Sample Paper -1
SUMMATIVE ASSESSMENT –I
Class – X Mathematics

Time allowed: 3 hours

Maximum Marks: 90

General Instructions:

a) All questions are compulsory.
b) The question paper comprises of 31 questions divided into four sections A, B, C and D. You are to attempt all the four sections.
c) Questions 1 to 4 in section A are one mark questions.
d) Questions 5 to 10 in section B are two marks questions.
e) Questions 11 to 20 in section C are three marks questions.
f) Questions 21 to 31 in section D are four marks questions.
g) There is no overall choice in the question paper. Use of calculators is not permitted.

SECTION – A

1.   Prove that cos1°cos2°cos3°……cos180° = 0.

2.   If HCF of a and b is 12 and product of these numbers is 1800. Then what is LCM of these numbers?

3.   If the lines given by $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel, then find value of k.

4.   Find the mode of the following data:
      120, 110, 130, 110, 120, 140, 130, 120, 140, 120

SECTION – B

5.   ABC is an isosceles triangle right-angled at C. Prove that $AB^2 = 2AC^2$.

6.   Prove that the polynomial $x^2 + 2x + 5$ has no zero.

7. $\Delta ABC \sim \Delta DEF$ and their areas be respectively $64\,cm^2$ and $121\,cm^2$. If $EF = 15.4\,cm$, find BC.

8.   For any positive real number x, prove that there exists an irrational number y such that

      0 <*y*<*x.*

9.   Find the value of : $3\sin^2 20^o - 2\tan^2 45^o + 3\sin^2 70^o$.

10.   If α and β are the zeros of the quadratic polynomial f(x) = x² – px + q, then find the value of $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$.
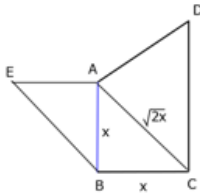
SECTION – C

11.   If n is an old positive integer, show that $(n^2 - 1)$ divisible by 8.

12. Find the condition that the zeros of the polynomial $f(x) = x^3 - px^2 + qx - r$ may be in arithmetic progression.

13. A vertical pole of length 6 cm casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.

14. Find the four angles of a cyclic quadrilateral ABCD in which $\angle A = (2x - 5)°$, $\angle B = (y + 5)°$, $\angle C = (2y + 15)°$ and $\angle D = (4x - 7)°$.

15. Find the values of x and y if the total frequency and the median of the following data is 100 and 525, respectively.

Class interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	x	12	17	20	y	9	7	4

16. In a $\triangle$ABC, right angled at B, if AB = 4 and BC = 3, find all the six trigonometric ratios of $\angle A$.

17. ABC is an isosceles triangle right-angled at B. Similar triangles ACD and ABE are constructed on sides AC and AB. Find the ratio between the areas of $\triangle$ABE and $\triangle$ACD.

18. I am 3 times as old as my son. 5 years later, I shall be two and a half times as old as my son. How old am I and how old is my son?

19. Prove that $\dfrac{1 - \sin\theta}{1 + \sin\theta} = (\sec\theta - \tan\theta)^2$

20. In the given fig, $\triangle ABC$ and $\triangle DBC$ on the same base BC. If AD intersects BC at O. Prove that

$$\frac{ar(\triangle ABC)}{ar(\triangle DBC)} = \frac{AO}{DO}$$
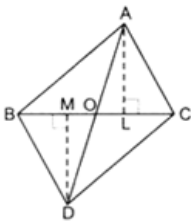
SECTION – D

21. The denominator of a fraction is 4 more than twice the numerator. When both the numerator and denominator are decreased by 6, then the denominator becomes 12 times the numerator. Determine the fraction.

22. Prove that : $\left(\dfrac{1+\tan^2 A}{1-\tan^2 A}\right)=\left(\dfrac{1-\tan A}{1+\tan A}\right)^2=\tan^2 A.$

23. If $x\sin^3\theta+y\cos^3\theta=\sin\theta\cos\theta$ and $x\sin\theta=y\cos\theta$, prove that $x^2+y^2=1$.

24. Find the mean marks of students from the following cumulative frequency distribution:

Marks	Number of students	Marks	Number of students
0 and above	80	60 and above	28
10 and above	77	70 and above	16
20 and above	72	80 and above	10
30 and above	65	90 and above	8
40 and above	55	100 and above	0
50 and above	43		

25. What must be added to $f(x)=4x^4+2x^3-2x^2+x-1$ so that the resulting polynomial is divisible by $g(x)=x^2+2x-3$?

26. Prove that, if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
    Using the above result, do the following:
    In given figure, DE||BC and BD = CE. Prove that $\triangle ABC$ is an isosceles triangle.
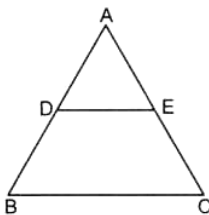
27. Draw the graphs of the following equations on the same graph paper.
    $2x+y=2;\qquad 2x+y=6$
    Find the coordinates of the vertices of the trapezium formed by these lines. Also, find the area of the trapezium formed.

28. Prove that the internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the sides containing the angle.

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

Weight (in kg)	Number of students	Weight (in kg)	Number of students
Less than 38	0	Less than 46	14
Less than 40	3	Less than 48	28
Less than 42	5	Less than 50	32
Less than 44	9	Less than 52	35

Draw a less than type ogive for the given data. Hence, obtain the median weight from the graph and verify the result by using the formula.

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

31. Rohan's mother decided to distribute 900 bananas among patients of a hospital on her birthday. If the female patients are twice the male patients and the male patients are thrice the child patients in the hospital, each patient will get only one apple.

(i) Find the number of child patients, male patients and female patients in the hospital.

(ii) Which values are depicted by Rohan's father in the question?