Class 9 (Optional Mathematics)						
Annual Lesson Plan 2081						
Area	**Topics**	**1st term**	**2nd term**	**3rd term**	**4th term**	
Algebra	Order Pair	All				
	Cartesian Product	All				
	Relation	All				
	Function		All			
	Polynomials		All			
	Sequence and Series			All		
Limit	Limit			All		
Matrix	Types of matrices	All				
	Operations of matrices	All				
	Transpose of Matrix	All				
	Multiplication of matrices by a Scalar		All			
	Multiplication of Matrices		All			
Coordinate Geometry	Locus	All				
	Section Formula	All				
	Equation of Straight lines					
	• Parallel to axes		All			
	• Slope intercept form		All			
	• Intercept form		All			
	• Perpendicular form			All		
	• Reduction to standard form			All		
	• Point slope form and two points form				All	
	Distance between a point and a straight line				All	
	Area of triangle and quadrilateral using coordinates				All	
Trigonometry	Measurement of Angles	All				
	Introduction to trigonometric Ratios	All				
	Trigonometric identities	All				
	Conversion of Trigonometric Ratios		All			
	Trigonometric Ratios of Standard Angles		All			
	Trigonometric Ratios of Different Angles			All		
	Trigonometric Ratios of Compound Angles				All	
Vector	Magnitude and Direction of Vector			All		
	Operation of Vectors			All		
	Multiplication of Vectors by Scalar			All		
	Law of Vector Addition				All	
Transformation	Reflection		All			
	Rotation			All		
	Translation				All	
	Enlargement or Reduction				All	
Statistics	Partition Values	All				
	Q.D. and its coefficient	All				
	M.D. and its coefficient			All		
	S.D. and its coefficient				All	

First Terminal Examination

S.N.	Contents	Working Hours	Knowledge 1marks	Understanding 2marks	Application 3marks	Higher Ability 4marks	Total No. of Questions	Total Marks
1.	Algebra	10	1	1	1	1	4	10
2.	Matrix	6	1	1	1		3	6
3.	Coordinate Geometry	9	2	1	1	1	5	11
4.	Trigonometry	13	2	2	3		7	15
5.	Statistics	4		1	2		3	8
	Total No. of Question		6	6	8	2	22	
	Weightage	42	6	12	24	8		50

Second Terminal Examination

S.N.	Contents	Working Hours	Knowledge 1marks	Understanding 2marks	Application 3marks	Higher Ability 4marks	Total No. of Questions	Total Marks
1.	Algebra	10+12	1	1	1	1	4	10
2.	Matrix	6+8	1	1	1		3	6
3.	Coordinate Geometry	9+10	2	1	1	1	5	11
4.	Trigonometry	13+10	1	2	3		6	14
5.	Transformation	5	1		1		2	4
6.	Statistics	4		1	1		2	5
	Total No. of Question		6	6	8	2	22	
	Weightage	87	6	12	24	8		50

Third Terminal Examination

S.N.	Contents	Working Hours	Knowledge 1marks	Understanding 2marks	Application 3marks	Higher Ability 4marks	Total No. of Questions	Total Marks
1.	Algebra	22+6	2	2	2	1	7	16
2.	Limit	8	1		1		2	4
3.	Matrix	14	1	1	1		3	6
4.	Coordinate Geometry	19+6	2	1	1	1	5	11
5.	Trigonometry	23+5	2	2	3		7	15
6.	Vectors	6	1	1		1	3	7
7.	Transformation	5+6	1		1	1	3	8
8.	Statistics	4+4		1	2			8
	Total No. of Question		6	6	8	2	22	
	Weightage	128	6	12	24	8		75

Annual Examination

S.N.	Contents	Knowledge 1marks	Understanding 2marks	Application 3marks	Higher ability 4marks	Total No. of Question	Total marks
1.	Algebra	2	2	2	1	7	16
2.	Limit	1	-	1	-	2	4
3.	Matrix	1	1	1	-	3	6
4.	Coordinate Geometry	2	1	1	1	5	11
5.	Trigonometry	2	2	3	-	7	15
6.	Vectors	1	1	-	1	3	7
7.	Transformations	1	-	1	1	3	8
8.	Statistics	-	1	2	-	3	8
	Total No. of Questions	10	8	11	4	33	-
	Total Marks	10	16	33	16		75

Internal Evaluation Scheme

S.N.	Criteria of internal Evaluation	Marks
1.	Participation (Attendance, Active Participation in Learning Activities)	3
2.	Practical and Project Works	16
3.	Terminal Examinations	6
	Total Marks	25

Note: The method of internal evaluation is same as in Compulsory Mathematics.

Model Question

First Terminal Examination-2081

Class-9 Time:2hrs F.M.:50

Sub: Optional Mathematics P.M.:17.5

Group-A [6x1=6]

1. Define inverse relation.
2. Write down the type of matrix $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$.
3. Write down the coordinates of midpoint of line segment having end points of line segment (x_1, y_1) and (x_2, y_2).
4. Define locus of moving point.
5. Express $tan\theta$ in terms of $sec\theta$.
6. How many grades equal to one right angles?

Group-B [6x2=12]

7. For what values of p and q, $(p+5, q+2)$ and $(7,5)$ are equal to each other?
8. Construct a 2x2 matrix whose elements is in the form of $a_{ij} = 3i - 2j$.
9. Find the coordinates of a point which divides the line joining the points $(1,2)$ and $(3,4)$ in the ratio 4:5 externally.
10. Find the ratio of an angles 48^o and 80^g.
11. Prove that: $\frac{1+cosA}{1-cosA} = (cosecA + cotA)^2$
12. 12,17,2x+3,3x+5,36,43 are in ascending order. If its 50th percentile is 29, find the value of x.

Group-C [8x3=24]

13. Let $A = \{1,2,3\}$, express the relation $R = \{(x, y): y = x^2\}$ on A by
    i. Set of ordered pairs ii. Tabulation method iii. Arrow diagram
14. If $A = \begin{pmatrix} 1 & 2 \\ -3 & 6 \\ 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 3 \\ 5 & 7 \\ 1 & -4 \end{pmatrix}$, then prove that: $(A+B)^T = A^T + B^T$.
15. Find the locus of a point which moves so that it is equidistant from the points $(4,3)$ and $(5,4)$.
16. Three angles of a triangle are $\left(\frac{20x}{9}\right)^g$, $3x^o$ and $\left(\frac{\pi x}{75}\right)^c$. Find all angles in degrees.
17. Prove that radian is a constant angle.
18. Prove that: $(3 - 2sin^2\theta)(2cot^2\theta - 3) = (1 + 3cot^2\theta)(2 - 5sin^2\theta)$
19. Find the third deciles from the following data:

Wages (Rs)	35	45	55	65	75
No. of workers	50	54	85	45	30

20. Find quartile deviation.

Age (in years)	10	12	14	16	18
No. of people	6	10	16	23	5

Group-D [2x4=8]

21. If $A = \{1,2,3\}, B = \{4,5\}$ and $C = \{6,7,8\}$, then prove that the cartesian products $A \times (B \cup C) = (A \times B) \cup (A \times C)$
22. Find the coordinates of the points of trisection of the line segment joining the points $P(1,2)$ and $Q(4,2)$.

Model Question

Second Terminal Examination-2081

Class-9 Time:2hrs F.M.:50

Sub: Optional Mathematics P.M.:17.5

Group-A [6x1=6]

1. Define Cartesian product of any two non-empty sets.
2. Write any one example of scalar matrix.
3. Write down the coordinates of the centroid of triangle whose vertices are (x_1, y_1), (x_2, y_2) and (x_3, y_3).
4. Write down the equation of straight lines parallel to x-axis and at a distance of 'a' units.
5. In a right-angled triangle ABC, $cosA = \frac{AB}{AC}$, write the ratio of $sinA$.
6. Write a property of reflection.

Group-B [6x2=12]

7. If $f; A \to B$ is defined by $f(x) = 2x - 1$ and $A = \{1, 2, 3\}$, then find the range of function.
8. For the matrix $A = \begin{pmatrix} 2 & 1 \\ -2 & -1 \end{pmatrix}$. Prove that $A^2 = A$.
9. In what ratio does X-axis divide the line joining the points $(2, -3)$ and $(5, 8)$? $find$.
10. Find the value of $\frac{4}{tan^2 60^o} + \frac{4}{cos^2 30^o} - sin^2 45^o$.
11. If degree and radian measure of an angle are D and C respectively, prove that $\frac{D}{90} = \frac{2C}{\pi}$.
12. Find the 20th percentile from the given data: 10,20,30,40,50,60,70,80,90.

Group-C [8x3=24]

13. If $f(x) = mx + c, f(2) = 7$ and $f(3) = 10$,find the value of m and c. Also, find $f(x)$.
14. If $A - B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ 3 & -4 \end{pmatrix}$ then find the product of $(A + B)$ and $(A - B)$.
15. Show that the points $P(3,4), Q(7,7)$ and $R(11, 10)$ are collinear.
16. A cow is tied to a pole with a rope of length 14 m. If the cow grazes such that it describes a circle of radius 14 m, how far will it have moved when the rope traces an angle of 45^o at the pole?
17. Prove that: $\frac{tan\theta + sec\theta - 1}{tan\theta - sec\theta + 1} = \frac{1 + sin\theta}{cos\theta}$.
18. If $5sin\theta + 12cos\theta = 13$ then find the value of $tan\theta$.
19. Reflect a trapezium PQRS with vertices $P(-3, 5), Q(1, 5), R(3, 1)$ and $S(-2, 1)$ about the line $x = 1$ to get the trapezium P'Q'R'S'. find the vertices of trapezium P'Q'R'S'. Also present both the trapeziums on the same graph paper.
20. Find quartile deviation.

Scores	12	13	14	15	16	18
Frequency	5	5	5	6	1	1

Group-D [2x4=8]

21. If $p(x) = q(x)$, then find the value of a, b and c if $p(x) = 7x^6 + (a + 3)x^4 + (b + 2)x^2 + (c + 3)x + 5$ and $q(x) = 7x^6 + (2a - 1)x^4 + (3b - 4)x^2 + 5c$.
22. Find the equation of straight lines which passes through the points $(3, 4)$ and sum of its intercept on the axes is 14.