



SUMMATIVE ASSESSMENT - I, 2015-16 MATHEMATICS

Class - X

Time Allowed: 3 hours

Maximum Marks: 90

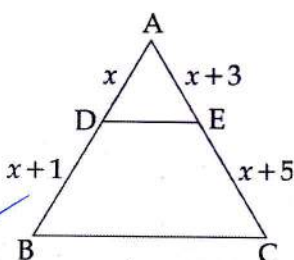
General Instructions:

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

In ΔABC , $DE \parallel BC$, find the value of x .



1

1

2

If $\operatorname{cosec} A = \frac{2}{\sqrt{3}}$, where A is acute, then find value of $\sin^2 A$.

1

3

Find the value of $\frac{1 - \cos \theta}{1 + \cos \theta}$, when $\theta = 0^\circ$.

1

4

The mean of the 10 observations is 8.5. If each observation is multiplied by 2, then what is the new mean.

1

SECTION-B

Question numbers 5 to 10 carry two marks each.

5

State Euclid division lemma. If Euclid lemma is used for $a < b$ as $a = bq + r$, then which of a , b , q , or r is necessarily zero.

2

6

Check whether 15^n can end with the digit 0 for any natural number n .

2

7

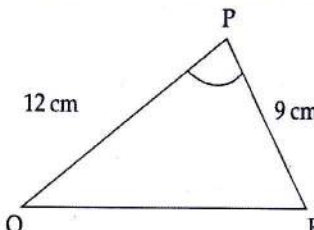
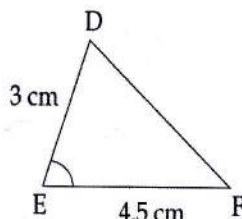
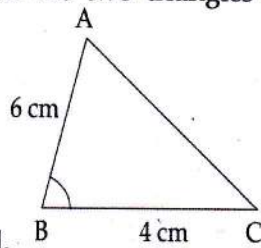
If the sum of two positive numbers is 44 and one number is three times the other number, then find the numbers.

2

8

State which of the two triangles given in the figure are similar. Also state the similarity criterion used.

2



criterion used.

Handwritten calculations for question 6:

$$(3 \times 5)^n$$

3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

9 Prove the following identity :

$$\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} = 1 - \sin\theta \cdot \cos\theta$$

10 The distribution of sale of shirts sold in a month in a departmental store is as under. Calculate the modal size of shirts sold. 2

Size (in cm)	80-85	85-90	90-95	95-100	100-105	105-110	110-115
Number of shirts sold	33	27	85	155	110	45	15

Calculate the modal size of shirt :

Handwritten calculations for question 10:
 $\frac{155}{115} = 1.35$
 $\frac{110}{115} = 0.95$
 $\frac{45}{115} = 0.39$
 $\frac{15}{115} = 0.13$
 $\frac{85}{115} = 0.74$
 $\frac{27}{115} = 0.23$
 $\frac{33}{115} = 0.29$

SECTION-C

Question numbers 11 to 20 carry three marks each.

11 Show that any positive odd integer is of the form $6q+1$, $6q+3$ or $6q+5$ where q is some whole number. 3

12 Solve the following pair of equations graphically : 3

$$3x - y = 7$$

$$2x + 5y + 1 = 0$$

13 Divide the polynomial $4x^4 - 3x^3 + 2x^2 - x - 6$ by the polynomial $x^2 - x + 1$ and verify the division algorithm. 3

14 The larger of the two supplementary angles is 46° more than the smaller angle. Find the angles. 3

15 $\triangle ABC$ is right angled at C. If D is the mid-point of BC, then prove that $AB^2 = 4AD^2 - 3AC^2$. 3

16 If in $\triangle ABC \sim \triangle PQR$, $BC = 18.2$ cm, $QR = 6.5$ cm and perimeter of $\triangle ABC = 140$ cm, then find the perimeter of $\triangle PQR$. 3

17 If $15 \sin \theta = 8 \cos \theta$, then find the value of :

$$\frac{1 + \sin \theta}{1 - \cos \theta} \cdot \cot \theta$$

18 Prove that :

$$(\cot\theta - \operatorname{cosec}\theta)^2 = \frac{1 - \cos\theta}{1 + \cos\theta}$$

19 Construct a less than type table from the given frequency distribution table and draw 'less than type ogive'. 3

Wages more than or equal to (in ₹)	100	120	140	160	180	200	220	240
No. of workers	50	45	42	36	24	15	8	2

Handwritten calculations for question 19:
 $2u = 1 - 75$
 $2u = -16$
 $u = -8$
 $2u = 1 - 75$
 $2u = -16$
 $u = -8$

Handwritten calculations for question 17:
 $-2(3) + 5y = -1$
 $5y = -1 + 6$
 $5y = 5$
 $y = 1$
 $2u = 1 - 75$
 $2u = -16$
 $u = -8$

and the unknown entries a, b, c, d, e and f in the following distribution of heights of students in a class :



Weight (in Kg)	Frequency	Less than type c.f.
35 - 40	7	a
40 - 45	d	21
45 - 50	15	b
50 - 55	e	58
55 - 60	23	c
60 - 65	19	100
Total	f	

$x^3 = (x+1)(x^2-x+1)$
 $x^2 - x + 1$
 $x^2 + 1$
 $x^2 + 1$

SECTION-D

Question numbers 21 to 31 carry four marks each.

21 Find HCF of 378, 180 and 420 by prime factorization method. Is $HCF \times LCM$ of three numbers equal to the product of the three numbers ? 4

22 Determine the value of k for which the following system of linear equations has infinite number of solutions : 4

$(k-3)x + 3y = k, kx + ky = 12$

23 Obtain all other zeroes of the polynomial $x^4 + 2x^3 - 13x^2 - 38x - 24$, if two of its zeroes are -1 and -2 . 4

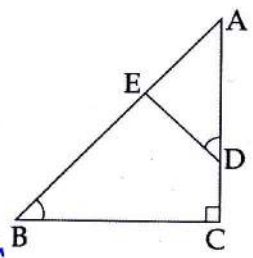
24 Rahul donated some money and books to a school for poor children. Money and books can be represented by the zeroes (i.e. α, β) of the polynomial $p(x) = x^2 - x - 2$. Akash who is friend of Rahul, also got inspired by him and donated the money and books in the form of a polynomial whose zeroes are $1 + 2\alpha$ and $1 + 2\beta$. Find the polynomial represented by Akash's donation ? Why Akash got inspired by Rahul ? 4

2, 7, 7
20, 18, 9
20, 18, 9
3780

25 Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides. 4

26 In ΔABC , if $\angle ADE = \angle B$, then prove that $\Delta ADE \sim \Delta ABC$. 4

Also, if $AD = 7.6$ cm, $AE = 7.2$ cm, $BE = 4.2$ cm and $BC = 8.4$ cm, then find DE.



27 Evaluate : 4

$$\frac{\operatorname{cosec}^2 61^\circ - \tan^2 29^\circ + 2 \sin 30^\circ}{\operatorname{cosec}^2 A - \tan^2 (90^\circ - A) + \tan^2 45^\circ} + \frac{3 \cot 11^\circ \cdot \cot 21^\circ \cdot \cot 31^\circ \cdot \cot 59^\circ \cdot \cot 69^\circ \cdot \cot 79^\circ}{2 (\sin^2 21^\circ + \sin^2 69^\circ) - (\cos^2 41^\circ + \cos^2 49^\circ)}$$

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Prove that :



$$\left(\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} \right) \cdot \left(\frac{\cos A}{1 - \sin A} - \frac{1 - \sin A}{\cos A} \right) = 4 \tan A \cdot \sec A$$

29

If $m = \cos \theta - \sin \theta$ and $n = \cos \theta + \sin \theta$, then show that

$$\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} = \frac{2}{\sqrt{1 - \tan^2 \theta}}$$

30

The following table gives the daily income of 50 workers of a factory. Draw both types ("less than type" and "greater than type") ogives

Daily income (in ₹)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

31

In annual day of a school, age-wise participation of students is shown in the following frequency distribution :

Age of student (in years)	5-7	7-9	9-11	11-13	13-15	15-17	17-19
Number of students	20	18	22	25	20	15	10

Find the mean age of the participants.

Handwritten student work for question 31. It includes several calculations for the mean age:

- Initial attempt: $\frac{15876}{118} = 134.54$
- Correction: $\frac{147008}{15876} = 9.26$
- Final calculation: $\frac{158768}{118} = 134.54$
- Another calculation: $\frac{3780}{118} = 31.99$
- Final result: $134.54 + 31.99 = 166.53$

There are also several division problems shown, such as $18 \overline{) 3780} = 210$ and $18 \overline{) 420} = 23$.