

Sl. No.

## SSLC MODEL EXAMINATION, FEBRUARY - 2024

## MATHEMATICS

(English)

Time : 2½ Hours

Total Score : 80

**Instructions :**

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

Score

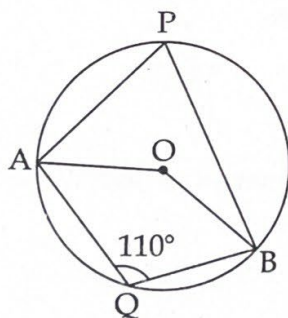
Answer any three questions from 1 to 4. Each question carries 2 scores.

3x2=6

1. Consider the arithmetic sequence 1, 11, 21 .....

- What is its common difference ?
- Find the 10<sup>th</sup> term of this sequence.

2.

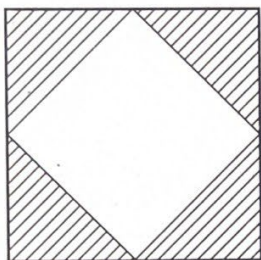
In the figure O is the centre of the circle and  $\angle AQB = 110^\circ$ .

- What is the measure of  $\angle APB$  ?
- What is the measure of  $\angle AOB$  ?

3. The marks of 8 students in a Maths test are given in ascending order as below.

20, 20, 24, 32,  $x$ , 40, 45, 48If the median mark is 34, then find the value of  $x$ .

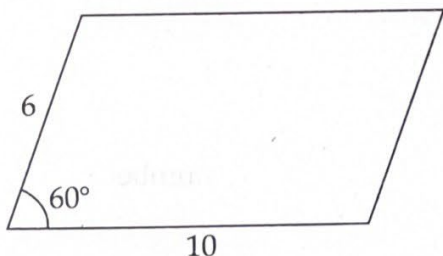
4. The midpoints of the sides of a square are joined to form another square. If a dot is put inside the large square find the probability that it is within the shaded portion.



Answer any four questions from 5 to 10. Each question carries 3 score.

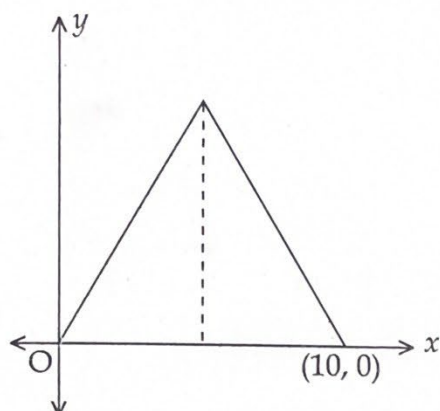
4x3=12

5. The algebraic expression of an Arithmetic sequence is  $3n - 2$ .
- Find the first term of the sequence.
  - Find the sum of the first 50 terms.
6. Draw a triangle of circumradius 3 centimetres and two of its angles  $55^\circ$  and  $62\frac{1}{2}^\circ$ .
7. One side of a rectangle is 12 centimetres longer than the other side and its area is 864 square centimetres.
- Form a second degree equation by taking the smaller side as ' $x$ '.
  - Calculate the lengths of the sides of the rectangle.
8. A parallelogram is drawn with lengths of adjacent sides 10 centimetres, 6 centimetres and angle between them is  $60^\circ$ .



- Find the distance between the top and bottom side of the parallelogram.
- Calculate the area of the parallelogram.

9. Two vertices of an equilateral triangle are  $(0, 0)$  and  $(10, 0)$ .



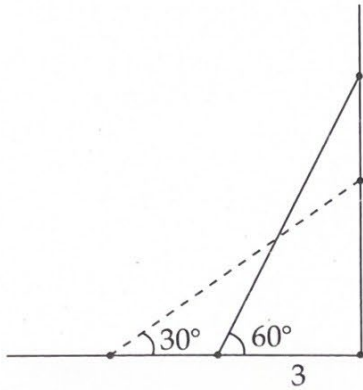
- (a) Find the length of one side of this triangle  
 (b) Find the height of the triangle  
 (c) Find the coordinates of the third vertex
10. A circle with centre at the origin passes through the point  $(4, 3)$ .  
 (a) What is the radius of the circle ?  
 (b) Write the coordinates of the points where this circle cut the  $y$  axis.

Answer any eight questions from 11 to 21. Each question carries 4 score.

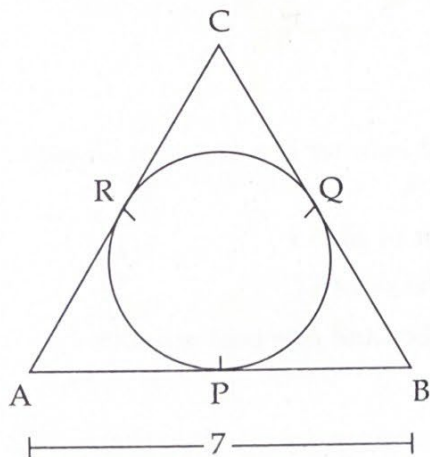
8x4=32

11. The 3<sup>rd</sup> term of an arithmetic sequence is 16 and its 21<sup>st</sup> term is 124.  
 (a) Find the common difference of the sequence.  
 (b) Find the first term of the sequence.  
 (c) What is the position of 280 in this sequence ?
12. One box contains 10 paper slips numbered 1 to 10 and another box contains 20 paper slips numbered 1 to 20. One slip is taken from each box.  
 (a) In how many different ways can we choose a pair of slips ?  
 (b) What is the probability of both numbers being the same ?  
 (c) What is the probability of getting one even number and one odd number ?
13. 10 added to the product of a natural number and the number 7 more than that is 304.  
 (a) If the first number is  $x$ , what will be the next number ?  
 (b) Form a second degree equation and find the two numbers.

14. A ladder leans against a wall with its foot 3 metres away from the wall and makes an angle  $60^\circ$  with the floor.



- (a) Find the length of the ladder.  
 (b) The foot of the ladder is pulled to make an angle  $30^\circ$  with the floor. How high will be its top from the ground?
15. (a) Find the distance between the points  $(-1, 2)$  and  $(5, 10)$ .  
 (b) Prove that the line joining these points passes through the point  $(11, 18)$ .
16. Draw a circle of radius 3 centimetres. Mark a point 7.5 centimetres away from the centre and draw the pair of tangents to the circle from this point.
17. The incircle of a triangle touches the sides at  $P, Q$  and  $R$ . The perimeter of the triangle is 24 centimetres and the length of  $AB$  is 7 centimetres.



- (a) Prove that  $AP + BQ + CR = 12$  centimetres.  
 (b) Find the length of  $QC$ .

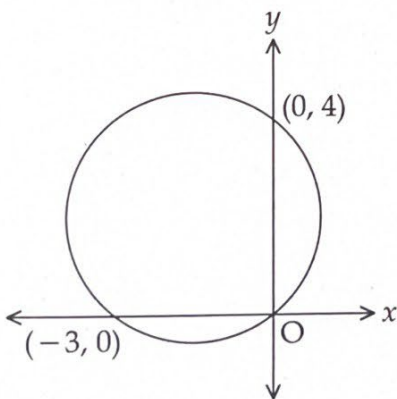
Score

18. A cone of radius 12 centimetres is to be made by folding a sector cut from a circle of radius 20 centimetres.
- What should be the central angle of the sector ?
  - Calculate the curved surface area of the cone.
19. A line is drawn by joining the points (2, 3) and (5, 9)
- Find the slope of the line.
  - Find the equation of the line.
  - Check whether (1, 5) is a point on this line.
20. Consider the polynomial  $P(x) = 2x^2 - 7x + 9$
- Find the value  $P(2)$
  - Find the solutions of the equation  $P(x) - P(2) = 0$
21. A solid metal hemisphere of radius 10 centimetres is melted and recast into small solid spheres of radius 1 centimetre each. How many such spheres can be made ?

Answer any six questions from 22 to 29. Each question carries 5 score.

6x5=30

22. The first term of an arithmetic sequence is 5 and the common difference is 4.
- What is the algebraic expression for this sequence ?
  - What is the algebraic expression for the sum of first n terms of this sequence ?
  - Find the sum of first 20 terms of this sequence.
23. A circle passes through the origin, (-3, 0) and (0, 4).

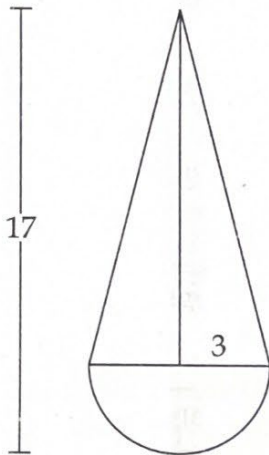


- Find the length of the diameter of circle.
- What are the coordinates of the centre ?
- Write the equation of the circle.

P.T.O.

Score

24. Draw a triangle of sides 4 centimetres, 5 centimetres and angle between them  $70^\circ$ . Draw the incircle of the triangle and measure its inradius.
25. A toy is in the shape of a cone attached to a hemisphere. Its common radius is 3 centimetres and the total height is 17 centimetres.



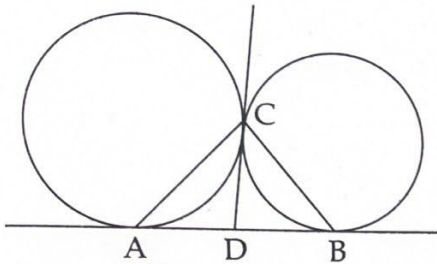
- (a) What is the height of the cone ?
- (b) Find the volume of the toy.
26. The table shows the number of workers in a company sorted according to their daily wages.

Daily wages (Rs.)	Number of Workers
800 - 900	5
900 - 1000	7
1000 - 1100	6
1100 - 1200	10
1200 - 1300	15
1300 - 1400	2

- (a) If the daily wages are arranged in ascending order, what will be the assumed wage of the 19<sup>th</sup> worker ?
- (b) Find the median wage.

27. A boy 1.5 metre tall, standing at the top of a building 8.5 metre high, sees the top of a tower at an elevation of  $40^\circ$  and the bottom of the tower at a depression of  $50^\circ$ .
- Draw a rough figure using the given details.
  - How far is the building from the tower ?
  - Find the height of the tower.  
( $\tan 40^\circ = 0.84$ ,  $\tan 50^\circ = 1.2$ )

28. Two circles meet at point C. AB and CD are common tangents to the circles.



- Prove that D is the midpoint of AB.
  - Find the measure of  $\angle ACB$
29. See the pattern given below.

$$1 + 2 + 1 = 4$$

$$1 + 2 + 3 + 2 + 1 = 9$$

$$1 + 2 + 3 + 4 + 3 + 2 + 1 = 16$$

$$1 + 2 + 3 + 4 + 5 + 4 + 3 + 2 + 1 = 25$$

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- Write the 5<sup>th</sup> line of the pattern.
- Find the sum of the line  
 $1 + 2 + 3 + \dots + 13 + 14 + 15 + 14 + 13 + \dots + 2 + 1$
- Find the middle number of the line that gives the sum 400.
- Find the value of n if  
 $1 + 2 + 3 + \dots + (3n - 2) + (3n - 1) + (3n - 2) + \dots + 2 + 1 = 2500$