(Pages : 6)

241

Sl. No.

SSLC MODEL EXAMINATION, FEBRUARY - 2017.

MATHEMATICS

(English)

Time : 2½ Hours | Total Score : 80

Instructions :

- The first 15 minutes are to be used for reading and understanding the questions.
- Before answering each question, read the instructions carefully and understand the problem.
- Answers should contain explanations, wherever necessary.
- Numbers like $\sqrt{2}$ or π may be given as such in the answers, instead of their decimal approximations.
- There is a choice between certain pairs of questions. Such questions have an 'OR' between them and have a tag A or B along with their number. You need answer only one of each such pair.

Score

1. See these figures made with matchsticks : **3**

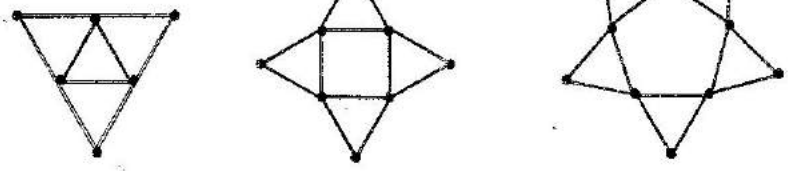


Figure 1 Figure 2 Figure 3

(a) How many sticks are needed for the next figure ?

(b) If we continue this, what is the relation between the numbers 1, 2, 3, ... and the number of matchsticks used in Figure 1, Figure 2, Figure 3 and so on ?

(c) If we write the number of matchsticks in order, what is the algebraic expression to find the n^{th} term of this sequence ?

2. Consider the arithmetic sequence 12, 23, 34, ... **2**

(a) What is the 10^{th} term of this sequence ?

(b) Is 1111 a term of this sequence ? Why ?

3. The first term of an arithmetic sequence is 6 and the sum of the first 6 terms is 66. **5**

(a) What is its 6^{th} term ?

(b) What is the common difference of the sequence ?

(c) What are the first 6 terms of this sequence ?

P.T.O.

Score

4. (A) The first term of an arithmetic sequence is 6 and the common difference is 4. 4

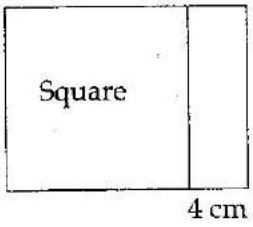
(a) What is the algebraic form of this sequence ?

(b) What is the algebraic expression to find the sum of the first n terms of this sequence ?

(c) How many terms of this sequence, starting from the first, are to be added to get 510 ?

OR

(B) The figure below shows two parallel sides of a square extended by 4 centimeters to make a rectangle :



The area of the new rectangle is 396 square centimeters.

(a) Taking the length of a side of the square as x centimeters, write down the given facts as an algebraic equation.

(b) Using this equation, compute the length of a side of the square.

5. 1 added to a positive number gives the square of the number. Find the number. 3

6. Consider the polynomial $p(x) = x^3 + x^2 + x + 1$ 5

(a) What is the remainder got on dividing it by $x - 1$?

(b) What is the remainder got on dividing it by $x + 1$?

(c) What first degree polynomial subtracted from $p(x)$ gives a polynomial which is a multiple of $x^2 - 1$?

7. Two dice, each marked with numbers from 1 to 6, are rolled together : 5

(a) If the possible numbers got from the dice are written as pairs, how many pairs would be there ?

(b) In how many pairs are the product of the numbers odd ?

(c) What is the probability of getting an odd product ?

(d) What is the probability of getting an even product ?

Score

8. The table below classifies 25 families in a locality according to their monthly income. Compute the median income. 2

MONTHLY INCOME (₹)	NUMBER OF FAMILIES
5,000	6
6,000	6
7,000	4
8,000	4
9,000	3
10,000	2

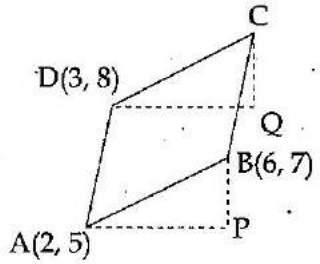
9. The table below shows groups of children in a class according to their heights : 5

HEIGHT CM	NUMBER OF CHILDREN
135 - 140	5
140 - 145	8
145 - 150	10
150 - 155	9
155 - 160	6
160 - 165	3

(a) If the children are lined up according to their heights, the median is the height of the child in which position ?
(b) According to the table, the height of this child is between what limits ?
(c) What are the assumptions used to compute the median ?
(d) What is the median height according to these assumptions ?

10. The sides of a rectangle are parallel to the axes and the coordinates of two of its opposite vertices are (5, 1) and (2, 3). What are the coordinates of the other two vertices ? 2

11. In the figure below, ABCD is a parallelogram. The lines AP and DQ are parallel to the x-axis and the lines BP and CQ are parallel to the y-axis. 3



(a) What are the lengths of AP and BP ?
(b) What are the lengths of DQ and CQ ?
(c) What are the coordinates of C ?

Score

12. The line passing through the points with coordinates (1, 4) and (5, 6) is drawn : 5

(a) The x-coordinate of a point on this line is 3. What is its y-coordinate ?

(b) The y-coordinate of a point on this line is 3. What is its x-coordinate ?

(c) What is the relation between the difference of the x-coordinates and the difference of the y-coordinates of any two points on this line ?

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

13. The line joining the points with coordinates (4, 3) and (0, 1) is drawn : 5

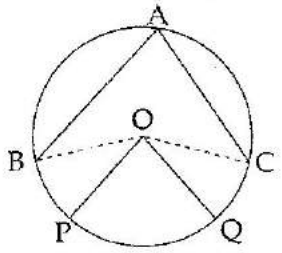
(a) What is the length of this line ?

(b) What are the coordinates of the midpoint of this line ?

(c) What is the equation of the circle with this line as diameter ?

(d) What is the equation to determine the x-coordinates of the points where this circle intersects the x-axis ? Find the coordinates of these points using this equation.

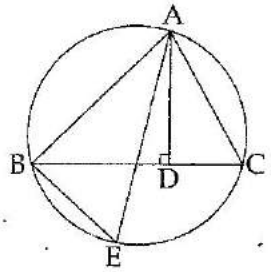
14. In the figure below, AB and AC are chords of the circle and OP and OQ are radii parallel to them : 3



(a) What is the relation between $\angle BOC$ and $\angle POQ$?

(b) What is the relation between the small arc joining B and C and the small arc joining P and Q ?

15. In the figure below, AD is the perpendicular from A to BC and AE is the diameter through A of the circumcircle of ΔABC : 4



(a) Prove that ΔADC and ΔABE are similar.

(b) Prove that the area of ΔABC is $\frac{AB \times BC \times CA}{2AE}$.

Score

16. (A) Draw a rectangle of length 5 centimeters and width 4 centimeters. Draw a rectangle of the same area with width 6 centimeters. 4

OR

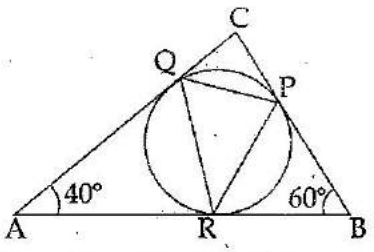
(B) Draw a rectangle of length 5 centimeters and width 4 centimeters. Draw a square of double its area.

17. Draw a circle of radius 3 centimeters and mark a point 6 centimeters from its center. 3

(a) Draw the pair of tangents from this point to the circle.

(b) What is the angle between these tangents in degrees ? Give reasons for your answer.

18. In the figure below, P, Q, R are the points where the incircle of ΔABC touches the sides : 4



(a) Compute the other two angles of ΔAQR.

(b) Compute the angle at P in ΔPQR.

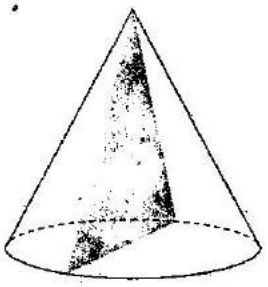
(c) Compute the other two angles of ΔPQR.

19. Can we make a square pyramid using a square of side 8 centimeters and four triangles of one side 8 centimeters and the other two sides 5 centimeters ? Explain the reason. 3

20. (A) A cone is made by bending a semicircle 3

(a) What is the relation between its base radius and slant height ?

(b)



Prove that a triangle formed by joining the apex of the cone to the ends of a diameter of the base is equilateral.

OR

(B) The bases of two solid hemispheres of the same radius are joined together to form a sphere. The surface area of a hemisphere is 120 square centimeters.

(a) What is the base area of a hemisphere ?

(b) What is the surface area of the whole sphere ?

Score

21. (A) The hypotenuse of a right triangle is 6 centimeters and one of its angles is 40°. 3

(a) Is the side opposite this angle shorter or longer than 3 centimeters ? What is the reason ?

(b) Can we draw a triangle with one side 6 centimeters, one angle 40° and the side opposite this angle 3 centimeters ? What is the reason ?

OR

(B) What is the circumradius of a triangle whose one of the angles is 120° and the side opposite to this is 6 centimeters ?

22. (A) A man standing on level ground sees the top of a far away hill at an elevation of 70°. Moving 100 meters back, he sees it at an elevation of 50°. Taking $\tan 70° \approx 2.8$ and $\tan 50° \approx 1.2$, find the approximate height of the hill. 4

OR

(B) In ΔABC, all angles are less than 90°. Taking the length of the side BC as a, prove that the area of the triangle is $\frac{a^2 \tan B \tan C}{2(\tan B + \tan C)}$

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