MATHS

BOOKS - MTG IIT JEE FOUNDATION

SURFACE AREAS AND VOLUMES

Illustrations

1. Two cubes each of 10cm edge are joined end to end. Find the surface area of the resulting cuboid.

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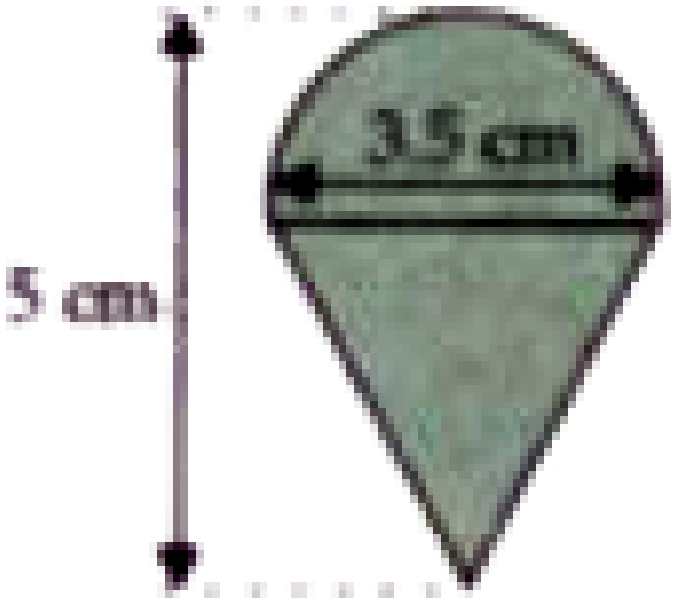
2. Rasheed got a playing top (lattu) as his birthday present,which surprisingly had no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere (see figure).



The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour. (takeπ = 22/7)

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3. A decorative block shown in Fig. 16.50 is made of two solids a cube and a hemisphere. The base of the block is a cube with edge 5 cm, and the hemisphere fixed on the top has a diameter 4.2 cm. Find the total surface area of the block (Take $\pi = 22/7$).

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4. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and the radius of each

hemispherical end is 7 cm, find the cost of polishing its surface at the rate of Rs 2 per dm^2 (takeπ = 22/7)

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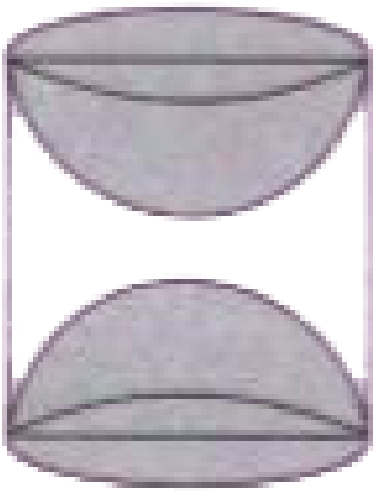
5. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in figure. If the height of the cylinder is 100 cm, and its base is of radius 7

cm, find the total surface area of the article.



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6. 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. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the dif

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7. A solid toy is in the form of a right circular cylinder with a hemispherical shape at one end and a cone at the other end. Their common diameter is 4.2 cm. and the height of the cylindrical and conical portions are 12 cm

and 7 cm respectively. Find the volume of the solid toy. (Use $\pi = 22/7$)

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8. A cone of height 24 cm and radius of base 6 cm is made up of modelling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere.

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9. How many spherical bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter.

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10. Water is flowing at the rate of 5 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 25 m long and 22 m wide. Determine the time in which the level of

water in the tank will rise by 21 cm. (take π = 22/7)

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11. A 10 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 5 m by 11 m. Find the height of the platform.

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12. The radii of the ends of a frustum of a cone 45 cm high are 28 cm and 7 cm. Find its volume, the curved surface area and the total surface area.

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13. A bucket is in the form of a frustum of a cone. Its depth is 15 cm and the diameters of the top and the bottom are 56 cm and 42 cm

respectively. Find how many litres of water the bucket can hold. [Take $\pi = \frac{22}{7}$].

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Solved Examples

1. A wooden toy rocket is in the shape of a cone mounted on a cylinder as shown in Fig. 16.36. The height of the entire rocket is 26 cm, while the height of the conical part is 6 cm. The base of the conical portion has a diameter

of 5 cm, while the base diameter of the cylindrical portion is 3 cm. If the conical portion is to be painted orange and the cylindrical portion yellow, find the area of the rocket painted with each of these colours. (Take $\pi = 3.14$)

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2. Mayank made a bird-bath 30 cm for his garden in the shape of a cylinder with a hemispherical depression at one end (see

figure).

The height of the cylinder is 1.45 m and its

radius is 30 cm. Find the total surface area of the bird-bath. (takeπ = 22/7)

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3. Shanta runs an industry in a shed which is in the shape of a cuboid surmounted by a half cylinder. If the base of the shed is of dimension $7m\ \times\ 15m$, and the height of the cuboidal portion is 8 m, find the volume of air that the shed

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4. Selvis house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (an underground tank) which is in the shape of a cuboid. The sump has dimensions $1.57m \times 1.44m \times 95cm$. The overhead tank has its radius 60 cm and height 95 cm. Find the height of the water left in the underground tank after the overhead tank has been completely filled with water from underground tank which had been full.

Compare the capacity of both the tanks. (take $\pi = 22/7$)

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5. Hanumappa and his wife Gangamma are busy making jaggery out of sugarcane juice. They have processed the sugarcane juice to make the molasses, which is poured into moulds in the shape of a frustum of a cone having the diameters of its two circular

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6. The rainwater from a roof of 22 m x 20 m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just full, find the rainfall in cm.

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7. The perimeter of the ends of a frustum are 48 cm and 36 cm. If the height of the frustum is 11 cm, find its volume.

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8. A container, open from the top, 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 milk which can completely fill the container at the rate of Rs 15 per litre and the cost of metal sheet used, if it costs Rs 5 per 100 cm^2. (takeπ = 22/7)

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9. A hemispherical bowl of internal diameter 36 cm is full of liquid. The liquid is to be filled into cylindrical shaped bottles each of radius 3 cm and height 9 cm. How many bottles are required to empty the bowl?

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10. The height of a cone is 40 cm. A small cone is cut off at the top by a plane parallel to its base. If the volume of a small cone is $\frac{1}{64}$ of

the volume of the given cone, at what height above the base is the section made?

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11. A copper rod of diameter 1 cm and length 8 cm is drawn into a wire of length 18 m of uniform thickness. Find the thickness of the wire.

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12. A solid is hemispherical at the bottom and conical above. If the surface areas of the two parts are equal, then the ratio of its radius and the height of its conical part is $1:3$ (b) $1:\sqrt{3}$ (c) $1:1$ (d) $\sqrt{3}:1$

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13. A solid consists of a circular cylinder with an exact fitting right circular cone placed at the top. The height of the cone is h . If the

total volume of the solid is 3 times the volume of the cone, then the height of the circular cylinder is $2h$ (b) $\frac{2h}{3}$ (c) $\frac{3h}{2}$ (d) $4h$

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14. A solid piece of iron of dimensions 49 cm x 33 cm x 24 cm is moulded into a sphere. Find the radius of the sphere.

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15. A solid 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 so formed.

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Ncert Section Exercise 13 1

1. 2 cubes each of volume 64 cm3 are joined end to end. Find the surface area of the

resulting cuboid

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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.

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3. A toy is in 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.

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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 acylinder with two hemispheres stuck 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.

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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 2.1 m 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. A

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8. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, 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. 16.37. 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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Ncert Section 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 .

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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 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

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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 5 cm and diameter 2.8 cm

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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 o

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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, on

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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 $1cm^3$ of iron has approximately 8 gm mass. (Use $\prod$ = 3.14)

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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 upright in a right circular cylinder full of water such that it touches the bottoms. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm.

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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 $345\,cm^3$. Check whether she is correct, takin

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Ncert Section Exercise 13 3

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

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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.

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3. 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.

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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.

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5. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full 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.

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

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7. A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. This bucket is emptied out 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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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?

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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 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?

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Ncert Section 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.

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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.

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3. A fez, the headgear cap used by the trucks 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.

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4. A container, opened from the top and 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. (takeπ = 3.14)

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5. A solid metallic right circular cone 20 cm high with vertical angle $60o$ is cut into two

parts at the middle point of its height by a plane parallel to the 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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Ncert Section 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 be `8. 88g"\ "p e r"\

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

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3. A cistern, internally measuring 150 cm x 120 cm x 110 cm, has 129600 cu.cm 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 22.5 cm x 7.5 cm x 6.5 cm?

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4. In one fortnight of a given month, there was a rainfall of 10cm in a river valley. If the area of the valley is $7280km^2$. 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 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.

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6. Derive the formula for the curved surface area and total 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.

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Exercise Multiple Choice Questions

1. The volume of a cube is $2744cm^3$. Its surface area is

A. 196 cm^2

B. 1176 cm^2

C. 784 cm^2

D. 588 cm^2

Answer: B

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2. A cubical ice-cream brick of edge 22 cm is to be distributed among some children by filling ice-cream cones of radius 2 cm and height 7

cm up to its brim . How many children will get the ice-cream cones ?

A. 163

B. 263

C. 363

D. 463

Answer: C

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3. The ratio of the total surface area to the lateral surface area of a cylineder with base radius 80 cm and height 20 cm is

A. 1 : 2

B. 2 : 1

C. 3 : 1

D. 5 : 1

Answer: D

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4. The curved surface area of a cylinder is $176cm^2$ and its base area is $38.5cm^2$. Find the volume of the cylinder.

A. 308 cm^3

B. 830 cm^3

C. 803 cm^3

D. None of these

Answer: A

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5. The height of a cylinder is 14 cm and its curved surface area is $264cm^2$. The volume of the cylinder is

A. 296 cm^3

B. 396 cm^3

C. 369 cm^3

D. 503 cm^3

Answer: B

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6. The ratio between the radius of the base and the height of the cylinder is 2:3. If its volume is 1617 cm^3 , the total surface area of the cylinderical is

A. 208 cm^2

B. 77 cm^2

C. 707 cm^2

D. 770 cm^2

Answer: D

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7. If the ratio of the volumes of the spheres is 8:27, then the ratio of their surface areas is a) $4:9$ b) $9:4$ c) $4:3$ d) $2:9$

A. 2 : 3

B. 4 : 27

C. 8 : 9

D. 4 : 9

Answer: D

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8. The curved surface area of a cylindrical pillar is 264 m^2 and its volume is 924 m^3 . The height of the pillar is

A. 3 m

B. 4 m

C. 6 m

D. 8 m

Answer: C

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9. The radii of the bases of a cylinder and a cone are in the ratio of 3:4 and their heights are in the ratio 2 : 3. Find the ratio of their volumes.

A. 9 : 8

B. 9 : 4

C. 3 : 1

D. 27 : 64

Answer: A

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10. The base radius of the cylinder is 1 2/3 times its height. The cost of painting its C.S.A. at 2 paise/cm^2 is Rs 92.40. The volume of the cylinder is

A. 80850 cm^3

B. 88850 cm^3

C. 80508 cm^3

D. None of these

Answer: A

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11. A cylindrical vessel contains 49.896 litres of liquid. Cost of painting its C.S.A. at 2 paise/sq. cm is Rs 95.04. Then, its total surface area is

A. 5724 cm^2

B. 7524 cm^2

C. 5742 cm^2

D. None of these

Answer: B

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

A. 1.5 cm

B. 2 cm

C. 3 cm

D. 2.5 cm

Answer: D

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13. The cost of painting the T.S.A. of a cone at 5 paise/ cm2 is Rs 35.20. If its slant height is 25 cm, then its volume is

A. 1223 cm^3

B. 1232 cm^3

C. 1323 cm^3

D. 1332 cm^3

Answer: B

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14. A piece of metal pipe is 77 cm long with inside diameter of the section as 4 cm. If the

outer diameter is 4.5 cm and the metal weighs 8 gm/cm^3 , the weight of the pipe is

A. 2.057 kg

B. 20.57 kg

C. 205.7 kg

D. None of these

Answer: A

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15. How many balls, each of radius 1 cm, can be made from a solid sphere of lead of radius 8 cm?

A. 60

B. 512

C. 4096

D. 8

Answer: B

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16. A circus tent is cylindrical to a height of 4 m and conical above it. If its diameter is 105 m and its slant height is 40 m, the total area of the canvas required in m^2 is (a) 1760 (b) 2640 (c) 3960 (d) 7920

A. 7920 m^2

B. 7820 m^2

C. 9720 m^2

D. 2645 m^2

Answer: A

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17. A glass cylinder with diameter 20 cm has water to a height of 9 cm. A metal cube of 8 cm edge is immersed in it completely. Calculate the height by which water will rise in the cylinder. $(Take\ \pi = 3.142)$

A. 1.6 cm

B. 2.5 cm

C. 1 cm

D. 2.6 cm

Answer: A

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18. A solid sphere of radius r is melted and cast into the shape of a solid cone of height r , the radius of the base of the cone is $2r$ (b) $3r$ (c) r (d) $4r$

A. 2r

B. 3r

C. r

D. 4r

Answer: A

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19. The material of a cone is converted into the shape of a cylinder of equal radius. If height of the cylinder is 5 cm, then height of the cone is

(a) 10 cm (b) 15 cm (c) 18 cm (d) 24 cm

A. 10 cm

B. 15 cm

C. 18 cm

D. 24 cm

Answer: B

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20. A cylindrical vessel 16 cm high and 9 cm as the radius of the base, is filled with sand. This vessel is emptied on the ground and a conical

heap of sand is formed. If the height of the conical heap is 12 cm, the radius of its base is

A. 12 cm

B. 18 cm

C. 36 cm

D. 48 cm

Answer: B

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21. A right triangle with sides 3 cm, 4 cm and 5 cm is rotated about the side of 3 cm to form a cone. The volume of the cone so formed is $12\pi\ cm^3$ (b) $15\pi\ cm^3$ (c) $16\pi\ cm^3$ (d) $20\pi\ cm^3$

A. $12\pi cm^3$

B. $15\pi cm^3$

C. $16\pi cm^3$

D. $20\pi cm^3$

Answer: C

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22. The volume 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 $\frac{4}{3}\pi$ (b) $\frac{10}{3}\pi$ (c) 5π (d) $\frac{20}{3}\pi$

A. 4/3 πcm^3

B. 10/3 πcm^3

C. $5\pi cm^3$

D. 20/3 πcm^3

Answer: A

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23. 12 spheres of the same size are made from melting a solid cylinder of 16 cm diameter and 2 cm height. The diameter of each sphere is $\sqrt{3}cm$ (b) $2\ cm$ (c) 3 cm (d) 4 cm

A. $\sqrt{2}$ cm

B. 2 cm

C. 3 cm

D. 4 cm

Answer: D

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24. A rectangular sheet of paper 44 cm x 18 cm is rolled along its length and a cylinder is formed. The volume of the cylinder so formed is equal to (Take π= 22/7)

A. 2772 cm^3

B. 2506 cm^3

C. 2460 cm^3

D. 2672 cm^3

Answer: A

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25. The radius and slant height of a cone are in the ratio of 4:7. If its curved surface area is $792cm^2$, find its radius. $\left(Use\pi = \frac{22}{7}\right)$

A. 10 cm

B. 8 cm

C. 12 cm

D. 6 cm

Answer: C

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26. A toy is in the form of a cone mounted on a hemisphere of radius 7 cm. The total height of

the toy is 14.5 cm. Find the volume of the toy.

(Take π= 22/7)

A. 539/6 cm^3

B. 3311/3 cm^3

C. 847/6 cm^3

D. 200 cm^3

Answer: B

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27. A bucket is in the form of a frustum of a cone and holds 28.490 litres of water. The radii of the top and bottom are 14 cm and 21 cm respectively. Find the height of the bucket.

A. 29.2 cm

B. 10 cm

C. 20.9 cm

D. 25 cm

Answer: A

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28. A cone, a hemisphere and a cylinder stand on equal bases and have the same height. The ratio of their volumes is

A. 3 : 2 : 1

B. 2 : 3 : 1

C. 1 : 2 : 3

D. 3 : 1 : 2

Answer: C

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29. Two metallic right circular cones having their heights 4.1 cm and 4.3 cm and the radii of their bases 2.1 cm each, have been melted together and recast into a sphere. Find the diameter of the sphere.

A. 3.5 cm

B. 4.2 cm

C. 4.9 cm

D. 5.6 cm

Answer: B

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30. A cylindrical container whose diameter is 12 cm and height is 15 cm, is filled with ice cream. The whole ice cream is distributed to 20 children in equal cones having hemispherical tops. If the height of the conical portion is twice the diameter of its base, then the diameter of the ice cream cone is

A. 15.7 cm

B. 12.8 cm

C. 9 cm

D. 4.7 cm

Answer: D

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31. A cube whose edge is 20 cm long, has circles on each of its faces painted black. What is the total area of the unpainted surface of

the cube, if the circles are of the largest possible areas?

A. 90.72 cm^2

B. 256.72 cm^2

C. 330.3 cm^2

D. 516 cm^2

Answer: D

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32. In a swimming pool measuring 90 m by 40 m, 150 men take a dip. If the average displacement of water by a man is $8m^3$, what will be the rise in water level?

A. 27.33 cm

B. 30 cm

C. 31.33 cm

D. 33.33 cm

Answer: D

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33. If the areas of the adjacent faces of a rectangular block are in the ratio 2:3:4 and its volume is $9000\,cm^3$, then the length of the shortest edge is 30 cm (b) 20 cm (c) 15 cm (d) 10 cm

A. 10 cm

B. 12 cm

C. 15 cm

D. 18 cm

Answer: C

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34. Metallic spheres of radii 7 cm, 9 cm and 11 cm respectively are melted to form a single solid sphere. The radius of the resulting sphere is

A. 10 cm

B. 8.6 cm

C. 11.5 cm

D. 13.39 cm

Answer: D

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35. The number of spherical bullets that can be made out of a solid cube of lead whose edge measures 88 cm, each bullet being 4 cm in diameter, is

A. 25000

B. 25440

C. 20328

D. 25140

Answer: C

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36. The height of a conical tent is 14 m and its floor area is 346.5 m^2 . How much canvas , 1.1 m wide , will be required for it

A. 490 m

B. 525 m

C. 665 m

D. 860 m

Answer: B

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37. A solid metallic sphere of diameter 21 cm is melted and recast into a number of smaller

cones, each of diameter 3.5 cm and height 3 cm. Find the number of cones so formed.

A. 405

B. 540

C. 504

D. None of these

Answer: C

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38. The diameter of a sphere is 6 cm. It is melted and drawn into a wire of diameter 2 mm. The length of the wire is

A. 12 m

B. 18 m

C. 36 m

D. 66 m

Answer: C

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39. If a cone is cut into two parts by a horizontal plane passing through the mid-point of its axis, then the ratio of the volumes of the upper part and the given cone is

A. 1 : 2

B. 1 : 4

C. 1 : 6

D. 1 : 8

Answer: D

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

A. 48 minutes 15 secs

B. 51minutes12 secs

C. 52 minutes 1 sec

D. 55 minutes

Answer: B

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41. A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The radius and height of the cylindrical part are 5 cm and 12 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Find the surface area of th e toy, if the total height of the toy is 30 cm.

A. 245.35 cm^2

B. 700.16 cm^2

C. 752.71 cm^2

D. 500.27 cm^2

Answer: C

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42. A mason constructs a wall of dimension $270cm \times 300cm \times 350cm$ with the bricks each of size $22.5cm \times 11.25cm \times 8.75cm$ and

it is assumed that $\frac{1}{8}$ space is coverd by the mortra. Then, the number of bricks used to construct the wall is .

A. 11100

B. 11200

C. 11000

D. 11300

Answer: B

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43. Twelve solid spheres of the same size are made by melting a solid metallic cylinder of base diameter 2 cm height 16 cm . The diameter of each sphere is .

A. 4 cm

B. 3 cm

C. 2 cm

D. 6 cm

Answer: C

Watch Video Solution

44. The radii the top and bottom of a bucket of slant height 45 cm are 28 cm and 7 cm respectively . The curved surface area of the bucket is

A. 4950 cm^2

B. 4951 cm^2

C. 4952 cm^2

D. 4953 cm^2

Answer: A

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45. A medicine -capsule is the shape of a cylinder of diameter 0.5 cm with two hemisphere stuck to each of its ends. The length of entire capsule is 2cm. The capacity of the capsule is

A. 0.36 cm^3

B. 0.35 cm^3

C. 0.34 cm^3

D. 0.33 cm^3

Answer: A

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46. A juice seller was serving his customers using glasses. The inner diameter of the cylindrical glass was 5 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was 10

A. 32.71 cm^3

B. 196.25 cm^3

C. 163.54 cm^3

D. 129 cm^3

Answer: C

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47. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank which is 10 min diameter and 2 m deep. If

the water flows through the pipe at the rate of 4 km per hour, in how much time will the tank be filled completely?

A. 1/4 hour

B. 3/4 hour

C. 1/2 hour

D. 1 1/4 hour

Answer: D

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48. An open metal bucket is in the shape of a frustum of a cone, mounted on a hollow cylindrical base made of the same metallic sheet. The diameters of the two circular ends of the bucket are 45 cm and 25 cm, the total vertical height of the bucket i

A. 4860.9 cm^2

B. 453.2 cm^2

C. 4700 cm^2

D. 3860.2 cm^2

Answer: A

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49. A building is in the form of a cylinder surmounted by a hemispherical vaulted dome which contains 17.7 m3 of air and its internal diameter is equal to the height of the crown of the vault above the floor. Find the height of the building (Take π= 22/7)

A. 3m

B. 1 m

C. 12 m

D. 9 m

Answer: A

View Text Solution

50. A metal sheet 27 cm long, 8 cm broad and 1 cm thick is melted into a cube. The difference between surface areas of two solids is

A. 284 cm^2

B. 285 cm^2

C. 286 cm^2

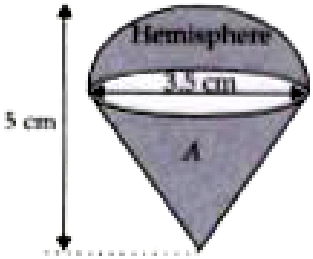
D. 287 cm^2

Answer: C

View Text Solution

Exercise Match The Following

1. For the given figure, match the lists:



List-I	List-II
(P) Curved surface area of hemisphere is	(1) 3.25 cm
(Q) Height of cone is	(2) $77/4$ cm^2
(R) Slant height of cone is	(3) 3.7 cm
(S) Surface area of figure is	(4) 39.6 cm^2

A. P-1, Q-2, R-3, S-4

B. P-2, Q-1, R-3, S-4

C. P-3, Q-2, R-1, S-4

D. P-1, Q-2 R-4, S-3

Answer: B

View Text Solution

2. Match the following :

List-I	List-II
(P) Volume of the largest sphere cut out from a cuboid of edge l units is $\frac{1}{k}\pi l^3$ cubic units. Find k.	(1) 7
(Q) Number of balls each of radius 0.5 cm can be made from a sphere of radius 10 cm is	(2) 6
(R) Three cubes each of side 4 cm joined end to end. Surface area of resulting cuboid (in cm^2) is	(3) 8000
(S) Radius of the sphere whose surface area is 616 cm^2 (in cm) is	(4) 224

A. P-2, Q-3, R-4, S-1

B. P-1, Q-2, R-3, S-4

C. P-4, Q-2, R-1, S-3

D. P-3, Q-4, R-1, S-2

Answer: A

View Text Solution

3. Match the following :

List-I	List-II
(P) Length of the longest pole that can be kept in a room 12 m × 9 m × 8 m (in cm) is	(1) 25
(Q) The volume of a cube is 2744 cm^3. Its surface area (in cm^2) is	(2) 27
(R) Each edge of a cube is increased by 50%, then percentage increase in surface area is 5K %. Find K.	(3) 1176
(S) A cube of side 6 cm is cut into a number of cubes of side 2 cm. Number of cubes is	(4) 17

A. P-2, Q-1, R-4, S-3

B. P-4, Q-3, R-2, S-1

C. P-4, Q-3, R-1, S-2

D. P-1, Q-2, R-3, S-4

Answer: C

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Exercise Assertion And Reason Type

1. Assertion : From a solid cylinder whose height is 12 cm and diameter 10 cm a conical cavity of same height and same diameter is hollowed out. Volume of the cone is 2200 cm^3.

Reason : If a conical cavity of same height and same diameter is hollowed out from a cylinder

of height h and base radius r, then volume of the cone is equal to 1/2 of the 2 cylinder.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C

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2. Assertion : A plane parallel to the base of a cone divides its height in the ratio 1 : 2 starting from the vertex. Ratio of the volume of upper part to the frustum is 1 : 25.

Reason : Ratio of the radius of the base to radius of the upper part is 3 : 1.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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3. Assertion : The sum of the length, breadth and height of a cuboid is 19 cm and its diagonal is $5\sqrt{5}$ cm. Its surface area is 236 `cm^(2).

Reason : The lateral surface area of a cuboid is 2(l + b).

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C

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4. Assertion : If the areas of three adjacent faces of a cuboid are x, y, z respectively then the volume of the cuboid is `sqrt(xyz).

Reason : Volume of a cuboid whose edges are l, b and h is lbh units.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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5. Assertion : The volume of a hall, which is 5 times as high as it is broad and 8 times as long as it is high, is 12.8 m^3 . The breadth of the hall is 25 cm.

Reason : The total surface area of a cuboid of length (l), breadth (b) and height (h) is 2[lb + bh + lh].

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

View Text Solution

Exercise Comprehension Type

1. The diameter of the largest sphere which can be carved out of a cube of side a units is a units.

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

A. $180cm^3$

B. $160cm^3$

C. $90cm^3$

D. $80cm^3$

Answer: A

View Text Solution

2. The diameter of the largest sphere which can be carved out of a cube of side a units is a units.

Determin e the ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube.

A. $\pi : 6$

B. $6 : \pi$

C. $3 : \pi$

D. $\pi : 3$

Answer: B

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3. The diameter of the largest sphere which can be carved out of a cube of side a units is a units.

Determine the ratio of the largest length of rods that can be fitted in a sphere and cube, given that the sphere exactly fits inside the cube.

A. $\sqrt{3}:1$

B. $1:\sqrt{3}$

C. $1:1$

D. $2:1$

Answer: B

View Text Solution

4. If h is the height, I the slant height and r_1, r_2 radii of the circular bases of the frustum of a cone, then slant height of the frustum =

$\sqrt{(r_1 - r_2)^2 + h^2}$. Find the height of the cone of which the frustum is a part = (hr_1/($r_1 - r_2$).We have a bucket in the form of frustum of a cone in which h = 8 cm, r_1 = 9 cm and r_2 = 3 cm.

A. 12 cm

B. 9 cm

C. 11 cm

D. 8 cm

Answer: A

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5. If h is the height, I the slant height and r_1, r_2 radii of the circular bases of the frustum of a cone, then slant height of the frustum = $\sqrt{(r_1 - r_2)^2 + h^2}$. Height of the cone of which the frustum is a part = (hr_1/($r_1 - r_2$).We have a bucket in the form of frustum of a cone in which h = 8 cm, r_1 = 9 cm and r_2 = 3 cm. Find its volume.

A. $321\pi cm^3$

B. $312\pi cm^3$

C. $108\pi cm^3$

D. $324\pi cm^3$

Answer: B

Watch Video Solution

6. If h is the height, I the slant height and r_1, r_2 radii of the circular bases of the frustum of a cone, then slant height of the frustum = $\sqrt{(r_1 - r_2)^2 + h^2}$. Height of the cone of

which the frustum is a part = $(hr_1/(r_1 - r_2$).We have a bucket in the form of frustum of a cone in which h = 8 cm, r_1 = 9 cm and r_2 = 3 cm.

A. $109\pi cm^2$

B. $129cm^2$

C. $129\pi cm^2$

D. $105cm^2$

Answer: C

View Text Solution

7. A hemispherical bowl of internal radius 9 cm is full of liquid. This liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are necessary to empty the bowl?

A. 54

B. 27

C. 36

D. 18

Answer: A

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8. If x cubic units of a liquid is filled in n cylindrical shaped containers of radius rand height h then n =x/$\pi r^2 h$. If x cubic units of solid material is nr h consumed for making n spherical balls of radius r. Then n= 3x/4πr^3

The base radius and height of a right circular solid cone are 12 cm and 24 cm respectively. It is melted and recast into spheres of diameter 6 cm each. Find the number of spheres so formed.

A. 64

B. 32

C. 16

D. 20

Answer: B

View Text Solution

9. If x cubic units of a liquid is filled in n cylindrical shaped containers of radius rand height h then n =x/$\pi r^2 h$. If x cubic units of

solid material is nr h consumed for making n spherical balls of radius r. Then n= 3x/4πr^3

If 21560 cubic cm of a liquid is filled in some cylindrical shaped container of radius 7 cm and height 14 cm. Find the number of such containers.

A. 5

B. 10

C. 15

D. 7

Answer: B

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Exercise Subjective Problems Very Short Answer Type

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

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2. The length of a cold storage is double its breadth. Its height is $3\ metres$. The area of its four walls (including doors) is $108\ m^2$. Find its volume.

Watch Video Solution

3. The radii of the internal and external surfaces of a metallic spherical shell are 3 cm and 5 cm respectively. It is melted and recast into a solid right circular cylinder of height

$10\frac{2}{3}$ cm. Find the diameter of the base of the cylinder.

Watch Video Solution

4. Find the number of coins, 1.5 cm in diameter and 0.2 cm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.

Watch Video Solution

5. A cone and a cylinder of equal radius and height 20 cm are melted and recast into a sphere of diameter 10 cm. Find the radius of the cone.

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6. The total surface area of a cube is 32 $2/3m^2$. Find the volume of cube.

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7. The side of solid metallic cube is 50 cm. The cube is melted and recast into 8000 equal solid cubical dice. Determine the side of the dice.

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8. The diameter of a garden roller is 1.4 m and it is 2 m long. How much area will it cover in 5 revolutions? (a) 36 m2 (b) 40 m2 (c) 44 m2 (d) 48 m2

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9. The surface area of the three coterminus faces of a cuboid are 6, 15 and 10 cm^2 respectively. The volume of the cuboid is

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10. If curved surface area of cylinder is equal to its volume. What is the radius of cylinder?

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Exercise Subjective Problems Short Answer Type

1. A solid iron rectangular block of dimensions 4.4m, 2.6m and 1m is cast into a hollow cylindrical pipe of internal radius 30cm and thickness 5cm. Find the length of the pipe.

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2. Three metal cubes whose edges measure $3cm,\ 4cm\ and\ 5cm$ respectively are melted to

form a single cube. Find its edge. Also, find the surface area of the new cube.

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3. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per second. How much time will it take to make the tank half-empty, if the tank is 3 m in diameter?

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4. If the diameter of cross-section of a wire is decreased by 5% how much percent will the length be increased so that the volume remains the same?

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5. The radius of the base of a right circular cone is r. It is cut by a plane parallel to the base at a height h from the base. The distance of the boundary of the surface from the centre

of the base of the frustum is $\sqrt{h^2 + \frac{r^2}{9}}$. Show that the volume of the frustum is $13/27\pi r^2 h$.

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

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7. A sector of a circle of radius 15 cm has the angle 120°. It is rolled up so that two bounded radii are joined together to form a cone. Find the volume of the cone. (Take π = 22/7)

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8. The internal and external diameters of a hollow hemispherical vessel are 24cm and 25cm respectively. The cost to paint $1cm^2$ the surface is Rs. 0.05. Find the total cost to paint the vessel all over. $\left(use\pi = \frac{22}{7}\right)$

Watch Video Solution

9. A metal cube of 9 cm edge is melted and recast into three smaller cubes. If the edge of

two of the smaller cubes are 1 cm and 6 cm. Find the edge of the third cube.

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10. The height of a cone is 5 m. Find the height of a cone whose volume is sixteen times its volume and radius equal to its diameter.

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Exercise Subjective Problems Long Answer Type

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

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2. A led pencil consists of a cylindner of wood with a solid cylinder of graphite filled into it. the diameter of pencil is 7mm, the diameter of

graphite is 1 mm and the length of the pencil is 10cm. Calculate the weight of the whole pencil, if the specific gravity of the wood is $0.7\frac{gm}{(cm)^3}$ and that of graphite is $2.1\frac{gm}{(cm)^3}$

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3. The height of a right circular cone is trisected by two planes drawn parallel to the base. Show that the volumes of the three portions starting from the top are in the ratio 1:7:19.

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4. A Hollow cone is cut by a plane parallel to the base and upper portion is removed. If the curved surface of the remainder is 8/9 of the curved surface of the whole cone; find the ration of the line-segment into which the cone's altitude is divided by the plane.

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Exercise Integer Numerical Value Type

1. 247 Three cubes of side 4 cm each are joined end to end to form a cuboid. The surface area of theresulting cuboid and total surface area of the three cubes are in the ratio:(B) 7:3(C) 7:9(D) 9:7

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2. The volume of metallic cylindrical pipe is $748\ cm^3$. Its length is 14cm and its external radius is 9cm. Find its thickness.

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3. The surface area of a sphere is same as the curved surface area of a right circular cylinder whose height and diameter are 6 cm each. What is the radius (in cm) of the sphere?

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4. How many sphere 12 cm in diameter can be made from a metallic cylinder of diameter 8 cm and height 90 cm ?

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5. A metallic hemisphere is melted and recast in the shape of a cone with the same base radius R as that of the hemisphere. If H is the height of the cone, then write the value of H / R.

Watch Video Solution

6. A hollow sphere of internal and external diameters 4 cm and 8 cm respectively is melted into a cone of base diameter 8 cm. Calculate the height of the cone.

Watch Video Solution

7. The number of solid spheres, each of diameter 6 cm that could be moulded to form a solid metal cylinder of height 45 cm and diameter 4 cm, is (a) 3 (b) 4 (c) 5 (d) 6

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8. If the curved surface area of a solid right circular cylinder of height h and radius r is one-third of its total surface area, then h = (1/k)r, find k.

Watch Video Solution

9. The surface area of a sphere is same as the curved surface area of a right circular cylinder whose height and diameter are 12 cm each.

The radius of the sphere is (a) 3 cm (b) 4 cm (c) 6 cm (d) 12 cm

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10. The radius and height of a cylinder are in the ratio 5:7 and its volume is 550 cm^2 Find its radius.

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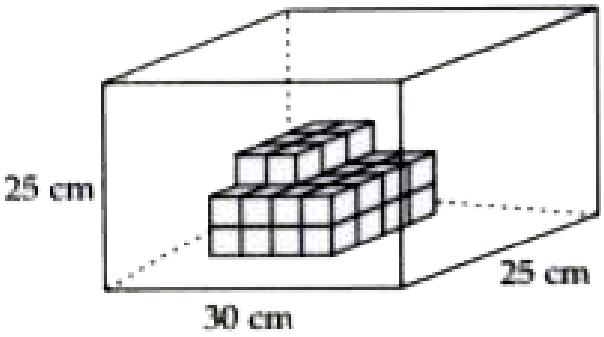
Olympiad Hots Corner

1. Kunal arranged some metal blocks at the bottom of a tank as seen in the figure below. Then he filled the 30 cm by 25 cm by 25 cm tank with water. If each block is 4 cm long, 3 cm wide and 5 cm tall, then how much water is needed to fill the tank to 80% of the tank's height?



A. 15000 cm^3

B. 2280 cm^3

C. 12720 cm^3

D. 16470 cm^3

Answer: C

Watch Video Solution

2. A solid rectangular block has a square base with side $\left(\sqrt{3}-\sqrt{2}\right)$ m. The volume of the block is $\left(3\sqrt{18}-7\sqrt{3}\right)m^3$. Find the height of

the block in the form $\left(a\sqrt{2}+b\sqrt{3}\right)$ m, where a and b are integers.

A. $\left(3\sqrt{2}-\sqrt{3}\right)$ m

B. $\left(5\sqrt{3}+4\sqrt{2}\right)$ m

C. $\left(15\sqrt{2}+\sqrt{3}\right)$ m

D. $\left(5\sqrt{5}+3\sqrt{3}\right)$ m

Answer: A

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3. A cone and a hemisphere have equal bases and equal volumes. The ratio of their heights is

A. $1 : \sqrt{4}$

B. $2 : 1$

C. $4 : 1$

D. $\sqrt{2} : 1$

Answer: B

Watch Video Solution

4. Three solid spheres of radii 3, 4 and 5 cm respectively are melted and converted into a single solid sphere. Find the radius of this sphere.

A. 12 cm

B. 9 cm

C. 8 cm

D. 6 cm

Answer: D

Watch Video Solution

5. Two solid right circular cones have the same height. The radii of their bases are a and b. They are melted and recast into a cylinder of same height. The radius of the base of the cylinder is

A. $\frac{a+b}{\sqrt{3}}$

B. $\frac{a+b}{3}$

C. $\frac{\sqrt{(a^2+b^2)}}{3}$

D. $\sqrt{\frac{a^2+b^2}{3}}$

Answer: D

Watch Video Solution

6. The circumference of the base of a cylindrical vessel is 132 cm and its height is 25cm. How many litres of water can it hold?

A. 34.11

B. 45.4

C. 24.65

D. 34.65

Answer: D

Watch Video Solution

7. A right circular cylinder whose diameter is equal to its height, is inscribed in a right circular cone of base diameter 16 cm and height 3 times the base diameter. The axes of both solids coincide. What is the volume (in cm^3) of the solid inside the cone but outside the cylinder?

A. 296π

B. 512π

C. 432π

D. 592π

Answer: D

Watch Video Solution

8. The side of solid metallic cube is 20 cm. The cube is melted and recast into 8 equal solid cubical dice. Determine the side of the dice.

A. 7 cm

B. 9 cm

C. 8 cm

D. 10 cm

Answer: D

Watch Video Solution

9. A solid 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 1/12 cm, find the length of the wire.

A. 2440 m

B. 2560 m

C. 4480 m

D. 3280 m

Answer: C

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10. V_1, V_2, V_3 are the volumes of four cubes of side lengths x cm, 2x cm, 3x cm and 4x cm respectively. Some statements regarding these 4 volumes are shown here. Which of the given statements are correct?

A. (1) and (2) only

B. (2) and (3) only

C. (1) and (3) only

D. (1), (2) and (3)

Answer: D

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11. Read the statements carefully and select the correct option.

Statement-I : If a hemisphere of lead of radius 7 cm is melted and recast into a right circular cone of height 49 cm, then the radius of the base is 7 cm.

Statement-II: Lead spheres of diameter 6 cm are dropped into a cylindrical beaker containing some water and are fully submerged. If the diameter of the beaker is 18

cm and water rises by 40 cm, then the number of lead spheres dropped in the water is 40.

A. Both Statement-I and Statement-II are false.

B. Both Statement-I and Statement-II are true.

C. Statement-I is true but Statement-II is false.

D. Statement-I is false but Statement-II is true.

Answer: A

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12. The height of a hollow cylinder is 14 cm. If external diameter is 16 cm and total curved surface area of the hollow cylinder is 1320 sq. cm, then its internal diameter is

A. 14 cm

B. 16 cm

C. 7 cm

D. 8 cm

Answer: A

 Watch Video Solution

13. Find the capacity of a glass which is in the shape of frustum of height 14 cm and diameters of both circular ends are 4 cm and 2 cm.

A. 308/3 cm^3

B. 298/21 cm^3

C. 112 cm^3

D. 398/21 cm^3

Answer: A

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14. If the diameter of sphere is decreased by 25%, then by what percent the curved surface area will be decreased?

A. 34 3/4%

B. 75%

C. 25%

D. 43 3/4%

Answer: D

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15. Study the statements given below and decide which of the statements is/ are necessary to answer the given question?

What is the capacity of the cylindrical tank?

I. The area of the base is 61600 sq. cm.

II. The height of the tank is 1.5 times the radius.

III. The circumference of base is 880 cm.

A. Only I and II

B. Only II and III

C. Only I and Ill

D. Only II and either I or III

Answer: D

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16. A reservoir in the form of the frustum of a right circular cone contains 44×10^7 litres of water which fills it completely. The radii of the bottom and top of the reservoir are 50 metres and 100 metres respectively. Find the depth of water and the lateral surface area of the reservoir. (Take $\pi = 22/7$)

A. 32150.2 m^2

B. 17264.2 m^2

C. 26145.42 m^2

D. none of these

Answer: C

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17. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of base of each of cone and cylinder is 8 cm. The cylindrical part is 240 cm high and the conical

part is 36 cm high. Find

(i) The volume of iron used

(ii) The weight of pillar, if 1 cm3 of iron weighs 10g.

	(i)	(ii)
(a)	$50688\ cm^3$	826.65 kg
(b)	$42652\ cm^3$	705.23 kg
(c)	$50688\ cm^3$	506.88 kg
(d)	$42652\ cm^3$	710.33 kg

View Text Solution

18. A cone of height 8m has a curved surface area 188.4 square metres. Find its volume.

(Take $\pi = 3.14$)

A. 200 m^3

B. 201.88 m^3

C. 300 m^3

D. 301.44 m^3

Answer: D

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19. A small terrace at a uphill temple has 100 steps each of which is 108 m long and built of solid concrete. Each step has a rise of 1/3 m and has a tread of 2/3 m. The total volume of the concrete required to build the terrace will be

A. 188100 m^3

B. 256000 m^3

C. 144000 m^3

D. 121200 m^3

Answer: D

Watch Video Solution

20. The diameter of the base of a cylindrical metal block is 6.6 cm and its height is 0.4 m. How many discs of diameter 2.2 cm and height 0.2 cm can be formed from this metal block?

A. 180

B. 600

C. 1200

D. 1800

Answer: D

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