

NEW STANDARD ACADEMY

Marks: 80

Date : 10-11-25

CLASS : 10TH MATH'S 36B

Time: 3 hours.

SECTION A

This section has 20 Multiple choice Questions (MCQs) carrying 1 mark each.

- The points $(-1, -2)$, $(1, 0)$, $(-1, 2)$, $(-3, 0)$ form a quadrilateral of type
(a) Square (b) Rectangle
(c) Parallelogram (d) Rhombus
- The distance between the points $(a \cos \theta, a \sin \theta, 0)$ and $(0, a \sin \theta - b \cos \theta, 0)$, is
(a) $a^2 + b^2$ (b) $a^2 - b^2$
(c) $\sqrt{a^2 + b^2}$ (d) $\sqrt{a^2 - b^2}$
- The points $(-4, 0)$, $(4, 0)$, $(0, 3)$ are the vertices of a
(a) right triangle (b) isosceles triangle
(c) equilateral triangle (d) scalene triangle
- $A(4, -2)$, $B(7, -2)$ and $C(7, 9)$ are the vertices of a ΔABC then ΔABC is
(a) equilateral triangle
(b) isosceles triangle
(c) right angled triangle
(d) isosceles right angled triangle
- If $A(3, \sqrt{3})$, $B(0, 0)$ and $C(3, k)$ are the three vertices of an equilateral triangle ABC , then the value of k is
(a) 2 (b) -3
(c) $\pm\sqrt{3}$ (d) $\pm\sqrt{2}$
- The point which divides the line segment joining the points $(7, -6)$ and $(3, 4)$ in ratio 1:2 internally lies in the
(a) I quadrant (b) II quadrant
(c) III quadrant (d) IV quadrant
- What will be the coordinates of B , if the point $C(\frac{29}{7}, \frac{46}{7})$ divides the line segment joining $A(5, 8)$ and $B(a, b)$ in the ratio 2:5?
(a) $a = 2$ $b = 3$ (b) $a = -2$ $b = 3$
(c) $a = 2$ $b = -3$ (d) $a = -2$ $b = -3$
- The coordinates of a point A , where AB is diameter of a circle whose centre is $(2, -3)$ and B is $(1, 4)$, are:
(a) $(3, 0)$ (b) $(0, -10)$
(c) $(3, -10)$ (d) $(3, 4)$
- If $\sin A = 1/2$ and $\cos B = 1/2$ then $A + B = ?$
(a) 45° (b) 30°
(c) 60° (d) 90°
- If $\tan \theta = \frac{5}{2}$ then $\frac{4 \sin \theta + \cos \theta}{4 \sin \theta + \cos \theta}$ is equal to
(a) $11/9$ (b) $3/2$
(c) $9/11$ (d) 4
- If $\sin \theta = 1/3$ then the value of $2 \cot^2 \theta + 2$ is
(a) 6 (b) 1
(c) 18 (d) 10
- In a ΔABC right angled at B , $AB = 24$ cm and $BC = 7$ cm. Then the value of $\tan C$ is:
(a) $12/7$ (b) $24/7$
(c) $7/25$ (d) $7/24$
- If $(\frac{a}{3}, 4)$ is the mid-point of the line segment joining the points $Q(-6, 5)$ and $R(-2, 3)$ then the value of a is
(a) -4 (b) -12
(c) 12 (d) -6
- During a class activity, students derived the identity $\sin^2 A + \cos^2 A = 1$. If $\sin A = 0.6$ what is the value of $\cos A$?
(a) 0.2 (b) 0.4
(c) 0.5 (d) 0.8
- The value of $\cos^2 \theta - \frac{1}{1 + \tan^2 \theta}$ is
(a) $\sqrt{3}$ (b) 1
(c) 0 (d) $\frac{1}{2}$
- If $\cot \theta + \tan \theta = x$ and $\sec \theta - \cos \theta = y$ the value of $(x^2 y)^{2/3} - (xy^2)^{2/3}$ is
(a) 0 (b) 1
(c) $\tan \theta$ (d) $\sec \theta$

17. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$ then the value of $q(p^2 - 1) - 2p$ is

- (a) $2q$ (b) 0
(c) 1 (d) $p - q$

18. Given that $\sin \theta = \frac{a}{b}$, then $\cos \theta$ is .

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

Questions number 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R), Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.

19. **Assertion (A):** The co-ordinates of the point which divides the join of $A(-5, 11)$ and $B(4, -7)$ in the ratio $7:2$ is $(2, -3)$

Reason (R): The coordinates of the point $P(x, y)$ which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ in the ratio $m_1 : m_2$

$$\text{is } \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$$

20. **Assertion (A):** $k + 1 = \sec \theta (1 + \sin \theta)(1 - \sin \theta)$ then the value of k is 1 .

Reason (R): If $\sin \theta + \cos \theta = \sqrt{3}$ then the value of $\tan \theta + \cot \theta$ is 1 .

SECTION B

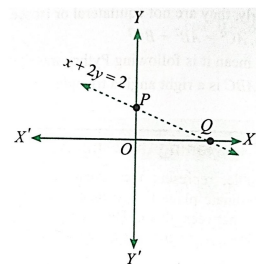
This section has 5 Very Short Answer (VSA) type questions carrying 2 marks each.

21. Find the value of $(1 + \tan^2 \theta)(1 - \sin \theta)(1 + \sin \theta)$

22. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$

23. If $A = 60^\circ$ and $B = 30^\circ$ verify that: $\sin(A + B) = \sin A \cos B + \cos A \sin B$

24. The line $x + 2y = 2$ forms a triangle OPQ, with the coordinate axes.



(i) What are the coordinates of points P and Q?

(ii) What is the area of the triangle formed? Show your steps

25. A line intersects the y-axis and x-axis at the points P and Q respectively. If $(2, -5)$ is the mid-point of PQ, then find the coordinates of P and Q.

SECTION C

This section has 6 Short Answer (SA) type questions carrying 2 marks each.

26. Points $A(-3, 7)$ and $B(5, -1)$ are given.

- a) Find the coordinates of the point P which divides the line segment AB internally in the ratio $2:3$.
b) Find the distance of P from the origin.
c) A point Q lies on AB such that $PQ = PB$. Find the coordinates of

27. Given three points: $A(2, 3)$, $B(-4, 1)$ and $C(5, k)$.

a) For what value of k will the point C lie on the perpendicular bisector of segment AB?

b) For that value of k , find the distance between C and the midpoint of AB.

28. Two towns are located at coordinates $T_1(-2, 4)$ and $T_2(8, -6)$.

a) Find the straight-line distance between the two towns.

b) A new town T_3 is to be built such that it lies on the line joining T_1 and T_2 and is 40% of the way from T_1 to T_2 . Find the coordinates of T_3 .

c) If a region of radius equal to the distance $T_1 T_3$ is to be fenced around T_3 , what would be the area of that region? (Use $\pi = 3.14$)

29. The vertices of triangle ABC are A(-1, 2), B(3, 5), and C(7, k).

- Find the value of k so that the area of triangle ABC is exactly 10 square units.
- With that k-value, verify whether the point D(9, 8) lies on the same plane and whether quadrilateral ABCD is a parallelogram.

30. Consider the points P(1, 2), Q(4, 6), R(7, m) and S(n, 10).

- Find the values of m and n so that PQRS is a rectangle.
- Once m and n are found, compute the length of the diagonal PR and QS and verify they are equal

31. . Prove that $(1 - \tan^2(A)) / (1 + \tan^2(A)) = \cos(2A)$ and hence find the value of A if the LHS equals 1/2

SECTION D

This section has 4 Long Answer (LA) type questions carrying 5 marks each.

- A vertical tower stands on a horizontal plane and is observed from a point A at a distance of 120 m from its foot. The angle of elevation of the top of the tower is 30 degrees. From another point B on the line joining A and the tower, the angle of elevation is 60 degrees. Find the distance between A and B, and the height of the tower.
- If $\sin\theta + \cos\theta = 5/4$, find the value of $\sin^3\theta + \cos^3\theta$.
- In triangle ABC, right-angled at C, it is given that $\sin(A) = 3/5$. Find the value of $\tan(A) + \tan(B)$. Also, find the ratio of the sides of the triangle.
- From the top of a 50 m high building, the angle of depression of the top and bottom of another building are 30 degrees and 45 degrees respectively. Find the height of the other building and the distance between the two buildings.

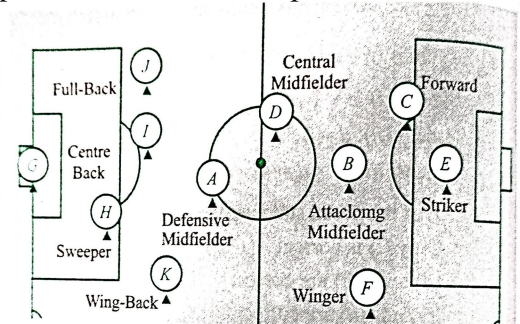
SECTION E

This section has 3 Case study based questions carrying 4 marks each.

Case Based-I:

- Tharunya was thrilled to know that the football tournament is fixed with a

monthly timeframe from 20th July to 20th August 2023 and for the first time in the FIFA Women's World Cup's history, two nations host in 10 venues. Her father felt that the game can be better understood if the position of players is represented as points on a coordinate plane.



- At an instance, the midfielders and forward formed a parallelogram. Find the position of the central midfielder (D) if the position of other players who formed the parallelogram are: A(1, 2) B(4, 3) and C(6,6)
- Check if the Goal keeper G(- 3, 5) Sweeper H(3, 1) and Wing-back K(0, 3) fall on a same straight line.

OR

Check if the Full-back J(5, - 3) and centre-back I(- 4, 6) are equidistant from forward C(0,1) and if C is the mid-point of IJ.

- If Defensive midfielder A(1, 4) Attacking midfielder B(2, - 3) and Striker E(a, b) lie on the same straight line and B is equidistant from A and E, find the position of E.

Case Based-II:

- Puja and her father go to meet her friend Priya for a party. When they reached to Priya's place, Puja saw the roof of the house, which is triangular in shape. If she imagined the dimensions of the roof as given in the figure, then



- If D is the mid point of AC, then Find the value of BD.
- Find the measure of angle A and angle C

OR

Find the value of $\sin A + \cos C$

(iii) Find the value of $\tan^2 C + \tan^2 A$

We have, $AB = BC = 6\sqrt{2}$ m and $AC = 12$ m

Case Based-III:

38. A coach is training athletes and incorporating trigonometry into their practice routines. If the position of three players are at A, B, and C respectively, they form an isosceles right-angle triangle at A.



Given that $AB = 6\sqrt{2}$ m, $AC = 6\sqrt{2}$ m, and $BC = 12$ m.

Based on the given information, answer the following questions:

- (i) If D is the midpoint of BC, then find the value of AD.
- (ii) Find the measure of $\angle B$ and $\angle C$ (using trigonometric ratios).
- (iii) Find the value of $\sin B + \cos C$ and $(\tan^2 C + \tan^2 B)$

OR

Determine the perimeter and area of $\triangle ABC$.