Surface Area and Volume of a Cuboid and Cube

(1) If a cuboid has length l, breadth b and height h, then
(i) Perimeter of the cuboid = 4 (L + b + h)
For Example: If l=5cm,b=2cm,h=3cm ,then
Perimeter of the cuboid =4(5+2+3)=40cm

(ii) Surface area of the cuboid =2(lb + bh + lh) For Example: If l=5cm,b=2cm,h=3cm ,then Surface area of the cuboid =2($5 \times 2 + 2 \times 3 + 5 \times 3$)=62cm²

(iii) Lateral surface area of the cuboid $=2(l + b) \times h$ For Example: If l=5cm, b=2cm, h=3cm, then Lateral surface area of the cuboid $= 2(5 + 2) \times 3 = 42$ cm²

(iv) Length of a diagonal = $\sqrt{l^2 + b^2 + h^2}$ For Example: If l = 5cm, b = 2cm, h = 3cm, then Length of a diagonal = $\sqrt{5^2 + 2^2 + 3^2} = \sqrt{38}cm$

(v) Volume of the cuboid = $l \times b \times h$ For Example: If l = 5 cm, b = 2 cm, h = 3 cm, then Volume of the cuboid = $5 \times 2 \times 3 = 30$ cm³

(2) If the length of each edge of a cube is l, then (i) Perimeter of the cuboid =12l=12(Edge) *For Example:* If l = 5cm, b = 2cm, h = 3cm ,then Perimeter of the cuboid = 12 × 5 = 60cm

(ii) Surface area of the cuboid = $6l^2 = 6(Edge)^2$ For Example: If l = 5cm, b = 2cm, h = 3cm, then Surface area of the cuboid = $(6 \times 5)^2 = 900$ cm²

(iii) Lateral surface area of the cuboid = $4l^2 = 4(Edge)^2$ For Example: If l = 5 cm, b = 2 cm, h = 3 cm, then Lateral surface area of the cuboid = $(4 \times 5)^2 = 400 \text{ cm}^2$

(iv) Volume of the cuboid = /³ = (Edge)³ For Example: If l = 5cm, b = 2cm, h = 3cm, then Volume of the cuboid =53=125cm3

Surface Area and Volume of A Right Circular Cylinder

(1) If r is the radius and h is the height of a right circular cylinder, then

(i) Curved (lateral) surface area = $2\pi rh$

For Example: If radius r = 5cm and height h = 10cm, then Curved (lateral) surface area $= 2\pi \times 5 \times 10 = 314$ cm²

(ii) Total surface area = $2\pi r (h + r)$

For Example: If radius r=5cm and height h=10cm, then Total surface area = $2\pi \times 5(10+5)=471$ cm²

(iii) Volume = $\pi r^2 h$

For Example: If radius r=5cm and height h = 10cm, then Volume = $\pi \times 5^2 \times 10 = 785$ cm³

(2) Let R and r be the external and internal radii of a hollow cylinder of height h. Then,

(i) Each base surface area = π (R²-r²) *For Example:* If Internal radii r=5cm , external radii R=7cm and height h=10cm, then Each base surface area = π (7² - 5²) = 75.36cm²

(ii) Curved (lateral) surface area $=2\pi rh (R + r)$

For Example: If Internal radii r = 5cm, external radii R = 7cm and height h = 10cm, then Curved(lateral) surface area $=2\pi \times 5 \times 10(7 + 5) = 3768$ cm²

(iii) Total surface area $=2\pi(R + r)(h + R - r)$

For Example: If Internal radii r = 5cm, external radii R = 7cm and height h = 10cm, then Total surface area $=2\pi(7+5)(10+7-5) = 904.32$ cm²

(iv) Volume = π (R² - r²) h

For Example: If Internal radii r = 5cm, external radii R = 7cm and height h = 10cm, then Volume = $\pi (72 - 52)10 = 753.6$ cm³

Surface Area ad Volume of A Right Circular Cone

(1) A right circular cone is a solid generated by revolving a line segment which passes through a fixed point which makes a constant angle with a fixed line. The fixed point is called the vertex of the cone, the fixed line is called the axis of the cone.



Right Circular Cone

(2)For a right circular cone of base radius r, slant height l and height h, we have

(i) Curved surface area = πrl

For Example:

If radius r = 5cm, length l = 7cm, then Curved surface area = $\pi \times 5 \times 7 = 109.9$ cm²

(ii) Total surface area = $\pi r (l + r)$

For Example: If radius r = 5cm, length l = 7cm, then Total surface area = $\pi \times 5$ (7 + 5) = 188.4cm²

(iii) Volume = $\frac{1}{2}\pi r^2 h$

For Example: If radius r = 5cm and height h = 10cm, then Volume = $\frac{1}{3}\pi \times 5^2 \times 10 = 261.66$ cm³ Also, **Volume =** $\frac{1}{3}$ (Area of the base) × height

For Example: Volume = $\frac{1}{3}$ (78.5) × 10 = 261.66 cm³

Surface Area ad Volume of A Sphere

(1) The set of all points in space which are equidistant the fixed point is called a sphere. The fixed point is called the center of the sphere and the constant distance is called its radius.



(2) For a sphere of radius r, we have

(i) Surface area = $4\pi r^2$ For Example: If radius r = 5cm then Surface area = $4\pi \times 5^2 = 314$ cm²

(ii) Volume = $\frac{4}{3}\pi r^3$ For Example: If radius r = 5cm then Volume = $\frac{4}{3}\pi \times 5^3 = 523.33 \text{ cm}^3$

(3) Curved surface area of a hemisphere of radius r is $2\pi r^2$ *For Example:* If a radius of hemisphere is 5cm, then Curved surface area of a hemisphere is $2\pi \times 5^2 = 157 \text{ cm}^2$

(4) Total surface area of a hemisphere of radius r is $3\pi r^2$

For Example: If a radius of hemisphere is 5cm, then Total surface area of a hemisphere is $3\pi \times 5^2 = 235.5$ cm²

(5) Volume of a hemisphere of radius r is $\frac{2}{2}\pi r^3$

For Example: If a radius of hemisphere is 5cm, then Volume of a hemisphere is $\frac{2}{3}\pi \times 5^3 = 261.66$ cm³

(6) Volume of a spherical shell whose outer and inner radii are R and r respectively is given by

$$V = \frac{4}{2} \pi (R^3 - r^3)$$

For Example: If Internal radii r = 5cm and external radii R = 7cm,then

 $V = \frac{4}{3} \pi (73 - 53) = 912.69 \text{ cm}^3$