

**CODE:1002-AG-3-FC-23-24**

पञ्चम क्रमांक

REG.NO:-TMC -D/79/89/36**General Instructions:**

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 case based integrated units of assessment (04 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 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

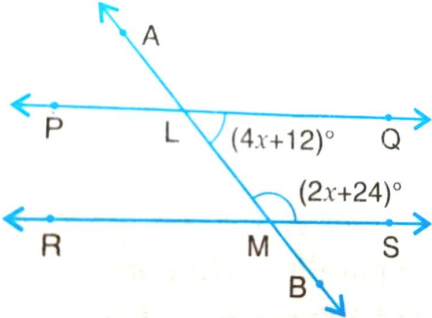
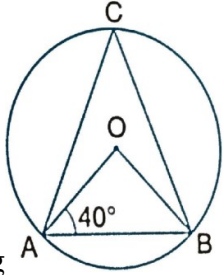
EXAMINATION 2023 -24

Time : 3 Hours

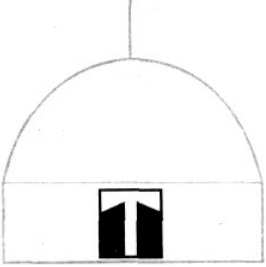
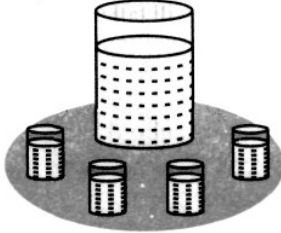
Maximum Marks : 80

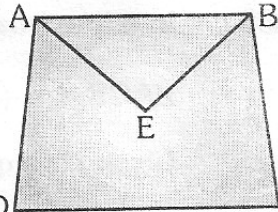
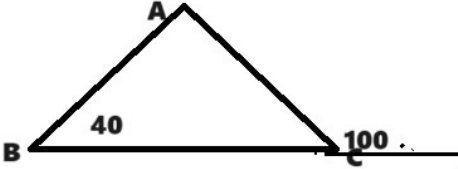
CLASS - IX**MATHEMATICS**

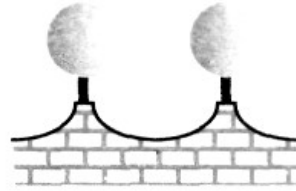
Sr. No.	SECTION - A	Marks
	This section comprises of very short answer type-questions (VSA) of 1 marks each	
Q.1	Factors of $(a + b)^3 - (a - b)^3$ is : (A) $2ab(3a^2 + b^2)$ (B) $ab(3a^2 + b^2)$ (C) $2b(3a^2 + b^2)$ (D) $3a^2 + b^2$	1
Q.2	The two diagonals are equal in a (a) parallelogram (b) rhombus (c) rectangle (d) trapezium	1
Q.3	If $\frac{3+\sqrt{7}}{3-\sqrt{7}} = a + b\sqrt{7}$ then (a,b) = (A) (8, -3) (B) (-8, -3) (C) (-8, 3) (D) (8, 3)	1
Q.4	If $(2k - 1, k)$ is a solution of the equation $10x - 9y = 12$ then k =	1

	(a) 1	(b) 2	(c) 3	(d) 4	
Q.5	The value of $0.\overline{423}$ is :-				1
	(A) $\frac{423}{1000}$	(B) $\frac{479}{1000}$	(C) $\frac{423}{990}$	(D) $\frac{419}{990}$	
Q.6	The volume of a cube with surface area 384 sq. cm, is :				1
	(a) 216 cm^3	(b) 512 cm^3	(c) 484 cm^3	(d) NONE	
Q.7	 <p>In Fig . If transversal AB cuts parallel lines PQ and RS and L and M respectively. Then, then the value of x is :</p>				1
	(a) 20°	(b) 24°	(c) 30°	(d) 34°	
Q.8	 <p>In Fig . If $\angle OAB = 40^\circ$, then $\angle ACB$ is equal to</p>				1
	(a) 50°	(b) 40°	(c) 60°	(d) 70°	
Q.9	The Autorikshaw fare in a city is charged @ Rs. 10 for the first kilometer and @ Rs. 4 per kilometer for subsequent distance covered. Taking the distance covered as x km and total fare as Rs y, write a linear equation for this information, The linear equation to express the statement is				1
	(a) $y = 4x + 10$	(b) $y = 4x + 6$	(c) $y + 4x = 10$	(d) $y + 4x = 6$	
Q.10	The solution of the linear equation $3x + 2y = 6$ which represents a point on y-axis is :				1
	(a) (0, 3)	(b) (2, 0)	(c) (4, -3)	(d) None of these	
Q.11	If a hemi-spherical dome has an inner diameter of 28 m, then its volume (in m^3) is :				1
	(a) 6186.60	(b) 5749.33	(c) 7099.33	(d) 7459.33	
Q.12	If an angle of a parallelogram is two thirds of its adjacent angle, the smallest angle of parallelogram is				1
	(a) 108°	(b) 72°	(c) 54°	(d) 81°	
Q.13	The equation $x - 2 = 0$ on number line is represented by				1
	(a) a line	(b) a point	(c) infinitely many lines	(d) two lines	

Q.14	The area of right triangle is 28cm^2 .if one of its perpendicular sides exceeds the other by 10cm, then the length of the longest of the perpendicular is (a) 16cm (b) 14cm (c) $6\sqrt{5}$ cm (d) 18cm	1
Q.15	The graph of $y = 6$ is a line (a) parallel to x-axis at a distance 6 units from the origin. (b) parallel to y-axis at a distance 6 units from the origin. (c) making an intercept 6 on the x-axis. (d) making on intercept 6 on both the axes.	1
Q.16	The solution of the linear equation $x + 2y = 8$ which represents a point on x-axis, is (a) (4, 0) (b) (0, 4) (c) (8, 0) (d) (4, 2)	1
Q.17	The value of p for which the polynomial $x^3 + 4x^2 - px + 8$ is exactly divisible by $(x - 2)$ is (A) 0 (B) 3 (C) 5 (D) 16	1
Q.18	Class mark of a class is obtained by using (A) (upper limit - lower limit) / 2 (B) (upper limit + lower limit) / 2 (C) upper limit - lower limit (D) Upper limit + lower limit	1
ASSERTION-REASON BASED QUESTIONS		
In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices. (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.		
Q.19	Statement-1 (Assertion) : In a ΔABC , the bisector of $\angle B$ and $\angle C$ meet a point O and the bisector of ext $\angle B$ and ext $\angle C$ meet a point O'. If $\angle BOC = 135^\circ$, then $\angle BO'C = 45^\circ$ Statement-2 (Reason) : In a ΔABC , if the bisector of $\angle B$ and $\angle C$ meet a point O and the bisector of ext $\angle B$ and ext $\angle C$ meet at a point O'. Then, $\angle BOC$ and $\angle BO'C$ are supplementary.	1
Q.20	Statement-1 (Assertion) : The altitude p of an equilateral triangle having each side a is given by $p = \frac{a\sqrt{3}}{2}$. Statement-2 (Reason) : Area of equilateral triangle with each side a is $\frac{\sqrt{3}(a)^2}{4}$.	1
SECTION - B		
This section comprises of very short answer type-questions (VSA) of 2 marks each		
Q.21	Divide the polynomial $3x^4 - 4x^3 - 3x - 1$ by $(x - 1)$.	2
Q.22	The heights of 50 students, measured to the nearest centimetres, have been found to be as follows: 161 150 154 165 168 161 154 162 150 151 162 164 171 165	2

	<p>158 154 156 172 160 170 153 159 161 170 162 165 166 168 165 164 154 152 153 156 158 162 160 161 173 166 161 159 162 167 168 159 158 153 154 159</p> <p>(i) Represent the data given above by a grouped frequency distribution table, taking the class intervals as 160 -165,165 -170, etc. (ii)What can you conclude about their heights from the table?</p>	
Q.23	The angle in a semi-circle is a right angle .	2
Q.24	<p>A hemispherical dome of a building needs to be painted (see Fig.</p>  <p>). If the circumference of the base of the dome is 17.6 m, find the cost of painting it, given the cost of painting is Rs 5 per 100 cm².</p> <p style="text-align: center;">OR</p> <p>At a Ramzan Mela, a stall keeper in one of the food stalls has a large cylindrical vessel of base radius 15 cm filled up to a height of 32 cm with orange juice. The</p>  <p>juice is filled in small cylindrical glasses (see Fig.) of radius 3 cm up to a height of 8 cm, and sold for Rs 3 each. How much money does the stall keeper receive by selling the juice completely?</p>	2
Q.25	<p>If $\frac{3+2\sqrt{2}}{3-\sqrt{2}} = a+b\sqrt{2}$. where a and b are rational. Find the values of a and b .</p> <p style="text-align: center;">OR</p> <p>Simplify : $\frac{(25)^{3/2} \times (243)^{3/5}}{(16)^{5/4} \times (8)^{4/3}}$.</p>	2
SECTION – C		
(This section comprises of short answer type questions (SA) of 3 marks each)		
Q.26	<p>ABCD is a rectangle in which diagonal AC bisects $\angle A$ as well as $\angle C$. Show that</p> <p>(i) ABCD is a square (ii) diagonal BD bisect $\angle B$ as well as $\angle D$.</p>	3

<p>Q.27</p>	<div style="text-align: center;">  </div> <p>In the given figure $ABCD$, $ABCD$ is a quadrilateral in which AE and BE are the angle bisectors of $\angle A$ and $\angle B$. Prove that $\angle C + \angle D = 2\angle AEB$.</p> <p style="text-align: center;">OR</p> <div style="text-align: center;">  </div> <p>In fig ABC, show that : (i) $AB > AC$ (ii) $AB > BC$ and (iii) $BC > AC$.</p>	<p>3</p>																												
<p>Q.28</p>	<p>A hemispherical bowl is made from a metal sheet having thickness 0.3 cm. The inner radius of the bowl is 24.7 cm. Find the cost of polishing its outer surface at the rate of Rs. 4 per 100 cm^2. (Take $\pi = 3.14$)</p>	<p>3</p>																												
<p>Q.29</p>	<p>The following table gives the distribution of students of two sections according to the marks obtained by them:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">Section A</th> <th colspan="2">Section B</th> </tr> <tr> <th>Marks</th> <th>Frequency</th> <th>Marks</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>0 - 10</td> <td>3</td> <td>0 - 10</td> <td>5</td> </tr> <tr> <td>10 - 20</td> <td>9</td> <td>10 - 20</td> <td>19</td> </tr> <tr> <td>20 - 30</td> <td>17</td> <td>20 - 30</td> <td>15</td> </tr> <tr> <td>30 - 40</td> <td>12</td> <td>30 - 40</td> <td>10</td> </tr> <tr> <td>40 - 50</td> <td>9</td> <td>40 - 50</td> <td>1</td> </tr> </tbody> </table> <p>Represent the marks of the students of both the sections on the same graph by two frequency polygons. From the two polygons compare the performance of the two sections.</p>	Section A		Section B		Marks	Frequency	Marks	Frequency	0 - 10	3	0 - 10	5	10 - 20	9	10 - 20	19	20 - 30	17	20 - 30	15	30 - 40	12	30 - 40	10	40 - 50	9	40 - 50	1	<p>3</p>
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40 - 50	9	40 - 50	1																											
<p>Q.30</p>	<p>The perimeter of a triangular field is 450 m and its sides are in the ratio 13 : 12 : 5. Find the area of triangle.</p>	<p>3</p>																												
<p>Q.31</p>	<p>The front compound wall of a house is decorated by wooden spheres of diameter 21</p>	<p>3</p>																												



cm, placed on small supports as shown in Fig . Eight such spheres are used for this purpose, and are to be painted silver. Each support is a cylinder of radius 1.5 cm and height 7 cm and is to be painted black. Find the cost of paint required if silver paint costs 25 paise per cm^2 and black paint costs 5 paise per cm^2 .

OR

Shanti Sweets Stall was placing an order for making cardboard boxes for packing their sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm x 20 cm x 5 cm and the smaller of dimensions 15 cm x 12 cm x 5 cm. For all the overlaps, 5% of the total surface area is required extra. If the cost of the cardboard is Rs 4 for 1000 cm^2 , find the cost of cardboard required for supplying 250 boxes of each kind.

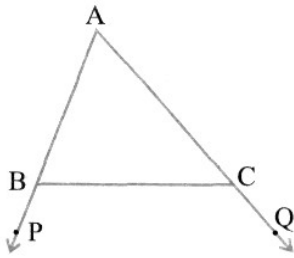
SECTION – D

(This section comprises of long answer-type questions (LA) of 5 marks each)

Q.32 Show that if the diagonals of a quadrilateral bisect each other at right angles, then it is a rhombus . 5

Q.33 If $\sqrt{5} = 2.236$ and $\sqrt{2} = 1.414$, then Evaluate : $\frac{3}{\sqrt{5} + \sqrt{2}} + \frac{4}{\sqrt{5} - \sqrt{2}}$. 5

Q.34 Prove that The sum of any two sides of a triangle is greater than its third side. Also 5



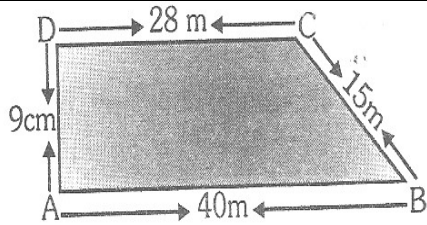
Show that $AC > AB$ in Fig. , sides AB and AC of ΔABC are extended to points P and Q respectively. Also, $\angle PBC < \angle QCB$.

OR

Prove that “Two triangles are congruent, if two angles and the included side of the one triangle are equal to two angles and the included side of the other triangle”.

Q.35 A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field. 5

OR



In fig . ABCD is a field in the form of a quadrilateral whose sides are indicated in the figure. If $\angle DAB = 90^\circ$, find the area of the field.

SECTION - E

(This section comprises of 3 case study / passage – based questions of 4 marks each with two sub parts (i),(ii),(iii) of marks 1, 1, 2 respectively. The third case study question has two sub – parts of 2 marks each.)

Q.36

CASE STUDY - 1

According to given information choose the correct answer

i.

In Fig . $\angle ACD = 120^\circ$ and $\angle ABC = 40^\circ$, then $\angle BAC =$
 (a) 80° (b) 60° (c) 50° (d) 40°

1

ii.

In Fig . sides CB and BA of $\triangle ABC$ are produced to D and E respectively. If $\angle ABD = 105^\circ$ and $\angle CAE = 130^\circ$, then $\angle ACB =$
 (a) 50° (b) 55° (c) 75° (d) 130°

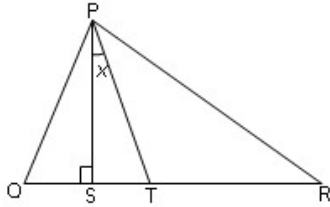
1

iii.

In a $\triangle ABC$, it is given that $\angle A : \angle B : \angle C = 3 : 2 : 1$ and $\angle ACD = 90^\circ$. If BC produced to E, then $\angle ECD =$
 (a) 60° (b) 30° (c) 50° (d) 40°

2

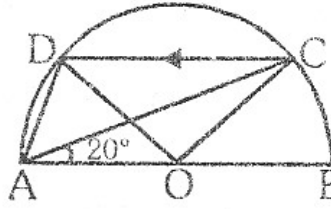
OR



In Fig . If PT is the bisector of $\angle QPR$ in ΔPQR , $\angle PQR = 50^\circ$, $\angle PRQ = 30^\circ$ and $PS \perp QR$, then $x =$
 (a) 40° (b) 20° (c) 30° (d) 10°

Q.37

CASE STUDY – 2



In the adjoining figure , AB is a diameter of a circle with center O and $CD \parallel BA$. If $\angle BAC = 20^\circ$, find the value of

- | | | |
|------|--------------|---|
| i. | $\angle BOC$ | 1 |
| ii. | $\angle DOC$ | 1 |
| iii. | $\angle DAC$ | 2 |
| | OR | |
| | $\angle ADC$ | |

Q.38

CASE STUDY – 2

(i) $a^3 + b^3 + c^3 - 3abc = (a + b + c) (a^2 + b^2 + c^2 - ab - bc - ac)$

(ii) $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ac)$

- | | | |
|------|--|---|
| i. | If $a + b + c = 0$ and $a^2 + b^2 + c^2 = 16$, find the value of $ab + bc + ca$. | 1 |
| ii. | If $a + b + c = 9$ and $ab + bc + ca = 23$, find the value of $a^2 + b^2 + c^2$. | 2 |
| iii. | If $a + b + c = 9$ and $a^2 + b^2 + c^2 = 35$, find the value of $a^3 + b^3 + c^3 - 3abc$. | 1 |
| | OR | |
| | If $x + y + z = 8$ and $xy + yz + zx = 20$, find the value of $x^3 + y^3 + z^3 - 3xyz$. | |

“शिक्षा कभी भी व्यर्थ नहीं होती भले ही वो किसी भी तरह की ग्रहण की गई हो।”