CBSE Test Paper 04

CH-13 Surface Areas and Volumes

1. The volume of a cone is 1570 cm^3. If it is 15 cm high then its base area is
   a. 413 cm^2.
   b. 314 cm^2.
   c. 514 cm^2.
   d. 415 cm^2.
2. Volume of hollow cylinder of height h, with outer radius R and inner radius r
   a. $\pi\left(R^2-r^2\right)h$
   b. $\pi r^2 h$
   c. $\pi r^2\left(h_1-h_2\right)$
   d. $\pi R^2 h$
3. If the perimeter of one of the faces of a cube is 40 cm, then its volume is
   a. 1000 cu cm
   b. 6000 cu cm
   c. 600 cu cm
   d. 1600 cu cm
4. The difference between the total surface area and the lateral surface area of a cuboid of length 20 cm, breadth 10 cm and height 40 cm is
   a. 800 cm^2.
   b. 600 cm^2.
   c. 200 cm^2.
   d. 400 cm^2.
5. The total surface area of a cube is $96\ cm^2$. Find its lateral surface area.
   a. $27\ cm^2$
   b. $512\ cm^2$
   c. $32\ cm^2$
   d. $64\ cm^2$
6. Fill in the blanks:

   There are_____diagonals in a cuboid which are equal in length.

7. Fill in the blanks:

   Volume of spherical shell is equal to_____cubic units.

8. A cast-iron pipe has an external diameter of 75 mm. If it is 4.2 m long. Find the area of the outer surface.

9. Find the volume of a sphere whose radius is 10.5 cm.

10. Find the weight of a solid cone whose base is of diameter 14 m and vertical height 51 m, supporting the material of which it is made weighs 10 g per m^3.

11. How many cubic centimetres of iron are there in an open box whose external dimensions are 36 cm, 25 cm and 16.5 cm, the iron being 1.5 cm thick throughout? If 1 cubic cm of iron weighs 15 g, find the weight of the empty box in kg.

12. A school provides milk to the students daily in a cylindrical glasses of diameter 7 cm. If the glass is filled with milk upto an height of 12 cm, find how many litres of milk is needed to serve 1600 students.

13. The cost of papering the four walls of a room at 70 paise per square metre is Rs. 157.50. The height of the room is 5 metres. Find the length and breadth of the room if they are in the ratio 4 : 1.

14. The dimensions of a room are 12.5 m by 9 m by 7 m. There are 2 doors and 4 windows in the room; each door measures 2.5 m by 1.2 m and each window 1.5 m by 1 m. Find the cost of painting the walls at Rs.3.50 per square metre.

15. Length of a class-room is two times its height and its breadth is $1\frac{1}{2}$ times its height. The cost of white-washing the walls at the rate of Rs.1.60 per m^2 is Rs.179.20. Find the cost of tiling the floor at the rate of Rs.6.75 per m^2.

CBSE Test Paper 04

CH-13 Surface Areas and Volumes

Solution

1. (b) 314 cm^2.

   Explanation: Volume of cone = 1/3 × π × r^2 × h

   1570 = 1/3× π × r^2 × 15

   π r^2 = 314 cm^2

   Base area is 314 cm^2

2. (a) $\pi\left(R^2 - r^2\right)h$

   Explanation: Volume of cylinder is R^2h(outer)

   Volume of cylinder is πr^2h(inner)

   Since, it is hollow,

   Volume of hollow cylinder= πR^2h - πr^2h = πh(R^2 - r^2)

3. (a) 1000 cu cm

   Explanation: Perimeter of one face of a cube = 4a =40 cm (where a= side of the cube)

   sides of face of a cube = 4

   Therefore side of the cube = 4a/4 = 40 / 4= 10 cm

   Therefore volume of the cube = a^3 =10^3 = 1000 cu cm

4. (d) 400 cm^2.

   Explanation: TSA of cuboid = 2(lb+bh+hl), Lateral surface area of cuboid= 2h(l+b)

   so , their difference is

   = 2(lb+bh+hl) - 2(bh+hl)

   =2(lb)

=2 × 10 × 20

= 400cm^2

5. (d) $64\ cm^2$

Explanation: Total surface area of cube=6a^2 (let a be a side of cube)

so, 6a^2=96,

a^2=$\frac{96}{6}$

=16

a=4cm

Now, lateral surface area of cube is 4a^2

so, 4a^2=4 ×(4)^2

= 4 × 16

= 64cm^2

6. four
7. $\frac{4}{3}\pi(R^3 - r^3)$
8. External diameter = 75 mm

   ∴ External radius (r) = $\frac{75}{2}$ mm = 37.5 mm

   $= \frac{37.5}{10}\ cm = 3.75\ cm$

   Length of the pipe (h) = 4.2 m = 4.2 × 100 cm = 420 cm

   ∴ Area of the outer surface = $2\pi rh$

   = $2 \times \frac{22}{7} \times 3.75 \times 420$ = 9900 cm^2
9. r = 10.5 cm

   ∴ volume = $\frac{4}{3}\pi r^3$

   $= \frac{4}{3} \times \frac{22}{7} \times (10.5)^3$

   = 4851 cm^3
10. Diameter of the base = 14 m

    ∴ Radius of the base (r)= $\frac{14}{2}\ m$= 7 m

Vertical height (h) = 51 m

∴ Volume of the solid cone = $\frac{1}{3}\pi r^2 h$

= $\frac{1}{3} \times \frac{22}{7} \times (7)^2 \times 51$ = 2618 m^3

∴ Weight of the solid cone = 2618 × 10 g

= 26180 g = 26.18 kg.

11. Outer dimensions:

l = 36 cm

b = 25 cm

h = 16.5 cm

Inner dimensions:

l = 36 - (2 × 1.5) = 33 cm

b = 25 - 3 = 22 cm

h = 16.5 - 1.5 = 15 cm

Volume of iron = Outer volume - Inner volume

= (36 × 25 × 16.5 - 33 × 22 × 15) cm^3

= (14850 - 10890) cm^3

= 3960 cm^3

Weight of iron = 3960 × 15 gm = 59400 gm = 59.4 kg

12. Radius of cylinder glass = 7 ÷ 2 = 3.5 cm.

Glass is filled with milk upto an height of 12 cm.

$= \pi r^2 h = \frac{22}{7} \times (3.5)^2 \times 12$

$= \frac{22}{7} \times 12.25 \times 12 = 22 \times 1.75 \times 12 = 462 cm^3$

Quantity of milk needed for 1600 students = (462 × 1600) cm^3

= 739.2 litres.

13. Let the length and the breadth of the room be '4x' m and 'x' m respectively.

∴ Area of the four walls of the room = 2(l + b)h

= 2(4x + x)5 = 50 x m^2

∴ Cost of preparing the four walls of the room at the rate of 70 paise per square metre.

= Rs. 50x × 0.70 = Rs. 35x

According to the question 35x = 157.50

x = $\frac{157.50}{35}$ = 4.5

∴ Breadth of the room = 4.5 m

$\therefore$ Length of the room = 4 × 4.5 m = 18 m.

14. Length of room = 12.5 m

Breadth of room = 9 m

Height of room = 7 m

$\therefore$ Total surface area of 4 walls = 2(l + b) h

= 2(12.5 + 9) $\times$ 7

= 301 m^2

Area of 2 doors = 2[2.5 $\times$ 1.2] = 6 m^2

Area to be painted on 4 walls = 301 - (6 + 6)

= 201 - 12 = 289 m^2

$\therefore$ Cost of painting = 289 $\times$ 3.50 = Rs.1011.5

15. Let the height of the classroom be h metres. Then,

Length = 2h metres and, Breadth = $\frac{3}{2}$ h metres

$\therefore$ Area of the four walls = 2 $\times$ Height $\times$ (Length + Breadth)

$\Rightarrow$ Area of the four walls = {2 $\times$ h $\times$ (2h + $\frac{3}{2}$ h)}m^2

$\Rightarrow$ Area of the four walls = {2 $\times$ h $\times$ ($\frac{4h+3h}{2}$)}m^2

$\Rightarrow$ Area of the four walls = { 2 $\times$ h $\times$ $\frac{7h}{2}$ }m^2 = $7h^2m^2$

We have,

Cost of white washing of 1 m^2 = Rs. 1.60

$\therefore$ Cost of white washing of the four walls = Rs.(1.60 $\times$ $7h^2$) = Rs.$11.20h^2$

But, the cost of white-washing is given as Rs. 179.20

$\therefore$ $11.20h^2$ = 179.20

$\Rightarrow$ h^2 = $\frac{179.20}{11.20}$ = 16 $\Rightarrow$ h^2 = 42 $\Rightarrow$ h = 4

$\therefore$ Length of the classroom = (2 $\times$ 4)m = 8m

Breadth of the classroom = ($\frac{3}{2}$ $\times$ 4)m = 6 m

$\therefore$ Area of the floor of the room = (8 $\times$ 6)m^2 = $48m^2$

We have,

Cost of tiling of 1 m^2 of the floor = Rs. 6.75

$\therefore$ Cost of tiling the floor = Rs.(6.75 $\times$ 48) = Rs.324