

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.

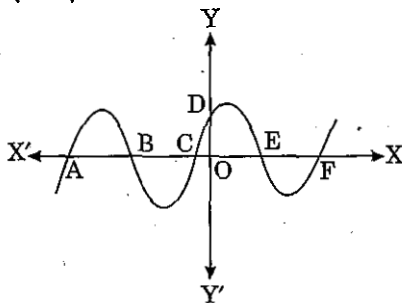
Section 'A'

Question numbers 1 to 10 are of one mark each.

1. The decimal expansion of $\frac{147}{120}$ will terminate after how many places of decimal ?

- (a) 1 (b) 2
(c) 4 (d) 3

2. In figure, the graph of a polynomial $p(x)$ is shown. The number of zeroes of $p(x)$ is

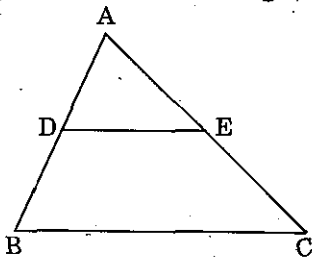


- (a) 2 (b) 3
(c) 4 (d) 5

3. If θ and $(2\theta - 45^\circ)$ are acute angles such that $\sin \theta = \cos (2\theta - 45^\circ)$, then $\tan \theta$ is equal to

- (a) 0 (b) 1
(c) $\frac{1}{\sqrt{3}}$ (d) $\sqrt{3}$

4. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 2.5$ cm, $BD = 3$ cm and $AE = 3.75$ cm, then the length of AC is



- (a) 7.25 cm (b) 8.25 cm
(c) 9.25 cm (d) 6.25 cm

5. If $\tan \theta = \sqrt{3}$, then the value of $\operatorname{cosec} \theta$ is

- (a) $\frac{1}{2}$ (b) 2
(c) $\frac{2}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{2}$

6. If $\operatorname{cosec} \theta = \sqrt{2}$, then the value of $\frac{2 \sin^2 \theta + 3 \cot^2 \theta}{4 (\tan^2 \theta - \cos^2 \theta)}$ is

- (a) 0 (b) -1
(c) 2 (d) -2

7. The value of $\frac{\cos 30^\circ + \sin 60^\circ}{1 + \cos 60^\circ + \sin 30^\circ}$ is

- (a) 1 (b) $\sqrt{2}$
(c) $\frac{\sqrt{3}}{2}$ (d) None of these

8. Euclid's Division Lemma states that for any two positive integers a and b , there exist unique integers q and r such that $a = bq + r$, where r must satisfy :

- (a) $0 \leq r < b$ (b) $1 < r < b$
(c) $0 < r < b$ (d) None of these

9. For a given data with 60 observations the 'less than ogive' and the 'more than ogive' intersect at $(20.5, 30)$. The median of the data is

- (a) 20 (b) 60
(c) 30 (d) 20.5

10. The value of k for which the system of equations $3x + 5y = 0$ and $kx + 10y = 0$ has non-zero solution is

- (a) 2 (b) 0
(c) 6 (d) 8

Section 'B'

Question numbers 11 to 18 carry 2 marks each.

11. Prove that $\sqrt{3}$ is an irrational.

12. Find the value(s) of k for which the pair of linear equations $kx + 3y = k - 2$ and $12x + ky = k$ has no solution.

13. In triangle ABC , right-angled at B , if $\tan A = \frac{1}{\sqrt{3}}$, find the value of:

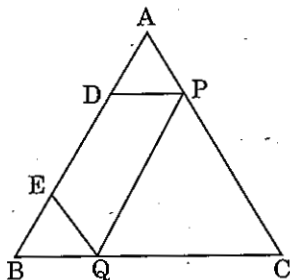
- (i) $\sin A \cos C + \cos A \sin C$
 (ii) $\cos A \cos C - \sin A \sin C$

Or

Prove that: $\frac{\cos A}{1 - \sin A} + \frac{\cos A}{1 + \sin A} = 2 \sec A$

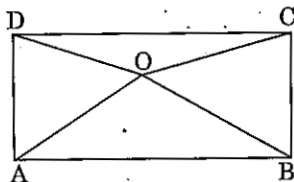
14. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and coefficients of the polynomial.

15. Let ABC be a triangle and D and E be two points on side AB such that $AD = BE$. If $DP \parallel BC$ and $EQ \parallel AC$, then prove that $PQ \parallel AB$.



16. O is any point inside a rectangle $ABCD$ is joined with each of the vertices A, B, C and D . Prove that

$$OB^2 + OD^2 = OC^2 + OA^2$$



17. The following distribution gives the scores of 230 students of a school :

Scores	No. of Students
400 - 450	20
450 - 500	35
500 - 550	40
550 - 600	32
600 - 650	24
650 - 700	27
700 - 750	18
750 - 800	34
Total	230

Write the above distribution as more than type cumulative frequency distribution.

18. Find the mode of the following distribution of house-hold expenditure (in ₹) of manual workers in a city.

Expenditure (in ₹)	Frequency
1000 – 2000	24
2000 – 3000	40
3000 – 4000	33
4000 – 5000	28
5000 – 6000	30
6000 – 7000	22
7000 – 8000	16
8000 – 9000	7

Section 'C'

Question numbers 19 to 28 carry 3 marks each.

19. Show that an even integer is of the form $4q$ or $4q + 2$ where q is a positive integer.

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

Or

Check whether 6^n can end with the digit 0 for any natural number n .

21. The sum of a two digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the first number, the new number is 4 more than 5 times the sum of the digits in the first number. Find the first number.

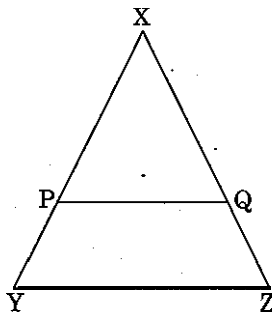
Or

The total expenditure per month of a household consisting of a fixed rent of the house and mess charges depending upon the number of people sharing the house. The total monthly expenditure is ₹ 3900 for 2 people and ₹ 7500 for 5 people. Find the rent of the house and the mess charges per head per month.

22. If α, β are the zeroes of the polynomial : $p(x) = 2x^2 + 5x + k$ satisfying $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then find the value of k for this to be possible.

23. Prove that : $(\sin \theta - \sec \theta)^2 + (\cos \theta - \operatorname{cosec} \theta)^2 = (1 - \sec \theta \operatorname{cosec} \theta)^2$.

24. In figure, $\frac{XP}{PY} = \frac{XQ}{QZ} = 3$, if the area of ΔXYZ is 32 cm^2 , then find the area of the quadrilateral $PYZQ$.



25. If $\sec \theta + \tan \theta = x$, obtain the values of $\sec \theta$, $\tan \theta$ and $\sin \theta$.

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

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

Classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	7	12	13	10	8

Or

The mean of the following distribution is 196.8. Find the value of p

Classes	0 - 80	80 - 160	160 - 240	240 - 320	320 - 400
Frequency	22	35	44	p	24

28. Find the median of the following data :

Classes	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140
Frequency	6	8	10	12	6	5	3

Section D

Question numbers 29 to 34 carry 4 marks each.

29. Find all the zeroes of $2x^4 - 9x^3 + 5x^2 + 3x - 1$, if two of its zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$.

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

Or

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.

31. Prove that :

$$\frac{\sin \theta + 1 - \cos \theta}{\cos \theta - 1 + \sin \theta} = \frac{1 + \sin \theta}{\cos \theta}$$

Or

Evaluate :
$$\frac{\sec \theta \operatorname{cosec} (90^\circ - \theta) - \tan \theta \cot (90^\circ - \theta) + \sin^2 55^\circ + \sin^2 35^\circ}{\tan 10^\circ \tan 20^\circ \tan 60^\circ \tan 70^\circ \tan 80^\circ}$$

32. Prove that :

$$\frac{1}{\operatorname{cosec} A + \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\operatorname{cosec} A - \cot A}$$

33. If the median of the distribution given below is 28.5, find the values of x and y , if the total frequency is 60.

Class Interval	Frequency
0 - 10	5
10 - 20	x
20 - 30	20
30 - 40	15
40 - 50	y
50 - 60	5
Total	60

34. Form the pair of linear equations in the following problem, and find their solutions graphically.

10 students of class X took part in a mathematics quiz. If the number of girls is 4 more than the number of boys, find the number of boys and girls who took part in the quiz.

ANSWERS

Section 'A'

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

Section 'B'

12. $k = \pm 6$ 13. (i) 1 (ii) 0 14. Zeroes are $\frac{3}{2}$ and $-\frac{1}{3}$

17.

<i>Scores more than</i>	<i>Cumulative frequency</i>
400	230
450	210
500	175
550	135
600	103
650	79
700	52
750	34

18. Mode = ₹ 2695.65

Section 'C'

21. Number = 64
Or Monthly rent = ₹ 1500 and mess charges per head per month = ₹ 1200
22. $k = 2$
23. Or $2 + \frac{1}{\sqrt{3}}$
24. ar (quad. PYZQ) = 14 cm^2
25. $\sec \theta = \frac{1}{2} \left(x + \frac{1}{x} \right)$, $\tan \theta = \frac{1}{2} \left(x - \frac{1}{x} \right)$, $\sin \theta = \frac{x^2 - 1}{x^2 + 1}$
26. $\frac{\text{ar}(\triangle ABE)}{\text{ar}(\triangle ACD)} = \frac{1}{2}$
27. Mean = 25 or $p = 25$
28. Median = 61.67

Section 'D'

29. $2 + \sqrt{3}$, $2 - \sqrt{3}$, 1 and $-\frac{1}{2}$

31. Or $\frac{2}{\sqrt{3}}$

33. $x = 8, y = 7$

34. $x = 7, y = 3$, i.e., the number of girls and boys who took part in the quiz are 7 and 3.