

SUMMATIVE ASSESSMENT - I, 2014
MATHEMATICS
Class - X

Time Allowed: 3 hours
General Instructions:

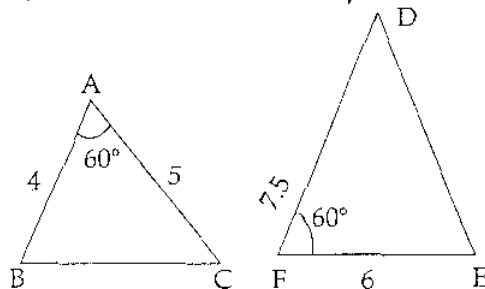
Maximum Marks: 90

1. All questions are compulsory.
2. The question paper consists of 31 questions divided into four sections A, B, C and D. Section-A comprises of 4 questions of 1 mark 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



1

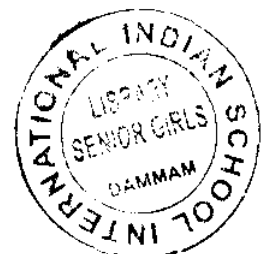
Are triangles ABC and FED similar?

2. If $\tan(3x + 30^\circ) = 1$, then find the value of x . 1
3. In $\triangle ABC$, $\angle C = 90^\circ$, $\angle A = 45^\circ$ and $AB = 10$ cm. Find BC , using trigonometric ratios. 1
4. The mean of 50 observations is 20. If each observation is multiplied by 3, then what will be the new mean? 1

SECTION-B

Question numbers 5 to 10 carry two marks each.

5. Find the smallest positive rational number by which $\frac{1}{7}$ should be multiplied so that its decimal expansion terminates after 2 places of decimal. 2



6 Determine the values of p and q so that the prime factorisation of 2520 is expressible as $2^3 \times 3^p \times q \times 7$ 2

7 Given the linear equation $3x - 4y - 7 = 0$, write another linear equation in these two variables such that the geometrical representation of the pair so formed is :

(i) intersecting lines (ii) parallel lines

8 P and Q are points on the sides AB and AC respectively of a triangle ABC such that $AP = a$, $PB = 3a$, $QC = 6b$ and $AQ = 2b$, then find whether $PQ \parallel BC$. 2

9 If $x = p \sec \theta + q \tan \theta$ and $y = p \tan \theta + q \sec \theta$, then prove that $x^2 - y^2 = p^2 - q^2$ 2

10 Find the mean of the following distribution : 2

Class Interval	0-6	6-12	12-18	18-24	24-30
Frequency	5	4	1	6	4

SECTION-C

Question numbers 11 to 20 carry three marks each.

11 Prove that $4 - \sqrt{3}$ is an irrational number. 3

12 Check whether polynomial $3x^2 - 5x + 2$ is a factor of the polynomial $3x^4 - 5x^3 - 10x^2 - 20x - 8$. Verify by division algorithm 3

13 If $x^4 - 2x^3 + 6x^2 - 6x + k$ is completely divisible by $x^2 - 2x + 3$, then find the value of k . 3

14 Solve for x and y : 3

$$\begin{array}{l} \underline{5} - 4Y + 3 = 0 \\ X \\ \underline{7} + 6Y - 19 = 0 \\ X \end{array}$$

15 In two triangles ABC and PQR , if AD and PS are medians to $\triangle ABC$ and $\triangle PQR$ respectively and $\triangle ABD \sim \triangle PQS$, then prove that $\triangle ABC \sim \triangle PQR$. 3

16 In a right angled $\triangle ABC$, $\angle B = 90^\circ$. If $\frac{BC}{AB} = \frac{1}{\sqrt{3}}$, then find $\frac{AB}{AC}$. 3

17 In $\triangle ABC$, right angled at C . if $\tan A = \frac{1}{\sqrt{3}}$, show that $\sin A \cdot \cos B + \cos A \cdot \sin B = 1$ 3

18 Prove the identity : 3

$$(\sec A - \cos A) \cdot (\cot A + \tan A) = \sec A \cdot \tan A$$

19 Monthly consumption of electricity of some consumers is given below as a distribution. Find the missing frequency (x), if mode of distribution is given to be 200 units. 3

Monthly consumption (in units)	90-120	120-150	150-180	180-210	210-240
Number of consumers	20	15	x	75	30

20 During a medical check up of students of a class X, their weights were recorded as follows : 3

Weight (in kg)	less than 35	less than 38	less than 41	less than 44	less than 47	less than 50	less than 53
Number of students	0	4	6	8	18	33	40

Draw a 'less than type' ogive for the above data, and hence obtain the median from the curve.

SECTION-D

Question numbers 21 to 31 carry four marks each.

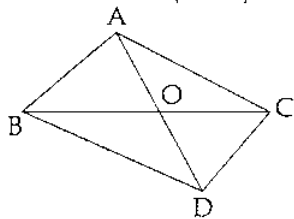
21 Use Euclid's division lemma to show that the cube of any positive integer is of the form $9m$, $9m+1$ or $9m+8$, where m is an integer. 4

22 Jhanavi wants to make a rectangular park for children and others to play. The area of the park remains unchanged if its length is increased by 7 m and breadth is decreased by 3 m unit. Its area remains unaffected if the length is decreased by 7 m and breadth is increased by 5 m. Find the dimension of the park. Why did Jhanavi decide to make a park ? 4

23 Two years ago, a father was five times old as his son. Two years later from today his age will be 8 years more than three times the age of his son. Find their present ages. 4

24 Obtain all other zeroes of the polynomial $2x^4+3x^3-5x^2-9x-3$, if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$. 4

- 25 In the figure ABC and DBC are two triangles on the same base BC but in opposite direction. Prove that $\frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta DBC)} = \frac{AO}{DO}$ 4



- 26 In ΔABC if $AD \perp BC$ and $AD^2 = BD \times DC$, then prove that $\angle BAC = 90^\circ$. 4

- 27 Prove that : 4

$$\left[\frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} \right] \left[\frac{\cos A}{1 - \sin A} - \frac{1 - \sin A}{\cos A} \right] = 4 \sec A$$

- 28 If $\cot \theta = \frac{15}{8}$, evaluate : 4

$$\frac{4 \cot \theta - 5 \sec \theta - 8 \operatorname{cosec} \theta}{5 \tan \theta - 4 \cot \theta - 17 \sin \theta}$$

- 29 If $a \cos \theta - b \sin \theta = c$, then prove that $a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$ 4

- 30 In the following frequency distribution, the weekly median cost of Living index is 1755. If total number of weeks is 52, then find the missing frequencies f_1 and f_2 in the distribution: 4

Cost of Living Index	1500 - 1600	1600 - 1700	1700 - 1800	1800 - 1900	1900 - 2000	2000 - 2100	2100 - 2200
Number of Weeks	4	f_1	f_2	8	4	3	2

- 32 On sports day of a school, age - wise participation of students is shown in the following distribution: 4

Age (in years)	5 - 7	7 - 9	9 - 11	11 - 13	13 - 15	15 - 17	17 - 19
Number of students	X	15	18	30	50	48	x

Find the mode of the data. Also find missing frequencies when sum of frequencies is 181.