INDIAN SCHOOL SOHAR **No. of printed pages: 6**

FINAL EXAMINATION (2022-23)

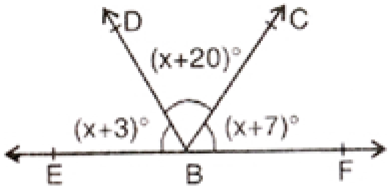
MATHEMATICS (041)

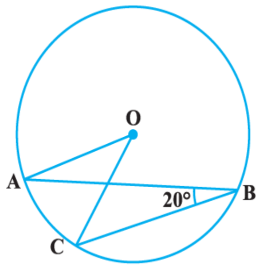
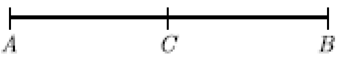
CLASS: IX **MAX.MARKS: 80**

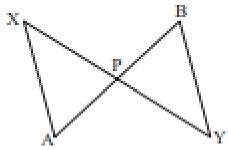
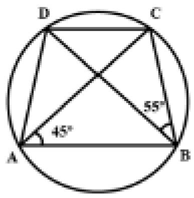
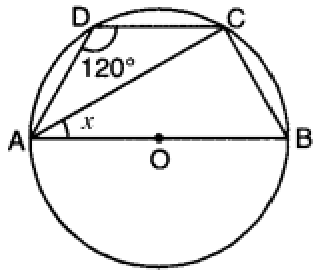
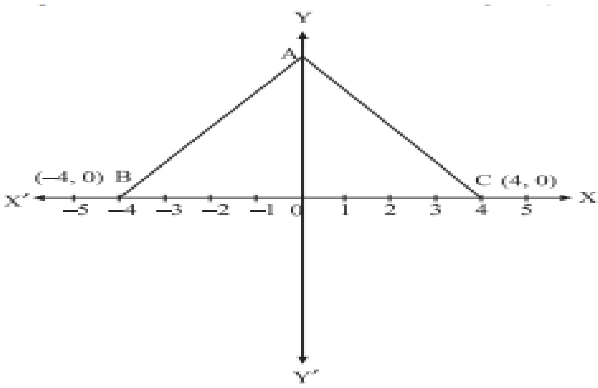
DATE: **TIME: 3 HOURS**

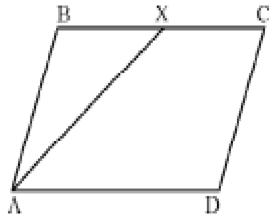
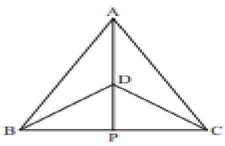
General Instructions:

1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. Section D has 4 Long Answer (LA) type questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1,1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 2 marks, 2 Qs of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take π = $\frac{22}{7}$ wherever required if not stated.

	Section A **Section A consists of 20 questions of 1 mark each.**	
1.	If (x-1) is the factor of $4x^3 + 3x^2 - 4x + k$ then k is (a) - 3 (b) 3 (c) - 5 (d) 5	1
2.	If P(a,b) lies in II quadrant then which of the following is true about a and b? (a) $a < 0, b < 0$ (b) $a > 0, b < 0$ (c) $a < 0, b > 0$ (d) $a > 0, b > 0$	1
3.	The distance of the point P(-3, -4) from the x-axis is (a) -3 (b) 3 (c) 4 (d) 5	1
4.	In the given figure, find the value of x:  a) 40° (b) 50° (c) 60° (d) 80°	1
5.	The curved surface area of a hemisphere is 77 cm^2. Radius of the sphere is: (a) 3.5 cm (b) 7 cm (c) 10.5 cm (d) 11 cm	1
6.	The coefficient of x^2 in $(2 - 3x^2)(x^2 - 5)$ (a) -17 (b) -10 (c) 4 (d) 17	1
7.	The class mark of class interval 60—70 is: (a) 60 (b) 65 (c) 70 (d) 75	1
8.	Find the value of $x + y + z$ if $x^2 + y^2 + z^2 = 18$ and $xy + yz + zx = 9$ (a) 9 (b) 3 (c) 6 (d) 8	1

9.	The value of $\sqrt[4]{(81)^{-2}}$ is: (a) $\frac{1}{9}$ (b) $\frac{1}{3}$ (c) 9 (d) $\frac{1}{81}$	1
10.	After rationalizing the denominator of $\frac{7}{3\sqrt{3}-2\sqrt{2}}$, we get the denominator as (a) 13 (b) 35 (c) 5 (d) 19	1
11.	The decimal expansion of $\sqrt{3}$ is: (a) 1.732 (b) non-terminating repeating (c) finite decimal (d) non terminating non-recurring	1
12.	In Fig, if ∠ABC =20° , then ∠AOC is equal to:  (a) 80° (b) 20° (c) 40° (d) 45°	1
13.	Find the value of $\sqrt[3]{1000} - \sqrt[3]{729}$ (a) 1 (b) 4 (c) 2 (d) -1	1
14.	Any point on the line x = 3y is of the form (a) (a, 3a) (b) (3a, a) (c) $(a, \frac{a}{3})$ (d) $(\frac{a}{3}, a)$	1
15.	If a point *C* lies between two point *A* and *B* such that *AC* = *BC* , then  (a) AC = AB (b) AB = $\frac{1}{2}$ AC (c) AC = $\frac{1}{2}$ AB d) AC = $\frac{1}{3}$ AB	1
16.	Two adjacent angles on a straight line are in the ratio 6 : 3. The measure of the greater angle is: (a) 120° (b) 180° (c) 90° (d) 110°	1
17	The perimeter of an equilateral triangle is 60 m. Its area is: (a) $10\sqrt{3}$ m^2 (b) 40 m^2 (c) 100 $\sqrt{3}$ m^2 (d) $20\sqrt{3}$ m^2	1
18.	In an isosceles triangle, if the vertical angle is twice the sum of the base angles, then the vertical angle is : (a) 130° (b) 30° (c) 60° (d) 120°	1
19	**Assertion:** 2 + $\sqrt{3}$ is an irrational number. **Reason:** Sum of a rational and an irrational number is always an irrational number. Square root of a positive real number always exists. (a) Both assertion and reason are true and reason is the correct explanation of assertion. (b) Both assertion and reason are true but reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Assertion is false but reason is true	1

20	**Assertion:** The equation of $2x + 5 = 0$ and $3x + y = 5$ both have degree 1. **Reason:** The degree of a linear equation in two variables is 2. (a) Both assertion and reason are true and reason is the correct explanation of assertion. (b) Both assertion and reason are true but reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Assertion is false but reason is true.	1
	Section B **Section B consists of 5 questions of 2 marks each.**	
21.	In the figure, AX = BY and AX||BY, prove that $\Delta APX \cong \Delta BPY$. 	2
22.	ABCD is a cyclic quadrilateral in which AC and BD are its diagonals. If $\angle DBC = 55°$ and $\angle BAC = 45°$, find $\angle BCD$.  OR In the figure, O is the centre of a circle passing through points A, B, C and D and $\angle D = 120°$. Find the value of x. 	2
23.	In the figure, ΔABC is an equilateral triangle with coordinates of vertices B and C as (–4, 0) and (4, 0) respectively. Find the coordinates of the point A. 	2

24.	If the volume of a right circular cone of height 9 cm is 48 π cm^3, find the diameter of its base. OR Surface area of a sphere is 2464 cm^2. Find its volume.	2
25.	If x = $2+\sqrt{3}$, then find the value of $(x - \frac{1}{x})^3$	2
Section C **Section C consists of 6 questions of 3 marks each.**		
26.	Prove that if two lines intersect, the vertically opposite angles are equal.	3
27.	Factorize: $(x^2 - 2x)^2 - 2(x^2 - 2x) - 3$. OR If $x^2 + \frac{1}{x^2}$ = 14, find the value of (i) $x + \frac{1}{x}$ (ii) $x^3 + \frac{1}{x^3}$	3
28.	In a parallelogram ABCD, bisector of ∠A, also bisects BC at X. Prove that AD = 2 AB.  **OR** Show that if the diagonals of a quadrilateral bisect each other at right angles, then it is a rhombus	3
29.	In the figure, ΔABC and ΔDBC are two isosceles triangles on the same base BC and the vertices A and D are on the same side of BC. AD is extended to meet BC at P. Prove that AP bisects ∠A as well as ∠D.  	3
30.	If a = $7 - 4\sqrt{3}$, find the value of $\sqrt{a} + \frac{1}{\sqrt{a}}$	3
31.	Express y in terms of x in equation 2x – 3y = 12. Find the points where the line represented by this equation cuts x- axis and y- axis.	3
Section D **Section D consists of 4 questions of 5 marks each.**		
32.	If the polynomials $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + a$ leave the same remainder when divided by x – 3, find the value of a.	5
33.	Prove that the angle subtended by an arc at the centre is double the angles subtended by it at any point on the remaining part of the circle.	5

34 A cloth having an area of 165 m^2 is shaped into the form of conical tent of radius 5 m. **5**

(i)How many students can sit in the tent if a student, on an average occupies $\frac{5}{7}$ m^2 on the ground?

(ii) Find the volume of the cone.

OR

A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered with canvas, find the area of the canvas required.

35. A random survey of the number of children of various age groups playing in a park was found as follows: **5**

Age in years	1-2	2-3	3-5	5-7	7-10	10-15	15-17
No. of children	5	3	6	12	9	10	4

Draw a histogram to represent the data above.

OR

Draw a frequency polygon for the following distribution:

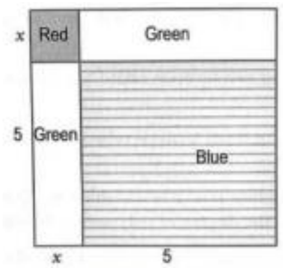
Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	7	10	6	8	12	3	2

Section E

Case study-based questions are compulsory.

36 **Case Study – 1**

Prakrit formed a square using four pieces of origami, as shown in figure.



Based on above information answer the following questions.

(i) Write the trinomial which describes the area of the given square. **1**

(ii) What is the degree of the polynomial $x^4 + 2x + 0x^5 - 25$ **1**

(iii) If $p(x) = 2x^2 - 3x + 5$, then find the value of $p(x) - p(-x)$ **2**

OR

If the area of the square is given by the polynomial $x^2 + 20x + 100$, then what will be side of the square?

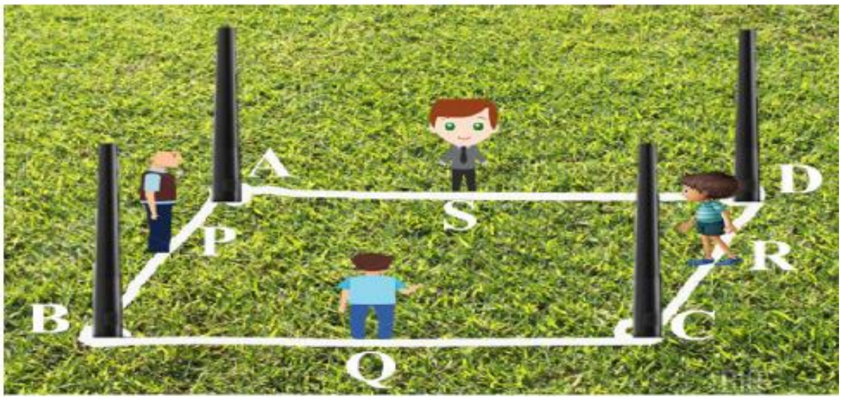
37. **Case Study – 2**

Shipra is very fond of sceneries. She has decorated her home with many beautiful sceneries in various shapes. One of her friends visited her house and was impressed to see the triangular sceneries there. The dimensions of each triangular frame are 40 cm, 50 cm and 50 cm.

Based on the above information answer the following questions. **1**

(i) What is the total length of frame of scenery? **1**

(ii) If the area of an equilateral triangle is $25\sqrt{3}$ $m^{2,}$ find the length each side of triangle. **2**

	(iii) Find the area of the wall which is covered by one triangular scenery. OR An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find area of the triangle.	
38.	**Case Study – 3** In a village, four boys were playing in a ground. They planned to device a game using geometrical concepts. Ramesh took the lead and planned in the following manner: Four poles were marked in the ground as A, B, C, D. With the help of a rope, the poles were joined to form a quadrilateral. Now, Ramesh selected four boys such as P, Q, R and S and placed in the mid-points of the rope paths... After making this arrangement, they started playing throw ball in the order from P to Q; Q to R; R to S and finally from S to P.  On the basis of this arrangement, Ramesh asks the following questions to the other boys: (i) Which geometrical shape is generated by PQRS? (ii) What shape is expected by the join of PQRS if ABCD forms a rhombus? (iii) If PQ = 10 m, what is the distance between the two poles A & C? OR If AC = 30 m, find RS?	 1 1 2

THE END***