



# MATHS

## BOOKS - SURA MATHS (TAMIL ENGLISH)

### MENSURATION

#### Exercise 7 1

1. The radius and height of a cylinder are in the ratio 5 : 7 and its curved surface area is 5500

sq. cm. Find its radius and height.



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2. A solid iron cylinder has total surface area of 1848 sq.m. Its curved surface area is five -sixth of its total surface area. Find the radius and height of the iron cylinder.



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3. The external radius and the length of a hollow wooden log are 16 cm and 13 cm respectively. If its thickness is 4 cm then find its T.S.A.



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4. A right angled triangle PQR where  $\angle Q = 90^\circ$  is rotated about QR and PQ. If QR=16 cm and PR=20 cm, compare the curved

surface areas of the right circular cones so formed by the triangle.



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5. 4 person live in a conical tent whose slant height is 19 cm. If each person require  $22\text{cm}^2$  of the floor area, then find the height of the tent.



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6. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is  $5720\text{cm}^2$ , how many caps can be made with radius 5 cm and height 12 cm.



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7. The ratio of the radii of two right circular cones of same height is 1 : 3. Find the ratio of their curved surface area when the height of

each cone is 3 times the radius of the smaller cone.



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**8.** The radius of a sphere increases by 25% .  
Find the percentage increase in its surface area.



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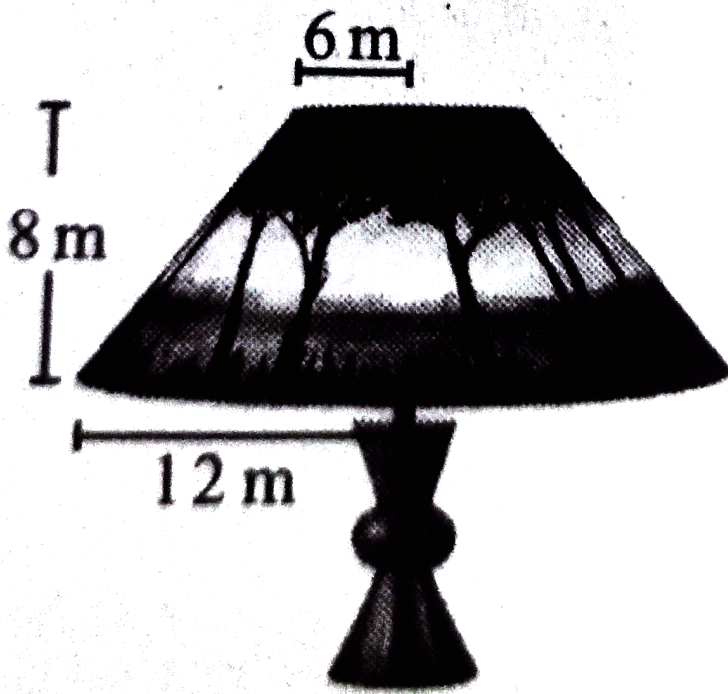
9. The internal and external diameters of a hollow hemispherical vessel are 20 cm and 28 cm respectively. Find the cost to paint the vessel all over at Rs. 0.14 per  $cm^2$ .



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10. The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if

the cost of painting 1 sq. cm is Rs. 2.



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**Exercise 7 2**



1. A 14 m deep well with inner diameter 10 m is dug and the earth taken out is evenly spread all around the well to form an embankment of width 5 m. Find the height of the embankment.



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2. A cylindrical glass with diameter 20 cm has water to a height of 9 cm. A small cylindrical metal of radius 5 cm and height 4 cm is

immersed it completely. Calculate the raise of the water in the glass ?



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**3.** If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.



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4. A conical container is fully filled with petrol. The radius is 10 m and the height is 15 m. If the container can release the petrol through its bottom at the rate of 25 cu. Meter per minute, in how many minutes the container will be emptied. Round off your answer to the nearest minute.



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5. A right angled triangle whose sides are 6 cm, 8 cm and 10 cm is revolved about the sides containing the right angle in two ways. Find the difference in volumes of the two solids so formed.



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6. The volumes of two cones of same base radius are  $3600\text{cm}^3$  and  $5040\text{cm}^3$ . Find the ratio of heights.





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7. If the ratio of radii of two spheres is  $4 : 7$ , find the ratio of their volumes.



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8. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volume is  $3\sqrt{3} : 4$ .



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9. The outer and the inner surface areas of a spherical copper shell are  $576\pi\text{cm}^2$  and  $324\pi\text{cm}^2$  respectively. Find the volume of the material required to make the shell.



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10. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and

20 cm respectively. Find the cost of milk which can completely fill a container at the rate of Rs. 40 per litre.



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### Exercise 7 3

1. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter is 14 cm and the height of the vessel is 13 cm. Find the capacity of the vessel.



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2. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. 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 the model that Nathan made.



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3. From a solid cylinder whose height is 2.4 cm and the diameter 1.4 cm, a cone of the same height and same diameter is carved out. Find the volume of the remaining solid to the nearest  $cm^3$ .

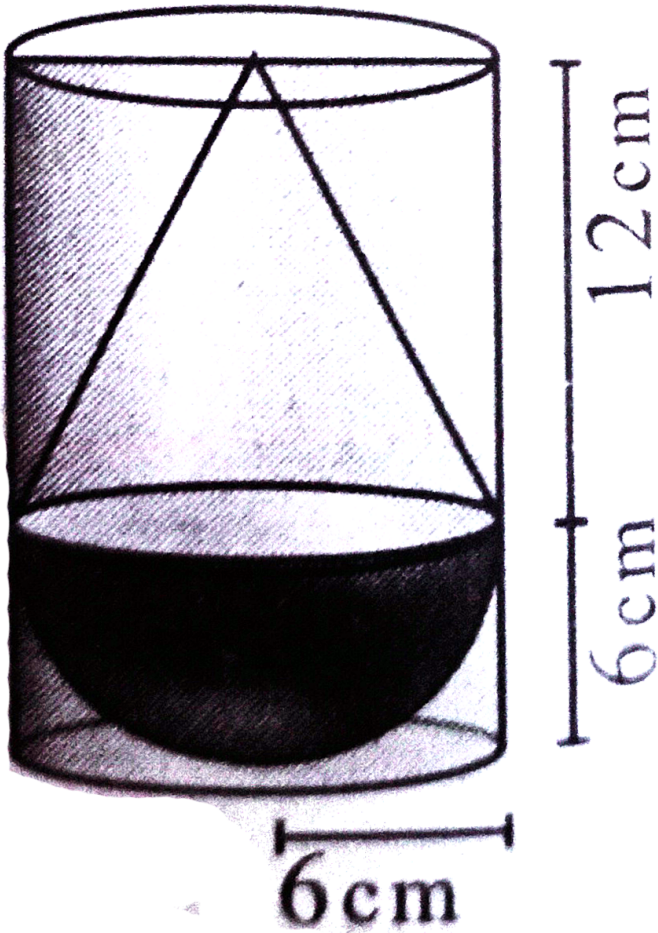


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4. A solid consisting of a right circular cone of height 12 cm and radius 6 cm standing on a hemisphere of radius 6 cm is placed upright in

a right circular cylinder full of water such that it touches the bottom. Find the volume of the water displaced out of the cylinder, if the radius of the cylinder is 6 cm and height is 18

cm.



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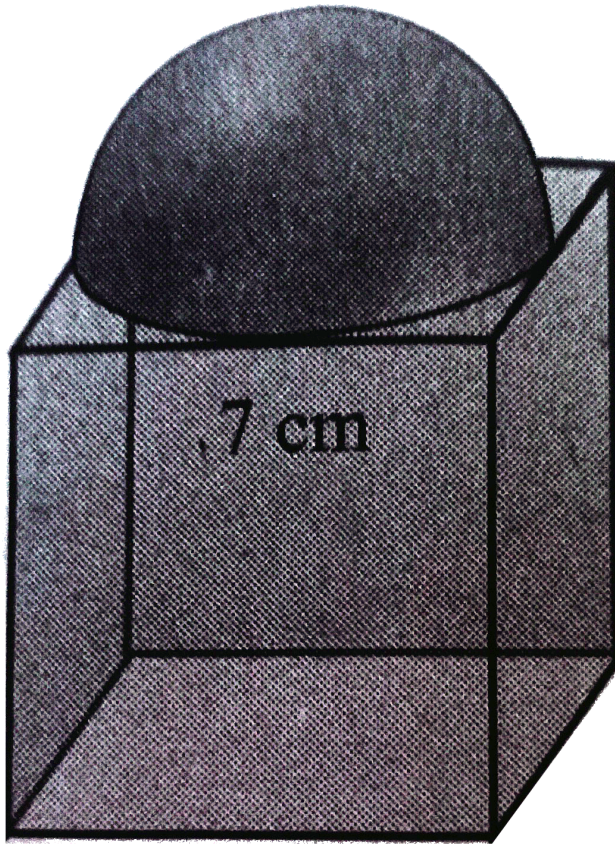
5. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hold ?



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6. As shown in figure a cubical block of side 7 cm is surmounted by a hemisphere. Find the

surface area of the solid.



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7. A right circular cylinder just enclose a sphere of radius  $r$  units.

Calculate

(i) the surface area of the sphere

(ii) the curved surface area of the cylinder

(iii) the ratio of the areas obtained in (i) and (ii).



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8. A shuttle cock used for playing badminton has the shape of a frustum of a cone is mounted on a hemisphere. The diameters of the frustum are 5 cm and 2 cm. The height of the frustum is 7 cm. Find its external surface area.



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**Exercise 7 4**

1. An aluminium sphere of radius 12 cm is melted to make a cylinder of radius 8 cm. Find the height of the cylinder.



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2. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tanks will rise by 21 cm.







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3. A conical flask is full of water. The flask has base radius  $r$  units and height  $h$  units, the water poured into a cylindrical flask of base radius  $xr$  units. Find the height of water in the cylindrical flask.



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4. A solid right circular cone of diameter 14 cm and height 8 cm is melted to form a hollow

sphere. If the external diameter of the sphere is 10 cm, find the internal diameter.



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5. Seenu's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid. The sump has dimensions  $2m \times 1.5m \times 1m$ . The overhead tank has its radius of 60 cm and height 105 cm. Find the volume of the water left in the sump

after the overhead tank has been completely filled with water from the sump which has been full, initially.



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6. The internal and external diameter of a hollow hemispherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, then find the height of the cylinder.



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7. A solid sphere of radius 6 cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is 32 cm, then find the thickness of the cylinder.



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8. A hemispherical bowl is filled to the brim with juice. The juice is poured into a cylindrical vessel whose radius is 50% more than its

height. If the diameter is same for both the bowl and the cylinder then find the percentage of juice that can be transferred from the bowl into the cylindrical vessel.



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## Exercise 7 5

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is

A.  $60\pi cm^2$

B.  $68\pi cm^2$

C.  $120\pi cm^2$

D.  $136\pi cm^2$

**Answer: D**



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2. If two solid hemispheres of same base radius  $r$  units are joined together along their

bases, then curved surface area of this new solid is

A.  $4\pi r^2$  sq. units

B.  $6\pi r^2$  sq. units

C.  $3\pi r^2$  sq. units

D.  $8\pi r^2$  sq. units

**Answer: A**



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3. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

A. 12 cm

B. 10 cm

C. 13 cm

D. 5 cm

**Answer: A**



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4. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is

A. 1 : 2

B. 1 : 4

C. 1 : 6

D. 1 : 8

**Answer: B**





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5. The total surface area of a cylinder whose radius is  $\frac{1}{3}$  of its height is

A.  $\frac{9\pi h^2}{8}$  sq. units

B.  $24\pi h^2$  sq. units

C.  $\frac{8\pi h^2}{9}$  sq. units

D.  $\frac{56\pi h^2}{9}$  sq. units

**Answer: C**



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6. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is

A.  $5600\pi cm^3$

B.  $11200\pi cm^3$

C.  $56\pi cm^3$

D.  $3600\pi cm^3$

**Answer: B**



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7. If the radius of the base of a cone is tripled and the height is doubled then the volume is

A. made 6 times

B. made 18 times

C. made 12 times

D. unchanged

**Answer: B**



8. The total surface area of a hemi-sphere is how much times the square of its radius.

A.  $\pi$

B.  $4\pi$

C.  $3\pi$

D.  $2\pi$

**Answer: C**



9. A solid sphere of radius  $x$  cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is

A.  $3x$  cm

B.  $x$  cm

C.  $4x$  cm

D.  $2x$  cm

**Answer: C**



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10. A frustum of a right circular cone is of height 16 cm with radii of its ends as 8 cm and 20 cm. Then, the volume of the frustum is

A.  $3328\pi cm^3$

B.  $3228\pi cm^3$

C.  $3240\pi cm^3$

D.  $3340\pi cm^3$

**Answer: A**





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**11.** A shuttle cock used for playing badminton has the shape of the combination of

- A. a cylinder and a sphere
- B. a hemisphere and a cone
- C. a sphere and a cone
- D. frustum of a cone and a hemisphere

**Answer: D**



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12. A spherical ball of radius  $r_1$  units is melted to make 8 new identical balls each of radius  $r_2$  units. Then  $r_1 : r_2$  is

A. 2 : 1

B. 1 : 2

C. 4 : 1

D. 1 : 4

**Answer: A**



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13. The volume (in  $cm^3$ ) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is

A.  $\frac{4}{3}\pi$

B.  $\frac{10}{3}\pi$

C.  $5\pi$

D.  $\frac{20}{3}\pi$

**Answer: A**



14. The height and radius of the cone of which the frustum is a part are  $h^1$  units and  $r_1$  units respectively. Height of the frustum is  $h_2$  units and radius of the smaller base is  $r_2$  units. If  $h_2:h_1 = 1:2$  then  $r_2:r_1$  is

A. 1:3

B. 1:2

C. 2:1

D. 3:1

**Answer: B**



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**15.** The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is

A. 1 : 2 : 3

B. 2 : 1 : 3

C. 1 : 3 : 2

D. 3 : 1 : 2

**Answer: D**



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## Unit Exercise 7

1. The barrel of a fountain-pen cylindrical in shape, is 7 cm long and 5 mm in diameter. A full barrel of ink in the pen will be used for writing 330 words on an average. How many words can be written using a bottle of ink containing one fifth of a litre ?



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2. A hemi-spherical tank of radius 1.75 m is full of water. It is connected with a pipe which empties the tank at the rate of 7 litre per second. How much time will it take to empty the tank completely ?



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3. Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius  $r$  units.



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4. An oil funnel 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, the diameter of the cylindrical portion be 8 cm and the diameter of the top of the funnel be

18 cm, then find the area of the tin sheet required to make the funnel.



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5. Find the number of coins, 1.5 cm in diameter and 2 mm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.



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6. A hollow metallic cylinder whose external radius is 4.3 cm and internal radius is 1.1 cm and whole length is 4 cm is melted and recast into a solid cylinder of 12 cm long. Find the diameter of solid cylinder.



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7. The slant height of a frustum of a cone is 4 m and the perimeter of circular ends are 18 m

and 16 m. Find the cost of painting its curved surface area at Rs 100 per sq. m.



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8. A hemi-spherical hollow bowl has material of volume  $\frac{436\pi}{3}$  cubic cm. Its external diameter is 14 cm. Find its thickness.



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9. The volume of a cone is  $1005\frac{5}{7}$  cu. Cm. The area of its base is  $201\frac{1}{7}$  sq. cm. Find the slant height of the cone.



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10. A metallic sheet in the form of a sector of a circle of radius 21 cm has central angle of  $216^\circ$ . The sector is made into a cone by bringing the bounding radii together. Find the volume of the cone formed.





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## Government Exam Questions

1. The height of a right circular cone whose radius is 3 cm and slant height is 5 cm will be

A. 12 cm

B. 4 cm

C. 13 cm

D. 5 cm

**Answer: B**



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2. The volume of a solid right circular cone is  $11088\text{cm}^3$ . If its height is 24 cm then find the radius of the cone.



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3. A cylindrical bucket of 32 cm high and with radius of base 18 cm, is filled with sand

completely. 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.



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## Additional Questions Answers

1. If the radii of the circular ends of a conical bucket which is 45 cm high are 28 cm and 7 cm find the capacity of the bucket.



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2. Find the depth of a cylindrical tank of radius 28 m, if its capacity is equal to that of a rectangular tank of size  $28m \times 16m \times 11m$ .



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3. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is



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4. Find the number of coins, 1.5 cm in diameter and 2 mm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.



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5. A spherical ball of iron has been melted and made into small balls. If the radius of each smaller ball is one-fourth of the radius of the



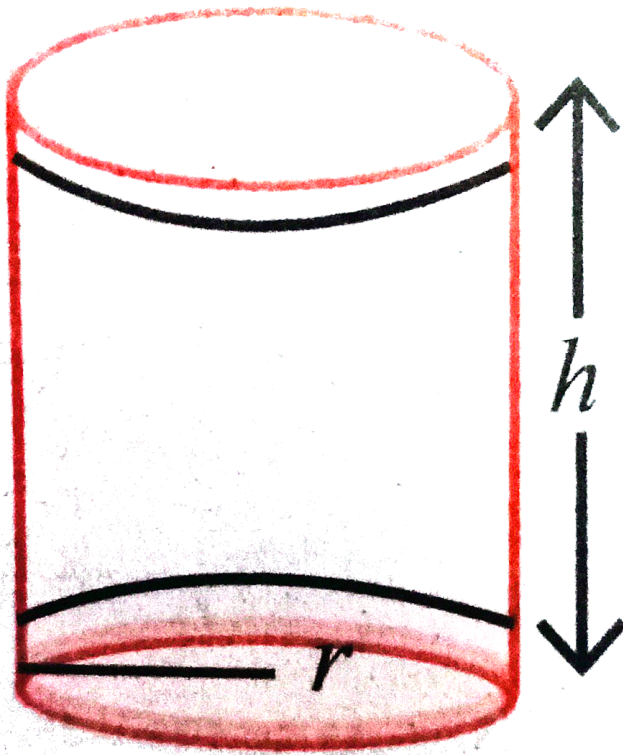
original one, how many such balls can be made ?



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6. A wooden article was made by scooping out a hemisphere from each end of a cylinder as shown in 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.



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1. If two solid hemispheres of same base radius  $r$  units are joined together along their bases, then curved surface area of this new solid is

A.  $4\pi r^2$  sq. units

B.  $6\pi r^2$  sq. units

C.  $3\pi r^2$  sq. units

D.  $8\pi r^2$  sq. units

**Answer: A**



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2. The total surface area of a cylinder whose radius is  $\frac{1}{3}$  of its height is

A.  $\frac{9\pi h^2}{8}$  sq. units

B.  $24\pi h^2$  sq. units

C.  $\frac{8\pi h^2}{9}$  sq. units

D.  $\frac{56\pi h^2}{9}$  sq. units

**Answer: C**



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3. The total surface area of a hemi-sphere is how much times the square of its radius.

A.  $\pi$

B.  $4\pi$

C.  $3\pi$

D.  $2\pi$

**Answer: C**



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4. A shuttle cock used for playing badminton has the shape of the combination of

- A. a cylinder and a sphere
- B. a hemisphere and a cone
- C. a sphere and a cone
- D. frustum of a cone and a hemisphere

**Answer: d**



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5. The height and radius of the cone of which the frustum is a part are  $h^1$  units and  $r_1$  units respectively. Height of the frustum is  $h_2$  units and radius of the smaller base is  $r_2$  units. If  $h_2:h_1 = 1:2$  then  $r_2:r_1$  is

A. 1:3

B. 1:2

C. 2:1

D. 3:1

**Answer: B**





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## Unit Test Section B

1. A hemi-spherical tank of radius 1.75 m is full of water. It is connected with a pipe which empties the tank at the rate of 7 litre per second. How much time will it take to empty the tank completely ?



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2. Find the number of coins, 1.5 cm in diameter and 2 mm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.



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## Unit Test Section C

1. A shuttle cock used for playing badminton has the shape of a frustum of a cone is

mounted on a hemisphere. The diameters of the frustum are 5 cm and 2 cm. The height of the entire shuttle cock is 7 cm. Find its external surface area.



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2. A metallic sheet in the form of a sector of a circle of radius 21 cm has central angle of  $216^\circ$ . The sector is made into a cone by bringing the bounding radii together. Find the volume of the cone formed.



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