

SOMERVILLE SCHOOL, NOIDA
HALF YEARLY EXAMINATION-(2026 -27)
SUBJECT-MATHEMATICS
SUBJECT CODE-041
CLASS-IX

M.M : 80

TIME : 3 Hours

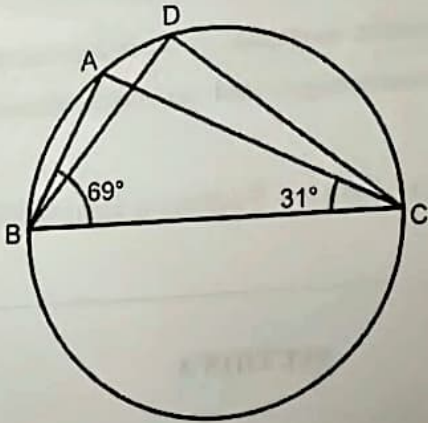
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GENERAL INSTRUCTIONS:

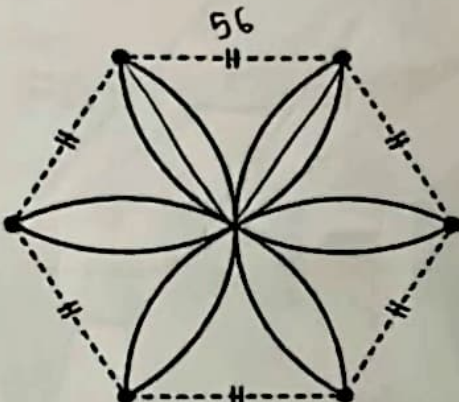
- This Question Paper has 5 Sections A, B, C, D and E.
- Section A has (1 to 18) multiple choice questions and (19 -20) are Assertion- Reason based questions carrying 1 mark each.
- Section B has 5 questions carrying 02 marks each.
- Section C has 6 questions carrying 03 marks each.
- Section D has 4 questions carrying 05 marks each.
- Section E has 3 case based questions carrying 04 marks each with sub- parts of 1, 1 and 2 marks each respectively.
- All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
- Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

	SECTION A	
1	The perimeter of the triangle with vertices (0,4), (0,0) and (3,0) is: (a) $(7+\sqrt{5})$ (b) 5 (c) 10 (d) 12	1
2	A die is thrown once. The probability of getting an odd number greater than 3 is: (a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) 0	1
3	An irrational number between 1.011324..... and 1.011424..... is: (a) 1.011143.... (b) 1.012343.... (c) 1.01133213.... (d) 1.013243	1

4	The value of $\frac{(0.013)^3 + (0.007)^3}{(0.013)^2 - 0.013 \times 0.007 + (0.007)^2}$ is: (a) 0.006 (b) 0.02 (c) 0.0091 (d) 0.00185	1
5	The sides of a triangle are 30cm, 30cm and 48cm and area of the triangle is 432sq cm. The radius of incircle of the triangle is: (a) 25cm (b) 8cm (c) 12cm (d) 20cm	1
6	If $\frac{x}{y} + \frac{y}{x} = -1$ ($x, y \neq 0$), then the value of $x^3 - y^3$ is: (a) 0 (b) 1 (c) -1 (d) $\frac{1}{2}$	1
7	One of the factors of $(25x^2 - 1) + (1 + 5x)^2$ is: (a) $5 + x$ (b) $5 - x$ (c) $5x - 1$ (d) $10x$	1
8	The coefficient of x^2 in the expression $(x^2 - 5)(7 + 3x^2)$ is: (a) 12 (b) 5 (c) -8 (d) 8	1
9	The coordinates of a point which lies on y-axis at a distance of 6 units in the negative direction of y-axis is: (a) (0,0) (b) (0, -6) (c) (-6, 0) (d) (6, -6)	1
10	Three coins are tossed simultaneously. The probability of getting exactly two heads is: (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{3}{8}$ (d) $\frac{3}{4}$	1
11	If $\angle ABC = 69^\circ$ and $\angle ACB = 31^\circ$, then the value of $\angle BDC$ is: (a) 69° (b) 31° (c) 100° (d) 80°	1
		
12	If two diameters of a circle intersect each other at right angles, then the quadrilateral formed by joining their end points is a: (a) square (b) rectangle (c) parallelogram (d) rhombus	1

13	An isosceles triangle has a base of 10cm and an area of 60cm^2 . The length of the equal sides is: (a) 13cm (b) 6cm (c) 26cm (d) 36cm	1
14	If $(a, 4)$ lies on the graph of $3x + y = 10$, then the value of a is: (a) 3 (b) 1 (c) 2 (d) 4	1
15	The smallest rational number by which $\frac{1}{3}$ should be multiplied so that its decimal expansion terminates after one place of decimal is: (a) $\frac{1}{10}$ (b) $\frac{3}{10}$ (c) 3 (d) 30	1
16	Decimal representation of a rational number cannot be: (a) terminating (b) non-terminating (c) non-terminating and repeating (d) non-terminating and non-repeating	1
17	If $P(E)$ denotes the probability of an event E then: (a) $P(E) < 0$ (b) $P(E) > 1$ (c) $0 \leq P(E) \leq 1$ (d) $-1 \leq P(E) \leq 1$	1
18	In a circle of radius 14cm, an arc subtends an angle of 60° at the centre. If the area of the sector so formed is 103cm^2 , then the area of the minor segment is: (a) $(103+98\sqrt{3})\text{cm}^2$ (b) $(103+49\sqrt{3})\text{cm}^2$ (c) $(103-98\sqrt{3})\text{cm}^2$ (d) $(103-49\sqrt{3})\text{cm}^2$	1
	DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option: (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	
19	Assertion: Point $P(0,2)$ is the point of intersection of y-axis with the line $3x + 2y = 4$. Reason: The distance of point $P(0,2)$ from the x-axis is 2 units.	1
20	Assertion : P, Q, R, S are four points such that S is the centre of the circle through Q, R and P. If $\angle QPR = 40^\circ$, then $\angle QSR = 80^\circ$. Reason : If A, B, C and D are four points such that $\angle BAC = 60^\circ$ and $\angle BDC = 60^\circ$, then A, B, C and D are concyclic points.	

SECTION B		
21	If $a + b + c = 9$ and $a^2 + b^2 + c^2 = 35$, then find the value of $a^3 + b^3 + c^3 - 3abc$.	2
22	A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. What is the probability that it will point at (i) A prime number greater than 3 and less than 8? (ii) A multiple of 3?	2
23	Find the slope and y-intercept of $3x + 2y = 7$. OR The graph of a linear polynomial $p(x) = ax + b$ passes through the points (1, 5) and (3, 11). Find the value of a and b.	2
24	The co-ordinates of point A, an end point of the diameter AB of a circle are A (4, -1) and the co-ordinates of the centre of the circle are C (1, -3). Find the coordinates of B. OR The coordinates of point P are (7, -2). The reflection of point P in x-axis is mapped as M. The point M on reflection in y-axis is mapped as N. Write the coordinates of M and N.	2
25	A car has two wipers which do not overlap. Each wiper has a blade of length 42 cm and sweeps through an angle of 110° . Find the total area cleaned at each sweep of one blade.	2
SECTION C		
26	Two parallel chords of lengths 10 cm and 24 cm are on the same side of the centre of a circle. The distance between the chords is 7 cm. Find the radius of the circle.	3
27	Simplify the rational expression assuming that the expression in the denominator is not equal to zero: $\frac{p^4 - 16}{p^2 - 4p + 4}$ OR Find the possible length and breadth of the rectangle whose area is $(35y^2 + 8y - 16)$. Also, find the area if $y = -2$.	3
28	The sum of a two-digit number and the number obtained by reversing the digits is 99. If the digits of the number differ by 3, find the number.	3

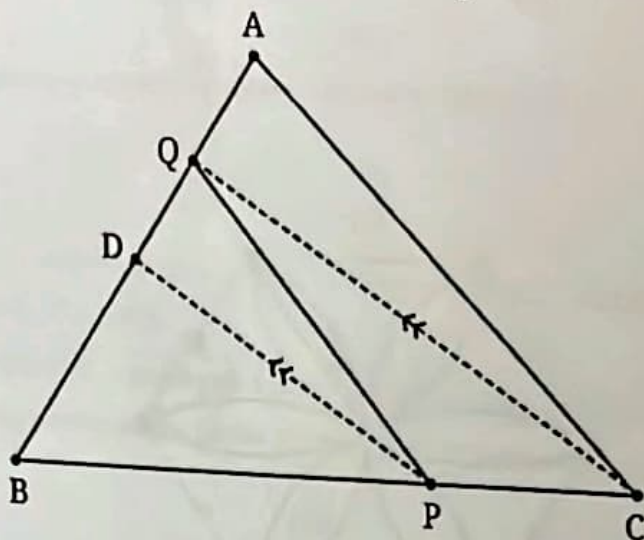
29	Prove that $\sqrt{5}$ is an irrational number.	3
30	Two different dice are rolled together. Find the probability of getting: (i) the sum of numbers on two dice to be five. (ii) even number on both dice.	3
31	Prove that equal chords of a circle subtend equal angles at the centre of the circle. OR Find the total perimeter of all the petals of the given flower. The side of regular hexagon is 56 cm. 	3
SECTION D		
32	(i) Convert the decimal number 1.23535353535..... in the form of $\frac{p}{q}$. (ii) Simplify: $\frac{2}{3} \times (-\frac{5}{4} + 1\frac{1}{2}) - \frac{3}{2}$ OR Draw the graphs of $y = -2x - 3$, $y = -2x$ and $y = 2x + 3$ on the same coordinate plane. From the graph: (i) find the slope of parallel lines. (ii) which line is the steepest?	5
33	ABCD is a quadrilateral with vertices A(3, 5), B(6, 0), C(1, -3) and D(-2, 2). Using distance formula, identify the type of quadrilateral.	5
34	When two chords intersect, each of them is divided into two line segments. Show that if the intersecting chords are of equal length, then the line segments of one chord are equal to the corresponding line segments of the other chord.	5
35	(i) A cow is tied at the corner of a rectangular field of dimensions 30m $\times$ 20m with a rope of length 14m. If the cow is allowed to graze only outside the field, find the total area the cow can graze.	

(ii) The sides of a triangle are in the ratio 2: 3: 4, and its perimeter is 54 cm. Find its area.

5

OR

In $\triangle ABC$, D is the mid-point of AB. P is any point on BC and Q is a point on AC such that $CQ \parallel PD$. PQ is joined. Prove that $\text{Area}(\triangle BPQ) = \frac{1}{2} \text{Area}(\triangle ABC)$.



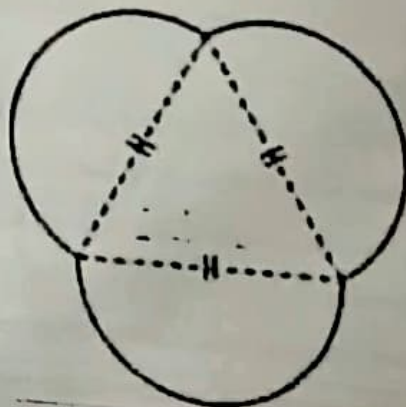
SECTION E

36

In a workshop, two types of Brooches are made - Brooch A and Brooch B. Brooch A is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters that divide the circle into 10 equal sectors, as shown in the figure. Brooch B is made with silver wire by joining three semi-circles, each with a diameter of 14 mm, as shown in the figure. The wire is also used to make 3 diameters. They make 100 such brooches of each type.



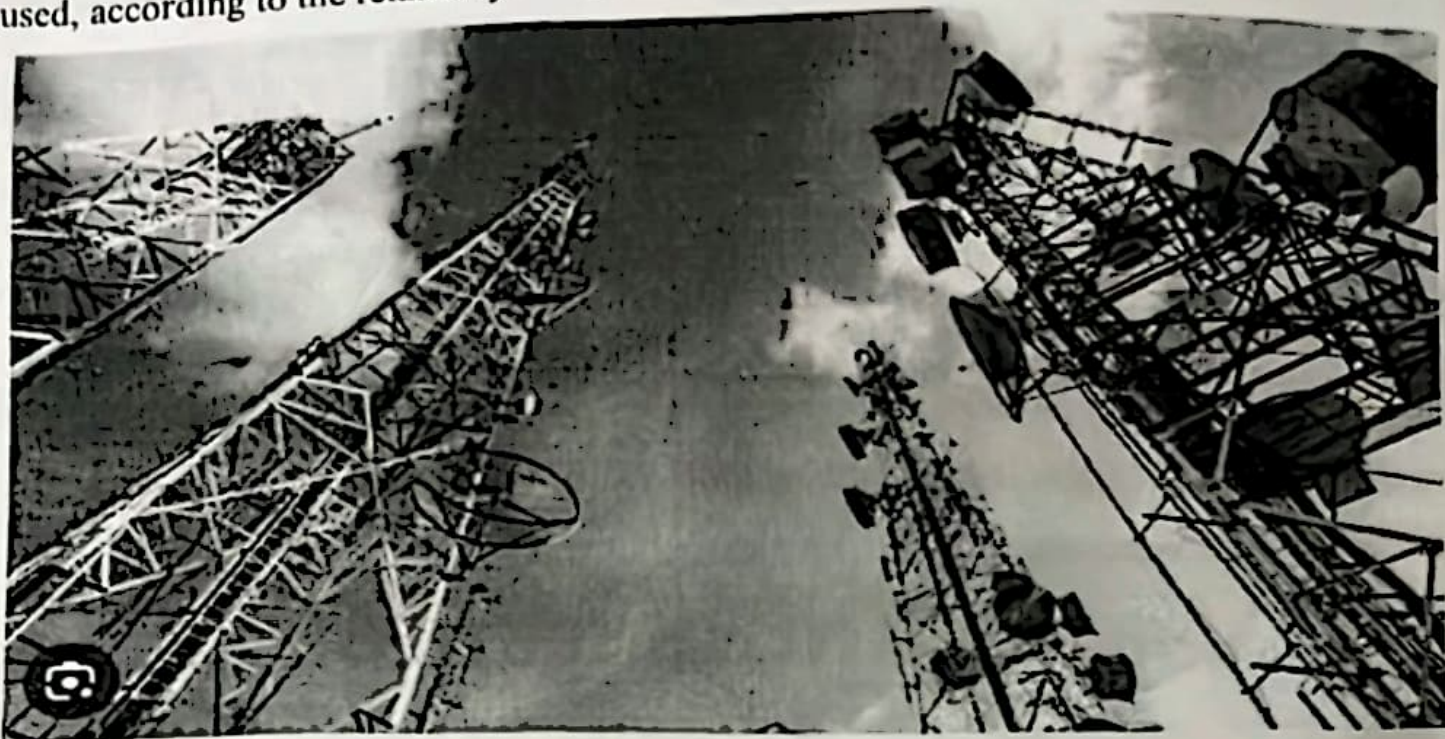
BROOCH A



BROOCH B

	Based on the information given above, answer the following questions: (i) What is the circumference of the Brooch A? (ii) Find the circumference of Brooch B? (iii) If 100 brooches of type B are made, then what is the length of silver wire used? OR (i) What is the area of each sector of the Brooch A?	1 1 2
37	Ankur and Ranjan start a new business together. The amounts invested by the two partners are represented by the factors of the polynomial $p(x) = 4x^2 + 12x + 5$, which is the product of their individual shares. PARTNERSHIP  Based on the information given above, answer the following questions: (i) Express $p(x)$ as the product of the shares of Ankur and Ranjan. (ii) Find the total amount invested by both, if $x = 1000$. (iii) The amount invested by both the partners together can also be represented by $q(x) = 5x^2 - kx - 18$ and polynomial $g(x) = (x - 2)$, $x > 2$ is a factor of $q(x)$, then find the value of k. OR A rectangular pool is such that its breadth is 4 metres less than its length and the area is 192 sq. metres. Find the length and breadth of the pool.	1 1 2
38	A telecom company charges a fixed monthly fee and an additional cost per GB of internet data used. A student observes that when she used 10 GB, her bill is ₹350. When she used	

20 GB, her bill is ₹550. The monthly bill 'y' depends on the amount of data 'x' (in GB) used, according to the relation $y = ax + b$.



Based on the information given above, answer the following questions:

- (i) Find the two equations expressing the relation between monthly usage and bill paid.
- (ii) Is it linear growth or linear decay? Justify.
- (iii) Find the value of a and b.

OR

Manya has 3 times as many two-rupee coins as she has five rupee-coins in her purse after paying the telecom bill. If she has a total ₹88 left in her purse, how many coins of each type does she have?