

SSLC EXAMINATION, MARCH - 2019

MATHEMATICS

(English)

Total Score : 80

Time : 2½ Hours

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 $\sqrt{2}$, $\sqrt{3}$, π etc., using approximations unless you are asked to do so.

Score

3x2=6

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

1. In the figure O is the centre of the circle. $\angle AOC = 80^\circ$

- What is the measure of $\angle ABC$?
- What is the measure of $\angle ADC$?

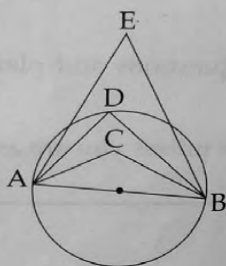


- Write the first integer term of the arithmetic sequence $\frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \dots$
- What is the sum of the first 7 terms of this sequence ?
- If $C(-1, k)$ is a point on the line passing through the points $A(2, 4)$ and $B(4, 8)$ which number is k ?
- What is the relation between the x coordinate and the y coordinate of any point on this line ?
- Find $P(1)$ if $P(x) = x^2 + 2x + 5$.
- If $(x-1)$ is a factor of $x^2 + 2x + k$, What number is k ?

Answer any five questions from 5 to 11. Each question carries 3 score.

5. (a) What is the remainder on dividing the terms of the arithmetic sequence 100, 107, 114 by 7 ?
(b) Write the sequence of all three digit numbers. Which leaves remainder 3 on division by 7 ? Which is the last term of this sequence ?

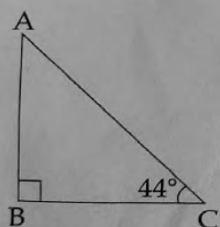
6. AB is the diameter of the circle. D is a point on the circle.



$\angle ACB + \angle ADB + \angle AEB = 270^\circ$. Measure of one among $\angle ACB$, $\angle ADB$, $\angle AEB$ is 110° . Write the measures of $\angle ADB$, $\angle ACB$, and $\angle AEB$.

7. If x is a natural number
(a) What number is to be added to $x^2 + 6x$ to get a perfect square ?
(b) If $x^2 + ax + 16$ is a perfect square which number is 'a' ?
(c) If $x^2 + ax + b$ is a perfect square prove that $a^2 = 4b$.

8. In the figure $\angle B = 90^\circ$, $\angle C = 44^\circ$



- (a) What is the measure of $\angle A$?
(b) Which among the following is $\tan 44^\circ$?

$$\left(\frac{AB}{BC}, \frac{AB}{AC}, \frac{BC}{AB}, \frac{BC}{AC} \right)$$

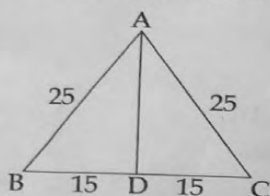
- (c) Prove that $\tan 44^\circ \times \tan 46^\circ = 1$.

9. Draw a circle of radius 3 centimetres. Mark a point P at a distance 6 centimetres from the centre of the circle. Draw tangents from P to the circle.

10. (a) Find the coordinates of the point on x axis, which is at a distance 4 units from (3, 4).
(b) Find the coordinates of the points on x axis at a distance 5 units from (3, 4).

11. The given figure is the lateral face of a square pyramid. $AB = AC = 25$ centimetres and $BD = DC = 15$ centimetres.

- (a) What is the length of its base edge?
(b) Find the lateral surface area of the pyramid.



Answer any 7 questions from 12 to 21. Each question carries 4 score.

7x4=28

12. In triangle ABC, $\angle A = 30^\circ$, $\angle B = 80^\circ$, circumradius of the triangle is 4 centimetres. Draw the triangle. Measure and write the length of its smallest side.

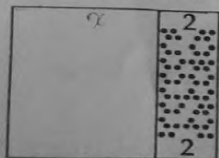
13. Find the following sums :

- (a) $1 + 2 + 3 + \dots + 100$
(b) $1 + 3 + 5 + \dots + 99$
(c) $2 + 4 + 6 + \dots + 100$
(d) $3 + 7 + 11 + \dots + 199$

14. A box contains some green and blue balls. 7 red balls are put into it. Now the probability of getting a red ball from the box is $\frac{7}{24}$ and that of a blue ball is $\frac{1}{6}$.

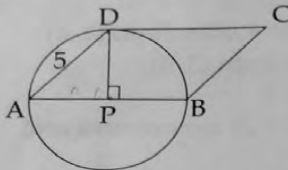
- (a) How many balls are there in the box?
(b) How many of them are blue?
(c) What is the probability of getting a green ball from the box?

15. Land is acquired for road widening from a square ground, as shown in the figure. The width of the acquired land is 2 metres. Area of the remaining ground is 440 square metres.



- (a) What is the shape of the remaining ground?
(b) What is the length of the remaining ground?

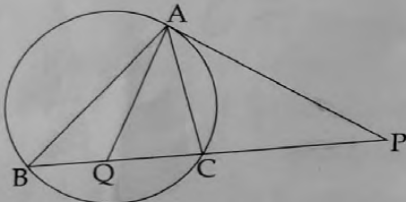
16. In the figure P is the centre of the circle. A, B and D are points on the circle. $\angle P = 90^\circ$, $AD = 5$ centimetres.



- What is the measure of $\angle A$?
- What is the area of triangle APD?
- Find the area of the parallelogram ABCD.

17. (a) Draw the coordinate axes and mark the points $A(1, 1)$, $B(7, 1)$.
 (b) Draw an isosceles right triangle ABC with AB as hypotenuse.
 (c) Write the coordinates of C.

18. In the figure chord BC is extended to P. Tangent from P to the circle is PA. AQ is the bisector of $\angle BAC$.



- Write one pair of equal angles from the figure.
- If $\angle PAC = x$ and $\angle PCA = y$ prove that $\angle BAC = y - x$.
- Prove that $\angle PAQ = \frac{y+x}{2}$.

19. If $x - 1$ is a factor of the second degree polynomial $P(x) = ax^2 + bx + c$ and $P(0) = -5$.

- What is the value of c ?
- Prove that $a + b = 5$.
- Write a second degree polynomial whose one factor is $x - 1$.

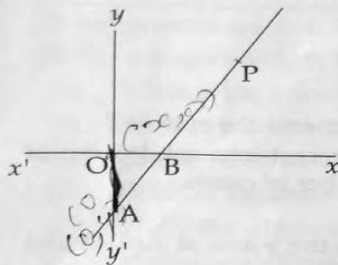
20. A circular sheet of paper is divided into two sectors. Central angle of one of them is 160° .

- What is the central angle of the remaining sector?
- These sectors are bent into cones of maximum volume. If the radius of the small cone is 8 centimetres, what is the radius of the other?
- What is the slant height of the cones?

Score

21. Equation of the line AB is $3x - 2y = 6$. P is a point on the line. The line intersects the y-axis at A and the x-axis at B.

- What is the x coordinate of A ?
- What is the length of OA ?
- What is the length of OB ?
- The x coordinate and the y coordinate of P are same. Find the coordinates of P.



Answer any five questions from 22 to 28. Each question carries 5 score.

5x5=25

22. If the terms of the arithmetic sequence $\frac{2}{9}, \frac{3}{9}, \frac{4}{9}, \frac{5}{9}, \dots$ are represented as x_1, x_2, x_3, \dots then

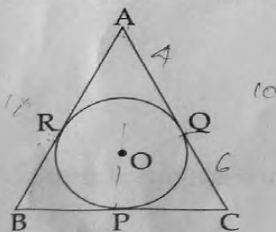
- $x_1 + x_2 + x_3 = \dots$
- $x_4 + x_5 + x_6 = \dots$
- Find the sum of first 9 terms.
- What is the sum of first 300 terms ?

23. Draw a rectangle of area 12 square centimetres. Draw a square having the same area.

24. A boy standing at one bank of a river sees the top of a tree on the other bank directly opposite to the boy at an elevation of 60° . Stepping 40 metres back, he sees the top at an elevation of 30° .

- Draw a rough figure and find the height of the tree.
- What is the width of the river ?

25. Circle with centre O touches the sides of the triangle at P, Q and R, $AB = AC$, $AQ = 4$ centimetres and $CQ = 6$ centimetres.



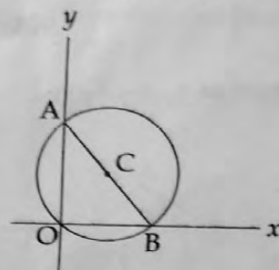
- What is the length of CP ?
- Find the perimeter and the area of the triangle.
- What is the radius of the circle ?

6. Radius of a cylinder is equal to its height. If the radius is taken as r , volume of the cylinder is $\pi r^2 \times r = \pi r^3$. Like this find the volumes of the solids, with the following measures.

| Solids | Measures | Volume |
|------------|-----------------------|--------|
| Cone | radius = height = r | |
| Hemisphere | radius = r | |
| Sphere | radius = r | |

- (a) What is the ratio of the volumes of cone, hemisphere, cylinder and the sphere ?
 (b) A solid metal sphere of radius 6 centimetres is melted and recast into solid cones of radius 6 centimetres and height 6 centimetres. Find the number of cones.

C is the centre of the circle passing through the origin. Circle cuts the y -axis at $A(0, 4)$ and the x -axis at $B(4, 0)$.



- (a) Write coordinates of C.
 (b) Write the equation of the circle.
 (c) $(0, 0)$ is a point on the circle. There is one more point on the circle with x and y coordinates equal. Which is that point ?

The table below shows the number of children in a class, sorted according to their heights.

| Height (Centimetres) | Number of Children |
|----------------------|--------------------|
| 130 -140 | 7 |
| 140 - 150 | 9 |
| 150 -160 | 10 |
| 160 -170 | 10 |
| 170 -180 | 9 |

If the students are directed to stand in a line according to the order of their heights starting from the smallest, then

- (a) The height of the child at what position is taken as the median ?
 (b) What is the assumed height of the child in the 17th position ?
 (c) Find the median height.

Score

Read the following. Understand the Mathematical concepts in it and answer the questions that follow.

6x1=6

The remainders obtained on dividing the powers of two by 7 have an interesting property. We can understand it from the table given below.

| Number | 2^1 | 2^2 | 2^3 | 2^4 | 2^5 | 2^6 | 2^7 | |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Remainder | 2 | 4 | 1 | 2 | 4 | 1 | 2 | |

If the powers are 1, 4, 7, the remainder is 2

If the powers are 3, 6, 9, the remainder is 1

- What is the remainder on dividing 2^8 by 7?
- Write the sequence of powers of 2 leaving remainder 1 on division by 7.
- Check whether 2019 is a term of the arithmetic sequence 3, 6, 9,
- What is the remainder on dividing 2^{2019} by 7?
- Write the algebraic form of the arithmetic sequence 1, 4, 7,
- Write the algebraic form of the sequence $2^1, 2^4, 2^7, \dots$ (powers of two leaving remainder 2 on division by 7).

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