

Vedanta's

11-DAYS PACK



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for

SEE PREPARATION

[OPT-I (Mathematics)]

[Rapid Revision Pack for 11th HOUR]

Daily Routine

Days	Chapters
1	Function + Angle between Two Straight Lines
2	Standard Deviation + Multiple/ Sub-Multiple Angles
3	Matrix + Vector
4	Transformation of Trigonometric Formulae + Equation and Graph
5	Mean Deviation + Pair of straight Lines
6	Polynomials + Height and Distance
7	Continuity + Conic Section / Circle
8	Conditional Trigonometric Identities + Inversion Transformation
9	Combined Transformation + Quartile Deviation
10	Sequence and Series + Matrix Transformation
11	Trigonometric Equations + LPP

DAY-1

(FUNCTION + ANGLE BETWEEN TWO STRAIGHT LINES)

FUNCTION...

A. VERY SHORT ANSWER QUESTIONS

- What type of algebraic function is defined by $f(x) = ax^2 + bx + c$? *Ans: Quadratic function*
- Define constant function. *Ans: A function $f: A \rightarrow B$ defined by $f(x) = c$, for any constant c*
- What do you mean by identity function? *Ans: A function $f: A \rightarrow B$ defined by $f(x) = x$, for all $x \in A$*
- Write the nature of graph of constant function. *Ans: parallel to x-axis*
- Write the nature of graph of identity function. *Ans: equally inclined to both the positive axes*
- Define composite function. *Ans: If $f: A \rightarrow B$ and $g: B \rightarrow C$ are any two functions then a function defined from A to C*
- If $f: A \rightarrow B$ and $g: B \rightarrow C$ be two functions, how the function defined from A to C is denoted? *Ans: $g \circ f$*
- Under what condition, the inverse of a function is possible? *Ans: One to one and onto*
- What do you mean by inverse function? *Ans: If $f: A \rightarrow B$ is a 1-1 and onto function, a function defined from B to A*
- Define trigonometric function *Ans: A function involving trigonometric ration*
- What are the maximum and minimum value of $y = \cos x$? *Ans: 1 and -1*
- Write the range of the function $f(x) = \sin x$. *Ans: -1 to +1 inclusive or $R = [-1, 1]$*
- What is the period of the function $f(x) = \sin x$? *Ans: 2π*
- Write the period of the function $f(x) = \cos x$. *Ans: 2π*
- What is the period of the function $f(x) = \tan x$? *Ans: π*

B. SHORT ANSWER QUESTIONS

- If $f = \{(-1, -3), (0, 0), (1, 3)\}$ and $g = \{(-3, -1), (0, 2), (3, 5)\}$, show the function $g \circ f$ in an arrow diagram and find it in ordered pair form. *Ans: $\{(-1, -1), (0, 2), (1, 5)\}$*
- Define composite function. If $f = \{(1, 3), (2, 4), (3, 5)\}$ and $g = \{(3, 1), (4, 2), (5, 3)\}$, then show $(f \circ g)$ in arrow-diagram. Write the ordered pairs of $(f \circ g)$. *Ans: $\{(3, 3), (4, 4), (5, 5)\}$*
- If $f(x) = x + 1$ and $g(x) = 2x + 1$, find $g \circ f(x)$. *Ans: $2x + 3$*
- If $f(x) = 3x + 2$ and $g(x) = x + 2$, find $f \circ g(4)$. *Ans: 20*
- Define inverse function. If $f(x) = 2x - 1$, find $f \circ f(-1)$. *Ans: -7*
- If $g(x) = \frac{x+1}{2}$ and $h(x) = 2x - 1$ are two functions, prove that $h \circ g(x)$ is an identity function.
- If $f(x) = \frac{2x+1}{5}$ and $g(x) = \frac{5x-1}{2}$ are two functions, prove that $f \circ g(x)$ is an identity function.
- If $f: x \rightarrow 3x + b$ and $ff(2) = 12$, find the value of b . *Ans: -3/2*
- If $f(x) = 3x - 2$ and $f \circ g(x) = 6x - 2$, find $g(x)$. *Ans: $2x$*
- If $f(x) = 2x - 3$, find the value of $f^{-1}(x)$. *Ans: $f^{-1}(x) = \frac{x+3}{2}$*
- If $f(x) = 5x - 1$, find the value of $f^{-1}(4)$. *Ans: 1*
- If $f^{-1}(x) = \frac{2x+1}{3}$, find the value of $f(x)$. *Ans: $f(x) = \frac{3x-1}{2}$*

C. LONG ANSWER QUESTIONS

- If $f(x) = 3x + 4$ and $g(x) = 2(x + 1)$, prove that $(f \circ g)(x) = (g \circ f)(x)$. Also, find $f^{-1}(2)$. *Ans: -2/3*
- If $f(x) = 8 - 3x$, evaluate $f^{-1}(-4)$ and $f \circ f(2)$. *Ans: 4, 2*
- If $f(x) = 2x + 1$ and $g(x) = x - 5$ then find the value of $f^{-1} \circ g^{-1}(3)$. *Ans: 5*
- If $f(x) = 3x + a$ and $f \circ f(6) = 10$, find the value of 'a' and $f^{-1}(4)$. *Ans: -11, 5*

32. If $f(x) = 4x + 5$ and $(fog)(x) = 8x + 13$, find the value of x such that $(gof)(x) = 28$. Ans: 2
33. If $f(x) = 2x - 1$, $g(x) = \frac{4x + 3}{5}$ and $fog^{-1}(x) = 5$, find the value of x . Ans: 3
34. If $f(x) = 4x - 17$, $g(x) = \frac{2x + 8}{5}$ and $ff(x) = g^{-1}(x)$, find the value of x . Ans: 6
35. Given that $f(x) = \frac{2x + 5}{8}$ and $g(x) = 3x - 4$ are two functions. If $(fog)^{-1}(x)$ is an identity function, find the value of x . Ans: $-\frac{3}{2}$

ANGLE BETWEEN TWO STRAIGHT LINES...

A. VERY SHORT ANSWER QUESTIONS

1. If the slopes of two straight lines are m_1 and m_2 respectively and θ be the angle between them, write the formula for $\tan\theta$. Ans: $\tan\theta = \pm \frac{m_1 - m_2}{1 + m_1 m_2}$
2. If two straight lines $y = m_1 x + c_1$ and $y = m_2 x + c_2$ are parallel to each other, write the relation between m_1 and m_2 . Ans: $m_1 = m_2$
3. Write the condition of two straight lines $y = m_1 x + c_1$ and $y = m_2 x + c_2$ being perpendicular (orthogonal) to each other. Ans: $m_1 \times m_2 = -1$

B. SHORT ANSWER QUESTIONS

4. Find the slopes of two straight lines $3x + 4y + 5 = 0$ and $6x + 8y + 7 = 0$ and write the relation between them. Ans: parallel
5. Prove that straight line passing through the points $(3, -4)$ and $(-2, 6)$ and the straight line having equation $2x + y + 3 = 0$ are parallel.
6. If the lines with equations $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$ are parallel, show that $a_1 b_2 = a_2 b_1$.
7. If a line passing through the points $(4, -p)$ and $(-2, 6)$ is parallel to the line $2y + 3x = 4$, find the value of p . Ans: 3
8. If the lines $3x + my = 5$ and $\frac{x}{2} + \frac{y}{3} = 1$ are parallel to each other, find the value of m . Ans: 2
9. Find the slopes of two straight lines $3x - 2y + 4 = 0$ and $2x + 3y + 10 = 0$ and write the relation between them. Ans: perpendicular
10. If lines $px + qy + r = 0$ and $lx + my + n = 0$ are perpendicular to each other, show that: $pl + qm = 0$.
11. If the line $kx - 3y + 6 = 0$ is perpendicular to the line joining the points $(4, 3)$ and $(5, -3)$, find the value of k . Ans: $\frac{1}{2}$
12. Find the acute angle between the lines with slopes 2 and -3. Ans: 45°
13. Find the acute angle between the lines whose slopes are $\sqrt{3}$ and $-\sqrt{3}$. Ans: 60°
14. Find the acute angle between the lines $4x - y + 7 = 0$ and $3x - 5y = 1$. Ans: 45°

C. LONG ANSWER QUESTIONS

15. Find the equation of a line passing through the point $(4, 1)$ and parallel to the line $2x + 5y = 3$. Ans: $2x + 5y - 13 = 0$
16. Find the equation of a straight line which is parallel to the line $2x + y - 4 = 0$ and making an intercept of length 2 units along y -axis. Ans: $2x + y = 2$
17. Find the equation of the line passing through the centroid of ΔPQR with vertices $P(3, 3)$, $Q(-2, -6)$ and $R(5, -3)$ and parallel to the line QR . Ans: $3x - 7y = 20$
18. Find the equation of a line passing through $(3, 2)$ and perpendicular to the line $4x - 3y - 10 = 0$. Ans: $3x + 4y = 17$
19. Find the equation of the straight line which passes through the point $(-2, -3)$ and is perpendicular to the line $5x + 7y = 14$. Ans: $7x - 5y - 1 = 0$
20. Determine the equation of the line passing through the mid-points of the line joining the points $(3, 4)$ and $(-1, -6)$ and perpendicular to the line $3x - 8y + 7 = 0$. Ans: $8x + 3y - 5 = 0$
21. In a rhombus PQRS, the equation of a diagonal QS is $5x - 7y + 12 = 0$ and the coordinates of the point P are $(2, -3)$, find the equation of the diagonal PR. Ans: $7x + 5y + 1 = 0$

22. The points M(3, 4), N(-1, 1) and P(5, -1) are the vertices of a triangle MNP. Find the equation of the altitude of the triangle MNP drawn from the point N(-1, 1). Ans: $2x - 5y + 7 = 0$.
23. The equation of a diagonal AC of a square ABCD is $3x - 4y + 10 = 0$ and the coordinates of vertex B are (4, -5). Find the equation of diagonal BD. Ans: $4x + 3y = 1$
24. The vertices of a ΔABC are A(3, 4), B(-2, 2) and C(3, -3). AD is also perpendicular drawn from the vertex A on the opposite side BC. Find the equation of the AD. Ans: $x - y + 1 = 0$
25. Find the equation of the altitude of triangle ABC with vertices A(2, 3), B(-4, 1) and C(2, 0) drawn from the vertex A(2, 3). Ans: $6x - y = 9$
26. Find the equation of the perpendicular bisector of a line which is formed by joining the points M(2, 5) and N(8, -1). Ans: $x - y = 3$
27. Determine the equation of the perpendicular bisector of the line segment joining the points (3, 5) and (-7, 3). Ans: $5x + y + 6 = 0$
28. The points A and B have co-ordinates (3, -1) and (7, 1) respectively. Find the equation of the perpendicular bisector of AB. Ans: $2x + y - 10 = 0$
29. Given that A (3, 5) and C (7, 9) are the opposite vertices of a rhombus ABCD, find the equation of the diagonal BD. Ans: $x + y = 12$
30. P (0, -1) and R (10, 7) are the opposite vertices of a square PQRS, find the equation of the diagonal QS. Ans: $5x + 4y - 37 = 0$
31. If (2, 3) and (-6, 5) are the end points of one of the diagonal of a square, find the equation of the other diagonal. Ans: $4x - y + 12 = 0$
32. Find the equation of the line which passes through the point of intersection of the lines $3x + 4y = 7$ and $5x - 2y = 3$ and perpendicular to the line $2x + 3y = 5$. Ans: $3x - 2y = 1$
33. Find the equation of a straight line passing through a point (2, -1) and making an angle of 45° with the straight line having equation $6x + 5y - 2 = 0$. Ans: $11x - y = 23$ and $x + 11y + 9 = 0$
34. Find the equation of the straight lines passing through the point (5, 0) and making an angle of 45° with the line $4x - 5y + 9 = 0$. Ans: $x + 9y = 5$ and $9x - y = 45$

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
 B. **Excellent**
 C. **Very Good**
 D. **Good**

DAY-2

(S.D. + MULTIPLE/SUB-MULTIPLE ANGLES)

STANDARD DEVIATION...

A. SHORT ANSWER QUESTIONS

1. In a continuous series, if $N = 50$, mean $(\bar{x}) = 20$ and $\sum f(m - \bar{x})^2 = 1250$, find the standard deviation and its coefficient.
 Ans: 5, 0.25
2. In a grouped data, $N = 100$, $\sum fm = 3100$ and $\sum fm^2 = 112800$, find the standard deviation and its coefficient.
 Ans: 12.92, 0.416

3. In a continuous series, $\Sigma fm = 1250$, $\Sigma fm^2 = 36250$ and $N = 50$ then find standard deviation and its coefficient. Ans: 10, 0.4
4. If the standard deviation of set of data is 0.25, find its variance. Ans: 0.0625
5. If the standard deviation of set of data is 5 and mean is 40, find its coefficient of variation. Ans: 12.5%

B. LONG ANSWER QUESTIONS

6. Find the standard deviation from the given data. Ans: 12.36

Age in years	0-10	10-20	20-30	30-40	40-50
No of people	4	6	5	3	2

7. Compute the standard deviation from the given data. Ans: 12.68

Weight (in kg)	0-10	10-20	20-30	30-40	40-50
No of students	5	4	4	6	1

8. Find the standard deviation and its coefficient from given data. Ans: 11.66 and 0.35

Marks obtained	0-10	10-20	20-30	30-40	40-50
No of students	5	15	25	35	45

9. Find the standard deviation and its coefficient from given data. Ans: Rs 118.3 and 0.26

Wages	200-300	300-400	400-500	500-600	600-700
No of workers	5	10	15	9	6

10. Find the standard deviation and coefficient of variation from given data. Ans: 6.05 and 50.42%

Age in years	0-4	4-8	8-12	12-16	16-20	20-24
No of students	7	7	10	15	7	6

11. Find the standard deviation and coefficient of variation from given data. Ans: 1.12 and 32.27%

Study hours	1-2	2-3	3-4	4-5	5-6
No of students	4	9	14	8	4

MULTIPLE/SUB-MULTIPLE ANGLES...

A. VERY SHORT ANSWER QUESTIONS

- | | |
|--|---|
| 1. Express $\sin 2A$ in terms of $\tan A$. | Ans: $\sin 2A = \frac{2 \tan A}{1 + \tan^2 A}$ |
| 2. Express $\sin 2A$ in terms of $\sin A$ and $\cos A$. | Ans: $\sin 2A = 2 \sin A \cdot \cos A$ |
| 3. Express $\cos 2\theta$ in terms of $\cos \theta$. | Ans: $\cos 2\theta = 2 \cos^2 \theta - 1$ |
| 4. Express $\cos 2\theta$ in terms of $\sin \theta$. | Ans: $\cos 2\theta = 1 - 2 \sin^2 \theta$ |
| 5. Express $\cos 2\theta$ in terms of $\tan \theta$. | Ans: $\cos 2\theta = \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$ |
| 6. Express $\tan 2A$ in terms of $\tan A$. | Ans: $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$ |
| 7. Write $\sin 3A$ in terms of $\sin A$ | Ans: $\sin 3A = 3 \sin A - 4 \sin^3 A$ |
| 8. Express $\cos 3\alpha$ in terms of $\cos \alpha$. | Ans: $\cos 3\alpha = 4 \cos^3 \alpha - 3 \cos \alpha$ |
| 9. Express $\sin A$ in terms of $\tan \frac{A}{2}$. | Ans: $\sin A = \frac{2 \tan \frac{A}{2}}{1 + \tan^2 \frac{A}{2}}$ |
| 10. Write $\sin A$ in terms of $\sin \frac{A}{2}$ and $\cos \frac{A}{2}$. | Ans: $\sin A = 2 \sin \frac{A}{2} \cdot \cos \frac{A}{2}$ |
| 11. Write the relation of $\cos \theta$ and $\cos \frac{\theta}{2}$. | Ans: $\cos \theta = 2 \cos^2 \frac{\theta}{2} - 1$ |
| 12. Write the relation of $\cos \theta$ and $\sin \frac{\theta}{2}$. | Ans: $\cos \theta = 1 - 2 \sin^2 \frac{\theta}{2}$ |

13. Write the relation of $\cos\theta$ and $\tan\frac{\theta}{2}$.

$$\text{Ans: } \cos\theta = \frac{1 - \tan^2\frac{\theta}{2}}{1 + \tan^2\frac{\theta}{2}}$$

14. Write $\sin A$ in terms of $\sin\frac{A}{3}$

$$\text{Ans: } \sin A = 3\sin\frac{A}{3} - 4\sin^3\frac{A}{3}$$

15. Express $\cos A$ in terms of $\cos\frac{A}{3}$.

$$\text{Ans: } \cos A = 4\cos^3\frac{A}{3} - 3\cos\frac{A}{3}$$

B. SHORT ANSWER QUESTIONS

16. If $\sin A = \frac{3}{5}$, find the value of $\sin 2A$.

$$\text{Ans: } \frac{24}{25}$$

17. If $\sin A = \frac{12}{13}$, find the value of $\sin 2A$.

$$\text{Ans: } \frac{120}{169}$$

18. If $\cos A = \frac{4}{5}$, find the value of $\sin 2A$.

$$\text{Ans: } \frac{24}{25}$$

19. If $\tan A = \frac{3}{4}$, find the value of $\sin 2A$.

$$\text{Ans: } \frac{24}{25}$$

20. If $\cot A = 1$, find the value of $\sin 2A$.

$$\text{Ans: } 1$$

21. If $\cos\theta = \frac{3}{5}$, find the value of $\cos 2\theta$.

$$\text{Ans: } -\frac{7}{25}$$

22. If $\cos\theta = \frac{1}{2}$, find the value of $\cos 2\theta$.

$$\text{Ans: } -\frac{1}{2}$$

23. If $\sin\theta = \frac{1}{\sqrt{2}}$, find the value of $\cos 2\theta$.

$$\text{Ans: } 0$$

24. If $\tan\theta = \frac{3}{4}$, find the value of $\cos 2\theta$.

$$\text{Ans: } \frac{7}{25}$$

25. If $\tan\theta = 1$, find the value of $\cos 2\theta$.

$$\text{Ans: } 0$$

26. If $\tan\alpha = \frac{3}{4}$, find the value of $\tan 2\alpha$.

$$\text{Ans: } \frac{24}{7}$$

27. If $\cot\theta = \frac{2}{3}$, find the value of $\cos 2\theta$.

$$\text{Ans: } -\frac{5}{13}$$

28. If $\sin A = \frac{1}{2}$, find the value of $\sin 3A$.

$$\text{Ans: } 1$$

29. If $\sin A = \frac{4}{5}$, find the value of $\sin 3A$.

$$\text{Ans: } \frac{44}{125}$$

30. If $\cos A = \frac{1}{2}$, find the value of $\cos 3A$.

$$\text{Ans: } -1$$

31. If $\cos A = \frac{4}{5}$, find the value of $\cos 3A$.

$$\text{Ans: } -\frac{44}{125}$$

32. If $\cos A = \frac{1}{2}\left(p + \frac{1}{p}\right)$ then show that: $\cos 2A = \frac{1}{2}\left(p^2 + \frac{1}{p^2}\right)$.

33. If $\sin A = \frac{1}{2}\left(a + \frac{1}{a}\right)$ then show that: $\cos 2A + \frac{1}{2}\left(a^2 + \frac{1}{a^2}\right) = 0$.

34. If $\cos A = \frac{1}{2}\left(m + \frac{1}{m}\right)$ then show that: $\cos 3A = \frac{1}{2}\left(m^3 + \frac{1}{m^3}\right)$.

35. If $\sin A = \frac{1}{2}\left(x + \frac{1}{x}\right)$ then show that: $\sin 3A = -\frac{1}{2}\left(x^3 + \frac{1}{x^3}\right)$.

36. If $\cos\frac{A}{2} = \frac{1}{2}\left(k + \frac{1}{k}\right)$ then show that: $\cos A = \frac{1}{2}\left(k^2 + \frac{1}{k^2}\right)$.

37. If $\cos\frac{A}{3} = \frac{1}{2}\left(b + \frac{1}{b}\right)$ then show that: $\cos A = \frac{1}{2}\left(b^3 + \frac{1}{b^3}\right)$.

38. Given that $\cos 30^\circ = \frac{\sqrt{3}}{2}$ show that $\sin 15^\circ = \frac{1}{2}(\sqrt{2 - \sqrt{3}})$
39. Given that $\cos 30^\circ = \frac{\sqrt{3}}{2}$ show that $\cos 15^\circ = \frac{1}{2}(\sqrt{2 + \sqrt{3}})$
40. Given that $\cos 30^\circ = \frac{\sqrt{3}}{2}$ show that $\cos 15^\circ = \frac{\sqrt{3} + 1}{2\sqrt{2}}$
41. If $\cos 45^\circ = \frac{1}{\sqrt{2}}$ show that $\cos\left(22\frac{1}{2}\right)^\circ = \frac{1}{2}(\sqrt{2 + \sqrt{2}})$
42. If $\cos 45^\circ = \frac{1}{\sqrt{2}}$ show that $\sin\left(22\frac{1}{2}\right)^\circ = \frac{1}{2}(\sqrt{2 - \sqrt{2}})$
43. If $\cos 45^\circ = \frac{1}{\sqrt{2}}$ show that $\tan\left(22\frac{1}{2}\right)^\circ = \sqrt{2} - 1$
44. Prove that: $(\sin A + \cos A)^2 = 1 + \sin 2A$
45. Prove that: $(\sin A - \cos A)^2 = 1 - \sin 2A$
46. Prove that: $\cos^4 A - \sin^4 A = \cos 2A$
47. Prove that: $\sin A \cdot \cos^5 A - \sin^5 A \cdot \cos A = \frac{1}{2} \sin 2A \cdot \cos 2A$
48. Express $\frac{\sin 2A}{1 + \cos 2A}$ in terms of tangent.
49. Express $\frac{\sin \theta + \sin 2\theta}{1 + \cos \theta + \cos 2\theta}$ in terms of tangent.
50. Prove that: $\frac{\sin 2A - \sin A}{1 - \cos A + \cos 2A} = \tan A$
51. Prove that: $\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A} = 1 - \frac{1}{2} \sin 2A$
52. Prove that: $\frac{\cos^3 A - \sin^3 A}{\cos A - \sin A} = 1 + \frac{1}{2} \sin 2A$
53. Prove that: $6\sin\frac{\pi^c}{18} - 8\sin^3\frac{\pi^c}{18} = 2$
54. Prove that: $8\cos^3\frac{\pi^c}{9} - 6\cos\frac{\pi^c}{9} = 2$
55. Prove that: $\frac{\sin A - \sqrt{1 + \sin 2A}}{\cos A - \sqrt{1 + \sin 2A}} = \cot A$
56. Prove that: $\frac{\cos A - \sqrt{1 + \sin 2A}}{\sin A - \sqrt{1 + \sin 2A}} = \tan A$
57. Prove that: $\sin 2A = \frac{2\tan A}{1 + \tan^2 A}$
58. Prove that: $\sin 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A}$
59. Prove that: $\sin 3A = 3\sin A - 4\sin^3 A$
60. Prove that: $\cos 3A = 4\cos^3 A - 3\cos A$
61. Express $\frac{\cos^3 A - \cos 3A}{\sin^3 A + \sin 3A}$ in terms of tangent.
62. Express $\frac{\sin^3 A + \sin 3A}{\cos^3 A - \cos 3A}$ in terms of cotangent.
63. Express $\frac{\sin 2A}{\sin A} - \frac{\cos 2A}{\cos A}$ in terms of secant.
64. Express $\frac{\sin A + \sin 2A}{1 + \cos A + \cos 2A}$ in terms of tangent.

65. Express $\frac{\sin 2A - \sin A}{\cos 2A - \cos A + 1}$ in terms of tangent.
66. Express $\frac{1 + \sin 2A - \cos 2A}{1 + \sin 2A + \cos 2A}$ in terms of tangent.
67. Express $\frac{1 + \sin 2A - \cos 2A}{1 + \sin 2A + \cos 2A}$ in terms of tangent
68. Express $\operatorname{cosec} 2A - \cot 2A$ in terms of tangent.
69. Express $\operatorname{cosec} 2A + \cot 2A$ in terms of cotangent
70. Express $\frac{\sin A}{1 + \cos A}$ in terms of sub-multiple angle of tangent.
71. Express $\frac{2\sin\beta - \sin 2\beta}{2\sin\beta + \sin 2\beta}$ in terms of sub-multiple angle of tangent.

72. Prove that:
$$\frac{\sin\alpha + \sin\frac{\alpha}{2}}{1 + \cos\alpha + \cos\frac{\alpha}{2}} = \tan\frac{\alpha}{2}$$

73. Prove that:
$$\tan\frac{\theta}{2} = \frac{1 + \sin\theta - \cos\theta}{1 + \sin\theta + \cos\theta}$$

74. Prove that: $\cos^2(45^\circ - A) - \sin^2(45^\circ - A) = \sin 2A$

75. Prove that: $1 - 2\sin^2(45^\circ - A) = \sin 2A$

76. Prove that: $2\cos^2(45^\circ - A) - 1 = \sin 2A$

77. Prove that:
$$\frac{\cos 2A}{1 + \sin 2A} = \frac{1 - \tan A}{1 + \tan A}$$

78. Prove that:
$$\frac{1 - \sin 2A}{\cos 2A} = \frac{1 - \tan A}{1 + \tan A}$$

79. Prove that: $\operatorname{cosec} 2A + \cot 2A = \cot A$

80. Prove that: $\tan A + \cot A = 2\operatorname{cosec} 2A$

81. Prove that: $\tan A + 2\cot 2A = \cot A$

82. Prove that: $(2\cos A + 1)(2\cos A - 1) = 2\cos 2A + 1$

83. Prove that:
$$\frac{1 + \sec 2A}{\tan 2A} = \cot A$$

84. Prove that: $\sqrt{2 + \sqrt{2 + 2\cos 4A}} = 2\cos A$

85. Prove that: $\sqrt{2 + \sqrt{2 + 2\cos 4\alpha}} = 2\cos\alpha$

86. Prove that:
$$\frac{1 - \tan^2(45^\circ - \frac{\theta}{4})}{1 + \tan^2(45^\circ - \frac{\theta}{4})} = \sin\frac{\theta}{2}$$

87. Prove that:
$$\frac{2\sin\beta - \sin 2\beta}{2\sin\beta + \sin 2\beta} = \tan^2\frac{\beta}{2}$$

88. Prove that:
$$\frac{2\sin\beta + \sin 2\beta}{2\sin\beta - \sin 2\beta} = \cot^2\frac{\beta}{2}$$

C. LONG ANSWER QUESTIONS

89. Prove that: $\frac{1}{\sin 10^\circ} - \frac{\sqrt{3}}{\cos 10^\circ} = 4$

90. Prove that: $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ = 4$

91. Prove that: $\operatorname{cosec} 10^\circ - \sqrt{3} \sec 10^\circ = 4$

92. Prove that: $(1 + \sin 2A + \cos 2A)^2 = 4 \cos^2 A (1 + \sin 2A)$

93. Prove that: $(1 - \sin 2A + \cos 2A)^2 = 4 \cos^2 A (1 - \sin 2A)$

94. Prove that: $\cos^2 A + \sin^2 A \cdot \cos 2B = \cos^2 B + \sin^2 B \cdot \cos 2A$

95. Prove that: $\cos^2 \alpha + \sin^2 \alpha \cdot \cos 2\beta = \cos^2 \beta + \sin^2 \beta \cdot \cos 2\alpha$

96. Prove that: $\sin^2 A - \cos^2 A \cdot \cos 2B = \sin^2 B - \cos^2 B \cdot \cos 2A$
97. Prove that: $4 \operatorname{cosec} 2A \cdot \cot 2A = \operatorname{cosec}^2 A - \sec^2 A$
98. Prove that: $\cos^6 \theta - \sin^6 \theta = \cos 2\theta \left(1 - \frac{1}{4} \sin^2 2\theta\right)$
99. Prove that: $\sin^4 x = \frac{1}{8} (3 - 4\cos 2x + \cos 4x)$
100. Prove that: $\cos^4 \theta = \frac{1}{8} (3 + 4\cos 2\theta + \cos 4\theta)$
101. Prove that: $8\sin^4 x + 4\cos 2x - \cos 4x = 3$
102. Prove that: $3 + 4\cos 2\theta + \cos 4\theta = 8\cos^4 \theta$
103. Prove that: $\operatorname{cosec} 2A + \cot 4A = \cot A - \operatorname{cosec} 4A$
104. Prove that: $\operatorname{cosec} 4A + \cot 8A = \cot 2A - \operatorname{cosec} 8A$
105. Prove that: $\frac{\sec 4A - 1}{\sec 2A - 1} = \tan 4A \cdot \cot A$
106. Prove that: $\cot\left(A + \frac{\pi^c}{4}\right) - \tan\left(A - \frac{\pi^c}{4}\right) = \frac{2\cos 2A}{1 + \sin 2A}$
107. Prove that: $\tan\left(A + \frac{\pi^c}{4}\right) - \tan\left(A - \frac{\pi^c}{4}\right) = 2\sec 2A$
108. Prove that: $\tan \theta + 2\tan 2\theta + 4\cot 4\theta = \cot \theta$
109. Prove that: $\tan \theta + 2\tan 2\theta + 4\tan 4\theta + 8\cot 8\theta = \cot \theta$
110. Prove that: $(2\cos A + 1)(2\cos A - 1)(2\cos 2A - 1) = 2\cos 4A + 1$
111. Prove that: $(2\cos A + 1)(2\cos A - 1)(2\cos 2A - 1)(2\cos 4A - 1) = 2\cos 8A + 1$
112. Prove that: $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8A}}} = 2\cos A$
113. Prove that: $\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 16A}}}} = 2\cos A$
114. Prove that: $\left(1 + \sin \frac{\pi^c}{8}\right)\left(1 - \sin \frac{3\pi^c}{8}\right)\left(1 + \sin \frac{5\pi^c}{8}\right)\left(1 - \sin \frac{7\pi^c}{8}\right) = \frac{1}{8}$
115. Prove that: $8\left(1 + \sin \frac{\pi^c}{8}\right)\left(1 + \sin \frac{3\pi^c}{8}\right)\left(1 - \sin \frac{5\pi^c}{8}\right)\left(1 - \sin \frac{7\pi^c}{8}\right) = 1$
116. Prove that: $\left(1 + \cos \frac{\pi^c}{8}\right)\left(1 + \cos \frac{3\pi^c}{8}\right)\left(1 + \cos \frac{5\pi^c}{8}\right)\left(1 + \cos \frac{7\pi^c}{8}\right) = \frac{1}{8}$
117. Prove that: $4(\cos^3 20^\circ + \sin^3 10^\circ) = 3(\cos 20^\circ + \sin 10^\circ)$
118. Prove that: $4(\cos^3 15^\circ + \sin^3 15^\circ) = 3(\cos 15^\circ + \sin 15^\circ)$
119. Prove that: $\cos^3 A \cdot \cos 3A + \sin^3 A \cdot \sin 3A = \cos^3 2A$
120. Prove that: $\cos^3 A \cdot \sin 3A + \sin^3 A \cdot \cos 3A = \frac{3}{4} \sin 4A$
121. If $2\tan A = 3 \tan B$, prove that: $\tan(A + B) = \frac{5\sin 2B}{5\cos 2B - 1}$
122. Prove that: $\cos \frac{\pi}{7} \cdot \cos \frac{2\pi}{7} \cdot \cos \frac{3\pi}{7} = \frac{1}{8}$
123. Prove that: $\cos \frac{\pi}{7} \cdot \cos \frac{2\pi}{7} \cdot \cos \frac{4\pi}{7} = -\frac{1}{8}$

Great job! Your smart practice will lead to success.

What is your performance level? Test your learning experience and choose your learning level.

- A. Outstanding**
- B. Excellent**
- C. Very Good**
- D. Good**

DAY-3

(MATRIX + VECTOR)

MATRIX...

A. VERY SHORT ANSWER QUESTIONS

- If matrix A is a singular matrix, what is the determinant of matrix A? Ans: 0
- Define singular matrix. Ans: A square matrix having determinant zero
- Under what condition the matrix becomes singular? Ans: When determinant is zero
- If $A = (4)$, what is the value of $|A|$? Ans: 4
- If $A = [-5]$, what is the value of $|A|$? Ans: -5
- If $A = \begin{pmatrix} p & q \\ r & s \end{pmatrix}$, what is the value of $|A|$? Ans: $ps - qr$
- Write the adjoint matrix of $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$. Ans: $\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$
- What is the determinant of an identity matrix of order 2×2 ? Ans: 1
- Define inverse matrix. Ans: If A and B are two square matrices of same order such that $AB = BA = I$
- If A and B are inverse each other, what is the relation between the matrices A, B and identity matrix I of order same as the order of matrix A or B? Ans: $AB = BA = I$
- Write the necessary condition for the possibility of inverse of a matrix. Ans: Non-singular matrix
- Write the condition under which the inverse of a matrix does not exist. Ans: Determinant is zero
- For the matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, what does $\frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$ represent? Ans: A^{-1}
- Write the equations $2x + 3y = 10$ and $4x - y = 6$ in matrix form. Ans: $\begin{pmatrix} 2 & 3 \\ 4 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 10 \\ 6 \end{pmatrix}$

B. SHORT ANSWER QUESTIONS

- If the matrix $\begin{pmatrix} 3 & 9 \\ x & 6 \end{pmatrix}$ is singular, find the value of x. Ans: 2
- If the matrix $\begin{pmatrix} 1 & x + 2 \\ 3 & x + 4 \end{pmatrix}$ is singular, find the value of x. Ans: -1
- If $M = \begin{pmatrix} 2 & 5 \\ 1 & 3 \end{pmatrix}$ and $N = \begin{pmatrix} -4 & -6 \\ 3 & 2 \end{pmatrix}$, find $|MN|$. Ans: 10
- If $A = \begin{pmatrix} 2 & 3 \\ -1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 0 \\ 2 & -1 \end{pmatrix}$, find $|AB|$. Ans: -11
- If $A = \begin{pmatrix} 3 & 1 \\ 4 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}$, find the determinant of $2A + B$ Ans: 19
- If $P = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$ and $Q = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$, show that PQ is a singular matrix.
- If the determinant of matrix $A = \begin{pmatrix} 4 & 1 \\ 3 & k \end{pmatrix}$ is 5, find the value of k. Ans: 2
- The determinant of matrix $A = \begin{pmatrix} 3 & 2 \\ m & 7 \end{pmatrix}$ is 11, find the value of m. Ans: 5

9. If $M = \begin{pmatrix} 2 & 1 \\ 3 & p \end{pmatrix}$, $N = \begin{pmatrix} 7 & 4 \\ 3 & 2 \end{pmatrix}$ and $|MN| = 10$, find the value of p . Ans: 4
10. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 1 \\ 3 & x \end{pmatrix}$ and $|AB| = 5$, find the value of x . Ans: 1
11. If $A = \begin{pmatrix} 2 & -1 \\ 3 & 1 \end{pmatrix}$, find $|A|$ and write A^{-1} is defined or not. Ans: Yes
12. Find the inverse matrix of matrix $\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$. Ans: $\begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix}$
13. Show that the matrices $A = \begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} -5 & 2 \\ 3 & -1 \end{pmatrix}$ are inverse to each other.
14. Show that the matrices $A = \begin{pmatrix} 3 & 4 \\ 2 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -4 \\ -2 & 3 \end{pmatrix}$ are inverse to each other.
15. Matrices $A = \begin{pmatrix} 5 & 3 \\ 7 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} -4 & 3 \\ 7 & m \end{pmatrix}$ are inverse to each other, find the values of m . Ans: -5
16. If the matrices $\begin{pmatrix} 2x & 7 \\ 5 & 9 \end{pmatrix}$ and $\begin{pmatrix} 9 & y \\ -5 & 4 \end{pmatrix}$ are inverse to each other, find the values of x and y . Ans: 2 -7
17. Find the inverse of the matrix $\begin{pmatrix} 1 & 1 \\ 3 & 4 \end{pmatrix}$ Ans: $\begin{pmatrix} 4 & -1 \\ -3 & 1 \end{pmatrix}$
18. For what value of x , the matrix has no inverse $\begin{pmatrix} 8 & 4 \\ x & 2 \end{pmatrix}$? Ans: 4
19. Find the determinants D_1 and D_2 of coefficient of x , y and constant terms by using Cramer's rule from the equations $4x - 5y = 2$ and $3x + 4y = 48$ Ans: 248, 186
20. Find the determinants D_1 and D_2 of coefficient of x , y and constant terms by using Cramer's rule from the equations $2x + 3y = 7$ and $5x - 4y = 6$. Ans: -46, -23
21. According to Cramer's rule, find the value of D_1 and D_2 for $ax + by = c$ and $px + qy = r$
22. In the equations $2x + 3y = 7$ and $4y - x = 2$, according to Cramer's rule, the value of D is 11, find the value of x . Ans: 4

C. LONG ANSWER QUESTIONS

1. Solve by matrix method: $3x + 5y = 11$, $2x - 3y = 1$ Ans: $x = 2, y = 1$
2. Solve by inverse matrix method: $3x + 5y = 24$, $5x - 2y = 9$ Ans: $x = 3, y = 3$
3. Solve by inverse matrix method: $2x - 3y - 7 = 0$, $4y - 3x = -10$ Ans: $x = 2, y = -1$
4. Solve by inverse matrix method: $x = \frac{2}{3}y$, $4x - 3y = 1$ Ans: $x = -2, y = -3$
5. Solve by inverse matrix method: $\frac{3}{2}x + 2y = 1$, $\frac{x}{3} - \frac{y}{3} = 1$ Ans: $x = 2, y = -1$
6. Solve the system of linear equations by using matrix: $\frac{3x + 5y}{8} = \frac{5x - 2y}{3} = 3$ Ans: $x = y = 3$
7. Solve the system of linear equations by using matrix: $\frac{3x + 5y}{4} = \frac{7x + 3y}{5} = 4$ Ans: $x = y = 2$
8. Solve by inverse matrix method: $3x + \frac{4}{y} = 10$, $x + \frac{1}{y} = 3$ Ans: $x = 2, y = 1$
9. Solve by inverse matrix method: $\frac{2}{x} + \frac{6}{y} = 3$, $\frac{10}{x} - \frac{9}{y} = 2$ Ans: $x = 2, y = 3$
10. Solve by inverse matrix method: $\frac{1}{x} + \frac{2}{y} = 1$, $\frac{4}{x} = 3 - \frac{4}{y}$ Ans: $x = 2, y = 4$
11. Solve by Cramer's rule: $4x - 3y = 11$ and $3x + y = 5$ Ans: $x = 2, y = -1$
12. Solve by Cramer's rule: $2x + 3y = 13$, $4x - y = 5$ Ans: $x = 2, y = 3$
13. Solve by Cramer's rule: $7x + 8y = 23$, $5x - 2y = 1$ Ans: $x = 1, y = 2$

14. Solve by Cramer's rule: $x - \frac{2}{y} = 4$; $2x + \frac{3}{y} = 1$ Ans: $x = 2, y = -1$
15. Solve by Cramer's rule: $\frac{6}{y} + \frac{10}{x} = 3$, $\frac{3}{y} - \frac{21}{x} = -5$ Ans: $x = 4, y = 12$

VECTOR...

A. VERY SHORT ANSWER QUESTIONS

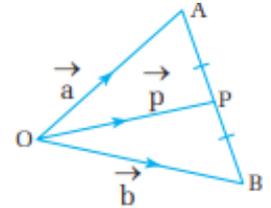
- What is the scalar product of two vectors \vec{a} and \vec{b} if the angle between them is θ ? Ans: $\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos\theta$
- If $\vec{a} = (x_1, y_1)$ and $\vec{b} = (x_2, y_2)$, what is the scalar product of $\vec{a} \cdot \vec{b}$? Ans: $\vec{a} \cdot \vec{b} = x_1x_2 + y_1y_2$
- If \vec{a} and \vec{b} are perpendicular (orthogonal) to each other, what is the value of $\vec{a} \cdot \vec{b}$? Ans: 0
- If \vec{i} the standard unit vector along x-axis, what is the value of $\vec{i} \cdot \vec{i}$? Ans: 1
- If \vec{i} and \vec{j} are the unit vectors along x-axis and y-axis respectively, what is the value of $\vec{i} \cdot \vec{j}$? Ans: 0
- Write the formula to calculate the angle between \vec{a} and \vec{b} . Ans: $\cos\theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$
- If $\vec{a} \cdot \vec{b} = 0$, what is the angle between \vec{a} and \vec{b} ? Ans: 90°
- What should be the angle between \vec{a} and \vec{b} to get the maximum value of $\vec{a} \cdot \vec{b}$? Ans: 0°
- What should be the angle between \vec{a} and \vec{b} to get the minimum value of $\vec{a} \cdot \vec{b}$? Ans: 180°
- The position vectors of vertices of a triangle ABC are \vec{a} , \vec{b} and \vec{c} . What is the position vector of its centroid G? Ans: $\vec{g} = \frac{\vec{a} + \vec{b} + \vec{c}}{3}$
- The position vectors two points A and B are \vec{a} and \vec{b} respectively. What is the position vector of the mid-point M of the segment AB? Ans: $\vec{m} = \frac{\vec{a} + \vec{b}}{2}$
- The position vectors two points A and B are \vec{a} and \vec{b} respectively. What is the position vector of the P which divides AB internally in the ratio $m_1 : m_2$? Ans: $\vec{p} = \frac{m_1 \vec{b} + m_2 \vec{a}}{m_1 + m_2}$
- The position vectors two points A and B are \vec{a} and \vec{b} respectively. What is the position vector of the P which divides AB externally in the ratio $m_1 : m_2$? Ans: $\vec{p} = \frac{m_1 \vec{b} - m_2 \vec{a}}{m_1 - m_2}$

B. SHORT ANSWER QUESTIONS

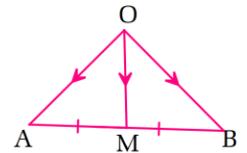
- If $|\vec{a}| = 4\sqrt{2}$, $|\vec{b}| = 6$ and angle between \vec{a} and \vec{b} is 45° , find the value of $\vec{a} \cdot \vec{b}$ Ans: 24
- If $|\vec{p}| = 6\sqrt{2}$, $\vec{p} \cdot \vec{q} = 12$ and $\theta = 60^\circ$, find the value of $|\vec{q}|$ Ans: 5
- If $|\vec{a}| = 4$ and $|\vec{b}| = 5$ and $\vec{a} \cdot \vec{b} = 10$, then find the angle between \vec{a} and \vec{b} . Ans: 60°
- If $|\vec{a}| = 4$ and $|\vec{b}| = 5$ and $\vec{a} \cdot \vec{b} = 10\sqrt{2}$, then find the angle between \vec{a} and \vec{b} . Ans: 45°
- If $\vec{a} = 2\vec{i} + \vec{j}$ and $\vec{b} = \vec{i} + 3\vec{j}$ then find the angle between \vec{a} and \vec{b} . Ans: 45°
- If $\vec{a} = -\vec{i} + 2\vec{j}$ and $\vec{b} = 4\vec{i} + 2\vec{j}$, find the angle between \vec{a} and \vec{b} . Ans: 90°
- If $\vec{OA} = \begin{pmatrix} -5 \\ 3 \end{pmatrix}$, $\vec{OB} = \begin{pmatrix} k \\ k+2 \end{pmatrix}$ and $\angle AOB = 90^\circ$, find the value of k. Ans: 3
- For what value of k, are the vectors $\vec{a} = 6\vec{i} - k\vec{j}$ and $\vec{b} = 2\vec{i} + 3\vec{j}$ are perpendicular to each other? Ans: 3
- Prove that the vectors $\vec{a} = 2\vec{i} - 5\vec{j}$ and $\vec{b} = 10\vec{i} + 4\vec{j}$ are orthogonal to each other.

10. If $(\vec{a} + \vec{b})^2 = (\vec{a} - \vec{b})^2$, prove that \vec{a} and \vec{b} are perpendicular to each other.
11. If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$, prove that \vec{a} and \vec{b} are perpendicular to each other.
12. If $\vec{a} + \vec{b} + \vec{c} = 0$, $|\vec{a}| = 3$, $|\vec{b}| = 5$ and $|\vec{c}| = 7$, find the angle between \vec{a} and \vec{b} . Ans: 60°
13. If $\vec{a} + \vec{b} + \vec{c} = 0$, $|\vec{a}| = 6$, $|\vec{b}| = 7$ and $|\vec{c}| = \sqrt{127}$, find the angle between \vec{a} and \vec{b} . Ans: 60°
14. If $\vec{a} + 2\vec{b}$ and $5\vec{a} - 4\vec{b}$ are perpendicular to each other and \vec{a} and \vec{b} are unit vectors, find the angle between \vec{a} and \vec{b} . Ans: 60°

15. O is the origin in the given figure and P is the mid-point of AB. If \vec{a} and \vec{b} are the position vector of the points A and B, show that the position vector of point P is $\vec{p} = \frac{1}{2}(\vec{a} + \vec{b})$



16. O is the origin in the given figure and OM is the median of triangle OAB. Prove that the position vector of point M is $\vec{OM} = \frac{1}{2}(\vec{OA} + \vec{OB})$



17. If the position vectors of A and B are $3\vec{i} + 4\vec{j}$ and $7\vec{i} + 8\vec{j}$ respectively, find the position vector of the mid-point of the line joining A and B. Ans: $5\vec{i} + 6\vec{j}$

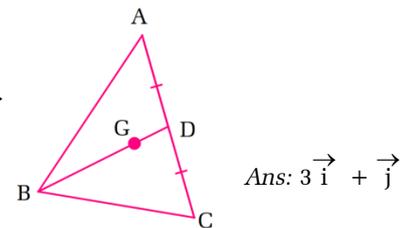
18. If the position vectors of M and N are $7\vec{i} + 2\vec{j}$ and $\vec{i} + 4\vec{j}$. Find the position vector of a point P such that $\vec{MP} = \vec{PN}$ Ans: $4\vec{i} + 3\vec{j}$

19. The position vectors of A and B are $\vec{i} + 2\vec{j}$ and $6\vec{i} + 7\vec{j}$. Find the position vector of a point P which divides AB internally in the ratio 2:3. Ans: $3\vec{i} + 4\vec{j}$

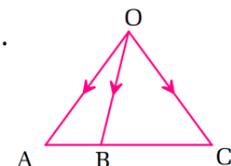
20. The position vectors of A and B are $\vec{i} + \vec{j}$ and $2\vec{i} - \vec{j}$. Find the position vector of a point P which divides AB externally in the ratio 3:2. Ans: $4\vec{i} - \vec{j}$

21. If the position vectors of the vertices A, B, and C of ΔABC are respectively $(3\vec{i} + 5\vec{j})$, $(5\vec{i} - \vec{j})$, and $(\vec{i} + 8\vec{j})$, find the position vector of centroid of the triangle. Ans: $3\vec{i} + 4\vec{j}$

22. In the given figure, AD = DC and the point G is the centroid of the triangle ABC. If the position vectors of the points B and D are $3\vec{i} + 7\vec{j}$ and $3\vec{i} - 2\vec{j}$ respectively, find the position vector of G.



23. If $\vec{OA} = \vec{a}$ and $\vec{OB} = \vec{b}$ and $\vec{AC} = 3\vec{AB}$, find \vec{OC} in terms of \vec{a} and \vec{b} . Ans: $3\vec{b} - 2\vec{a}$



C. LONG ANSWER QUESTIONS

1. Prove by vector method that the median of an isosceles triangle is perpendicular to the base.
2. Prove by vector method that the angle in a semi-circle is right angle.
3. Prove by vector method that the diagonals of a rectangle are equal to each other.
4. Prove by vector method that the mid-point of hypotenuse of a right angled triangle is equidistance from its every vertex.

5. By using vector method, prove that the quadrilateral formed by joining the midpoints of adjacent sides of a quadrilateral in order is a parallelogram.
6. Prove by vector method that the diagonals of a parallelogram bisect to each other.
7. Prove by vector method that the diagonals of a rhombus bisect to each other perpendicularly.

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
- B. **Excellent**
- C. **Very Good**
- D. **Good**

DAY-4

(TRANSFORMATION OF TRIGONOMETRIC FORMULAE + EQUATION AND GRAPH)

TRANSFORMATION OF TRIGONOMETRIC FORMULAE...

A. VERY SHORT ANSWER QUESTIONS

- | | |
|--|---|
| 1. Write $\sin A + \sin B$ in the terms of product of sin or cosine. | $Ans: \sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right) \cdot \cos\left(\frac{A-B}{2}\right)$ |
| 2. Write $\sin X - \sin Y$ in the terms of product of sin or cosine. | $Ans: \sin X - \sin Y = 2\cos\left(\frac{X+Y}{2}\right) \cdot \sin\left(\frac{X-Y}{2}\right)$ |
| 3. Write $\cos P + \cos Q$ in the terms of product of sin or cosine. | $Ans: \cos P + \cos Q = 2\cos\left(\frac{P+Q}{2}\right) \cdot \cos\left(\frac{P-Q}{2}\right)$ |
| 4. Write $\cos A - \cos B$ in the terms of product of sin or cosine. | $Ans: \cos A - \cos B = 2\sin\left(\frac{A+B}{2}\right) \cdot \sin\left(\frac{B-A}{2}\right)$ |
| 5. Write $2\sin A \cdot \cos B$ as the sum and difference of sine. | $Ans: 2\sin A \cdot \cos B = \sin(A+B) + \sin(A-B)$ |
| 6. Write $2\cos A \cdot \sin B$ as the sum and difference of sine. | $Ans: 2\cos A \cdot \sin B = \sin(A+B) - \sin(A-B)$ |
| 7. Write $2\cos A \cdot \cos B$ as the sum and difference of sine. | $Ans: 2\cos A \cdot \cos B = \cos(A+B) + \cos(A-B)$ |
| 8. Write $2\sin P \cdot \sin Q$ as the sum and difference of sine. | $Ans: 2\sin P \cdot \sin Q = \cos(P-Q) - \cos(P+Q)$ |

B. SHORT ANSWER QUESTIONS

- | | |
|--|--|
| 1. Convert $\sin 6A \cdot \cos 4A$ into sum of difference of sine or cosine | $Ans: \frac{1}{2}(\sin 10A + \sin 2A)$ |
| 2. Convert $\cos 9\theta \cdot \cos 5\theta$ into sum of difference of sine or cosine. | $Ans: \frac{1}{2}(\cos 14\theta + \cos 4\theta)$ |
| 3. Express $\sin 8A + \sin 2A$ into product of sine or cosine. | $Ans: 2\sin 5A \cdot \cos 3A$ |
| 4. Express $\cos 40A - \cos 60A$ into product of sine. | $Ans: 2\sin 50A \cdot \sin 10A$ |
| 5. Without using calculator, find the value of $\sin 75^\circ + \sin 15^\circ$ | $Ans: \sqrt{\frac{3}{2}}$ |
| 6. Without using calculator, find the value of $\sin 75^\circ - \sin 15^\circ$ | $Ans: \frac{1}{\sqrt{2}}$ |
| 7. Without using calculator, find the value of $\cos 15^\circ - \cos 75^\circ$ | $Ans: \sqrt{\frac{3}{2}}$ |

8. Without using calculator, find the value of $4\cos 105^\circ \cdot \cos 15^\circ$ Ans: -1
9. Without using calculator, find the value of $\sin 75^\circ \cdot \sin 15^\circ$ Ans: $\frac{1}{4}$
10. Without using calculator, find the value of $\sin 105^\circ \cdot \sin 15^\circ$ Ans: $\frac{1}{4}$
11. Without using calculator, find the value of $4\sin 105^\circ \cdot \sin 15^\circ$ Ans: 1
12. Prove that: $\cos 105^\circ + \cos 15^\circ = \frac{1}{\sqrt{2}}$
13. Prove that: $\cos 75^\circ + \cos 15^\circ = \sqrt{\frac{3}{2}}$
14. Prove that: $\cos 10^\circ + \cos 110^\circ + \cos 130^\circ = 0$
15. Prove that: $\cos 40^\circ + \sin 40^\circ = \sqrt{2} \cos 5^\circ$
16. Prove that: $\sin 65^\circ + \cos 65^\circ = \sqrt{2} \cos 20^\circ$
17. Prove that: $\sin 55^\circ + \cos 55^\circ = \sqrt{2} \cos 10^\circ$
18. Prove that: $\cos 10^\circ + \cos 110^\circ + \cos 130^\circ = 0$
19. Prove that: $\cos 20^\circ + \cos 140^\circ + \cos 170^\circ = 0$
20. Prove that: $2\cos 70^\circ \cdot \cos 20^\circ = \cos 50^\circ$
21. Prove that: $\cos 105^\circ \cdot \cos 15^\circ = -\frac{1}{4}$
22. Prove that: $2\cos (45^\circ + A) \cdot \cos (45^\circ - A) = \cos 2A$
23. Prove that: $2\cos (45^\circ + A) \cdot \sin (45^\circ + A) = \cos 2A$
24. Prove that: $\frac{\sin A + \sin B}{\cos A + \cos B} = \tan\left(\frac{A + B}{2}\right)$
25. Prove that: $\frac{\sin A + \sin 5A}{\cos A + \cos 5A} = \tan 3A$
26. Prove that: $\frac{\cos A - \cos 5A}{\sin 5A - \sin A} = \tan 3A$
27. Prove that: $\frac{\cos 40^\circ - \sin 30^\circ}{\sin 60^\circ - \cos 50^\circ} = \tan 50^\circ$

C. LONG ANSWER QUESTIONS

1. Prove that: $\frac{\sin^2 A - \sin^2 B}{\sin A \cdot \cos A - \sin B \cdot \cos B} = \tan (A + B)$
2. Prove that: $\frac{\cos^2 A - \sin^2 B}{\sin A \cdot \cos A + \sin B \cdot \cos B} = \cot (A + B)$
3. Prove that: $\sin A \cdot \sin (60^\circ - A) \cdot \sin (60^\circ + A) = \frac{1}{4} \sin 3A$
4. $\cos A \cdot \cos (60^\circ - A) \cdot \cos (60^\circ + A) = \frac{1}{4} \cos 3A$
5. Prove that: $(\cos A + \cos B)^2 + (\sin A + \sin B)^2 = 4 \cos^2 \left(\frac{A + B}{2}\right)$
6. Prove that: $\sin 10^\circ \cdot \sin 30^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \frac{1}{16}$
7. Prove that: $\sin 10^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \frac{1}{8}$
8. Prove that: $\cos 10^\circ \cdot \cos 30^\circ \cdot \cos 50^\circ \cdot \cos 70^\circ = \frac{3}{16}$
9. Prove that: $8\cos 10^\circ \cdot \cos 50^\circ \cdot \cos 70^\circ = \sqrt{3}$
10. Find the value of $\sin 20^\circ \cdot \sin 30^\circ \cdot \sin 40^\circ \cdot \sin 80^\circ$ Ans: $\frac{\sqrt{3}}{16}$
11. Prove that: $\frac{\sin 2A + \sin 5A - \sin A}{\cos 2A + \cos 5A + \cos A} = \tan 2A$

12. Prove that: $\frac{\sin(A+B) - 2\sin A + \sin(A-B)}{\cos(A+B) - 2\cos A + \cos(A-B)} = \tan A$
13. Prove: $\frac{\sin \theta - \sin 3\theta + \sin 5\theta - \sin 7\theta}{\cos \theta - \cos 3\theta - \cos 5\theta + \cos 7\theta} = \cot 2\theta$
14. Prove that: $\frac{1 - \cos A + \cos B - \cos(A+B)}{1 + \cos A - \cos B - \cos(A+B)} = \tan \frac{A}{2} \cdot \cot \frac{B}{2}$
15. Prove that: $\sec\left(\frac{\pi}{4} + \frac{\theta}{2}\right) \cdot \sec\left(\frac{\pi}{4} - \frac{\theta}{2}\right) = 2\sec\theta$
16. Prove that: $\operatorname{cosec}\left(\frac{\pi}{4} + \frac{\theta}{2}\right) \cdot \operatorname{cosec}\left(\frac{\pi}{4} - \frac{\theta}{2}\right) = 2\sec\theta$
17. Prove that: $\cos^3 A \cdot \sin^2 A = \frac{1}{16} (2\cos A - \cos 3A - \cos 5A)$
18. Prove that: $\sin^3 A \cdot \cos^2 A = \frac{1}{16} (2\cos A - \cos 3A + \cos 5A)$
19. Prove that: $\cos(36^\circ - A) \cdot \cos(36^\circ + A) + \cos(54^\circ + A) \cos(54^\circ - A) = \cos 2A$
20. Prove that: $\sin^2 A + \sin^2(A - 120^\circ) + \sin^2(A + 120^\circ) = \frac{3}{2}$

EQUATION AND GRAPH...

A. VERY SHORT ANSWER QUESTIONS

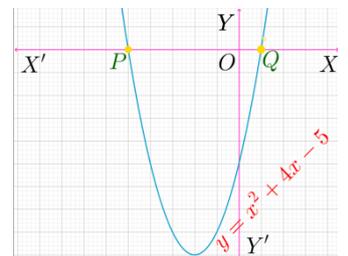
1. What is the coordinates of vertex of parabola $y = ax^2 + bx + c, a \neq 0$? Ans: $(h, k) = \left(\frac{-b}{2a}, \frac{4ac - b^2}{4a}\right)$
2. What is the equation of line symmetry of parabola $y = ax^2 + bx + c, a \neq 0$? Ans: $x = \frac{-b}{2a}$
3. What is the vertex of parabola whose equation is $y = a(x - h)^2 + k, a \neq 0$? Ans: Vertex = (h, k)
4. What is the equation of line symmetry of parabola $y = a(x - h)^2 + k, a \neq 0$? Ans: $x = h$
5. When ' $a > 0$ ', in which side does the mouth of the graph of $y = ax^2, a \neq 0$ face? Ans: Upwards x-axis
6. When ' $a < 0$ ', in which side does the mouth of the graph of $y = ax^2, a \neq 0$ face? Ans: Downwards x-axis
7. When ' a ' becomes larger, what happens in the size of graph of $y = ax^2, a \neq 0$? Ans: narrower
8. When ' a ' becomes smaller, what happens in the size of graph of $y = ax^2, a \neq 0$? Ans: wider

B. SHORT ANSWER QUESTIONS

1. What will be the points of intersection of the curve $f(x) = x^2 - 1$ and $f(x) = 3$? Ans: $(-2, 3), (2, 3)$
2. Find the vertex of the parabola $y = x^2 - 2x - 3$. Ans: $(1, -4)$
3. Find the vertex of the parabola $y = 2x^2 - 4x + 1$. Ans: $(1, -1)$
4. Find the y-intercept of the parabola $y = x^2 - 3x - 4$. Ans: -4

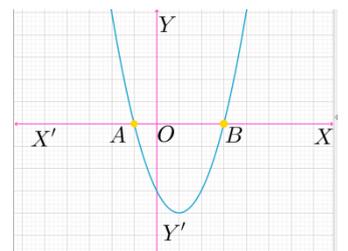
5. Figure along the side represents the sketch of the graph $y = x^2 + 4x - 5$. It cuts the X-axis at P and Q. What are the co-ordinates of P and Q? What do these X-co-ordinates denote?

Ans: $P(-5, 0)$ and $Q(1, 0)$, x-components represent the roots.



6. Figure given alongside represents the sketch of the graph $y = ax^2 + bx + c$. The graph intersects X-axis at A and B. What are the co-ordinates of A and B and what do their X-co-ordinates represent?

Ans: $A\left(\frac{-b - \sqrt{b^2 - 4ac}}{2a}, 0\right)$ and $B\left(\frac{-b + \sqrt{b^2 - 4ac}}{2a}, 0\right)$, x-components represent the roots



7. Find the equation of the parabola having vertex $(0, 0)$ and passing through the point $(3, 9)$. Ans: $y = x^2$
8. Find the equation of the parabola having vertex $(0, 0)$ and passing through the point $(-2, 4)$. Ans: $y = x^2$
9. Find the equation of the parabola which passes through the point $(1, 2)$ and vertex lies at the origin. Ans: $y = 2x^2$

Ans: $y = 2x^2$

10. The curve of a cubic equation passes through the origin contains the point (2, 32). Find the cubic equation. Ans: $y = 2x^3$

B. LONG ANSWER QUESTIONS

1. Solve graphically: $x^2 + 2x - 3 = 0$ Ans: $x = -3, 1$
 2. Solve graphically: $x^2 - 3x - 4 = 0$ Ans: $x = -1, 4$
 3. Solve graphically: $y = x^2$ and $y = 2 - x$ Ans: $x = (1, 1), (-2, 4)$
 4. Solve graphically: $y = x^2$ and $y = 2x - 1$ Ans: $x = (1, 1)$
 5. Solve graphically: $y = x^2 - 2x - 1$ and $y = x + 3$ Ans: $x = (-1, 2), (4, 7)$

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
- B. **Excellent**
- C. **Very Good**
- D. **Good**

DAY-5

(MEAN DEVIATION + PAIR OF STRAIGHT LINES)

MEAN DEVIATION...

A. SHORT ANSWER QUESTIONS

1. In a grouped data $\sum fm = 200$, $\sum f|m - \bar{x}| = 480$ and $N = 40$ then calculate the mean deviation and its coefficient. Ans: 12, 3
2. In a continuous data if $\sum f|m - M_{dn}| = 544$, $N = 40$ and median (M_{dn}) = 37 calculate the mean deviation and its coefficient from median. Ans: 13.6, 0.3
3. A continuous series has $\sum fm = 110$, $N = 10$ and $\sum f|m - \bar{x}| = 44$. Find mean deviation and its coefficient from mean. Ans: 4.4, 0.4
4. A continuous series has $\sum fm = 120$, $\bar{x} = 20$ and $\sum f|m - \bar{x}| = 25$. Find mean deviation and its coefficient from mean. Ans: 2.5, 0.125
5. In a continuous series, Median (M_d) = 25, $N = 10$ and $\sum f|m - M_d| = 50$. Find mean deviation and its coefficient from mean. Ans: 5, 0.2

B. LONG ANSWER QUESTIONS

6. From the data given, find the mean deviation from the mean and its coefficient. Ans: 10.3, 0.37

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	2	3	6	5	4

7. Compute the mean deviation and its coefficient from the mean. Ans: 10.3, 0.31

Weight (in kg)	5-15	15-25	25-35	35-45	45-55
No. of people	2	3	6	5	4

8. Compute the mean deviation and its coefficient from the mean. Ans: 4.6, 0.56

Age (in years)	0-4	4-8	8-12	12-16	16-20
No. of boys	12	8	10	6	4

9. Find the mean deviation and its coefficient from median.

Ans: 9.56 and 0.34

Marks obtained	0-10	10-20	20-30	30-40	40-50
No of students	5	8	15	16	6

10. Find the mean deviation and its coefficient about median.

Ans: 11.3, 0.35

Wages	0-10	10-20	20-30	30-40	40-50
No of workers	2	3	4	5	6

11. Calculate the mean deviation of the data given below from median:

Ans: 11.3, 0.35

Marks obtained	10-20	20-30	30-40	40-50	50-60
No of students	5	4	5	4	2

PAIR OF STRAIGHT LINES...

A. VERY SHORT ANSWER QUESTIONS

1. If θ be the angles the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$, what is the value of $\tan\theta$?
 Ans: $\tan\theta = \pm \frac{2\sqrt{h^2 - ab}}{a + b}$
2. If the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ are coincident to each other, write the relation between a, b and h.
 Ans: $h^2 = ab$
3. Write the condition under which the pair of straight lines represented by $ax^2 + 2hxy + by^2 = 0$ are perpendicular to each other.
 Ans: $a + b = 0$

B. SHORT ANSWER QUESTIONS

1. Find the single equation for the pair of straight lines represented by $3x + 2y = 0$ and $2x - 3y = 0$.
 Ans: $6x^2 - 5xy - 6y^2 = 0$
2. Find the single equation for the pair of straight lines represented by $ax + by = 0$ and $bx + ay = 0$.
 Ans: $ab(x^2 + y^2) + (a^2 + b^2)xy = 0$
3. Find the separate equations of lines represented by $x^2 + 7xy + 6y^2 = 0$ Ans: $x + 6y = 0, x + y = 0$
4. Find the separate equations of lines represented by $x^2 - 2x - 2y - y^2 = 0$ Ans: $x + y = 0, x - y - 2 = 0$
5. Show that the pair of straight lines represented by $4x^2 + 12xy + 9y^2 = 0$ are coincident to each other.
6. Show that the pair of straight lines represented by $x^2 + 4xy + 4y^2 = 0$ are coincident to each other.
7. A pair of lines represented by $px^2 - 12xy + 9y^2 = 0$ are coincident, find the value of p. Ans: 4
8. If the pair of lines represented by $(k+2)x^2 + 8xy + 4y^2 = 0$ are coincident, find the value of k. Ans: 2
9. Show that the lines represented by $3x^2 + 8xy - 3y^2 = 0$ are perpendicular to each other.
10. Show that the lines represented by $5x^2 + 24xy - 5y^2 = 0$ intersect at a right angle.
11. If the pair of straight lines represented by $(k + 1)x^2 - 3xy - 5y^2 = 0$ are perpendicular to each other, find the value of k?
 Ans: 4
12. For what value of m, the pair of lines represented by $3x^2 + 8xy + my^2 = 0$ are perpendicular to each other?
 Ans: -3
13. If the angle between the lines represented by $8x^2 - 5xy + py^2 = 0$ is a right angle, find the value of p.
 Ans: -8
14. Find the acute angle between the lines represented by the equation $3x^2 + 7xy + 2y^2 = 0$ Ans: 45°
15. Find the acute angle between the lines represented by the equation $6x^2 + xy - y^2 = 0$. Ans: 45°
16. Find the acute angle between the lines represented by the equation $x^2 + 4xy + y^2 = 0$ Ans: 60°
17. Find the obtuse angle between the lines represented by the equation $\sqrt{3}x^2 + 4xy + \sqrt{3}y^2 = 0$. Ans: 150°
18. Find the obtuse angle between the lines represented by the equation $12x^2 - 23xy + 5y^2 = 0$ Ans: 135°
19. Find the separate lines represented by $x^2 + 2xy\sec\theta + y^2 = 0$ Ans: $x - y(\sec\theta - \tan\theta) = 0, x - y(\sec\theta + \tan\theta) = 0$

C. LONG ANSWER QUESTIONS

1. Find the separate equation of the pair of line represented by the equation $3x^2 - 8xy - 3y^2 = 0$. Also find the angle between them.
 Ans: $x - 3y = 0, 3x + y = 0, 90^\circ$
2. Find the separate equations of lines represented by $2x^2 + 7xy + 3y^2 = 0$. Also, find the angle between them.
 Ans: $2x + y = 0, x + 3y = 0, 45^\circ, 135^\circ$

3. If two straight lines represented by an equation $3x^2 + 8xy + my^2 = 0$ are perpendicular to each other, find the separate equation of two lines. *Ans: $x + 3y = 0, 3x - y = 0$*
4. If the straight lines represented by $5x^2 - 8xy + py^2 = 0$ are perpendicular to each other, then find the value of p . Also find the equations of straight lines represented by $5x^2 - 8xy + (p + 8)y^2 = 0$. *Ans: $-5, x - y = 0, 5x - 3y = 0$*
5. If α be the acute angle between the pair of lines represented by the equation $x^2 + 2xy\sec\theta + y^2 = 0$, prove that: $\alpha = \theta$
6. If the acute angle between the pair of straight lines represented by $x^2 - 2xy\csc\theta + y^2 = 0$ is α , prove that: $\alpha = 90^\circ - \theta$.
7. If α be the obtuse angle between the pair of lines represented by the equation $x^2 + 2xy\sec\theta + y^2 = 0$, prove that: $\alpha = 180^\circ - \theta$
8. If the acute angle between the pair of straight lines represented by $x^2 - 2xy\csc\theta + y^2 = 0$ is α , prove that: $\alpha = 90^\circ + \theta$.
9. Find the single equation of the pair of straight lines passing through the origin and perpendicular to the lines represented by $2x^2 - 5xy + 2y^2 = 0$. *Ans: $2x^2 + 5xy + 2y^2 = 0$*
10. Find the single equation of a pair of straight lines passing through the origin and perpendicular to the lines represented by the equation $2x^2 - 3xy - 5y^2 = 0$. *Ans: $5x^2 - 3xy - 2y^2 = 0$*
11. Find the single equation of a pair of straight lines through the origin and perpendicular to the lines pairs represented by $x^2 - xy - 2y^2 = 0$. *Ans: $2x^2 - xy - y^2 = 0$*
12. Find the single equation of a pair of straight lines passing through the point $(0, 1)$ and parallel to the pair of straight lines represented by the equation $x^2 + 3xy - 4y^2 = 0$. *Ans: $x^2 + 3xy - 4y^2 - 3x + 8y - 4 = 0$*
13. Find the single equation of the pair of straight lines passing through the point $(1, 2)$ and parallel to the lines represented by $x^2 + 3xy + 2y^2 = 0$. *Ans: $x^2 + 3xy + 2y^2 - 8x - 11y + 15 = 0$*
14. The angle between a pair of straight lines represented by the equation $x^2 + xy - ky^2 = 0$ is 45° . Find the value of k . *Ans: $0, 6$*
15. If an angle between the lines represented by $2x^2 + kxy + 3y^2 = 0$ is 45° , find the positive value of k and then separate equation of lines. *Ans: $7, 2x + y = 0, x + 3y = 0$*
16. Determine the lines represented by the equation $x^2 + 2xy + y^2 - 2x - 2y - 15 = 0$. *Ans: $x + y - 5 = 0$ and $x + y + 3 = 0$*
17. Find the equation of a pair of straight lines represented by $2x^2 - 5xy - 3y^2 + 3x + 19y - 20 = 0$. *Ans: $x - 3y + 4 = 0$ and $2x + y = 5$*

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. Outstanding**
- B. Excellent**
- C. Very Good**
- D. Good**

DAY-6

(POLYNOMIAL + HEIGHT AND DISTANCE)

POLYNOMIAL...

A. VERY SHORT ANSWER QUESTIONS

1. State remainder theorem. *Ans: If a polynomial $f(x)$ is divided by $(x - a)$ then remainder $(R) = f(a)$.*

2. State factor theorem. *Ans: If a polynomial $f(x)$ is divided by $(x - a)$ and remainder $f(a) = 0$ then $(x - a)$ is a factor of $f(x)$.*
3. If a polynomial $f(x)$ is divided by $(x - a)$, what will be its remainder? *Ans: $f(a)$*
4. If a polynomial $f(x)$ is divided by $(x + a)$, what will be its remainder? *Ans: $f(-a)$*
5. If a polynomial $f(x)$ is divided by $(x - 2)$, what will be its remainder? *Ans: $f(2)$*
6. If a polynomial $f(x)$ is divided by $(x + 3)$, what will be its remainder? *Ans: $f(-3)$*
7. If $(x - m)$ is a factor of polynomial $p(x)$, what is the value of $p(m)$? *Ans: 0*
8. If $(x - 1)$ is a factor of polynomial $p(x)$, what is the value of $p(1)$? *Ans: 0*
9. If $f(x)$, $q(x)$, $d(x)$ and $r(x)$ represent a polynomial, quotient, divisor and remainder respectively, write the relation among them. *Ans: $f(x) = d(x) \times q(x) + r(x)$*

B. SHORT ANSWER QUESTIONS

1. Find the values of $Q(x)$ and R in $2x^3 - 4x + 3 = (x - 2) \times Q(x) + R$ using synthetic division method. *Ans: $2x^2 + 4x + 4, 11$*
2. If $2x^3 - 7x^2 + x + 10 = (x - 1) \times Q(x) + R$, find the remainder R and quotient $Q(x)$. *Ans: 6, $2x^2 - 5x - 4$*
3. If $2x^3 - 6x^2 + 3 = (x + 2) \times Q(x) + R$, find $Q(x)$ and R . *Ans: $2x^2 - 10x + 20, -37$*
4. By using the remainder theorem, find the remainder if $4x^3 + 6x^2 - 5x + 2$ is divided by $x - 2$. *Ans: 48*
5. Using Remainder theorem, find the remainder when $8x^3 - 4x^2 + 2x - 5$ is divided by $2x - 1$. *Ans: -4*
6. Find the remainder when $2x^3 - 7x^2 + 5x + 4$ is divided by $(x - 3)$. *Ans: 10*
7. If $f(x) = 4x^3 - 3x^2 + 3x - k$ is divided by $(x - 2)$, the remainder is 12. Find the value of k . *Ans: 14*
8. If $2x^3 - 4x^2 + kx + 10$ is divided by $(x + 2)$, the remainder is 4. Find the value of k using remainder theorem. *Ans: -13*
9. If $x^3 + 6x^2 + kx + 10$ leaves the remainder 4 when divided by $x + 2$, find the value of k . *Ans: 11*
10. Find the value of p when $x^3 + 3x^2 - px + 4$ is divided by $x + 2$ leaves the remainder p . *Ans: -8*
11. Given that the polynomial $f(x) = 2x^4 - 3x^3 + 6x + k$. If $f(1) = 0$, find the value of k . *Ans: -5*
12. Show that $(x + 2)$ is a factor of the polynomial $x^3 - 3x^2 - 4x + 12$.
13. Test whether $(x - 3)$ is a factor of $x^3 - 6x^2 + 11x - 6$ or not.
14. If a factor of a polynomial $p(x) = 2x^3 - 6x^2 - 5m - 2$ is $x - 2$, find the value of m . *Ans: -2*
15. If $(x + 3)$ is a factor of $x^3 - (m - 1)x^2 + mx + 54$, find the value of m . *Ans: 3*
16. If $(x - k)$ is a factor of $x^3 - kx^2 - 4x + k + 9$, find the value of k . *Ans: 3*

C. LONG ANSWER QUESTIONS

1. Solve: $x^3 - 3x^2 - 4x + 12 = 0$ *Ans: -2, 2, 3*
2. Solve: $x^3 - 3x^2 - 10x + 24 = 0$ *Ans: 2, -3, 4*
3. Solve: $8x^3 - 2x^2 - 5x - 1 = 0$ *Ans: 1, -1/4, -1/2*
4. Solve: $3x^3 - 13x^2 + 16 = 0$ *Ans: -1, 4, 4/3*
5. Solve: $3x^3 = 7x^2 - 4$ *Ans: 1, 2, -2/3*
6. Solve: $x^3 - 19x - 30 = 0$ *Ans: -3, -2, 5*
7. Solve: $x^3 - 21x - 20 = 0$ *Ans: -1, -3, 4*
8. Solve: $(x+1)(x^2 - 5x + 10) - 12 = 0$ *Ans: 1, 1, 2*
9. Solve: $(x - 1)(x^2 - 3x + 2) + 4 = 0$ *Ans: -1, 2, 3*
10. Solve: $y = x^3 - 4x^2 + x + 8$ and $y = 2$ *Ans: -1, 2, 3*
11. Solve: $y = x^3 - 4x^2 - 7x + 11$ and $y = 1$ *Ans: 1, -2, 5*

HEIGHT AND DISTANCE...

A. VERY SHORT ANSWER QUESTIONS

1. Define angle of elevation.
2. Define angle of depression.

B. LONG ANSWER QUESTIONS

1. The angle of elevation of the top of a tower was observed to be 60° from a point. On walking 200 m away from the point it was found to be 30° . Find the height of the tower. *Ans: 173.2 m*
2. The angle of elevation of the top of a tree as observed from a point on the ground is found to be 60° . On walking 40 meter away from the point, the angle of the elevation was found to be 45° . Find the height of the tree. *Ans: 94.64 m*

3. The angle of elevation of the top of a tower from a point was observed to be 45° and on walking 60 meter away from that point it was found to be 30° . Find the height of the tower. *Ans: 81.96 m*
4. From the roof and foot of a house, the angles of depression and elevation of the top of a tree are 60° and 30° respectively. If the height of the tree is 15 ft, find the height of the house. *Ans: 60 ft.*
5. The shadow of a tower on the ground is found to be 10.5 m longer when sun's altitude is 45° than it is 60° . Find the height of the tower. *Ans: 24.64*
6. From the roof of a building 16 meter high, the angles of elevation and depression of the top and the foot of an electric pole are observed to be 60° and 30° respectively. Find the height of the pole. *Ans: 64 m*
7. From the top of 30 m high cliff, the angles of depression of the top and the foot of a tower are observed to be 45° and 60° respectively. Find the height of the tower. *Ans: 12.68 m*
8. The angles of depression and elevation of the pinnacle of a temple 20 meter high are found to be 60° and 30° from the top and foot of a tower respectively. Find the height of the tower. *Ans: 80 m*
9. The angle of depression and elevation of the top of a building 40 m high from the top and bottom of a tower are found to be 60° and 30° respectively, find the height of the tower. *Ans: 160 m*
10. The angle of depression and elevation of the top of a pole 25 m high from the top and bottom of a tower are 60° and 30° respectively. Find the height of the tower. *Ans: 100 m*
11. From the top of a building of 20 m high, the angles of depression of the top and bottom of a pole are observed to be 45° and 60° respectively. Find the height of the pole and the distance between the house and the pole. *Ans: 11.55 m*
12. From the top of a cliff 100 m high, the angles of depression of the top and bottom of a building are observed to be 30° and 45° respectively. Find the height of the building. Also, find the distance between the tower and the building. *Ans: 42.27 m*
13. From a point on the horizontal plane, the angle of elevation of the top of a tower standing on the same plane was observed and found to be 60° . The angle of elevation of a point 24 meter below the top of the tower was found to be 30° from the same point. Find the height of the tower. *Ans: 36 m*
14. From a place at the ground level in front of a tower the angle of elevations of the top and bottom of flagstaff 6 m high situated at the top of a tower are observed 60° and 45° respectively. Find the height of the tower and the distance between the base of the tower and point of observation. *Ans: 8.19 m, 8.19 m*
15. A flagstaff of height 7 m stands on the top of a tower. The angles subtended by the tower and the flagstaff at a point on the ground are 45° and 15° respectively, find the height of the tower. *Ans: 9.56 m*
16. A statue stands on the top of a column. The angles subtend by the column and statue at a point 100 m away from the foot of the column are 45° and 15° respectively. Find the height of the statue. *Ans: 73.21 m*
17. The angles of elevation of the top of the tower as observed from the distances of 20 m and 45 m from its foot are found to be complementary. Find the height of the tower. *Ans: 30 m*
18. The angles of elevation of the top of the tower as observed from the distances of 32 m and 50 m from its foot are found to be complementary. Find the height of the tower. *Ans: 40 m*
19. Two posts are 180 m apart and the height of one is double that of the other. From the mid-point of the line joining their feet, an observer finds the angles of the elevation of their tops to be complementary, find the height of the longer post. *Ans: 127.28m*
20. A ladder 10 m long reaches to a point 10 m below the top of building. From the foot of the ladder, the angle of elevation of the building is 60° . Find the height of the building. *Ans: 15 m*
21. A ladder 18 m long reaches to a point 18 m below the top of building. From the foot of the ladder, the angle of elevation of the building is 60° . Find the height of the building. *Ans: 27 m*
22. A vertical pole AB is divided by a point C such that $AC:CB = 2:1$. The angle of elevation of C from a point on the ground is 30° . What is the angle of elevation of A from the same point? Find it where B is the foot of the pole. *Ans: 60°*
23. A poster hanging on a wall has a vertical height 3.66 m. From a point 5 m away from the wall on the same plane the angle of elevation of the bottom edge of the poster was found to be 45° . What will be the angle of elevation of the top edge of the poster if it is observed from the same point on the horizontal plane? *Ans: 60°*

24. A vertical pole is divided by any point in the ratio 9: 1. If both the segments of a pole subtend equal angles to each other at a distance of 20 m away from the foot of the pole, find the height of the pole.

Ans: 178.8 m

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
- B. **Excellent**
- C. **Very Good**
- D. **Good**

DAY-7

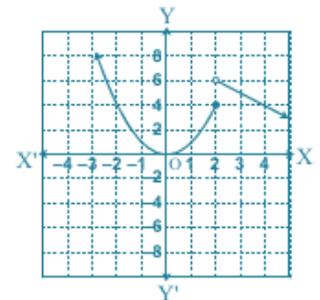
(CONTINUITY + CONIC SECTION)

CONTINUITY...

A. VERY SHORT ANSWER QUESTIONS

- | | |
|--|---|
| 1. Write the set of numbers which is continuous. | Ans: The set of real numbers |
| 2. State whether the set of whole numbers is continuous or discontinuous. | Ans: Discontinuous |
| 3. Express “{x: - 1 ≤ x ≤ 2}” in interval form. | Ans: [-1, 2] |
| 4. Express “{x: 3 < x ≤ 7}” in interval form. | Ans: (3, 7] |
| 5. Write the interval notation for “{x: 0 ≤ x < 4}”. | Ans: [0, 4) |
| 6. Write the interval notation for “{x: 0 < x < 4}”. | Ans: (0, 4) |
| 7. Under what condition the limit of a function $f(x)$ exists at $x = a$? | Ans: $\lim_{x \rightarrow a^-} f(x) = \lim_{x \rightarrow a^+} f(x)$ |
| 8. Write the left-hand limit of $f(x)$ at $x = 3$ in notation. | Ans: $\lim_{x \rightarrow 3^-} f(x)$ |
| 9. Write the right-hand limit of $f(x)$ at $x = 2$ in notation. | Ans: $\lim_{x \rightarrow 2^+} f(x)$ |
| 10. Write the limit of $f(x)$ at $x = 7$ in notation. | Ans: $\lim_{x \rightarrow 7} f(x)$ |
| 11. Express $\lim_{x \rightarrow 5^+} f(x)$ in sentence. | Ans: Right-hand limit of $f(x)$ at $x = 5$ |
| 12. Express $\lim_{x \rightarrow 1^-} f(x)$ in sentence. | Ans: Left-hand limit of $f(x)$ at $x = 1$ |
| 13. In which condition is the function $f(x)$ continuous at $x = a$? | Ans: $\lim_{x \rightarrow a^-} f(x) = \lim_{x \rightarrow a^+} f(x) = f(a)$ |
| 14. At which point is the function discontinuous? Give reason. | |

Ans: At $x = 2$, there is a jump



B. LONG ANSWER QUESTIONS

15. For a real valued function $f(x) = x + 3$.
- (i) Find the values of $f(x)$ at $x = 1.9, 1.99, 1.999, , 2, 2.1, 2.01, 2.001$

- (ii) Find $\lim_{x \rightarrow 2^-} -f(x)$ and $\lim_{x \rightarrow 2^+} +f(x)$ and $f(2)$.
- (iii) Is this function continuous at $x = 2$?
 Ans: (i) 4.9, 4.99, 4.999, 5, 5.1, 5.01, 5.001 (ii) 5, 5, 5 (iii) Continuous
- 16.** For a real valued function $f(x) = 2x + 1$.
- (i) Find the values of $f(x)$ at $x = 3.9, 3.99, 3.999, 4, 4.1, 4.01, 4.001$
- (ii) Find $\lim_{x \rightarrow 4^-} -f(x)$ and $\lim_{x \rightarrow 4^+} +f(x)$ and $f(4)$.
- (iii) Is this function $f(x)$ continuous at $x = 4$?
 Ans: (i) 8.8, 8.98, 8.998, 9, 9.2, 9.02, 9.002 (ii) 9, 9, 9 (iii) Continuous
- 17.** If the function $f(x) = 2x + 3$ is defined.
- (i) Find the values of $f(1.999)$ and $f(2.001)$.
- (ii) Write the values of $\lim_{x \rightarrow 2^-} -f(x)$ and $\lim_{x \rightarrow 2^+} +f(x)$.
- (iii) Is this function $f(x)$ continuous at $x = 2$? Give reason.
 Ans: (i) 6.998, 7.002 (ii) 7 (iii) Continuous
- 18.** For a real valued function $f(x) = 2x + 3$
- (i) Find the values of $f(2.95), f(2.99), f(3.01), f(3.05)$ and $f(3)$. Ans: 8.9, 8.98, 9.02, 9.1, 9
- (ii) Is this function continuous at $x = 3$? Ans: Continuous
- 19.** For a real valued function $f(x) = 6x + 1$
- (i) Find the values of $f(1.9), f(1.99), f(2.01), f(2.05)$ and $f(2)$. Ans: 12.4, 12.94, 13.06, 13.3, 13
- (ii) Is this function continuous at $x = 2$? Ans: Continuous
- 20.** For a real valued function $f(x) = 2x + 3$, find the values of $f(2.99), f(3.01)$ and $f(3)$. Is this function continuous at $x = 3$?
 Ans: 8.98, 9.02, 9, Continuous
- 21.** Examine whether a function $f(x) = \begin{cases} x + 2 & \text{for } x \leq 2 \\ 3x - 2 & \text{for } x > 2 \end{cases}$ is continuous or not at $x = 2$. Ans: Continuous
- 22.** If $f(x) = \begin{cases} x + 4 & \text{for } x < 2 \\ 4x - 2, & \text{for } x \geq 2 \end{cases}$ is defined, is the function $f(x)$ continuous at $x = 2$? Give reason.
- 23.** Prove that the function $f(x) = \begin{cases} 3x - 1 & \text{for } x < 2 \\ 5 & \text{for } x = 2 \\ 2x + 1 & \text{for } x > 2 \end{cases}$ is continuous at a point $x = 2$.
- 24.** Prove that the function $g(x) = \begin{cases} 2x - 1 & \text{for } x < 3 \\ 5x + 4 & \text{for } x \geq 3 \end{cases}$ is discontinuous at a point $x = 3$.

CONIC SECTION / CIRCLE...

A. VERY SHORT ANSWER QUESTIONS

- Which geometrical figure will form if a plane intersects a cone parallel to its base? Ans: circle
- Which geometrical figure will form if a plane intersects a cone parallel to its generator? Ans: parabola
- If the plane cuts the cone being parallel to its axis, what conic section will form? Ans: hyperbola
- Name the conic section so formed when an intersecting plane is neither parallel nor perpendicular to the base. Ans: ellipse
- Define circle on the basis of conic section. Ans: When the base of cone is parallel to intersecting plane
- Define parabola on the basis of conic section. Ans: When the generator of cone is parallel to intersecting plane
- Define hyperbola on the basis of conic section. Ans: When the axis of cone is parallel to intersecting plane
- What is the equation of the circle having centre (a, b) and radius c units? Ans: $(x - h)^2 + (y - k)^2 = r^2$
- Write the equation of the circle having ends of a diameter are (x_1, x_2) and (y_1, y_2) .
 Ans: $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$
- What will be the length of radius of a circle having centre (h, k) and touches the x-axis? Ans: $r = |k|$
- What will be the length of radius of a circle having centre (h, k) and touches the y-axis? Ans: $r = |h|$
- If the circle having centre (h, k) in the first quadrant and radius 'r' touches both the axes, what is the relation among r, h and k? Ans: $r = h = k$

B. SHORT ANSWER QUESTIONS

13. Find the equation of circle with centre (0, 3) and radius 4 units. *Ans: $x^2 + y^2 - 4y = 7$*
14. Find the equation of circle with centre (5, 1) and radius 5 units. *Ans: $x^2 + y^2 - 10x - 2y + 1 = 0$*
15. Find the equation of a circle having centre (1, -2) and the diameter $2\sqrt{5}$ units. *Ans: $x^2 + y^2 - 2x + 4y = 0$*
16. Find the equation of a circle with centre (-6, 5) and tangent to x-axis. *Ans: $x^2 + y^2 + 12x - 10y + 36 = 0$*
17. Find the equation of a circle with centre (4, 5) and touching y-axis. *Ans: $x^2 + y^2 - 8x - 10y + 25 = 0$*
18. Find the equation of circle with radius 3, touching both the positive axes. *Ans: $x^2 + y^2 - 6x - 6y + 9 = 0$*
19. Find the equation of the circle with centre (2, 2) touching both of the axes. *Ans: $x^2 + y^2 - 4x - 4y + 4 = 0$*
20. Find the equation of a circle whose ends of a diameter are (2, 3) and (-1, 4). *Ans: $x^2 + y^2 - x - 7y + 10 = 0$*
21. Find the equation of a circle whose ends of a diameter are (-2, -3) and (2, 3). *Ans: $x^2 + y^2 = 13$*
22. Find the equation of a circle with centre (2, 3) and passes through (-2, 0). *Ans: $x^2 + y^2 - 4x - 6y = 12$*
23. Find the equation of a circle having centre (3, 4) and passing through (7, 7). *Ans: $x^2 + y^2 - 6x - 8y = 0$*
24. Find the centre of a circle having equations of two diameters $x + y = 5$ and $2x - y = 1$ *Ans: (2, 3)*
25. If the equation of a circle is $(x + 5)^2 + y^2 = 64$, find its centre and radius. *Ans: (-5, 0), 8 units*
26. If the equation of a circle is $x^2 + (y + 1)^2 = 25$, find its centre and radius. *Ans: (0, -1), 5 units*
27. Find the centre and radius of a circle having the equation $x^2 + y^2 - 10x - 4y = 7$. *Ans: (5, 2), 6 units*
28. Find the centre and radius of the centre of the circle $x^2 + y^2 - 20y + 75 = 0$. *Ans: (0, 10), 5 units*
29. If the radius of the circle $x^2 + y^2 - 4x - 6y - k = 0$ is 4 units, find the value of k. *Ans: 3*
30. Find the length of the circumference of a circle having the equation $x^2 + y^2 - 2y - 48 = 0$. *Ans: 44 units*

C. LONG ANSWER QUESTIONS

1. Find the centre and the radius of the circle $9x^2 + 9y^2 - 36x + 6y = 107$. *Ans: (2, -1/3), 4 units*
2. Find the centre and radius of the circle $2x^2 + 2y^2 - 20x - 28y + 98 = 0$. *Ans: (5, 7), 5 units*
3. If the equation of a circle is $4x^2 + 4y^2 - 24x - 20y - 3 = 0$, find the co-ordinates of its centre and the diameter of the circle. *Ans: (3, 5/2), 8 units*
4. If (3, 4) is one end of a diameter of a circle $x^2 + y^2 - 4x - 6y + 11 = 0$, find the other end. *Ans: (1, 2)*
5. If the coordinates of one end of a diameter of the circle having equation $x^2 + y^2 + 4x - 6y + 8 = 0$ is (0, 2) then find the co-ordinates of the other end of the diameter. *Ans: (-4, 4)*
6. The co-ordinates of an end point of the diameter of circle $x^2 + y^2 - 2x - 2y = 8$ is (2, 4), find the coordinate of other end. *Ans (0, -2)*
7. Find the equation of the circle having centre (1, 2) and passing through the point of intersection of the lines $x + 2y = 3$ and $3x + y = 4$. *Ans: $x^2 + y^2 - 2x - 4y + 4 = 0$*
8. Find the equation of the circle having the centre (4, 6) and passing through the midpoint of the line joining the points (-1, 3) and (3, 1). *Ans: $x^2 + y^2 - 8x - 12y + 27 = 0$*
9. Find the equation of the circle which passes through the point (1, 4) and equations of two diameters are $2x + y = 5$ and $x - y = 1$. *Ans: $x^2 + y^2 - 4x - 2y = 5$*
10. The equations of two diameters of a circle passing through the point (3, 4) are $x + y = 14$ and $2x - y = 4$. Find the equation of the circle. *Ans: $x^2 + y^2 - 12x - 16y + 75 = 0$*
11. A circle has radius 5 units & the equations of its 2 diameters are $2x - y = 5$ & $x - 3y + 5 = 0$. Find the equation of the circle and prove that it passes through the origin. *Ans: $x^2 + y^2 - 8x - 6y = 0$*
12. Find the equation of a circle whose centre is at the point of intersection of $2x + y = 4$ and $2y - x = 3$ and passing the point (4, 6). *Ans: $x^2 + y^2 - 2x - 4y = 20$*
13. Find the equation of the circle with centre (3, 2) and passing through the centre of circle $x^2 + y^2 - 2x + 4y + 5 = 0$. *Ans: $x^2 + y^2 - 6x - 4y + 5 = 0$*
14. Find the equation of circle concentric with the circle $x^2 + y^2 - 6x + y = 1$ and passing through the point (4, -2). *Ans: $x^2 + y^2 - 6x + y + 6 = 0$*
15. Find the equation of the circle which is concentric with the circle $x^2 + y^2 - 8x + 12y + 15 = 0$ and passing through the point (5, 4). *Ans: $x^2 + y^2 - 8x + 12y = 49$*
16. Find the equation of circle having centre (-4, 1) and has the same radius as the circle with equation $x^2 + y^2 - 2x + 2y = 7$. *Ans: $x^2 + y^2 + 8x - 2y = 8$*
17. The centers of two equal circles A and B are X and Y respectively. If the coordinates of X are (2, 3) and the equation of circle B is $x^2 + y^2 - 2x + 6y + 1 = 0$ then find the equation of the circle A.

$$\text{Ans: } x^2 + y^2 - 4x - 6y + 4 = 0$$

18. The circle A with centre X passes through the centre Y of the circle B. If the equation of circle B is $x^2 + y^2 - 4x + 6y - 12 = 0$ and the co-ordinates of X are $(-4, 5)$, then find the equation of the circle A.
 $\text{Ans: } x^2 + y^2 + 8x - 10y - 59 = 0$
19. Find the equation of the circle which passes through the points $(2, 3)$ and $(-1, 2)$ and its centre lies on the straight line $2x - 3y + 1 = 0$.
 $\text{Ans: } x^2 + y^2 - 2x - 2y - 3 = 0$
20. Find the equation of the circle passing through $(2, 3)$ and $(5, 4)$ and centre on the line $2x + 3y - 7 = 0$.
 $\text{Ans: } x^2 + y^2 - 10x + 2y + 1 = 0$
21. Find the equation of a circle having the centre at $(b, 4)$ and passing through the points $(-2, 0)$ and $(4, 0)$ of X-axis.
 $\text{Ans: } x^2 + y^2 - 2x - 8y = 8$
22. Find the radius to the circle passing through the points $(1, 2)$, $(3, -4)$ and $(5, -6)$.
 $\text{Ans: } 10 \text{ units}$
23. Find the equation of circle which passes through the points $(2, 0)$, $(0, 2)$ and $(-2, 0)$.
 $\text{Ans: } x^2 + y^2 = 4$
24. On a wheel there are three points $(5, 7)$, $(-1, 7)$ and $(5, -1)$ located such that the distance from a fixed point to these points is always equal. Find the coordinates of the fixed point and then derive the equation of representing the locus that contains all three points.
 $\text{Ans: } (2, 3), x^2 + y^2 - 4x - 6y - 12 = 0$
25. Find the equation of the circle which passes through the origin and making intercepts of lengths 6 and 8 units on the positive x- axis and y- axis.
 $\text{Ans: } x^2 + y^2 - 6x - 8y = 0$

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
 B. **Excellent**
 C. **Very Good**
 D. **Good**

DAY-8

(CONDITIONAL TRIGONOMETRIC IDENTITIES + INVERSION TRANSFORMATION)

CONDITIONAL TRIGONOMETRIC IDENTITIES...

A. LONG ANSWER QUESTIONS

- If $A + B + C = 180^\circ$, prove that: $\cot \frac{A}{2} \cdot \cot \frac{B}{2} \cdot \cot \frac{C}{2} = \cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2}$
- If $A + B + C = 180^\circ$, prove that: $\tan \frac{A}{2} \cdot \tan \frac{B}{2} + \tan \frac{B}{2} \cdot \tan \frac{C}{2} + \tan \frac{C}{2} \cdot \tan \frac{A}{2} = 1$
- If $A + B + C = 180^\circ$, then prove that: $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \cdot \sin B \cdot \sin C$
- If $A + B + C = 180^\circ$, then prove that: $\sin 2A + \sin 2B - \sin 2C = 4 \cos A \cdot \cos B \cdot \sin C$
- If $A + B + C = 180^\circ$, then prove that: $\sin 2A - \sin 2B + \sin 2C = 4 \cos A \cdot \sin B \cdot \cos C$
- If $A + B + C = 180^\circ$, prove that: $\sin (B + C - A) + \sin (C + A - B) + \sin (A + B - C) = 4 \sin A \cdot \sin B \cdot \sin C$
- If $A + B + C = 180^\circ$, prove that: $\frac{\cos A}{\sin B \cdot \sin C} + \frac{\cos B}{\sin C \cdot \sin A} + \frac{\cos C}{\sin A \cdot \sin B} = 2$
- If $A + B + C = 180^\circ$, prove that: $\cos 2A + \cos 2B + \cos 2C = -4 \cos A \cdot \sin B \cdot \sin C - 1$
- If $A + B + C = 180^\circ$, prove that: $\cos 2A - \cos 2B - \cos 2C = 4 \cos A \cdot \sin B \cdot \sin C - 1$

10. If $A + B + C = 180^\circ$, then prove that: $\cos 2A + \cos 2B - \cos 2C = 1 - 4 \sin A \cdot \sin B \cdot \cos C$
11. If $A + B + C = 180^\circ$, prove that: $\cos (B + C - A) + \cos (C + A - B) + \cos (A + B - C) = 4 \cos A \cdot \cos B \cdot \cos C + 1$
12. If $A + B + C = 180^\circ$, prove that: $\sin A \cdot \cos B \cdot \cos C + \sin B \cdot \cos C \cdot \cos A + \sin C \cdot \cos A \cdot \cos B = \sin A \cdot \sin B \cdot \sin C$
13. If $A + B + C = 180^\circ$, prove that: $\cos A \cdot \sin B \cdot \sin C + \cos B \cdot \sin C \cdot \sin A + \cos C \cdot \sin A \cdot \sin B = 1 + \cos A \cdot \cos B \cdot \cos C$
14. If $A + B + C = 180^\circ$, then prove that: $\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2 \cos A \cdot \cos B \cdot \cos C$
15. If $A + B + C = 180^\circ$, then prove that: $\sin^2 A - \sin^2 B + \sin^2 C = 2 \sin A \cdot \cos B \cdot \sin C$
16. If $A + B + C = 180^\circ$, then prove that: $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2 \cos A \cdot \cos B \cdot \cos C$
17. If $A + B + C = 90^\circ$, prove that: $\cos 2A + \cos 2B + \cos 2C = 1 + 4 \sin A \cdot \sin B \cdot \sin C$
18. If $A + B + C = 90^\circ$, prove that: $\sin 2A + \sin 2B + \sin 2C = 4 \cos A \cdot \cos B \cdot \cos C$
19. If $A + B + C = 180^\circ$, then prove that: $\sin A + \sin B + \sin C = 4 \cos \frac{A}{2} \cdot \cos \frac{B}{2} \cdot \cos \frac{C}{2}$
20. If $A + B + C = 180^\circ$, then prove that: $\cos A + \cos B + \cos C = 1 + 4 \sin \frac{A}{2} \cdot \sin \frac{B}{2} \cdot \sin \frac{C}{2}$
21. If $A + B + C = 180^\circ$, then prove that: $\sin A - \sin B + \sin C = 4 \sin \frac{A}{2} \cdot \cos \frac{A}{2} \cdot \sin \frac{A}{2}$
22. If $A + B + C = 180^\circ$, then prove that: $\sin A + \sin B - \sin C = 4 \sin \frac{A}{2} \cdot \sin \frac{A}{2} \cdot \cos \frac{A}{2}$
23. If $A + B + C = 180^\circ$, then prove that: $\sin^2 \frac{A}{2} + \sin^2 \frac{B}{2} + \sin^2 \frac{C}{2} = 1 - 2 \sin \frac{A}{2} \cdot \sin \frac{B}{2} \cdot \sin \frac{C}{2}$
24. If $A + B + C = 180^\circ$, then prove that: $\cos^2 \frac{A}{2} + \cos^2 \frac{B}{2} + \cos^2 \frac{C}{2} = 2 \left(1 + \sin \frac{A}{2} \cdot \sin \frac{B}{2} \cdot \sin \frac{C}{2} \right)$
25. If $A + B + C = 180^\circ$, then prove that: $2 \left(\sin \frac{Q}{2} + \sin \frac{R}{2} \right) \left(\sin \frac{Q}{2} - \sin \frac{R}{2} \right) - \cos P = 1 - 4 \cos \frac{P}{2} \cdot \cos \frac{Q}{2} \cdot \cos \frac{R}{2}$

INVERSION TRANSFORMATION...

A. VERY SHORT ANSWER QUESTIONS

1. Define inversion transformation. *Ans: The transformation with respect to a circle*
2. Where does the inverse of P lie when point P is outside the circle of inversion? *Ans: inside the circle*
3. Where does the inverse of P lie when point P is inside the circle of inversion? *Ans: outside the circle*
4. Where does the inverse of P lie when point P is on the circumference of the circle? *Ans: coincide*
5. Where is the inverse of P if point P is at the centre of the circle of inversion? *Ans: to the infinity*
6. If the inverse of P is P' with respect to the circle having centre O and radius 'r', write the relation between OP, OP' and r. *Ans: $OP \times OP' = r^2$*
7. Write the formula to find P'(x', y') if P(x, y) is the inversion point of P(x, y) in a circle with centre at origin. *Ans: $x' = \frac{r^2 x}{x^2 + y^2}$ and $y' = \frac{r^2 y}{x^2 + y^2}$*
8. Write the formula to find P'(x', y') if P(x, y) is the inversion point of P(x, y) in a circle with centre at (h, k). *Ans: $x' = h + \frac{r^2(x-h)}{(x-h)^2 + (y-k)^2}$ and $y' = k + \frac{r^2(y-k)}{(x-h)^2 + (y-k)^2}$*

B. LONG ANSWER QUESTIONS

1. Find the inverse of the point (6, 7) with respect to the circle $x^2 + y^2 - 4x - 6y = 51$. *Ans: (10, 11)*
2. Find the inverse of the point (4, 5) with respect to the circle $x^2 + y^2 - 4x - 6y = 3$. *Ans: (6, 7)*
3. Find the inverse point (3, 4) with respect to the circle $x^2 + y^2 - 4x - 6y - 23 = 0$. *Ans: (20, 21)*

Great job! Your smart practice will lead to success.

What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
- B. **Excellent**
- C. **Very Good**
- D. **Good**

DAY-9

(COMBINED TRANSFORMATION + Q.D)

COMBINED TRANSFORMATION...

A. VERY SHORT ANSWER QUESTIONS

- If a transformation $T_1 = \begin{pmatrix} a \\ b \end{pmatrix}$ is followed by another transformation $T_2 = \begin{pmatrix} c \\ d \end{pmatrix}$, what will be the single transformation for the combined transformations?
 Ans: Transformation $T_2 \circ T_1 = \begin{pmatrix} a + c \\ b + d \end{pmatrix}$
- What will be single transformation when a rotation through θ_1 about origin is followed by another rotation through θ_2 about origin?
 Ans: Rotation $(\theta_1 + \theta_2, O)$
- If an enlargement $E_1[(0, 0); k_1]$ is followed by another enlargement $E_2[(0, 0); k_2]$, what will be the single transformation for the combined enlargements?
 Ans: Enlargement: $E_2 \circ E_1 = [(0, 0); k_1 \times k_2]$
- What is the single transformation when the reflection about x-axis is followed by the reflection about y-axis?
 Ans: rotation through 180° about origin
- What is the single transformation when the reflection about x-axis is followed by the reflection about the line $y = x$?
 Ans: rotation through $+90^\circ$ about origin
- What is the single transformation when the reflection about y-axis is followed by the reflection about the line $y = -x$?
 Ans: rotation through $+90^\circ$ about origin
- What is the single transformation when the reflection in the line $x = h$ is followed by the reflection in the line $y = k$?
 Ans: rotation through 180° about (h, k)
- If r_1 represents the reflection about x-axis and r_2 represents the the rotation through -90° about origin, what does $r_2 \circ r_1$ represent?
 Ans: reflection in the line $y = -x$
- If r_1 represents the reflection about x-axis and r_2 represents the the rotation through -90° about origin, what does $r_1 \circ r_2$ represent?
 Ans: reflection in the line $y = x$

C. LONG ANSWER QUESTIONS

- A triangle XYZ with vertices X(1, 2), Y(-1, -2) and Z(5, 0) is translated by a vector $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$. The image so formed is reflected on the X-axis. Write the co-ordinates of the vertices of the images thus obtained and represent the ΔXYZ and its images on the same graph paper.
 Ans: $X'(3, 3)$, $Y'(1, -1)$, $Z'(7, 1)$, $X''(3, -3)$, $Y''(1, 1)$ and $Z''(7, -1)$.
- A triangle PQR with vertices P(2, 1), Q(4, 3) and R(6, -1) is reflected on the X-axis. The image so formed is translated by the vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$. Write down the co-ordinates of the vertices of the images thus obtained and represent the ΔPQR and its images on the same graph paper.
 Ans: $P'(2, -1)$, $Q'(4, -3)$, $R'(6, 1)$, $P''(-1, 1)$, $Q''(1, -1)$, $R''(3, 3)$.
- ΔPQR with vertices P(2, 1), Q(2, 4) and R(5, 2) is translated by the vector $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$ and then the image so formed is rotated about the origin through 90° in positive direction. Write down the co-ordinates of the vertices of the images thus obtained and present ΔPQR and its images in the same graph paper.
 Ans: $P'(3, -1)$, $Q'(3, 2)$, $R'(6, 0)$, $P''(1, 3)$, $Q''(-2, 3)$ and $R''(0, 6)$
- A (2, 5), B (-1, 3) and C (4, 1) are the vertices of a ΔABC . Find the coordinates of the vertices of image of ΔABC under the rotation of positive 90° about origin followed by enlargement E [(0, 0); 2]. Represent the object and the images on the same graph paper.
 Ans: $A'(-5, 2)$, $B'(-3, -1)$, $C'(-1, 4)$; $A''(-10, 4)$, $B''(-6, -2)$, $C''(-2, 8)$

5. A triangle LMN with vertices L(-3, 3), M(-6, 3) and N(-3, 9) respectively is reflected in y-axis and then image formed is rotated about the origin through 180°. Write the co-ordinates of the vertices of the images thus obtained and present the triangle LMN and its images in the same graph paper.
Ans: L'(3, 3), M'(6, 3), N'(3, 9), L''(-3, -3), M''(-6, -3) and N''(-3, -9)
6. ΔPQR having the vertices P(3, 4), Q(2, 1) and R(4, 2) is translated by $T = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$. The image so formed is enlarged by E[(0, 0), 2]. Writing the co-ordinates of the vertices of images thus obtained, represent the ΔPQR and its images in the same graph paper.
Ans: P'(1, 7), Q'(0, 4), R'(2, 5) and P''(2, 14), Q''(0, 8), R''(4, 10)
7. Triangle PQR having vertices P(2, 1), Q(5, 3) and R(7, -1) is reflected on the y-axis. the image so formed is enlarged by E[(0, 0), 2]. Write the co-ordinates of the vertices of the images thus obtained and present the ΔPQR and its images in the same graph paper.
Ans: P'(-2, 1), Q'(-5, 3), R'(-7, -1) and P''(-4, 2), Q''(-10, 6), R''(-14, -2)
8. A triangle having vertices A(2, 5), B(-1, 3) and C(4, 1) is rotated about origin through + 90°. The image so obtained is reflected on the line x = 0. Find the vertices of image triangles. Show all the triangles in the same graph paper and also write the single transformation to represent these two transformations.
Ans: A'(-5, 2), B'(-3, -1), C'(-1, 4), A''(5, 2), B''(3, -1), C''(1, 4), reflection: y = x
9. State the single transformation equivalent to the combination of reflections on the X-axis and Y-axis respectively. Using this single transformation find the coordinates of the vertices of the image of ΔABC having vertices A(2, 3), B(3, -4) and C(1, -2). Also, draw the object and image on the same graph.
Ans: R [180°, (0,0)]; A'(-2, -3), B'(-3, 4) and C'(-1, 2)
10. State the single transformation equivalent to the combination of reflections in the X-axis and y = x respectively. Using this single transformation find the coordinates of the vertices of the image of ΔABC having vertices A(5, 4), B(2, 2) and C(5, 2). Also, draw the object and image on the same graph.
Ans: R [90°, (0,0)]; A'(-4, 5), B'(-2, 2) and C'(-2, 5)
11. The coordinates of vertices of a quadrilateral ABCD are A (1, 1), B (2,3), C (4, 2) and D(3,-2). Rotate this quadrilateral about origin through 180°. Reflect this image of quadrilateral about y = -x. Write the name of transformation which denotes the combined transformation of above two transformations.
Ans: y = x, A' (1, 1), B' (3, 2), C' (2, 4) and D' (-2, 3)
12. A triangle with vertices A(1, 2), B(4, -1) and C(2, 5) is reflected successively in the lines x = 5 and y = -2. Find by stating coordinates and graphically represent the images under these transformations. State also the single transformation given by the combinations of these transformations.
Ans: A'(9, 2), B'(6, -1), C'(8, 5), A''(9, -6), B''(6, -3), C''(8, -9), half-turn about (5, -2)
13. A triangle with vertices A (1, 2), B (4, -1) and C (2, 5) is reflected successively in the lines x = -1 and y = 2. Find by stating coordinates and graphically represent images under these transformations. State also the single transformation given by the combination of these transformations.
Ans: A' (-3, 2), B' (-6, -1), C' (-4, 5); A'' (-3, 2), B'' (-6, 5), C'' (-4, -1); R [180°, (-1, 2)]
14. If R_1 is the reflection about x = 1 and R_2 is the reflection about x = 3. Find the rule that is equivalent to $R_2 \circ R_1$. Transform ΔABC with the vertices A (2, 2), B (1, -1) and C (3, 0) by using $R_2 \circ R_1$. Represent the triangle ABC and its image on the same graph paper. *Ans: T = $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$, A' (6, 2), B' (5, -1), C' (7, 0)*

QUARTILE DEVIATION...

A. SHORT ANSWER QUESTIONS

1. In a continuous series, if the first quartile (Q_1) is 10 and the third quartile (Q_3) is 30, find the quartile deviation and its coefficient.
Ans: 10, 0.25
2. In a series, the first quartile (Q_1) = 35 and third quartile (Q_3) = 75, find the quartile deviation and its coefficient.
Ans: 20, 0.363
3. In a continuous series, the third quartile is two times the first quartile. If the first quartile is 24, find the third quartile and quartile deviation.
Ans: 12, 0.33

4. In a data, the first quartile and quartile deviation are 40 and 50 respectively. Find the third quartile and the coefficient of quartile deviation. Ans: 60, 0.5
5. In a continuous data, the quartile deviation is 15 and the coefficient of quartile deviation is 0.6, find the third quartile. Ans: 40
6. In a continuous data, the quartile deviation is 20 and the coefficient of quartile deviation is 0.4, find the first quartile. Ans: 30

B. LONG ANSWER QUESTIONS

12. The first quartile of the given data is 25, find the quartile deviation and its coefficient. Ans: 15, 0.375

Marks	0-15	15-30	30-45	45-60	60-75
No. of students	8	6	12	15	7

13. In the given data, $Q_1 = 24.5$, find the quartile deviation and its coefficient. Ans: 10.25, 0.295

Weight (in kg)	0-10	10-20	20-30	30-40	40-50	50-60
No. of people	3	5	10	12	15	5

14. In the given data, $Q_3 = 330$, find the quartile deviation and its coefficient. Ans: 95, 0.404

Daily wages (in Rs)	0-100	100-200	200-300	300-400	400-500
Number of workers	7	20	15	10	8

15. The upper quartile of the given data is 60, find the quartile deviation and its coefficient. Ans: 16, 0.364

Marks	10-20	20-33	30-40	40-50	50-60	60-70	70-80
No. of students	3	5	4	5	4	4	3

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What is your performance level? Test your leaning experience and choose your learning level.

- A. **Outstanding**
- B. **Excellent**
- C. **Very Good**
- D. **Good**

DAY-10

(SEQUENCE AND SERIES + MATRIX TRANSFORMATION)

SEQUENCE AND SERIES...

A. VERY SHORT ANSWER QUESTIONS

1. The first term of an AS is a and common difference is d , what is the n^{th} term? Ans: $t_n = a + (n-1)d$
2. What is the arithmetic mean between the numbers 'a' and 'b'? Ans: A.M. = $\frac{a+b}{2}$
3. If there are 'n' arithmetic means between the numbers 'a' and 'b', what is the common difference (d) of the arithmetic sequence? Ans: $d = \frac{b-a}{n+1}$

4. What does 'n' represent in the formula $d = \frac{b-a}{n+1}$? Ans: No. of arithmetic means
5. What is the last mean of an AS having the first term 'a' and common difference 'd'? Ans: $m_n = a + nd$
6. What is the last mean of an AP having the last term 'b' and common difference 'd'? Ans: $m_n = b - d$
7. If an arithmetic series has the first term (a) and common difference (d), what is the sum of the first 'n' terms of the series? Ans: $S_n = \frac{n}{2}[2a + (n-1)d]$
8. An AS has the first term (a), last term (l) and number of terms (n), what is the sum? Ans: $S_n = \frac{n}{2}(a + l)$
9. The first term of a geometric series is 'a' and common ratio 'r', what is the nth term? Ans: $t_n = ar^{n-1}$
10. What is the geometric mean between the numbers 'a' and 'b'? Ans: G.M. = \sqrt{ab}
11. What is the common ratio if there are 'n' geometric means between 'a' and 'b'? Ans: $r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}}$
12. What does 'n' denote in the formula $r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}}$? Ans: No. of geometric means
13. What is the last mean of an GS having the first term 'a' and common ratio 'r'? Ans: $g_n = ar^n$
14. What is the last mean of an GP having the last term 'b' and common ratio 'r'? Ans: $g_n = \frac{b}{r}$
15. If a geometric series has the first term 'a' and common ratio 'r', what is the sum of the first 'n' terms of the series? Ans: $S_n = \frac{a(r^n - 1)}{r - 1}$
16. An AS has the first term (a), last term (l) and common ratio 'r', what is the sum? Ans: $S_n = \frac{lr - a}{r - 1}$

B. SHORT ANSWER QUESTIONS

17. Find the 10th term of an arithmetic sequence 7, 11, 15, ... Ans: 43
18. If the nth term of the series $84 + 78 + 72 + \dots$ is 0, find the value of n. Ans: 15
19. Which term of the series $2 + 5 + 8 + \dots$ is 56? Ans: 19th
20. If 6, p, q, 18 are in an AP, find the values of p and q. Ans: 10, 14
21. Find the sum of the series: $3 + 7 + 11 + 15 + \dots$ 10 terms. Ans: 210
22. An arithmetic series has 20 terms and the last term is 50. If the first term is 4, find the sum of the series. Ans: 540
23. If the 3rd term of an arithmetic series is 13, find the sum of first 5 terms. Ans: 65
24. The first and the second term of a GP are 9 and 18 respectively. What is the fifth term? Ans: 144
25. How many terms are there in the geometric series $\frac{1}{4} + \frac{1}{2} + 1 + 2 + \dots + 64$ Ans: 9
26. If $x - 1, x + 1, 3x - 1$ are in a GS, find the value of x. Ans: 3, 0
27. If the third term of a G.P. is 2, find the product of first five terms. Ans: 32
28. Find the values of x, y and z from the given GP: $\frac{1}{8}, x, y, z, 2$ Ans: 1/4, 1/2, 1
29. If the arithmetic mean between 2 and x is 5, find the geometric mean. Ans: 4
30. Find the sum of the series $1 + 3 + 9 + \dots$ up to 6 terms Ans: 364

C. LONG ANSWER QUESTIONS

15. If the third and eleventh terms of an arithmetic series are 8 and -8 respectively, find the sum of the first seven terms of the series. Ans: 42
16. If the fourth and fifteenth terms of an arithmetic series are 11 and 44 respectively then find the sum of its first 20 terms. Ans: 610
17. The sum of first eight terms of an arithmetic series is 180 and its fifth term is five times of the first term, find the sum of the first 10 terms. Ans: 275
18. Three terms in an arithmetic series have sum 12 and product 48. Find the terms. Ans: 2, 4, 6 or, 6, 4, 2
19. Three terms in an arithmetic series have sum 21 and product 315. Find the terms. Ans: 9, 7, 5 or, 5, 7, 9
20. There are n arithmetic means between 3 and 39. If the ratio of third mean to the last mean is 3:7, then find the number of arithmetic means. Ans: 8

21. There are n arithmetic means between 7 and 77. If the ratio of first mean to the last mean is 1:6, then find the number of arithmetic means. *Ans: 13*
22. If the sum of three numbers in geometric series is 14 and their product is 64, find the numbers. *Ans: 2, 4, 8 or 8, 4, 2*
23. The sum of three consecutive terms in GP is 62 and their product is 1000, find the terms. *Ans: 2, 10, 50 or 50, 10, 2*
24. Insert 4 geometric means between $\frac{2}{3}$ and 162. *Ans: 2, 6, 18, 54*
25. There are some geometric means between $\frac{1}{2}$ and 16. If the third mean be 4, find the numbers of means. *Ans: 4*
26. Find the sum of the first eight terms of a geometric series whose second term is 6 and the fourth term is 54. *Ans: 6560*
27. If the second term of a geometric series is 48 and its fifth term is 6, find the sum of the first 6 terms. *Ans: 189*
28. In a geometric series, if the sixth term is 16 times the second term and the sum of the first seven terms is $\frac{127}{4}$, find positive common ratio and the first term. *Ans: 2, $\frac{1}{4}$*
29. The sum of first four terms is 15 and the sum of the first two terms is 3 of a geometric series whose common ratio is positive, find the sum of first 10 terms the series. *Ans: 1023*
30. The sum of first four terms is 40 and the sum of the first two terms is 4 of a geometric series whose common ratio is positive, find the sum of first 8 terms the series. *Ans: 3280*
31. If the arithmetic mean and geometric mean of two numbers are 5 and 4 respectively, find the numbers. *Ans: 2 and 8 or 8 and 2*
32. If the arithmetic mean and geometric mean of two numbers are 13 and 12 respectively, find the numbers. *Ans: 8 and 18 or 18 and 8*
19. Three numbers whose sum is 21 are in AP. If 1, 3 and 10 are added to them respectively; then the numbers are in G.P. Find the numbers. *Ans: 4, 7, 10 or 19, 7, -5*
20. Three numbers whose sum is 7 are in GP. If 1, 3 and 4 are added to them respectively; then the numbers are in A.P. Find the numbers. *Ans: 1, 2, 4 or 4, 2, 1*
21. The product of the first five terms of a geometric series is 243. If the third term of the geometric series is equal to the tenth term of an arithmetic series, find the sum of the first 19 terms of the arithmetic series. *Ans: 57*
22. A firm produced 2500 pair of shoes in its first year. If it increased its production by a constant number every year and produced 17500 pair of shoes at the end of the fifth year, find the increased number of pair of shoes in each year. *Ans: 500*
23. A contractor on construction job specifies a penalty for delay of completion beyond a certain date as Rs 200 for the first day, Rs 250 for the second day, Rs 300 for the third day and so on. The penalty for each succeeding day being Rs 50 more than that of the preceding day. How much money the contractor has to pay as penalty, if he has delayed the work by 30 days? *Ans: Rs 27750*
24. A person pays a loan of Rs 975 in monthly installments, each installment being less than a former by Rs 5. The amount of first installment is Rs 100. In how many installments will the entire amount be paid? Give reason. *Ans: 15*
25. A man borrows Rs 3465 without interest and repays the loan in 6 monthly installments, each installment being double the preceding one. Find the first and last installments. *Ans: Rs 55, Rs 1760*

MATRIX TRANSFORMATION...

A. VERY SHORT ANSWER QUESTIONS

1. Which 2×2 matrix is associated to the reflection about x-axis? *Ans: $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$*
2. Which 2×2 matrix is associated to the reflection about y-axis? *Ans: $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$*

3. Which 2×2 matrix is associated to the reflection about the line $y = x$? Ans: $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$
4. Write the 2×2 matrix which represents reflection about the line $y = -x$? Ans: $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$
5. Write the 2×2 matrix which is associated to rotation through $+90^\circ$ about origin? Ans: $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$
6. Find the transformation represented by the matrix $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$? Ans: reflection about x-axis
7. Find the transformation represented by the matrix $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$? Ans: reflection about y-axis
8. Find the transformation represented by the matrix $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$? Ans: reflection about $y = x$
9. Find the transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$? Ans: reflection about $y = -x$
10. Which transformation is represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$? Ans: Rotation through $+90^\circ$ about origin
11. Which transformation is represented by the matrix $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$? Ans: Rotation through -90° about origin
12. Which transformation is represented by the matrix $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$? Ans: Rotation through 180° about origin
13. To what transformation is the matrix $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ associated? Ans: Enlargement with scale factor 2 about origin
14. To what transformation is the matrix $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$ associated? Ans: Enlargement with scale factor 3 about origin

B. LONG ANSWER QUESTIONS

15. The parallelogram QRST has the vertices $Q(-1, 1)$, $R(-2, -1)$, $S(2, -1)$ and $T(3, 1)$. Transform the given parallelogram under the matrix $\begin{pmatrix} 4 & 3 \\ 2 & 0 \end{pmatrix}$ and find the coordinates of vertices of its image.
Ans: $Q'(-1, -2)$, $R'(-11, -4)$, $S'(5, 4)$ and $T'(15, 6)$
16. The square WXYZ has the vertices $W(0, 3)$, $X(1, 1)$, $Y(3, 2)$ and $Z(2, 4)$. Transform the given square WXYZ under the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ and find the coordinates of the vertices of its image.
Ans: $W'(-3, 0)$, $X'(-1, -1)$, $Y'(-2, -3)$ and $Z'(-4, -2)$
17. Find the co-ordinates of the vertices of the image of the unit square transformed by the matrix $\begin{pmatrix} 4 & 2 \\ 1 & 2 \end{pmatrix}$.
Ans: $(0, 0)$, $(4, 1)$, $(6, 3)$ and $(2, 2)$.
18. A unit square MNOP having vertices $M(0, 0)$, $N(1, 0)$, $O(1, 1)$ and $P(0, 1)$ is transformed under the matrix transformation through $y = -x$ and write the vertices of the images quadrilateral $M'N'O'P'$ so formed.
Ans: $M'(0, 0)$, $N'(0, -1)$, $O'(-1, -1)$ and $P'(-1, 0)$
19. $P(-3, 2)$, $Q(-1, 4)$ and $R(2, 0)$ are the vertices of ΔPQR . Find the vertices of the image triangle under the reflection on X-axis by using matrix method.
Ans: $P'(-3, -2)$, $Q'(-1, -4)$ and $R'(2, 0)$
20. Find the 2×2 matrix which transforms the unit square into a parallelogram $\begin{pmatrix} 0 & 3 & 4 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix}$. Ans: $\begin{pmatrix} 3 & 1 \\ 0 & 1 \end{pmatrix}$
21. Find the 2×2 matrix which transforms the unit square into a parallelogram $\begin{pmatrix} 0 & 4 & 6 & 2 \\ 0 & 1 & 3 & 2 \end{pmatrix}$. Ans: $\begin{pmatrix} 4 & 2 \\ 1 & 2 \end{pmatrix}$

22. Find the 2×2 matrix which transforms the unit square into a parm $\begin{pmatrix} 0 & 3 & 5 & 2 \\ 0 & -1 & -2 & -1 \end{pmatrix}$. Ans: $\begin{pmatrix} 3 & 2 \\ -1 & -1 \end{pmatrix}$
23. If the matrix $\begin{pmatrix} a & 2 \\ b & 2 \end{pmatrix}$ transforms a unit square to the parallelogram $\begin{pmatrix} 0 & 4 & c & 2 \\ 0 & 1 & 3 & d \end{pmatrix}$, find the values of a, b, c and d. Ans: a = 4, b = 1, c = 6, d = 2
24. If the matrix $\begin{pmatrix} a & 0 \\ c & -1 \end{pmatrix}$ transforms a rectangle $\begin{pmatrix} 0 & 2 & 2 & 0 \\ 0 & b & 1 & 1 \end{pmatrix}$ into a rectangle $\begin{pmatrix} 0 & 2 & 2 & 0 \\ 0 & 0 & -1 & d \end{pmatrix}$, find the values of a, b, c and d. Ans: a = 1, b = 1, c = 0, d = -1
25. A square ABCD with vertices A (0, 3), B (1, 1), C (3, 2) and D (2, 4) is mapped on to the parallelogram A'B'C'D' by a 2×2 transformation matrix so that the vertices of $\square A'B'C'D'$ are A' (6, -6), B' (3, -1), C' (7, -1) and D' (10, -6). Find the 2×2 matrix. Ans: $\begin{pmatrix} 1 & 2 \\ 1 & -2 \end{pmatrix}$
26. Find a 2×2 matrix which transforms a $\triangle ABC$ with vertices A(3, 6), B(5, -3) and C(-4, 2) into $\triangle A'B'C'$ with vertices A'(-3, -6), B'(-5, 3) and C'(4, -2). Find the 2×2 matrix. Ans: $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$
27. Find a 2×2 matrix which transforms a $\triangle PQR$ with vertices P(4, 3), Q(6, 4) and R(8, 1) into the $\triangle P'Q'R'$ with vertices P'(-3, -4), Q'(-4, -6) and R'(-1, -8). Ans: $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$
28. Find a 2×2 matrix which transforms a $\triangle XYZ$ with vertices X(1, -3), Y(4, 1) and Z(-2, 0) into the $\triangle X'Y'Z'$ with vertices X'(3, 1), Y'(-1, 4) and Z'(0, -2). Ans: $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$

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What is your performance level? Test your leaning experience and choose your learning level.

- E. **Outstanding**
- F. **Excellent**
- G. **Very Good**
- H. **Good**

DAY-11

(TRIGONOMETRIC EQUATIONS + LPP)

TRIGONOMETRIC EQUATIONS...

A. VERY SHORT ANSWER QUESTIONS

1. Define trigonometric equation. Ans: An equation involving trigonometric ratio
2. For what acute angle A, $\sin A = \frac{1}{2}$ is true? Ans: 30°
3. If $\sin A = \cos A$, what the acute angle A? Ans: 45°

B. SHORT ANSWER QUESTIONS

4. If $2\sin 2\theta = \sqrt{3}$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$). Ans: $30^\circ, 60^\circ$
5. If $2\sin 2\theta = 1$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$). Ans: $15^\circ, 75^\circ$
6. If $\sqrt{3} \tan 3A - 3 = 0$, find the value of θ . ($0^\circ \leq \theta \leq 90^\circ$) Ans: $20^\circ, 80^\circ$

7. If $\sqrt{2} \sin \frac{A}{2} = 1$, find the value of A. ($0^\circ \leq A \leq 180^\circ$). Ans: 90°
8. If $\sin \theta = \cos \theta$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$) Ans: 45°
9. If $\operatorname{cosec} \theta = \sec \theta$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$) Ans: 45°
10. If $\sin \theta = \cos \theta$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$) Ans: 45°
11. If $\sec \theta = 2 \sin \theta$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$) Ans: $15^\circ, 75^\circ$
12. If $4 \sin \theta - 3 \operatorname{cosec} \theta = 0$, find the value of θ . ($0^\circ \leq \theta \leq 180^\circ$) Ans: $60^\circ, 120^\circ$
13. Solve: $\sqrt{3} \sec \theta - 2 = 0$ ($0^\circ \leq \theta \leq 90^\circ$) Ans: 30°
14. Solve: $\tan \theta + \cot \theta = 2$ ($0^\circ \leq \theta \leq 90^\circ$) Ans: 45°
15. If $4 \cos^2 A - 4 \cos A + 1 = 0$, find A. ($0^\circ \leq A \leq 180^\circ$) Ans: 60°
16. Solve: $\sin^2 \frac{\theta}{4} - \sin \frac{\theta}{4} + \frac{1}{4} = 0$ ($0^\circ \leq \theta \leq 180^\circ$) Ans: 120°

C. LONG ANSWER QUESTIONS

15. Solve: $2 \cos^2 \theta = 3 \sin \theta$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $30^\circ, 150^\circ$
16. Solve: $3 \sin^2 \theta + 4 \cos \theta = 4$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $0^\circ, 360^\circ, \cos^{-1}(\frac{1}{3})$
17. Solve: $2 \sin^2 A + 3 \cos A = 3$ ($0^\circ \leq A \leq 360^\circ$) Ans: $0^\circ, 60^\circ, 300^\circ, 360^\circ$
18. Solve: $3 \tan^2 \theta - 4 \sec \theta - 1 = 0$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $60^\circ, 300^\circ$
19. Solve: $2\sqrt{3} \sin^2 \theta = \cos \theta$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $30^\circ, 330^\circ$
20. Solve: $2\sqrt{3} \cos^2 \theta = \sin \theta$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $60^\circ, 120^\circ$
21. Solve: $\sec \theta \cdot \tan \theta = \sqrt{2}$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $45^\circ, 135^\circ$
22. Solve: $\operatorname{cosec} \theta \cdot \cot \theta = \sqrt{2}$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $45^\circ, 315^\circ$
23. Solve: $\cot^2 \theta + \left(\sqrt{3} + \frac{1}{\sqrt{3}}\right) \cot \theta + 1 = 0$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $120^\circ, 150^\circ, 300^\circ, 330^\circ$
24. Solve: $\tan^2 \theta - \left(\sqrt{3} + \frac{1}{\sqrt{3}}\right) \tan \theta + 1 = 0$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $30^\circ, 60^\circ, 210^\circ, 240^\circ$
25. Solve: $\sqrt{3} \sin A + \cos A = \sqrt{2}$ ($0^\circ \leq A \leq 360^\circ$) Ans: $15^\circ, 105^\circ$
26. Solve: $\sin A = \sqrt{3} (1 - \cos A)$ ($0^\circ \leq A \leq 360^\circ$) Ans: $0^\circ, 60^\circ, 360^\circ$
27. Solve: $\cos A + \cos 2A + \cos 3A = 0$ ($0^\circ \leq A \leq 360^\circ$) Ans: $45^\circ, 120^\circ, 135^\circ$
28. Solve: $\sin 3\theta + \sin \theta = \sin 2\theta$ ($0^\circ \leq \theta \leq 360^\circ$) Ans: $0^\circ, 60^\circ, 180^\circ, 270^\circ, 300^\circ, 360^\circ$

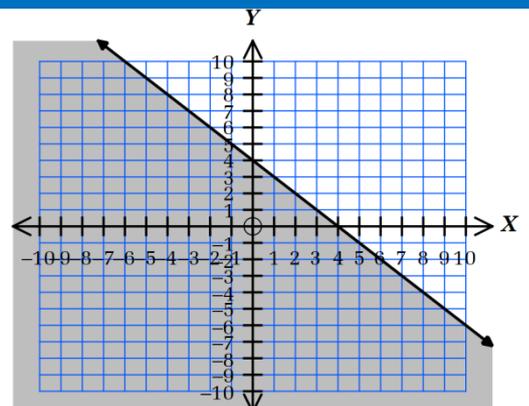
LINEAR PROGRAMMING PROBLEMS (LPP)...

A. VERY SHORT ANSWER QUESTIONS

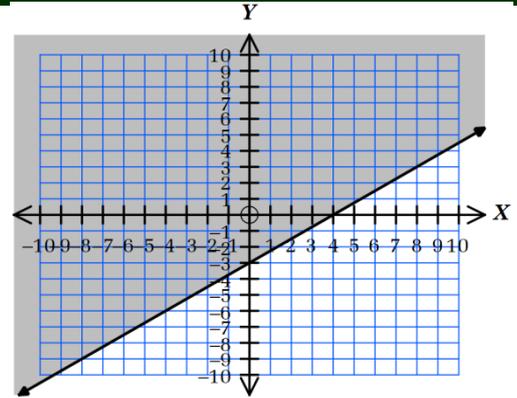
1. Which inequality has boundary line $ax + by + c = 0$ and contains the origin? Ans: $ax + by + c \leq 0$
2. Which inequality has boundary line $ax + by = c$ and does not contain the origin? Ans: $ax + by \geq c$

B. SHORT ANSWER QUESTIONS

3. Write down the inequality represented by the shaded region in the adjoining figure. Ans: $x + y \leq 4$



4. Write down the inequality represented by the shaded region in the adjoining figure. *Ans: $3x - 4y \leq 12$*



5. Draw the graph of the inequality $x + y \leq 5$.
 6. Draw the graph of the inequality $2x + 3y \leq 6$.
 7. Draw the graph of the inequality $4x + 3y \geq 12$.
 8. Draw the graph of the inequality $x - y \geq 0$.

C. LONG ANSWER QUESTIONS

9. Maximize the objective function $P = 3x + 5y$ subject to the following constraints:
 $x + y \leq 6, x - y \leq 4, x \geq 0, y \geq 0$ *Ans: $P_{Max} = 30$ at $(0, 6)$*
10. Maximize the objective function $P = 5x + 3y$ subject to the constraints
 $2y \geq x - 1, x + y \leq 4, x \geq 0, y \geq 0$ *Ans: $P_{Max} = 10$ at $(3, 1)$*
11. Minimize the objective function $Z = 5x + 3y$ subject to the constraints
 $2x + y \leq 20, 2x + 3y \geq 24, x \geq 0, y \geq 0$ *Ans: $Z_{Min} = 0$ at $(0, 0)$*
12. Minimize the objective function $Z = 3x + 2y$ subject to the constraints
 $x + y \geq 0, x - y \leq 0, x \geq -1, y \leq 2$ *Ans: $Z_{Min} = -8$ at $(-1, 2)$*
13. Optimize the given objective function $F = 2x + 3y$ subject to the constraints
 $x - 2y \leq 2, x + y \leq 5, x \geq 0, y \geq 0$ *Ans: $F_{Max} = 15$ at $(0, 5), F_{Min} = 0$ at $(0, 0)$*
14. The maximum value of an objective function $P = 5x + 3y + k$, for $k > 0$ under the given constraints
 $2x + y \leq 20, 2x + 3y \leq 24, x \geq 0, y \geq 0$ is 55, find the value of k . *Ans: $k = 4$*
15. The maximum value of an objective function $P = 5x + 4y + k$, for $k > 0$ under the given constraints
 $2x + y \geq 5, 3x + y \leq 7, x \geq 0, y \geq 0$ is 30, find the value of k . *Ans: $k = 2$*

Great job! Your smart practice will lead to success.

What is your performance level? Test your learning experience and choose your learning level.

- A. **Outstanding**
 B. **Excellent**
 C. **Very Good**
 D. **Good**

HAPPY LEARNING!