

SUMMATIVE ASSESSMENT - I, 2014
MATHEMATICS
Class - X

Time Allowed: 3 hours

Maximum Marks: 90

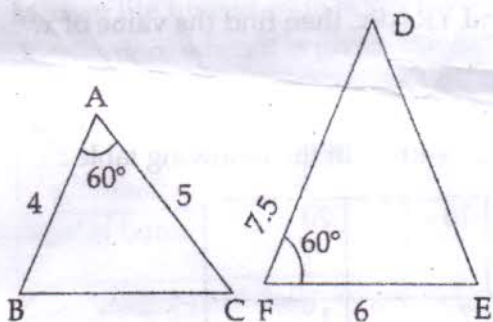
General Instructions:

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 Evaluate : $\sin 30^\circ - \cos 60^\circ$ 30
10
5 1
- 3 If $\tan(3x + 30^\circ) = 1$, then find the value of x . 1
- 4 In the following frequency distribution, find the missing frequencies x and y if it is given that they are equal : 1

Height (in cm)	140-145	145-150	150-155	155-160	160-165	165-170	Total
Frequency	5	x	25	30	y	10	100

SECTION-B

Question numbers 5 to 10 carry two marks each.

- 5 Explain why $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 + 5$ is a composite number? 2
- 6 Find the smallest natural number by which 1200 should be multiplied so that the square root of the product is a rational number. 2
- 7 Find whether the following pair of linear equations is consistent or inconsistent: 2
- $X + 3y = -5$
- $2x + 6y = -8$
- 8 If in a ΔPQR , $XY \parallel QR$, $PX = x - 2$, $XQ = 3x$, $PY = x + 2$ and $YR = 9x$, then find the value of x . 2
- 9 Express $\cos A$ in terms of $\cot A$. 2
- 10 In a class test marks, obtained (out of 20) by students are shown in the following table: 2

Marks obtained	7	10	12	15	18	20
Number of students	6	12	15	9	7	1

Find the median marks.

SECTION-C

Question numbers 11 to 20 carry three marks each.

- 11 Prove that $\frac{13\sqrt{5}}{7}$ is an irrational number. 3
- 12 What should be added in the polynomial $x^4 + 5x^3 + 7x^2 + 3x + 4$ so that it is completely divisible by $x^2 + 2x + 1$. 3

- 13 If zeroes of the polynomial $x^2 + 4x + 2a$ are α and $\frac{2}{\alpha}$, then find the value of a . 3
- 14 Find the two numbers whose sum is 75 and difference is 15. 3
- 15 In ΔABC , $AP \perp BC$ and $AC^2 = BC^2 - AB^2$, then prove that $PA^2 = PB \times CP$ 3
- 16 In a parallelogram $ABCD$, side AB is produced to the point P . DP intersects BC at Q . Show that 3

(i) $\Delta PQB \sim \Delta PDA$

(ii) $\frac{PQ}{PD} = \frac{PB}{PA}$

- 17 Prove that :

$$\frac{\operatorname{cosec} \theta + \cot \theta}{\operatorname{cosec} \theta - \cot \theta} = 1 + 2 \cot^2 \theta + 2 \operatorname{cosec} \theta \cdot \cot \theta, 0 < \theta < 90^\circ$$

- 18 If $\sin \theta = \frac{1}{2}$ then show that $3 \cos \theta - 4 \cos^3 \theta = 0$ 3

- 19 Median life time of bulb is 980 hours. Find the missing frequencies in the following frequency distribution, when it is given that sum of all frequencies is 80. 3

Life time (in hours)	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300	1300-1400
No. of bulbs	8	x	30	14	10	y	4

- 20 A contractor paid daily wages to the labourers as follows : 3

Daily wage (in ₹)	200-250	250-300	300-350	350-400	400-450	450-500	500-550
Number of labourers	3	4	8	7	6	6	7

Find the median wages of the labourers.

SECTION-D

Question numbers 21 to 31 carry four marks each.

- 21 If two positive integers x and y are expressible in terms of primes as $x = p^2q^3$ and $y = p^3q$, what can you say about their LCM and HCF. Is LCM a multiple of HCF? Explain. 4

22 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone. What is the benefit of doing work in team? 4

23 If a polynomial $4x^4 - 4x^3 - 35x^2 + 36x - 9$ has two zeroes as 3 and -3 , then find the other zeroes. 4

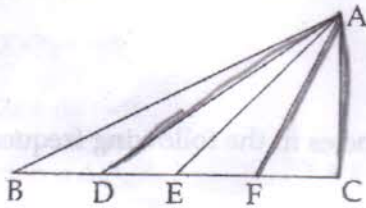
24 Solve the following pair of equations : 4

$$\frac{2}{x-y} + \frac{3}{x+y} = 1$$

$$\frac{4}{x-y} + \frac{9}{x+y} = \frac{5}{2}$$

25 In right angled $\triangle ABC$, $\angle C = 90^\circ$ and D, E, F are three points on BC such that they divide it in equal parts. Then prove that 4

$$8(AF^2 + AD^2) = 11AC^2 + 5AB^2$$

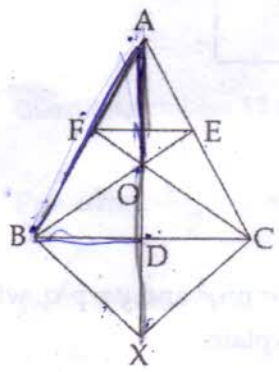


In $\triangle ABC$, AD is median and O is any point on AD. BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that $OD = OX$ as shown in figure. 4

Prove that

(i) $AO : AX = AF : AB$ $\triangle ABO \sim \triangle AEO$ $\triangle ACO \sim \triangle AFO$

(ii) $EF \parallel BC$



Handwritten scribbles and calculations:
 $\frac{1}{2} + 3$
 $\frac{3}{2}$
 $\frac{3}{2}$

27 Given that $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$; evaluate $\tan 15^\circ$ in two ways.

(i) taking $A = 60^\circ, B = 45^\circ$

(ii) taking $A = 45^\circ, B = 30^\circ$

Handwritten notes:
 $\sec^2 A - \tan^2 A = 1$
 $\sin^2 A + \cos^2 A = 1$
 $\operatorname{cosec}^2 A + \cot^2 A = 1$
 $1 + \cot^2 A = \operatorname{cosec}^2 A$
 $\sqrt{3} + 1$

28 Prove that :

$$\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \frac{1 + \sin A}{\cos A} = \frac{\cos A}{1 - \sin A}$$

29 If $\tan(20^\circ - 3\alpha) = \cot(5\alpha - 20^\circ)$, then find the value of α and hence evaluate :

$$\sin \alpha \cdot \sec \alpha \cdot \tan \alpha - \operatorname{cosec} \alpha \cdot \cos \alpha \cdot \cot \alpha$$

30 During the medical check up of 35 students of a class, their weights were recorded as follows :

Weight (in kg)	38-40	40-42	42-44	44-46	46-48	48-50	50-52
Number of students	3	2	4	5	14	4	3

Draw a 'less than type' ogive for the given data. From the curve, obtain the median weight and verify the result by actual calculations of median.

31 The given distribution shows number of wickets taken by the bowlers in one-day international cricket matches :

Number of wickets	Less than 15	Less than 30	Less than 45	Less than 60	Less than 75	Less than 90	Less than 105	Less than 120
Number of bowlers	2	5	9	17	39	54	70	80

Draw a 'less than type' ogive from the above. Find median from the curve. Verify median by actual calculations.

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Handwritten calculations:
 $(\sqrt{3} - 1)(1 - \sqrt{3})$
 $\sqrt{3} - 3 - 1 + \sqrt{3}$

Handwritten calculations:
 $\frac{120}{25}$
 $\frac{105}{25}$
 $\frac{25}{25}$