MATHS

BOOKS - ZEN MATHS (KANNADA ENGLISH)

SURFACE AREAS AND VOLUMES

Illustrative Examples

1. Find the volume of a cuboid of the given dimensions:

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2. The volume of a right circular cylinder is $1100cm^3$ and the radius of its base is 5 cm. find its height.

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3. A rectangular sheet of an aluminium foil is 44 cm long and 20 cm wide. A cylinder is made out of rolling the foil along its length. Find the volume of the cylinder.

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4. Two cubes, each of edge 10 cm, are joined end to end. Find the surface area and volume of the resulting solid.

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5. A cylinder has a base radius 80 cm and height 20 cm. Compare their lateral surface areas and total surface areas.

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6. A right circular cone has a height of 84 cm. the radius of the base is 35 cm. find the volume and curved surface area.

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7. The height and radius of a cone are in the ratio 12:5. if its volume is $314cm^3$, find the slant height and the radius.

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8. The radius of a sphere is 21 cm. calculate its surface area and volume.

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9. The volume of two spheres is in the ratio $27:64$. The sum of their radii is 42 cm. find their radii.

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10. The circumference of the dge of a hemispherical bowl is 132 cm. find its curved surface ara and volume.

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11. Find the volume of a cuboid if the surface areas of its three adjacent faces are $432cm^2$, $720cm^2$, and $540cm^2$.

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12. If each edge of a cube is increased by 50%, find the percentage increase in surface area.

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

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14. A solid wooden toy is in the shape of a right circular cone mounted on a hemisphere. If the radius of the hemisphere is 4.2 cm and the total height of the toy is 10.2 cm, find its volume.

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15. A petrol tank is a cylinder of base radius 10.5 cm and length 18 cm fitted with conical ends, each of axis 9 cm. how many litres of petrol does the tank hold ?

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16. A cylinderical container of diameter 12 cm and height 15 cm is filled with ice cream. The whole ice cream has to be distributed to 10 children in equal cones with hemispherical tops. If the height of the conical portion is four times the radius of its base, find the radius of the ice cream cone.

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17. The given figure shows the cross section of a solid with cone, hemisphere, and cylinder all with the same radius of 5 cm and other dimensions as given. Calculate:

a] total curved surface area

b] total volume of the solid

c] density of the material if its total weight is 1.7 kg.

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18. A tent is in the form of a right circular cylinder up to a height of 3 m and them becomes a right circular cone with a maximum height of 13.5 m above the ground. Calculate the cost of painting the inner surface of the tent at Rs 10/sq.m if the radius of the base is 14 m.

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19. A building is in the form of a cylinder surmounted by hemispherical vaulted dome and contains $41\frac{19}{21}m^3$ of air. If the internal diameter of the dome is equal to its total height above the ground, find the height of the building.

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20. A milk tank is in the shape of a cyclinder with hemispheres of same radii attached to both ends of it as shown in figure. If the total height of the tank is 6m and the radius is 1m, calculate the maximum quantity of milk filled in the tank in litres. $\left(\pi = \frac{22}{7}\right)$

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21. The cross section of a tunnel is a square of 7 m surmounted by a semicircle as shown in the figure. The tunnel is 80 m long. Calculate:

a] its volume

b] its floor area

c] surface area (excluding floor)

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22. A cylinderical beaker whose diameter is 30 cm is filled with water up to a height of 20 cm. A heavy iron spherical ball of radius 10 cm is dropped to submerge completely in water in the beaker. Find the increase in the level of water.

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23. From an iron cylinder of height 36 cm and radius 14 cm a conical cavity of radius 7 cm and height 24 cm is taken out.

a] find the total surface area of the remaining solid.

b] Find the volume of the remaining solid.

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24. A cylinderical tank of diameter 1.4 m and height 2.1 m is being fed by a pipe of dimater 3.5 cm through which water flows at the rate of 2m/s. calculate in minutes, the time taken to fill the tank.

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25. A canal is 300 cm wide and 120 cm deep. The water in the canal is flowing with a speed of 20 km/h. how much

area will it irrigate in 20 minutes if 8 cm standing water is desired ?

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26. A right circular cone of height 8.4cm and the radius of its base is 2.1cm. It is melted and recast into a sphere. Find the radius of the sphere.

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27. A sphere of radius 3 cm is melted and recast into a wire of diameter 0.2 cm. find the length of the wire.

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28. The cuboid in the given figure is melted and recast into a cube. Find the surface area of the cube.

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29. How many shots having diameter 3 cm can be made from a cuboidal lead solid of dimension $9cm \times 10cm \times 12cm$?

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30. What length of a solid cylinder 2 cm in diameter must be taken to recast into a hollow cylinder of length 16 cm, external diameter 20 cm and thickness 2.5 mm?

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31. A hollow sphere of internal and external radii 4 cm and 8 cm respectively is melted into a cone of base radius 4 cm. calculate the height of the cone.

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32. A rectangular tank with base dimensions $6m \times 11$m contains water up to 5m. All the water in this m. determine the height to which the water level rises.

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33. The largest sphere is carved out of a cube of side 7 cm. Find the volume of the sphere.

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34. A spherical shell of external radius 8 cm is melted and recast into a right circular cylinder of height 8 cm and radius 6 cm. find the inner diameter of the shell.

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35. A certain number of metallic cones, each of radius 2 cm and height 3 cm, are melted and recast into a solid sphere of radius 6 cm. find the no. of cones used.

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36. A solid sphere of radius 3 cm is melted and recast into smaller spherical balls of radius 0.3 cm. find the number of balls thus obtained.

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37. 500 persons are taking a dip in a cuboidal pond 80 m long and 50 m broad. What is rise of water level in the pond if the average displacement of water by a person is 0.04 m^3.

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38. Three cubes of sided 3 cm, 4cm, and 5 cm are melted and recast into a cube.

a] find the length of the cube.

b] find the surface area of the cube.

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39. 16 glass spheres each of radius 2 cm are packed into a cuboidal box of internal dimensions $16cm \times 8cm \times 8cm$ and the box is filled with water. Find the volume of water filled in the box.

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40. Three cubes of metal whose edges are in the ratio 3:4:5 are melted and converted into a single cube whose diagonals is $12\sqrt{3}$cm. find the edges of the three cubes.

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41. Find the number of solid metallic spheres each of radius 3 cm that should be melted and recast to form a metal cone whose height is 45 cm and radius 6 cm.

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42. A metallic sphere of radius 10.5 cm is melted and recast into a number of smaller cones each of radius 3.5 cm and

height 3 cm. find the number of cones thus formed.

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43. The rainwater from a roof of dimensions $22 \times 20m$ drains into a cylinderical vessel having diameter of base 2 m and height 3.5 m. if the rain-water from the roof just fills the cylinder vessel, find the rainfall in cm.

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44. A hemispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylinder bottles each of radius 1.5 cm and height 4 cm. how many bottles are needed to empty the bowl?

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45. The radii of ends of a bucket of height 24 cm are 15 cm and 5 cm. find its capacity.

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46. The radii of the ends of a frustum are 28 cm and 7 cm whose height is 45 cm. find it's

a] LSA

b] TSA

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47. A bucket is in the form of a frustum of cone and holds 28.490 litres of water. The radii of top and bottom are 28 cm and 21 cm respectively. Find the height of the bucket.

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48. The height of a cone is 30 cm. a small cone is cut off at the top by a plane parallel to its base. If its volume be $\frac{1}{27}th$ volume of the given cone, at what height above the base is the section cut off ?

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49. A cone of radius 10 cm is cut into two parts by a plane through the mid-point of its vertical axis parallel to the base . Find the ratio of the volumes of the smaller cone and frustum of the cone.

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Textual Exercises Exercise 15 1

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

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

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

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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

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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.

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6. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends (see fig). The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.

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7. A rent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4m respectively , and the slant height of the top is 2.8m, 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 $500 \text{per} m^2$ (Note that the base of the tent will not be covered with canvas.)

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8. From a solid cylinder whose height is 2.4cm and diameter 1.4cm, a conical 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.

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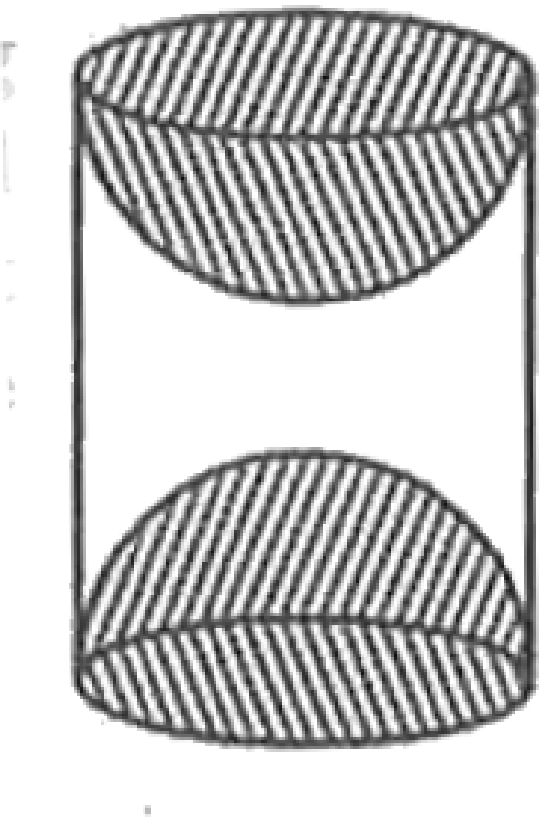
9. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder ,as shown in Fig . If the height of the cylinder is 10 cm and its base is of

radius 3.5cm, find the total surface area of the article.



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Textual Exercises Exercise 15 2

1. A solid 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.

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2. Rachel, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminum sheet. The diameter of the model is 3 cm and its length is 12 cm . If each cone has a height of 2cm , find the volume of air contained in the model that Rachel made . (Assume of outer and inner dimensions of the model to be nearly the same .

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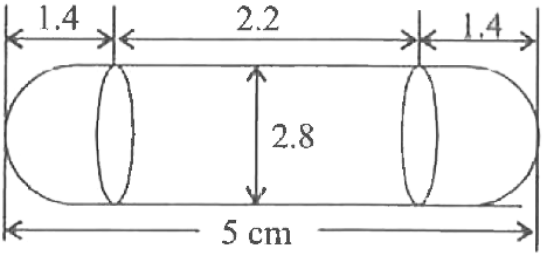
3. A gulab jamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns, each shaped like a cylinder with two hemispherical ends with length 5cm and diameter 2.8cm



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4. A pen stand is made f wood in the shape of a cuboid with four conical depressions to bold pens. The dimensions

of cuboid are 15 cm by 10 cm by 3.5 cm. the radius of each depression is 0.5 cm and depth 1.4 cm. find the volume of wood in the entire stand.

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5. A vessel is the from 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 uo to the brim . When lead shots, each of which is a sphere of radius 0.5cm are dropped into the vessel, one - fourth of the water flows. out. find the number of lead shots dropped in the vessel.

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

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7. A solid consisting of a right circular cone of height 120cm and radius 60cm standing ona hemisphere of radius 60 cm is place upright in a right circular cylinder full of water such that it touchs the bottom .Find the volume of water left in the cylinder , If the radius of the cylinder is 60 cm and its height is 180cm.

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8. A spherical glass vessel has a cylindrical neck 8cm long, 2cm in diameter, the diameter of the spherical part is 8.5cm. By measuring the amount of water it holds, a child finds its volume to bt $354cm^3$ Check whether she is correct , taking the above as the inside measurements , and $\pi = 3.14$.

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Textual Exercises Exercise 15 3

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

of the cylinder.

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

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3. A 20 m deep well with diameter 7m is dug and the earth from digging is evenly spread out ot form a platform 22m by 14m. Find the height of the platform.

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

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

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6. How many silver coins, 1.75cm in diameter and thickness 2mm, must be melted to from a cuboid of dimensions $5.5cm \times 10cm \times 3.5cm$?

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7. A cylindrical bucket , 32cm high and with radius of base 18cm , 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 24cm , find the radius and slant height of the heap.

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

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9. A farmer connects a pipe of internal diameter 20cm from a canal into a cylindrical tank in her field , which is 10m in diameter and 2m deep. If water flows through the pipe at the rate of 3km/h, in how much time will the tank be filled ?

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Textual Exercises Exercise 15 4

1. A drinking glass is in the shape of a frustum of a cone of height 14cm . The diameters of its two circular ends. are 4cm and 2cm . Find the capacity of the glass.

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2. The slant height of a frustum of a cone is 4cm and the perimeters (circumference) of its circular ends are 18cm and 6cm . Find the curved surface area of the frustum.

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3. A Fez , the cap used by the Turks is shaped like the frustum of a cone (see fig) . If its radius on the open side is

10cm , radius at the upper base is 4cm and its slant height is 15cm , find the area of material used for making it.

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4. A container opened from the top is in the form of a frustrum of a cone of height 16cm with radii of its lower and upper ends 8cm and 20cm respectively. find the cost of the milkwhich can completely fill the container at the rate of Rs. 20 per litre.[Take $\pi e = 3.14$]

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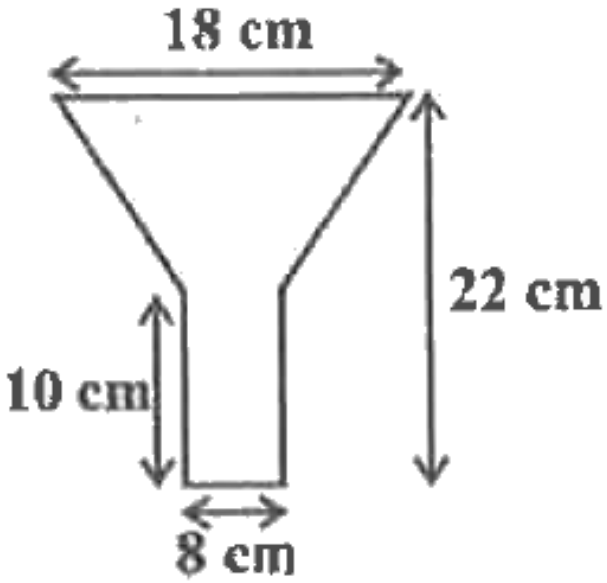
5. A metallic right circular cone 20cm high and whose vertical angle is 60° is cut into two parts at the middle of

its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm find the length of the wire.



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Textual Exercises Exercise 15 5

1. A copper wire, 3mm in diameter , is wound about a cylinder whose length is 12cm, and diameter 10cm, so as to cover the curved surface of the cylinder . Find the length and mass of the wire, assuming the density of copper to be $8.88 g per cm^3$

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

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

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4. In one fortnight of a given month, there was a rainfall of 10 cm in a river valley. If the area of the valley is 7280 km^2, show that the total rainfall was approximately equivalent to the total 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 10 cm long cylindrical portion 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 (see Fig).

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6. Write the foumula to calculate the curved surface area of the frustum of a cone .

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7. Derive the formula for the volume of the frustum of a cone, using the symbols explain.

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Zee Additional Questions Multiple Choice Questions

1. A medicine capsule is a combination of

A. 1 cylinder, 1 cone, 1 sphere

B. 1 cylinder, 2 cones

C. 1 cylinder, 2 hemisphere

D. 2 cylinders, 1 hemisphere

Answer: C

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2. A pencil sharpened at one edge is an example of

A. a cone and a cylinder

B. frustum of cone and a cylinder

C. hemisphere and a cylinder

D. 2 cylinders

Answer: A

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3. A funnel is a combination of frustum cone ad

A. Hemisphere

B. Cylinder

C. Sphere

D. Cone

Answer: B

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4. The ratio of sides of two cubes is 2:3. then the ratio of their volumes is

A. $2:3$

B. $4:9$

C. $8:27$

D. $27:8$

Answer: C

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5. The internal and external radii of a hollow hemispherical bowl are r_1 and r_2 respectively. The curved surfacea rea of the bowl is

A. $2\pi\left(r_1^2+r_2^2\right)$

B. $2\pi\left(r_1^2+r_2^2\right)$

C. $2\pi\left(r_2^2-r_1^2\right)$

D. $\pi\left(r_2^2 - r_1^2\right)$.

Answer: C

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6. The radii of two cylinders are in the ratio 2:3 and their heights are in the ratio 5:3. then the ratio of their volumes is

A. $27:20$

B. $4:9$

C. $20:27$

D. $9:4$

Answer: C

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7. The CSA of a right circular cone of height 15 cm and base diameter 16 cm is

A. 68 π sq. cm

B. 120π sq. cm

C. 136π sq. cm

D. 60π sq. cm

Answer: C

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8. The largest sphere that can be carved out of a cube of side 7 inches will have its diameter

A. 7 inches

B. 3.5 inches

C. 10 inches

D. 14 inches

Answer: A

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9. Two solid hemispheres of same base radius 'r' are joined together along their bases. The curved surface area of the

new solid is

A. $4\pi r^2$

B. $3\pi r^2$

C. $6\pi r^2$

D. $\frac{4}{3}\pi r^2$.

Answer: A

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10. An iron sphere of radius 8 cm is melted and recast into smaller spheres of radius 1 cm. how many such spheres are formed ?

A. 64

B. 512

C. 216

D. 256

Answer: B

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11. A solid piece of iron of dimensions $49 \times 33 \times 24$ is moulded into a sphere is

A. 21 cm

B. 28 cm

C. 35 cm

D. 36 cm

Answer: A

12. Three metallic solid cubes of edge 3 ft, 4 ft, and 5 ft are melted and formed into a single cube. The edge of the resultant cube is

A. 5 ft

B. 6 ft

C. 7 ft

D. 8 ft

Answer: B

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13. A right circular cone 3.6 cm high with base radius 1.6 cm is melted and recast into another cone of base radius 1.2 cm. then its height is

A. 6 cm

B. 6.4 cm

C. 7 cm

D. 4.5 cm

Answer: B

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14. The diamter of a metallic sphere is 6 cm. it is melted and a wire of diameter 0.2 cm is drawn. Then the length of the wire is

A. 24m

B. 28 m

C. 32m

D. 36m

Answer: D

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15. A solid metal cone with radius 12 cm and height 24 cm is melted to form solid spherical balls each of diameter 6 cm. the number of such balls made are

A. 32

B. 36

C. 48

D. none

Answer: A

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16. Twelve solid sphere of same size and made by melting a solid metallic cylinder of base radius 1 cm and height 16 cm. the diameter of each sphere is

A. 2 cm

B. 3 cm

C. 4 cm

D. 6 cm

Answer: A

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17. A solid metallic sphere of radius 8 cm is melted and recast into 'n' spherical solids of radius 1 cm. then n=

A. 500

B. 256

C. 556

D. 512

Answer: D

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18. The slant height of a bucket is 26 cm, the diameter of upper and lower circular ends are 36 cm and 16 cm. then

the height of the bucket is

A. 22 cm

B. 24 cm

C. 50 cm

D. 5504 πcm^3

Answer: B

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19. A frustum of cone with radii 20 cm and 32 cm has height 8 cm. its volume is

A. 1720 πcm^3

B. $1720cm^3$

C. $260\pi cm^3$

D. $5504\pi cm^3$

Answer: D

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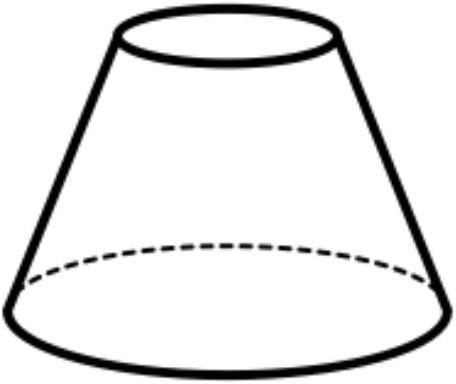
20. The total surface area of the given frustum of cone is



A. $\pi z(x+y)+\pi\left(x^2+y^2\right)$

B. $\pi z(x+y)+\pi h\left(x^2+y^2\right)$

C. $\pi h\left(x^2+y^2+xy\right)$

D. $\frac{1}{3}\pi h\left(x^2+y^2+xy\right)$

Answer: A

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21. The slant height of a frustom of a cone is 12 cm and the perimeters of its plane ends are 18 cm and 6 cm. then the CSA of frustum is

A. $132cm^2$

B. $144cm^2$

C. $144\pi cm^2$

D. $32\pi cm^2$

Answer: B

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22. A bucket shaped as the frustum of a cone has depth 15 cm and radii of top and bottom are 28 cm and 21 cm. then the capacity (in litres) of the bucket is

A. 2849 l

B. 28.49 l

C. 42.53 l

D. 81.82l

Answer: B

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23. The volume of a frustum of cone when the circular ends have areas A_1 and A_2 is

A. $V = \frac{1}{3}\pi h[A_1 + A_2]$

B. $V = \frac{1}{3}[A_1 + A_2]$

C. $V = \frac{1}{3}h \times [A_1 + A_2 + A_1A_2]$

D. $V = \frac{1}{3} \times h \times \left[A_1 + A_2 + \sqrt{A_1 + A_2}\right]$

Answer: D

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24. A frustum of a cone whose slant height is 10 cm has diameters of ends as 32 cm and 20 cm. then its capacity is

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25. If the area of the circular base of a cylinder is $22cm^2$ and its height is $10cm^2$, then the volume of the cylinder is

A. $2200cm^2$

B. $2200cm^3$

C. $220cm^3$

D. $220cm^2$

Answer: C

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Zee Additional Questions Very Short Answer Vsa Questions

1. Two cubes have their volume in the ratio 1:27. what is the ratio of their surface areas ?

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2. A cylinder and cone are of same height and base radius. Find the ratio of their volume.

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3. Volume and total surface areas of a solid hemisphere are numerically equal. What is the diameter of the hemisphere ?

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4. A rectangular sheet of paper $40cm \times 22cm$ is rolled to form a cylinder of height 40 cm. find the radius of the cylinder.

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5. The curved surface area of a cylinder is $264cm^2$ and its volume is $924cm^3$. Find the height.

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6. The surface area of sphere is $616cm^2$. Find its radius.

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7. The volume of a cylinderical vessel is $448\pi cm^3$ and its height is 7 cm. find the diameter of the base.

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8. The volume of a cone is $2355cm^3$ and its base area is 314 cm^2. Find its height.

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9. A metallic solid cone is melted to form a solid cylinder of equal radius. Find the height of the cone if the height of the cylinder is 6 cm.

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10. The sum of radius of base and height of a solid cylinder is 37 cm. the total surface area of the solid cylinder is 1628 cm^2. Find the volume of the cylinder.

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11. The volume of a hemisphere is $2425\frac{1}{2}cm^3$. Find its curved surface area.

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12. A conical tent is to accommodate 11 persons. Each person must have 4 sq. m of the space on the ground and 20 m^3 of air of breathe. Find the height of the cone.

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13. A cloth 5 m wide is used to make a conical tent of base diameter 14 m and height 24m. Find the cost of cloth at the rate Rs 25 per metre.

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14. If the total surface area of a solid hemisphere is $462cm^2$, find its volume.

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15. The slant height of a frustum of a cone is 5 cm and the difference between radii of its two circular ends is 4 cm. find the height.

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16. Write the foumula to calculate the curved surface area of the frustum of a cone .

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17. Write the formula to find the total surface area of the cone whose radius is 'r' units and slant height is 'l' units.

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Zee Additional Questions Short Answer Sa Type 1 Questions

1. Find the ratio of volumes of a cube to that of a sphere which exactly fits inside the cube.

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2. Determine the ratio of volume of a cube and a right circular cone that can be fit into the cube whose side is α units.

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3. The largest cone is carved out of a solid cube of side 21 cm. find the volume of the remaining solid.

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4. The largest possible sphere is carved out from a wooden cube of side 7 cm. find the volume of the wood left.

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5. The area of three adjacent faces of a cube are x,y and z. if its volume is V, prove that $V = \sqrt{xyz}$.

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6. If S denotes the surface area of a sphere and V volume, Prove that $S^3 = 36\pi V^2$.

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7. From a cuboidal block of dimensions $15cm \times 10cm \times 5cm$, a cylinderical hole of diameter 7 cm is drilled out. Find the surface area of the remaining block.

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8. A juice seller was serving his customers using glasses. The inner diameter of the cylinderical glass was 5 cm but the bottom fo the glass had a hemispherical raised portion which reduced to capacity of the glass. If the height of the glass was 10 cm, find the apparent capacity of the glass and the actual capacity of the glass.

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9. A solid wooden toy is in the form of a hemisphere surmounted by a cone of same radius. The radius of hemisphere is 3.5 cm and the total wood used in making of toy is $166\frac{5}{6}cm^3$. Find the height of the toy. Also find the cost of painting the hemispherical part of the toy at the rate of Rs. 10 per cm^2 (take $\pi = \frac{22}{7}$)

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10. A room in the form of a cylinder surmounted by a hemishperical vaulted dome contains $17.7m^3$ of air, and the internal diameter of the building is equal to the height of the dome above the floor. Find the height of the building.

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11. A cylinderical container with radius of its base 21 cm has sufficient water to submerge a rectangular solid of dimensions $22cm \times 14cm \times 10.5cm$. Find the rise in the water level when the solid is fully submerged.

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12. A toy is in the form of a hemisphere surmounted by a right circular cone of same base radius. If the radius of the base of the cone is 21 cm and its volume is $\frac{2}{3}$ volume of hemisphere, calculate the height of the cone and the total curved surface area of the toy.

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13. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. find the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference in volume of cylinder and the toy.

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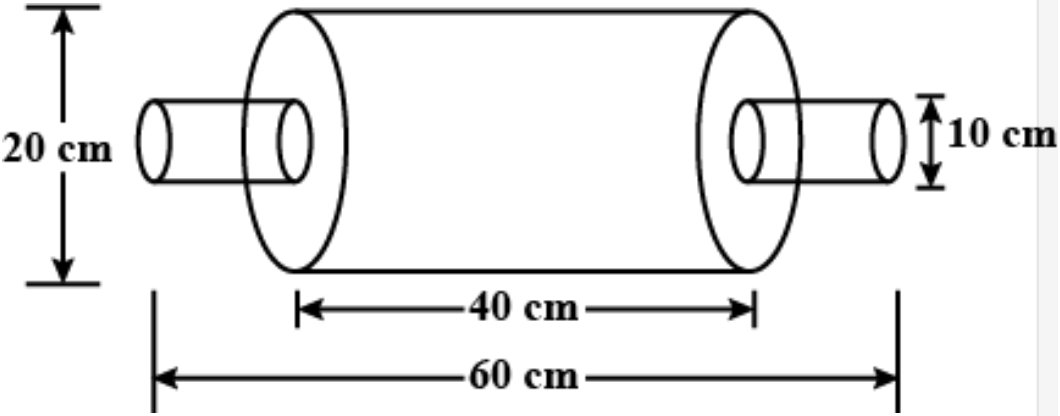
14. A wooden belan was made by using 3 wooden cylinders as shown in the figure. Find the total surface area of the

belan.



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15. A glass in the form of a frustum of cone has capacity of $104\pi cm^3$. Its height is 8 cm and one of the radii is 2 cm. determine the diamter of the other circular part.

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16. The radii of two circular ends of a frustum of a cone shaped dustbin are 15 cm and 18 cm . If its depth is 63 cm find the volume of the dustbin

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Zee Additional Questions Short Answer Sa Type 2 Questions

1. A hollow sphere of internal and external radii 2 cm and 4 cm respectively is melted into a cone of base radius 4 cm. find the height and the slant height of the cone.

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2. From the top of a solid cone of height 12 cm and base radius 6 cm, a cone of height 4 cm is removed by a plane parallel to the base of the original cone. Find the total surface area of the remaining solid. [use $\pi = 3.14, \sqrt{5} = 2.236$]

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3. The radii of bases of two right circular solid cones of same height (h) are x and y respectively. The cones are melted and recast as a sphere of radius R.

Show that $h = \frac{4R^3}{x^2 + y^2}$.

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4. The difference between the outer and inner curved surface areas of a hollow right circular cylinder 14 cm long is 88 cm^2. If the volume of metal used in making the cylinder is $176cm^3$, find the inner and outer diameters.

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5. 3/4th part of a conical vessel of internal radius 5 cm and height 24 cm is full of water. The water is emptied into a cylinderical vessel with internal radius 10 cm. find the height of the water in the cylinderical vessel.

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6. How many spherical lead shots each of diameter height 24 cm is full of water. The water is emptied into a cylinderical vessel with internal radius 10 cm. find the height of the water in the cylinderical vessel.

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7. Find the number metallic circular plates (discs) with base diameter 1.5 cm and height of 0.2 cm to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.

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8. A spherical ball of radius 3 cm is melted and recast into three spherical balls. The radii of two balls are 1.5 cm and 2 cm. find the diameter of the third ball.

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9. A solid cuboid of iron with dimensions $53cm \times 40cm \times 15cm$ is melted and recast into a cylinderical pipe. The outer and inner diameter of the pipe are 8 cm and 7 cm. find the length of the pipe.

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10. The diameter of a metallic sphere is 6 cm. the sphere is melted and drawn into a wire of uniform cross section. If the length of the wire is 36 cm, find its radius.

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11. The surface area of a metallic sphere is $616cm^2$. It is melted and recast into a cone of height 28 cm. find the diameter of the base of the cone so formed.

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12. A cylinderical jar of diameter 12 cm contains water. Iron spheres, each of radius 1.5 cm, are immersed in water. How

many such spheres are necessary to raise to level of water by 2 cm ?

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13. 150 spherical marbles, each of diameter 14 cm, are dripped in a cylindrical vessel of diameter 7 cm containing some water. The marbles are completely immersed in water. Find the rise in the level of water.

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14. A container in the shape of a frusum of a cone having diameters of its two circular faces as 35 cm and 30 cm and vertical height 14 cm is completely filled with oil. If each

cm^3 of oil weighs 1.2g, find the cost of oil in the container at the rate Rs 40/kg.

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15. A bucket of height 8 cm and made up of a copper sheet is in the form of frustum of a right circular cone with radii of its upper and lower ends being 3 cm and 9 cm respectively. Calculate.

A] The height of the cone of which the bucket is a part.

B] Volume of water which can be filled in the bucket

C] The area of copper sheet required to make the bucket.

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Zee Additional Questions Long Answer La Type Questions

1. The surface areas of a cube and a sphere are equal. Prove that the ratio of their volumes is $\sqrt{\frac{\pi}{6}} : 1$.

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2. A tent consists of a frustum of a cone surmounted by a cone. If the diameter of the lower and upper circular ends of the frustum be 14 m and 26 m respectively, the height of the frustum be 8 m, and the slant height of the surmounted conical portion be 12m, find the area of canvas required to make the tent assuming the radii of the upper circular end and the base of surmounted conical portion are equal.

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3. When a metal cube is completely submerged in water contained in a cylinderical vessel with diameter 30 cm, the level of water rises by $1\frac{41}{99}$ cm. find the length of edge of the cube and the TSA of cube.

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

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5. A hemispherical bowl of internal diameter 36 cm contains liquid. This liquid is filled into 72 cylinderical bottles of diameters 6 cm. find the height of each bottle if 10% liquid is wasted in transfer.

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6. Water flows through a cylinderical pipe of internal diameter 7 cm at 5m/s. calculate.

A] Volume, in litres of the water discharged by the pipe in one minute.

B] The time in minutes the pipe would take to fill and empty rectangular tank $4m \times 3m \times 2.31m$.

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7. A hemispherical tank full of water is emptied by a pipe at the rate of $\frac{25}{7}$ litre/sec. how much time will it take to empty half the tank if the diameter of the base of the tank is 3m?

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8. A farmer connects a pipe of internal diameter 25 cm from a canal into a cylinderical tank which is 12 m in diameter and 2.5m deep. If the water flows through the pipe at the rate of 3.6 kmph, in how much time will the tank

be filled? Also find the cost of water if the irrigation department charges at the rate of Rs 0.07/m^3.

View Text Solution

9. A cylindrical vessel with internal solid diameter 10 cm and height 10.5 cm if full of water. A solid cone of base diameter 7 cm and height 6 cm is completely immersed in water. Find the volume of

A] Water displaced out of cylinderical vessel

B] water left in the cylinderical vessel.

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10. Water flows at the rate of 15 kmph through a pipe of diameter 14 cm into a cuboidal pond 50m long annd 44m wide. In what time will the water in the pond rise by 21 cm?

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11. Water flows at the rate of 10 m/min through a cylinderical pipe 5 mm in diameter. How long would it take to fill a conical vessel whose diameter at the base is 40 cm and depth 24 cm ?

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12. Selvi's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from the sump, which is cuboidal in shape. The sump has dimensions $1.57m \times 1.44m \times 0.95m$. the overhead tank has radius 60 cm and its height is 95 cm. find the height of the water left in the sump after overhead tank has been completely filled with water from the sump, which was full. compare the capacity of tank with that of the sump.

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13. A hollow cone is cut by a plane parallel to its base and the upper portion is removed. If the curved surface area of the remainder is $\frac{8}{9}$th the curved surface area of the whole

cone, find the ratio of line segment into which the cone's altitude is divided by the plane.

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14. The radius of the base ofa right circular cone is 'x'. It is cut by a plane parallel to the base at a height y from the base. The distance boundary of upper surface from the base of frustum is $\sqrt{y^2 + \frac{x^2}{9}}$. Show that the volume of frustum is $\frac{13}{27}\pi x^2 ycu.$ units.

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15. The height of a right circular cone is trisected by two planes drawn parallel to its base. Show that the volumes of

the three portions starting from the top are in the ratio 1:7:19.

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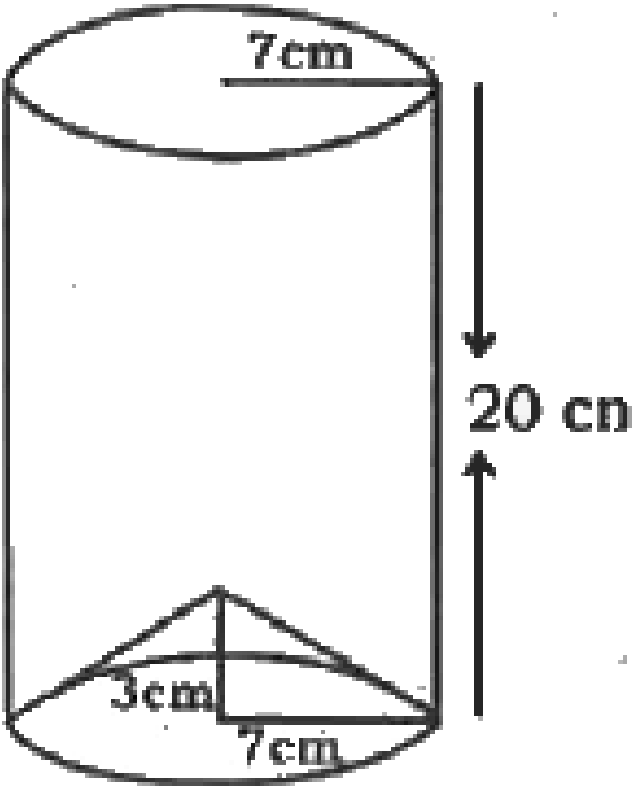
16. The bottom of a right cylindrical shaped vessel made from metallic sheet is closed by a cone shaped vessel as shown in the figure . The radius of the circular base of the cylinder and radius of the circular base of the cone each os equal to 7 cm . If the height of the cylinder is 20 cm and height of cone is 3 cm calculate the cost of milk to fill

completely this vessel at the rate of Rs. 20 per litre.



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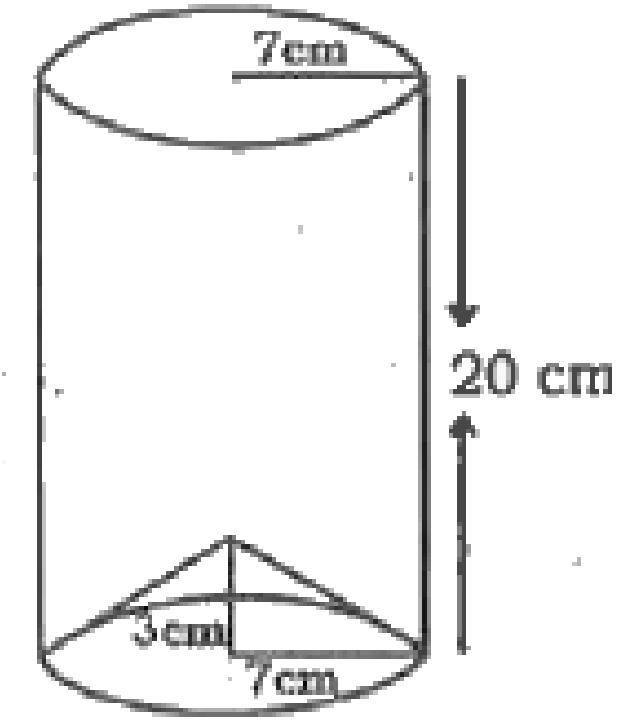
17. A hemispherical vessel of radius 14 cm is fully filled with sand . This sand is poured on a level ground. The heap of sand forms a cone shape of height 7 cm . Calculate the area of ground occupied by the circular base of the heap of the sand.



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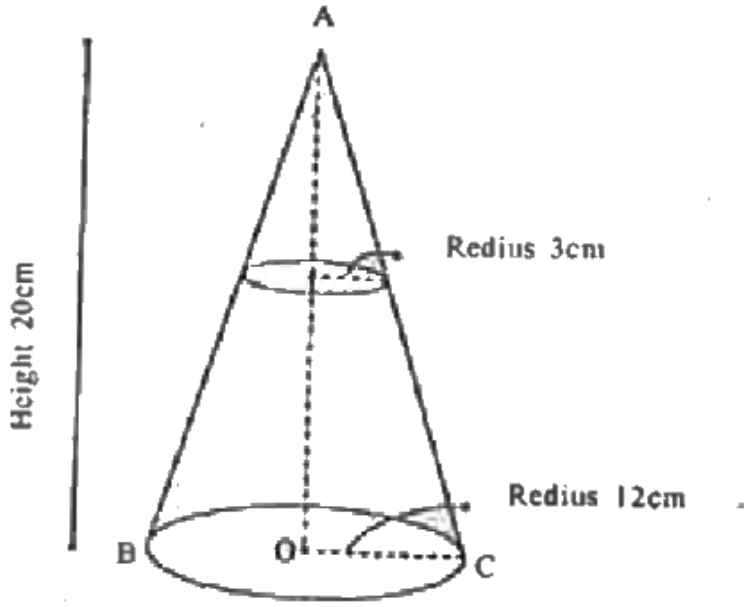
18. A cone is having its base radius 12 cm and height 20 cm. If the top of this cone is cut in to form of a small cone of base radius 3cm is remove, then the remaining part of the solid cone becomes a frustum. Calculate the volume of the frustum.



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Zee Additional Questions Hots Higher Order Thinking Skills Questions

1. A sector of a circular is of radius 12 cm and angle 120°. It is rolled up so that two bounding radii are joined together to form a cone. Find the volume of the cone.

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2. A wooden box open at the top has its outer dimensions $2.5cm \times 9cm \times 10cm$ and its thickness is 0.5 cm. find the volume of wood used.

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3. A cylinderical vessel of radius 2 m is partly filled with coloured liquid. 300 balls are dropped in it. The rise in the water is 0.8cm. Find the radius of each ball dropped.

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4. To construct a wall 24 m long, 0.4 m thick, and 6 m high, bricks of dimensions $25cm \times 16 \times 10cm$ each are used. If the mortar occupies 1/10th of the volume of the wall, find the number of bricks used.

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5. A conical vessel of radius 12 cm and height 16 cm is completely filled with water. A sphere is lowered into the water. Its size is such that when it touches the sides, it is just immersed. What is the fraction of water that overflows ?

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6. A vertical cone of volume V with vertex downwards is filled with water up to half of its height. Prove that the volume of water is $\frac{V}{8}$ cu. Units.

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7. If h,C,V represent height, curved surface area,

and volume of cone, prove that

$3\pi Vh^3 - C^2h^2 + 9V^2 = 0.$

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8. If V denotes the volume of a cube and 'S' its surface area,

then prove that S^3=216V^2`.

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9. A child consumed an ice cream shaped in an inverted right circular cone, from the top and left only 12.5% of the

cone for her mother. If the height of the ice cream is 8 cm, what was the height of the remaining ice cream cone ?

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10. 

A solid cube has a square hole and a circlar hole cut along two faces of the cube. The dimensions are as shown in the figure. Calculate the volume of the remaining solid after the holes have been cut.

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11. A closed right circular cone, contains water up to a height $\left(\frac{H}{2}\right)$ above its base, where H is its height. To what

height does the water rise, if the cone is inverted ?

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