Assignments in Mathematics Class X (Term II)

15. PROBABILITY

IMPORTANT TERMS, DEFINITIONS AND RESULTS

- The science which measures the degree of uncertainty is called **probability.**
- There are two types of approaches to the study of probability. These are experimental or empirical approach and theoretical approach.
- In the experimental approach to probability, we find the probability of the occurrence of an event by actually performing the experiment a number of times and record the happening of an event.
- In the theoretical approach to probability, we predict the results without actually performing the experiment.
- The observations of an experiment are called its **outcomes**.
- An experiment in which all possible outcomes are known and the exact outcome cannot be predicted in advance, is called a **random experiment**.
- The word **unbiased** means each outcome is equally likely to occur. For example, an unbiased die indicates that each of the outcomes 1, 2, 3, 4, 5 or 6 has equal chances to occur. Throughout this chapter, we shall assume that all the experiments have equally likely outcomes.
- The theoretical probability of an event E, written as P(E) is defined as

$$P(E) = \frac{\text{Number of outcomes favourable to E}}{\text{Total number of all possible outcomes of the experiment}}$$

- An event having only one outcome of the experiment is called an elementary event.
- The sum of the probabilities of all the elementary events of an experiment is 1.

  In general for any event E

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

  or $P(\bar{E}) = 1 - P(E)$

  or $P(E) + P(\bar{E}) = 1$

  Here the event $\bar{E}$, representing not E, is called the compliment of the event E.
- The probability of the event which is impossible to occur is 0. Such an event is called an **impossible event**.
- The probability of an event which is sure (or certain) to occur is 1. Such an event is called a **sure** or a **certain event**.
- For an event E, we have $0 \leq P(E) \leq 1$.
- A die is a well balanced cube with its six faces marked with numbers or dots 1 to 6. When we throw a die we are interested in the number that occurs on the top face.
- The pack or deck of playing cards consists of 52 cards, 26 of red colour and 26 of black colour. There are four suits each of 13 cards namely hearts (♥), spades (♠), diamonds (♦) and clubs (♣).

  Each suit contains ace, king, queen, jack or knave, 10, 9, 8, 7, 6, 5, 4, 3, 2.

  There are 4 aces, 4 kings, 4 queens, 4 jacks, 4 tens, and so on in a pack.

  Kings, queens, and jacks are called face cards.

SUMMATIVE ASSESSMENT

MULTIPLE CHOICE QUESTIONS [1 Mark]

A. Important Questions

1. The theoretical probability P(E) of an event E is defined as :

(a) $P(E) = \frac{\text{No. of all possible outcomes of the experiment}}{\text{No. of outcomes favourable to E}}$

(b) P(E) = No. of outcomes favourable to E × No. of all possible outcomes of the experiment

(c) $P(E) = \frac{\text{No. of outcomes favourable to E}}{\text{No. of all possible outcomes of the experiment}}$

(d) none of these

2. Which of the following can be the probability of an event?

(a) – 0.02 (b) 1.4 (c) $\frac{25}{26}$ (d) $\frac{5}{4}$

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

(a) $\frac{1}{3}$ (b) 0.2 (c) 4% (d) $\frac{17}{15}$

4. Getting a number 8 in a single throw of a die is :

(a) a certain event (b) an impossible event

(c) neither certain nor-impossible event

(d) none of these

5. An event is very unlikely to happen. Its probability is closest to :

(a) 0.0001 (b) 0.001 (c) 0.01 (d) 0.1

6. If we throw a die, all the possible outcomes are :

(a) 1 (b) 2, 4, 6

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

7. How many cards are of red colour in a pack of playing cards?

(a) 4 (b) 13

(c) 26 (d) none of these

8. How many face cards are there in a pack of playing cards?

(a) 4 (b) 12 (c) 13 (d) 26

9. The probability expressed as a percentage of a particular occurrence can never be :

(a) less than 100

(b) less than 0

(c) greater than 1

(d) anything but a whole number

10. How many suits are there in a pack of playing cards?

(a) 4 (b) 13

(c) 26 (d) none of these

11. If P(E) = 0.35, then P(not E) is given by :

(a) – 0.35 (b) 0.65

(c) – 0.65 (d) none of these

12. An event is very likely to happen. Its probability is closest to :

(a) 0.999 (b) 0.990 (c) 0.909 (d) 0.099

13. If P (not E) = $\frac{1}{6}$, then P(E) is given by :

(a) $\frac{5}{6}$ (b) $-\frac{5}{6}$

(c) $-\frac{1}{6}$ (d) none of these

14. Two coins are tossed simultaneously. All the possible outcomes are :

(a) H, T (b) HH, TT

(c) HT, TT (d) HH, HT, TH, TT

15. In a throw of a die, the probability of getting an odd number is :

(a) 0 (b) $\frac{1}{6}$ (c) $\frac{2}{6}$ (d) $\frac{3}{6}$

16. A card is selected at random from a well shuffled deck of 52 playing cards. The probability of its being a face card is :

(a) $\frac{3}{13}$ (b) $\frac{4}{13}$ (c) $\frac{6}{13}$ (d) $\frac{9}{13}$

17. The probability that a non-leap year selected at random will contain 53 sundays is :

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{5}{7}$

18. When a die is thrown, the probability of getting an odd number less than 3 is :

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 0

19. A bag contains 3 red balls, 5 white balls and 7 black balls. What is the probability that a ball drawn from the bag at random will be neither red nor black?

(a) $\frac{1}{5}$ (b) $\frac{1}{3}$ (c) $\frac{7}{15}$ (d) $\frac{8}{15}$

20. A card is drawn from a pack of 52 playing cards. The probability that it is a queen is :

(a) $\frac{1}{52}$ (b) $\frac{1}{13}$ (c) $\frac{4}{13}$ (d) $\frac{1}{4}$

21. Two dice are thrown simultaneously. The probability of getting a doublet is :

(a) 0 (b) $\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $\frac{5}{6}$

22. A school has five houses A , B, C, D and E. A class has 23 students, 4 from house A, 3 from house B, 5 from house C and rest from house E. A single student is selected at random to be the class monitor. The probability that the selected student is not from A , B and C is :

(a) $\frac{4}{23}$ (b) $\frac{6}{23}$ (c) $\frac{8}{23}$ (d) $\frac{17}{23}$

23. A card is drawn from a pack of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is :

(a) 4 (b) 13 (c) 48 (d) 51

24. One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is :

(a) $\frac{1}{5}$ (b) $\frac{3}{5}$ (c) $\frac{4}{5}$ (d) $\frac{1}{3}$

25. One card is accidently dropped from a pack of 52 playing cards. The probillity that it is a card of red colour is :

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{26}$ (d) $\frac{1}{13}$

26. The probability of drawing a rotten egg from a lot of 400 is $\frac{7}{200}$. The number of rotten eggs in the lot is :

(a)7 (b) 14 (c) 21 (d) 28

27. One card is drawn at random from a box can turning cards numbered from 1 to 100. The probability that the drawn card has a prime number is :

(a) $\frac{1}{5}$ (b) $\frac{1}{4}$ (c) $\frac{3}{5}$ (d) $\frac{3}{4}$

28. Gurmeet calculates that the probalility of his winning the first prize in a lottery is $\frac{2}{25}$. If 1600 tickets are sold, how many has he bought ?

(a) 40 (b) 240 (c) 480 (d) 750

29. Two dice are thrown simualtaneously. The event E, is getting the same number on each dice. The number of outcomes favourable to E is :

(a) 2 (b) 4 (c) 6 (d) 36

B. Questions From CBSE Examination Papers

1. If a letter of English alphabet is chosen at random, then the probability that the letter is a consonant is : **[2011 (T-II)]**

(a) $\frac{5}{26}$ (b) $\frac{21}{26}$ (c) $\frac{10}{13}$ (d) $\frac{11}{13}$

2. If two coins are tossed simultaneously, then the probability of getting at least one head is : **[2011 (T-II)]**

(a) $\frac{3}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) 1

3. Two dice are thrown simultaneously. Probability of getting a prime number on both dice is : **[2011 (T-II)]**

(a) $\frac{5}{18}$ (b) $\frac{2}{9}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

4. Two coins are tossed together. The probability of getting head on both is : **[2011 (T-II)]**

(a) 0 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

5. The probability that a leap year has 53 Sundays is **[2011 (T-II)]**

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{4}{7}$

6. The probability of getting a number between 3 and 100 which is divisible by 7 is **[2011 (T-II)]**

(a) $\frac{29}{98}$ (b) $\frac{1}{7}$ (c) $\frac{25}{98}$ (d) $\frac{23}{98}$

7. In a throw of a pair of dice, what is the probability of getting a doublet ? **[2011 (T-II)]**

(a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{5}{12}$ (d) $\frac{2}{3}$

8. A bag contains cards which are numbered from 2 to 90. A card is drawn at random from the bag. The probability that it bears a two digit number is : **[2011 (T-II)]**

(a) $\frac{88}{92}$ (b) $\frac{88}{90}$ (c) $\frac{81}{89}$ (d) $\frac{89}{90}$

9. Which of the following cannot be the probability of an event ? **[2011 (T-II)]**

(a) 0 (b) $\frac{1}{5}$ (c) $\frac{5}{4}$ (d) 1

10. Which of the following cannot be the probability of an event ? **[2011 (T-II)]**

(a) $\frac{2}{3}$ (b) –1.5 (c) 15% (d) 0.7

11. From a pack of 52 playing cards, a card is drawn at random. The probability, that the drawn card is not a face card is : **[2011 (T-II)]**

(a) $\frac{3}{13}$ (b) $\frac{9}{13}$ (c) $\frac{10}{13}$ (d) $\frac{3}{4}$

12. The probability of getting a prime number in single throw of a dice is : **[2011 (T-II)]**

(a) zero (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

13. The probability of drawing a green coloured ball from a bag containing 6 red and 5 black balls is : **[2011 (T-II)]**

(a) 0 (b) 1 (c) $\frac{5}{11}$ (d) $\frac{6}{11}$

14. The sum of probability of all the events of an experiment is : **[2011 (T-II)]**

(a) $\frac{2}{3}$ (b) 3 (c) 1 (d) 2

15. The probability of guessing the correct answer to certain question is $\frac{p}{12}$. If the pobability of not guessing the correct answer to same question is $\frac{3}{4}$, the value of p is : **[2011 (T-II)]**

(a) 3 (b) 4 (c) 2 (d) 1

16. The probability of getting a bad egg from a lot of 400 eggs is 0.035. The number of bad eggs in the lot is **[2011 (T-II)]**

(a) 7 (b) 14 (c) 21 (d) 28

17. If a die is thrown once, the probability of getting a number less than 3 and greater than 2 is **[2011 (T-II)]**

(a) 0 (b) 1 (c) $\frac{1}{3}$ (d) $\frac{2}{3}$

18. If the probability of winning a game is 0.995, then the probability of losing it is : **[2011 (T-II)]**

(a) 1 (b) 0.05 (c) 0.0050 (d) 0.0

19. Someone is asked to select a number from 1 to 30. The probability that the selected number is a prime number is : **[2011 (T-II)]**

(a) $\frac{1}{5}$ (b) $\frac{2}{7}$ (c) $\frac{1}{3}$ (d) $\frac{7}{16}$

20. In a throw of two dice, the probability of getting a sum of 10 is : **[2011 (T-II)]**

(a) $\frac{1}{12}$ (b) $\frac{1}{36}$ (c) $\frac{1}{6}$ (d) $\frac{1}{4}$

21. The probability that a non leap year selected at random will have 53 Tuesdays is : **[2011 (T-II)]**

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{4}{7}$

SHORT ANSWER TYPE QUESTIONS [2 Marks]

A. Important Questions

1. In an experiment there are only two possible outcomes. The probability of each outcome is $\frac{1}{2}$. Is it true? Give reason. **[HOTS]**

2. Two dice are thrown simultaneously. List the sample space for this experiment. **[HOTS]**

3. 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. What is the probability of getting a heart?

4. A girl tosses a coin 3 times and gets a tail each time. Do you think that the outcome of next toss will be a tail? Justify your answer.

5. I toss three coins together. The possible outcomes are no heads, 1 head, 2 heads and 3 heads. So, I say that probability of no heads is $\frac{1}{4}$. What is wrong with this conclusion?

6. A card is drawn at random from an ordinary pack of 52. What is the probability that the card is a black king?

7. One number is chosen at random from the whole numbers 1 to 100 inclusive. What is the probability that the number has two digits?

8. Two dice are thrown together. Find the probability that the sum of the digits showing on the top faces of the dice is less than 5.

9. Find the probability that the month of February may have 5 Sundays in a leap year.

10. A girl throws a die and squares the number that appears on it. A boy throws two dice once and computes the product of numbers appearing on the dice. Who has the better chance of getting the numbers 36. Give reason.

11. A coin is tossed 6 times and on each occasion a head is obtained. Can we say that the probability of getting a head is 1? Give reasons.

12. Three unbiased coins are tossed together. Find the probability of getting either all heads or all tails.

13. Two dice are thrown simultaneously. Find the probability that the difference of the numbers on the two dice is 2.

14. A coin is tossed two times. Find the probability of getting at most one head.

15. A letter of English alphabet is chosen at random. Determine the probabiliry that the letter is a consonant.

B. Questions From CBSE Examination Papers

1. A bag contains 14 balls, of which x are white. If 6 more white balls are added to the bag, the probability of drawing a white ball is $\frac{1}{2}$. Find the value of x. **[2011 (T-II)]**

2. 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 the number on the card is : **[2011 (T-II)]**

(a) divisible by 5

(b) a number which is a perfect square.

3. A die is thrown once. Find the probability of getting : **[2011 (T-II)]**

(a) a prime number

(b) a number less than 6

4. 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 **[2011 (T-II)]**

(a) a prime number ? (b) a factor of 8 ?

5. A card is drawn at random from a pack of well shuffled deck of playing cards. Find the probability that the card is : **[2011 (T-II)]**

(a) a king or a jack

(b) a card of spade or an ace

6. A bag contains 2 green, 3 red and 4 black balls. A ball is taken out of the bag at random. Find the probability that the selected ball is (a) not green (b) not black. **[2011 (T-II)]**

7. A bag contains cards numbered from 2 to 26. One card is drawn from the bag at random. Find the probability that it has a number divisible by both 2 and 3. **[2011 (T-II)]**

8. In a leap year, find the probability that there are 53 Tuesdays in the year. **[2011 (T-II)]**

9. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting a red face card. **[2011 (T-II)]**

10. Two dice are thrown simultaneously. Find the probability that the sum of the two numbers appearing on their tops is less than or equal to 10. **[2011 (T-II)]**

11. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability that the card drawn is neither a red card nor a queen. **[2011 (T-II)]**

12. A bag contains 5 red, 8 green and 7 white balls. One ball is drawn at random from the bag. Find the probability of getting neither a green ball nor a red ball. **[2011 (T-II)]**

13. 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. **[2011 (T-II)]**

14. Two dice are thrown once. Find the probability of obtaining : **[2011 (T-II)]**

(a) a total of 6 of numbers on both dice.

(b) the same number on both dice.

15. From a group of 2 boys and 2 girls, two children are selected at random. What is the sample space representing the event. Find the probability that one boy and one girl is selected. **[2011 (T-II)]**

16. A letter is chosen at random from the English alphabet. Find the probability that it is **[2011 (T-II)]**

(a) a vowel (b) a consonant

17. A fair coin is tossed thrice. Find the probability of getting. **[2011 (T-II)]**

(a) No heads (b) at least one head.

18. A box contains cards numbered from 1 to 17. If one card is drawn at random from the box, find the probability that it bears a prime number. **[2011 (T-II)]**

19. From a deck of playing cards all spades are removed, a card is drawn at random from the remaining cards. Find the probability that it is a : **[2011 (T-II)]**

(a) red card (b) black face card

20. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability that card drawn is : **[2011 (T-II)]**

(a) spade or an ace

(b) neither king nor queen

21. Form a deck of playing cards all aces and clubs are removed, a card is drawn at random from the remaining cards. Find the probability that it is : **[2011 (T-II)]**

(a) a black face card. (b) a red card

22. A bag contains cards numbered 3 to 102, one card is drawn at random. Find the probability that it is : **[2011 (T-II)]**

(a) an even number

(b) a number divisible by 5

23. Two dice are thrown together. Determine the probability of 2 coming on the first die and multiple of 3 on other die. **[2011 (T-II)]**

24. Geeta and Sita are friends. What is the probability that both will have **[2011 (T-II)]**

(a) different birthdays ? (b) the same birthday ? (ignoring a leap year)

25. A bag contains 5 black, 7 red and 3 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is : **[2011 (T-II)]**

(a) black or white (b) not black

26. Cards marked with numbers 3, 4, 5, ..., 50 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the drawn card is : **[2011 (T-II)]**

(a) divisible by 7.

(b) is a perfect square.

27. Cards, marked with numbers 5 to 50, are placed in a box and mixed thoroughly. A card is drawn from the box at random. Find the probability that the number on the taken card is :

(a) a prime number less than 10

(b) a number which is a perfact square. **[2008]**

28. Two dice are thrown simultaneously. Find the probability that the sum of the two numbers appearing on the top is less than or equal to 10. **[2008C]**

29. A die is thrown once. What is the probability of getting a number greater than 4? **[2010]**

SHORT ANSWER TYPE QUESTIONS [3 Marks]

A. Important Questions

1. Two dice are thrown simultaneously. What is the probability that the sum of the numbers appearing on the dice is:

(a) 7? (b) a prime number? (c) 1?

2. A bag contains 5 red balls, 8 white balls, 4 green balls and 7 black balls. If one ball is drawn at random, find the probability that it is :

(a) black (b) red (c) not green

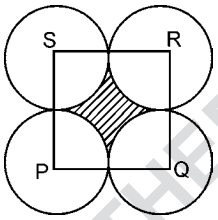
3. A dice has it is six faces marked 0, 1, 1, 1, 6, 6,. Two such dice are thrown together and the total score is recorded.

(a) How many different score-s are available?

(b) What is the probability of getting a total of 7?

4. What is the probability that a number selected at random from the numbers 1, 2, 2, 3, 3, 2, 3, 4, 4, 4, 4 will be their average? **[HOTS]**

5. In the figure, each circle touch other two circles externally. The circles are congruent. If a point is selected at random from the interior of square PQRS, find the probability that it will not be in the shaded region. **[HOTS]**



6. A child's game has 8 triangles, of which 3 are blue and rest are red, and 10 squares of which 6 are blue ad rest are red. One piece is lost at random. Find the probability that it is a : **[HOTS]**

(a) triangle (b) square

(c) square of blue colour.

7. The number of matchsticks in 10 boxes is as follows :

48, 46, 46, 45, 48, 47, 46, 44, 49, 45 one box is selected at random. Find the probability of the box containing : **[HOTS]**

(a) 49 matchsticks

(b) 46 matchsticks

(c) more than 47 matchsticks.

8. A box contains 5 red balls, 3 yellow balls, 3 white balls and 2 black balls. A ball is drawn from the box. Find the probability that it is:

(a) a white ball

(b) a yellow or a black ball

(c) a ball which is not red.

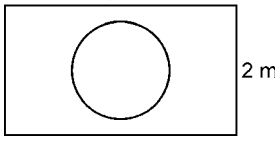
9. A bag contains 24 balls of which x are red, $2x$ are white are $3x$ are blue. A ball is selected at random. What is the probability that it is :

(a) not red? (b) white?

10. In my house the geyser is kept *on* 24 hours a day. Because of the thermostat setting, it automatically *turns off* for a total of $4\frac{1}{2}$ hours a day. A red light is shown when the power is *on*. What is the probability that the light will be

(a) *off* (b) *on* if it is looked at random

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



12. A lot consists of 48 mobile phones of which 42 are good, 3 have only minor defects and 3 have major defects. Saroj will buy a phone if it is good but the trader will buy a mobile if it has no major defect. One phone is seleted at random from the lot. What is the probability that it is **[HOTS]**

(a) acceptable to Saroj?

(b) acceptable to the trader?

13. A die is thrown twice. What is the probability that

(a) 5 will not come up either time?

(b) 5 will come up at least once?

14. In a single throw of two dice, find the probability of getting

(a) a total of 11 (b) doublets

(c) 6 as a product

15. Two dice are numbered 1, 2, 3, 4, 5, 6 and 1, 1, 2, 2, 3, 3 respectively. They are thrown and the sum of the numbers on them is noted. Find the probability getting each sum from 2 to 9 separately. **[HOTS]**

B. Questions From CBSE Examination Papers

1. Three coins are tossed simultaneously. Find the probability of getting. **[2011 (T-II)]**

(a) three heads (b) exactly 2 heads

(c) at least 2 heads

2. A box contains 17 cards numbered 1, 2, 3, ... 16, 17. A card is drawn at random from the box. Find the probability that the number on the drawn card is : **[2011 (T-II)]**

(a) odd (b) even and prime (c) divisible by 3

3. King, queen and jack of hearts are removed from a pack of 52 playing cards and then the pack is well shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of **[2011 (T-II)]**

(a) hearts (b) a queen (c) not a king

4. All the three face cards of spades are removed from a wellshuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting **[2011 (T-II)]**

(a) a black face card (b) a queen

(c) a black card

5. A bag contains cards numbered from 1 to 25, one card is drawn at random from the bag. Find the probability that this card has a number which is divisible by both 2 and 3. **[2011 (T-II)]**

6. Cards numbered from 1 to 64 are placed in a box. A card is drawn at random from the box. Find the probability that the card number on the card drawn is a perfect cube. **[2011 (T-II)]**

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 drawn ball is : **[2011 (T-II)]**

(a) an odd number (b) divisible for 2 or 3

(c) prime number (d) not divisible by 10

8. Two dice are thrown at the same time. Write down all the possible outcomes. What is the probability that the two numbers appearing on the top of the dice **[2011 (T-II)]**

(a) are prime ?

(b) has the sum less than or equal to 12 ?

9. Two dice are thrown together. Find the probability that the product of the numbers on the top of the dice is : **[2011 (T-II)]**

(a) 6 (b) 12 (c) 7

10. A bag contains 5 white balls, 7 red balls, 4 black balls and 2 blue balls. One ball is drawn at random from the bag. What is the probability that the ball drawn is : **[2011 (T-II)]**

(a) white or blue (b) not white

(c) neither white nor black

11. Two dice are thrown simultaneously. Find the probability of getting : **[2011 (T-II)]**

(a) same number on both dice.

(b) different numbers on both the dice.

12. 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 the number on the drawn card is : **[2011 (T-II)]**

(a) divisible by 5

(b) a number which is a perfect square.

13. 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. What is the probability that both will visit the shop on **[2011 (T-II)]**

(a) the same day ? (b) consecutive days ?

14. All the face cards of spades are removed from a pack of 52 playing cards and then the pack is shuffled well. A card is then drawn at random from the remaining pack of cards. Find the probability of getting (a) a black face card, (b) a queen. **[2011 (T-II)]**

15. An urn contains 8 red, 6 white and 4 black balls. A ball is drawn at random from the urn. Find the probability that the drawn ball is : **[2011 (T-II)]**

(a) red or white

(b) neither black nor white

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

A	B	C	D	E	A

The die is thrown at random once. What is the probability of getting (a) A (b) E. **[2011 (T-II)]**

17. From a well shuffled pack of 52 cards, two black kings and two black jacks are removed. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is not a king. **[2011 (T-II)]**

18. 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 : **[2011 (T-II)]**

(a) a two-digit number.

(b) a perfect square number.

(c) a number divisible by 5.

19. A pair of dice is thrown once. **[2011 (T-II)]**

(a) Write sample space for the experiment.

(b) Find the probability of getting an odd number on each dice.

20. From a bag containing 5 red, 6 black and 7 yellow balls, a ball is drawn at random. Find the probability that it is : **[2011 (T-II)]**

(a) not yellow ball (b) neither black nor red

(c) either black or yellow

21. A bag contains 18 balls, out of which x balls are red. **[2011 (T-II)]**

(a) If one ball is drawn at random from the bag, what is probability that it is a red ball.

(b) If 2 more red balls are put in the bag, the probability of drawing a red ball will be $\frac{9}{8}$ times that of the probability of red ball coming in part (a). Find x.

22. Three unbiased coins are tossed. What is the probability of getting **[2011 (T-II)]**

(a) two heads

(b) at least two heads

(c) at most two heads

23. From a well shuffled pack of 52 playing cards, black jacks, black kings and black aces are removed. A card is then drawn at random from the remaining pack. Find the probability of getting : **[2011 (T-II)]**

(a) a red card (b) not a diamond card

24. A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the prbability that it will be a black ball ? If 6 more black balls are put in the box, the probability of drawing a black ball now is double of what it was before. Find x. **[2011 (T-II)]**

25. A bag contains 5 white balls, 7 red balls, 4 black balls and 2 blue balls. One ball is drawn at random from the bag. What is the probability that the ball drawn is : **[2006]**

(a) white or blue

(b) red or black

(c) not white

(d) neither white not black.

26. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is : **[2006]**

(a) a king or a jack (b) a non-ace

(c) a red card

(d) neither a king nor a queen.

27. Find the probability that a number selected at random from the number 1, 2, 3, ..., 35 is a **[2006C]**

(a) prime number (b) multiple of 7

(c) multiple of 3 or 5.

28. 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 : **[2006C]**

(a) a black queen (b) a red card

(c) a black jack

(d) a picture card (jacks, queens and kings are picture cards)

29. A bag conains 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. **[2007]**

30. A box 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 drawn is : **[2007]**

(a) white

(b) neither red nor white

31. All the three face cards of spades are removed from a well-shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting **[2007]**

(a) a black face card (b) a queen

(c) a black card.

32. A box has cards numbered 14 to 99. Cards are mixed thoroughly and a card is drawn from the bag at random. Find the probability that the number on the card, drawn from the box is : **[2009]**

(a) an odd number

(b) a perfact square number

(c) a number divisible by 7.

B. FORMATIVE ASSESSMENT

Activity

Objective : To find the probability of an outcome and compare it with its theoretical probability.

Materials Required : Geometry box, thick white card sheet, sketch pens.

Procedure :

1. On a piece of thick card sheet, draw a circle of radius 5 cm. Now using your compasses, divide the circle into 8 equal parts by marking off angles of 45 at the centre of the circle. Mark points A, B, C, …, H on the circle and join AB, BC, CD, …, GH to get a regular octagon.

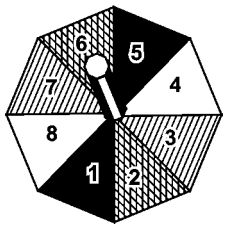


Figure 1

2. Cut off the octagon ABCDEFGH. Insert a small piece of pencil stub to make a top as shown in figure 1.

   Number the triangles 1, 2, 3, …, 8.

3. Spin the top 40 times and record in table 1, the frequency with which each of the numbers 1 to 8 touches the table or floor.
4. Calculate the experimental probability of obtaining each number.
5. Calculate the theoretical probability of obtaining each score.
6. Draw a combined bar graph to compare the probabilities obtained in steps 4 and 5 above. Write your observations.

Table 1

Number	Tally-marks	Frequency
1	𝍸	3
2	𝍸 I	4
3	𝍸 𝍸 III	8
4	𝍸 I	5
5	𝍸 𝍸 III	8
6	II	2
7	𝍸 I	5
8	𝍸 I	5
	Total	40

Table 2

Number	Experimental Probability	Theoretical Probability
1	$\frac{3}{40}$	$\frac{5}{40}$
2	$\frac{4}{40}$	$\frac{5}{40}$
3	$\frac{8}{40}$	$\frac{5}{40}$
4	$\frac{5}{40}$	$\frac{5}{40}$
5	$\frac{8}{40}$	$\frac{5}{40}$
6	$\frac{2}{40}$	$\frac{5}{40}$
7	$\frac{5}{40}$	$\frac{5}{40}$
8	$\frac{5}{40}$	$\frac{5}{40}$

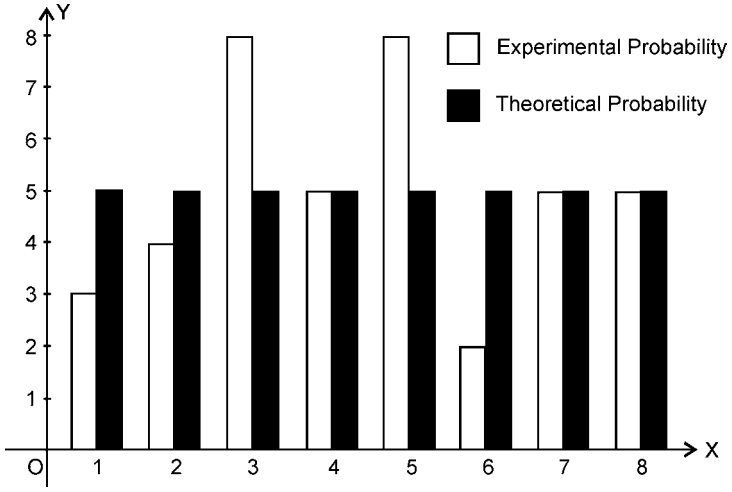


Figure 2

Observations : The experimental and theoretical probabilities are equal in three out of eight cases as seen in table 2 and figure 2. Thus, there is a wide difference between the experimental and theoretical probability of an event in the activity performed above.