ME 431

Sl. No.

SSLC MODEL EXAMINATION, FEBRUARY - 2025

MATHEMATICS

(English)

Time : 2½ Hours

Total Score : **80**

Instructions :

- Read each question carefully before answering.
- Give explanations wherever necessary.
- First **15** minutes is cool-off time. You may use this time to read the questions and plan your answers.
- No need to simplify irrationals like $\sqrt{2}$, $\sqrt{3}$, π etc., using approximations unless you are asked to do so.

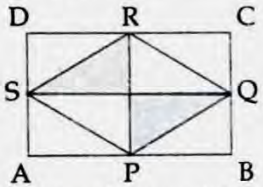
Score

Answer any three questions from 1 to 4. Each question carries 2 scores. **3x2=6**

1. In the arithmetic sequence given below, 1st term and 4th term are missing. Find them.

_____, 10, 16, _____

2.

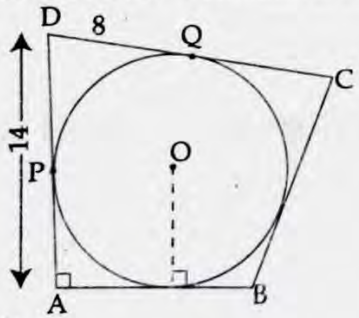


P, Q, R and S are midpoints of the sides of rectangle ABCD. A dot is put in this rectangle without looking into it. What is the probability that the dot to be :

(a) Inside the shaded region

(b) Outside the shaded region

3. The sides of Quadrilateral ABCD are tangents to the circle with centre O.
$\angle A = 90°$, DQ = 8 centimetres and AD = 14 centimetres.



Find :

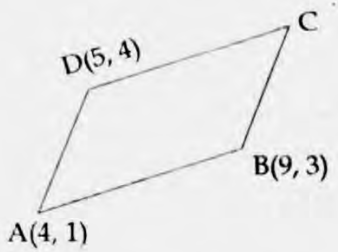
(a) The length DP

(b) The radius of the circle

P.T.O.

Score

4. ABCD is a Parallelogram. The coordinates of vertices A, B and D are (4, 1), (9, 3) and (5, 4). Find the coordinates of vertex C.

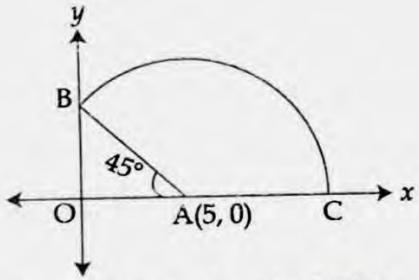


Answer any four questions from 5 to 10. Each question carries 3 scores. **4x3=12**

5. Draw a triangle of circumradius 3 centimetres and two of its angles 55° and $62\frac{1}{2}^{\circ}$.

6. Scores of 5 students in an examination are given below in the increasing order.
   29, 34, x, 36, 39
   (a) What number is x, if the median score is 34.
   (b) Find the median mark, if a student of score 41 is added to this group.

7. In the figure, $\angle OAB = 45°$ and ABC is a sector with centre A(5, 0).



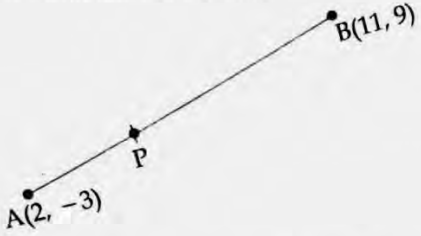
   (a) What is the length of OA ?
   (b) Find the length of AB.
   (c) Write the coordinates of point C.

8. In an arithmetic sequence, sum of first five terms is 70 and sum of first 6 terms is 96.
   Find : (a) 6^{th} term
   (b) 3^{rd} term
   (c) common difference

9. A cone is made by rolling up a sector. Height of the cone is 9 centimetres and slant height is 15 centimetres.
   (a) Find the radius of the cone.
   (b) Find the central angle of the sector.

Score

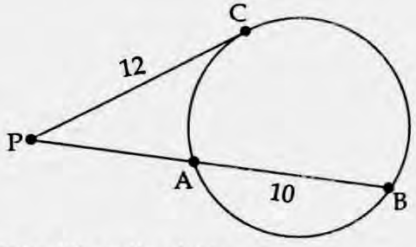
10. The coordinates of the points A and B are (2, −3) and (11, 9) AP : PB = 1 : 2. Find the coordinates of the point P.



Answer any eight questions from 11 to 21. Each question carries 4 scores. 8x4=32

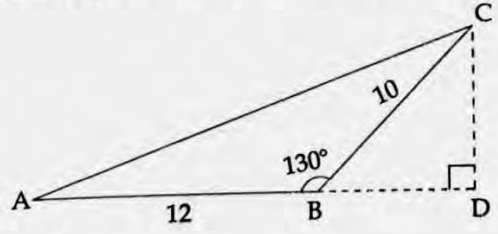
11. Draw a circle of radius 3 centimetres. Mark a point P, 7.5 centimetres away from the centre. Draw tangents from the point P to the circle.

12. In the figure, PC is the tangent to the circle at C and AB is a chord.



PC = 12 centimetres
AB = 10 centimetres
(a) If PA = x centimetres, then PB = _____.
(b) Form a second degree equation and find the length of PA.

13. In the figure, AB = 12 centimetres, BC = 10 centimetres and ∠ABC = 130°.



Find :
(a) The measure of ∠CBD
(b) The height CD
(c) Area of the triangle ABC
[sin50° = 0.8, cos50° = 0.6, tan50° = 1.2]

P.T.O.

Score

14. Consider the Polynomial, $P(x) = x^2 + 3x - k$

(a) Find P(1)

(b) $(x - 1)$ is a factor of $P(x)$. Find the number k.

(c) When k is this number,

write $P(x)$ as the product of two first degree polynomials.

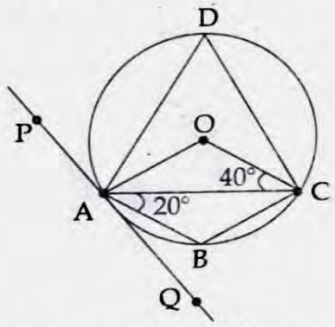
15. (a) Find the n^{th} term of the arithmetic sequence 3, 5, 7, 9, . . .

(b) Find the n^{th} term of the arithmetic sequence $\frac{3}{7}, \frac{5}{7}, \frac{7}{7}, \frac{9}{7}, \cdots$

(c) 'All the integer terms of the arithmetic sequence $\frac{3}{7}, \frac{5}{7}, \frac{7}{7}, \frac{9}{7}, \cdots$ are odd numbers'.

Justify this statement.

16. In the figure, O is the centre of the circle. A, B, C and D are points on the circle and PQ is a tangent through the point A. $\angle OCA = 40°$ and $\angle CAB = 20°$.



Find the measures of :

(a) $\angle AOC$

(b) $\angle D$

(c) $\angle B$

(d) $\angle BAQ$

17. There are two boxes.

The first box contains 25 black and 5 white balls.

The second box contains 10 black and 40 white balls. One ball is taken from each box.

What is the probability of getting

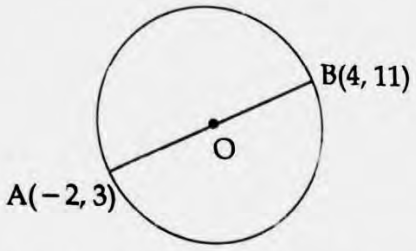
(a) both balls black ?

(b) a black ball from first box and a white ball from second box ?

(c) one black ball and one white ball ?

Score

18. In the figure, O is the centre of the circle. Coordinates of end point of the diameter AB are $(-2, 3)$ and $(4, 11)$.



(a) Find the coordinates of centre O.

(b) Find the radius of the circle.

(c) Write the equation of the circle.

19. Slant height of a square pyramid is 15 centimetres and its lateral surface area is 270 square centimetres.

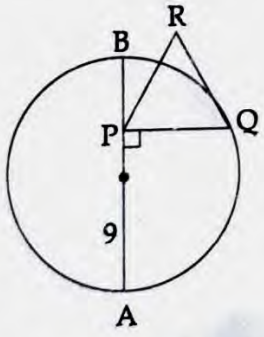
Find :

(a) the base edge

(b) the height and

(c) the volume of the pyramid

20. In the figure, PQR is an equilateral triangle with perimeter 18 centimetres. AB is a diameter of the circle. PQ is perpendicular to AB and PA = 9 centimetres.



(a) What is the length of PQ.

(b) Find the length of PB.

(c) Find the radius of circle.

Score

21. The weights (in kilograms) of 25 people are given in the table.

Weight (kg)	No. of People
30 - 40	2
40 - 50	4
50 - 60	3
60 - 70	5
70 - 80	7
80 - 90	4
Total	25

(a) If people are standing in order of their weights, the weight of the person in which position is taken as median ?

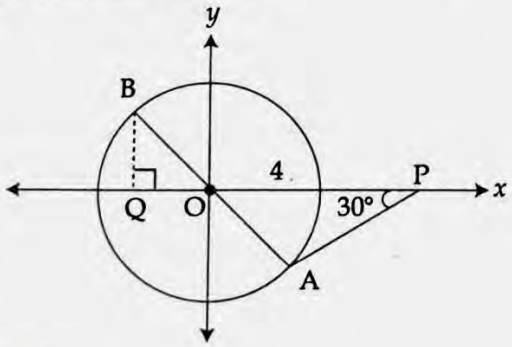
(b) As per assumption, find the weight of 10^{th} person.

(c) Find the median weight.

Answer any six questions from 22 to 29. Each question carries 5 scores. **6x5=30**

22. Draw an equilateral triangle of sides 7 centimetres.
Draw its incircle and measure its radius.

23. In the figure AB is a diameter and O is the centre of the circle.
OP = 4 units, $\angle OPA = 30°$. PA is a tangent to the circle through the point A and QB perpendicular to x axis.



Find :

(a) the measure of $\angle OAP$

(b) the radius OA

(c) the length of QB

(d) the coordinates of point B.

Score

24. Consider the following arithmetic sequences :

Sequence 1 : 6, 11, 16, 21, . . .

Sequence 2 : 7, 13, 19, 25, . . .

(a) What is the difference of 1^{st} terms of these sequences ?

(b) What is the difference of 5^{th} terms of these sequences ?

(c) Calculate the difference between the sums of the first 20 terms of these sequences.

(d) What is the difference between the 40^{th} terms of the two sequences with algebraic forms $5n+1$ and $6n+1$?

25. A line passes through the points (4, 0) and (6, 1)

(a) Find the slope of the line.

(b) Write the equation of the line.

(c) If (a, 7) is a point on this line, find the number a.

(d) Find the coordinates of the point, where this line cuts the y axis.

26. (a) Find the volume of a sphere with radius 10 centimetres.

(b) Find the volume of a cone with base radius of 4 centimetres and height of 5 centimetres.

(c) How many cones with base radius of 4 centimetres and height of 5 centimetres can be formed by melting a solid metal sphere with radius 10 centimetres.

27. Sum of first n terms of an arithmetic sequence is n^2+5n.

(a) Find the sum of first 4 terms.

(b) How many terms of this sequence must be added to get 300 ?

28. A boy is standing 40 metres away from the foot of a tower and he sees the top of the tower at an elevation of 45°. A girl standing opposite side of this tower sees the top of the tower at an elevation of 38°.

(a) Draw a rough figure showing these details.

(b) Find the height of the tower.

(c) How far is the girl standing away from the bottom of the tower ?

[$\sin 38° = 0.6$, $\cos 38° = 0.8$, $\tan 38° = 0.8$]

Score

29. Observe the table of trigonometric values given :

Trigonometric values

Angle	sin	cos
1°	0.0175	0.9998
2°	0.0349	0.9994
3°	0.0523	0.9986
4°	0.0698	0.9976
5°	....	....
86°	0.9976	0.0698
87°	0.9986	0.0523
88°	0.9994	0.0349
89°	0.9998	0.0175

$\sin 1° = 0.0175$, $\sin 2° = 0.0349$, ...

Values of sine of angles from 1° to 89° are increasing.

$\sin 1° < \sin 2° < \sin 3° < \ldots\ldots < \sin 89°$

Some values of sine and cosine are equal.

We will get a pattern from the table.

$\sin 1° = \cos 89°$

$\sin 2° = \cos 88°$

$\sin 3° = \cos 87°$

$\sin 4° = \cos 86°$

.....

.....

(a) Write the next line of this pattern.

(b) $\sin 10° = \cos k°$, what number is k ?

(c) If $\sin x = \cos x$, then, x is _____.
[30°, 45°, 60°, 90°]

(d) Which among the following is correct ?
[$\sin 1° > \sin 5°$; $\cos 1° < \cos 5°$; $\cos 85° < \cos 86°$; $\sin 85° < \sin 86°$]

(e) Write the following in increasing order $\sin 80°$, $\sin 40°$, $\cos 80°$

- o O o -