

# Mathematics

## Summative Assessment - I

**(Class - X )****(Set - 9 )**

Time allowed: 3 hours

Maximum Marks: 90

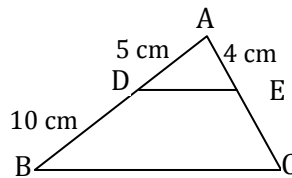
**General Instructions:**

- 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. If two positive integers  $a$  and  $b$  are expressible in the form  $a = pq^3$  and  $b = p^2q$ ;  $p$  and  $q$  being prime numbers, then LCM  $(a, b)$  is
  - a.  $pq$
  - b.  $p^2q^3$
  - c.  $p^3q^3$
  - d.  $p^3q^2$
2. If the sum of the zeros of the quadratic polynomial  $f(x) = x^2 - 4x + k$  is 3, find the value of  $k$ .

3. In the adjoining figure, find AC.



4.  $\sin 2A = 2\sin A$  is true when  $A =$ 
  - a.  $0^\circ$
  - b.  $30^\circ$
  - c.  $45^\circ$
  - d.  $60^\circ$

**SECTION – B**

5. Find a quadratic polynomial with  $\sqrt{2}$  and  $\frac{1}{3}$  as the sum and product of its zeros, respectively.
6. Solve the following system of equations by using the method of substitution.  
 $3x - 5y = -1$ ;  $x - y = -1$

7. The perimeters of two similar triangles ABC and PQR are respectively 24 cm and 12 cm. If PQ = 12 cm, find AB.
8. In a triangle ABC, right angled at A, if AB = 5, AC = 12 and BC = 13, find sinB, cosC and tanB.
9. Prove  $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$ .
10. Find the mode of the following distribution of marks obtained by 80 students:

Marks obtained	0-10	10-20	20-30	30-40	40-50
Number of students	6	10	12	32	20

### SECTION - C

11. Verify that  $\frac{1}{2}$ , 1 and -2 are the zeros of the polynomial  $2x^3 + x^2 - 5x + 2$ . Also verify the relationship between the zeros and coefficients.
12. Solve:  $ax + by = a - b$ ;  $bx - ay = a + b$
13. The coach of a cricket team buys 7 balls and 6 bats for Rs 3800. Later, he buys 3 balls and 5 bats for Rs 1750. Find the cost of each ball and each bat.
14. State and prove Basic Proportionality Theorem or Thales Theorem.
15. In the given figure,  $\triangle ABC$  and  $\triangle DBC$  are on the same base BC and on opposite sides of BC and Q is the point of intersection of AD and BC. Prove that  $\frac{\text{area}(\triangle ABC)}{\text{area}(\triangle DBC)} = \frac{AQ}{DQ}$ .
16. A rhombus of side 20 cm has two angles of  $60^\circ$  each. Find the length of the diagonals.
17. If  $\operatorname{cosec}\theta + \cot\theta = m$  and  $\operatorname{cosec}\theta - \cot\theta = n$ , prove that  $mn = 1$ .
18. Find the mean of the following frequency distribution:
- |            |      |       |       |       |        |
|------------|------|-------|-------|-------|--------|
| Classes:   | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 |
| Frequency: | 15   | 18    | 21    | 29    | 17     |
19. If the median of the following frequency distribution is 46, find the missing frequencies.
- |           |       |       |       |       |       |       |       |       |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Variable  | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | Total |
| Frequency | 12    | 30    | ?     | 65    | ?     | 25    | 18    | 229   |
20. If  $\sin\theta = \frac{a^2 - b^2}{a^2 + b^2}$ , find the values of other five trigonometric ratios.

### SECTION - D

21. Obtain all the zeros of the polynomial  $3x^4 + 6x^3 - 2x^2 - 10x - 5$ , if two of its zeros are  $\sqrt{\frac{5}{3}}$  and  $-\sqrt{\frac{5}{3}}$ .

22. In an equilateral triangle ABC, the side BC is trisected at D. Prove that  $9AD^2 = 7AB^2$ .

23. If  $\operatorname{cosec}\theta - \sin\theta = l$  and  $\sec\theta - \cos\theta = m$ , prove that  $l^2m^2(l^2 + m^2 + 3) = 1$ .

24. Mr. Sharma tells his son, "7 years ago, I was 7 times as old as you were then. Also, 3 years from now, I shall be 3 times as old as you will be". Represent this situation algebraically and graphically.

25. Two isosceles triangles have equal vertical angles and their areas are in the ratio 16:25. Find the ratio of their corresponding heights.

26. Prove that  $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \tan A + \cot A = 1 + \sec A \operatorname{cosec} A$

27. The following table gives the production yield per hectare of wheat of 100 farms of a village.

Production yield in kg/hectare	50-55	55-60	60-65	65-70	70-75	75-80
Number of farms	2	8	12	24	38	16

Change the above distribution to more than type distribution and draw its ogive.

28. Without using trigonometric tables, evaluate the following:

$$\frac{\sec 37^\circ}{\operatorname{cosec} 53^\circ} + 2 \cot 15^\circ \cot 25^\circ \cot 45^\circ \cot 75^\circ \cot 65^\circ - 3(\sin^2 18^\circ + \sin^2 72^\circ)$$

29. For what value of k will the following system of linear equations has no solution:

$$3x + y = 1; \quad (2k - 1)x + (k - 1)y = 2k + 1$$

30. Prove that in a triangle if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.

31. In a primary school in a village, number of girls enrolled has tripled this year as compared to last year.

a. Form a linear equation by taking number of enrollment of this year as x and of previous year as y.

b. If the total number of students enrolled this year is 60, out of which 15 are boys. Find the number of enrollment of girls of the previous year.

c. Which value is depicted in the question?