n(E)}{n(S)} = \dfrac{3}{4}$

(iii) E = event of getting both heads or both tails = {HH, TT}

$n(E) = 2$

Probability of getting both heads or both tails = $\dfrac{n(E)}{n(S)} = \dfrac{2}{4} = \dfrac{1}{2}$

Two dice are rolled together. Find the probability of getting:

(i) a total of at least 10.

(ii) a multiple of 2 on one die and an odd number on the other die.

Solution:

In throwing a dice. total possible outcomes = [1. 2. 3. 4. 5. 6]

n(S) = 6

For two dice. n(S) = 6 × 6 = 36

(i) E = event of getting a total of at least 10 = [(4. 6). (5. 5). (5. 6). (6. 4). (6. 5). (6. 6)]

n(E) = 6

Probability of getting a total of at least 10 = $\frac{n(E)}{n(S)} = \frac{6}{36} = \frac{1}{6}$

Number of possible outcomes when card is drawn from pack of 52 cards = 52

$n(S) = 52$

(i) Number of spade cards = 13 = E = event of drawing a spade

$n(E) = 13$

Probability of drawing a spade = $\dfrac{n(E)}{n(S)} = \dfrac{13}{52} = \dfrac{1}{4}$

(ii) Number of red cards(hearts + diamonds) = 26 = E = event of drawing a red card

$n(E) = 26$

Probability of drawing a red card = $\dfrac{n(E)}{n(S)} = \dfrac{26}{52} = \dfrac{1}{2}$

(iii) Number of face cards(4 kings + 4 queens + 4 Jacks)= 12 = E = Event of drawing a face card

$n(E) = 12$

Probability of drawing a face card = $\dfrac{n(E)}{n(S)} = \dfrac{12}{52} = \dfrac{3}{13}$

(iv) E = event of drawing a 5 of heart or of diamond = {5H, 5D}

$n(E) = 2$

Probability of drawing a 5 of heart or of diamond =

$\dfrac{n(E)}{n(S)} = \dfrac{2}{52} = \dfrac{1}{26}$

(v) E = event of drawing a jack or a queen = {JH, JS, JD, JC, QH, QS, QD, QC}

$n(E) = 8$

Probability of drawing a jack or a queen = $\dfrac{n(E)}{n(S)} = \dfrac{8}{52} = \dfrac{2}{13}$

(vi) A card cannot be both an ace as well as a king.

E =event of drawing an ace and a king = 0

$n(E) = 0$

Probability of drawing an ace and a king = $\dfrac{n(E)}{n(S)} = \dfrac{0}{52} = 0$

Probability of drawing a red card = $\dfrac{n(E)}{n(S)} = \dfrac{26}{52} = \dfrac{1}{2}$

(iii) Number of face cards(4 kings + 4 queens + 4 Jacks)= 12 = E = Event of drawing a face card

n(E) = 12

Probability of drawing a face card = $\dfrac{n(E)}{n(S)} = \dfrac{12}{52} = \dfrac{3}{13}$

(iv) E = event of drawing a 5 of heart or of diamond = {5H, 5D}

n(E) = 2

Probability of drawing a 5 of heart or of diamond =

$\dfrac{n(E)}{n(S)} = \dfrac{2}{52} = \dfrac{1}{26}$

(v) E = event of drawing a jack or a queen = {JH, JS, JD, JC, QH, QS, QD, QC}

n(E) = 8

Probability of drawing a jack or a queen = $\dfrac{n(E)}{n(S)} = \dfrac{8}{52} = \dfrac{2}{13}$

(vi) A card cannot be both an ace as well as a king.

E =event of drawing an ace and a king = 0

n(E) = 0

Probability of drawing an ace and a king = $\dfrac{n(E)}{n(S)} = \dfrac{0}{52} = 0$

(vii) E = event of drawing a red and a king = {KH, KD }

n(E) = 2

Probability of drawing a red and a king = $\dfrac{n(E)}{n(S)} = \dfrac{2}{52} = \dfrac{1}{26}$

(viii) E = event of drawing a red or a king = 26 red cards (13 h + 13D) + 2 black kings[since 26 red cards contain 2 red kings]

n(E) = 28

Probability of drawing a red or a king = $\dfrac{n(E)}{n(S)} = \dfrac{28}{52} = \dfrac{7}{13}$

Question 10.

A bag contains 16 colored balls. Six are green, 7 are red and 3 are white. A ball is chosen, without looking into the bag. Find the probability that the ball chosen is:

(i) red(v) green or red

(ii) not red(vi) white or green

(iii) white(vii) green or red or white

(iv) not white

Solution:

Balls in the bag = 16 = Number of balls that could be drawn

$n(S) = 16$

(i) E = Event of drawing a red ball = number of red balls = 7

$n(E) = 7$

Probability of drawing a red ball = $\dfrac{n(E)}{n(S)} = \dfrac{7}{16}$

(ii) Not a red ball = 16 - number of red balls = 16 -7 = 9 = E

$n(E) = 9$

Probability of not drawing a red ball = $\dfrac{n(E)}{n(S)} = \dfrac{9}{16}$

(iii) E = Event of drawing a white ball = number of white balls = 3

$n(E) = 3$

Probability of drawing a white ball = $\dfrac{n(E)}{n(S)} = \dfrac{3}{16}$

(iv) Not a white ball = 16 - number of white balls = 16-3 = 13=E

$n(E) = 13$

white ball = $\dfrac{n(E)}{n(S)} = \dfrac{13}{16}$

Probability of not drawing a white ball $= \dfrac{n(E)}{n(S)} = \dfrac{13}{16}$

(v) E = Event of drawing a green or a red ball = number of green balls + number of red balls = 6 + 7 = 13

n(E) = 13

Probability of drawing a green or a red ball $= \dfrac{n(E)}{n(S)} = \dfrac{13}{16}$

(vi) E = Event of drawing a green or a white ball = number of green balls + number of white balls = 6 + 3 = 9

n(E) = 9

Probability of drawing a green or a white ball $= \dfrac{n(E)}{n(S)} = \dfrac{9}{16}$

(vii) E = Event of drawing a green or a white or a red ball = number of green balls + number of white balls + number of red balls = 6 + 3 + 7 = 16

n(E) = 16

Probability of drawing a green or a white or a red ball =

$\dfrac{n(E)}{n(S)} = \dfrac{16}{16} = 1$

Question 11.

A ball is drawn at random from a box containing 12 white, 16 red and 20 green balls. Determine the probability that the ball drawn is:

(i) white(iii) not green

(ii) red(iv) red or white

Solution:

Total number of balls in the box = 48

Total possible outcomes on drawing a ball = 48

$n(S) = 48$

(i) Event of drawing a white ball = E = 12

n(E) = 12

n(S) = 48

(i) Event of drawing a white ball = E = 12

n(E) = 12

Probability of drawing a white ball = $\dfrac{n(E)}{n(S)} = \dfrac{12}{48} = \dfrac{1}{4}$

(ii) Event of drawing a red ball = E = 16

n{E) = 16

Probability of drawing a red ball = $\dfrac{n(E)}{n(S)} = \dfrac{16}{48} = \dfrac{1}{3}$

(iii) Event of drawing a green ball = E = 2
n(E) = 20

Probability of drawing a green ball = $\dfrac{n(E)}{n(S)} = \dfrac{20}{48} = \dfrac{5}{12}$

Probability of drawing a green ball = $\dfrac{n(E)}{n(S)} = \dfrac{20}{48} = \dfrac{5}{12}$

Probability of not drawing a green ball = $1 - \dfrac{5}{12}$

$= \dfrac{12-5}{12} = \dfrac{7}{12}$

(iv) red or a white ball = 12 + 16 = 28 balls

Event of drawing a red or white ball = E = 28

n(E) = 28

Probability of not dr...

A card is drawn from a pack of 52 cards. Find the probability that the card drawn is:

(i) a red card

(ii) a black card

(iii) a spade

(iv) an ace

(v) a black ace

(vi) ace of diamonds

(vii) not a club

(viii) a queen or a jack

Solution:

Number of possible outcomes when card is drawn from pack of 52 cards = 52

$n(S) = 52$

(i) Number of red cards(hearts + diamonds) = 26 = E

$n(E) = 26$

Probability of drawing a red card = $\dfrac{n(E)}{n(S)} = \dfrac{26}{52} = \dfrac{1}{2}$

(ii) Number of black cards(spade + clubs) = 26 = E

$n(E) = 26$

Probability of drawing a black card = $\dfrac{n(E)}{n(S)} = \dfrac{26}{52} = \dfrac{1}{2}$

(iii) Number of spade cards = 13 = E = event of drawing a spade

Probability of drawing a spade $= \dfrac{n(E)}{n(S)} = \dfrac{13}{52} = \dfrac{1}{4}$

(iv) Number of ace cards = 4 = E = event of drawing an ace

$n(E) = 4$

Probability of drawing an ace $= \dfrac{n(E)}{n(S)} = \dfrac{4}{52} = \dfrac{1}{13}$

(v) Number of black ace cards = 2 = E = event of drawing an ace

$n(E) = 2$

Probability of drawing a black ace $= \dfrac{n(E)}{n(S)} = \dfrac{2}{52} = \dfrac{1}{26}$

(vi) There is only one ace of diamonds.

E = event of drawing an ace of diamonds

$n(E) = 1$

Probability of drawing an ace of diamonds $= \dfrac{n(E)}{n(S)} = \dfrac{1}{52}$

(vii) Number of club cards = 13 = E = event of drawing a club card

$n(E) = 13$

Probability of drawing a club card $= \dfrac{n(E)}{n(S)} = \dfrac{13}{52} = \dfrac{1}{4}$

Probability of not drawing a club card $= 1 - \dfrac{1}{4}$

$= \dfrac{4-1}{4} = \dfrac{3}{4}$

Question 13.

Thirty identical cards are marked with numbers 1 to 30. If one card is drawn at random, find the probability that it is:

(i) a multiple of 4 or 6

(ii) a multiple of 3 and 5

(iii) a multiple of 3 or 5

Solution:

There are 30 cards from which one card is drawn.

Total number of elementary events = $n(S)$ = 30

(i) From numbers 1 to 30, there are 10 numbers which are multiple of 4 or 6 i.e. [4, 6, 8, 12, 16, 18, 20, 24, 28, 30] Favorable number of events = $n(E)$ = 10

Probability of selecting a card with a multiple of 4 or 6 =

$$\frac{n(E)}{n(S)} = \frac{10}{30} = \frac{1}{3}$$

(ii) From numbers 1 to 30, there are 2 numbers which are multiple of 3 and 5 i.e. [15, 30] Favorable number of events = $n(E)$ = 2

Probability of selecting a card with a multiple of 3 and 5 =

$$\frac{n(E)}{n(S)} = \frac{2}{30} = \frac{1}{15}$$

(iii) From numbers 1 to 30, there are 14 numbers which is multiple of 3 or 5 i.e. [3, 5, 6, 9, 10, 12, 15, 18, 20, 21, 24, 25, 27, 30] Favorable number of events = $n(E)$ = 14

Probability of selecting a card with a multiple of 3 or 5 =

$$\frac{n(E)}{n(S)} = \frac{14}{30} = \frac{7}{15}$$

In a single throw of two dice, find the probability of

(i) a doublet

(ii) a number less than 3 on each dice

(iii) an odd number as a sum

(iv) a total of at most 10

(v) an odd number on one dice and a number less than or equal to 4 on the other dice.

Solution:

The number of possible outcomes is $6 \times 6 = 36$. We write them as given below:

1,11,21,31,41,51,6

2,12,22,32,42,52,6

3,13,23,33,43,53,6

4,14,24,34,44,54,6

5,15,25,35,45,55,6

6,16,26,36,46,56,6

$n(S) = 36$

(i) E = Event of getting a doublet = $\{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)\}$

$n(E) = 6$

Probability of getting a doublet = $\frac{n(E)}{n(S)} = \frac{6}{36} = \frac{1}{6}$

(ii) E = Event of getting a number less than 3 on each dice

$= \{(1, 1), (1, 2), (2, 1), (2, 2)\}$

$n(E) = 4$

Probability of getting a number less than 3 on each dice = $\frac{n(E)}{n(S)} = \frac{4}{36} = \frac{1}{9}$

(iii) E = Event of getting an odd number as a sum = $\{(1, 2), (1, 4), \ldots$

(iii) E - Event of getting an odd number as a sum = {(1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (3, 6), (4, 1), (4, 3), (4, 5),

(6, 3), (6, 5)}

n(E) = 18

Probability of getting an odd number as sum = $\frac{n(E)}{n(S)} = \frac{18}{36} = \frac{1}{2}$

(iv) E = Event of getting a total of at most 10 =

{(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)

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

Therefore total number of favorable ways = 33 = n(E)

Probability of getting a total of at most 10 = $\frac{n(E)}{n(S)} = \frac{33}{36} = \frac{11}{12}$

(v) E - Event of getting an odd number on dice 1 and a number less than or equal to 4 on dice 2 =

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

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

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

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

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

Therefore total number of favorable ways = 20 = n(E)

Probability of getting an odd number on dice 1 and a number less than or equal to 4 on dice 2 = $\frac{n(E)}{n(S)} = \frac{20}{36} = \frac{5}{9}$

Selina Concise Mathematics Class 10 ICSE Solutions

Question 1.

A bag contains 3 red balls, 4 blue balls and 1 yellow ball, all the balls being identical in shape and size. If a ball is taken out of the bag without looking into it; find the probability that the ball is:

(i) yellow

(ii) red

(iii) not yellow

(iv) neither yellow nor red

Solution:

Total number of balls in the bag = 3+4+1 = 8 balls

Number of possible outcomes = 8 = n(S)

(i) Event of drawing a yellow ball = {Y}

n(E) = 1

Probability of drawing a yellow ball = $\frac{n(E)}{n(S)} = \frac{1}{8}$

(ii) Event of drawing a red ball = {R, R, R}

Probability of not drawing a yellow ball $= 1 - \dfrac{1}{8}$

$= \dfrac{8-1}{8} = \dfrac{7}{8}$

(iv) Neither yellow ball nor red ball means a blue ball

Event of not drawing a yellow or red ball = E = 4

n(E) = 4

Probability of not drawing a yellow or red ball $= \dfrac{n(E)}{n(S)} = \dfrac{4}{8} = \dfrac{1}{2}$

Question 2.

A dice is thrown once. What is the probability of getting a number:

(i) greater than 2?

(ii) less than or equal to 2?

Solution:

Number of possible outcomes when dice is thrown = {1,2,3,4,5,6}

n(S) = 6

(i) Event of getting a number greater than 2 = E = {3, 4, 5, 6}

n(E) = 4

Probability of getting a number greater than 2 $= \dfrac{n(E)}{} = \dfrac{4}{} = \dfrac{2}{}$

Question 2.

A dice is thrown once. What is the probability of getting a number:

(i) greater than 2?

(ii) less than or equal to 2?

Solution:

Number of possible outcomes when dice is thrown = {1,2,3,4,5,6}

$n(S) = 6$

(i) Event of getting a number greater than 2 = E = {3, 4, 5, 6}

$n(E) = 4$

Probability of getting a number greater than 2 = $\dfrac{n(E)}{n(S)} = \dfrac{4}{6} = \dfrac{2}{3}$

(ii) Event of getting a number less than or equal to 2 = E = {1, 2}

$n(E) = 2$

Probability of getting a number less than or equal to 2 =

$\dfrac{n(E)}{n(S)} = \dfrac{2}{6} = \dfrac{1}{3}$

Question 3.

From a well shuffled deck of 52 cards, one card is drawn. Find the probability that the card drawn is:

(i) a face card

(ii) not a face card

(iii) a queen of black card

(iv) a card with number 5 or 6

(v) a card with number less than 8

(vi) a card with number between 2 and 9

Solution:

Total number of possible outcomes = 52

$n(S) = 52$

(i) No. of face cards in a deck of 52 cards = 12 (4 kings, 4 queens and 4 jacks)

Event of drawing a face cards = E = (4 kings, 4 queens and 4 jacks)

$n(E) = 12$

Probability of drawing a face card = $\dfrac{n(E)}{n(S)} = \dfrac{12}{52} = \dfrac{3}{13}$

(ii) Probability of not drawing a face card = 1 - probability of drawing a face card

Probability of not drawing a face card = $1 - \dfrac{3}{13}$

$= \dfrac{13-3}{13} = \dfrac{10}{13}$

(iii) Event of drawing a queen of black color ={ Q(spade), Q(club)} = E

$n(E) = 2$

Probability of drawing a queen of black color =

$\dfrac{n(E)}{n(S)} = \dfrac{2}{52} = \dfrac{1}{26}$

(iv) Event of drawing a card with number 5 or 6 = E = {5H, 5D, 5S, 5C, 6H, 6D, 6S, 6C}

$n(E) = 8$

Probability of drawing a card with number 5 or 6 =

$\dfrac{n(E)}{n(S)} = \dfrac{8}{52} = \dfrac{2}{13}$

(v) Numbers less than 8 = {2, 3, 4, 5, 6, 7}

Event of drawing a card with number less than 8 = E = {6H cards, 6D cards, 6S cards, 6C cards}

$n(E) = 24$

Probability of drawing a card with number less than 8 =

of drawing a card with number 5 or 6 = E = {5H, 5D, 5S, 5C, 6H, 6D, 6S, 6C}

Probability of drawing a card with number 5 or 6 =

$$\frac{n(E)}{n(S)} = \frac{8}{52} = \frac{2}{13}$$

(v) Numbers less than 8 = {2, 3, 4, 5, 6, 7}

Event of drawing a card with number less than 8 = E = {6H cards, 6D cards, 6S cards, 6C cards}

n(E) = 24

Probability of drawing a card with number less than 8 =

$$\frac{n(E)}{n(S)} = \frac{24}{52} = \frac{6}{13}$$

(vi) Number between 2 and 9 = {3, 4, 5, 6, 7, 8}

Event of drawing a card with number between 2 and 9 = E = {6H cards, 6D cards, 6S cards, 6C cards}

n(E) = 24

Probability of drawing a card with number between 2 and 9 =

$$\frac{n(E)}{n(S)} = \frac{24}{52} = \frac{6}{13}$$

Question 4.

In a match between A and B:

(i) the probability of winning of A is 0.83. What is the probability of winning of B?

(ii) the probability of losing the match is 0.49 for B. What is the probability of winning of A?

Solution:

(i) Probability of winning of A + Probability of losing of A = 1

Probability of losing of A = Probability of winning of B

Therefore,

Probability of winning of A + Probability of winning of B = 1

0.83 + Probability of winning of B = 1

Probability of winning of B = 1 - 0.83 = 0.17

Question 4.

In a match between A and B:

(i) the probability of winning of A is 0.83. What is the probability of winning of B?

(ii) the probability of losing the match is 0.49 for B. What is the probability of winning of A?

Solution:

(i) Probability of winning of A + Probability of losing of A = 1

Probability of losing of A = Probability of winning of B

Therefore,

Probability of winning of A + Probability of winning of B = 1

0.83 + Probability of winning of B = 1

Probability of winning of B = 1 - 0.83 = 0.17

(ii) Probability of winning of B + Probability of losing of B = 1

Probability of losing of B = Probability of winning of A

Therefore,

Probability of winning of A = 0.49

Question 5.

A and B are friends. Ignoring the leap year, find the probability that both friends will have:

(i) different birthdays?

(ii) the same birthday?

Solution:

Out of the two friends, A's birthday can be any day of the year. Now, B's birthday can also be any day of 365 days in the year.

We assume that these 365 outcomes are equally likely.

(i) If A's birthday is different from B's, the number of favourable outcomes for his birthday is $365 - 1 = 364$

So, P (A's birthday is different from B's birthday) $= \dfrac{364}{365}$

(ii) P(A and B have the same birthday)

$= 1 - P$ (both have different birthdays)

$= 1 - \dfrac{364}{365}$ [Using P(E') = 1 - P(E)]

$= \dfrac{1}{365}$

A man tosses two different coins (one of Rs 2 and another of Rs 5) simultaneously. What is the probability that he gets:

(i) at least one head?

(ii) at most one head?

Solution:

When two coins are tossed simultaneously, the possible outcomes are {(H, H), (H, T), (T, H), (T, T)}

n(S) = 4

(i) The outcomes favourable to the event E, 'at least one head' are

{(H, H), (H, T), (T, H)}

So, the number of outcomes favourable to E is 3 = n(E)

Therefore, P(E) = $\dfrac{n(E)}{n(S)} = \dfrac{3}{4}$

(ii) The outcomes favourable to the event E, 'at most one head'

are {(T, H), (H, T), (T, T)}

So, the number of outcomes favourable to E is 3 = n(E)

Therefore, P(E) = $\dfrac{n(E)}{n(S)} = \dfrac{3}{4}$

Question 7.

A box contains 7 red balls, 8 green balls and 5 white balls. A ball is drawn at random from the box. Find the probability that the ball is:

(i) white

(ii) neither red nor white.

Solution:

Total number of balls in the box = 7+8+5 = 20 balls

Total possible outcomes = 20 = n(S)

(i) Event of drawing a white ball = E = number of white balls

Remaining cards = 52 - 3 = 49 = number of possible outcomes

n(S) = 49

(i) Number of black face cards left = 3 face cards of club

Event of drawing a black face card = E = 3

n(E) = 3

Probability of drawing a black face card = $\dfrac{n(E)}{n(S)} = \dfrac{3}{49}$

(ii) Number of queen cards left = 3

Event of drawing a black face card = E = 3

n(E) = 3

Probability of drawing a queen card = $\dfrac{n(E)}{n(S)} = \dfrac{3}{49}$

(iii) Number of black cards left = 23 cards (13 club + 10 spade)

Event of drawing a black card = E = 23

n(E) = 23

Probability of drawing a black card = $\dfrac{n(E)}{n(S)} = \dfrac{23}{49}$

In a musical chairs game, a person has been advised to stop playing the music at any time within 40 seconds after its start. What is the probability that the music will stop within the first 15 seconds?

Solution:

Total result = 0 sec to 40 sec

Total possible outcomes = 40

$n(S) = 40$

Favorable results = 0 sec to 15 sec

Favorable outcomes = 15

$n(E) = 15$

Probability that the music will stop in first 15 sec = $\dfrac{n(E)}{} = \dfrac{15}{} = \dfrac{3}{}$