Question 10.

In a bundle of 50 shirts, 44 are good, 4 have minor defects and 2 have major defects. What is the probability that:

(i) it is acceptable to a trader who accepts only a good shirt?

(ii) it is acceptable to a trader who rejects only a shirt with major defects?

Solution:

Total number of shirts = 50

Total number of elementary events = 50 = n(S)

(i) Since trader accepts only good shirts and number of good shirts = 44

Event of accepting good shirts = 44 = n(E)

Probability of accepting a good shirt = $\frac{n(E)}{n(S)} = \frac{44}{50} = \frac{22}{25}$

(ii) Since trader rejects shirts with major defects only and number of shirts with major defects = 2

Event of accepting shirts = 50 - 2 = 48 = n(E)

Probability of accepting shirts = $\frac{n(E)}{n(S)} = \frac{48}{50} = \frac{24}{25}$

Two dice are thrown at the same time. Find the probability that the sum of the two numbers appearing on the top of the dice is:

(i) 8

(ii) 13

(iii) less than or equal to 12

Solution:

The number of possible outcomes = $6 \times 6 = 36$.

(i) The outcomes favourable to the event 'the sum of the two numbers is 8' = E = {(2, 6), (3, 5), (4, 4), (5, 3), (6, 2)}

The number of outcomes favourable to E = n(E) = 5.

Hence, $P(E) = \frac{n(E)}{n(S)} = \frac{5}{36}$

(ii) There is no outcome favourable to the event E = 'the sum of two numbers is 13'.

n(E) = 0

Hence, $P(E) = \frac{n(E)}{n(S)} = \frac{0}{36}$

(iii) All the outcomes are favourable to the event E = 'sum of two numbers $\leq$ 12'.

Hence, $P(E) = \frac{n(E)}{n(S)} = \frac{36}{36} = 1$

Question 12.

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

(i) 3/7

(ii) 0.82

(iii) 37%

(iv) −2.4

Solution:

We know that probability of an event E is $0 \leq P(E) \leq 1$

(i) Since $0 \leq \frac{3}{7} \leq 1$

Therefore, $\frac{3}{7}$ can be a probability of an event.

(ii) Since $0 \leq 0.82 \leq 1$

Therefore, 0.82 can be a probability of an event.

(iii)Since $0 \leq 37\% = \left(\frac{37}{100}\right) \leq 1$

Therefore, 37% can be a probability of an event.

(iv) Since $-2.4 < 0$

Therefore, -2.4 cannot be a probability of an event.

Question 13.

If P(E) = 0.59; find P(not E)

Solution:

$P(E) + P(\text{not } E) = 1$

$0.59 + P(\text{not } E) = 1$

$P(\text{not } E) = 1 - 0.59 = 0.41$

Question 14.

A bag contains a certain number of red balls. A bal
is drawn. Find the probability that the ball drawn is

(i) black

(ii) red

Solution:

Total possible outcomes = number of red balls.

i) Number of favorable outcomes for black balls = 0

P(black ball) = 0

i) Number of favorable outcomes for red balls = number of red balls

(red ball) =

$$\frac{\text{umber of favorable outcomes}}{\text{total possible outcomes}} = \frac{\text{number or red balls}}{\text{number of red balls}} = 1$$



$$\text{...ber of favorable outcomes} = \frac{\text{number or red balls}}{\text{total possible outcomes}} = \frac{\text{number of red balls}}{\text{number of red balls}} = 1$$

Question 15.

The probability that two boys do not have the same birthday is 0.897. What is the probability that the two boys have the same birthday?

Solution:

P(do not have the same birthday)+P(have same birthday) = 1

0.897 + P(have same birthday) = 1

P(have same birthday) = 1 − 0.897

P(have same birthday) = 0.103

Question 16.

A bag contains 10 red balls, 16 white balls and 8 green balls. A ball is drawn out of the bag at random. What is the probability that the ball drawn will be:

(i) not red?



same birthday) = 0.103

Question 16.

A bag contains 10 red balls, 16 white balls and 8 green balls. A ball is drawn out of the bag at random. What is the probability that the ball drawn will be:

(i) not red?

(ii) neither red nor green?

(iii) white or green?

Solution:

Total number of possible outcomes = 10+16+8 = 34 balls

n(S) = 34

(i) Favorable outcomes for not a red ball = favorable outcomes for white or green ball

Number of favorable outcomes for white or green ball = 16+8=24 = n(E)

Probability for not drawing a red ball = $\frac{n(E)}{n(S)} = \frac{24}{34} = \frac{12}{17}$

(ii) Favorable outcomes for neither a red nor a green ball = favorable outcomes for white ball

Number of favorable outcomes for white ball = 16 = n(E)

Probability for not drawing a red or green ball = $\frac{n(E)}{n(S)} = \frac{16}{34} = \frac{8}{17}$

(iii) Number of favorable outcomes for white or green ball = 16+8=24 = n(E)

Probability for drawing a white or green ball = $\frac{n(E)}{n(S)} = \frac{24}{34} = \frac{12}{17}$

Question 17.

A bag contains twenty Rs 5 coins, fifty Rs 2 coins

Question 17.

A bag contains twenty Rs 5 coins, fifty Rs 2 coins and thirty Re 1 coins. If it is equally likely that one of the coins will fall down when the bag is turned upside down, what is the probability that the coin:

(i) will be a Re 1 coin?

(ii) will not be a Rs 2 coin?

(iii) will neither be a Rs 5 coin nor be a Re 1 coin?

Solution:

Total number of coins = 20+50+30 = 100

Total possible outcomes = 100 = n(S)

(i) Number of favorable outcomes for Re 1 coins = 30 = n(E)

$$\text{Probability(Re 1 coin)} = \frac{n(E)}{n(S)} = \frac{30}{100} = \frac{3}{10}$$

Number of favorable outcomes for Re 1 or Rs 5 coins = 30+20 = 50 = n(



Solution:

Total number of possible outcomes = 12

(i) Number of favorable outcomes for 6 = 1

P(the pointer will point at 6) = $\frac{1}{12}$

(ii) Favorable outcomes for an even number are 2, 4, 6, 8, 10, 12

Number of favorable outcomes = 6

P(the pointer will be at an even number) = $\frac{6}{12} = \frac{1}{2}$

(iii) Favorable outcomes for a prime number are 2, 3, 5, 7, 11

Number of favorable outcomes = 5

P(the pointer will be at a prime number) = $\frac{5}{12}$

(iv) Favorable outcomes for a number greater than 8 are 9, 10, 11, 12

Number of favorable outcomes = 4

P(the pointer will be at a number greater than 8) = $\frac{4}{12} = \frac{1}{3}$

(v) Favorable outcomes for a number less than or equal to 9 are 1, 2, 3, 4, 5, 6, 7, 8, 9

Number of favorable outcomes = 9

P(the pointer will be at a number less than or equal to 9) =

$\frac{9}{12} = \frac{3}{4}$

(vi) Favorable outcomes for a number between 3 and 11 are 4, 5, 6, 7, 8, 9, 10

Number of favorable outcomes = 7

P(the pointer will be at a number between 3 and 11) = $\frac{7}{12}$

Question 19.



(ii) a black face card

(iii) the jack or the queen of the hearts

(iv) a diamond

(v) a diamond or a spade

Solution:

Total possible outcomes = 52

(i) Number queens of red color = 2

Number of favorable outcomes = 2

$$P(\text{queen of red color}) = \frac{2}{52} = \frac{1}{26}$$

(ii) Number of black cards = 26

Number of black face cards = 6

Number of favorable outcomes = 6

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

(iii) Favorable outcomes for jack or queen of hearts = 1 jack + 1 queen

Number of favorable outcomes = 2

$$P(\text{jack or queen of hearts}) = \frac{2}{52} = \frac{1}{26}$$

(iv) Number of favorable outcomes for a diamond = 13

Number of favorable outcomes = 13

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

(v) Number of favorable outcomes for a diamond or a spade = 13 + 13 = 26

Number of favorable outcomes = 26

$$P(\text{getting a diamond or a spade}) = \frac{26}{52} = \frac{1}{2}$$

Question 20.

From a deck of 52 cards, all the face cards are removed and then the remaining cards are shuffled. Now one card is drawn from the remaining deck. Find the probability that the card drawn is:

(i) a black card

(ii) 8 of red color

(iii) a king of black color

Solution:

There are 12 face cards in a deck.

Therefore, possible number of outcomes = 52 - 12 = 40

(i) number of favorable outcomes for black cards = 26 cards - 6 face cards = 20

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

(ii) number of favorable outcomes for 8 of red color = 2

$$P(\text{getting a card with 8 of red color}) = \frac{2}{40} = \frac{1}{20}$$

(iii) Since all face cards are removed

Number of favorable outcomes for a king of black color = 0

$$P(\text{getting a king of black color}) = \frac{0}{40} = 0$$

Seven cards:– the eight, the nine, the ten, jack, queen, king and ace of diamonds are well shuffled. One card is then picked up at random.

(i) What is the probability that the card drawn is the eight or the king?

(ii) If the king is drawn and put aside, what is the probability that the second card picked up is:

a) an ace? b) a king?

Solution:

Total number of possible outcomes = 7

(i) Number of favorable outcomes for the card is 8 or the king = 2

P(card is 8 or the king) = $\frac{2}{7}$

(ii) a) If a king is drawn and put aside, then total possible outcomes = 6

Number of favorable outcomes for an ace = 1

P(card is an ace) = $\frac{1}{6}$

b) Now, for second pick number of king = 0

Number of favorable outcomes for a king = 0

P(card is a king) = $\frac{0}{6} = 0$

Question 22.

A box contains 150 bulbs out of which 15 are defective. It is not possible to just look at a bulb and tell whether or not it is defective. One bulb is taken out at random from this box. Calculate the probability that the bulb taken out is:

(i) a good one

(ii) a defective one

Solution:

Total number of possible outcomes = 150

(i) out of 150 bulbs, 15 are defective

Number of bulbs which are good = 150 - 15 = 135

$$P(\text{taking out a good bulb}) = \frac{135}{150} = \frac{9}{10}$$

(ii)Number of bulbs which are defective = 15

$$P(\text{taking out a defective bulb}) = \frac{15}{150} = \frac{1}{10}$$

tion 23.

(i) 4 defective pens are accidentally mixed with 16 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is drawn at random from the lot. What is the probability that the pen is defective?

(ii) Suppose the pen drawn in (i) is defective and is not replaced. Now one more pen is drawn at random from the rest. What is the probability that this pen is:

a) defective

b) not defective?

Solution:

(i) Total number of pens = 4 + 16 = 20

Total possible outcomes = 20

Number of defective pens = 4

P(defective pen) = $\frac{4}{20} = \frac{1}{5}$

(ii) If defective pen drawn in first draw is not replaced, total possible outcomes = 20 - 1 = 19

a) Number of defective pens = 3

P(defective pens) = $\frac{3}{19}$

b) Number of not defective pens = 16

P(not defective pens) = $\frac{16}{19}$

Question 24.

A bag contains 100 identical marble stones which are numbered 1 to 100. If one stone is drawn at random from the bag, find the probability that it bears:

(i) a perfect square number

(ii) a number divisible by 4

(iii) a number divisible by 5

(iv) a number divisible by 4 or 5

(v) a number divisible by 4 and 5

Solution:

Total number of possible outcomes = 100

(i) Numbers which are perfect squares = 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Number of favorable outcomes = 10

P(a perfect square) = $\frac{10}{100} = \frac{1}{10}$

(ii) Numbers which are divisible by 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100

Number of favorable outcomes = 25

P(number divisible by 4) = $\frac{25}{100} = \frac{1}{4}$

(iii) Numbers which are divisible by 5 = 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

Number of favorable outcomes = 20

P(number divisible by 5) = $\frac{20}{100} = \frac{1}{5}$

(iv) Numbers which are divisible by 4 or 5 = 4, 5, 8, 10, 12, 15, 16, 20, 24, 25, 28, 30, 32, 35, 36, 40, 44, 45, 48, 50, 52, 55, 56, 60, 64, 65, 68, 70, 72, 75, 76, 80, 84, 85, 88, 90, 92, 95, 96, 100

A circle with diameter 20 cm is drawn somewhere on a rectangular piece of paper with length 40 cm and width 30 cm. This paper is kept horizontal on table top and a die, very small in size, is dropped on the rectangular paper without seeing towards it. If the die falls and lands on paper only, find the probability that it will fall and land:

(i) inside the circle

(ii) outside the circle

Solution:

Diameter of the circle = 20 cm

Radius = 10 cm

Area of circle = $\pi r^2 = \frac{22}{7} \times 10 \times 10 = \frac{2200}{7} cm^2$

Length of paper = 40 cm

Width of paper = 30 cm

Area of paper = 1200 cm^2

Total possible outcomes = area of rectangular paper

(ii) P (outside the circle) = 1 - P (inside the circle)

$= 1 - \frac{11}{42}$

$= \frac{31}{42}$

Question 26.

Two dice (each bearing numbers 1 to 6) are rolled together. Find the probability that the sum of the numbers on the upper-most faces of two dice is:

(i) 4 or 5

(ii) 7, 8 or 9

(iii) between 5 and 8

(iv) more than 10

(v) less than 6

Solution:

When two dice are rolled, total number of possible outcomes = 36

(i) Favorable outcomes for the sum of numbers 4 or 5 are:

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

Number of favorable outcomes = 7

P(getting a sum of 4 or 5) = $\frac{7}{36}$

(ii) Favorable outcomes for the sum of numbers 7, 8 or 9 are:

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

When two dice are rolled, total number of possible outcomes = 36

(i) Favorable outcomes for the sum of numbers 4 or 5 are:

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

Number of favorable outcomes = 7

P(getting a sum of 4 or 5) = $\frac{7}{36}$

(ii) Favorable outcomes for the sum of numbers 7, 8 or 9 are:

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

Number of favorable outcomes = 15

P(getting a sum of 7, 8 or 9) = $\frac{15}{36} = \frac{5}{12}$

(iii) Favorable outcomes for the sum of numbers between 5 and 8 i.e. 6 or 7 are:

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

Number of favorable outcomes = 11

P(getting a sum of 6 or 7) = $\frac{11}{36}$

(iv) Favorable outcomes for the sum of numbers more than 10 i.e. 11 or 12 are:

{(5, 6), (6, 5), (6, 6)}

Number of favorable outcomes = 3

P(getting a sum of numbers more than 10) = $\frac{3}{36} = \frac{1}{12}$

(v) Favorable outcomes for the sum of numbers less than 6 I.e. 2, 3, 4 or 5 are:

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

Number of favorable outcomes = 10

P(getting a sum of less than 6) = $\frac{10}{36} = \frac{5}{18}$

getting:

(i) exactly two heads

(ii) at least two heads

(iii) at most two heads

(iv) all tails

(v) at least one tail

Solution:

When three coins are tossed, possible outcomes are:

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

Total possible outcomes = 8

(i) Favorable outcomes for exactly two heads = HHT, THH, HTH

Number of favorable outcomes = 3

$$P(\text{exactly two heads}) = \frac{3}{8}$$

(ii) Favorable outcomes for at least two heads = HHT, THH, HTH, HHH

Number of favorable outcomes = 4

$$P(\text{at least two heads}) = \frac{4}{8} = \frac{1}{2}$$

(iii) Favorable outcomes for at most two heads = HHT, THH, HTH, HTT, THT, TTH, TTT

Number of favorable outcomes = 7

$$P(\text{at most two heads}) = \frac{7}{8}$$

(iv) Favorable outcomes for all tails = TTT

Number of favorable outcomes = 1

$$P(\text{all tails}) = \frac{1}{8}$$

(v) Favorable outcomes for at least one tails = HHT, THH, HTH, HTT, THT, TTH, TTT

Number of favorable outcomes = 7

tion 28.

Two dice are thrown simultaneously. What is the probability that:

i) 4 will not come up either time?

ii) 4 will come up at least once?

Solution:

When two dice are thrown, total possible outcomes = 36

(i) Favorable outcomes for 4 will not come up either time:

{(1,1), (1,2), (1,3), (1,5), (1,6)

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

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

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

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

Number of favorable outcomes = 25

$$P(\text{4 will not come up}) = \frac{25}{36}$$

(ii) P(4 will come up once) = 1 - P(4 will not come up either time)

$$P(\text{4 will come up once}) = 1 - \frac{25}{36}$$

$$P(\text{4 will come up once}) = \frac{36 - 25}{36} = \frac{11}{36}$$

Number of favorable outcomes = 8

$$P(\text{a prime number}) = \frac{8}{20} = \frac{2}{5}$$

(ii) Favorable outcomes for a number divisible by 3 = 3, 6, 9, 12, 15, 18

Number of favorable outcomes = 6

$$P(\text{divisible by 3}) = \frac{6}{20} = \frac{3}{10}$$

(iii) Favorable outcomes for a perfect square = 1, 4, 9, 16

Number of favorable outcomes = 4

$$P(\text{a perfect square}) = \frac{4}{20} = \frac{1}{5}$$

Question 30.

Offices in Delhi are open for five days in a week (Monday to Friday). Two employees of an office remain absent for one day in the same particular week. Find the probability that they remain absent on:

(i) the same day

(ii) consecutive day

(iii) different days

Solution:

Total number of possible outcomes = 5 x 5 = 25

The possible outcomes are:

MM, MT, MW, MTh, MF, TM, TT, TW, TTh, TF, WM, WT, WW, WTh, WF, ThM, ThT, ThW, ThTh, ThF, FM, FT, FW, FTh, FF

(i) Favorable outcomes for two employees remaining absent on same day are: MM, TT, WW, ThTh, FF

Number of favorable outcomes = 5

$$P(\text{same day}) = \frac{5}{25} = \frac{1}{5}$$

(ii) Favorable outcomes for two employees remaining absent on consecutive days are: MT, TM, TW, WT, WTh, ThW, ThF, FTh

Let the number of black balls in the box = x

Total number of balls in the box = $x+30$

$$\text{P(drawing a black ball)} = \frac{x}{x+30}$$

$$\text{P(drawing a white ball} = \frac{30}{x+30}$$

$$\text{But, P(drawing a black ball)} = \frac{2}{5} \times \text{P(drawing a white ball)}$$

$$\frac{x}{x+30} = \frac{2}{5} \times \frac{30}{x+30}$$

$$\frac{x}{x+30} = \frac{12}{x+30}$$

$$x = 12$$

Number of black balls in the box = 12

From a pack of 52 playing cards, all cards whose numbers are multiples of 3 are removed. A card is now drawn at random. What is the probability that the card drawn is

(i) A face card (King, Jack or Queen)

(ii) An even numbered red card?

Solution:

No. of total cards = 52

Cards removed of 4 colours of multiples of 3

= 3, 6, 9 = 4 × 3 = 12

Remaining cards = 52 - 12 = 40

(i) No. of face cards = 12 cards

➡ Probability $P(E) = \frac{12}{40} = \frac{3}{10}$

(ii) An even number red cards = 2,4,8,10 cards = 2×4 = 8

➡ Probability $P(E) = \frac{8}{40} = \frac{1}{5}$

A die has 6 faces marked by the given numbers as shown below:

The die is thrown once. What is the probability of getting

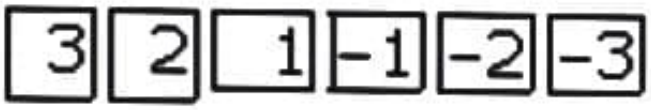
(i) a positive integer?

(ii) an integer greater than −3?

(iii) the smallest integer?

Solution:

Given that the die has 6 faces marked by the given numbers as below:



When a die is rolled, total number of possible outcomes − 6

(i) For getting a positive integer, the favourable outoomes are: 1, 2, 3

⇒ Number of favourable outcomes − 3

⇒ Required probability = $\frac{3}{6} = \frac{1}{2}$

(ii) For getting an integer greater than −3, the favourable outcomes

are: −2,−1, 1, 2, 3

⇒ Number of favourable outcomes − 5

⇒ Required probability = $\frac{5}{6}$

(iii) For getting a smallest integer, the favourable outoomes are: −3

⇒ Number of favourable outcomes = 1

⇒ Required probability = $\frac{1}{6}$

Question 34.

A bag contains 5 white balls, 6 red balls and 9 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is:

(i) a green ball

(ii) a white or a red ball.

(iii)Neither a green ball nor a white ball

Solution:

Number of white balls = 5

Number of red balls = 6