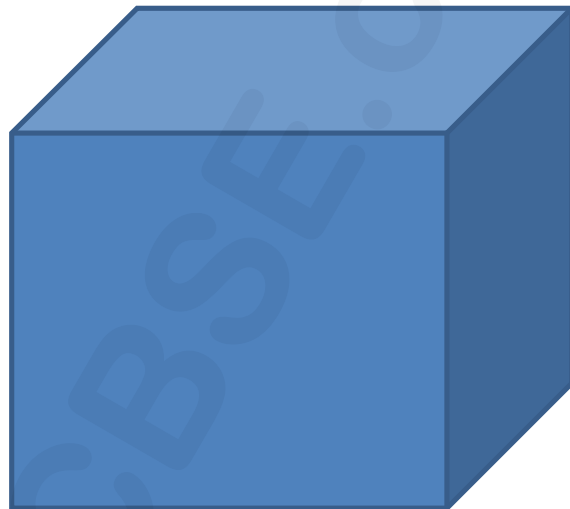


# Volume and Surface Area of Cube and Cuboid



## Objective

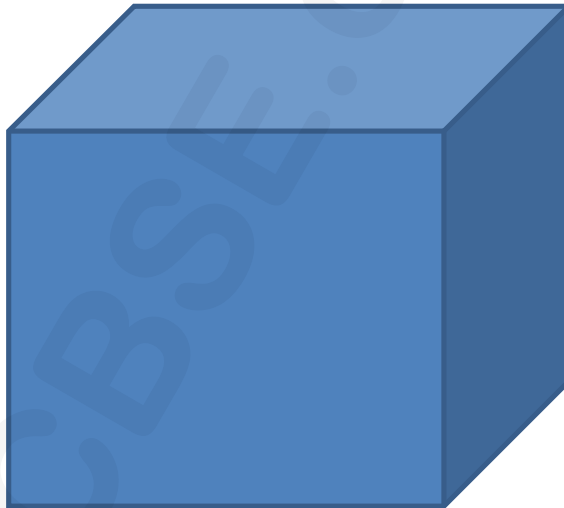
To explore the changes in surface areas and volumes of cuboids with respect to each other.

## Description

### **Case 1:**

Took the cuboids having equal volumes and following dimensions:-

- 1) Length = 20cm, Breadth = 10cm, Height = 5cm.
- 2) Length = 10cm, Breadth = 10cm, Height = 10cm.
- 3) Length = 100cm, Breadth = 5cm, Height = 2cm.



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**Calculation:-**

1. Volume of cuboid =  $lbh$

$$= 20 \times 10 \times 5$$

$$= 1000 \text{ cubic cm.}$$

Surface area of cuboid =  $2(lb + bh + hl)$

$$= 2(20 \times 10 + 10 \times 5 + 5 \times 12)$$

$$= 2(200 + 50 + 60)$$

$$= 620 \text{ square cm.}$$

2. Volume of cuboid =  $lbh$

$$= 10 \times 10 \times 10$$

$$= 1000 \text{ cubic cm.}$$

Surface area of cuboid =  $2(lb + bh + hl)$

$$= 2(10 \times 10 + 10 \times 10 + 10 \times 10)$$

$$= 2(100 + 100 + 100)$$

$$= 600 \text{ square cm.}$$



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3. Volume of cuboid =  $lbh$

$$= 100 \times 5 \times 2$$

$$= 1000 \text{ cubic cm.}$$

Surface area of cuboid =  $2(lb + bh + hl)$

$$= 2(100 \times 5 + 5 \times 2 + 2 \times 100)$$

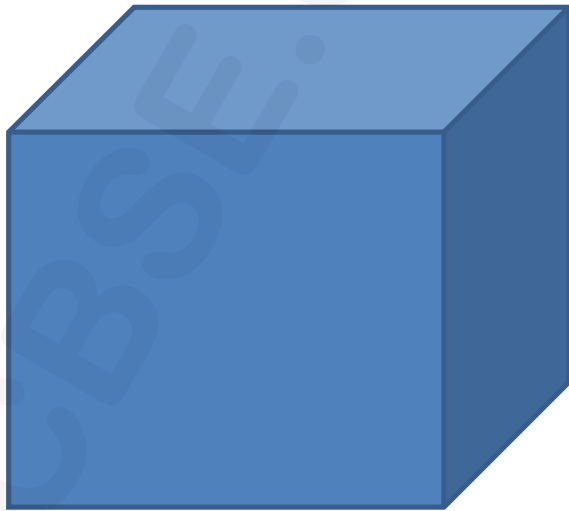
$$= 2(500 + 10 + 200)$$

$$= 1420 \text{ square cm.}$$

**Observation:-**

All these cuboids have volume = 1000 cubic cm that is volumes are equal. The surface areas are not equal.

The surface of cuboid which is a cube is minimum.

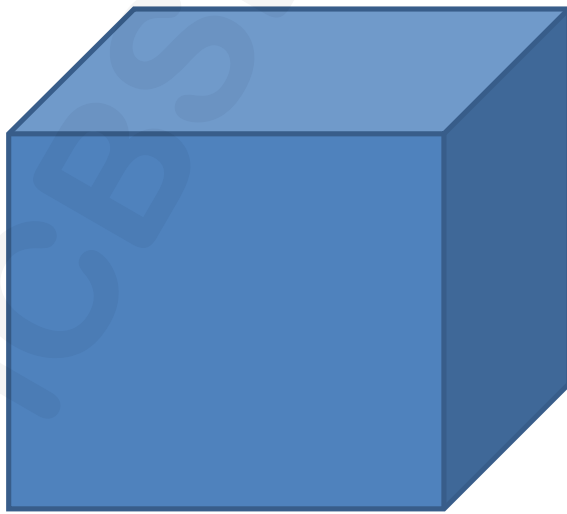
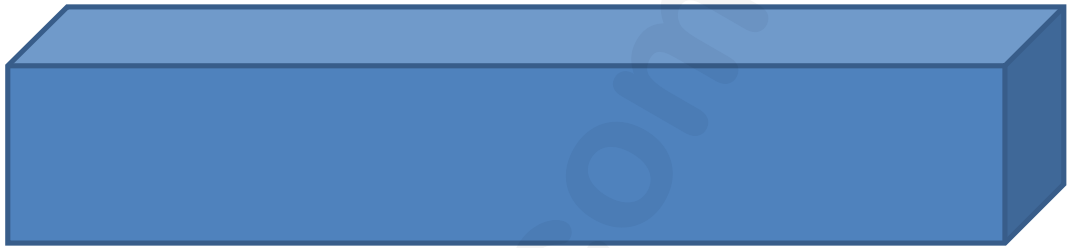


## Case 2:

Took the cuboids having equal volumes and following dimensions:-

- 1) Length = 14cm, Breadth = 6cm, Height = 5.4cm.
- 2) Length = 8cm, Breadth = 8cm, Height = 8cm.
- 3) Length = 16cm, Breadth = 6.4cm, Height = 4cm.





**1. Volume of cuboid =lbh**

$$= 14 \times 6 \times 5.4$$

$$= 453.6 \text{ cubic cm.}$$

**Surface area of cuboid = 2(lb + bh + hl)**

$$= 2(14 \times 6 + 6 \times 5.4 + 5.4 \times 14)$$

$$= 2(84 + 32.4 + 75.6)$$

$$= 384 \text{ square cm.}$$

**2) Volume of cuboid =lbh**

$$= 8 \times 8 \times 8$$

$$= 512 \text{ cubic cm.}$$

**Surface area of cuboid = 2(lb + bh + hl)**

$$= 2(8 \times 8 + 8 \times 8 + 8 \times 8)$$

$$= 2(64 + 64 + 64)$$

$$= 384 \text{ square cm.}$$



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**Volume of cuboid =  $lbh$**

$$= 16 \times 6.4 \times 4$$

$$= 409.6 \text{ cubic cm.}$$

**Surface area of cuboid =  $2(lb + bh + hl)$**

$$= 2(16 \times 6.4 + 6.4 \times 4 + 4 \times 16)$$

$$= 2(102.4 + 25.6 + 64)$$

$$= 384 \text{ square cm.}$$

**Observation:**

**All these cuboids have surface area = 384 square cm that is surface areas are equal. The volumes are not equal.**

**The cuboid which a cube has largest volume.**

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### **Final Conclusion:**

- 1) Of all the cuboids with equal volumes, the cube has the minimum surface area.**
- 2) Of all the cuboids with equal surface areas, the cube has the maximum volume.**

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