

MODEL TEST PAPER

FIRST TERM (SA-I)

MATHEMATICS

(With Answers)

CLASS X

Time Allowed : 3 to 3½ Hours

Maximum Marks : 80

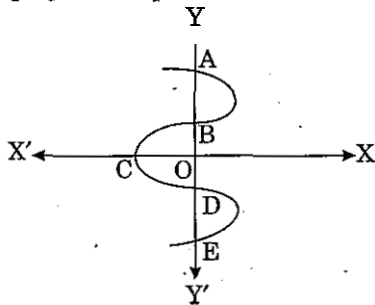
General Instructions :

- All questions are compulsory.
- The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each, Section B comprises of 8 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 6 questions of 4 marks each.
- Question numbers 1 to 10 in Section A are multiple choice questions where you are to select one correct option out of the given four.
- There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.
- Use of calculators is not permitted.

Section 'A'

Question numbers 1 to 10 are of one mark each.

- The least number that is divisible by all the numbers from 1 to 6 both inclusive is
 - 6
 - 30
 - 60
 - 90
- In figure, the graph of a polynomial $p(x)$ is shown. The number of zeroes of $p(x)$ is



- 1
 - 2
 - 3
 - 4
- It is given that $\triangle ABC \sim \triangle DEF$ and $\frac{BC}{EF} = \frac{1}{5}$. Then $\frac{\text{ar}(\triangle DEF)}{\text{ar}(\triangle ABC)}$ is equal to
 - $\frac{1}{5}$
 - 5
 - $\frac{1}{25}$
 - 25

4. If $\sin \theta - \cos \theta = 0$, then the value of $\sin^8 \theta + \cos^8 \theta$ is
- (a) $\frac{1}{2}$ (b) $\frac{1}{4}$
 (c) $\frac{1}{8}$ (d) $\frac{3}{4}$
5. The value of $\cos 0^\circ \cdot \cos 1^\circ \cdot \cos 2^\circ \dots \cos 89^\circ$ is
- (a) 0 (b) -1
 (c) 1 (d) $\frac{1}{\sqrt{2}}$
6. $(\cos \theta + \sin \theta)^2 + (\cos \theta - \sin \theta)^2$ is equal to
- (a) 0 (b) -1
 (c) 1 (d) 2
7. If $\sin(\theta + 36^\circ) = \cos \theta$, where $\theta + 36^\circ$ is an acute angle, then θ is equal to
- (a) 9° (b) 18°
 (c) 27° (d) 36°
8. For a frequency distribution, mean, mode and median are connected by the relation
- (a) Mode = 3 Mean - 2 Median (b) Mode = 2 Median - 3 Mean
 (c) Mode = 3 Median - 2 Mean (d) Mode = 3 Median + 2 Mean
9. If the lines represented by the pair of linear equations
 $4x + ky - 8 = 0$ and $3x - 5y + 7 = 0$
 are parallel, then the value of k is
- (a) $-\frac{3}{20}$ (b) $-\frac{20}{3}$
 (c) $-\frac{10}{3}$ (d) $\frac{20}{3}$
10. The decimal expansion of $\frac{21}{1120}$ will terminate after how many places of decimal?
- (a) 3 (b) 2
 (c) 4 (d) 5

Section 'B'

Question numbers 11 to 18 carry 2 marks each.

11. If 2 is a zero of both the polynomials $3x^2 + mx - 14$ and $2x^3 + nx^2 + x - 2$, find the value of $m - 2n$.
12. Explain why $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ is a composite number.
13. For what value of 'k' will the following pair of linear equations have infinite number of solutions.

$$\begin{aligned} kx + 3y &= k - 3 \\ 12x + ky &= k. \end{aligned}$$

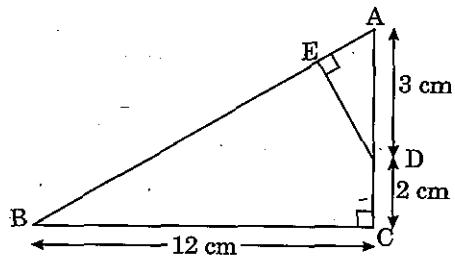
14. Prove that :

$$\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A.$$

Or

If $\sin \theta + \cos \theta = \sqrt{2} \sin (90^\circ - \theta)$, determine $\cot \theta$.

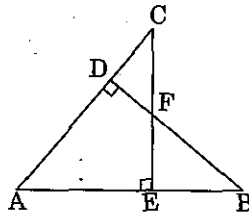
15. In figure, $\triangle ABC$ is right angled at C and $DE \perp AB$. Prove that $\triangle ABC \sim \triangle ADE$ and hence find the lengths of AE and DE .



16. In figure, if $BD \perp AC$ and $CE \perp AB$, prove that

(i) $\triangle AEC \sim \triangle ADB$.

(ii) $\frac{CA}{AB} = \frac{CE}{DB}$



17. The following cumulative frequency distribution gives daily wages of 60 workers :

Daily wages (in ₹)	No. of workers
More than or equal to 300	0
More than or equal to 250	12
More than or equal to 200	21
More than or equal to 150	44
More than or equal to 100	53
More than or equal to 50	59
More than or equal to 0	60

Write the above cumulative frequency distribution as frequency distribution.

18. Find the modal marks of the following distribution of marks obtained by 70 students

Marks obtained	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Number of students	5	18	30	45	40	15	10	7

Section 'C'

Question numbers 19 to 28 carry 3 marks each.

19. Show that any positive odd integer is of the form $6q + 1$ or $6q + 3$ or $6q + 5$, where q is a positive integer.

20. Prove that $3 - \sqrt{5}$ is an irrational.

Or

Prove that $\frac{3}{5}\sqrt{2}$ is an irrational.

21. The sum of a two digit number and the number formed by interchanging the digits is 132. If 12 is added to the number, the new number becomes 5 times the sum of the digits. Find the number.

Or

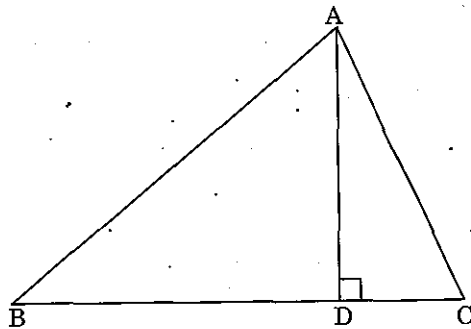
A fraction is such that if the numerator is multiplied by 3 and the denominator reduced by 3, we get $\frac{18}{11}$, but if the numerator is increased by 8 and the denominator is doubled, we get $\frac{2}{5}$. Find the fraction.

22. If α and β are the zeroes of the polynomial : $p(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of k .

23. If $\cot B = \frac{12}{5}$, prove that : $\tan^2 B - \sin^2 B = \sin^4 B \sec^2 B$.

24. Show that : $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$.

25. In figure, $\angle B < 90^\circ$ and $AD \perp BC$. Prove that $AC^2 = AB^2 + BC^2 - 2BC \cdot BD$.



26. E is a point on the side AD produced of a parallelogram $ABCD$ and BE intersects CD at F . Show that $\triangle ABC \sim \triangle CFB$.

27. Find mean of the following frequency distribution using step-deviation method :

Class-Interval	0 - 60	60 - 120	120 - 180	180 - 240	240 - 300
Frequency	22	35	44	25	24

Or

The mean of the following frequency distribution is 24.4. Find the value of p .

Classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	16	24	28	p	18

28. Find the median of the following distribution :

Marks	Frequency
0 - 100	2
100 - 200	5
200 - 300	9
300 - 400	12
400 - 500	17
500 - 600	20
600 - 700	15
700 - 800	9
800 - 900	7
900 - 1000	4

Section 'D'

Question numbers 29 to 34 carry 4 marks each.

29. Find the zeroes of the polynomial : $p(x) = x^3 - 5x^2 - 2x + 24$, if it is given that the product of its two zeroes is 12.

30. Prove that, in a right triangle, the square of the hypotenuse is equal to the sum of squares of other two sides.

Or

Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

31. If $\operatorname{cosec} \theta - \sin \theta = a$ and $\sec \theta - \tan \theta = b$, prove that $a^2 b^2 (a^2 + b^2 + 3) = 1$.

Or

Evaluate :

$$\cot 10^\circ \cot 36^\circ \cot 54^\circ \cot 60^\circ \cot 80^\circ + \tan (55^\circ - \theta) - \cot (35^\circ + \theta) + \cos (40^\circ + \theta) - \sin (50^\circ - \theta) + \frac{\cos^2 39^\circ + \cos^2 51^\circ}{\sin^2 39^\circ + \sin^2 51^\circ}$$

32. If $\frac{x}{a} \cos \theta + \frac{y}{b} \sin \theta = 1$ and $\frac{x}{a} \sin \theta - \frac{y}{b} \cos \theta = -1$, prove that : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

33. The lengths of 40 leaves of a plant are measured correct to the nearest millimetre, and the data obtained is represented in the following table :

Length (in mm)	Number of leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

Draw a more than type ogive for the given data. Hence, obtain the median length of the leaves from the graph and verify the result by using the formula.

34. Solve the following system of equations graphically :

$$x - 2y = -3$$

$$2x + y = 4$$

Find the points where the lines intersect x -axis.

ANSWERS

Section 'A'

1. (c) 2. (a) 3. (d)
4. (c) 5. (d) 6. (d)
7. (c) 8. (c) 9. (b)
10. (d)

Section 'B'

11. $m - 2n = 9$
12. $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5 = 5 \times 1009$ is a composite number as product of prime occur.
13. $k = 6$ 14. Or $\sqrt{2} + 1$
15. $AE = \frac{15}{13}$ cm, $DE = \frac{36}{13}$ cm

17.

Daily wages (in ₹)	Number of workers frequency
0 - 50	1
50 - 100	6
100 - 150	9
150 - 200	23
200 - 250	9
250 - 300	12

18. Mode = 37.5

Section 'C'

21. Number = 48 Or Fraction is $\frac{12}{25}$ 22. $k = 6$
27. Mean = 147.6 Or $p = 14$ 28. Median = 525

Section 'D'

29. Zeroes of the given polynomial are 3, 4 and -2.
31. Or $\frac{\sqrt{3} + 3}{3}$ 33. Median = 146.75 mm.
34. $x = 1$ and $y = 2$; (-3, 0) and (2, 0)