



# MATHS

## BOOKS - CENGAGE

### SURFACE AREAS AND VOLUMES

#### Worked Examples

1. A carton box of length 40 cm, breadth 20 cm, and height 30 cm has to be made from the cardboard. What is the area of the area of the

sheet required to make the box? What will be the capacity of the box after it is made?



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2. What is the cost of painting the walls and roof of a room measuring  $4m \times 3m \times 4m$  at  $\text{₹}20/m^2$ ?



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3. A conical circus tent has to be erected with a base diameter of 70 m and height 21 m. If canvas costs  $50/m^2$ , what will be the total cost of the tent?



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4. Four times the sum of the area of the top and bottom of a circular cylinder is equal to twice the curved surface area. If the height of the cylinder is 8 cm, what is its diameter?





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5. How many cubes of side 2 cm should be dropped into a cylindrical tube of radius 14 cm so as to increase the water level by 5 cm?



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## Test Yourself Level 1

1. What is the height of a rectangular vessel of length 12 cm and breadth 8 cm if the vessel

can hold 576 cc of oil?



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2. A circular cylinder of capacity 480 cc is full of water. Water from the cylinder is pured into a conical tin of the same diameter and same height. How much water will overflow?



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3. A thick hemispherical vessel has outer diameter 18 cm and thickness 1 cm. How much water can the vessel hold? (tak  $\pi$  as 3.14)



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4. What is the volume of a conical filter paper of height 7 cm and radius 1.5cm? (take  $\pi$  as  $\frac{22}{7}$ )



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5. What is the length of each side of an ice cube of volume 27 cm<sup>3</sup>?



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## Test Yourself Level 2

1. A cardboard carton of length 1 m, breadth 50 cm, and height 60 cm with an open top has to be made. What is the area of the cardboard required?



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2. What length of canvas of width 2 m is required to make a conical tent 8 m diameter and 5.6 m slant height?

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3. Find the volume of a pyramid whose base is a square of side 6 cm and height 20 cm.

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## Test Yourself Level 3

1. A room has dimensions  $10\text{ m} \times 7.2\text{ m} \times 5.4\text{ m}$ , and the thickness of the walls is  $60\text{ cm}$ . The room has two doors of dimensions  $2.4\text{ m} \times 1.2\text{ m}$  each and four windows of dimensions  $1.8\text{ m} \times 0.9\text{ m}$  each. If the bricks used are of size  $22.5\text{ cm} \times 10\text{ cm} \times 5\text{ cm}$ , how many bricks have been used?



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2. The outer length, breadth, and height of a rectangular box are 36, 30, and 12 cm, respectively, and the thickness of the wood used is 1 cm. If the weight of one cc of wood?



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3. A hollow cylindrical tube opens at both ends is made of iron 2 cm thick. If the outer diameter is 50 cm and the length of the tube is 140 cm, find the number of cc of iron in it.





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4. The diameter of a roller is 98 cm and its length is 1.2 m. If the roller makes 600 revolutions to move once to level a playground, what is the area of the playground?



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5. 27 solid steel balls each of radius 2 cm are melted and cast into a single ball. What is the

radius and surface area of this single ball?



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## Test Yourself Mcq

1. If the radius of a sphere is 3 cm, then ratio of its surface area and volume is

A. 1 : 1

B. 1 : 3

C. 3 : 2

D. 1:2

**Answer: A**



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2. Two cubes of volume  $27 \text{ cm}^3$  are joined end to end. Find the total surface area of resulting cuboid.

A.  $45\text{cm}^2$

B.  $90\text{cm}^2$

C.  $144\text{cm}^2$

D.  $54\text{cm}^2$

**Answer: B**



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3. Two cubes each of surface area  $54\text{cm}^2$  are joined end to end. Volume of resulting cuboid is

A.  $54\text{cm}^3$

B.  $108\text{cm}^3$

C.  $81\text{cm}^3$

D.  $27\text{cm}^3$

**Answer: A**



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4. Diagonal of a cube is  $\sqrt{3}\text{cm}$ , then its volume is

A.  $1\text{cm}^3$

B.  $3\sqrt{3}cm^3$

C.  $6\sqrt{5}cm^3$

D. none of these

**Answer: A**



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5. A sphere of radius 5 cm is cut by a plane at a distance of 4 cm from its centre. Find the radius of circular section hence formed.



A. 3 cm

B. 5 cm

C. 4 cm

D. 6 cm

**Answer: A**



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6. Find the volume of a triangular prism if its base is equilateral triangle of side length 2 cm and height  $\sqrt{3}cm$ .

A.  $3cm^3$

B.  $\sqrt{3}cm^3$

C.  $3\sqrt{3}cm^3$

D.  $9cm^3$

**Answer: A**



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7. Volume of a square prism is  $96cm^3$ . If side length of base is 4 cm then find its height.

A. 6 cm

B. 8 cm

C. 16 cm

D. 12 cm

**Answer: A**



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**8.** A solid cylinder of radius  $r$  and height  $h$  is melted and casted into a cone. If radius of cone is  $\left(\frac{r}{2}\right)$  then find its height.

A. 4 h

B. 6 h

C. 12 h

D. 8 h

**Answer: C**



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**9.** Area of the base of a cone is  $25\pi cm^2$  and its curved surface area is  $65\pi cm^2$ . Find the volume of the cone.

A.  $300\pi cm^2$

B.  $200\pi cm^2$

C.  $100\pi cm^2$

D.  $150\pi cm^2$

**Answer: C**



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**10.** Height of a cylinder is 6 cm. Find the height of another cylinder whose volume is 16 times its volume and diameter equal to its radius.

A. 3 m

B. 3.6 m

C. 3.84 m

D. 3.8 m

**Answer: C**



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**11.** If  $n$  spherical balls of radius 2 cm are melted together to form a solid disc of radius 8 cm and height 2 cm then find value of  $n$ .

A. 4

B. 6

C. 12

D. 16

**Answer: C**



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**12.** Find the volume of a hollow cylinder if its outer radius is  $R$ , inner radius is  $r$  and height is  $h$ .

A.  $\frac{1}{3}\pi(R^2 - r^2)h$

B.  $\pi h(R^2 - r^2)$

C.  $\pi h(R^2 + r^2)$

D.  $2\pi h(R - r)$

**Answer: B**



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**13.** A football is just packed in a cubical container of side 12 cm. Then volume of football is



A.  $228\pi cm^3$

B.  $248\pi cm^3$

C.  $288\pi cm^3$

D.  $298\pi cm^3$

**Answer: C**



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14. What is the percentage change in the surface area of a sphere when radius is increased to  $\frac{3}{2}$  times?

A. 225 %

B. 180 %

C. 125 %

D. 200 %

**Answer: C**



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**15.** A hemisphere and a cylinder have common base and cylinder is circumscribing it. If

volume of hemisphere is  $20\text{cm}^3$ , then volume of cylinder is

A.  $20\text{cm}^3$

B.  $30\text{cm}^3$

C.  $40\text{cm}^3$

D.  $50\text{cm}^3$

**Answer: B**



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**16.** Let the dimensions of a cuboid be  $a$ ,  $b$  and  $c$ . If  $v$  is volume and  $s$  is its surface area, then

$$\frac{1}{v} = \frac{k}{s} \left( \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right). \text{ Value of } k \text{ is}$$

A. 4

B. 3

C. 2

D. 1

**Answer: C**



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17. The outer measurement of a closed wooden box is  $30\text{cm} \times 26\text{cm} \times 22\text{cm}$ . If the box is made up of 1 cm thick wood, then find the capacity of box.

A.  $14330\text{cm}^3$

B.  $13440\text{cm}^3$

C.  $21504\text{cm}^3$

D.  $13220\text{cm}^3$

**Answer: B**



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**18.** If the dimensions of a warehouse are 200 m, 100 m and 18 m. How many cartons can be placed in the warehouse if each requires  $360m^3$  of air?

A. 200

B. 1000

C. 700

D. 1200

**Answer: B**



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**19.** Four identical cubes are joined horizontally in a row. Find the ratio of total surface area of new cuboid to sum of surface areas of four cubes.

A. 3:4

B. 4:3

C. 16:9

D. 9: 16

**Answer: A**



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**20.** Let  $h$ ,  $s$  and  $v$  be height, curved surface area and volume, respectively, of a cone. If

$3\pi v h^3 - s^2 h^2 + k v^2 = 0$ , then value of  $k$  is

A. 3

B. 6



C. 9

D. 12

**Answer: C**



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**21.** 100 circular pipes each with radius 14 cm and length 1 m are joined to form a long pipe line.

Volume of pipe line is  $\left( \pi = \frac{7}{22} \right)$

A.  $616m^3$

B.  $6.16m^3$

C.  $61600m^3$

D.  $6166000m^3$

**Answer: B**



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**Olympiad And Ntse Level Exercises**

1. A right triangle with sides 5 cm, 12 cm, and 13 cm is revolved about the side 12 cm. Find the volume of the cone thus formed.

A.  $314\frac{2}{7}cm^3$

B.  $258cm^3$

C.  $300\frac{5}{8}cm^3$

D.  $392\frac{1}{3}cm^3$

**Answer: A**



**View Text Solution**

2. The ratio of the volumes of a cylinder and a cone having equal radii and equal heights is

A. 1 : 1

B. 2 : 1

C. 3 : 1

D. 4 : 1

**Answer: C**



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3. If the radius of a sphere is doubled, what is the ratio of the volume of the first sphere to that of the second?

A. 2 : 8

B. 1 : 2

C. 1 : 3

D. 1 : 8

**Answer: A::D**



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4. How many spherical bullets can be made out of a solid cube of lead whose edge measures 44 cm, if each bullet has radius 2 cm?

A. 3000

B. 2541

C. 1779

D. 2332

**Answer: B**



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5. The largest sphere is carved out of a cube of edge 14 cm. Find the volume of the sphere.

A.  $1370\text{cm}^3$

B.  $1800\text{cm}^3$

C.  $1437\text{cm}^3$

D.  $1734\text{cm}^3$

**Answer: C**



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**6.** Study the given statements:

Statement 1: If each side of cuboid is doubled, its volume will also be doubled.

Statement 2: If the surface areas of two spheres are equal, then their radii are also equal.

A. Both Statement 1 and Statement 2 are true

B. Statement 1 is true and Statement 2 is false



C. Statement 1 is false and Statement 2 is true

D. Both Statement 1 and Statement 2 are false

**Answer: C**



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7. If the volumes of a cone and a cylinder of same base radius are same, then the ratio of their heights is 1 : 3.

- A. (i) (ii) (iii) (iv)  
F T T F
- B. (i) (ii) (iii) (iv)  
T T F F
- C. (i) (ii) (iii) (iv)  
T F T T
- D. (i) (ii) (iii) (iv)  
T F T F

**Answer: D**



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**8.** 20 balls of radius 1 cm can be made from a 320 cm long iron rod of half base radius.

- A. (i) (ii) (iii) (iv)  
F T T F
- B. (i) (ii) (iii) (iv)  
T T F F
- C. (i) (ii) (iii) (iv)  
T F T T
- D. (i) (ii) (iii) (iv)  
T F T F

**Answer:**



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9. 3 ice cubes of side  $\pi$  cm when dropped into a cylindrical glass of base diameter  $2\pi$  cm increase the level of water in the glass by 3 cm.

- A. (i) (ii) (iii) (iv)  
F T T F
- B. (i) (ii) (iii) (iv)  
T T F F
- C. (i) (ii) (iii) (iv)  
T F T T
- D. (i) (ii) (iii) (iv)  
T F T F

**Answer: C**



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**10.** Cost of painting the walls and roof of a 4 m wide, 5 m long and 6 m high room at ₹15 per  $m^2$  is ₹1860.

- A. (i) (ii) (iii) (iv)  
F T T F
- B. (i) (ii) (iii) (iv)  
T T F F
- C. (i) (ii) (iii) (iv)  
T F T T
- D. (i) (ii) (iii) (iv)  
T F T F

**Answer: A::B**



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**11.** The internal and external diameters of a hemispherical silver bowl are 14 cm and 14.5 cm. What is the cost of polishing the bowl at

the rate of ₹0.56 per  $cm^2$  when

(i) the edge of the bowl is not to be polished

(ii) the edge of the bowl is also to be polished

- A. (i) ₹1430 (ii) ₹1404.92
- B. (i) ₹1430 (ii) ₹1455.08
- C. (i) ₹1455.08 (ii) ₹1430
- D. (i) ₹1404.92 (ii) ₹1455.08

**Answer: B**



**View Text Solution**

12. The sum of the radius and the height of a solid cylinder is 37 cm. If the total surface area of the solid is  $1628 \text{ cm}^2$ , find the circumference of the base.

A. 30 cm

B. 34 cm

C. 44 cm

D. 40 cm

**Answer: C**



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**13.** From a solid cylinder whose height is 8 cm and radius is 6 cm, a conical cavity of height 8 cm and base radius 6 cm is hollowed out. Find the volume of the remaining solid.

A.  $603\text{cm}^3$

B.  $720\text{cm}^3$

C.  $548\text{cm}^3$

D.  $637\text{cm}^3$

**Answer: A**





**View Text Solution**