

SRE VIDYASAAGAR MATRIC.HR.SEC.SCHOOL,SANKARI.**DEERAN CHINNAMALAI NINAIVUCHINNAM- R.S. ROAD 8344554224, 8344554225, 9489977251.****X MATHS 2024 Important 5 marks S MATHESH B.Sc.,MSc.,B.Ed.,Maths 7373556433**

1. Let $A = \{x \in W \mid x < 2\}$, $B = \{x \in N \mid 1 < x \leq 4\}$ and $C = \{3, 5\}$. Verify that
- i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$ ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
2. If the function f is defined by $f(x) = \begin{cases} x + 2 & : x > 1 \\ 2 & : -1 \leq x \leq 1 \\ x - 1 & : -3 < x < 1 \end{cases}$
- i) $f(3)$ (ii) $f(0)$ (iii) $f(-1.5)$ (iv) $f(2) + f(-2)$
3. $f(x) = x - 1$, $g(x) = 3x + 1$ and $h(x) = x^2$. Show that i) $(f \circ g) \circ h = f \circ (g \circ h)$
ii) $f(x) = x - 4$, $g(x) = x^2$ and $h(x) = 3x - 5$
4. $f(x) = 2x - 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$ Show that $f \circ (g \circ h) \neq (f \circ g) \circ h$
5. Let $A =$ The set of all natural numbers less than 8, $B =$ The set of all prime numbers less than 8, $C =$ The set of even prime number. Verify that $A \times (B - C) = (A \times B) - (A \times C)$
6. Let $A = \{1, 2, 3, 4\}$ and $B = \{2, 5, 8, 11, 14\}$ be two sets. Let $f: A \rightarrow B$ be a function given by $f(x) = 3x - 1$. Represent this function
(i) by arrow diagram (ii) in a table form (iii) as a set of ordered pairs
(iv) in a graphical form
7. Let $f: A \rightarrow B$ be a function defined by $f(x) = \frac{x}{2} - 1$, where $A = \{2, 4, 6, 10, 12\}$, $B = \{0, 1, 2, 4, 5, 9\}$. Represent f by (i) set of ordered pairs
(ii) a table (iii) an arrow diagram (iv) a graph
8. Find the greatest number consisting of 6 digits which is exactly divisible by 24, 15, 36?
9. The sum of first n , $2n$ and $3n$ terms of an A.P. are S_1 , S_2 , and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.
10. Find the sum of the Geometric series $3 + 6 + 12 + \dots + 1536$.
11. The product of three consecutive terms of a Geometric Progression is 343 and their sum is $\frac{91}{3}$. Find the three terms.
12. Rekha has 15 square colour papers of sizes 10cm, 11cm, 12 cm, ..., 24cm. How much area can be decorated with these colour papers?
13. Find the sum to n terms of the series $3 + 33 + 333 + \dots$ terms.
14. Find the HCF of 396, 504, 636.
15. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.
16. Find the sum of the following series $10^3 + 11^3 + 12^3 + \dots + 20^3$
17. If $p_1 \times p_2 \times p_3 \times p_4 = 113400$ where p_1, p_2, p_3, p_4 , are primes in ascending order and $x_1, x_2, x_3, x_4, \dots$, are integers, find the value of $p_1, p_2, p_3, p_4, \dots$, and $X_1, x_2, x_3, x_4, \dots$.
18. Solve the following system of linear equations in three variables
 $x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$
19. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$.

20. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.
21. Solve $\begin{bmatrix} x^2 \\ y^2 \end{bmatrix} + 2 \begin{bmatrix} -2x \\ -y \end{bmatrix} = \begin{bmatrix} 5 \\ 8 \end{bmatrix}$
22. Solve $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{bmatrix}$ Show that $(AB)^T = B^T A^T$
23. $ax^4 - bx^3 + 361x^2 + 220x + 100$ is a perfect square, Find the values of a & b
24. If α, β are the roots of the equation $2x^2 - x - 1 = 0$, then form the equation whose roots are (i) $\frac{1}{\alpha}, \frac{1}{\beta}$ (ii) $2\alpha + \beta$ (iii) $2\beta + \alpha$
25. Find the GCD of the polynomials $3x^4 + 6x^3 - 12x^2 - 24x$, $4x^4 + 14x^3 + 8x^2 - 8x$.
26. $x^4 - 8x^3 + mx^2 + nx + 16$ Find the values of m and n if the following polynomials are perfect squares.
27. Simplify $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$
28. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$
29. Discuss the nature of solutions of the following system of equations $\frac{y+z}{4} = \frac{z+x}{3} = \frac{x+y}{2}$, $x+y+z = 27$
30. Solve $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$ Show that $(AB)^T = B^T A^T$
31. Basic Proportionality Theorem (BPT) or Thales theorem state and prove.
32. Show that the angle bisectors of a triangle are concurrent
33. Pythagoras Theorem state and prove
34. If 5th, 12th and 15th terms of an A.P are x,y,z respectively then find the value of $3x - 10y + 7z$.
35. Find the area of the quadrilateral whose vertices are at $(-9,0), (-8,6), (-1,-2)$ and $(-6, -3)$
36. Find the equation of a straight line parallel to Y axis and passing through the point of intersection of the lines $4x + 5y = 13$ and $x - 8y + 9 = 0$.
37. Find the area of the quadrilateral whose vertices are at $(-9, -2), (-8, -4), (2, 2)$ and $(1, -3)$
38. Find the equation of a straight line
(i) passing through $(1, -4)$ and has intercepts which are in the ratio 2:5
(ii) passing through $(-8, 4)$ and making equal intercepts on the coordinate axes
39. Find the equation of a straight line through the point of intersection of lines $8x + 3y = 18$, $4x + 5y = 9$ and bisecting the line segment joining the points $(5, -4)$ and $(-7, 6)$.
40. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through $(-3, 8)$. Find its equation.
41. If vertices of a quadrilateral are at $A(-5, 7)$, $B(-4, k)$, $C(-1, -6)$ and $D(4, 5)$ and its area is 72 sq.units. Find the value of k.

42. Find the equation of the median and altitude of $\triangle ABC$ through A where the vertices are $A(6,2)$, $B(-5,-1)$ and $C(1,9)$
43. Find the equation of the median and altitude of $\triangle ABC$ through A where the vertices are $A(2,1)$, $B(6,-1)$ and $C(4,11)$
44. A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45° . What is the approximate speed of the boat (in km / hr), assuming that it is sailing in still water? ($\sqrt{3} = 1.732$).
45. An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats. ($\sqrt{3} = 1.732$).
46. If $\operatorname{cosec} \theta + \cot \theta = P$, then prove that $\cos \theta = \frac{P^2 - 1}{P^2 + 1}$
47. The top of a 15 m high tower makes an angle of elevation of 60° with the bottom of an electronic pole and angle of elevation of 30° with the top of the pole. What is the height of the electric pole?
48. The horizontal distance between two buildings is 140 m. The angle of depression of the top of the first building when seen from the top of the second building is 30° . If the height of the first building is 60 m, find the height of the second building. ($\sqrt{3} = 1.732$)
49. A conical container is fully filled with petrol. The radius is 10m and the height is 15 m. If the container can release the petrol through its bottom at the rate of 25 cu. meter per minute, in how many minutes the container will be emptied. Round off your answer to the nearest minute
50. Arul has to make arrangements for the accommodation of 150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by a cone. Each person occupies 4 sq.m of the space on ground and 40 cu.meter of air to breathe. What should be the height of the conical part of the tent if the height of cylindrical part is 8 m?
51. Seenu's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid. The sump has dimensions 2 m \times 1.5 m \times 1 m. The overhead tank has its radius of 60 cm and height 105 cm. Find the volume of the water left in the sump after the overhead tank has been completely filled with water from the sump which has been full, initially.
52. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of the model that Nathan made
53. The slant height of a frustum of a cone is 4 m and the perimeter of circular ends are 18 m and 16 m. Find the cost of painting its curved surface area at $\text{₹}100$ per sq. m.

54. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.
55. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.
56. A chess board contains 64 equal squares and the area of each square is 6.25 cm^2 . A border around the board is 2cm wide. Find the length of the side of the chess board?
57. Find the coefficient of variation of 24, 26, 33, 37, 29, 31.
58. The rainfall recorded in various places of five districts in a week are given below. Find its standard deviation.

45	50	55	60	65	70
5	13	4	9	5	4

- Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also, measure the lengths of the tangents
- Draw a tangent to the circle from the point P having radius 3.6 cm, and centre at O. Point P is at a distance 7.2 cm from the centre.
- Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from that point
- Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle.
- A garment shop announces a flat 50% discount on every purchase of items for their customers. Draw the graph for the relation between the Marked Price and the Discount. Hence find
 - the marked price when a customer gets a discount of Rs.3250
 - the discount when the marked price is Rs.2500
- Graph the following linear function $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph.
Also (i) find y when $x = 9$ (ii) find x when $y = 7.5$.
- A two wheeler parking zone near bus stand charges as below.

4	8	12	24
60	120	180	360

- Check if the amount charged are in direct variation or in inverse variation to the parking time. Graph the data. Also (i) find the amount to be paid when parking time is 6 hr; (ii) find the parking duration when the amount paid is Rs.150.
- Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Jeyanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively. Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr
 - Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find,
 - y when $x = 3$ and (ii) x when $y = 6$.