# ICSE Board <br> Class IX Mathematics <br> Paper 2 

Time: $\mathbf{2}^{1 ⁄ 2}$ hrs
Total Marks: $\mathbf{8 0}$

## General Instructions:

1. Answers to this paper must be written on the paper provided separately.
2. You will NOT be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.
3. The time given at the head of this paper is the time allowed for writing the answers.
4. This question paper is divided into two Sections. Attempt all questions from Section A and any four questions from Section B.
5. Intended marks for questions or parts of questions are given in brackets along the questions.
6. All working, including rough work, must be clearly shown and should be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.
7. Mathematical tables are provided.

## SECTION - A (40 Marks) <br> (Answer all questions from this Section)

Q. 1.
(a) Without using tables, find the value of $\frac{\sin 30^{\circ}-\sin 90^{\circ}+2 \cos 0^{\circ}}{\tan 30^{\circ} \times \tan 60^{\circ}}$
(b) Evaluate: $\frac{3 \times 27^{n+1}+9 \times 3^{n-1}}{8 \times 3^{3 n}-5 \times 27^{n}}$
(c) If $x$ and $y$ are rational numbers and $\frac{2+\sqrt{3}}{2-\sqrt{3}}=x+y \sqrt{3}$, find the value of $x$ and $y$.
Q. 2.
(a) In the given figure, $A O C$ is a diameter of a circle with centre 0 and $\operatorname{arc} A X B=\frac{1}{2} \operatorname{arc}$ $B Y C$. Find $\angle B O C$.

(b) Find $x y$, if $x+y=6$ and $x-y=4$.
(c) If $\frac{\log a}{b-c}=\frac{\log b}{c-a}=\frac{\log c}{a-b}$, prove that $a^{a} \cdot b^{b} \cdot c^{c}=1$
Q. 3.
(a) From the given figure, find the angles of the parallelogram $A B C D$.

(b) Express $5.3 \overline{47}$ in the form $\frac{\mathrm{p}}{\mathrm{q}}$ where p and q are integers and $\mathrm{q} \neq 0$.
(c) The table below classifies the days of the months of June, July and August according to the rainfall received in a locality.

| Rain (mm) | Days |
| :---: | :---: |
| $10-20$ | 8 |
| $20-30$ | 10 |
| $30-40$ | 14 |
| $40-50$ | 20 |
| $50-60$ | 15 |
| $60-70$ | 8 |
| $70-80$ | 7 |
| $80-90$ | 6 |
| $90-100$ | 4 |

Q. 4.
(a) There are two regular polygons with number of sides equal to $(n-1)$ and $(n+2)$.

Their external angles differ by $6^{\circ}$. Find the value of $n$.
(b) ABCD is a parallelogram, E is the midpoint of AB and F is the mid-point of $\mathrm{CD} . \mathrm{PQ}$ is any line that intersects $\mathrm{AD}, \mathrm{EF}$ and BC at $\mathrm{P}, \mathrm{G}$ and Q . Prove that $\mathrm{PG}=\mathrm{GQ}$.
(c) A man borrows Rs. 5000 at 12\% p.a. compound interest. He repays Rs. 2000 at the end of each year. Calculate the amount he has to pay at the end of the third year. [4]

## SECTION - B (40 Marks) <br> (Answer any four questions from this Section)

Q. 5.
(a) A wire is bent to form a square enclosing an area of 484 m 2 . Using the same wire, a circle is formed. Find the area of the circle.
(b) Given, $\sin \theta=\frac{\mathrm{p}}{\mathrm{q}}$, find $\cos \theta+\sin \theta$ in terms of p and q .
(c) If the points $(a, 0),(0, b)$ and $(1,1)$ are collinear, then prove that

$$
\frac{1}{a}+\frac{1}{b}=1
$$

Q. 6.
(a) Factorise: $\left(x^{2}+y^{2}-z^{2}\right)^{2}-4 x^{2} y^{2}$
(b) Prove that if the diagonals of a parallelogram cut at right angles, it is a rhombus. [4]
(c) If $3 a=p\left(\frac{x}{2}-y\right)$, make ' $y$ ' the subject. Find $y$, when $x=4, p=5$.
Q. 7.
(a) Draw the graph of the equations $2 x-3 y=7$ and $x+6 y=11$, taking $1 \mathrm{~cm}=1$ unit on both axes and find their solutions.
(b) In the given figure, area of parallelogram AFEC is $140 \mathrm{~cm}^{2}$. Find the area of i. Parallelogram BFED
ii. $\triangle \mathrm{BFD}$


## Q. 8.

(a) Show that in any quadrilateral the sum of all the four sides exceeds the sum of the diagonals.
(b) A and B start at the same time from two places 30 km apart. If they walk in the same directions, A overtakes B in 10 hours and if they walk in opposite directions they meet in 2hours. Find the rates of walking of $A$ and $B$.

## Q. 9.

(a) The mean height of the 10 girls in a class is 1.38 m and the mean height of the 40 boys is 1.44 m . Find the mean height of the 50 students of the class.
(b) In the given fig., $\mathrm{m} \angle \mathrm{D}=90^{\circ}, \mathrm{AB}=8 \mathrm{~cm}, \mathrm{BC}=6 \mathrm{~cm}$ and $\mathrm{CA}=3 \mathrm{~cm}$. Find CD .

(c) A rectangular water-tank measuring $80 \mathrm{~cm} \times 60 \mathrm{~cm} \times 60 \mathrm{~cm}$ is filled form a pipe of cross-sectional area $1.5 \mathrm{~cm}^{2}$, the water emerging at $3.2 \mathrm{~m} / \mathrm{s}$. How long does it take to fill the tank?
Q. 10.
(a) Find the value of

$$
\begin{equation*}
\frac{\sec \left(90^{\circ}-\theta\right) \cdot \operatorname{cosec} \theta-\tan \left(90^{\circ}-\theta\right) \cot \theta+\cos ^{2} 25^{\circ}+\cos ^{2} 65^{\circ}}{3 \tan 27^{\circ} \tan 63^{\circ}} \tag{3}
\end{equation*}
$$

(b) Construct a rhombus ABCD in which $\mathrm{AB}=4.5 \mathrm{~cm}$ and $\mathrm{m} \angle \mathrm{A}=60^{\circ}$.
(c) Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other and on opposite sides of the centre. If the distance between AB and CD is 6 cm , find the radius of the circle.
Q. 11.
(a) If $a+\frac{1}{a}=p$, show that $a^{3}+\frac{1}{a^{3}}=p\left(p^{2}-3\right)$.
(b) Solve: $\frac{5}{x+y}+\frac{3}{x-y}=4, \frac{2}{x+y}+\frac{5}{x-y}=5 \frac{2}{5}$
(c) Find the mean of the following data:

| x | 25 | 35 | 45 | 55 | 65 | 75 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| f | 10 | 6 | 8 | 12 | 5 | 9 |

