

CAMBRIDGE SCHOOL SRINIVASAPURI
HALF YEARLY EXAMINATION 2026-27
MATHEMATICS
CLASS - X

TIME: 3 hours

MM: 80

General Instructions:

- (1) This question paper contains 38 questions. All questions are compulsory.
- (2) This question paper is divided into five Sections – A, B, C, D and E.
- (3) In **Section A** - Questions no. 1 to 18 are multiple choice questions (MCQs) type and questions number 19 & 20 are Assertion-Reason based questions (VSA) type questions of 2 marks each.
- (4) In **Section B** - Questions no. 21 to 25 are very short answer (VSA) type questions, carrying 3 marks each.
- (5) In **Section C** - Questions no. 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
- (6) In **Section D** - Questions no. 32 to 35 are long answer (LA) type questions carrying 5 marks each.
- (7) In **Section E** - Questions no. 36 to 38 are case study-based questions carrying 4 marks each.
- (8) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
- (9) Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.
- (10) Use of calculators is **NOT** allowed.

SECTION A

Section A comprises of 18 MCQs and 02 Assertion-Reason based questions of 1 mark each

$20 \times 1 = 20$

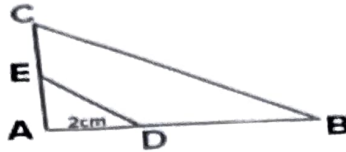
1. ✓ If 'n' is a natural number, then which of the following numbers end with zero?
 (a) $(3 \times 2)^n$ (b) $(2 \times 5)^n$ (c) $(6 \times 2)^n$ (d) $(5 \times 3)^n$
2. ✓ If one zero of the polynomial $(p^2 + 4)x^2 + 65x + 4p$ is the reciprocal of the other, then value of 'p' is
 (a) -1 (b) 1 (c) -2 (d) 2
3. Which of the following equations has the sum of its roots as 4?
 (a) $2x^2 - 4x + 8 = 0$ (b) $x^2 + 4x + 4 = 0$
 (c) $\sqrt{2}x^2 - \frac{4}{\sqrt{2}}x + 1$ (d) $4x^2 - 4x + 4 = 0$
4. Find the sum of all the 11 terms of an AP whose middle most term is 30
 (a) 330 (b) 303 (c) 340 (d) 304
5. The point on the x-axis which is equidistant from points $(-1, 0)$ and $(5, 0)$ is:
 (a) $(0, 2)$ (b) $(2, 0)$ (c) $(3, 0)$ (d) $(0, 3)$

$5M = \frac{1}{2} (2a + 1)$
 $26 + 11$

6. The system of equations $y + a = 0$ and $2x - b = 0$ has
 (a) No solution
 (b) $(-a, \frac{b}{2})$ as its solution
 (c) $(\frac{b}{2}, -a)$ as its solution
 (d) Infinite solutions

7. If $\frac{x}{3} = 2 \sin A$, $\frac{y}{3} = 2 \cos A$, then the value of $x^2 + y^2$ is:
 (a) 36
 (b) 9
 (c) 6
 (d) 18

8. In fig, $DE \parallel BC$, $AC = 9\text{cm}$, $AB = 6\text{cm}$ and $AD = 2\text{cm}$, then the measure of AE is



- (a) 3cm
 (b) 6.3 cm
 (c) $\frac{3}{4}$ cm
 (d) $\frac{4}{3}$ cm
9. Sum of first 200 natural numbers is
 (a) 2010
 (b) 2000
 (c) 20100
 (d) 21000
10. If α and β are the zeroes of the polynomial $f(x) = px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$ then the value of p is:
 (a) $\frac{2}{3}$
 (b) $(-\frac{2}{3})$
 (c) $\frac{1}{3}$
 (d) $(-\frac{1}{3})$

11. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then
 (a) $a = -7, b = -1$
 (b) $a = 5, b = -1$
 (c) $a = -2, b = -6$
 (d) $a = 0, b = -6$

12. If $(x + 2)$ is factor of $x^2 + ax + 2b$ and $a + b = 4$, then
 (a) $a = 1, b = 3$
 (b) $a = 3, b = 1$
 (c) $a = -1, b = 5$
 (d) $a = 5, b = -1$

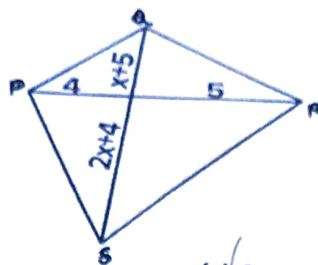
13. For what value of k , the equations $kx + y = k^2$ and $x + ky = 1$ have infinitely many solutions.
 (a) $k = 1$
 (b) $k = -1$
 (c) $k = -2$
 (d) $k = \pm 1$

14. If $\alpha + \beta = 90^\circ$ and $\alpha = 2\beta$ then $\cos^2 \alpha + \sin^2 \beta$ is equal to
 (a) 0
 (b) $\frac{1}{2}$
 (c) 1
 (d) 2

15. If two positive integers a and b are written as $a = p^3 q^2$ and $b = pq^3$; p, q are prime numbers, then HCF (a, b) is:
 (a) pq^2
 (b) pq
 (c) $p^3 q^3$
 (d) $p^2 q^2$

16. If the points $P(7, 3)$, $Q(9, 4)$, $R(8, k)$ and $S(6, 1)$ taken in order, are the vertices of the rectangle, then the value of ' k ' is:
 (a) (-2)
 (b) 3
 (c) 2
 (d) (-4)

17. In what ratio, does x -axis divide the line segment joining the points A (3, 6) and B (-12, -3)?
 (a) 2 : 1 (b) 1 : 4 (c) 4 : 1 (d) 1 : 2
18. Evaluate ' x ' from the given trapezium PQRS such that $PQ \parallel SR$



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

ASSERTION – REASON BASED QUESTIONS

In questions number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.
19. **Assertion (A):** In a right $\triangle ABC$, right angled at B, if $\tan A = \frac{12}{5}$, then $\sec A = \frac{13}{5}$.
Reason (R) : $1 + \tan^2 A = \sec^2 A$
20. **Assertion (A):** If S_n is the sum of the first ' n ' terms of an A.P., then its n th term a_n is given by $a_n = S_n - S_{n-1}$.
Reason(R) : S_n contains the first $(n - 1)$ terms, while S_{n-1} contains the first ' n ' terms. Their difference is the n th term.

SECTION B

This section comprises of 5 Very Short Answer (VSA)-type questions of 2 marks each. 5 × 2 = 10

21. If the system of equations $2x + 3y = 7$ and $(a + b)x + (2a - b)y = 21$ has infinitely many solutions, then find ' a ' and ' b '.
22. Find the sum of first 20 terms of an A.P. whose n^{th} term is given by $a_n = 5 + 2n$.
23. A. Point A (-1, k) and B (5, 7) lie on a circle with centre C (2, $-3k$). Find the values of ' k ' and hence find the radius of the circle.

OR

- B. Find a relation between x and y such that the point $P(x, y)$ is equidistant from the points A (7, 1) and B (3, 5).
24. Two numbers are in the ratio 4: 5 and their HCF is 11. Find the LCM of these numbers.

25. A. If $4k = \tan^2 60^\circ - 2 \operatorname{cosec}^2 30^\circ - 2 \tan^2 30^\circ$, then find the value of k .

2

OR

B. If $2 \sin(A + B) = \sqrt{3}$ and $\cos(A - B) = 1$ then find A and B.

SECTION C

This section comprises of 6 Short Answer (SA) type questions of 3 marks each

$6 \times 3 = 18$

26. Given that $\sqrt{3}$ is irrational, prove that $2\sqrt{3} - 5$ is an irrational number.

3

27. Find the zeroes of the polynomial $4\sqrt{3}x^2 - 5x - 2\sqrt{3}$ by factorisation method and verify the relation between the zeroes and the coefficients of the polynomial.

3

28. A. Solve the following pair of linear equations for x and y :

3

$$\frac{b}{a}x + \frac{a}{b}y = a^2 + b^2 \text{ and } x + y = 2ab$$

OR

B. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3, if each of them manages to save Rs 5000 per month. Find their monthly incomes

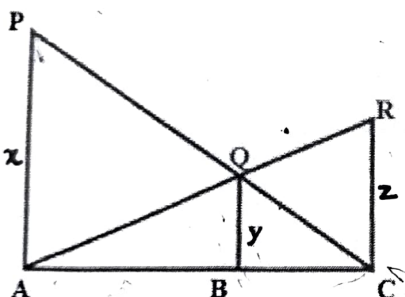
3

29. Point P divides A (3, -5) and B (-4, 8) such that AP : PB = k : 1. If P lies on $x + y = 0$, Find 'k'.

3

30. In the given figure, PA, QB and RC are perpendicular to AC. If PA = x units, QB = y units and RC = z units, prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$

3



31. A. Prove that: $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

3

OR

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

3

SECTION D

This section comprises of 4 Long Answer (LA)-type questions of 5 marks each.

$4 \times 5 = 20$

32. A. Solve the pair of equations $x + 3y - 6 = 0$ and $2x - 3y - 12 = 0$ graphically and find the area of triangle formed between the lines and the y-axis.

5

OR

B. The sum of the digits of a 2-digit number is 9. Seven times the number is equal to four times the number obtained by reversing the order of the digits. Find the number

5

12

33. A. The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of an AP. 5

OR

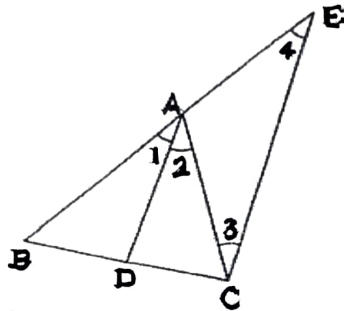
- B. If 8th term of an A.P. is half of its second term and 11th term exceeds one third of its fourth term by 1. Find the 15th term. 5

34. (i) Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. (3 + 2) 5

(ii) Use the above mentioned theorem to do the following:

In $\triangle ABC$, AD is the angle bisector of angle A. BA is produced to E such that

$CE \parallel AD$. Prove that $\frac{BD}{DC} = \frac{BA}{AC}$



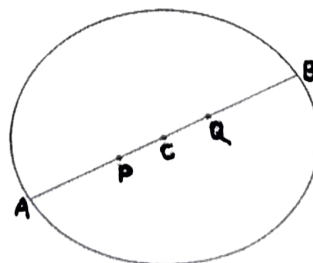
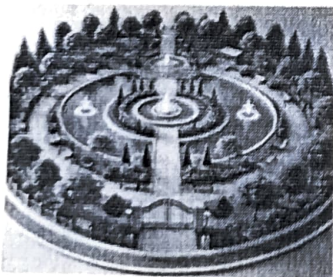
35. Some students planned a picnic. The total budget for food was Rs. 2,000. But 5 students failed to attend the picnic and thus the cost of food for each member increased by Rs. 20. How many students attended the picnic and how much did each student pay for the food? 5

SECTION E

This section comprises of 3 case based questions of 4 marks with three sub parts carrying 1, 1, 2 marks each respectively

$3 \times 4 = 12$

36. In a society, there is a circular park having two gates. The gates are placed diametrically opposite at points A (10, 20) and B (50, 50), as shown in the figure below. Two fountains are installed at points P and Q on AB such that $AP = PQ = QB$.



Based on the above information, answer the following questions:

- (i) Find the coordinates of the centre C of the circular park. 1
(ii) Find the radius of the circular park. 1
(iii) A. Find the coordinate of P. 2

OR

- B. Find the distance of the fountain at Q from gate A. 2

37. In a society, a yoga instructor was hired to train the people of the society to live a healthy lifestyle. Yoga sessions were held daily from 5 p.m. to 7 p.m. in the society park. On day one, 5 people joined the yoga session, on day two, 3 more people joined, on day three, another 3 people joined and, in this manner, every next day, 3 more people kept on joining.



Based on the given information, answer the following questions:

- (i) On which day did 59 people join the yoga session? 1
(ii) How many people joined the yoga session on the 31st day? 1
(iii) A. The yoga instructor was paid ₹100 for each person attending the yoga session. On which day would he earn ₹5,000? 2

OR

- B. What was the total amount earned by the yoga instructor in 16 days? 2

38. The school is organizing a Sports Day event. The Physical Education Department has arranged some refreshments for the participants. There are 48 juice boxes and 72 fruit packets available. The refreshments are to be distributed equally among all the participants so that each participant gets the same number of juice boxes and fruit packets, with nothing left over.



Based on the above information, answer the following questions:

- (i) What is the maximum number of participants among whom the refreshments can be distributed equally? 1
(ii) How many juice boxes and fruit packets will each participant get? 1
(iii) A. If the school decides to add 24 water bottles, what is the maximum number of participants among whom all the items can be distributed equally? 2

OR

- B. If the school decides to add 6 more fruit packets and remove 12 juice boxes, what is the maximum number of participants among whom the remaining refreshments can be distributed equally? 2