MATHS

BOOKS - NAND LAL PUBLICATION

SURFACE AREAS AND VOLUME

Exercise 13 1

1. 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

2. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

3. A toy isin the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

4. A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have ? Find the surface area of the solid.

5. A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.
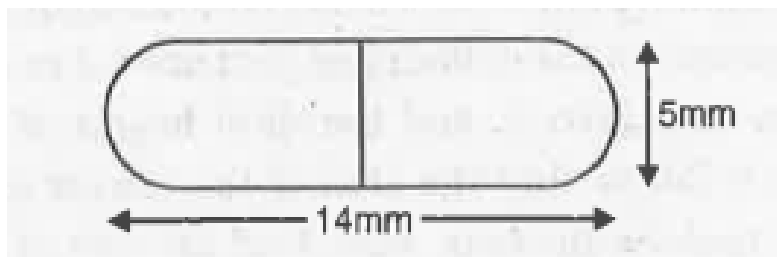
6. A medicine capsule isin the shape of a cylinder with twohemispheresstuck to each of

its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.

7. A tent is in the shape of a cylinder surmounted by a conical top.If the height and diameter of the cylindrical part are 2.1m and 4 m respectively, and the slant height of the top

is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m^2 (Note that the base of the tent will not be covered with canvas.)

8. From a solid cylinder whose height is 2.4 cm and diameter 1.4cm,aconical cavity of the same height and same diameter is hollowed out.
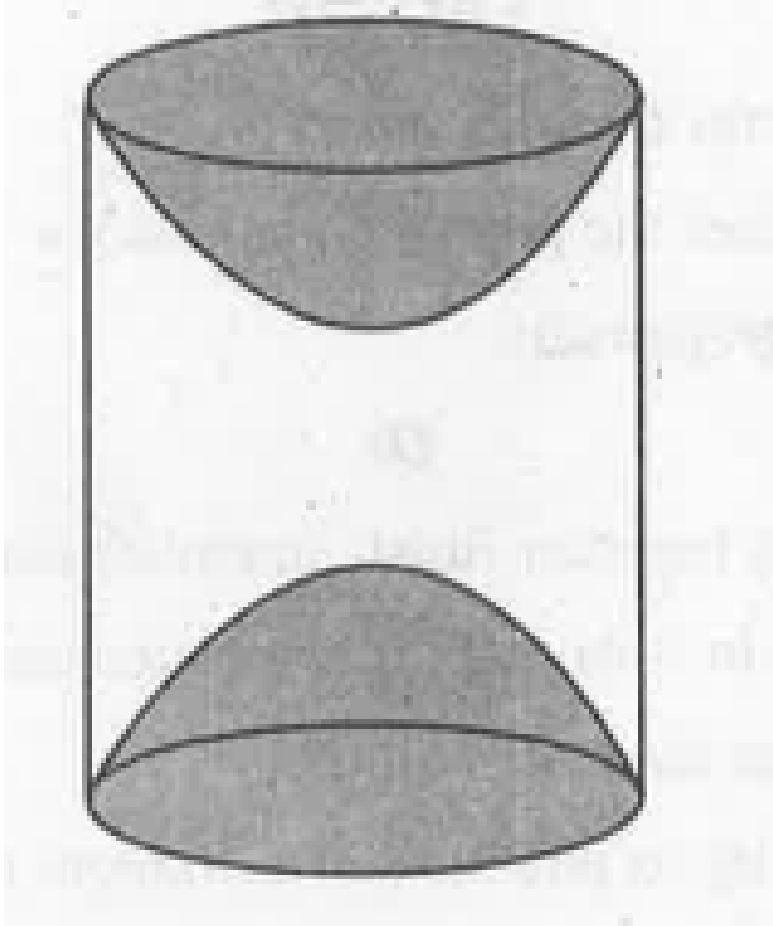
Find the total surface area of the remaining solid to the nearest cm^2.

9. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the total surface area of the

article.

Exercise 13 2

1. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius.. Find the volume of the solid in terms of π.

2. Rachel, an engineering student, was asked to make a model shaped like a cyclinder. with two cones attached at its two ends by using a

thin aluminium sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of air contained in the model the Rachel made. (Assume the outer and inner dimensions of the model to be nearly the same.)

3. A gulab jamun, containssugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab

jamuns, each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm.
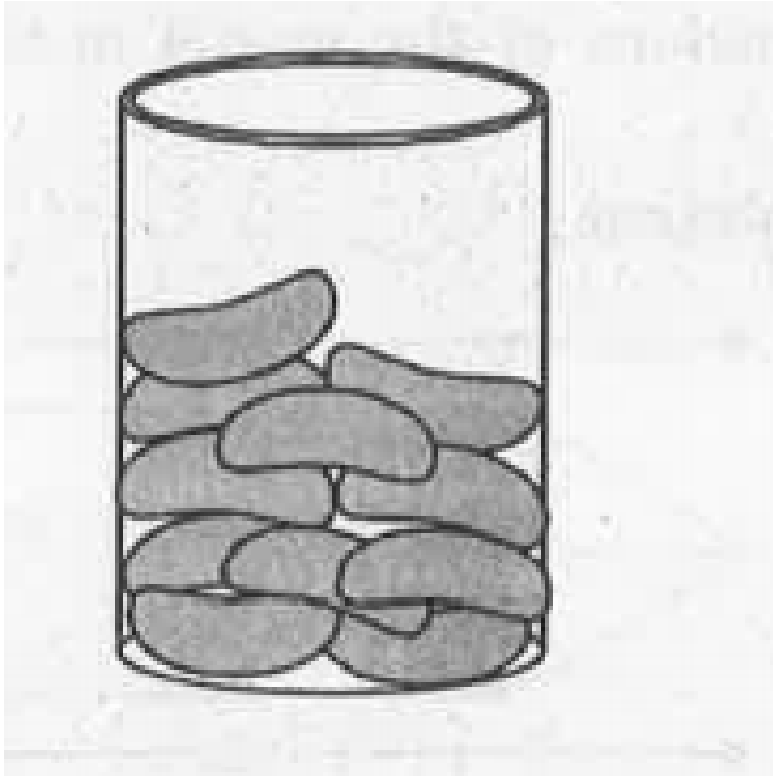
4. A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4 cm. Find the volume of wood in the entire stand.
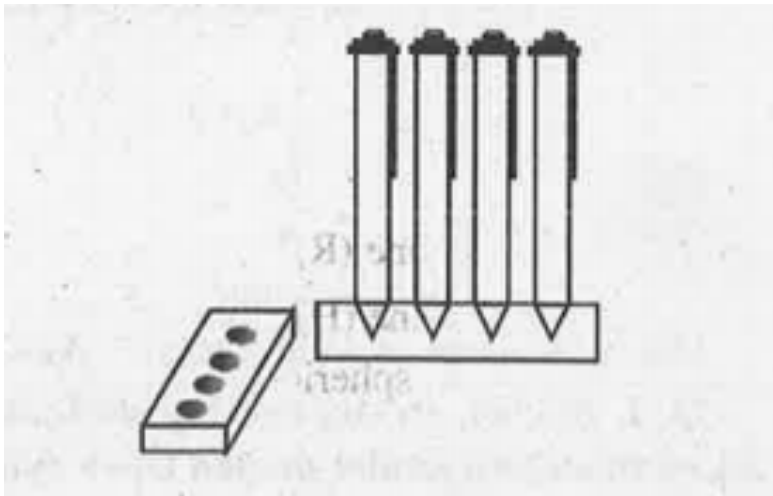
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5. A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of the water flows out.Find the number of lead shots dropped in the vessel.

6. A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (Use π = 3.14)

7. A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a

hemisphere of radius 60 cm is placed uprightina right circular cylinder full of water such that it touches the bottom..Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm

8. A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter, the diameter of the spherical part is 8.5 cm. By measuring the

amount of water it holds, a child finds its volume to be $345cm^3$. Check whether she is correct, taking the above as the inside measurements, and π = 3.14.

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Exercise 13 3

1. A metallic sphere of radius 4.2 cm is melted and recast into the shape of cylinder of radius 6 cm. Find the height of the cylinder.

2. Metallic spheres of radii 6 cm, 8 cm and 10 cm, respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.

3. A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread

out to form platform of 22 m by 14 m. Find the height of the platform.

4. A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment.

5. A container shaped like a right circular cylinder having diameter 12 cm and hight 15 cm isfull of ice-cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice-cream.

6. How many silver coins 1.75 cm in diameter and of thickness 2 mm, must be melted to

form a cuboid of dimensions $5.5cm \times 10cm \times 3.5cm$?

7. A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.

8. Water in a canal 6 m wide and 1.5 m deep is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed ?

9. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in her field, which is 10 m in diameter and 2m deep.If water flowsthrough the pipe at the

rate of 3 km/h, in how much time will the tank be filled ?

Exercise 13 4

1. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.
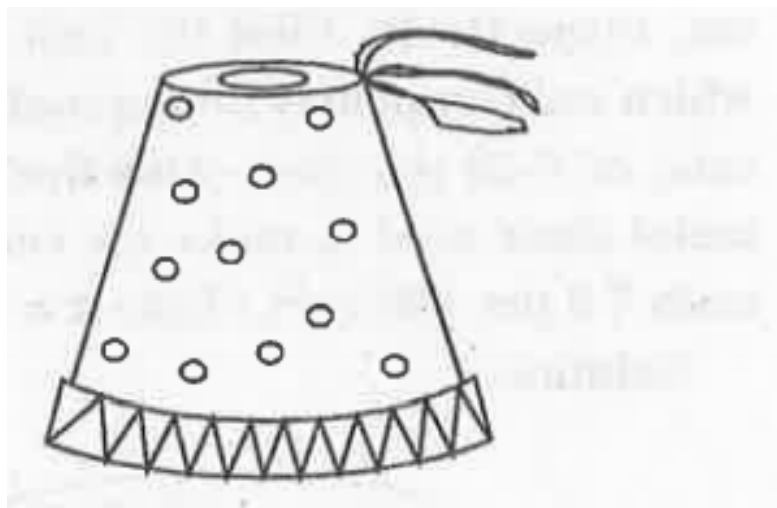
2. The slant height of a frustum of a cone is 4 cm and the perimeters (circumference) of its circular ends are 18 cm and 6 cm. Find the curved surface area of the frustum.

3. A fez, the cap used by the Turks, is shaped like the frustum of a cone.If its radius on the open side is 10 cm, radius at the upper base is 4 cm and its slant height is 15 cm, find the area

of material used for making it.

4. A container opened from the top is made up of a metal sheet is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm,

respectively. Find the cost of the milk which can completely fill the container, at the rate, of Rs 20 per litre. Also find the cost of metal sheet used to make the container, if it costs Rs 8 per 100 cm^2. (Take π = 3.14.)

5. A metallic right circular cone 20 cm high and whose vertical angle is $60°$ is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained

be drawn into a wire of diameter 1/16 cm, find the length of the wire.

Exercise 13 5

1. A copper wire 3 mm in diameter is wound about a cylinder whose length is 12 cm, and diameter 10 cm,so as to cover the curved surface of the cylinder. Find the length and

mass of the wire, assuming the density of copper to 8.88 g per cm^3.

2. A right triangle, whose sides are 3cm and 4cm (other than hypotenuse)ismade to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. (Choose value of π as found appropriate.)

3. A cistern, internally measuring $150cm \times 120cm \times 110cm$, has 129600 cm^3 of water in it. Porous bricks are placed in the water until the cistern isfull to the brim. Each brick absorbs one-seventeenth of its own volume of water. How many bricks can be put in without the water overflowing, each brick being $22.5cm \times 7.5cm \times 6.5cm$?

4. In one for night of a given month, there was a rainfall of 10 cm in a river valley. If the area of the valley is 97280 km^2, show that the total rainfall was approximately equivalent to the addition to the normal water of three rivers each 1072 km long, 75 m wide and 3 m deep.

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5. An oil funnel made of tin sheet consists of a cylindrical portion 10 cm long attached to a

frustum of a cone. If the total height is 22 cm, diameter of the cylindrical portion is 8 cm and the diameter of the top of the funnel is 18 cm, find the area of the tin sheet required to make the funnel.
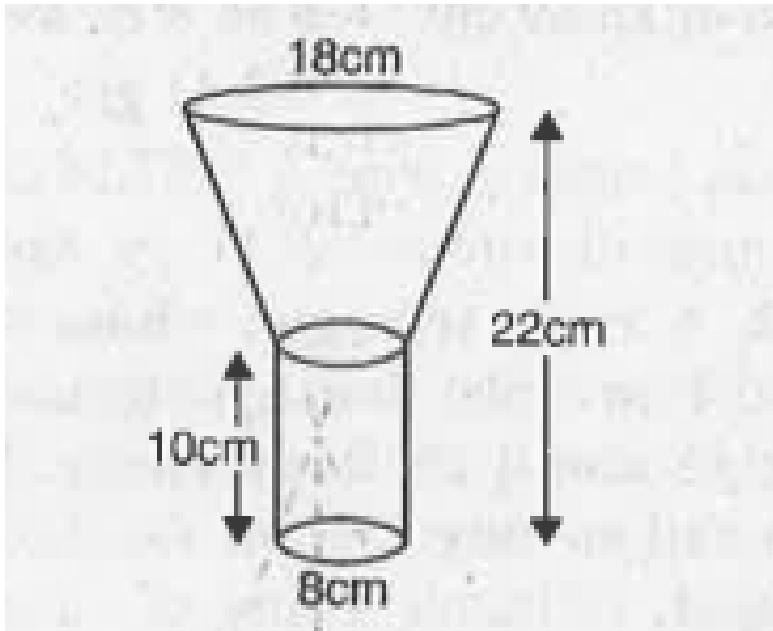
6. Derive the formula for the curved surface area and total surface area of a frustum of acone, given to youinSection 13.5, using the symbols as explained.

7. Write the formula for volume of the frustum of the Cone