

MATHEMATICS
CLASS – X
Sample Question Paper SA- I

Time – 3 Hr

Max.Marks – 90

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 31 questions divided into four section A,B,C and D. Section A comprises of 4 questions of 1 marks each, section B comprises of 6 questions of 2 marks each, section C comprises of 10 questions of 3 marks each and section – D comprises of 11 questions of 4 marks each.
3. There is no overall choice in this question paper.
4. Use of calculator is not permitted.

SECTION – A

(Question numbers 1 to 4 carry one mark each)

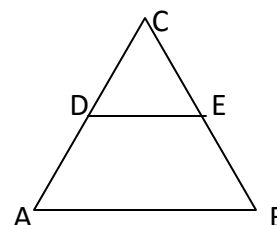
1. If $\Delta ABC \sim \Delta DEF$, $BC = 4\text{cm}$, $EF = 5\text{cm}$ and area of $\Delta ABC = 80\text{cm}^2$, then find the area of ΔDEF .
2. For a given data with 35 observations, the 'less than ogive' and 'more than ogive' intersect at $(28.5,30)$. What is the median of the data?
3. Find the value of $\tan 35^\circ - \cot 35^\circ$.
4. In ΔABC , right angled at B. if $\tan A = \frac{1}{\sqrt{3}}$ then find the value of $\sin A \cdot \cos C + \cos A \cdot \sin C$.

SECTION – B

(Question number 5 to 10 carry two marks each)

5. Is there any natural number n , for which 4^n ends with digit 0? Give reason in support of your answer.
6. If α and β are two zeros of the polynomial $3x^2 + 5x + 2$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.
7. If $3 \cot \theta = 4$, then find the value of $\frac{5 \sin \theta - 3 \cos \theta}{5 \sin \theta + 3 \cos \theta}$
8. $\frac{163}{150}$ will have a terminating decimal expansion, state whether it is true or false. Justify your answer.

9. In given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$.



10. Mean of n observations is 30 and their mode is 45, then find the median.

SECTION – C

(Questions numbers 11 to 20 carry three marks each)

11. Sanjeev and Mona run around a circular sports field (in the morning). Sanjeev takes 16min to complete one round, while Mona complete the round in 20min. if both start running from the same point at the same time in the same direction, then
 - (i) After how much time will they meet at the starting point?
 - (ii) Which mathematical concept is used to solve the question?
 - (iii) What value is depicted in this question?
12. Solve the following system of linear equations graphically
 $x+y = 3$, $3x - 2y = 4$. State whether the equations are consistent or not.
13. If two zeros of the polynomial $x^4 + 3x^3 - 20x^2 - 6x + 36$ are 2 and $-\sqrt{2}$ then find the other zeros of the polynomial.
14. Find the zeroes of the quadratic polynomial $5x^2 - 4 - 8x$ and verify the relationship between the zeros and the coefficients of the polynomial.
15. In ΔABC if AD is the median, then prove that $AB^2 + AC^2 = 2(AD^2 + BD^2)$
16. In a trapezium $ABCD$ with $AB \parallel DC$, the diagonals AC and BD intersect at Q . if $AB = \frac{2}{3} CD$, then find the ratio of areas of ΔAOB and ΔCOD .

17. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, then show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.

18. If A and B are acute angles, such that $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$ and $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$ then find A+B.

19. The mean of the following data is 25. Find the value of p.

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50
Frequency	3	p	3	6	2

20. Calculate the median of the following data

Class	20 – 40	40 -60	60 – 80	80- 100	100 – 120	120 – 140	140 - 160
Frequency	12	15	25	18	12	12	8

SECTION – D

(Questions number 21 – 31 carry four marks each)

21. Prove that $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \cot A$.

22. Is square root of every non-square number always irrational? Find the smallest natural number which divides 2205 to make its square root a rational number.

23. Draw the graph of the following pair of linear equations, $x + 3y = 6$ and $2x - 3y = 12$. Hence, find the area of the region bounded by the lines $x = 0$, $y = 0$ and $2x - 3y = 12$.

24. Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's age was seven times that of his son. What are their present ages?

25. Solve the equations for x and y, $\frac{15}{x-y} + \frac{22}{x+y} = 5$, $x \neq y$, $\frac{40}{x-y} + \frac{55}{x+y} = 13$, $x \neq -y$.

26. Prove that the ratio of the area of two similar triangles is equal to the ratio of the squares of their corresponding sides.

27. ABC is a triangle, right angled at C. if p is the length of the perpendicular C to AB and a, b and c have the usual meaning, then prove that (i) $pc = ab$ (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

28. If $1 + \sin^2 \theta = 3 \sin \theta \cos \theta$, then prove that $\tan \theta = 1$ or $\frac{1}{2}$.

29. Prove that $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}$.

30. Find the mean of the following frequency distribution by using assumed mean method.

Marks obtained	Number of students
Less than 10	14
Less than 20	22
Less than 30	37
Less than 40	58
Less than 50	67
Less than 60	75

29. Following distribution shows that marks obtained by 100 students in a class.

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	10	15	30	32	8	5

Draw a less than ogive for the given data and hence obtain the median marks from the graph.