Subject : Mathematics
Class - 9
Second Term (SA-II)

Time : 3 Hours   **Maximum Marks : 90**

General Instructions

(i) *All questions are compulsory.*
(ii) *The question paper consists of **31** questions divided into **4** sections **A, B, C** and **D**.*
(iii) *Section **A** comprises of **4** questions of **1** mark each, Section **B** comprises of **6** questions of **2** marks each, Section **C** comprises of **10** questions of **3** marks each and Section **D** comprises of **11** questions of **4** marks each.*
(iv) *Use of calculators is not permitted.*

SECTION – A

Question numbers 1 to 4 carry 1 mark each.

1. Express the equation $3x = \dfrac{1}{2} - \dfrac{y}{2}$ in general form and indicate the values of a, b and c.

2. LONG is a rectangle, in which LO = 13 cm and its perimeter is 40 cm. Find the length and breadth of the rectangle.

3. In the given figure, ABCD is a parallelogram and L is the mid-point of DC. If ar(||gm ABCD) = 84 cm^2, then find the ar ($\triangle$ACL).
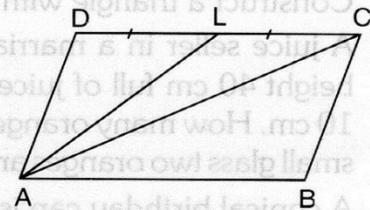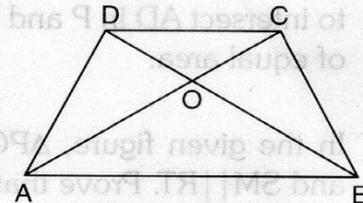
4. If the volume of a cube is $3\sqrt{3}\ a^3$, then find the total surface area of the cube.

SECTION – B

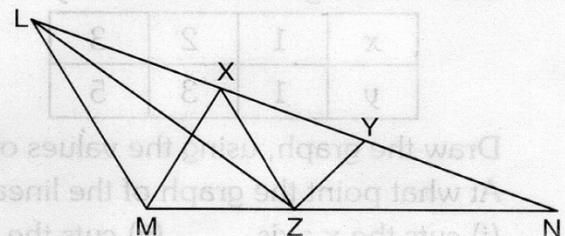**Question numbers 5 to 10 carry 2 marks each.**

5. In the given figure, ABCD is a trapezium in which AB||DC. Prove that : ar ($\triangle$AOD) = ar($\triangle$BOC)

6. Each edge of a cube is increased by 50%. Find the percentage increase in the surface area of the cube.

7. The mean weight per student of first 7 students is 55 kg and that of last 7 students is 63 kg. If the mean weight per student of 13 students is 59, find the weight of 7th student.

8. X and Y are points on the side LN of the $\triangle$LMN, such that LX = XY = YN. Through X, a line is drawn parallel to LM to meet MN at Z (see figure).
   Prove that : ar($\triangle$LZY) = ar($\square$MZYX).

9. The circumcentre of the ΔABC is O. Prove that :
   ∠OBC + ∠BAC = 90°

10. Three coins are tossed simultaneously 150 times with following frequency of different outcomes :

Outcome	3 heads	2 heads	1 head	No head
Frequency	20	80	30	20

   Compute the probability of getting : (*i*) two heads (*ii*) atleast two heads

SECTION – C

Question numbers 11 to 20 carry 3 marks each.

11. Following frequency distribution gives the weights of 40 students of a class :

Weight (in kg)	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Number of Students	10	4	15	5	3	2	1

   Find the probability that weight of a student is :
   (*i*) at most 54 kg   (*ii*) not more than 49 kg
   (*iii*) Also define two events, one having probability zero and other having probability one.

12. Construct a triangle with perimeter 11.8 cm and base angles 60° and 45°.

13. A juice seller in a marriage party has a cylindrical vessel with base radius 25 cm and height 40 cm full of juice. He gives the same in small glasses of radius 5 cm and height 10 cm. How many oranges are required for the bigger vessel to fill it completely if to fill one small glass two oranges are required ?

14. A conical birthday cap is 12 cm high and radius of its base is 5 cm. Find the area of the sheet required to make 15 such caps. [Use $\pi = 3.14$]

15. The diagonals of a parallelogram ABCD intersect at a point O. Through O, a line is drawn to intersect AD in P and BC in Q. Show that PQ divides the parallelogram into two parts of equal area.

16. In the given figure, ΔPQR, PS and RT are medians and SM||RT. Prove that PQ = 4QM.
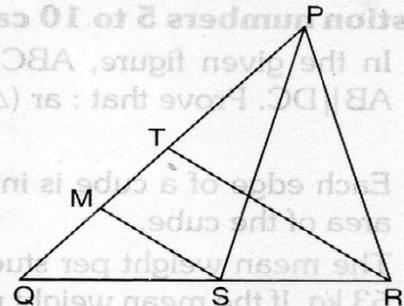
17. The following values of x and y are thought to satisfy a linear equation :

x	1	2	3
y	1	3	5

   Draw the graph, using the values of x, y, as given in the above table.
   At what point the graph of the linear equation.
   (*i*) cuts the x-axis   (*ii*) cuts the y-axis

18. Diagonals AC and BD of quadrilateral ABCD intersect at O in such a way that ar (ΔAOD) = ar(ΔBOC). Prove that ABCD is trapezium.

19. Draw a cumulative frequency curve for the following frequency distribution :

| Class Interval	Frequency
0 – 9	5
10 – 19	15
20 – 29	20
30 – 39	23
40 – 49	17
50 – 59	11
60 – 69	9

20. If the points P(1, 3) and Q(–2, –1) lie on the graph of the line $px + qy = 5$. Find the values of p and q.

SECTION – D

Question numbers 21 to 31 carry 4 marks each.

21. In a parallelogram PQRS, L and M are the mid-points of QR and RS respectively. Prove that : $ar(\Delta PLM) = \dfrac{3}{8} ar (\|gm\ PQRS)$

22. If a triangle and a parallelogram are on the same base and between the same parallels, then prove that the area of the triangle is equal to half the area of the parallelogram.

23. Construct an isosceles ΔABC in which base BC = 4 cm, sum of the perpendicular from A to BC and side AB is 6.5 cm.

24. In the given figure, find the measure of ∠ABD, ∠CDP, ∠PDA, ∠CAB and ∠CBD.
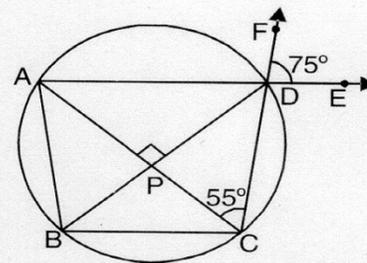
25. The surface area of a sphere of radius 5 cm is five times the area of the curved surface of a cone of radius 4 cm. Find the height and the volume of the cone.

26. Draw the graph of $2x – y + 2 = 0$ and $2x + y – 6 = 0$. Shade the region bounded by these lines and x – axis. Find the area of the shaded region.

27. Two chords AB and CD of lengths 6 cm and 8 cm of a circle are parallel and are on the same side of its centre. If the distance between them is 1 cm, find the radius of the circle.

28. Niharika prepare a small indoor greenhouse at home. It is made entirely of glass panes (including base) held together with tape measured 30 cm × 25 cm × 25 cm

(i) What is the area of glass used ?

(ii) How much tape is needed for all the 12 edges ?

29. The dimensions of a rectangular box are in the ratio 2 : 3 : 5 and the difference between the cost of covering it with sheet of paper at the rate of ₹ 5.50 and ₹ 6 per m² is ₹ 496. Find the dimensions of the box.

30. If the bisectors of opposite angles of a cyclic quadrilateral ABCD intersect the circle, circumscribing it at the points P and Q. Prove that PQ is a diameter of the circle.

31. The following data on the number of girls (to the nearest ten) per thousand boys in different sections of the Indian society is given below :

Section of Society	No. of Girls per thousands Boys
Scheduled Caste (SC)	910
Scheduled Tribe (ST)	940
Non-SC/ST	890
Backward districts	910
Non-backward districts	870
Rural	920
Urban	900

(i) Represent the above information by a bar graph.

(ii) In the classroom discuss what conclusion can be arrived at from the graph ?

(iii) What steps would be taken to improve the situation ?