S 1831

Sl. No. 1044536

SSLC EXAMINATION, MARCH - 2023

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.

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

1. 7, 13, 19, ... is an arithmetic sequence.

   (a) What is its common difference ?

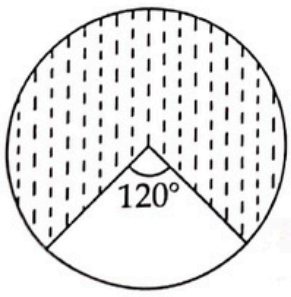
   (b) Find its 11^{th} term.

2. Weights of 11 players of a football team are given in kilograms :

   55, 65, 56, 70, 62, 54, 64, 58, 68, 65, 60

   Find the median of the weights of players.

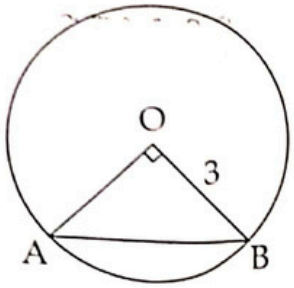
3. A dot is put inside the circle without looking it.



   (a) What is the probability that the dot to be within the unshaded part ?

   (b) What is the probability that the dot to be within the shaded part ?

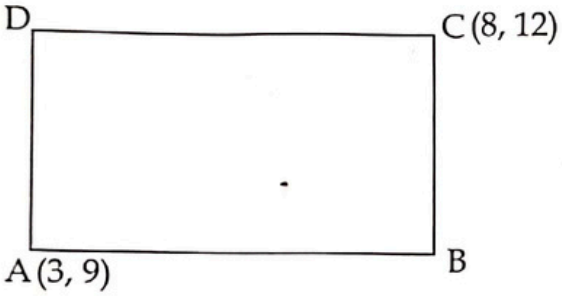
4.



AB is a chord of a circle of radius 3 centimetres. Chord AB makes a rightangle at the centre. What is the length of AB ?

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

5.



A(3, 9), C(8, 12) are the coordinates of two opposite vertices of a rectangle whose sides are parallel to the coordinate axes.

(a) Find the coordinates of other two vertices of the rectangle.

(b) Find the lengths of the sides of the rectangle.

6. Draw a circle of radius 4 centimetres.

Draw a triangle whose vertices are on this circle and two of the angles 40° and 60°.

7. Find the lengths of the sides of the rectangle whose perimeter is 80 centimetres and area 351 square centimetres.

8. (4, 5) and (8, 11) are coordinates of two points on a line.

(a) Find the slope of the line.

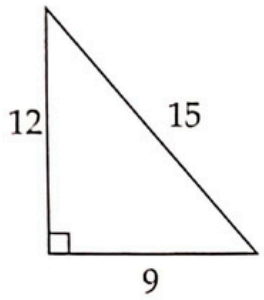
(b) Find the equation of the line.

9. 6^{th} term of an arithmetic sequence is 46. Its common difference is 8.

(a) What is its 16^{th} term ?

(b) Find its 21^{st} term.

10. The sides of a right triangle are 9 centimetres, 12 centimetres and 15 centimetres.



(a) Find the area of the triangle.

(b) Calculate the in radius of the triangle.

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

11. $P(x) = x^2 - 4x + 4$

(a) What is P(1) ?

(b) Write a first degree factor of $P(x) - P(1)$

(c) Write the polynomial $P(x) - P(1)$ as the product of two first degree polynomials.

12. A cone is made by rolling up a semicircle of radius 20 centimetres.

(a) What is the slant height of the cone ?

(b) Find the radius of the cone.

(c) Calculate the curved surface area of the cone.

13. Draw a circle of radius 2.5 centimetres. Mark a point 6.5 centimetres away from the centre.

Draw the tangents to the circle from this point.

Measure and write the lengths of the tangents.

14. Sum of first 7 terms of an arithmetic sequence is 140.

Sum of first 11 terms of the same arithmetic sequence is 440.

(a) What is the 4^{th} term of this arithmetic sequence ?

(b) Find its 6^{th} term.

(c) What is the common difference ?

(d) Find the first term of this sequence.

Score

15. A box contains 4 slips numbered 1, 2, 3, 4 and another contains 5 slips numbered 1, 2, 3, 4, 5. One slip is taken from each box without looking it.

(a) In how many different ways we can choose the slips ?

(b) What is the probability of both numbers being odd ?

(c) What is the probability of both numbers being the same ?

16. In a right triangle, one of the perpendicular sides is 2 centimetres more than that of the other.

Area of the triangle is 24 square centimetres.

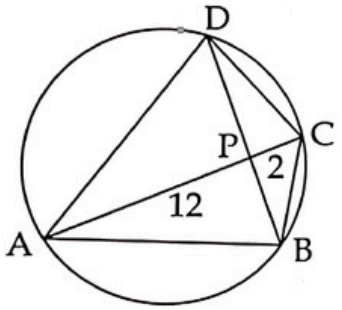
Find the lengths of the perpendicular sides of the right triangle.

17. Draw the co-ordinate axes and mark the points A(0, 0), B(4, 4), C(8, 0) and D(4, −4).

(a) Write the suitable name of the quadrilateral ABCD.

(b) Find the length of the diagonal BD.

18.



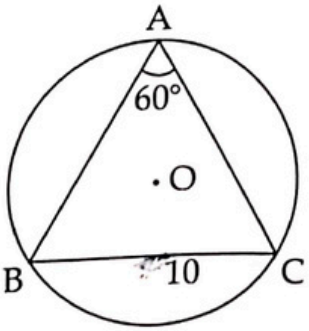
Diagonals AC and BD of the cyclic quadrilateral ABCD cuts at P.

PA = 12 centimetres; PC = 2 centimetres; BD = 11 centimetres.

(a) If PB = x, then write PD in terms of x.

(b) Find the lengths of PB and PD.

19.

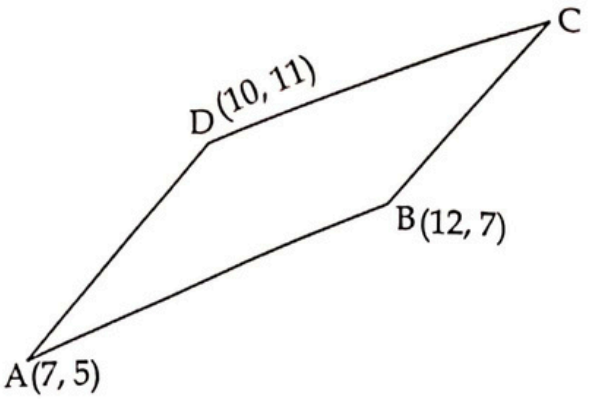


BC is a chord of the circle centred at O.

BC = 10 centimetres $\angle A = 60°$. Find the radius of the circle.

Score

20.



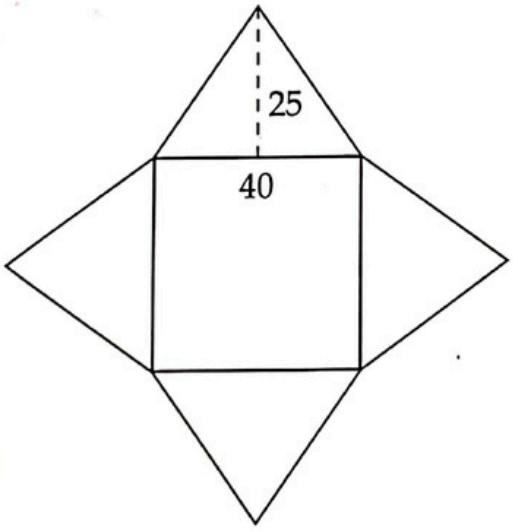
In the figure, co-ordinates of 3 vertices of the parallelogram ABCD are given.

(a) Write the co-ordinates of C.

(b) Calculate the length of the diagonal AC.

(c) Find the co-ordinates of the point of intersection of the diagonals.

21.



A square pyramid is made by cutting out a paper as in the figure. Side of the square is 40 centimetres. Height of the triangle is 25 centimetres.

(a) What is the slant height of the square pyramid ?

(b) Find the height of the pyramid.

(c) Calculate the volume of the pyramid.

Answer any 6 questions from 22 to 29. Each question carries 5 scores. 6x5=3

22. The daily wages of 99 workers in a factory is shown in the table.

Daily wages	Number of Workers
500-600	8
600-700	13
700-800	20
800-900	25
900-1000	19
1000-1100	14

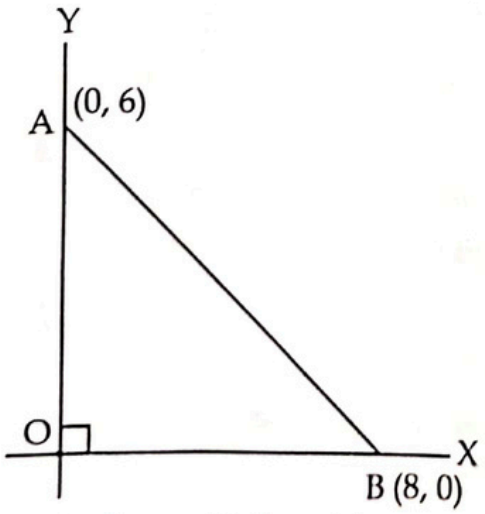
(a) If the workers are arranged on the basis of their daily wages, at what position does the median wage fall ?

(b) What is the median class ?

(c) Find the median of the wages.

23. Draw a rectangle of area 24 square centimetres. Draw a square of area equal to the area of this rectangle.

24.



In the figure, (0, 6) and (8, 0) are coordinates of the points A and B.

A circle of diameter AB is to be drawn.

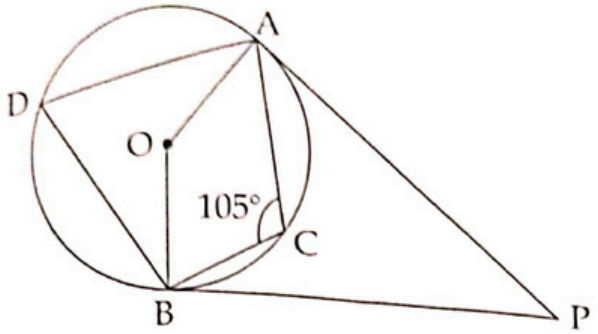
(a) Find the coordinates of the centre of the circle.

(b) Find the radius of the circle.

(c) What is the equation of the circle ?

Score

25.



PA and PB are two tangents to the circle centred at O.
$\angle ACB = 105°$. Find the angles given below.

(a) $\angle ADB$ = _____

(b) $\angle AOB$ = _____

(c) $\angle APB$ = _____

(d) $\angle ABP$ = _____

(e) $\angle ABO$ = _____

26. There are two cylindrical wooden blocks with diameter 60 centimetres and height 60 centimetres.

A largest cone is carved out from one block and a largest sphere from the other.

(a) What is the volume of the cylinder ?

(b) Find the volume of the cone.

(c) Find the radius of the sphere.

(d) Calculate the volume of the sphere.

(e) Find the ratio of the volumes of the cone and the sphere.

27. (a) Find the sum of first 20 natural numbers.

(b) Write the algebraic expression of the arithmetic sequence 5, 9, 13, _____

(c) Find the sum of first 20 terms of the arithmetic sequence 5, 9, 13, _____

28. A child sees the top of a telephone tower at an elevation of 80°. Stepping 20 metres back, he sees it at an elevation of 40°.

(a) Draw a rough figure.

(b) Calculate the height of the tower.

$$\begin{bmatrix} \sin 40° = 0.64 ; \cos 40° = 0.77 ; \tan 40° = 0.84 \\ \sin 80° = 0.98 ; \cos 80° = 0.17 ; \tan 80° = 5.7 \end{bmatrix}$$

Score

29. Diagonals of a quadrilateral are the lines joining its opposite vertices.

What about the diagonals of a polygon ?

The lines from one vertex to the adjacent two vertices are not diagonals. They are the sides of the polygon. Lines to all other vertices are diagonals.

In a quadrilateral, only one diagonal can be drawn from one vertex. If we draw from all 4 vertices, we get 4 diagonals. But 2 among them are the same. In a pentagon, from one vertex, 2 diagonals can be drawn.

Therefore total number of lines is $5 \times 2 = 10$.

But 5 among them are the same.

So number of diagonals in a pentagon $= \frac{5 \times 2}{2} = 5$.

Now complete the table given below :

Polygon	Number of sides	Number of diagonals from one vertex	Total number of diagonals
Quadrilateral	4	1	$\frac{4\times1}{2} = 2$
Pentagon	5	2	$\frac{5\times2}{2} = 5$
Hexagon	6	3	$\frac{6\times3}{2} = 9$
Heptagon	7	.....	.....
Decagon	10	.....	.....
n sided polygon	n	n−3	.....

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