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439

SSLC MODEL EXAMINATION—FEBRUARY, 2013

MATHEMATICS

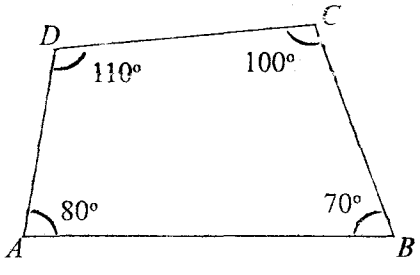
Time : 2½ hours | Total Score: 80

Instructions:

- Read the questions carefully, understand each question and then answer the questions.
- Give explanations wherever necessary.
- If there is an OR between any two questions, you may answer only one among them.
- 15 minutes will be given at the beginning as cool off time. This time may be utilised to read and understand the questions.
- Simplifications using π, etc., with their approximate values are not required if not specified in the question.

SCORE

1. Write down an arithmetic sequence with common difference 6. What is the n^{th} term of this sequence? [2]

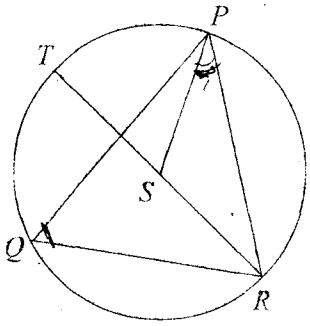
2. 

In the quadrilateral $ABCD$ shown in the figure, $\angle A = 80°$, $\angle B = 70°$, $\angle C = 100°$ and $\angle D = 110°$. Is this quadrilateral $ABCD$ a cyclic quadrilateral? [2]

Is the circle with diameter BD passes through A? Why?

3. The two opposite vertices of a rectangle whose sides parallel to axes are (3, 2) and (7, –4). Write the co-ordinates of the other two vertices of the rectangle. [2]

4. 15, 33, 51, ... is an arithmetic sequence. Prove that, if 1 is added to the sum of the continuous terms of this sequence, it will be a perfect square. [3]

5. 

In the figure S is the centre of the circumcircle of ΔPQR. RT is a diameter of the circle. Prove that $\angle PQR + \angle RPS = 90°$. [3]

6. A square pyramid has the base edge 14 centimetre and the lateral edge 25 centimetre. Find the height and slant height of this pyramid. [3]

7. In $\triangle ABC$, $\angle A = 80°$, $AB = 15$ centimetre and $AC = 8$ centimetre. [3]

(a) What is the perpendicular distance from C to AB?

(b) Calculate the area of the triangle.

($\sin 80° = 0.98$, $\cos 80° = 0.17$, $\tan 80° = 5.6$)

8. The area of a rectangle with length 6 centimetre more than the breadth, is 135 square centimetre. Find the length and breadth of the rectangle. [3]

OR

The perimeter of a rectangle is 40 centimetre. Can its area be 120 square centimetre? Justify your answer.

9. A box contains 3 white balls and 7 black balls. Another box contains 4 white balls and 6 black balls. If we choose one ball each from the two boxes without looking in to the boxes, [3]

(a) what is the probability of getting two balls with the same colour?

(b) what is the probability of getting two balls with different colours?

10. Draw the x-axis and y-axis in the answer sheet. [3]

Mark the points whose co-ordinates are (5, 3), (−3, 4), (2, 0) and (−1, −3).

11. When the polynomial $2x^3 + kx^2 + 17x - 2$ is divided by $(x - 2)$ and by $(x - 3)$ we get the same remainder. [3]

(a) Find the value of k.

(b) Check whether $(2x - 1)$ is a factor of this polynomial.

12. Can A (−1, 5), B (2, 1), C (7, −11) be the vertices of a triangle? Justify your answer. [3]

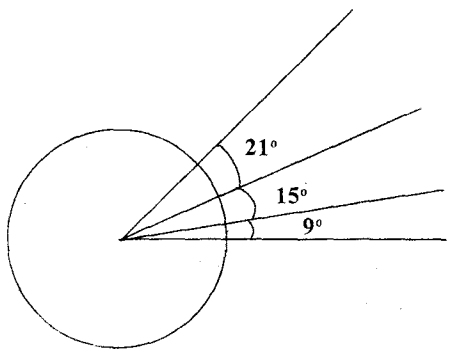
13. The electricity consumption of 50 houses of a colony is shown in the table below: [3]

Electricity consumption (in units)	*Number of houses*
0 – 20	2
20 – 40	6
40 – 60	8
60 – 80	10
80 – 100	12
100 – 120	7
120 – 140	5

Find the mean consumption.

14. The base angles of an isosceles triangle are 50° each. The radius of the circumcircle of this triangle is 3.5 centimetres. Construct the triangle. [4]

15. Thin metal rods of length 10 centimetre each is placed one end joined at a point to get a circular pattern. [4]



In this pattern the angle between the near two rods is increased by 6°. The smallest angle is 9°. Find the total length of the rods required to make this pattern.

OR

The expense for building the first metre of a clock tower is 4500 rupees, 500 rupees more for the next metre and so on. The total height of the tower is 15 metres.

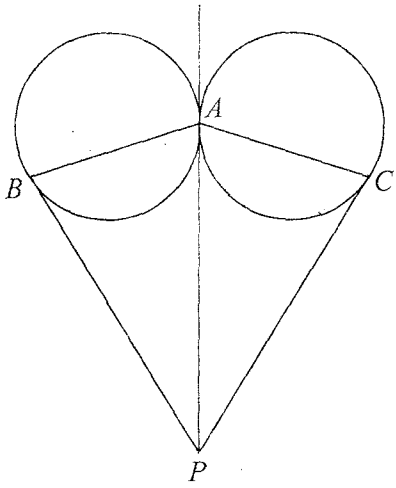
(a) How much more amount is needed to build the last metre of the tower than the first metre?

(b) What will be the total expense for building the tower?

16. In ΔABC, $AB = 7$ centimetre, $\angle B = 65^\circ$, $AC = 6.5$ centimetre. Construct ΔABC and its incircle. Write the radius of the incircle. [4]

17. Write $2x^2 - 5x - 3$ as the product of two first degree polynomials. [4]

18. [4]



In the figure two circles touch at A. P is a point on the tangent through A. PB and PC are tangents and PA is the bisector of $\angle BPC$. Then prove that $AB = AC$.

19. Scores of the students of a class in Mathematics examination is given in the table below: [4]

Score	*Number of students*
0 – 10	1
10 – 20	2
20 – 30	5
30 – 40	8
40 – 50	10
50 – 60	7
60 – 70	5
70 – 80	2

Find the median of scores.

20. A and B are two cities 300 kilometres apart. A car travels from A in uniform speed and reaches B. If the speed of the car is increased by 5 kilometres/hour it could have reached at B 2 hours early. [5]

(a) Taking the speed of the car as x, form a second degree equation.

(b) Find the speed of the car.

OR

The distance between the opposite vertices of a rectangular shaped plot is 26 metres. The length of this plot is 4 metres more than twice its breadth.

(a) If the breadth is x, what is the length?

(b) What is the cost of wire fencing around the plot at the rate of 80 rupees per metre?

21. In ΔABC, $BC = 10$ centimetres, $\angle ABC = 65^\circ$ and $\angle ACB = 75^\circ$. [5]

(a) What is the diameter of the circumcircle of ΔABC

(b) Using this diameter find the length of the other two sides of the triangle.

($\sin 65^\circ = 0.91$ $\sin 75^\circ = 0.97$ $\sin 40^\circ = 0.64$
$\cos 65^\circ = 0.42$ $\cos 75^\circ = 0.26$ $\cos 40^\circ = 0.76$)

22. A solid cone made of metal has slant height 10 centimetre and height 8 centimetre. [5]
On the base of this cone a solid hemisphere with the same metal is attached.

(a) Find the common radius of this solid.

(b) If we melt this solid and recast in to small solid spheres of radius 6 millimetres, how many complete spheres can be made?

OR

A metal solid is in the shape of hemispheres of same radii attached to the end faces of a cylinder. The total length of the solid is 10 metres and the common radius is 3 metres.

(a) What is the volume of this solid?

(b) What is the cost of painting the surface of this solid at the rate of 250 rupees per square metre?

23. $3x - 2y - 8 = 0$ and $2x - 3y - 1 = 0$ are equations of two lines. [5]

(a) Find in which of the above lines A (4, –2) and B (5, 3) belongs.

(b) If C is a point on the above two lines, write the coordinates of C.

(c) Find the product of the slopes of the lines CA and CB.