

15. Probability

Exercise 15

1 A. Question

Which of the following have 'equally likely' outcomes? Explain.

(i) A player calls for a head in a toss of a coin. The coin shows up either heads or tails.

(ii) Mr Sharma has one child. The child is either a boy or a girl.

(iii) An attempt was made to answer a true-false question. The answer is correct or incorrect.

(iv) A batsman plays and misses a ball. The ball either hits the wickets or misses them.

Answer

(i) **Equally likely outcome:** When all the outcomes in sample space have the same probability, outcomes are called equally likely outcomes.

In a toss of a coin occurrence of head or tail have equal probabilities. Thus it has an equally likely outcome of head and tail

(ii) **Equally likely outcome:** When all the outcomes in sample space have the same probability, outcomes are called equally likely outcomes.

Birth of a boy or a girl has an equal probability. Now Mr Sharma has one child. The child is a boy, or a girl has an equal probability and hence it is an equally likely outcome.

(iii) **Equally likely outcome:** When all the outcomes in sample space have the same probability, outcomes are called equally likely outcomes.

For a true false question there are only two probabilities: True or False. Now the sample space of the attempt contains two possibilities True or False.

There can be only one correct answer for the event. Hence there is equal possibilities of answer being correct or incorrect and therefore it is an equally likely outcome.

(iv) **Equally likely outcome:** When all the outcomes in sample space have the same probability, outcomes are called equally likely outcomes.

A player plays a ball and misses it. Now there are many possibilities of the path took by ball after being missed by batsman. Hence occurrence of ball hitting wicket is not an equally likely outcome with missing. As it may go to wicketkeeper or it may go pass wicket keeper. Thus there are many possibilities for the event.

1 B. Question

Which of the following experiments have equally likely outcomes? Explain

- (i) A driver attempts to start a car. The car starts or does not start.
- (ii) A player attempts to shoot a basketball. She/he shoots or misses the shot.

Answer

(i) Equally Likely Event:- Events that have same theoretical probability.

it's not equally likely Event as the car may have a mechanical breakdown or fuel problems or may be can be loose. So it depends upon a various thing, so it is not an equally likely event.

(ii) it is not equally likely. If he shoots the basket the ball will drop inside the basket, or he will miss it, this depends upon the skill of the individual basket ball player.

2 A. Question

Which of the following amongst the given options cannot be the probability of an event:

(i) 1.01 (ii) 67%

(iii) -0.5 (iv) $\frac{1}{3}$

(v) 0.3

Answer

we know that $0 < P(\text{Event}) < 1$.

we know that the probability of any event varies between 0 to 1 and cannot be negative.

(i) greater than 1 so it cannot be possible.

(ii) Since $67\% = \frac{67}{100} = 0.67$ possible

(iii) it cannot be negative.

(iv) It is within the range, so possible

(v) It is within the range, so possible

So (i) and (iii)

2 B. Question

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

(i) $\frac{2}{3}$ (ii) -1.5

(iii) 15% (iv) 0.7

Answer

we know that probability of any event varies between 0 to 1 and cannot be negative. Since $15\% = \frac{15}{100} = 0.15$

Therefore, only option is (ii)

3. Question

Find the probability of getting a head when a coin is tossed once. Also, find the probability of getting a tail.

Answer

when an unbiased coin is tossed the probability of getting a head or tail are equally likely since an unbiased coin has only HEAD or TAIL as favourable outcomes.

total number of outcomes = 2

$$P(H) = \frac{1}{2}$$

$$\text{So, } P(T) = \frac{1}{2}$$

4. Question

Why is tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game?

Answer

when an unbiased coin is tossed the chances of getting a head or tail are equally likely. So both teams get team equal and fair chances to try their luck. So tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game.

5. Question

In a simultaneous throw of two coins, find the probability of getting

(i) two heads

(ii) exactly one head

(iii) no tail

(iv) at least one tail

Answer

(i) Outcomes = (H,H), (H,T),(T,H),(T,T)

Total number of outcomes = 4

Two heads occurs only once so total number of favorable outcomes = 1

$$P(\text{two heads}) = \frac{1}{4}$$

(ii) Outcomes = (H,H), (H,T),(T,H),(T,T)

Total number of outcomes = 4

Exactly one head occurs 2 times so a total number of favourable outcomes = 2.

$$P(\text{exactly one head}) = 2/4$$

(iii) Outcomes = (H,H), (H,T),(T,H),(T,T)

Total number of outcomes = 4

No tails occurs only one time when there are two heads = 1

so total number of favourable outcomes = 1

$$P(\text{no tails}) = 1/4$$

(iv) Outcomes = (H,H), (H,T),(T,H),(T,T)

Total number of outcomes = 4

Atleast one tails occurs 3 times

so total number of favourable outcomes = 3

$$P(\text{atleast 1 tail}) = 3/4$$

6. Question

A bag contains a red ball, a blue ball and a yellow ball, all the balls being of the same size. Kritika takes out a ball from the bag without looking into it.

What is the probability that she takes out the

(i) yellow ball? (ii) red ball? (iii) blue ball?

Answer

total number of balls = 3

$$(i) \frac{1}{3}$$

$$(ii) \frac{1}{3}$$

$$(iii) \frac{1}{3}$$

7. Question

Suppose we throw a die once.

(i) What is the probability of getting a number greater than 4?

(ii) What is the probability of getting a number less than or equal to 4?

Answer

(i) Outcomes (X) = 1,2,3,4,5,6

In a dice throw number greater than 4 are 5,6 So

so total number of favorable outcomes = 2

$$\text{So } P(X > 4) = \frac{2}{6}$$

(ii) Outcomes (X) = 1,2,3,4,5,6

Number less than or equal to 4 are 1,2,3,4

so total number of favorable outcomes = 4

$$P(X \leq 4) = \frac{4}{6}$$

8. Question

One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will

(i) be an ace,

(ii) not be an ace

Answer

There are 4 suits in a pack of 52 cards

13- Heart

13- Diamond

13- Spades

13- Clubs

Each suit has one ace, 1jack, 1king, 1queen

So total ace cards = 4

(i) The probability of getting an Ace = $\frac{4}{52}$

(ii) There are 48 cards which are not ace

The probability of not getting an Ace = $\frac{48}{52}$

9. Question

In a throw of a fair die, find the probability of getting

(i) the number 5

(ii) the number 3 or 4

(iii) a prime number

(iv) a number greater than 4

(v) a number greater than 6

(vi) a number less than 6

Answer

Outcomes (X) = 1,2,3,4,5,6

(i)The number 5 appers only once in a throw of dice So $P(X) = \frac{1}{6}$

(ii) There are either chances of getting 3 or 4 $P(X) = \frac{2}{6}$

(iii)Prime Number:- a number which is divisible by 1 or number itself.

So favourable cases are 2,3,5 $P(X) = \frac{3}{6}$

(iv)Number greater than 4 are 5,6 so $P(X) = \frac{2}{6}$

(v) A Dice contains only n1,2,3,4,5,6 as the number, so there is no chance of getting a number than 6 So $P(X)=0$

(vi) Since A Dice contains only n1,2,3,4,5,6 as the number So Number, less than 6 is $P(X)=\frac{5}{6}$

10. Question

A bag contains blue coloured balls only. Rahul takes out one ball without looking into the bag. What is the probability of his

(i) taking out a green ball?

(ii) taking out a blue ball?

Answer

(i) 0 Since there are only blue balls so taking, green balls will be zero.

(ii)1 Since there are only blue balls.

11. Question

Find the probability that a number selected from the numbers 1 to 25 is not a prime number when each of the given numbers is equally likely to be selected.

Answer

Outcomes= 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25

Prime Numbers = 2,3,5,7,11,13,17,19,23

Let x be the event of getting prime numbers

$$P(x)=\frac{9}{25}$$

Therefore the probability of getting non-prime number = $\frac{16}{25}$

12. Question

A box contains 20 cards, numbered from 1 to 20. A card is drawn from the box at random. Find the probability that the number on the card drawn is (i) even (ii) prime and (iii) multiple of 3

Answer

Even number = 2,4,6,8,10,12,14,16,18,20

Prime Number = 2,3,5,7,11,13,17,19

Multiple of 3 = 3,6,9,12,15,18

$$(i) \text{Probability of getting an Even Number} = \frac{\text{Number of Even Numbers}}{\text{Total Numbers}} = \frac{10}{20}$$

$$(ii) \text{Probability of getting a prime number} = \frac{\text{Number of prime Numbers}}{\text{Total Numbers}} = \frac{8}{20}$$

$$(iii) \text{Probability of getting a multiple of 3} = \frac{\text{Number of multiples of 3}}{\text{Total numbers}} = \frac{6}{20}$$

13. Question

The numbers on the six faces of a die are replaced by the letters given below:



In the throw of this die, find the probability of getting

(i) A (ii) B

Answer

(i) Sample Space = (A, A, B, C, D, E)

Number of A's = 2

$$\text{Probability of getting an A} = \frac{\text{Number of A's}}{\text{Sample space}} = \frac{2}{6} = \frac{1}{3}$$

(ii) Sample Space = (A, A, B, C, D, E)

Number of B's = 1

$$\text{Probability of getting a B} = \frac{\text{Number of B's}}{\text{Sample Space}} = \frac{1}{6}$$

14. Question

In a single throw of two dice, find the probability of getting the sum of numbers appearing on the two dice.

(i) greater than 8

(ii) Less than or equal to 12

(iii) equal to 7

(iv) divisible by 3 or 4

Answer

Outcomes = (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)

(i) (6,3),(6,4),(6,5),(6,6),(3,6),(4,5),(4,6),(5,4),(5,5),(5,6)

$$P(\text{sum greater than } 8) = \frac{10}{36}$$

(ii) Less than or equal to 12 = ?

Outcomes = All Outcomes have sum less than or equal to 12.

$$P(\text{sum Less than or equal to } 12) = 36/36 = 1$$

(iii) Sum equal to 7

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

$$P(\text{sum equal to } 7) = \frac{6}{36}$$

(iv) Divisible by 3 or 4

Outcomes =

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

$$P(\text{divisible by } 3 \text{ or } 4) = \frac{20}{36}$$

15. Question

Two dice are rolled together. Write all the possible outcomes and find the probability of getting

(i) a number greater than 4 on each die.

(ii) a doublet (the same number appearing on each of the die)

Answer

(i) (5,5),(5,6),(6,5),(6,6)

$$P(\text{a number greater than } 4 \text{ on each die}) = \frac{4}{36}$$

(ii) (1,1),(2,2),(3,3),(4,4),(5,5),(6,6)

$$P(\text{a doublet (the same number appearing on each of the die)}) = \frac{6}{36}$$

16. Question

The integers from 1 to 30 are written on chits of paper (one number on each chit). These chits are then put in a box and well mixed. Ramesh picks up one chit. What is the probability that his chit has

- (i) the number 5
- (ii) an odd number
- (iii) a prime number

Answer

(i) $P(\text{the number 5}) = \frac{1}{30}$

(ii) 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29

$$P(\text{an odd number}) = \frac{15}{30}$$

(iii) 2,3,5,7,11,13,17,19,23,29

$$P(\text{a prime number}) = \frac{10}{30}$$

17. Question

Prakash draws a card from a well-shuffled deck of 52 cards. What is the probability that he draws

- (i) a king (ii) a red card (iii) a diamond (iv) the six of spade

Answer

There are 4 suits in a pack of 52 cards

13- Heart

13- Diamond

13- Spades

13- Clubs

Each suits has 1 ace , 1jack, 1king , 1queen

26- red card , 26- black card

(i) $P(\text{a king}) = \frac{4}{52}$

$$(ii) P(\text{a red card}) = \frac{26}{52}$$

$$(iii) P(\text{a diamond}) = \frac{13}{52}$$

$$(iv) P(\text{the six of spade}) = \frac{1}{13}$$

18. Question

There are 40 students in class X of a school of whom 25 are girls, and 15 are boys. The class teacher has to select one student as a class representative. She writes the name of each student on a separate card, the cards being identical. Then she puts the cards in a bag and mixes them thoroughly. She then draws one card from the bag. What is the probability that the name is written on the card is the name of

(i) a girl? (ii) a boy?

Answer

Sample Space = 40

Number of Girls = 25

Number of Boys = 15

$$(i) P(\text{a girl}) = \frac{25}{40}$$

$$(ii) P(\text{a boy}) = \frac{15}{40}$$

19. Question

A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red? (ii) not red?

Answer

Total number of balls :- 8

Red Balls = 3

Not Red Balls = 5

$$(i) P(\text{red}) = \frac{3}{8}$$

$$(ii) P(\text{not red}) = \frac{5}{8}$$

20. Question

A bag contains lemon flavoured candies only. Malini 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?

Answer

since there are only lemon coloured candies therefore

(i) $P(\text{an orange flavoured candy}) = 0$

(ii) $P(\text{a lemon flavoured candy}) = 1$

21. Question

Two dice, one blue and one grey, are thrown at the same time. Write down all the possible outcomes. What is the probability that sum of the two numbers appearing on the top of the dice is

(i) 8 (ii) 13 (iii) less than or equal to 12?

Answer

Outcomes = (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)

(i) Sum is 8

Favourable outcomes = (2, 6), (3, 5), (4, 4), (5, 3), (6, 2) = 5

$$P(\text{sum is 8}) = \frac{5}{36}$$

(ii) Sum is 13

Favourable Outcomes = 0

$$P(\text{sum is 13}) = 0$$

Since the maximum sum that can be obtained is 12.

(iii) Less than or equal to 12

Possible outcomes = All outcomes have sum less than or equal to 7.

$P(\text{less than or equal to } 12) = 1$

22. Question

In a deck of card. Find the probability of getting

(i) a king of red colour

(ii) a face card

(iii) a red face card

(iv) the jack of hearts

(v) a spade

(vi) the queen of diamonds

Answer

There are 4 suits in a pack of 52 cards

13- Heart

13- Diamond

13- Spades

13- Clubs

Each suits has 1 ace , 1jack, 1king , 1queen

Face Cards are Jack, king ,queen. So there are 3 face cards.

Total number of face cards =12

26- red card , 26- black card

(i) Since There are 26 red Cards and a total of 2 kings are there.

So $P(\text{a king of red colour}) = \frac{2}{26}$

(ii) Total number of face cards = 12

So $P(\text{a face card}) = \frac{12}{52}$

(iii) Total number of red cards =26

Total number of red face cards = 6

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

$$(iv) P(\text{a jack of heart}) = \frac{1}{13}$$

$$(v) P(\text{a spade}) = \frac{13}{52}$$

$$(vi) P(\text{a queen of diamond}) = \frac{1}{13}$$

23. Question

In a deck of card. Find the probability of getting

(i) a king of red colour

(ii) a face card

(iii) a red face card

(iv) the jack of hearts

(v) a spade

(vi) the queen of diamonds

Answer

There are 4 suits in a pack of 52 cards

13- Heart

13- Diamond

13- Spades

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Each suits has 1 ace , 1jack, 1king , 1queen

Face Cards are Jack, king ,queen. So there are 3 face cards.

Total number of face cards =12

26- red card , 26- black card

(i) Since There are 26 red Cards and a total of 2 kings are there.

$$\text{So } P(\text{a king of red colour}) = \frac{2}{26}$$

(ii) Total number of face cards = 12

$$\text{So } P(\text{a face card}) = \frac{12}{52}$$

(iii) Total number of red cards = 26

Total number of red face cards = 6

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

$$\text{(iv) } P(\text{a jack of heart}) = \frac{1}{13}$$

$$\text{(v) } P(\text{a spade}) = \frac{13}{52}$$

$$\text{(vi) } P(\text{a queen of diamond}) = \frac{1}{13}$$

24. Question

Five cards the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.

(i) What is the probability that the card is the queen?

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

(a) an ace? (b) a queen?

Answer

Total number of cards:- 5

$$\text{(i) } P(\text{probability that the card is the queen}) = \frac{1}{5}$$

Now, Total number of cards = 4

$$\text{(ii) (a) } P(\text{an ace}) = \frac{1}{4}$$

$$\text{(b) } P(\text{a queen}) = 0$$

Since there was only one queen which is put aside.

25. Question

Find the probability of a non-leap year having 53 Sundays.

Answer

1 year = 365 days

And a year has 52 weeks

So $52 \times 7 = 364$ days

So now remaining 1 day can be any day i.e. Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday

So $P(\text{probability of a non-leap year having 53 Sundays}) = \frac{1}{7}$

26. Question

Shoaid tosses two coins of denominations Re 1 and 2 simultaneously. What is the probability that he get at least one head?

Answer

Outcomes = (H,H), (H,T),(T,H),(T,T)

Atleast 1 head means that number of heads are one or more than 1.

Possible Outcomes = 3

$P(\text{that he get at least one head}) = \frac{3}{4}$

27. Question

A box contains 19 balls bearing numbers 1,2,3,..., 19. A ball is drawn at random from the box. Find the probability that the number on the ball is

(i) a prime number

(ii) divisible by 3 or 5

(iii) neither divisible by 5 nor by 10

(iv) an even number

Answer

(i) Possible Outcomes: 2,3,5,7,11,13,17,19

$P(\text{a prime number}) = \frac{8}{19}$

(ii) Possible Outcomes: 3,5,6,9,12,15,10,18

$P(\text{divisible by 3 or 5}) = \frac{8}{19}$

(iii) Possible Outcomes: 1,2,3,4,6,7,8,9,11,12,13,14,16,17,18,19

$P(\text{neither divisible by 5 nor by 10}) = \frac{16}{19}$

(iv) Possible Outcomes: 2,4,6,8,10,12,14,16,18

$$P(\text{an even number}) = \frac{9}{19}$$

28. Question

A bag contains 4 white ball, 6 red balls, 7 black balls and 3 blue balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is

(i) white

(ii) not black

(iii) neither white nor black

Answer

Total number of balls = 20

(i) Number of White Balls = 4

Total Balls = 20

$$P(\text{white}) = \frac{4}{20} = \frac{1}{5}$$

(ii) No black means the we have to pick white, red, blue balls only

$$P(\text{not black}) = \frac{13}{20}$$

(iii) neither black nor white means only white and red balls are left

$$P(\text{neither white nor black}) = \frac{9}{20}$$

29. Question

A bag contains 8 red,6 white and 4 black balls. A ball is drawn at random from the bag. Find the probability that the ball is drawn is :

(a) Red or white

(b) Not black

(c) Neither white Nor black

Answer

Total number of balls :- 18

Number of black balls:- 4

Number of white balls:- 6

Number of Red balls:- 8

(a) Since there are 14 balls which are red and white colour, so the total number of favourable cases becomes = 14

Total number of balls = 18

$$P(\text{Red or white}) = \frac{14}{18}$$

(b) Not black balls mean that red or white is drawn.

Total number of balls = 18

$$P(\text{Not black}) = \frac{14}{18}$$

(c) Neither white nor black means that the ball is drawn are red

Total Number of favourable cases = 8

$$P(\text{Neither white Nor black}) = \frac{8}{18}$$

30. Question

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. What is the probability that it will point at

(i) 8?

(ii) an odd number?

(iii) a number greater than 2?

(iv) a number less than 9?

Answer

(i) Number of times 8 comes = 1

$$P(8) = \frac{1}{8}$$

(ii) Number of Favourable outcomes = 1, 3, 5, 7 = 4

$$P(\text{an odd number}) = \frac{4}{8}$$

(iii) Number of Favourable Outcomes = 3, 4, 5, 6, 7, 8 = 6

$$P(\text{a number greater than 2}) = \frac{6}{8}$$

(iv) Number of Favourable Outcomes = 1, 2, 3, 4, 5, 6, 7, 8 = 8

$P(\text{a number less than } 9) = 1$

31. Question

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.

Answer

(i) Number of two digit numbers = $90 - (1, 2, 3, 4, 5, 6, 7, 8, 9) = 81$

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

(ii) Number of perfect squares = $1, 4, 9, 16, 25, 36, 49, 64, 81 = 9$

$$P(\text{a perfect square number}) = \frac{9}{90}$$

(iii) Numbers divisible by 5 = $5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90 = 18$

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

32. Question

A die is numbered in such a way that its faces show the numbers 1,2,2,3,3,6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws:

Number in first throw

+	1	2	2	3	3	6
1	2	3	3	4	4	7
2	3	4	4	5	5	8
2	3	4	4	5	5	8
3	4	5	5	6	6	9
3	4	5	5	6	6	9
6	7	8	8	9	9	12

What is the probability that the total score is

(i) even (ii) 6? (iii) at least 6?

Answer

Total number of outcomes = 36

(i) Number of even score = 18

Hence, $P(\text{even score}) = \frac{18}{36}$

(ii) Number of times 6 comes = 4

Hence, $P(\text{score of 6}) = \frac{4}{36}$

(ii) Number of times score is 6 or more = 15

Hence, $P(\text{score at least 6}) = \frac{15}{36}$

33. Question

Cards marked with numbers 13,14,15,..., 60 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that number on the drawn card is

(i) divisible by 5.

(ii) a number which is a perfect square.

Answer

(i) number divisible by 5

15,20,25,30,35,40,45,50,55,60

$P(\text{divisible by 5}) = \frac{10}{48}$

(ii) 16,25,36,49

$P(\text{a number which is a perfect square}) = \frac{4}{48}$

34. Question

A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.

Answer

Let the number of blue balls be X

So total number of balls = 5+X

$$P(\text{probability of drawing a red ball from the bag}) = \frac{5}{5+X}$$

$$P(\text{probability of drawing a blue ball from the bag}) = 3 \frac{5}{5+X}$$

ATQ ,

$$\frac{X}{5+X} = 3 \frac{5}{5+X}$$

$$\frac{X}{5+X} = \frac{15}{5+X}$$

$$5X + X^2 = 75 + 15X$$

$$X^2 - 10X + 75 = 0$$

$$(x-15)(x+5) = 0$$

$$\text{So } X \neq -5$$

Therefore No. Of blue balls = 15

35. Question

A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bags is four times that of a red ball, find the number of blue balls in the bag.

Answer

Let the number of blue balls be X

So total number of balls = 5 + X

$$P(\text{probability of drawing a red ball from the bag}) = \frac{5}{5+X}$$

$$P(\text{probability of drawing a blue ball from the bag}) = 4 \frac{5}{5+X}$$

ATQ ,

$$\frac{X}{5+X} = 4 \frac{5}{5+X}$$

$$\frac{X}{5+X} = \frac{20}{5+X}$$

$$5X + X^2 = 100 + 20X$$

$$X^2 - 15X + 100 = 0$$

$$(x-20)(x+5) = 0$$

So $X \neq -5$

Therefore No. Of blue balls = 20

36. Question

A box contains 3 blue, 2 white and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be

(i) white? (ii) blue? (iii) red?

Answer

Total Number of Marbles:- 9

White Marbles = 2

Blue Marbles = 3

Red Marbles = 4

$$(i)P(\text{white}) = \frac{2}{9}$$

$$(ii)P(\text{blue}) = \frac{3}{9}$$

$$(iii)P(\text{red}) = \frac{4}{9}$$

37. Question

Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish. What is the probability that the fish taken out is a male fish?

Answer

Total number of fishes = 13

$$P(\text{probability that the fish are taken out is a male fish}) = \frac{\text{Male Fishes}}{\text{Total Fishes}} = \frac{5}{13}$$

38. Question

A carton consists of 100 shirts of which 88 are good, 8 have minor defects, and 4 have major defects. Jimmy, a trader, will only accept the shirts which are good, but Sujatha, 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

(i) it is acceptable to Jimmy?

(ii) it is acceptable to Sujatha?

Answer

Total number of bulbs = 100

Total number of good bulbs = 88

Bulbs having minor defects = 8

Bulbs having major defects = 4

(i) it is acceptable to jimmy only it is good

$$P(\text{it is acceptable to Jimmy}) = \frac{88}{100}$$

(ii) She will accept all the bulbs which do not have major defects. So, total bulbs acceptable to her is 96

$$P(\text{it is acceptable to Sujatha}) = \frac{96}{100}$$

39. Question

(i) There are 30 cards of the same size, in a bag on which numbers 1 to 30 are written. One card is taken out of the bag at random. Find the probability that the number on the selected cards is not divisible by 3.

(ii) If the probability of an event E, i.e., P (E) is 0.08, what would the probability of the event 'not E' be?

(iii) In a group of 3 students, the probability of 2 students not passing an examination is 0.895. Find the probability of the 2 students passing the examination.

Answer

(i) Total number of cards = 30

Number divisible by 3 = 3,6,9,12,15,18,21,24,27,30

$$P(\text{probability that the number on the selected cards is not divisible by 3}) = \frac{20}{30}$$

(ii) P(E) = 0.8

$$P(\text{not E}) = 1 - 0.08 = 0.92$$

(iii) P (the probability of the 2 students passing the examination) = 1 - 0.895 = 0.105

40. Question

Three coins are tossed together. Find the probability of getting

(i) exactly two tails

(ii) at least one head

(iii) at least one head and one tail

Answer

Total number of outcomes = (HHH),(HHT),(HTH),(THH),(TTH),(TTT),(THT),
(HTT)

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

$$(ii) P(\text{at least one head}) = \frac{7}{8}$$

$$(iii) P(\text{at least one head and one tail}) = 1$$

41. Question

A bag contains 20 balls numbered 1 to 20. One ball is drawn at random. Find the probability that it is marked with a number which is a multiple of 5 or 7.

Answer

Total Number of Balls = 20

Number of balls that are multiple of 5 and 7 are = 5, 7, 10, 14, 15, 20 = 6

$$\text{Probability} = \frac{\text{Number of Balls multiple of 5 and 7}}{\text{Total Number of Balls}}$$

$$P(\text{probability that it is marked with a number which is a multiple of 5 or 7}) = \frac{6}{20}$$

42. Question

Two terms, A and B, play a game of football. It is known that the probability of A winning the game is 0.58. What is the probability of B winning the game if a tie is ruled out?

Answer

$$P(\text{A winning the game}) = 0.58$$

B will the game only when A loses

$$P(\text{B winning the game}) = 1 - 0.58$$

$$= 0.42$$

43. Question

Harpreet tosses two different coins simultaneously (say, one is of Re 1 and other of Rs. 2). What is the probability that she gets at least one head?

Answer

Outcomes = (H, H), (H,T), (T, H), (T, T)

At least one head means that there is one and more than one heads. And from outcomes we can see that it happens 3 times.

Total number of outcomes = 4

$$\text{Probability} = \frac{\text{Possible Outcomes}}{\text{Total Outcomes}}$$

$$P(\text{probability that she gets at least one head}) = \frac{3}{4}$$

44. Question

Savita and Hamida are friends. What is the probability that both will have (i) different birthdays? (ii) the same birthday? (ignoring a leap year).

Answer

Since there are 365 days

(i) If Savita is born on any day and Hamida born on any day except on which Savita was born.

$$P(\text{different birthdays}) = \frac{364}{365}$$

(ii) If Savita and Hamida have a same birthday, then it can be any 1 day of 365 days.

$$P(\text{the same birthday}) = \frac{1}{365}$$

45. Question

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

(i) face card

(ii) card which is neither a king nor a r
d card.

Answer

There are 4 suits in a pack of 52 cards

13- Heart

13- Diamond

13- Spades

13- Clubs

Each suits has 1 ace , 1jack, 1king , 1queen

Face cards = king ,queen,jack

Total face cards = 12

(i) $P(\text{probability of drawing a face card}) = \frac{12}{52}$

(ii) $P(\text{probability of drawing a card which is neither a king nor a red card}) = \frac{24}{52}$

46. Question

A die is thrown twice. What is the probability that

(i) 5 will not come up either time?

(ii) 5 will come up at least once?

[**Hint:** Throwing a die twice and throwing two dice simultaneously are treated as the same experiment]

Answer

Outcomes= (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)

(i) $P(5 \text{ will not come up either time}) = \frac{25}{36}$

Explanation:- 5 will not come up either time means In the throw no dice gets a number 5 on them so possible outcomes = (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)

$$(ii) P(5 \text{ will come up at least once}) = \frac{11}{36}$$

Explanation:- 5 will come up at least once means either of the dice gets a number 5 on them. So possible outcomes are :- (1,5),(2,5),(3,5),(4,5),(6,5) (5,1), (5,2),(5,3),(5,4),(5,5),(5,6)

47. Question

A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result, i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

Answer

Total number of outcomes = (HHH),(HHT),(HTH),(THH),(TTH),(TTT),(THT), (HTT)

Given: Hanif loses if there are different coins = $8 - 2 = 6$

For Hanif to lose the game, there are 6 possible chances

$$P(\text{probability that Hanif will lose the game}) = \frac{6}{8}$$

48. Question

A lot consists of 144 ball pens of which 20 are defective, and the others are good. Nuri will buy a pen if it is good, but will not buy 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?

Answer

(i) $P(\text{probability She will buy it}) = ?$

Sample Space = 144 ball pens

Good Pens = $144 - 20 = 124$

Defective Pens = 20

$$\text{Probability that she will buy} = \frac{\text{good pens}}{\text{Sample Space}}$$

$$\text{Probability that she will buy} = \frac{124}{144}$$

(ii) P(She will not buy it) =?

Sample Space = 144 ball pens

Good Pens = 144 - 20 = 124

Defective Pens = 20

$$\text{Probability that she will buy} = \frac{\text{Defective Pens}}{\text{Sample Space}}$$

$$\text{Probability that she will buy} = \frac{20}{144}$$

49. Question

in a game of musical chairs, the person playing music has been advised to stop playing the music at any time within 1 minute after she starts playing. What is the probability that the music will stop within the first 20 seconds after starting?

Answer

Music has to be Stopped within 1 minute

1 minute = 60 seconds

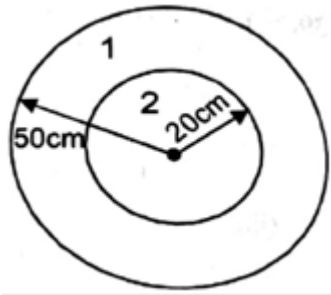
Music is stopped within 20 seconds

$$\text{Probability} = \frac{\text{Time within which music is stopped}}{\text{Time for which music can be played}}$$

$$\text{Probability} = \frac{20}{60} = \frac{1}{3}$$

50. Question

A dart is thrown at a circular board which has regions marked for scoring. If the dart hits the region 1, the player gets 50 points and if it hits the region 2, the player gets 100 points. If the dart hits the board, find probability of the player getting 100 points.



Answer

Area of bigger circle = $3.14 \times 50 \times 50$
 = 7850

Area of smaller circle = $3.14 \times 20 \times 20$
 = 1256

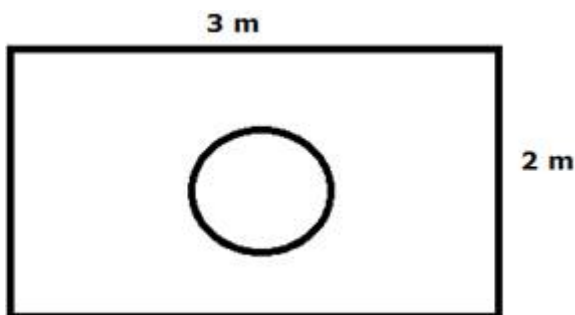
Now if the player wants to score 100 points in a single shot then he will have to hit inside the smaller circle

So $P(\text{scoring } 100) = \frac{1256}{7850}$

51. Question

Suppose you drop a die at random on the rectangular region shown in the figure. What is the probability that it will land inside the circle with diameter 1 m?

Answer



Length = 3m

Breadth = 2m

Area of Rectangle :- $L \times B$

= $6m^2$

Area of circle = πr^2

Radius = .5

$$\text{Area} = .25\pi m^2$$

$$P(\text{it will land inside the circle}) = \frac{\text{Area of circle}}{\text{Area of rectangle}}$$

$$= \frac{.25 \times \pi}{6}$$

$$= \frac{25 \times \pi}{100 \times 6}$$

$$= \frac{22}{7 \times 4 \times 6}$$

$$= \frac{11}{84}$$