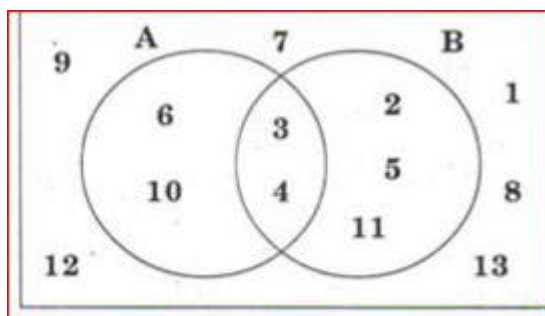
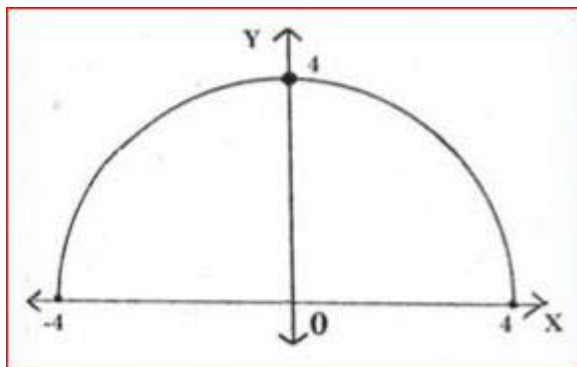


1. Find sum to "n" terms of the sequence  $4 + 44 + 444 + \dots$
2. Solve  $\sin 2x - \sin 4x + \sin 6x = 0$
3. One card is drawn at random from a pack of 52 playing cards. Find the probability that:
  - a. The card drawn is black
  - b. The card drawn is a face card
  - c. The card drawn is a black face card
4. (a) If  $A = \{a, b, c\}$ , then write the power set  $P(A)$ .  
 (b) If the number of subsets with 2 elements of a set P is 10, then find the total number of elements in set P,  
 (c) Find the number of elements in the power set of P.
5. Consider the Venn diagram of the Universal Set  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$



- a. Write sets A and B in Roster form
  - b. Verify  $(A \cap B)' = A' \cap B'$
  - c. Find  $n(A \cap B)'$
6. The figure shows the graph of a function  $f(x)$ , which is a semi-circle centred at the origin:



- a. Write the domain and range of  $f(x)$
- b. Define the function of  $f(x)$

7. Consider a point A (4, 8, 10) in space

- Find the distance of the point A from XY - plane
- Find the distance of the point A from X- axis
- Find the ratio in which the line segment joining the point A and B (6, 10, -8) is divided by YZ- plane

8. Consider the quadratic equation,  $x^2 + x + 1 = 0$ .

- Solve the quadratic equation
- Write the polar form of one of the roots
- If the two roots of the given quadratic are  $\alpha$  and  $\beta$ , show that  $\alpha^2 = \beta$ .

9. Consider the following data:

Class	10-20	20-30	30-40	40-50	50-60
Frequency	6	15	13	7	9

- Calculate the mean of the distribution
- Find the standard deviation of the distribution
- Find the coefficient of variation of the distribution

10. Consider the statement " $10^{2n-1} + 1$  is divisible by 11". Verify that P(1) is true and then prove the statement by using mathematical induction.

11. (a) Solve the inequality  $\frac{x}{3} > \frac{x}{2} + 1$
- (b) Solve the system of inequalities graphically:
- $$\begin{aligned} 2x + y &> 6 \\ 3x + 4y &\leq 12 \end{aligned}$$

12. (i) The distance between the points (1, -2, 3) and (4,1,2) is \_\_\_\_\_

- a. 12      (b) 19      (c) 11      (d) 15

(ii) The centroid of a triangle ABC is at the point (1, 2, 3). If the coordinates of A and B are (3, -5, 7) and (-1, 7, -6) respectively. Find the coordinate points of C.

13. (a) Find the variance for the observations 2,4,6,8 and 10.

(b) Consider the frequency distribution

x	5	10	15	20	25
f	7	4	6	3	5

14. (i)  $\sin 225^\circ =$  \_\_\_\_\_

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

(ii) Find the principal and general solutions of  $\sin x = -\frac{\sqrt{3}}{2}$

(iii) Prove that

$$\tan\left[\frac{A-B}{2}\right] = \frac{a-b}{a+b} \cot\frac{C}{2}$$

15. (a) Find the equation of the line passing through the points (3, -2) and (-1, 2)  
 (b) Reduce the equation  $3x + y - 8 = 0$  into normal form

(c) If the angle between two lines is  $\frac{\pi}{4}$  and slope of one of the lines is  $1/2$ , find the slope of the other line.

16. Which one among the following is the interval corresponding to the inequality  $-2 < x < 3$ ?

- a.  $[-2, 3]$  (b)  $[-2, 3)$  (c)  $(-2, 3]$  (d)  $(-2, 3)$

(b) Solve the following inequalities graphically:

$$\begin{aligned} 2x + y &\geq 4 \\ x + y &\leq 3 \\ 2x - 3y &\leq 6 \end{aligned}$$

17. (a) Write the negation of the statement :  
 "Every natural number is greater than zero"

(b) Verify by the method of contradiction:  
 "P:  $\sqrt{13}$  is irrational"

18. (a)  $A = \{x / x \text{ is a prime number, } x \leq 6\}$ .

- (i) Represent A in the Roster form  
 (ii) Write the Power set of A

(b) Out of the 25 members in an office, 17 like to take tea, 16 like to take coffee. Assume that each takes at least one of the two drinks.

How many like:

- (i) Both Coffee and Tea?  
 (ii) Only Tea and not Coffee?

19. (a) Number of terms in the expansion of  $\left[x + \frac{1}{x}\right]^{20}$  is \_\_\_\_\_

- (i) 19 (ii) 20 (iii) 21 (iv) 22

(b) Consider the expansion of  $\left[3x^2 - \frac{1}{3x}\right]^9$ . Find the coefficient of  $x^6$  and the term independent of  $x$ .

20. (i) If the first three terms of an A.P. are  $x-1$ ,  $x+1$ ,  $2x+3$ , then  $x$  is \_\_\_\_\_

a. -2 (b) 0 (c) 2 (d) 4

(ii) Find the sum of “ $n$ ” terms of the sequence

$1x^2 + 2x^3 + 2x + 3$ , then  $x$  is \_\_\_\_\_

(iii) The  $n$ th term of a G.P.  $5, -5/2, 5/4, -5/8, \frac{5}{1024}$  is  $\frac{5}{1024}$ . Find the “ $n$ ”

