

# INTERNATIONAL INDIAN SCHOOL, RIYADH

CLASS: IX

SUBJECT: MATHEMATICS

PT – III

## 1. SURFACE AREAS AND VOLUMES

- The total surface area of a cube is  $216 \text{ cm}^2$ . Find its volume (6 cm)
- Find the height of a cone of diameter 10 cm and slant height 13 cm (12 cm)
- Two cubes have their volumes in the ratio 1 : 27. Find the ratio of their surface area (1 : 9)
- Find the total surface area of a hemisphere of radius 10 cm ( use  $\pi = 3.14$ ) ( $942 \text{ cm}^2$ )
- Find the length of the longest rod that can be placed in a room 12 m long, 9 m broad and 8 m high (17 cm)
- How many bricks will be required to construct a wall 13.5 m long, 6 m high and 22.5 cm thick, if each brick measures ( 27 X 12.5 X 8) cm (6750)
- The surface area of the cuboid is  $1372 \text{ cm}^2$ . If its dimensions are in the ratio 4 : 2 : 1, then find its length (7 cm)
- A joker cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps  
(l = 25 cm, curved surface area = 5500sq cm)
- A hollow spherical shell is made of a metal of density 4.5 g per  $\text{cm}^3$ . If its internal and external radii are 8 cm and 9 cm, find the weight of the shell. (4.092 kg)
- A right circular cone is 5.4 cm high and radius of its base is 2 cm. It is melted and recast into another right circular cone with radius of base as 1.5 cm. Find the height of new cone formed. (9.6 cm)
- The curved surface area of a cylinder is  $176 \text{ cm}^2$  and its base area is  $38.5 \text{ cm}^2$ . Find the volume of the cylinder ( $308 \text{ cm}^3$ )
- A hemispherical dome of a building needs to be painted. If the circumference of the base of the dome is 17.6m, find the cost of painting it, given the cost of painting is RS 5 per  $100 \text{ cm}^2$  (Rs 24640)
- The height and the slant height of a cone are 21 cm and 28 cm. Find the volume of the cone  
( $r = 7\sqrt{7} \text{ cm}$ ,  $v = 7546 \text{ cm}^3$ )
- Monica has a piece of canvas whose area is  $551 \text{ m}^2$ . She uses it to have a conical tent made, with a base radius of 7 m. Assuming that all the stitching margins and the wastage incurred while cutting, amounts to approximately  $1 \text{ m}^2$ , find the volume of the tent that can be made with it  
( $h = 24 \text{ cm}$ ,  $v = 1232 \text{ m}^3$ )
- The external and internal diameters of a hemispherical bowl are 10 cm and 8 cm. What is the total surface area of the bowl (9286 sq cm)
- The length, breadth and height of a room are 4m, 3m and 7m. Find the cost of white washing the walls of the room and the ceiling at the rate of Rs 6 per  $\text{m}^2$  (Rs 600)
- Three cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid (224 sq cm)
- The height of a cylinder is 15 cm. Its curved surface area is  $660 \text{ cm}^2$ . Find its radius (7 cm)
- The height of a cone is 15 cm. If its volume is  $1570 \text{ cm}^3$ , find its radius

20. The diameter of a moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas
21. The diameter of a copper sphere is 6 cm. It is melted and drawn into a long wire of uniform circular cross section. If the length of the wire is 36 cm, find the radius (1cm)
22. Volume of a right circular cylinder  $1650 \text{ cm}^3$ . If the length of the cylinder is 21cm, find its curved surface area
23. How many spherical bullets of diameter 4cm can be made out of a solid cube of lead whose edges measures 44cm (2541)
24. Metallic spheres of radii 6cm, 8cm and 10cm respectively are melted together to form a single sphere. what will be the radius of new sphere (12cm)

## 2. HERONS FORMULA

1. **The sides of a triangle** are in the ratio 5 : 12 : 13 and its perimeter is 150 cm. Find the area of triangle (area = 75 sqcm)
2. Find the area of isosceles triangle each of whose equal sides is 13cm and whose base is 24cm (area = 60 sqcm)
3. Find the area of triangle two sides of which are 8cm and 11cm and the perimeter is 32 cm (area =  $8\sqrt{30}$ sqcm)
4. The lengths of two adjacent sides of a parallelogram are 51cm and 37cm and one of its diagonal is 20 cm. Find its area (612sqcm)
5. One of the diagonals of a rhombus of perimeter 140 m is 60 m. Find its area (1081.5  $\text{cm}^2$ )
6. Find the cost of laying grass in a triangular field of sides 50m, 65m and 65m at the rate of Rs 7/ $\text{m}^2$  (area =  $1500 \text{ m}^2$ , cost = Rs 10, 500)
7. Using Herons formula find the area of equilateral triangle whose perimeter is 24 cm ( $16\sqrt{3} \text{ cm}^2$ )
8. Find the area of a quadrilateral ABCD in which AB = 3cm, BC = 4cm, CD = 6cm and AD = 5cm and diagonal AC = 5cm (18  $\text{cm}^2$ )
9. One of the diagonals of rhombus of perimeter 140 m is 60 m. Find its area (1081.5  $\text{cm}^2$ )

## 3. STATISTICS

1. Find the mean of first six prime numbers (6.83)
2. If the mean of five observations  $x, x + 2, x + 4, x + 6$  and  $x + 8$  is 13. Find the value of  $x$  (9)
3. The mean of observations 7, 5, 8,  $p$  and 10 is 7.2. Find the value of  $p$
4. The mean of 15 numbers is 9. If each observation is multiplied by 4, what will be the new
5. The mean of 25 observations is 36. If the mean of first 13 observations is 32 and that of last 13 observations is 39, find the 13<sup>th</sup> observation (23)
6. The mean of 40 numbers was found to be 38. Later on, it was detected that a number 56 was misread as 36. Find the correct mean of the given numbers (38.5)
7. Construct a grouped frequency table with class intervals 0 – 5, 5 – 10 and so on for the following marks : 0, 5, 6, 7, 10, 12, 14, 15, 20, 22, 25, 26, 27, 8, 11, 17, 3, 6, 9, 17, 19, 21, 22, 29, 31, 35, 37, 40, 42, 45, 49, 4, 50, 16 and 20
8. Ten observations 6, 14, 15, 17,  $x + 1, 2x - 13, 30, 32, 34, 43$  are written in ascending order. If the median of the data is 24, find the value of  $x$
9. Find the median of first 11 multiples of 3 (18)
10. The class marks of a distribution are given below: 8, 14, 20, 26, 32, 38, 44, and 50. Find the class size and class interval

11. Find the median of the following data : 41, 43, 127, 99, 61, 92, 71, 58 and 57. If 58 is replaced 85, what will be the new median (61, 71)

12. The mean of five numbers is 28. If one of the number is excluded, the mean gets reduced by 2. Find the excluded number (36)

13. Find the mean of the following distribution:

x	10	30	50	70	89
f	7	8	10	15	10

14. If mean = 20.2, find p (p = 20)

X	10	15	20	25	30
F	6	8	p	10	6

14. Draw the frequency polygon for the following data:

Frequency	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 -85
Class	5	10	15	20	12	8

15. Draw a histogram for the following data

Class	1 – 4	4 – 6	6 – 8	8 – 12	12 – 20
Frequency	6	30	44	16	4

16. Construct a grouped frequency table with class intervals 0 – 5 , 5 – 10 and so on for the following marks obtained in math's out of 50 by group of students : 0, 5, 6, 7, 10, 12, 14, 15, 20, 22, 25, 26, 27, 8, 11, 17, 3, 6, 9, 17, 19, 21, 22, 29, 31, 35, 37, 40, 42, 45, 48, 4, 50, 16 and 20

a) what is the range of the data    b) determine the class size    c) construct a cumulative frequency table

#### 4. NUMBER SYSTEMS

1. Visualize 3.756 on the number line, using successive magnification

2. Represent  $\sqrt{3.5}$  on the number line

3. If  $x = 3 + 2\sqrt{2}$ , find the value of  $x^2 + 1/x^2$  (34)

4. If  $x = 9 - 4\sqrt{5}$ , find the value of  $x^2 + \frac{1}{x^2}$  (322)

5. If  $x = 3 - 2\sqrt{2}$ , find  $x^3 - 1/x^3$

6. If  $x = 5 - \sqrt{24}$ , find the value of  $(x^3 + 1/x^3) - 10(x^2 + 1/x^2) + 4(x + 1/x) - 30$  (0)

7. If  $x = 3 - 2\sqrt{2}$ , find the value of  $x^4 - \frac{1}{x^4}$

8. Rationalise the denominator  $\frac{1}{\sqrt{7} + \sqrt{6} - \sqrt{13}}$   $\left\{ \frac{7\sqrt{6} + 6\sqrt{7} + \sqrt{546}}{84} \right\}$

10. If a and b are rational numbers, find a and b

$$\frac{\sqrt{5} - 1}{\sqrt{5} + 1} + \frac{\sqrt{5} + 1}{\sqrt{5} - 1} = a + b\sqrt{5} \quad (a = 3, b = 0)$$

11. Simplify:  $\frac{1}{1 + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \frac{1}{\sqrt{3} + \sqrt{4}}$  (1)

12. If  $x = \frac{\sqrt{3} + 1}{\sqrt{3} - 1}$ ,  $y = \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$ , then find the value of  $x^2 + y^2 + xy$  (15)

13. If  $x = 1 - \sqrt{2}$ , find the value of  $\left[ x - \frac{1}{x} \right]^3$  (8)

14. If  $x = 3 + 2\sqrt{2}$ , find the value of  $\sqrt{x} - \frac{1}{\sqrt{x}}$  (8)

15. Simplify:  $\frac{\sqrt{32} + \sqrt{48}}{\sqrt{8} + \sqrt{12}}$  (2)

16. Simplify:  $\left[ \frac{x^a}{x^{-b}} \right]^{a-b} \left[ \frac{x^b}{x^{-c}} \right]^{b-c} \left[ \frac{x^c}{x^{-a}} \right]^{c-a}$  (1)

17. Find the value  $x$ , if  $5^{x-3} \times 3^{2x-8} = 225$  ( $x = 5$ )

18. If  $(a/b)^{x-1} = (b/a)^{x-3}$ , then find  $x$  ( $x = 2$ )

19. If  $49 \times 7^x = (343)^{1/3}$ , find  $x$  ( $x = -1$ )

20. given that  $\sqrt{3} = 1.732$  and  $\sqrt{5} = 2.236$ , find the value of  $\frac{6}{\sqrt{5} - \sqrt{3}}$  (11.904)

21. Simplify:  $(\sqrt{3} + 1)(1 - \sqrt{12}) + \frac{9}{\sqrt{3} + \sqrt{12}}$  (-5)

22. Find four rational numbers between  $3/5$  and  $4/5$

23. Find two irrational numbers lying between  $\sqrt{2}$  and  $\sqrt{3}$

24. Evaluate: a)  $125^{-1/3} \times 27^{1/3} (6^2 + 8^2)^{1/2}$  (6)

b)  $7\sqrt{6} - \sqrt{252} - \sqrt{294} + 6\sqrt{7}$  (0)

25. Give an example of two irrational numbers whose: (A) Sum is rational  
(B) Product is rational  
(C) Quotient is rational  
(D) Difference is a rational number

26. Prove that  $\frac{2^{30} + 2^{29} + 2^{28}}{2^{31} + 2^{30} - 2^{29}} = \frac{7}{10}$

27. Which is the greatest among  $\sqrt{2}$ ,  $\sqrt[3]{4}$ ,  $\sqrt[4]{3}$

28. Divide:  $16\sqrt{75}$  by  $5\sqrt{12}$  (8)

29. Express  $0.\overline{6} + 0.\overline{7} + 0.4\overline{7}$  in the form  $p/q$  (167/90)

30. If  $x^4 + \frac{1}{x^4} = 47$ , then find the value of  $x^3 + \frac{1}{x^3}$  (18)

31. If  $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$  and  $y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ , then find the value of  $x^2 + y^2$  (98)

32. Simplify:  $\left[ 5(8^{1/3} + 27^{1/3})^3 \right]^{1/4}$  (5)

33. If  $\frac{(9)^x \times (3)^5 \times (27)^3}{3 \times (81)^4} = 27$ , then find the value of  $x$  (3)

34. Simplify:  $\frac{4}{(216)^{-2/3}} - \frac{1}{(256)^{-3/4}}$  (80)