

Mathematics

Summative Assessment - I

(Class - X)**(Set - 10)**

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.

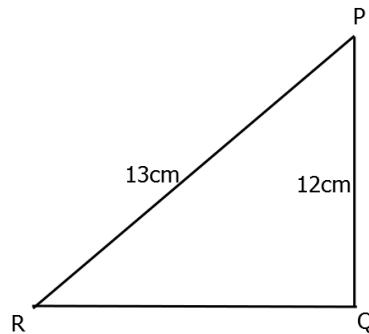
SECTION – A

- If n is a natural number, then $9^{2n} - 4^{2n}$ is always divisible by
a. 5 b. 13 c. both 5 and 13 d. None of these
- If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate $\alpha^2 + \beta^2$.
- The areas of two similar triangles ABC and DEF are 16 cm^2 and 25 cm^2 , respectively. If $BC = 2.3 \text{ cm}$, find EF.
- Write the maximum and minimum values of $\cos\theta$.

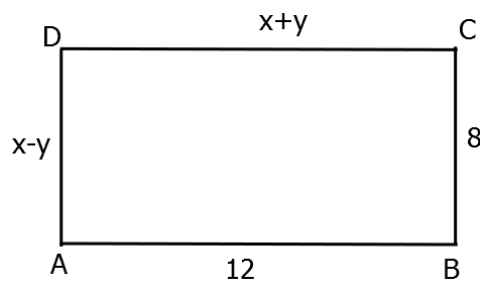
SECTION – B

- What is the value of $(1 - \cos^2\theta)\operatorname{cosec}^2\theta$?
- If $\frac{x \operatorname{cosec}^2 30^\circ \sec^2 45^\circ}{8 \cos^2 45^\circ \sin^2 60^\circ} = \tan^2 60^\circ - \tan^2 30^\circ$, then find the value of x .
- In a triangle ABC, $AC > AB$, D is the mid-point of BC and $AE \perp BC$. Prove that
$$AB^2 = AD^2 - BC \cdot DE + \frac{1}{4} BC^2.$$

8. In the given figure, find $\tan P$ and $\cot R$. Is $\tan P = \cot R$?



9. In the given figure, ABCD is a rectangle. Find the values of x and y .



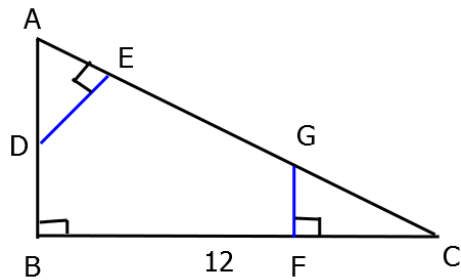
10. Find the mode of the following data:

Class	0-20	20-40	40-60	60-80
Frequency	15	6	18	10

SECTION - C

11. A library has a fixed charge f for the first 3 days and an additional charge f for each day thereafter. Sarika paid Rs 27 for a book kept for 7 days while Suruchi paid Rs 21 for the book kept for 5 days. Find the fixed charge and the charge for each extra day.
12. AD is an altitude of an equilateral triangle ABC. On AD as base, another equilateral triangle ADE is constructed. Prove that $\text{Area}(\triangle ADE) : (\triangle ABC) = 3 : 4$.
13. Prove that $\sqrt{7}$ is an irrational number.
14. Prove that $\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \tan^2\theta - \cot^2\theta$.

15. In the given figure, $AB \perp BC$, $FG \perp BC$ and $DE \perp AC$. Prove that $\triangle ADE \sim \triangle GCF$.



16. The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and denominator, the fraction becomes $\frac{3}{4}$. Find the fraction.
17. Find the missing frequencies in the following frequency distribution table, if $N = 100$ and median is 32.

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	Total
Number of students	10	?	25	30	?	10	100

18. If α and β are the zeros of the polynomial $x^2 - 2x - 15$, then form a quadratic polynomial whose zeroes are 2α and 2β .
19. Show that any positive odd integer is of the form $4q + 1$ and $4q + 3$ where q is a positive integer.
20. If $\cos\theta + \sin\theta = \sqrt{2} \cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2} \sin\theta$.

SECTION - D

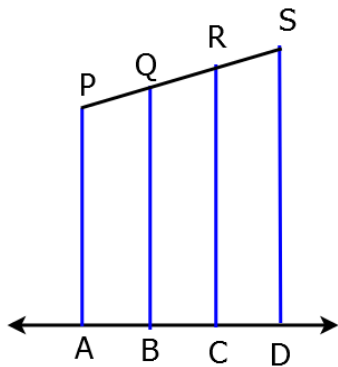
21. Find all the zeros of the polynomial $2x^4 + 7x^3 - 19x^2 - 14x + 30$, if two zeros are $\sqrt{2}$ and $-\sqrt{2}$.
22. Find the value of k so that the following linear equations have no solution:
 $(3k + 1)x + 3y - 2 = 0$
 $(k^2 + 1)x + (k - 2)y - 5 = 0$
23. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio.
24. The path of train A is given by the equation $x + 2y - 4 = 0$ and the path of train B is given by the equation $2x + 4y - 12 = 0$. Represent this situation graphically.
25. If $2\cos\theta - \sin\theta = x$ and $\cos\theta - 3\sin\theta = y$. Prove that $2x^2 + y^2 - 2xy = 5$.

26. Use euclid's division algorithm to find the HCF of 10224 and 9648.
27. The following table shows the marks scored by 140 students in an examination of a certain paper:

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	20	24	40	36	20

Find the mean marks by using all the three methods: direct method, assumed mean deviation and shortcut method.

28. Evaluate $\frac{\sec\theta\operatorname{cosec}(90^\circ-\theta)-\tan\theta\cot(90^\circ-\theta)\sin^2 55^\circ+\sin^2 35^\circ}{\tan 10^\circ \tan 20^\circ \tan 60^\circ \tan 70^\circ \tan 80^\circ}$.
29. Divide $15x^3 - 20x^2 + 13x - 12$ by $2 - 2x + x^2$ and verify the result by division algorithm.
30. In the given figure, each of PA, QB, RC and SD is perpendicular to l. If AB = 6 cm, BC = 9 cm, CD = 12 cm and PS = 36 cm, then find PQ, QR and RS.



31. A survey was conducted to find out the time spent by ten friends in an orphanage. The recordings are as given below:
10, 7, 13, 10, 14, 12, 20, 15, 10, 16
- Find the mean, mode and median.
 - Which value we draw from the above data?