CBSE Class 10 Mathematics

Important Questions

Chapter 15 - Probability

1. **An integer is chosen at random from the first two hundreds digit. What is the probability that the integer chosen is divisible by 6 or 8.**

   Ans: Multiples of 6 first 200 integers

   6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114, 120, 126, 132, 138, 144, 150, 156, 162, 168, 174, 180, 186, 192, 198

   Multiples of 8 first 200 integers

   8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200

   Number of Multiples of 6 or 8 = 50

   P(Multiples of 6 or 8) = 50/200 = 1/4

2. **A box contains 12 balls out of which x are black. if one ball is drawn at random from the box what is the probability that it will be a black ball? If 6 more black balls are out in the box. the probability of drawing a black ball is now double of what it was before. Find x.**

   Ans: Random drawing of balls ensures equally likely outcomes

   Total number of balls = 12

   Total number of possible outcomes = 12

   Number of black balls = x

   ('ll out of total 12 outcomes, favourable outcomes = x

   P (black ball) = $\frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$

   $= \frac{x}{12}$

   (21 if 6 more black balls are out in the bae. then The total number of black balls = x + 6

   Total number of balls in the bae =12 + 6 = 18 According to the question Probability of drawing black ball is second case

   = 2 X probability drawing of black ball in first case

   $\frac{x+6}{18} = 2(\frac{x}{12})$

   $\frac{x+6}{18} = \frac{x}{6}$

   6 x + 36 = 18x

x = 3

hence number of black balls = 3

3. **A bag contains 8 red balls and x blue balls, the odd against drawing a blue ball are 2: 5. What is the value of x?**

   Ans: No. of blue balls be x

   No. of red balls be 8 Total no. of balls = x + 8

   Probability of drawing blue balls = $\frac{x+6}{18} = \frac{x}{6}$

   Probability of drawing red balls $\frac{x+6}{18} = \frac{x}{6}$

   $\frac{8}{8+x} : \frac{x}{8+x} = 2 : 5$

   $2(\frac{x}{8+x}) = 5(\frac{8}{8+x})$

   2x = 40.

   ∴ x = 20

4. **A card is drawn from a well shuffled deck of cards**
   i. **What are the odds in favour of getting spade?**
   ii. **What are the odds against getting a spade?**
   iii. **What are the odds in favour of getting a face card?**
   iv. **What are the odds in favour of getting a red king**

   Ans: Total cards 52

   Spade =13

   Remaining cards 39

   i. The odds in favour of getting spade 13

      The odds is not in favour of getting spade 39

      $= \frac{13}{52} : \frac{39}{52} = 1 : 3$

   ii. The odds against getting a spade 13

      The odds not against getting a spade 39

   iii. The odds in favour of getting a face card 12

      The odds not in favour of getting a face card 40

      $= \frac{12}{52} : \frac{40}{52} = 3 : 10$

   iv. The odds in favour of getting a red king 2

      The odds not in favour of getting a red king 50

$= \frac{12}{52} : \frac{40}{52} = 3 : 10$

5. **A die is thrown repeatedly until a six comes up. What is the sample space for this experiment? HINT :A= {6} B= {1,2,3,4,5,}**
   Ans: The sample space is = {A, BA, BBA, BBBA, BBBBA ..... })
6. **Why is tossing a coin considered to be a fair wav of deciding which team should get the ball at the beginning of a foot ball match?**
   Ans: equally likely because they are mutually exclusive events.
7. **A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball. determine the number of blue balls in the bag.**
   Ans: Let the number of blue balls is the bag be x

   Then total number of balls is the bag = 5 + x
   ∴ Number of all possible outcomes = 5 + x
   Number of outcomes favourable to the event of drawing a blue ball = x
   (Q there are x blue balls)
   ∴ Probability of drawing a blue ball $\frac{x}{5+x}$
   Similarly, probability of drawing a red ball $= \frac{5}{5+x}$
   According to the answer
   $\frac{x}{5+x} = 2(\frac{5}{5+x})$
   x = 10

8. **A box contains 12 balls out of which x are black. If one ball is drawn at random from the box. what is the probability that it will be a black ball? If 6 more black balls are out in the box the probability of drawing a black ball is now double of what it was before. Find x?**

   Ans: Number of all possible outcomes = 12
   Number of outcomes favourable to the event of drawing black ball = x
   Required probability $= \frac{x}{12}$
   Now when 6 more black balls are out in the box.
   Number of all possible outcomes =12 + 6 = 18
   Number of outcomes favourable to the event of drawing a black ball = x + 6
   ∴ Probability of drawing a black ball $= \frac{x+6}{18}$
   According to the question.

$\frac{x+6}{18} = 2(\frac{x}{12})$

$\therefore$ x = 3

9. **If 65% of the populations have black eves. 25% have brown eyes and the remaining have blue eyes. What is the probability that a person selected at random has (i) Blue eves (ii) Brown or black eves (iii) Blue or black eves (iv) neither blue nor brown eves**

   Ans: No. of black eves = 65

   No. of Brown eves = 25

   No. of blue eves = 10

   Total no. of eves = 180

   i) P (Blue eves) = $\frac{10}{100} = \frac{1}{10}$

   ii) P ("Brown or black eves) = $\frac{90}{100} = \frac{9}{10}$

   iii) P (Blue or black eves) = $\frac{10}{100} = \frac{1}{10}$

   iv) P(neither blue nor brown eves) $= \frac{65}{100} = \frac{13}{20}$

10. **Find the probability of having 53 Sundays in**
    i. **a leap year**
    ii. **a non leap year**

    Ans: An ordinary year has 365 days i.e. 52 weeks and 1 day

    This day can be any one of the 7 days of the week.

    $\therefore$ Pith at this day is Sunday $= \frac{1}{7}$

    Hence. P(an ordinary year has 53 Sunday) $= \frac{1}{7}$

    A leap year 366 days i.e. 52 weeks and 2 days

    This day can be any one of the 7 days of the week

    $\therefore$ P (that this day is Sunday) $= \frac{2}{7}$

    Hence. P (a leap year has 53 Sunday)$= \frac{2}{7}$

11. **Five cards - the ten. Jack, queen, king and ace, are well shuffled with their face downwards. One card is then nicked un at random.**
    i. **What is the probability that the card is a queen?**
    ii. **If the queen is drawn and out aside, what is the probability that the second card nicked up is a (a) an ace (b) a queen**

    Ans: Here, the total number of elementary events = 5

i. Since, there is only one queen

∴ Favourable number of elementary events = 1

∴ Probability of setting the card of queen $= \frac{1}{5}$

ii. Now. the total number of elementary events = 4

(a) Since, there is only one ace

∴ Favourable number of elementary events = 1

∴ Probability of getting an ace card $= \frac{1}{4}$

(b) Since, there is no queen (as queen is nut aside)

∴ Favourable number of elementary events = 0

∴ Probability of getting a queen $= \frac{0}{4} = 0$

12. **A number x is chosen at random from the numbers -3, -2, -1, 0 1, 2, 3. What is the probability that |x|<2**

Ans: x can take 7 values

To set |x|<2 take -1.0. 1

Probability $(|x| < 2) = \frac{0}{4} = 0$

13. **A number x is selected from the numbers 1,2,3 and then a second number v is randomly selected from the numbers 1,4,9, What is the probability that the product xv of the two numbers will be less than 9?**

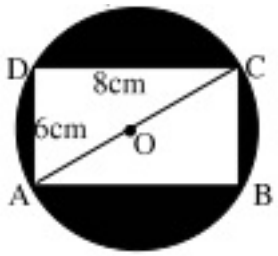
Ans: Number X can be selected in three wavs and corresponding to each such wav there are three wavs of selecting number y. Therefore. two numbers can be selected in 9 wavs as listed below:

(l. 1), (l.4), (2.l), (2.4), (3.1)

∴ Favourable number of elementary events = 5

Hence, required probability $= \frac{5}{9}$

14. **In the adjoining figure a dart is thrown at the dart board and lands in the interior of the circle. What is the probability that the dart will land in the shaded region.**



Ans: We have

AB = CD = 8 and AD = BC = 6

using Pythagoras Theorem is A ABC. we have

$AC^2 = AB^2 + BC^2$

$AC^2 = 82 + 62 = 100$

AC = 10

OA = OC = 5 [Q O is the midpoint of AC]

$\therefore$ Area of the circle $= \pi(OA)^2 = 25\ \pi$sq units [Q Area = πr^2]

ABCD = AB × BC = 8 × 6 = 48 sq units

Area of shaded region = Area of the circle - Area of rectangle ABCD

Area of shaded reeion = 25 π - 48 sq unit.

Hence

P (Dart lands in the shaded region) = $\frac{Area\ of\ shaded\ region}{Area\ of\ circle} = \frac{25\pi - 48}{25\pi}$

15. **In the fig points A. B .C and D are the centres of four circles. each having a radius of 1 unit. If a point is chosen at random from the interior of a square ABCD. what is the probability that the point will be chosen from the shaded region.**

Ans: Radius of the circle is 1 unit

Area of the circle = Area of 4 sector

$\pi r^2 = \pi \times 1^2 = \pi$

Side of the square ABCD = 2 units

Area of square = 2×2 = 4 units

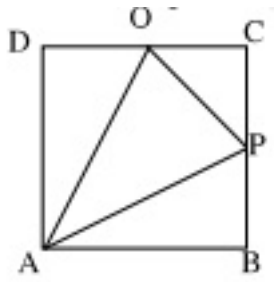
Area shaded region is

= Area of square - 4 × Area of sectors

$= 4 - \pi$

Probability = $\left(\frac{-\pi}{4}\right)$

16. **In the adjoining figure ABCD is a square with sides of length 6 units points P & O are the mid points of the sides BC & CD respectively. If a point is selected at random from the interior of the square what is the probability that the point will be chosen from the interior of the triangle APO.**



Ans: Area of triangle POC $= \frac{1}{2} \times 3 \times 3 = \frac{9}{2}$=4. 5 units 2

Area of triangle ABP $= \frac{1}{2} \times 6 \times 3 = 9$

Area of triangle ADQ $= \frac{1}{2} \times 6 \times 3 = 9$

Area of triangle APO = Area of a square - (Area of a triangle PQC + Area of triangle ABP + Area of triangle ABP)

= 36 - (l8+4.5)

= 36 - 22.5

= 13.5

Probability that the point will be chosen from the interior of the triangle APO

$= \frac{13.5}{36} = \frac{135}{360} = \frac{3}{8}$

17. **In a musical chair same the person playing the music has been advised to stop playing the music at any time within 2 minutes after she starts playing. What is the probability that the music will stop within the half minute after starting.**

Ans: Here the possible outcomes are all the numbers between 0 and 2.

This is the portion of the number line from 0 to 2 as shown in figure.

Let A be the event that 'the music is stopped within the first half minute.' Then, outcomes favorable to event A are all points on the number line from O to O i.e.

The total number of outcomes are the points on the number line from O to P i.e. 0 to 2.

∴ P (A) = $\frac{Length\ of\ OQ}{Length\ of\ OP} = \frac{1/2}{2} = \frac{1}{4}$

18. **A jar contains 54 marbles each of which is blue. green or white. The probability of selecting a blue marble at random from the jar is $\frac{1}{3}$ and the probability of selecting a green marble at random is $\frac{4}{9}$. How many white marbles does the jar contain?**

Ans: Let there be b blue, g green and w white marbles in the marbles in the jar. Then, b + g + w = 54

$\therefore$ P (Selecting a blue marble) $= \frac{b}{54}$

It is given that the probability of selecting a blue marble is $\frac{1}{3}$.

$\therefore \frac{1}{3} = \frac{b}{54} \Rightarrow b = 18$

We have.

P(Selecting a green marble) $= \frac{4}{9}$

$\Rightarrow \frac{g}{54} = \frac{4}{9}$ [Q P (Selecting a green marble) = $\Rightarrow \frac{g}{54} = \frac{4}{9}$ (Given)

⇒ g = 24

Substituting the values of b and g in (i), we get

18 + 24 + w = 54 ⇒ w = 12

CBSE Class 10 Mathematics

Important Questions

Chapter 15

Probability

1 Marks Questions

1. Complete the statements:

(i) Probability of event E + Probability of event "not E" = _____

(ii) The probability of an event that cannot happen is _____. Such an event is called _____.

(iii) The probability of an event that is certain to happen is _____. Such an event is called _____.

(iv) The sum of the probabilities of all the elementary events of an experiment is _____.

(v) The probability of an event is greater than or equal to _____ and less than or equal to _____.

Ans. (i) 1

(ii) 0, impossible event.

(iii) 1, sure or certain event

(iv) 1

(v) 0, 1

2. Which of the following cannot be the probability of an event:

(A) $\frac{2}{3}$

(B) -1.5

(C) 15%

(D) 0.7

Ans. (B) Since the probability of an event E is a number P(E) such that

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

$\therefore -1.5$ cannot be the probability of an event.

3. If P(E) = 0.05, what is the probability of 'not E'?

Ans. Since P(E) + P (not E) = 1

$\therefore$ P (not E) = 1 – P(E) = 1 – 0.05 = 0.95

4. It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday?

Ans. Let E be the event of having the same birthday

$\Rightarrow$ P(E) = 0.992

But $P(E) + P(\overline{E}) = 1$

$\therefore P(\overline{E}) = 1 - P(E) = 1 - 0.992 = 0.008$

5. 12 defective pens are accidently mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

Ans. Total number of favourable outcomes = 132 + 12 = 144

Number of favourable outcomes = 132

Hence, P (getting a good pen) = $\frac{132}{144} = \frac{11}{12}$

6. Which of the following is polynomial?

(a) $x^2 - 6\sqrt{x} + 2$

(b) $\sqrt{x} + \frac{1}{\sqrt{x}}$

(c) $\frac{5}{x^2 - 3x + 1}$

(d) none of these

Ans. (d) none of these

7. Polynomial $2x^4 + 3x^3 - 5x^2 - 5x^2 + 9x + 1$ **is a**

(a) linear polynomial

(b) quadratic polynomial

(c) cubic polynomial

(d) bi-quadratic polynomial

Ans. (d) bi-quadratic polynomial

8. If α **and** β **are zeros of** $x^2 + 5x + 8$**, then the value of** $(\alpha + \beta)$ **is**

(a) 5

(b) -5

(c) 8

(d) -8

Ans. (b) -5

9. The sum and product of the zeros of a quadratic polynomial are 2 and -15

respectively. The quadratic polynomial is

(a) $x^2-2x+15$
(b) $x^2-2x-15$
(c) $x^2+2x-15$
(d) $x^2+2x+15$

Ans. (b) $x^2-2x-15$

10. Cards each marked with one of the numbers 4,5,6,...20 are placed in a box and mixed thoroughly. One card is drawn at random from the box, what is the probability of getting an even prime number?

(a) 0

(b) 1

(c) 2

(d) 3

Ans. (a) 0

11. A bag contains 5 red and 4 black balls. A ball is drawn at random from the bag. What is the probability of getting a black ball?

(a) $\frac{1}{3}$
(b) $\frac{2}{9}$
(c) $\frac{4}{9}$
(d) None of these

Ans. (c) $\frac{4}{9}$

12. A dice is thrown once, what is the probability of getting a prime number?

(a) 1

(b) $\frac{1}{2}$

(c) $\frac{3}{2}$

(d) 0

Ans. (b) $\frac{1}{2}$

13. What is the probability that a number selected from the numbers 1,2,3,...15 is a multiple of 4?

(a) $\frac{1}{5}$

(b) $\frac{1}{2}$

(c) $\frac{2}{3}$

(d) 1

Ans. (a) $\frac{1}{5}$

14. Cards marked with the numbers 2 to 51 are placed in a box and mixed throughly. One card is drawn from this box, find the probability that the number on the card is an even number.

(a) $\frac{1}{2}$

(b) 1

(c) $\frac{3}{2}$

(d) None of these

Ans. (a) $\frac{1}{2}$

15. The king, queen and jack of clubs are removed from a deck of 52 playing cards and then well shuffled. One card is selected from the remaining cards, find the probability of getting a king.

(a) $\frac{3}{49}$

(b) 1

(c) $\frac{7}{17}$

(d) none of these

Ans. (a) $\frac{3}{49}$

16. What is the probability of getting a number less than 7 in a single throw of a die?

(a) $\frac{1}{2}$

(b) 0

(c) 1

(d) none of these

Ans. (c) 1

17. One card is drawn from a well shuffled deck of 52 cards. Find the probability of drawing '10' of a black suit.

(a) $\frac{1}{26}$

(b) 1

(c) $\frac{1}{2}$

(d) 0

Ans. (a) $\frac{1}{26}$

18. Cards each marked with one of the numbers 4,5,6,...20 are placed in a box and mixed thoroughly. One card is drawn at random from the box, what is the probability of getting an even prime number?

(a) 0

(b) 1

(c) 2

(d) 3

Ans. (a) 0

19. A bag contains 5 red and 4 black balls. A ball is drawn at random from the bag. What is the probability of getting a black ball?

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

(b) $\frac{2}{9}$

(c) $\frac{4}{9}$

(d) None of these

Ans. (c) $\frac{4}{9}$

20. A dice is thrown once, what is the probability of getting a prime number?

(a) 1

(b) $\frac{1}{2}$

(c) $\frac{3}{2}$

(d) 0

Ans. (b) $\frac{1}{2}$

21. What is the probability that a number selected from the numbers 1,2,3,...15 is a multiple of 4?

(a) $\frac{1}{5}$

(b) $\frac{1}{2}$

(c) $\frac{2}{3}$

(d) 1

Ans. (a) $\frac{1}{5}$

22. If E be any event, then value of P(E)lie in between

(a) $0 < P(E) < 1$

(b) $0 \leq P(E) < 1$

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

(d) $0 \leq P(E) \leq 2$

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

23. Maximum and minimum value of probability is

(a) (1,1)

(b) (1,0)

(c) (0,1)

(d) none of these

Ans. (b) (1,0)

24. An unbiased die is thrown. What is the probability of getting an even number or a multiple of 3?

(a) $\frac{2}{3}$

(b) $\frac{3}{2}$

(c) 1

(d) none of these

Ans. (a) $\frac{2}{3}$

25. Let E be any event, then the value of P(E) + P (not E) equals to

(a) 1

(b) 0

(c) 3

(d) $\frac{1}{2}$

Ans. (a) 1

26. Degree of polynomial $y^3 - 2y^2 - \sqrt{3y} + \frac{1}{2}$ **is**

(a) $\frac{1}{2}$

(b) 2

(c) 3

(d) $\frac{3}{2}$

Ans. (c) 3

27. Zeros of P(x) = $2x^2 + 9x - 35$ are

(a) 7 and $\frac{5}{2}$

(b) -7 and $\frac{5}{2}$

(c) 7 and 5

(d) 7 and 2

Ans. (b) -7 and $\frac{5}{2}$

28. The quadratic polynomial whore zeros are 3 and -5 is

(a) $x^2 + 2x - 15$

(b) $x^2 + 3x - 8$

(c) $x^2 - 5x - 15$

(d) None of these

Ans. (a) $x^2 + 2x - 15$

29. If α and β are the zeros of the quadratic polynomial P(x) = $x^2 - px + q$, then the value of $\alpha^2 + \beta^2$ is equal to

(a) $p^2 - 2q$

(b) $\frac{p}{q}$

(c) $q^2 - 2p$

(d) none of these

Ans. (a) $p^2 - 2q$

CBSE Class 10 Mathematics

Important Questions

Chapter 15

Probability

2 Marks Questions

1. 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.

(iii) A trial is made to answer a true-false question. The answer is right or wrong.

(iv) A baby is born. It is a boy or a girl.

Ans. (i) In the experiment, "A driver attempts to start a car. The car starts or does not start", we are not justified to assume that each outcome is as likely to occur as the other. Thus, the experiment has no equally likely outcomes.

(ii) In the experiment, "A player attempts to shoot a basket ball. She/he shoots or misses the shot", we are not justified to assume that each outcome is as likely to occur as the other. Thus, the experiment has no equally likely outcomes.

(iii) In the experiment "A trial is made to answer a true-false question. The answer is right or wrong." We know, in advance, that the result can lead in one of the two possible ways – either right or wrong. We can reasonably assume that each outcome, right or wrong, is likely to occur as the other.

Thus, the outcomes right or wrong are equally likely.

(iv) In the experiment, "A baby is born, It is a boy or a girl". We know, in advance that the outcome can lead in one of the two possible outcomes – either a boy or a girl. We are justified to assume that each outcome, boy or girl, is likely to occur as the other. Thus, the outcomes boy or girl are equally likely.

2. 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?

Ans. The tossing of a coin is considered to be a fair way of deciding which team should get the ball at the beginning of a football game as we know that the tossing of the coin only land in one of two possible ways – either head up or tail up. It can reasonably be assumed that each outcome, head or tail, is as likely to occur as the other, i.e., the outcomes head and tail are equally likely. So the result of the tossing of a coin is completely unpredictable.

3. A bag contains lemon flavoured candles 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?

Ans. (i) Consider the event related to the experiment of taking out of an orange flavoured candy from a bag containing only lemon flavoured candies.

Since no outcome gives an orange flavoured candy, therefore, it is an impossible event so its probability is 0.

(ii) Consider the event of taking a lemon flavoured candy out of a bag containing only lemon flavoured candies. This event is a certain event so its probability is 1.

4. 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?

Ans. There are 3 + 5 = 8 balls in a bag. Out of these 8 balls, one can be chosen in 8 ways.

$\therefore$ Total number of elementary events = 8

(i) Since the bag contains 3 red balls, therefore, one red ball can be drawn in 3 ways.

∴ Favourable number of elementary events = 3

Hence P (getting a red ball) = $\frac{3}{8}$

(ii) Since the bag contains 5 black balls along with 3 red balls, therefore one black (not red) ball can be drawn in 5 ways.

∴ Favourable number of elementary events = 5

Hence P (getting a black ball) = $\frac{5}{8}$

5. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be:

(i) red?

(ii) white?

(iii) not green?

Ans. Total number of marbles in the box = 5 + 8 + 4 = 17

∴ Total number of elementary events = 17

(i) There are 5 red marbles in the box.

∴ Favourable number of elementary events = 5

∴ P (getting a red marble) = $\frac{5}{17}$

(ii) There are 8 white marbles in the box.

∴ Favourable number of elementary events = 8

∴ P (getting a white marble) = $\frac{8}{17}$

(iii) There are 5 + 8 = 13 marbles in the box, which are not green.

∴ Favourable number of elementary events = 13

∴ P (not getting a green marble) = $\frac{13}{17}$

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

(i) will be a 50 p coin?

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

Ans. Total number of coins in a piggy bank = 100 + 50 + 20 + 10 = 180

∴ Total number of elementary events = 180

(i) There are one hundred 50 coins in the piggy bank.

∴ Favourable number of elementary events = 100

∴ P (falling out of a 50 p coin) = $\frac{100}{180} = \frac{5}{9}$

(ii) There are 100 + 50 + 20 = 170 coins other than Rs. 5 coin.

∴ Favourable number of elementary events = 170

∴ P (falling out of a coin other than Rs. 5 coin) = $\frac{170}{180} = \frac{17}{18}$

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

Ans. Total number of fish in the tank = 5 + 8 = 13

∴ Total number of elementary events = 13

There are 5 male fishes in the tank.

∴ Favourable number of elementary events = 5

Hence, P (taking out a male fish) = $\frac{5}{13}$

8. Five cards – then 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?

Ans. Total number of favourable outcomes = 5

(i) There is only one queen.

∴ Favourable outcome = 1

Hence, P (the queen) = $\frac{1}{5}$

(ii) In this situation, total number of favourable outcomes = 4

(a) Favourable outcome = 1

Hence, P (an ace) = $\frac{1}{4}$

(b) There is no card as queen.

$\therefore$ Favourable outcome = 0

Hence, P (the queen) = $\frac{0}{4} = 0$

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

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

Ans. (i) Total number of favourable outcomes = 20

Number of favourable outcomes = 4

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

(ii) Now total number of favourable outcomes = 20 – 1 = 19

Number of favouroable outcomes = 19 – 4 = 15

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

10. 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.

Ans. Total number of favourable outcomes = 90

(i) Number of two-digit numbers from 1 to 90 are 90 – 9 = 81

∴ Favourable outcomes = 81

Hence, P (getting a disc bearing a two-digit number) = $\frac{81}{90} = \frac{9}{10}$

(ii) From 1 to 90, the perfect squares are 1, 4, 9, 16, 25, 36, 49, 64 and 81.

∴ Favourable outcomes = 9

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

(iii) The numbers divisible by 5 from 1 to 90 are 18.

∴ Favourable outcomes = 18

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

11. A child has a die whose six faces show the letters as given below:

A, B, C, D, E, A

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

(i) A?

(ii) D?

Ans. Total number of favourable outcomes = 6

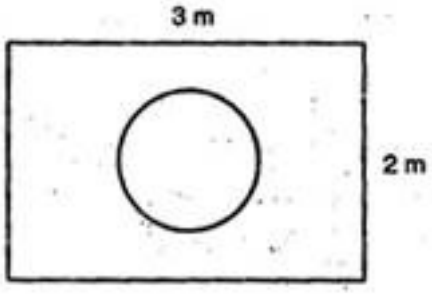
(i) Number of favourable outcomes = 2

Hence P (getting a letter A) = $\frac{2}{6} = \frac{1}{3}$

(ii) Number of favourable outcomes = 1

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

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



Ans. Total area of the given figure (rectangle) = 3 x 2 = 6 m^2

And Area of circle = πr^2 = $\pi\left(\frac{1}{2}\right)^2$ = $\frac{\pi}{4}m^2$

Hence, P (die to land inside the circle) = $\frac{\pi/4}{6} = \frac{\pi}{24}$

13. 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?

Ans. Total number of favourable outcomes = 144

(i) Number of non-defective pens = 144 – 20 = 124

∴ Number of favourable outcomes = 124

Hence P (she will buy) = P (a non-defective pen) = $\frac{124}{144} = \frac{31}{36}$

(ii) Number of favourable outcomes = 20

Hence P (she will not buy) = P (a defective pen) = $\frac{20}{144} = \frac{5}{36}$

14. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.

Ans. Let there be x blue balls in the bag.

$\therefore$ Total number of balls in the bag = $5 + x$

Now, P_1 = Probability of drawing a blue ball = $\frac{x}{5+x}$

And P_2 = Probability of drawing a blue ball = $\frac{5}{5+x}$

But according to question, $P_1 = 2P_2$

$\Rightarrow \frac{x}{5+x} = 2 \text{ x } \frac{5}{5+x}$

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

$\Rightarrow x = 10$

Hence, there are 10 blue balls in the bag.

15. A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball?

If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x.

Ans. There are 12 balls in the box.

Therefore, total number of favourbale outcomes = 12

The number of favourable outcomes = x

Therefore, P_1 = P (getting a black ball) = $\frac{x}{12}$

If 6 more balls put in the box, then

Total number of favourable outcomes = 12 + 6 = 18

And Number of favourable outcomes = $x+6$

$\therefore$ P_2= P (getting a black ball) = $\frac{x+6}{18}$

According to question, $P_2 = 2P_1$

$\Rightarrow \frac{x+6}{18} = 2 \text{ x } \frac{x}{12}$

$\Rightarrow \frac{x+6}{18} \times \frac{12}{x} = 2$

$\Rightarrow x = 3$

16. A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. Find the number if blue balls in the jar.

Ans. Here, Total number of favourable outcomes = 24

Let there be x green marbles.

Therefore, Favourable number of outcomes = x

$\therefore$ P(G) = $\frac{x}{24}$

But P(G) = $\frac{2}{3}$

$\therefore \frac{x}{24} = \frac{2}{3} \Rightarrow x$ = 16

Therefore, number of green marbles are 16

And number of blue marbles = 24 – 16 = 8

17. Why is tossing a coin considered is the way of deciding which team should get the ball at the beginning of a football match?

Ans. $\because$ Probability of head

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

Probability of tail $P(T) = \frac{1}{2}$

i.e. $P(T) = P(H) = \frac{1}{2}$

Probability of getting head and tail both are same.

$\therefore$ Tossing a coin considered tobe fair way.

18. An unbiased die is thrown, what is the probability of getting an even number?

Ans. Total number of outcomes are 1,2,3,4,5 and 6, which are 6 in number favourable case = 1 $[\because 2$ is the only even prime$]$

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

19. Two unbiased coins are tossed simultaneously, find the probability of getting two

heads.

Ans. Total number of outcomes are HH, HT, TH, TT, which are 4 in numbers

Favourable outcomes = HH, which is only

$\therefore$ Required probability = $\frac{1}{4}$

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

Ans. Total number of outcomes = 52

Favorable cases = 1 [There is only one jack of hearts]

$\therefore$ Required probability = $\frac{1}{52}$

21. 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 fails and loses otherwise. Calculate the probability that Hanif will lose the game.

Ans. Since a coin is tossed 3 times

$\therefore$ Possible outcomes are = {HHH,HHT,HTH,THH,HTT,THT,TTH,TTT}

$x(s) = 8$

3 heads and 3 tails {HHH,TTT}

x (3 heads and 3 tails) = 2

P(Hanif will win the game) = $\frac{2}{8} = \frac{1}{4}$

P (Hanif will lose the game) = $1 - \frac{1}{4} = \frac{3}{4}$

22. Gopy buys a fish from a shop for his aquarium. The shopkeeper take 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?

Ans. Total no. of fishes = 5+8=13

No. of male fishes = 5

P(male fish) = $\frac{5}{13}$

23. A lot consists of 144 ball pens of which 20 are defective and the others are food. Arti 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?

Ans. Total no. of ball pens = 144

Number of defective pens = 20

$\therefore$ Number of good pens = 144 – 20=124

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

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

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

Ans. For tossing 2 coins

Total possible outcomes are {HH,TT,TH,HT}= 4

Favourable outcomes = at least one head= {TH,HT,HH}=3

Required probability = $\frac{3}{4}$

25. Why is tossing a coin considered is the way of deciding which team should get the ball at the beginning of a football match?

Ans. ∵ Probability of head

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

Probability of tail $P(T)=\frac{1}{2}$

i.e. $P(T)=P(H)=\frac{1}{2}$

Probability of getting head and tail both are same.

∴ Tossing a coin considered to be fair way.

26. Two unbiased coins are tossed simultaneously, find the probability of getting two heads.

Ans. Total number of outcomes are HH, HT, TH, TT, which are 4 in numbers

Favourable outcomes = HH, which is only

∴ Required probability = $\frac{1}{4}$

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

Ans. Total number of outcomes = 52

Favorable cases = 1 [There is only one jack of hearts]

$\therefore$ Required probability = $\frac{1}{52}$

28. If two dice are thrown once, find the probability of getting 9.

Ans. Total number of possible outcomes of throwing two dice = $6 \times 6 = 36$

Number of outcomes of getting 9 i.e., (3+6),(4+5),(5+4),(6+3) = 4

$\therefore$ Required probability $= \frac{4}{36} = \frac{1}{4}$

29. A card is drawn from a well shuffled deck of playing cards. Find the probability of getting a face card.

Ans. Total number of possible outcomes = 52

Favourable outcomes = 4+4+4=12[4 jack, 4 queen, 4 king]

$\therefore$ Required probability = $\frac{12}{52} = \frac{3}{13}$

30. What is the probability of having 53 Mondays in a leap year?

Ans. Total number of days in a leap year = 366

This contains 52 weeks and 2 days

The remaining two days may beMT, TW,WTh, ThF, FS, SS, SM

Favourable cases are MT, SM i.e., 2 out of 7 cases

$\therefore$ Required probability = $\frac{2}{7}$

31. Cards bearing numbers 3 to 20 are placed in a bag and mixed thoroughly. A card is

taken out from the bag at random, what is the probability that the number on the card taken out is an even number?

Ans. Total number of outcomes = 20 – 3=17

Cards in the box having even numbers are 4,6,8,10,12,14,16,18,20, which are 9 in number

$\therefore$ favourable outcomes= 9

$\therefore$ P (an even number) = $\frac{9}{17}$

CBSE Class 10 Mathematics

Important Questions

Chapter 15

Probability

3 Marks Questions

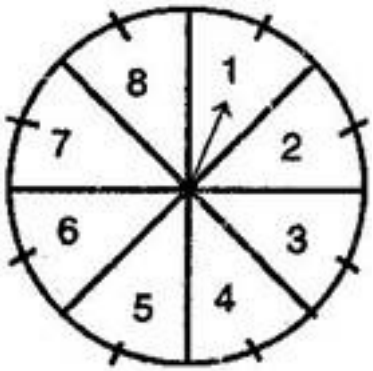
1. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (see figure) and these are equally likely outcomes. What is the probability that it will point at:

(i) 8?

(ii) an odd number?

(iii) a number greater than 2?

(iv) a number less than 9?



Ans. Out of 8 numbers, an arrow can point any of the numbers in 8 ways.

∴ Total number of favourable outcomes = 8

(i) Favourable number of outcomes = 1

Hence, P (arrow points at 8) = $\frac{1}{8}$

(ii) Favourable number of outcomes = 4

Hence, P (arrow points at an odd number) = $\frac{4}{8}=\frac{1}{2}$

(iii) Favourable number of outcomes = 6

Hence, P (arrow points at a number > 2) = $\frac{6}{8}=\frac{3}{4}$

(iv) Favourable number of outcomes = 8

Hence, P (arrow points at a number < 9) = $\frac{8}{8}$ =1

2. A dice is thrown once. Find the probability of getting:

(i) a prime number.

(ii) a number lying between 2 and 6.

(iii) an odd number.

Ans. Total number of favourable outcomes of throwing a dice = 6

(i) On a dice, the prime numbers are 2, 3 and 5.

Therefore, favourable outcomes = 3

Hence P (getting a prime number) = $\frac{3}{6}=\frac{1}{2}$

(ii) On a dice, the number lying between 2 and 6 are 3, 4, 5.

Therefore, favourable outcomes = 3

Hence P (getting a number lying between 2 and 6) = $\frac{3}{6}=\frac{1}{2}$

(iii) On a dice, the odd numbers are 1, 3 and 5.

Therefore, favourable outcomes = 3

Hence P (getting an odd number) = $\frac{3}{6} = \frac{1}{2}$

3. 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.

Ans. The outcomes associated with the experiment in which a coin is tossed thrice:

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

Therefore, Total number of favourable outcomes = 8

Number of favourable outcomes = 6

Hence required probability = $\frac{6}{8} = \frac{3}{4}$

4. 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 second throw \ 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					5	
3						
3			5			9
6	7	8	8	9	9	12

What is the probability that the total score is

What is the probability that the total score is:

(i) even

(ii) 6

(iii) at least 6?

Ans. Complete table is as under:

Number in second throw	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

It is clear that total number of favourable outcomes = 6 x 6 = 36

(i) Number of favourable outcomes of getting total score even are 18

Hence P (getting total score even) = $\frac{18}{36}=\frac{1}{2}$

(ii) Number of favourable outcomes of getting total score 6 are 4

Hence P (getting total score 6) = $\frac{4}{36}=\frac{1}{9}$

(iii) Number of favourable outcomes of getting total score at least 6 are 15

Hence P (getting total score at least 6) = $\frac{15}{36}=\frac{5}{12}$

5. 18 cards numbered 1, 2, 3, ...18 are put in a box and mixed thoroughly. A card is drawn at random from the box. Find the probabilities that the card bears

(i) an even number

(ii) a number divisible by 2 or 3

Ans. Total no. of possible outcomes = 18

(i) Favorable cases are 2,4,6,8,10,12,14,16,18 i.e., 9 in number

Required probability = $\frac{9}{18}=\frac{1}{2}$

(ii) Favorable cares are 2,3,4,6,8,9,10,12,14,15,16,18 i.e., 12 in number

Required probability = $\frac{12}{18}=\frac{2}{3}$

6. A bag contains 5 red balls, 4 green balls and 7 white balls. A ball is drawn at random from the box. Find the probability that the ball drown is

(a) white

(b) neither red nor white

Ans . Total number of balls in the bag = 5+4+7=16

∴ Total number of possible outcomes = 16

(a) Favourable outcomes for a white ball = 7

Required probability = $\frac{7}{16}$

(b) Favourable outcomes for neither red nor white ball=Number of green balls =4

∴ Required probability = $\frac{4}{16}=\frac{1}{4}$

7. A box contains 20 balls bearing numbers 1,2,3,4,...20. A ball is drawn at random from the box, what is the probability that the number on the ball is

(i) an odd number

(ii) divisible by 2 or 3

(iii) prime number

Ans. Total number of outcomes = 20

(i) Favorable outcomes are 1,3,5,7,9,11,13,15,17,19 i.e., 10 in number.

$\therefore$ Required probability = $\frac{10}{20} = \frac{1}{2}$

(ii) Number "divisible by 2" are 2,4,6,8,10,12,14,16,18,20 i.e., 10 in number

Numbers "divisible by 3 are 3,6,9,12,15,18. i.e., 6 in number

Numbers "divisible by 2 or 3 are 6,12,18 i.e., 3 in number.

$\therefore$ Numbers divisible by "2 or 3"=10+6 – 3=13

Favourable outcomes = 13

$\therefore$ Required probability = $\frac{13}{20}$

(iii) Prime numbers are 2,3,5,7,11,13,17,19 i.e., 8 in number

Favourable outcomes = 8

Required probability = $\frac{8}{20} = \frac{2}{5}$

8. A bag contains 5 red and some blue balls,

(i) if probability of drawing a blue ball from the bag is twice that of a red ball,find the number of blue balls in the bag.

(ii) if probability of drawing a blue ball from the bag is four times that of a red ball,find the number of blue balls in the bag.

Ans. Let number of blue balls = x

Total number of balls = $5 + x$

Probability of red ball = $\frac{5}{5+x}$

Probability of blue ball = $\frac{x}{5+x}$

By given condition,

(i) $\frac{x}{5+x} = 2.\frac{5}{5+x}$

$\Rightarrow x = 10$

No. of blue balls = 10

(ii) Here, $\frac{5}{5+x} = 4 \times \frac{x}{5+x}$

$\Rightarrow x = 20$

Hence, number of blue balls = 20

9. A box contains 3 blue marbles, 2 white marbles. If a marble is taken out at random from the box, what is the probability that it will be a white one? Blue one? Red one?

Ans. Total no. of possible outcomes = 3+2+4 = 9

No. of favourable outcomes for white marbles = 2

Required probability = $\frac{2}{9}$

No. of favourable outcomes for blue marbles = 3

Required probability = $\frac{3}{9} = \frac{1}{3}$

No. of favourable outcomes for red marbles =4

Required probability = $\frac{4}{9}$

10. The integers from 1 to 30 inclusive are written on cards (one number on one card). These card one put in a box and well mixed. Joseph picked up one card. What is the probability that his card has

(i) number 7

(ii) an even number

(iii) a prime number

Ans. Total no. of possible outcomes = 30

(i) P (the no.7) = $\frac{1}{30}$

(ii) Even no. are 2,4,6,8,10,12,14,16,18,20,22,24,26,28,30

Favourable outcomes = 15

Required probability = $\frac{15}{30} = \frac{1}{2}$

(iii) Prime numbers from 1 to 30 are 2,3,5,7,11,13,17,19,23,29}

No. of favourable outcomes = 10

Required probability = $\frac{10}{30} = \frac{1}{3}$

11. A bag contains lemon flavored candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out

(i) an orange flavored candy?

(ii) alemon flavored candy?

Ans. ∵ The bag has lemon flavored candies only.

(i) P(an orange flavored candy) = $\frac{0}{1} = 0$

(ii) P (a lemon flavored candy) = $\frac{1}{1} = 1$

12. A bag contains 6 red balls and some blue balls. If the probability of drawing a blue ball from the bag is twice that of a red, find the number of blue balls in the bag.

Ans. Suppose no. of blue bolls = x

Total no. of balls = $(x+6)$

Probability of blue balls = $\frac{x}{x+6}$

Probability of red balls = $\frac{6}{x+6}$

According to, question,

$$\frac{x}{\cancel{6+x}} = 2.\frac{6}{\cancel{6+x}}$$

$$\Rightarrow x = 12$$

Hence, no. of blue balls = 12

13. A bag contains 5 red, 4 black and 3 green balls. A ball is taken out of the bag at random, find the probability that the selected ball is

(i) of red colour,

(ii) not of green colour.

Ans. Total number of balls in the bag = 5+4+3

$\therefore$ Total number of outcomes = 12

(i) No. of red balls = 5

$\therefore$ Required probability for a red ball = $\frac{5}{12}$

(ii) favourable cases for non green ball = 12 – 3=9

$\therefore$ Required probability for a non green ball = $\frac{9}{12} = \frac{3}{4}$

14. From a well shuffled pack of 52 cards, black aces and black queens are removed. From the remaining cards a card is drawn at random, find the probability of drawing a king or a queen.

Ans. Total number of cards = 52

Number of black aces = 2

Number of black queens = 2

Cards left = 52 – 2 – 2=48

$\therefore$ Total number of equally likely cases = 48

Number of kings and queens left in the 48 cards = 4+2=6

Favourable cases = 6

$\therefore$ Required probability = $\frac{6}{48} = \frac{1}{6}$

15. 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 basket ball, she/he shoots or misses the shot.

(iii) A baby is born. It is a boy or a girl.

Ans. (i) A driver attempts to start a car,thencarstarts or does not start are not equally likely.

(ii) A player attempts to shoot a basket ball, she/he shoots or misses the shoot are not equally likely.

(iii) A baby is born,it is a boy or a girl is an equally likely event.

16. Find the probability that a number selected at random from the numbers 1,2,3,...35 is a

(i) prime number,

(ii) multiple of 7,

(iii) multiple of 3 or 5.

Ans. (i) Prime number are 2,3,5,7,11,13,17,19,23,29,31, which are 11 in number

$\because$ Total number of outcomes = 35

P (Prime number) = $\frac{11}{35}$

(ii) Multiples of '7' are 7,14,21,28,35, which are 5 in number

P (a multiple of 7) = $\frac{5}{35} = \frac{1}{7}$

(iii) Multiple of '3' are 3,6,9,...33, which are 11 in numbers

Multiple of 5 are 5,10,15,...35, which are 7 in number

Multiple of '3' and '5' are 15, 30, which are 2 in number

$\therefore$ Multiple of 3 or 5 = 11+7 – 2=16

$\therefore$ P (Multiple of 3 or 5) = $\frac{16}{35}$

CBSE Class 10 Mathematics

Important Questions

Chapter 15

Probability

4 Marks Questions

1. One card is drawn from a well-shuffled deck of 52 cards. 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.

Ans. Total number of favourable outcomes = 52

(i) There are two suits of red cards, i.e., diamond and heart. Each suit contains one king.

∴ Favourable outcomes = 1

Hence, P (a king of red colour) = $\frac{2}{52} = \frac{1}{26}$

(ii) There are 12 face cards in a pack.

∴ Favourable outcomes = 12

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

(iii) There are two suits of red cards, i.e., diamond and heart. Each suit contains 3 face cards.

∴ Favourable outcomes = 2 x 3 = 6

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

(iv) There are only one jack of heart.

$\therefore$ Favourable outcome = 1

Hence, P (the jack of hearts) = $\frac{1}{52}$

(v) There are 13 cards of spade.

$\therefore$ Favourable outcomes = 13

Hence, P (a spade) = $\frac{13}{52} = \frac{1}{4}$

(vi) There is only one queen of diamonds.

$\therefore$ Favourable outcome = 1

Hence, P (the queen of diamonds) = $\frac{1}{52}$

2. 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?

Ans. (i) The outcomes associated with the experiment in which a dice is thrown is twice:

(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)

Therefore, Total number of favourable outcomes = 36

Now consider the following events:

A = first throe shows 5 and B = second throw shows 5

Therefore, the number of favourable outcomes = 6 in each case.

$\therefore$ P(A) = $\frac{6}{36}$ and P(B) = $\frac{6}{36}$

$\Rightarrow P(\overline{A}) = 1 - \frac{6}{36} = \frac{30}{36} = \frac{5}{6}$ and $P(\overline{B}) = \frac{5}{6}$

$\therefore$ Required probability = $\frac{5}{6} \times \frac{5}{6} = \frac{25}{36}$

(ii) Let S be the sample space associated with the random experiment of throwing a die twice. Then, n(S) = 36

$\therefore$ A $\cap$ B = first and second throw shoe 5, i.e. getting 5 in each throw.

We have, A = (5, 1) (5, 2) (5, 3) (5, 4) (5, 5) (5, 6)

And B = (1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5)

$\therefore$ P(A) = $\frac{6}{36}$, P(B) = $\frac{6}{36}$ and P(A $\cap$ B) = $\frac{1}{36}$

$\therefore$ Required probability = Probability that at least one of the two throws shows 5

= P (A $\cup$ B) = P(A) + P(B) – P(A $\cap$ B)

= $\frac{6}{36} + \frac{6}{36} - \frac{1}{36} = \frac{11}{36}$

3. Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on (i) the same day? (ii) consecutive days? (iii) different days?

Ans. Total favourable outcomes associated to the random experiment of visiting a particular shop in the same week (Tuesday to Saturday) by two customers Shyam and Exta are:

(T, T) (T, W) (T, TH) (T, F) (T, S)

(W, T) (W, W) (W, TH) (W, F) (W, S)

(TH, T) (TH, W) (TH, TH) (TH, F) (TH, S)

(F, T) (F, W) (F, TH) (F, F) (F, S)

(S, T) (S, W) (S, TH) (S, F) (S< S)

∴ Total number of favourable outcomes = 25

(i) The favourable outcomes of visiting on the same day are (T, T), (W, W), (TH, TH), (F, F) and (S, S).

∴ Number of favourable outcomes = 5

Hence required probability = $\frac{5}{25} = \frac{1}{5}$

(ii) The favourable outcomes of visiting on consecutive days are (T, W), (W, T), (W, TH), (TH, W), (TH, F), (F, TH), (S, F) and (F, S).

∴ Number of favourable outcomes = 8

Hence required probability = $\frac{8}{25}$

(iii) Number of favourable outcomes of visiting on different days are 25 – 5 = 20

∴ Number of favourable outcomes = 20

Hence required probability = $\frac{20}{25} = \frac{4}{5}$

4. **A card is drawn at random from a well shuffled deck of playing cards. Find the probability that the card drawn is**

(i) a card of spades of an ace

(ii) a red king

(iii) neither a king nor a queen

(iv) either a king or a queen

(v) a face card

(vi) cards which is neither king nor a red card.

Ans. Total possible outcomes = 52

(i) No. of spades = 13

No. of ace = 4

1 card is common [ace of spade]

Favourable outcomes = 13+4 – 1=16

$\therefore$ Required probability = $\frac{16}{52}=\frac{4}{13}$

(ii) No. of red kings = 2

Favourable outcomes = 2

$\therefore$ Required probability = $\frac{2}{52}=\frac{1}{26}$

(iii) No. of king and queen = 4+4=8

Favourable outcomes = 52 – 8=44

Required probability = $\frac{44}{52}=\frac{11}{13}$

(iv) No. of king and queen =4+4=8

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

(v) No. of face cards = 4+4+4=12 [Jack, queen and king are face card]

Required probability = $\frac{12}{52} = \frac{3}{13}$

(vi) No. of cards which are neither red card nor king = 52 – (26+4 – 2

=52 – 28=24

∴ Required probability = $\frac{24}{52} = \frac{6}{13}$

5. Cards marked with numbers 1,2,3,...25 are placed in a box and mixed thoroughly and one card is drawn at random from the box, what is the probability that the number on the card is

(i) a prime number?

(ii) a multiple of 3 or 5?

(iii) an odd number?

(iv) neither divisible by 5 nor by 10?

(v) perfect square?

(vi) a two-digit number?

Ans. Total no. of possible outcomes = 25

(i) favourable cases are 2,3,5,7,11,13,17,19,23 which are 9 in number

∴ Required probability = $\frac{9}{25}$

(ii) Multiple of 3 or 5

Favourable cases are 3,5,6,9,10,12,15,18,20,21,24,25, which are 12 in number

∴ Required probability = $\frac{12}{25}$

(iii) Favourable cases are 1,3,5,7,9,11,13,15,17,19,21,23,25, which are 13 in number

∴ Required probability = $\frac{13}{25}$

(iv) Favourable cases are 1,2,3,4,6,7,8,9,11,12,13,14,16,17,18,19,21,22,23,24, which are 20 in number

Required probability = $\frac{20}{25}=\frac{4}{5}$

(v) Perfect square numbers are 1,4,9,16,25

Favourable cases are = 5

Required probability = $\frac{5}{25}=\frac{1}{5}$

(vi) Two-digit numbers are 10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25 =16

Required probability = $\frac{16}{25}$

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6. From a pack of 52 playing cards, jacks, queens, kings and aces of red colour are removed. From the remaining a card is drawn at random. Find the probability that the card drawn is (i) a black queen, (ii) a red card, (iii) a black jack,(iv) a honorable card.

Ans. Total number of outcomes = 52

Cards removed = 2+2+2+2 = 8[2 jack, 2 queen, 2 king and 2 aces of red colour]

∴ Remaining number of cards = 52 – 8=44

∴ Total number of outcomes = 44

(i) Favourable outcomes = 2 [There are 2 black queen]

∴ Required probability = $\frac{2}{44}=\frac{1}{22}$

(ii) Favourable outcomes = number of red cards left = 26 – 8=18

∴ Probability for a red card = $\frac{18}{44} = \frac{9}{22}$

(iii) Favourable outcomes = Number of black jacks = 2

Required probability = $\frac{2}{44} = \frac{1}{22}$

(iv) Number of picture cards left =2+2+2 = 6 [jack, queen, King are picture cards]

∴ Required probability = $\frac{6}{44} = \frac{3}{22}$

(v) Honorable cards [ace, jack, queen and king]

No. of honorable cards left = 2+2+2+2=8

∴ Required probability = $\frac{8}{44} = \frac{2}{11}$