SSLC EXAMINATION, MARCH - 2019

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

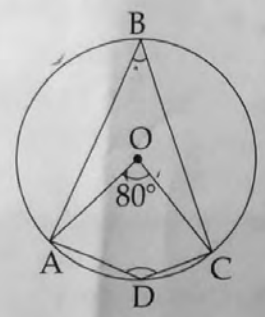
Score

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

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

(a) What is the measure of $\angle ABC$?

(b) What is the measure of $\angle ADC$?



2. (a) Write the first integer term of the arithmetic sequence $\frac{1}{7}, \frac{2}{7}, \frac{3}{7}$ .....

(b) What is the sum of the first 7 terms of this sequence ?

3. (a) 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 ?

(b) What is the relation between the x coordinate and the y coordinate of any point on this line ?

4. (a) Find P(1) if $P(x) = x^2 + 2x + 5$.

(b) If $(x-1)$ is a factor of $x^2 + 2x + k$, What number is k ?

P.T.O

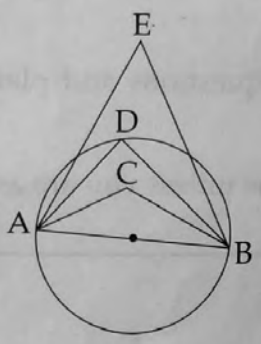
Score
5x3=15

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.



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

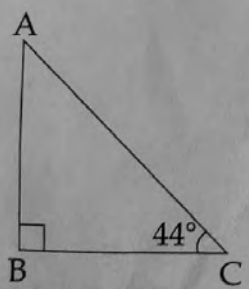
7. If x is a natural number

(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 $\angle B = 90°$, $\angle C = 44°$



(a) What is the measure of $\angle A$?

(b) Which among the following is tan 44° ?

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

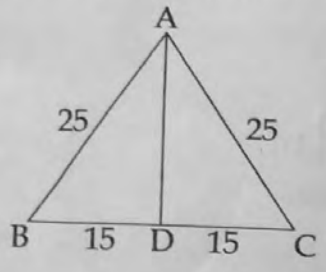
(c) Prove that $\tan 44° \times \tan 46° = 1$.

Score

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.



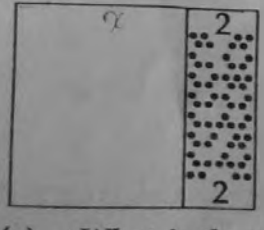
Answer any 7 questions from 12 to 21. Each question carries 4 score. 7x4=28

12. In triangle ABC, $\angle A = 30°$, $\angle B = 80°$, 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) $1+2+3+\ldots\ldots\ldots\ldots+100$
(b) $1+3+5+\ldots\ldots\ldots\ldots+99$
(c) $2+4+6+\ldots\ldots\ldots\ldots+100$
(d) $3+7+11+\ldots\ldots\ldots\ldots+199$

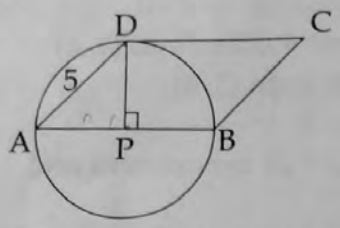
14. A box contains some green and blue balls. 7 red balls are put into it. Now the probability of getting a red ball from the box is $\frac{7}{24}$ and that of a blue ball is $\frac{1}{6}$.
(a) How many balls are there in the box ?
(b) How many of them are blue ?
(c) What is the probability of getting 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. $\angle P = 90°$, AD = 5 centimetres.



(a) What is the measure of $\angle A$?

(b) What is the area of triangle APD ?

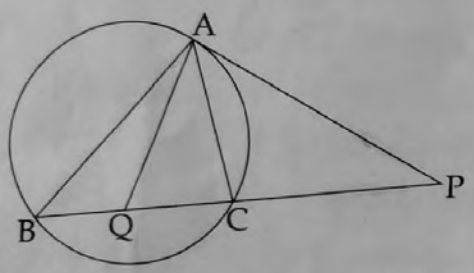
(c) Find the area of the parallelogram ABCD.

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 $\angle BAC$.



(a) Write one pair of equal angles from the figure.

(b) If $\angle PAC = x$ and $\angle PCA = y$ prove that $\angle BAC = y - x$.

(c) 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 $P(0) = -5$.

(a) What is the value of c ?

(b) Prove that $a + b = 5$.

(c) 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°.

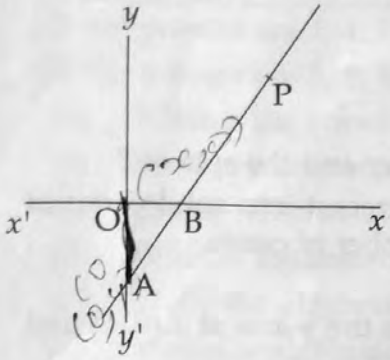
(a) What is the central angle of the remaining sector ?

(b) 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 ?

(c) 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.
(a) What is the x coordinate of A ?
(b) What is the length of OA ?
(c) What is the length of OB ?
(d) The x coordinate and the y coordinate of P are same. Find the coordinates of P.



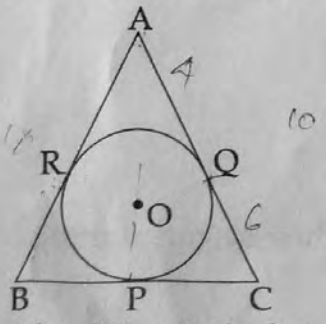
Answer **any five** questions from **22** to **28**. Each question carries **5** score. **5x5=25**

22. If the terms of the arithmetic sequence $\frac{2}{9}, \frac{3}{9}, \frac{4}{9}, \frac{5}{9}$ ..... are represented as x_1, x_2, x_3 ..... then
(a) $x_1+x_2+x_3$ = ...
(b) $x_4+x_5+x_6$ = ...
(c) Find the sum of first 9 terms.
(d) 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°.
(a) Draw a rough figure and find the height of the tree.
(b) 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.



(a) What is the length of CP ?
(b) Find the perimeter and the area of the triangle.
(c) What is the radius of the circle ?

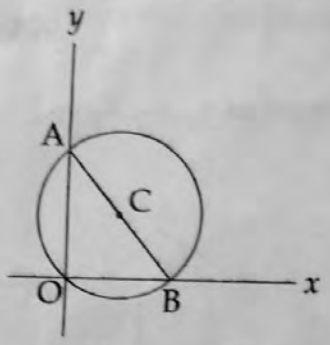
26. Radius of a cylinder is equal to its height. If the radius is taken as r, volume of the cylinder is $\pi r^2 \times r = \pi r^3$. Like this find the volumes of the solids, with the following measures.

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.

27. 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 ?

28. 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 17^{th} position ?

(c) Find the median height.

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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

(a) What is the remainder on dividing 2^8 by 7 ?

(b) Write the sequence of powers of 2 leaving remainder 1 on division by 7.

(c) Check whether 2019 is a term of the arithmetic sequence 3, 6, 9, ...

(d) What is the remainder on dividing 2^{2019} by 7 ?

(e) Write the algebraic form of the arithmetic sequence 1, 4, 7, ...

(f) Write the algebraic form of the sequence $2^1, 2^4, 2^7$, ... (powers of two leaving remainder 2 on division by 7).

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