SUMMATIVE ASSESSMENT – I, 2015-16
MATHEMATICS / Class – X

Time Allowed: 3 hours   Maximum Marks: 90

General Instructions:

All questions are compulsory.

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. There is no overall choice in this question paper.

Use of calculator is not permitted.

SECTION-A
Question numbers 1 to 4 carry one mark each

1. In $\triangle DEW$, $AB \| EW$. If $AD = 4$ cm, $DE = 12$ cm and $DW = 24$ cm, then find the value of DB.   1

2. If $\tan\theta + \cot\theta = 2$, then find the value of $\tan^2\theta + \cot^2\theta$.   1

3. If $(1 + \cos A)(1 - \cos A) = \dfrac{3}{4}$, find the value of secA.   1

4. Heights (in cm) of girls of Class X of a school are recorded as under :   1

Height (in cm)	Less than 140	Less than 145	Less than 150	Less than 155	Less than 160
Number of girls	3	10	31	☐48	50

Make a continuous frequency distribution table for the above data.

SECTION-B
Question numbers 5 to 10 carry two marks each.

5. Write the denominator of the rational number $\dfrac{15}{1600}$ in the form $2^m \times 5^n$, where m, n are non negative integers. Hence, write its decimal expansion without actual division.   2

6. Show that 14^n cannot end with digit 0 for any natural number n.   2

7. If α and β are the zeroes of a polynomial $9y^2 + 12y + 4$, then find the value of $\alpha + \beta + \alpha\beta$.   2

8. A ladder is placed against a wall such that its foot is at a distance of 5 m from the wall and its top reaches a window $5\sqrt{3}$ m above the ground. Find the length of the ladder.   2

9. Evaluate :   2

$$\dfrac{\sin^2 73° + \sin^2 17°}{\cos^2 37° + \cos^2 53°}$$

10   If empirical relationship between mean, median and mode is expressed as mean $= k(3$ 2
median $-$ mode), then find the value of k^2.

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   3
whole number.

12   Solve for x and y :   3
$x+2y-3=0$
$3x-2y+7=0$

13   If one zero of the polynomial $2x^2-5x-(2k+1)$ is twice the other, find both the zeroes of the   3
polynomial and the value of k.

14   Determine graphically whether the following pair of linear equations   3
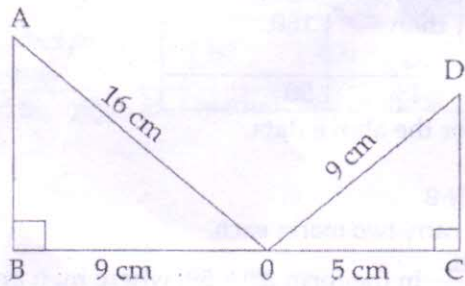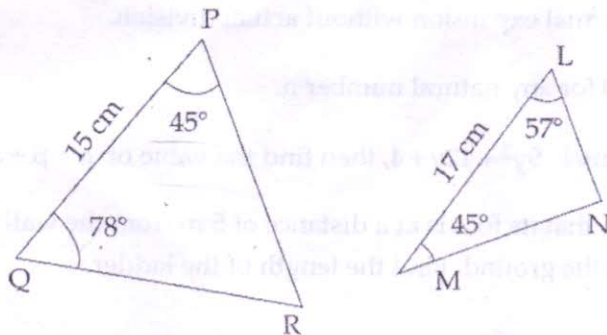$2x-3y=8$
$4x-6y=16$
has

(i)   a unique solution,   (ii)   infinitely many solutions or   (iii)   no solution

15   State whether the given pairs of triangles are similar or not. In case of similarity mention the   3
criterion.

(a)

(b)

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

17 Find the value of :   3

$$\frac{\csc^2 67° - \tan^2 23°}{\sin^2 17° + \sin^2 73°} + \frac{\sin 59°}{\cos 31°}$$

18 Prove the identity :   3
$\sin A.(1 + \tan A) + \cos A. (1 + \cot A) = \sec A + \csc A$

19 Some surnames were picked up from a local telephone directory and the frequency distribution of the   3
number of letters of the English alphabets was obtained as follows :

Number of letters	1-4	4-7	7-10	10-13	13-16	16-19
Number of surnames	10	25	35	x	12	8

If it is given that mode of the distribution is 8, then find the missing frequency (x).

20 Traffic police of a city gave following distribution showing number of victims and their ages in   3
accidents in a year in their city :

Age of victim (in years)	0-15	15-30	30-45	45-60	60-75	75-90
Number of victims	15	35	40	20	8	2

Draw a 'less than type' ogive for the above data.

SECTION-D
Question numbers 21 to 31 carry four marks each.

21 a) State Fundamental theorem of arithmetic.   4
    b) If the HCF and LCM of two numbers be 18 and 378 respectively and one of the numbers is 108, find the other number.

22 A boat goes 30 km upstream and 20 km downstream in 7 hours. In 6 hours, it can go 18 km upstream   4
and 30 km downstream. Determine the speed of the stream and that of the boat in still water.

23 If the polynomial (x4 + 2x3 + 8x2 + 12x + 18) is divided by another polynomial (x2 + 5), the remainder   4
comes out to be (px + q), find the values of p and q.

24 Sita Devi wants to make a rectangular pond on the road side for the purpose of providing drinking   4
water for street animals. The area of the pond will be decreased by 3 sq m if its length is decreased by
2m and breadth is increased by 1m its area will be increased by 4 sq m if the length is increased by 1m.
and breadth remains same. Find the dimension of the pond. What motivated Sita Devi to provide
water pond for street animals?

25 In ΔABC, altitudes AD and CE intersect each other at the point P. Prove that :   4
    (i)   ΔAPE ~ ΔCPD   (ii)   AP × PD = CP × PE
    (iii)   ΔADB ~ ΔCEB   (iv)   AB × CE = BC × AD

26 Hypotenuse AC of right triangle ABC is divided into 3 equal parts. Two line segments parallel to CB are   4
drawn from the points of division. If BC = 30 cm, then find the sum of lengths of the two drawn line
segments?

27. If $\tan (A + B) = \sqrt{3}$ and $\tan (A - B) = \dfrac{1}{\sqrt{3}}$, where $0 < A + B < 90°$, $A > B$, find A and B. Also calculate $\tan A.\sin (A + B) + \cos A.\tan(A - B)$ 4

28. Prove that :

    $(\sec\theta + \tan\theta)^2 = \dfrac{\cosec\theta + 1}{\cosec\theta - 1}$ 4

29. Prove that :

    $(1 + \cot A + \tan A). (\sin A - \cos A) = \dfrac{\sec^3 A - \cosec^3 A}{\sec^2 A. \cosec^2 A}$ 4

30. Find the mode of the following frequency distribution   4

Class interval	f
25 - 35	7
35 - 45	31
45 - 55	33
55 - 65	17
65 - 75	11
75 - 85	1

31. A school organised a dewali mela. Ages of persons, who visited the mela are given in the following frequency distribution :   4

Ages (in years)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of persons	50	400	☐108	530	47	10	5

    Find the mean and median age of the above distribution.