MATHS

BOOKS - PSEB

SURFACE AREAS AND VOLUMES

Exercise

1. A plastic box 1.5 m long, 1.25 m wide and 65 cm deep is to be made. It is opened at the top. Ignoring the thickness of the plastic sheet,

determine: (i) The area of the sheet required for making the box. (ii) The cost of sheet for it, if a sheet measuring $1m^2$ costs Rs 20.

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2. The length, breadth and height of a room are 5 m, 4 m and 3 m respectively. Find the cost of white washing the walls of the room and the ceiling at the rate of 7.50 per m^2 .

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3. The floor of a rectangular hall has a perimeter 250 m. If the cost of painting the four walls at the rate of Rs 10 per m^2 is Rs 15000, find the height of the hall.

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4. The paint in a certain container is sufficient to paint an area equal to $9.375m^2$. How many bricks of dimensions 22.5 cm x 10 cm x 7.5 cm can be painted out of this container ?

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5. A cubical box has each edge 10 cm a cuboidal box is 10 cm wide, 12. 5 cm long 8 cm high. Which box has the greater lateral surface area and hy how much ?

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6. A cubical box has each edge 10 cm and a cuboidal box is 10 cm wide, 12. 5 cm long 8 cm

high. Which box has the smaller total surface area and by how much ?

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7. A small indoor greenhouse (herbarium is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high. What is the surface area of the glass ?

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8. A small indoor greenhouse (herbarium is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high. How much of tape is needed for all the 12 edges ?

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9. Shanti Sweets Stall was placing an order for making cardboard boxes for paking their sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm by 20 cm by 5 cm

and the smaller of dimensions 15 cm by 12 cm by 5 cm. 5% of the total surface area is required extra, for all the overlaps. If the cost of the cardboard is Rs 4 for 1000 cm^2, find the cost of cardboard required for supplying 250 boxes of each kind.

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10. Parveen wanted to make a temporary shelter for her car, by making a box-like structure with tarpaulin that covers all the

four sides and the top of the car (with the front face as a flap which can be rolled up). Assuming that the stitching margins are very small, and therefore negligible, how much, tarpaulin would be required to make the shelter of height 2.5 m. with base dimensions 4 m x 3 m ?

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11. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 . Find the

diameter of the base of the cylinder. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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12. It is required to make a closed cylindrical tank of height 1 m and base diameter 140 cm from a metal sheet. How many square metres of the sheet are required for the same?

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13. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm (see Fig. 13.11). Find its (i) inner curved surface area, (ii) outer curved surface area, Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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14. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete

revolutions to move once over to level a playground. Find the area of the playground in m^2.

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15. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of ₹ 12.50 per m^2 .Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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16. Curved surface area of a right circular cylinder is 4.4 m^2. If the radius of the base of the cylinder is 0.7 m, find its height.

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17. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find (i) its inner curved surface area, (ii) the cost of plastering this curved surface at the rate of ₹ 40 per m^2 .Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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18. In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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19. Find:- the lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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20. Find:- how much steel was actually used, if $\frac{1}{12}$ of the steel actually used was wasted in making the tank. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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21. In Fig., you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade. Assume $\pi = \frac{22}{7}$

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22. The students of a Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base, using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with cardboard. If there were 35 competitors, how much cardboard was required to be bought for the competition? Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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23. Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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24. Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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25. Curved surface area of a cone is 308 cm^2 and its slant height is 14 cm. Find (i) radius of the base and (ii) total surface area of the cone. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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26. A conical tent is 10 m high and the radius of its base is 24 m. Find (i) slant height of the tent. (ii) cost of the canvas required to make

the tent, if the cost of 1 m^2 canvas is ₹ 70. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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27. What length of tarpaulin 3 m wide will be required to make conical tent of height 8 m and base radius 6m? Assume that the extra length of material that will be required for stitching margins and wastage in cutting is approximately 20 cm (use π = 3.14).

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28. The slant height and base diameter of a conical tomb are 25 m and 14 m, respectively. Find the cost of whitewashing its curved surface at the rate of Rs 210 per $100m^2$.

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29. A joker's 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. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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30. A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is Rs 12 per m^2, what will be the cost of painting all these

cones (use $\pi = 3.14$, and take $\sqrt{1.04} = 1.02$)

?

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31. Find the surface area of a sphere of radius:

14 cm

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32. Find the surface area of a sphere of radius:

5.6 cm

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33. Find the surface area of a sphere of radius:

21 cm

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34. Find the surface area of a sphere of diameter: 28cm

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35. Find the surface area of a sphere whose diameter is 21 dm.

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36. Find the surface area of a sphere of diameter: 3.5m

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37. Total surface area of a hemisphere of radius 10 cm is :

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38. The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumbed into it. Find the ratio of surface areas of the balloon in the two cases.

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39. A hemispherical bowl made of brass has inner diameter 105 cm. Find the cost of tin-plating it on the inside at the rate of Rs 16 per $100cm^2$.

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40. Find the radius of a sphere whose surface area is $154cm^2$.

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41. The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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42. A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.

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43. A right circular cylinder just encloses a sphere of radius r. Find (i) surface area of the sphere, (ii) curved surface area of the cylinder, (iii) ratio of the areas obtained in (i) and (ii). Assume $\pi = \frac{22}{7}$

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44. A matchbox 4 cm x 2.5 cm x 1.5 cm. What will be the volume a packet containing 12 such boxes ?

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45. A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold ? (1 m^3 = 1000 l).

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46. A cuboidal vessel is 10 m long and 8 m wide. How high must it be made to hold $380m^3$ of liquid ?

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47. Find the cost of digging a cuboidal pit 8 m long, 6 m broad and 3 m deep at the rate of Rs 30 per m^3.

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48. The capacity of a cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its length and depth are respectively 2.5 m and 10 m. $(1000l = 1m^3)$

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49. A village, having a population of 4000, requires 150 litres of water per head per day. It has a tank measuring 20 m by 15 m by 6 m. For how many days will the water of this tank last ?

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50. A godown measures $40m \times 25m \times 15m$. Find the maximum number of wooden crates

each measruing $1.5m \times 1.25m \times 0.5m$ that can be stored in the godown.

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51. A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube ? Also, find the ratio between their surface areas.

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52. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?

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53. The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. How many litres of water can it hold ? $(1000cm^3 = 11)$

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54. The inner diameter of a cylindrical wooden pipe is 24 cm and its out diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if 1 cm^3 of wood has a mass of 0.6 g.

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55. A soft drink is available in two packs – (i) a tin can with a rectangular base of length 5 cm and width 4 cm, having a height of 15 cm and

(ii) a plastic cylinder with circular base of diameter 7 cm and height 10 cm. Which container has greater capacity and by how much? Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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56. If the lateral surface of a cylinder is 94.2 cm^2 and its height is 5 cm, then find radius of its base. (Use π = 3.14)

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57. It costs Rs 2200 to paint the inner curved surface of a cylindrical vessel 10 m deep. If the cost of painting is at the rate of Rs 20 per m^2, find inner curved surface area of the vessel.

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58. The capacity of a closed cylindrical vessel of height 1m is 15.4 litres. How many square metres of metal sheet would be needed to make it ? ($1000l = 1m^3$)

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59. A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is 7 mm and diameter of graphite is 1 mm. If the length of the pencil is 14 cm, find the volumes of the wood and that of the graphite.

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60. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much soup the hospital has to prepare daily to serve 250 patients ?

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61. Find the volume of the right circular cone with radius 6 cm, height 7 cm .

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62. Find the volume of the right circular cone with radius 3.5 cm, height 12 cm .

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63. Find the capacity of a conical vessel with radius 7 cm, slant height 25 cm.

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64. Find the capacity of a conical vessel with height 12 cm, slant height 13 cm.

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65. The height of a cone is 15 cm. If its volume is $1570cm^3$, find the radius of the base. (Use π = 3.14)

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66. If the volume of a right circular cone of height 9 cm is $48\pi cm^3$, find the diameter of its base.

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67. A conical pit of top diameter 3.5m is 12 m deep. Its capacity in kilo litres is :

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68. The volume of a right circular cone is 9856 cm^3 . If the diameter of the base is 28 cm, find height of the cone. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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69. The volume of a right circular cone is 9856 cm^3 . If the diameter of the base is 28 cm, find slant height of the cone. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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70. The volume of a right circular cone is 9856 cm^3 . If the diameter of the base is 28 cm, find curved surface area of the cone. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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71. A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 12 cm.

Find the volume of the solid so obtained. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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72. If the triangle ABC in the Question above is revolved about the side 5 cm, then find the volume of the solid so obtained. Find also the ratio of the volumes of the two solids obtained in above and this Questions. Assume $\pi = \frac{22}{7}$, unless stated otherwise.

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73. A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

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74. Find the volume of a sphere whose radius is 7 cm.

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75. Find the volume of a sphere whose radius is 0.63 cm.

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76. Find the amount of water displaced by a solid spherical ball of diameter 28 m.

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77. Find the amount of water displaced by a solid spherical ball of diameter 0.21 m.

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78. The diameter of a metallic ball is 42 cm. What is the mass of the ball, if the metal weighs 8.9 g per cm^3 ?

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79. The diameter of the moon is approximately one-fourth the diameter of the earth. What fraction is the volume of the moon of the volume of the earth ?

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80. A hemispherical bowl has inner diameter 11.2 cm. Find the volume of the milk it can hold.

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81. A hemispherical tank is made up of an iron sheet 1 cm thick. If the inner radius is 1 m, then find the volume of the iron used to make the tank.

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82. Find the volume of a sphere whose surface area is $154cm^2$.

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83. A dome of a building is in the form of a hemisphere. From inside, it was white washed at the cost of Rs 498.96. If the cost of white-washing is at the rate of Rs 2.00 per square metre, find the inner surface area of the dome.

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84. Twenty seven solid iron spheres, each of radius r and surface area S are melted to form

a sphere with surface area S'. Find the radius r' area of the new sphere.

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85. A capsule of medicine is in the shape of a sphere of diameter 3.5 mm. How much medicine (in mm^3) is needed to fill this capsule ?

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86. A wooden bookshelf has external dimensions as follows : Height = 110 cm, Depth = 25 cm, Breadth = 85 cm [See Fig.]

 . The thickness of the planks is 5 cm everywhere. The external faces are to be polished and the inner faces are to be painted. If the rate of polishing is 20 paise per cm^2 and the rate of painting is 10 paise per cm^2, find the total experses required for polishing and painting the surface of the bookshelf.

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87. The front compound wall of a house is decorated by wooden spheres of diameter 21 cm, placed on small supports as shown in Fig.  .Eight such spheres are used for this purpose, and are to be painted silver. Each support is a cylinder of radius 1.5 cm and height 7 cm and Is to be painted black. Find the cost of paint required if silver paint costs 25 paise per cm^2 and black paint costs 5 paise per cm^2.

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88. If diameter of a sphere is decreased by 25% then what percent does its curved surface area decrease ?

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Example

1. Mary wants to decorate her Christmas tree. She wants to place the tree on a wooden box covered with coloured paper with picture of

Santa Claus on it (see Fig. 13.4). She must know the exact quantity of paper to buy for this purpose. If the box has length, breadth and height as 80 cm, 40 cm and 20 cm respectively how many square sheets of paper of side 40 cm would she require?

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2. Hameed has built a cubical water tank with lid for his house, with each outer edge 1.5 m long. He gets the outer surface of the tank

excluding the base, covered with square tiles of side 25 cm (see Fig. 13.5). Find how much he would spend for the tiles, if the cost of the tiles is ₹ 360 per dozen.

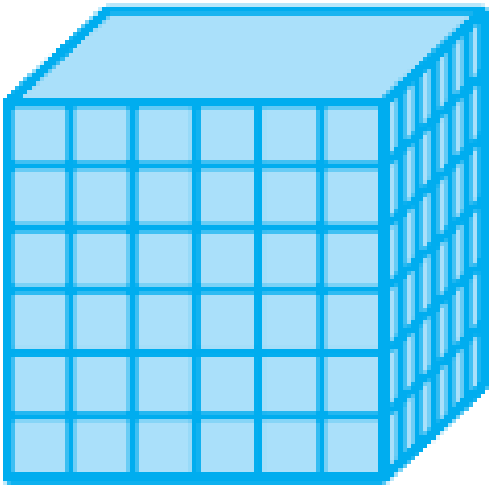

Fig. 13.5

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3. Savitri had to make a model of a cylindrical kaleidoscope for her science project. She wanted to use chart paper to make the curved surface of the kaleidoscope. What would be the area of chart paper required by her, if she wanted to make a kaleidoscope of length 25 cm with a 3.5 cm radius? You may take $\pi = \frac{22}{7}$.

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4. The curved surface area of a right circular cone of slant height 10 cm and base radius 7 cm is :

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5. The height of a cone is 16 cm and its base radius is 12 cm. Find the curved surface area and the total surface area of the cone. (Use π = 3.14)

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6. A corn cob (see Fig. 13.17), shaped somewhat like a cone, has the radius of its broadest end as 2.1 cm and length (height) as 20 cm. If each 1 cm2 of the surface of the cob carries an average of four grains, find how many grains

you would find on the entire cob.

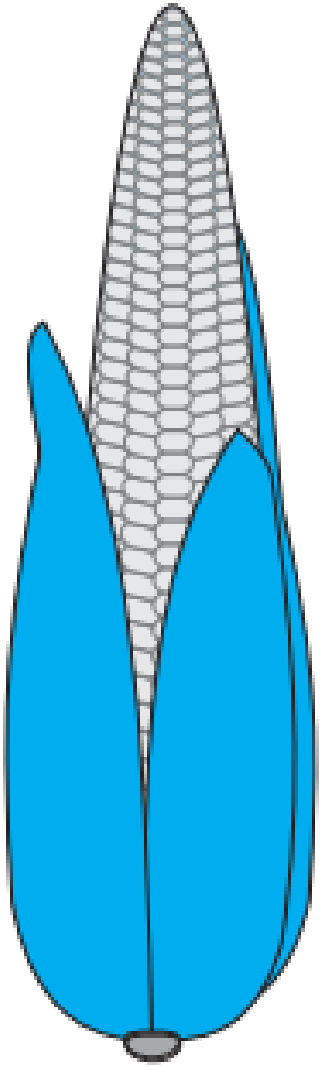

Fig. 13.17

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7. Find the surface area of a sphere of radius 7 cm.

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8. The surface area of a sphere is 5544 cm^2. Find its diameter.

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9. The hollow sphere, in which the circus motorcyclist performs his stunts, has a diameter of 7 m. Find the area available to the motorcyclist for riding.

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10. A hemispherical dome of a building needs to be painted (see Fig. 13.21). If the circumference of the base of the dome is 17.6 m, find the cost of painting it, given the cost of

painting is ₹5 per 100 cm^2 .

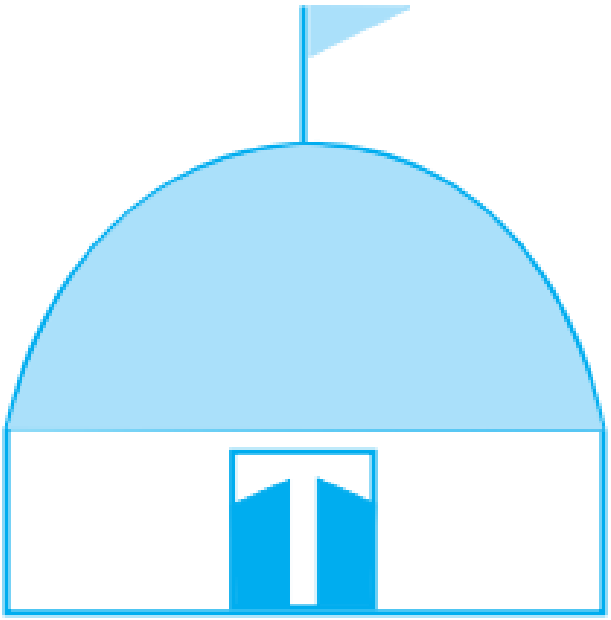

Fig. 13.21

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11. A wall of length 10 m was to be built across an open ground. The height of the wall is 4 m and thickness of the wall is 24 cm. If this wall is to be built up with bricks whose dimensions are 24 cm × 12 cm × 8 cm, how many bricks would be required?

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12. A child playing with building blocks, which are of the shape of cubes, has built a structure

as shown in Fig. 13.25. If the edge of each cube is 3 cm, find the volume of the structure built by the child.

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13. The pillars of a temple are cylindrically shaped (see Fig. 13.26). If each pillar has a circular base of radius 20 cm and height 10 m, how much concrete mixture would be required

to build 14 such pillars?

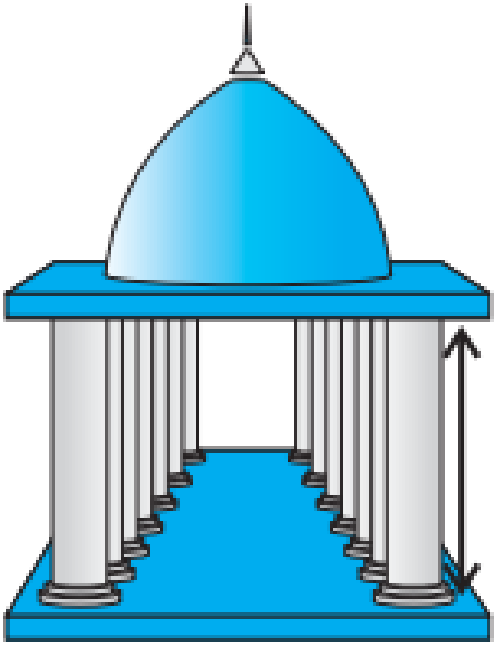

Fig. 13.26

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14. At a Ramzan Mela, a stall keeper in one of the food stalls has a large cylindrical vessel of base radius 15 cm filled up to a height of 32 cm with orange juice. The juice is filled in small cylindrical glasses of radius 3 cm up to a height of 8 cm, and sold for ₹ 3 each. How much money does the stall keeper receive by selling the juice completely?

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15. The height and the slant height of a cone are 21 cm and 28 cm respectively. Find the volume of the cone.

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16. Monica has a piece of canvas whose area is 551 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 m^2 , find the volume of the tent that can be made with it.

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17. Find the volume of a sphere of radius 11.2 cm.

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18. A shot-putt is a metallic sphere of radius 4.9 cm. If the density of the metal is 7.8 g per

cm^3 , find the mass of the shot-putt.

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19. A hemispherical bowl has a radius of 3.5 cm. What would be the volume of water it would contain?

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