

# Mathematics

## Summative Assessment - I

(Class - X )

(Set - 5 )

Time allowed: 3 hours

Maximum Marks: 90

### General Instructions:

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

### SECTION - A

- Explain why  $7 \times 11 \times 13 + 13$  is a composite number.
- Find whether the given system of equations has a unique solution, no solution or infinitely many solutions:  

$$x + y = 3, \quad 2x + 5y = 12$$

- Evaluate  $\frac{\sin 18^\circ}{\cos 72^\circ}$ .

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

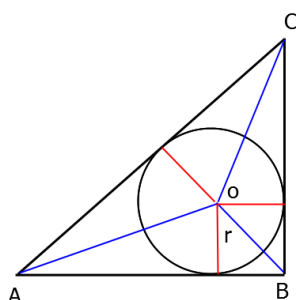
### SECTION - B

- The perimeters of two similar triangles are 30 cm and 20 cm. If one side of the first triangle is 12 cm, determine the corresponding side of the second triangle.
- Prove that the polynomial  $x^2 + 2x + 5$  has no zero.
- The areas of two similar triangles ABC and PQR are  $64 \text{ cm}^2$  and  $121 \text{ cm}^2$  respectively. If QR = 15.4 cm, find BC.
- For any positive real number x, prove that there exists an irrational number y such that  $0 < y < x$ .
- Given that  $\sin(A + B) = \sin A \cos B + \cos A \sin B$ , find the value of  $\sin 75^\circ$ .
- Find the values of  $\alpha$  and  $\beta$  for which the following system of linear equations has infinite number of solutions.

$$2x + 3y = 7, \quad 2\alpha x + (\alpha + \beta)y = 28$$

### SECTION - C

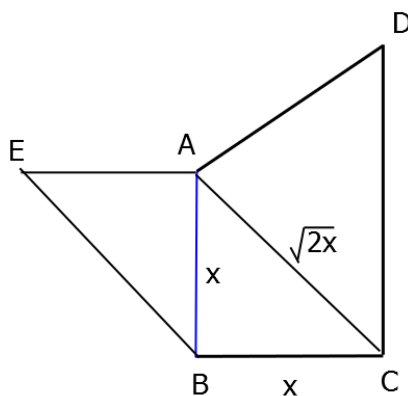
11. Find the largest positive integer that will divide 398, 436 and 542 leaving remainders 7, 11 and 15 respectively.
12. Find the condition that the zeros of the polynomial  $f(x) = x^3 - px^2 + qx - r$  may be in arithmetic progression.
13. ABC is a right-angled triangle right angled at A. A circle is inscribed in it the lengths of two sides containing the right angle are 6 cm and 8 cm. Find the radius of the circle.



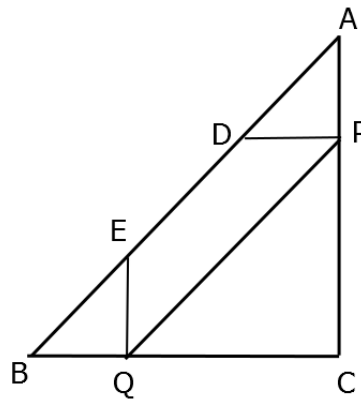
14. Find the four angles of a cyclic quadrilateral ABCD in which  $\angle A = (2x - 5)^\circ$ ,  $\angle B = (y + 5)^\circ$ ,  $\angle C = (2y + 15)^\circ$  and  $\angle D = (4x - 7)^\circ$ .
15. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table given below. Find the mode of the data.

Number of cars	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	7	14	13	12	20	11	15	8

16. In a  $\Delta ABC$ , 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  $\Delta ABE$  and  $\Delta ACD$ .



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  $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$ .
20. Let ABC be a triangle and D and E be two points on side AB such that AD = BE. If DP || BC and EQ || AC, then prove that PQ || AB.



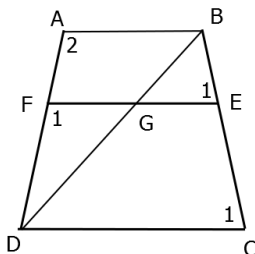
#### SECTION - D

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. If  $\operatorname{cosec}A = 2$ , find the value of  $\frac{1}{\tan A} + \frac{\sin A}{1 + \cos A}$ .
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. A frequency distribution of the life times of 400 T.V. picture tubes tested in a company is given below. Find the average life of a tube.

Life time (in hours)	Frequency	Life time (in hours)	Frequency
300-399	14	800-899	62
400-499	46	900-999	48
500-599	58	1000-1099	22
600-699	76	1100-1199	6
700-799	68		

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. In trapezium ABCD,  $AB \parallel DC$  and  $DC = 2AB$ . A line EF drawn parallel to AB cuts AD in F and BC in E such that  $\frac{BE}{EC} = \frac{3}{4}$ . Diagonal DB intersects EF at G. Prove that  $7FE = 10AB$ .



27. Solve the following system of linear equations graphically.

$$x - y = 1$$

$$2x + y = 8$$

Shade the area bounded by these two lines and y-axis. Also, determine this area.

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. Following is the age distribution of a group of students. Draw the cumulative frequency polygon, cumulative frequency curve (less than type) and hence obtain the median value.

Age	Frequency	Age	Frequency
5-6	40	11-12	92
6-7	56	12-13	80
7-8	60	13-14	64
8-9	66	14-15	44
9-10	84	15-16	20
10-11	96	16-17	8

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

31. In a housing society, people decided to do rainwater harvesting. Rainwater is collected in the underground tank at the rate of  $30 \text{ cm}^3/\text{sec}$ . Taking volume of water collected in  $x$  seconds as  $y \text{ cm}^3$ .
- Form a linear equation.
  - Write it in standard form as  $ax + by + c = 0$ .
  - Which values are promoted by the members of this society?