

Above 75

7JCA2ZX

**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**

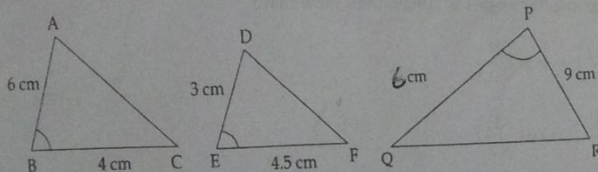
Question numbers 1 to 4 carry one mark each.

1. In  $\Delta PQR$ , S and T are points on the sides PQ and PR respectively such that  $ST \parallel QR$ . If  $PS = 4$  cm,  $PQ = 9$  cm and  $PR = 4.5$  cm, then find PT. 1
2. If  $\theta = 45^\circ$ , then find the value of  $2\operatorname{cosec}^2\theta + 3\sec^2\theta$ . 1
3. Find the value of  $(\operatorname{cosec}^2\theta - 1) \cdot \tan^2\theta$  1
4. The mean of 5 numbers is 18. If one number is excluded then their mean is 16, find the excluded number. 1

**SECTION-B**

Question numbers 5 to 10 carry two marks each.

5. Prove that  $2\sqrt{2}$  is an irrational number. 2
6. Find the LCM of 110 and 55 by Prime Factorisation method. 2
7. A lending library has a fixed charge for the first two days and an additional charge for each day thereafter. Abdul paid ₹ 30 for a book kept for 6 days while Kaira paid ₹ 45 for a book kept for 9 days. Find the fixed charge and the charge for each extra day. 2
8. State which of the two triangles given in the figure are similar. Also state the similarity criterion used. 2



9 In  $\triangle ABC$ ,  $BC = 18$  units,  $\angle C = 60^\circ$  and  $\angle B = 90^\circ$ . Determine the lengths of sides  $AC$  and  $AB$ . 2

10 Calculate the mode of the following data: 2

Class interval	100-200	200-300	300-400	400-500	500-600	600-700
Frequency	18	15	23	55	87	29

#### SECTION-C

Question numbers 11 to 20 carry three marks each.

11 Show that square of any positive odd integer is of the form  $8m + 1$  for some integer  $m$ . 3

12 Solve for  $x$  and  $y$ : 3

$$\frac{5}{x-1} + \frac{1}{y-2} = 2; \quad \frac{6}{x-1} - \frac{3}{y-2} = 1$$

13 Find a quadratic polynomial, the sum and product of whose zeroes are  $-10$  and  $25$  respectively. Hence find the zeroes. 3

14 Determine graphically whether the following pair of linear equations 3

$$3x - y = 7$$

$$2x + 3y + 1 = 0$$

has

(i) a unique solution.

(ii) infinitely many solutions or

(iii) no solution

15  $ABC$  is an isosceles triangle in which  $AB = AC$  and  $BC^2 = 2AB^2$ . Prove that  $ABC$  is a right triangle. 3

16 In  $\triangle ABC$ ,  $X$  is middle point of  $AC$ . If  $XY \parallel BC$ , then prove that  $Y$  is middle point of  $AB$ . 3

17 If  $P$ ,  $Q$  and  $R$  are the interior angles of  $\triangle PQR$ , then show that: 3

(i)  $\sin\left(\frac{P+Q}{2}\right) = \cos\left(\frac{R}{2}\right)$

(ii)  $\tan\left(\frac{P+Q}{2}\right) = \cot\left(\frac{R}{2}\right)$

18 Prove that :

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

19 In a hospital, age record of diabetic patients was recorded as follows :

Age (in years)	0-15	15-30	30-45	45-60	60-75
Number of patients	5	20	40	50	25

Find median age.

20

Use step deviation method to find the mean of the following frequency distribution :

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	2	4	8	5	1

#### SECTION-D

Question numbers 21 to 31 carry four marks each.

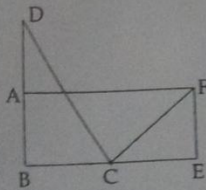
21 The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 8 a.m., at what time will they change together again.

22 A boat goes 30 km upstream and 20 km downstream in 7 hours. In 6 hours, it can go 18 km upstream and 30 km downstream. Determine the speed of the stream and that of the boat in still water.

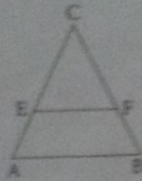
23 If the polynomial  $f(x) = 3x^4 - 9x^3 + x^2 + 15x + k$  is completely divisible by  $3x^2 - 5$ , find the value of  $k$  and hence the other two zeroes of the polynomial.

24 An old person decided to donate most of property and assets before his death to different orphanage for the well-being of the children living there. His total property is represented by  $2x^4 + 3x^3 - 4x^2 + ax + b$  and the number of orphanages contacted is given by  $2x^2 - 3x + 1$ . The left over amount he kept for his remaining life which is given by  $2x - 5$ . Find the value of  $a$  and  $b$ . What is the inspiration of old man?

25 ABEF is a rectangle. C is the middle point of BE. If  $AB = 9$  cm,  $DF = 25$  cm,  $BD = 16$  cm and  $BE = 24$  cm, then prove that  $\angle DCF = 90^\circ$ .



- 26 In  $\triangle ABC$ , if  $EF \parallel AB$  and  $ar(\triangle CEF) = ar(EBFA)$ , then find ratio of CA and EA. 4



- 27 If  $m \cot A = n$ , find the value of  $\frac{m \sin A - n \cos A}{n \cos A + m \sin A}$  4

- 28 Prove that: 4

$$\left( \frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} \right) \cdot \left( \frac{\sin A}{1 - \cos A} - \frac{1 - \cos A}{\sin A} \right) = 4 \operatorname{cosec} A \cdot \cot A$$

- 29 If  $\sin \theta + \cos \theta = m$  and  $\sec \theta + \operatorname{cosec} \theta = n$ , then prove that  $n(m^2 - 1) = 2m$ . 4

- 30 In annual day of a school, age-wise participation of students is shown in the following frequency distribution:  $\rightarrow$  Mean 4

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

- 31 The given frequency distribution represents the number of passengers who boarded a local bus during a particular day: 4

Time (in hours)	5-8	8-11	11-14	14-17	17-20	20-23
Number of passengers	40	90	44	58	53	10

Find the mode and median of the above data.