PROBABLITY

IMPORTANT CONCEPTS:-
TAKE A LOOK

1. **Probability:-** The theoretical probability of an event E, written as P(E) is defined as.

   P(E)= Number of outcomes favourable to E
         Number of all possible outcomes of the experiment

   Where we assume that the outcomes of the experiment are equally likely.

2. The probability of a sure event (or certain event) is 1.

3. The probability of an impossible event is 0.

4. The probability of an Event E is number P (E) such that $0 \le P(E) \le 1$.

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

6. For any event E,$P(E)+P(\overline{E})=1$, where $\overline{E}$ stands for not E, E and $\overline{E}$ are called complementary event.

7. Performing experiments:-
   a. Tossing a coin.
   b. Throwing a die.
   c. Drawing a card from deck of 52 cards.

8. **Sample space:-**The set of all possible outcomes in an experiment is called sample space.

LEVEL-I

1. Write a sample space of
   a. Tossing a coin.
   b. Throwing a die.   Ans-{H,T},{1,2,3,4,5,6}

2. Define probability (Theoretical probability of an event).

3. A card is drawn from a well-shuffled pack of 52 cards what is the probability that it is an ace?   Ans-1/13

4. A dice is thrown once. Find the probability of getting a number greater than 3.
                                                              Ans : ½

5. What is the probability that a number selected from the number 1,2,3………………16 is prime number?
                                                              Ans-3/8

6. A letter is chosen at random from the English alphabet. Find the probability that the letter chosen precedes 'g'.
                                                              Ans-3/13

7. Find the probability of getting a red heart.   Ans-1/4

8. A coin is tossed twice. Find the probability of getting at least one head.   Ans-3/4

9. What is the probability of a sure event?   Ans-1

LEVEL-II

1. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting.
   i. An ace
   ii. A face card   Ans- i- 1/13
                                                                              ii- 3/13

2. A bag contains 5 red balls, 4 green ball and 7 white balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) White (II) neither Red nor White.
                                                                      Ans- (i) 7/16
                                                                          (II)1/4

3. Find the probability of getting 53 Friday in a leap year.   Ans-2/7

4. Two dice are thrown simultaneously. What is the probability that.
   i. 5 will come up on at least one?
   ii. 5 will come up at both dice?
                                                                      Ans-(i)11/36
                                                                          (ii)1/36

5. Two coins are tossed once. Find the probability of getting.
   i. Exactly one head   Ans-(i)1/2
   ii. Almost one head   (ii)3/4

6. In a lottery there are 10 prizes and 25 blank. Find the probability of getting a prize.
                                                                      Ans-2/7

7. The king, the queen and the jack of clubs are removed from a deck of 52 playing cards and the remaining cards are shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of .
   i. Heart   Ans-(i)13/49 (ii)3/49 (iii)10/49
   ii. Queen
   iii. Clubs

LEVEL - III

1. Nidhi and Nisha are two friends. What is the probability that both will have
   a. Same birthday   Ans-(a) 1/365
   b. Different birthday (ignore the leap year)   (b)364/365

2. A box contains 20 balls bearing number 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.
   a. An odd number   Ans-(a)1/2 (b)13/20 (c)2/5
   b. divisible by 2 or 3
   c. Prime number

3. A card is drawn at random from a well shuffled deck of 52 cards. What is the probability of drawing
   a. King or a spade   Ans-(a) 4/13 (b)3/4 (c)5/52
   b. A non spade
   c. Either a king or a 10 of heart

4. Tom was born in February 2000. What is the probability that he was born on 13th Feb?
                                                                      Ans-1/29

5. Are the following outcomes equally likely or not? A baby is born " It is a boy or a girl".
                                                                      Ans-Yes equally likely

6. Find the probability of getting 53 Mondays in a leap year 53 Tuesday in a non leap year.
                                                                      Ans-2/7 and 1/7

7. A letter is selected from the letter of word MATHEMATICS. What is the probability that it is M?
                                                                      Ans-2/11

8. In an N.C.C camp there are 20 boys and 15 girls. The best cadet is to be chosen. What is the probability that the best cadet is a girl? Ans-3/7

9. Out of 400 bulbs in a box 15 bulbs are defective one bulb is taken out at random from the box. Find the probability that the drawn bulb is not defective. Ans-77/80

Self evaluation questions

1. A bag contains 5 white balls, 7 red balls and 2 blue balls. One ball is drawn at random from the bag what is probability that bulb drawn is

   a. White or blue
   b. Black or red
   c. Not white

2. A child has a die whose six faces show the letters as given below.
        A   B   C   D   E   A
      If a die is thrown once find probability of getting A and D.

3. Find the probability of getting 53 Sundays in a leap year.

4. From a well shuffled pack of 52 cards, a card is drawn at random. Find the probability that it is a:-
   a. Spade
   b. King
   c. Club
   d. Queen
   e. A red card
   f. The black king
   g. The queen of diamonds.

5. Two dice are thrown at the same time find the probability of getting.
   a. Same number on both dice.
   b. Different number on both dice.

6. Someone is asked to take a number from 1 to 100. Find the probability that it is not a prime number.

7. Card marked with number 5 to 50 are placed in a box and mixed throughout. A card is drawn from the box at random. Find the probability that the number on the taken out card is

   a. A Prime number less than 10
   b. A number which is a perfect square

8. There are 20 cards numbered 1,2,3,………20 in a box. One card is drawn. Find the probability that the number on the card is
   a. A number divisible by 6
   b. A number divisible by 7

FORMATIVE ASSESSMENT – III

TIME: 1 ½ HR   **MARKS : 40**

SECTION A
(EACH QUESTION CARRIES 1 MARK)

Q1. Which of the following equations has two distinct real roots?

   A). $2X^2 + 3\sqrt{2}X + 9/4 = 0$ b). $x^2 + x - 5 = 0$

   C). $x^2 + 3x + 2\sqrt{2} = 0$ d). $5x^2 - 3x + 1 = 0$

Ans : (b)

Q2. The sum of first 16 terms of the A.P. : 10,6,2, …………… is.

   a). -320   b). 320   c) -352   d). -400.

Ans :(a)

Q3: The point (-4,0),(4,0) ,(0,3) are the vertices of a .

   a). right angled triangle   b). Isosceles triangle   c). Equilateral triangle

   d).scalene triangle

Ans : (b)

Q4: A pole 6m high casts a shadow $2\sqrt{3}$m long an the ground, then the sun's elevation is.

a). 60^0 b). 45^0 c). 30^0 d). 90^0

Ans :(a)

Q5. If radii of two concentric circles are 4cm and 5cm,

   Then the length of each chord of one circle which is tangent to other circle is:

a). 3cm   b).6cm   c). 9cm   d). 1cm

Ans : (b)

SECTION B
(EACH QUESTION CARRIES 2 MARKS)

Q6.Find a relation between x and y such that the point (x,y) is equidistant from the point (3,6)
   and(-3,4).

Ans: 3x+y-5=0.

Q7.Check whether the following equation is a quadratic equation.

$x^2 - 4x + 6 = 0$ Ans: yes

Q8.The angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of the tower is 30^0. Find the height of the tower.

Ans: $10\sqrt{3}$ m.

Q9.Find the sum of the following A.P.:

-37,-33,-29,………………….. to 12 terms.

Ans: $S_{12} - 180$

Q10. The length of a tangent from a point A at distance 5cm from the center of the circle is 4cm.
 Find the radius of the circle.

Ans: -3cm

Q11. Find the distance between the points [-8/5,2] and [2/5,2].

Ans: 2 units.

SECTION C
(EACH QUESTION CARRIES 3 MARKS)

Q12.If (1,2),(4,y),(x,6) and (3,5) are the vertices of a ‖ gm taken in order, find x and y

Ans: x=6; y=3.

Q13. The angle of elevation of the top of a building from the foot of the tower is 30^0 and the angle of elevation of the top of tower from the foot of the building is 60^0 .If the tower is 50 meter high find the height of the building.

Ans: 16 2/3 m.

Q14. If triangle ABC is drown to circumscribe a circle of radius 4cm, such that the segment BD
And DC into which BC is divided by the point of contact D are of the length 8cm and 6cm respectively. Find the sides AB and AC (fig.)
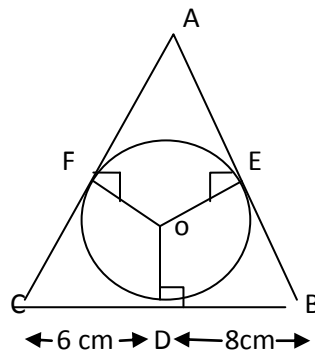
Q15. Find the value of k for the following quadratic equation, so that they have two equal roots.

KX(X-2)+6=0

Ans: k=6.

Q16. Which term of the A.P. 3,15,27,39,…………………….will be 132 more than its 54th term.

Ans: 65th term

SECTION D
(EACH QUESTION CARRIES 4 MARKS)

Q17. Two water taps together can fill a tank in 9 (3/8) hours. The tap of longer diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.
Ans: longer tap= 15 hours. Smaller tap=25 hours.

Q18. If the angle of elevation of a cloud from a point h meters above a lake is α and the depression of its reflection in the lake β , prove that the height of the cloud is

$$\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$$

OR

The length h of tangents drown from an external point to a circle are equal, prove it.