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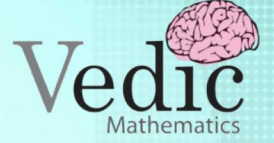
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SURFACE AREA AND VOLUME OF SOLID

I. SOLID

A part of space enclosed by plane or curved surface is called solid. A solid has three dimensions length, breadth and height (thickness).

II. SURFACE AREA

The area covered by the outer surface of solid is called surface area.

III. VOLUME

The amount of space enclosed by the bounding surfaces of a solid is called its volume.

IV. CUBE

A solid bounded by six square surface is called a cube. A cube has 12 edges and 6 faces and 8 corners (vertices). Let length, breadth and height of a cube is denoted by l , b and h respectively.

In cube all the edges are equal i.e.

Let $l = b = h = a$

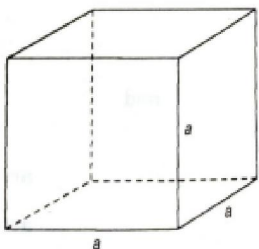
Surface area = $6a^2$

Lateral surface area = $4a^2$

Volume = a^3

Length of the diagonal = $\sqrt{3}a$

Edge of a cube = $\sqrt[3]{\text{Volume}}$



V. CUBOID

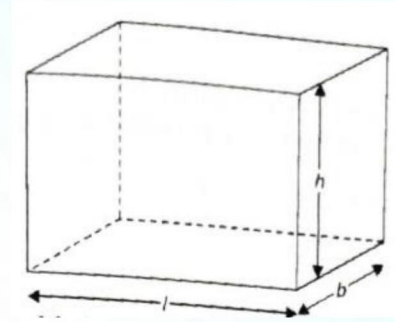
Let length, breadth and height of a cuboid is denoted by l , b and h respectively then

Surface area = $2(lb + bh + lh)$

Lateral surface area = $2(l + b) \times h$

Volume = $l \times b \times h$

Length of the diagonal = $\sqrt{l^2 + b^2 + h^2}$



VI. CYLINDER

If a rectangle is made to revolve about its one side as its axis, the solid thus formed is called a right circular cylinder.

If a circle of radius r is placed to a height h , then a right circular cylinder is formed.

Volume = $\pi r^2 h$

Curved surface area = $2\pi rh$

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

Volume of material in a hollow pipe = $\pi(R^2 - r^2)l$

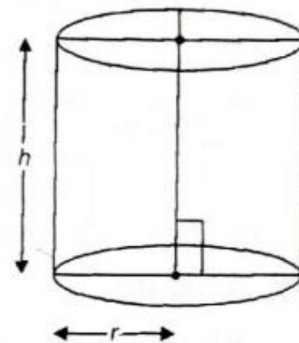
R = external radius

r = internal radius

l = length of the pipe

Total surface area of an open pipe = $2\pi(Rh + rh + (R^2 - r^2))$

Radius of the base of cylinder = $\sqrt{\frac{\text{Volume}}{r \times h}}$





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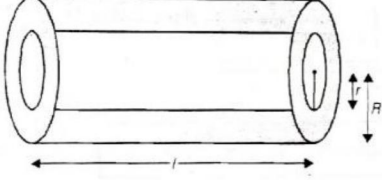
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VII. CONE

If a right-angled triangle is revolved about one of the sides containing a right angle, the solid thus formed is called a right circular cone.

In volume, cone is $\frac{1}{3}$ rd of the cylinder

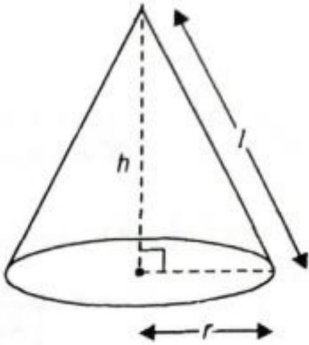
$$\text{Volume} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area} = \pi r l$$

Where l = slant height

$$\text{Total surface area} = \pi r (r + l)$$

$$\text{Slant height } l = \sqrt{h^2 + r^2}$$



VIII. FRUSTUM OF THE CONE

If the top of a cone is cut off by a plane parallel to the base, the remainder is called a frustum of the cone.

$$\text{Slant height } l = \sqrt{h^2 + (R - r)^2}$$

$$\text{Curved surface area} = \pi (r + R) l$$

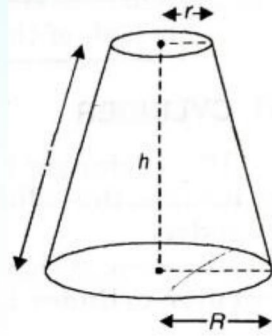
$$\text{Total surface area} = \pi ((r + R) l + r^2 + R^2)$$

$$\text{Volume} = \frac{\pi h}{3} (r^2 + R^2 + rR)$$

X. HEMISPHERE

A plan through the centre of the sphere divides it into two equal parts.

Each equal part is called hemisphere.



$$\text{Volume} = \frac{2}{3} \pi r^2 h$$

$$\text{Curved surface area} = 2 \pi r^2$$

$$\text{Total surface area} = 3 \pi r^2$$

XI. CROSS SECTION

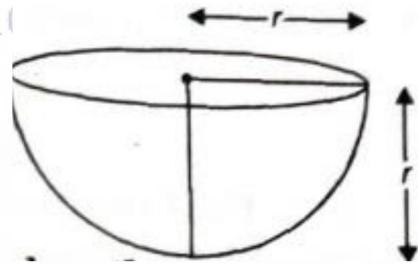
A cut, in a solid through perpendicular to its length, then it is called height is called uniform cross section.

When a solid has uniform cross section then its

$$\text{Volume} = \text{Area of cross section} \times \text{length}$$

$$\text{Lateral surface area} = \text{Perimeter of cross section} \times \text{length}$$

Frustum of a cone and hemisphere are example of uniform cross section.



SOME IMPORTANT POINTS

1. Area is measured in square units i.e. cm^2 , m^2 , mm^2 etc
2. Volume is measured in cubic units i.e. cm^3 , m^3 , mm^3 etc.
3. Lateral surface area of cube and cuboid is the sum of areas of the four walls.
4. Total surface area of cube and cuboid is the sum of areas of all the six faces of a cuboid.





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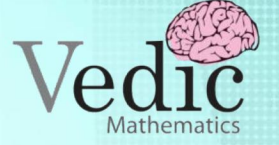
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5. Length of the diagonal of a cuboid or cube is the length of the longest rod that can be placed in the cuboid.

6. The capacity of container of any shape and size is equal to its volume.

7. The volume of a material in a hollow body is equal to difference between its external volume and internal volume. The case of hollow pipe is an example of it.

8. If the external dimension i.e. length, breadth and height of a box are l , b and h respectively and each side is of thickness x , then the internal dimensions of the

(a) Closed box are $l - 2x$, $b - 2x$ and $h - 2x$

(b) Open box are $l - 2x$, $b - 2x$ and $h - x$.

SOLVED EXAMPLES

Q.1. The diagonal of a cube is 20cm. Find its solid content and surface area.

(a) 600 cm^2

(b) 700 cm^2

(c) 400 cm^2

(d) 800 cm^2

Q.2. Find the length of the longest rod that can be placed in a room 30m long, 24m broad and 18 m high.

(a) $30\sqrt{2} \text{ m}$

(b) $40\sqrt{2} \text{ m}$

(c) $35\sqrt{2} \text{ m}$

(d) $20\sqrt{2} \text{ m}$

Q.3. A field is 102 m long and 25 m broad. A tank 10m long, 5m broad and 4m deep is dug out from the middle of the field and the earth removed is evenly spread over the remaining part of the field. Find the rise in the level of the remaining part of the field in centimeters.

(a) 5cm

(b) 8cm

(c) 6cm

(d) 7cm

Q.4. The diameter of the base of a cone is 42 m and its volume is 38808 cubic metre. What its

slant

a) 30m

c) 32m

b) 35m

d) 45m

height?

Q.5. the sum of the radius of the base and the height of a cylinder is 1628 cm^2 . Find the volume of the cylinder.

a) 4768 cm^2

b) 4543 cm^2

c) 4620 cm^3

d) 4690 cm^2

Q.6. A copper sphere of radius 3cm is beaten and drawn into a wire of diameter 0.2cm. Find the length of wire.

a) 36 m

b) 35m

c) 30m

d) 20m

Q.7. The annual rainfall at a place is 3.0 cm. How many litres of water fall down in one year in an area of one square kilometer, if one cubic meter of water measures 1000 litres ?

a) $4 \times 10^2 \text{ litres}$

b) $3 \times 10^7 \text{ litres}$

b) $6 \times 10^7 \text{ litres}$

d) $5 \times 10^7 \text{ litres}$

Q.8. A right circular cone of height H is cut by a plane parallel to the base and at a distance $h/3$ from the vertex, then ratio of the volume of the resulting cone and frustum.

a) 8 : 19

b) 9 : 6

c) 12 : 9

d) 17 : 4

Q.9. The area of cross section of a pipe is 5.4 cm^2 and water is pumped out of it at the rate of 27 km/ hr. Find in litres the volume of water which flows out of the pipe in one minute.

a) 250 litres

b) 245 liters

c) 243 liters

d) 240 liters

Q.10. Find the weight of a lead pipe 35 cm long. The external diameter of the pipe is 2.4 cm and





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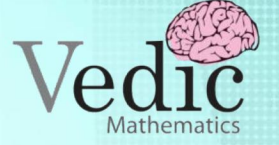
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thickness of the pipe is 2mm, given 1 cm^3 of lead weight 10 gm.

- a) 480 gm b) 450 gm
c) 458 gm **d) 484 gm**

Q.11. A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel, partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel ?

- a) 2 cm **d) 1 cm**
c) 3 cm d) 4 cm

Q.12. A hemispherical bowl of internal radius 15 cm contains a liquid. The liquid is to be filled into cylindrical shaped bottles of diameter 5 cm and height 6 cm. How many bottles are necessary to empty the bowl ?

- a) 70 b) 50
c) 60 d) 40

Q.13. A plate of copper 24 cm long and 15 cm wide weighs 252 gm. If 1 cubic centimeter of copper weigh 7 grams, then find the thickness of the plate.

- a) 2mm **b) 1mm**
c) 3mm d) 4mm

MODERATE LEVEL PRACTICE EXERCISE

1. The length, breadth and height of a cuboid are 8 cm, 5 cm and 3 cm respectively. Its volume is

- a) 120 cu. Cm** b) 100 cu. Cm
c) 40 cu. Cm d) 125 cu. Cm

2. The surface area of a cube is 1014 cm^2 . Its volume is

a) 2197 cu. Cm

b) 3197 cu. Cm

- c) 169 cu. Cm d) 1690 cu. cm

3. A beam 9 m long, 40 cm wide and 20 cm high is made up of iron which weights 50 kg per cubic metre. The weight of the beam is

- a) 56 kg b) 48 kg
c) 36 Kg d) 27 kg

4. The surface area of a cube whose one edge is 7 cm is

- a) 360 cm^2 **b) 294 cm^2**
c) 416 cm^2 d) 324 cm^2

5. Volume of a cube is 729 cm^3 . The length of its diagonal is

- a) 14.27 cm **b) 15.57 cm**
c) 13.47 cm d) 15.27 cm

6. The length, breadth and height of a rectangular solid are in the ratio 5 : 4 : 2. If the total surface area is 1216 cm^2 , the dimensions of solid are

- a) 20 cm, 16 cm, 8 cm**
b) 15 cm, 12 cm, 6 cm
c) 5 cm, 4 cm, 2 cm
d) 25 cm, 20 cm, 10 cm

7. If radius of a cylinder is doubled, its volume increase by

- a) 2 times b) 3 times
c) 4 times d) $4 \times \frac{22}{7}$ times

8. A rectangular solid measuring $8 \text{ cm} \times 4 \text{ cm} \times 2 \text{ cm}$ is melted and cast in the form of a cube. The side of the cube formed is

- a) 64 cm b) 32 cm
c) 8 cm **d) 4 cm**





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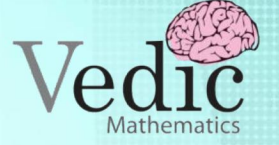
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9. Find the length of the longest pole that can be placed in a room 4 m long, 4 m wide and 4 m high.

- a) 6.93 m b) 6.00 m
c) 4.68 m d) 4.00 m

10. The height of a cuboid is twice the side of its volume is 3456 cubic centimeters. The area of its base is

- a) 144 cm² b) 169 cm²
c) 121 cm² d) 196 cm²

11. Radius of a cylinder is equal to 3 meters and its height is 7 metres. Total volume of the cylinder is

- a) 99 m³ b) 198 m³
c) 210 m³ d) 298 m³

12. Two cylindrical buckets have their diameter in the ratio 3 : 1 and their heights are as 1 : 3. Their volume are in the ratio of

- a) 1 : 2 b) 2 : 3
c) 3 : 1 d) 3 : 4

13. The number of cubes of surface area 24 sq. dm that can be made from a meter cube is

- a) 75 b) 100
c) 115 d) 125

14. The dimensions of a brick are 24 cm × 12 cm × 8 cm. How many bricks will be required to build a wall 24 m long, 8 m high and 60 cm thick, if 10% of the wall is filled with mortar ?

- a) 40000 b) 20000
c) 50000 d) 45000

15. The internal measurements of a box with lid are 115 × 75 × 35 cm³ and the wood of which it is made is 2.5 cm thick. The volume of wood is

- a) 80,000 cm³ b) 17,280 cm³
c) 82,125 cm³ d) 50,925 cm³

16. The ratio of the volume of a cube to that of a sphere which will fit inside the cube is

- a) 4 : π b) 4 : 3π
c) 6 : π d) 2 : π

17. A right circular cone, a right circular cylinder and a hemisphere, all have the same radius, and the heights of cone and cylinder are equal their diameters. Then their volumes are proportional, respectively to

- a) 1 : 3 : 1 b) 2 : 1 : 3
c) 3 : 2 : 1 d) 1 : 2 : 3

18. If the radius of the base and height of a cylinder and cone are each equal to r, the radius of a hemisphere, is also equal to r, then the volume of cone, cylinder and hemisphere are in the ratio

- a) 1 : 2 : 3 b) 1 : 3 : 2
c) 2 : 1 : 3 d) 3 : 2 : 1

19. The diameter of a copper sphere is 6 cm. The sphere is melted and is drawn into a long wire of uniform circular cross section. If the length of the wire is 36 cm, its radius is

- a) 1.5 cm b) 1 cm
c) 2 cm d) 2.5 cm

20. Three equal rectangular metal pieces each measuring 9 cm × 8 cm × 1 cm are melted together to form a cube. The volume of the cube is

- a) 216 sq.cm b) 224 sq.cm





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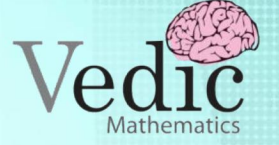
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c) 248 sq.cm

d) 72 sq. cm

21. Three equal rectangular pieces each measuring $9\text{ cm} \times 8\text{ cm} \times 1\text{ cm}$ are melted together to form a cube. The volume of the cube is

a) 224 cm^3

b) 216 cm^3

c) 72 cm^3

d) 64 cm^3

22. 11 cubic meters of steel is converted into bars 10 cm diameter and 1.4 meter length. The number of bars formed as

a) 10

b) 100

c) 1000

d) 10000

23. The curved surface area cylinder is 1000 cm^2 and its diameter is 20 cm. The volume of the cylinder is

a) 5000 cm^3

b) 6000 cm^3

c) 6500 cm^3

d) 6700 cm^3

24. 2.2 dm^3 of brass is to be drawn into cylindrical wire of diameter 0.50 cm. The length of the wire is

a) 98 m

b) 102 m

c) 108 m

d) 112

25. A reservoir is supplied from a pipe 6 cm in diameter. How many pipes of 3 cms diameter would discharge the same quantity, supposing the velocity of water is same?

a) 2

b) 3

c) 4

d) 5

26. A water tank having 1000 litres capacity was filled by adding 39 liters of water and as many buckets of water as each bucket had capacity. The capacity of each bucket in liters is

a) 31

b) 25.6

c) 19.5

d) 17

27. A copper sphere of radius 3 cm beaten and drawn into a wire of diameter 0.2 cm. The length of the wire is

a) 9 m

b) 12 m

c) 16 m

d) 36 m

28. A cylindrical piece of metal of radius 2 cm height 6 cm is shaped into a cone of same radius. The length of the cone is

a) 8 cm

b) 12 cm

c) 14 cm

d) 18 cm

29. If the surface areas of two spheres are in the ratio 4 : 25, then the ratio of their volumes is

a) 4:25

b) 25 :4

c) 125: 8

d) 8 : 125

30. The size of a wooden block is $5 \times 10 \times 20$ cms. How many whole such blocks will be required to construct a solid wooden cube of minimum size?

a) 6

b) 8

c) 12

d) 16

31. A closed wooden box of thickness 0.5 cm and length 21 cm, width 11 cm and height 6 cm is painted inside. The expenses of painting are Rs. 70. What is the rate of painting in rupees per sq. cm?

a) 0.7

b) 0.5

c) 0.1

d) 0.2

32. A cube of side 12 cm is painted red on all the faces and then cut into smaller cubes, each of side 3 cm. What is the total number of smaller cubes having none of their faces painted?

a) 16

b) 8

c) 12

d) 24





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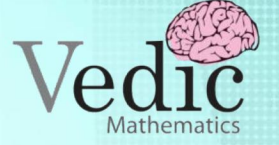
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33. There are two tanks, one cylindrical and the other conical. The cylindrical tank contains 500 litre limca more than the conical tank. 200 litres is removed both from the cylindrical and conical tank. Now the cylindrical tank contains double the volume of liquid in the conical tank. The capacity of the cylindrical tank in liter is

- a) 1200
b) 700
c) 500
d) 450

34. Let a and B be two solid sphere such that the surface area of B is 300% higher than the surface area of A. The volume of A is found to be k% lower than the volume of B. The value of k must be

- a) 85.5
b) 92.5
c) 90.5
d) 87.5

35. Marbles of diameter 1.4 cm are dropped into a beaker containing some water and are fully submerged. The diameter of the beaker is 7 cm. Find the numbers of marbles have been dropped in it, if the water rises by 5.6 cm

- a) 150
b) 100
c) 75
d) 175

Practice Exercise

1) A plastic box 1.5 m long, 1.25 m wide and 65 cm deep is to be made. It is opened at the top. Ignoring the thickness of the plastic sheet, determine

(i) The area of the sheet required for making the box.

(ii) The cost of sheet for it, if a sheet measuring 1m² costs ₹20.

- a) 5.45 m², Rs. 109
b) 5 m², Rs. 109
c) 5.45 m², Rs. 19
d) 55 m², Rs. 109

2) The length, breadth and height of a room are 5 m, 4 m and 3 m, respectively. Find the cost of

white washing the walls of the room and the ceiling at the rate of ₹17.50 per m².

- a) Rs. 567
b) Rs. 566
c) Rs. 555
d) Rs. 532

3) The floor of a rectangular hall has a perimeter 250 m. If the cost of painting the four walls at the rate of ₹10 per m² is ₹15000, find the height of the hall.

[Hint: Area of the four walls = Lateral surface area]

- a) 6 m
b) 7 m
c) 4 m
d) 3 m

4) The paint in a certain container is sufficient to paint an area equal to 9.375 m². How many bricks of dimensions 22.5 cm x 10 cm x 7.5 cm can be painted out of this container.

- a) 200
b) 150
c) 250
d) 100

5) A cubical box has each edge 10 cm and another cuboidal box is 12.5 cm long, 10 cm wide and 8 cm high.

(i) Which box has the greater lateral surface area and by how much?

(ii) Which box has the smaller total surface area and by how much?

- a) 40 cm², 11 cm²
b) 40 cm², 10 cm²
c) 49 cm², 10 cm²
d) 70 cm², 10 cm²

6) A small indoor greenhouse (herbarium) is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high.

(i) What is the area of the glass?

(ii) How much of tape is needed for all the 12 edges?

- a) 450 cm², 320 cm
b) 425 cm², 320 cm
c) 420 cm², 320 cm
d) 4250 cm², 320 cm

7) Shanti Sweets Stall was placing an order for making cardboard boxes for packing their





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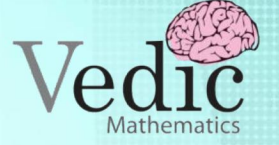
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sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm x 20 cm x 5 cm and the smaller of dimensions 15 cm x 12 cm x 5 cm. For all the overlaps, 5% of the total surface area is required extra. If the cost of the cardboard is ₹4 for 1000 cm², find the cost of cardboard required for supplying 250 boxes of each kind.

- a) Rs. 2084 b) Rs. 2384
c) **Rs. 2184** d) Rs. 2154

8) Parveen wanted to make a temporary shelter, for her car, by making a box-like structure with tarpaulin that covers all the four sides and the top of the car (with the front face as a flap which can be rolled up). Assuming that the stitching margins are very small and therefore negligible, how much tarpaulin would be required to make the shelter of height 2.5 m, with base dimensions 4 m x 3 m?

- a) **47 m²** b) 44 m²
c) 46 m² d) 43 m²

9) The curved surface area of a right circular cylinder of height 14 cm is 88 cm². Find the diameter of the base of the cylinder.

- a) 8 cm b) 3 cm
c) 5 cm d) **2 cm**

10) It is required to make a closed cylindrical tank of height 1 m and base diameter 140 cm from a metal sheet. How many square metres of the sheet are required for the same?

- a) 7.50 m² b) **7.48 m²**
c) 7.41 m² d) 7 m²

11) A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm. Find its

- (i) inner curved surface area.
(ii) outer curved surface area.
(iii) total surface area.

- a) 968 cm², 1024.8 cm², 2038.08 cm²
b) 908 cm², 1064.8 cm², 2018.08 cm²
c) 968 cm², 1064.8 cm², 2038.08 cm²

d) **968 cm², 1064.8 cm², 2038.08 cm²**

12) The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions to move once over to level a playground. Find the area of the playground in m².

- a) 1581m² b) 1984m²
c) **1584m²** d) 1524m²

13) A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of ₹12.50 per m².

- a) **68.75.** b) 38.75.
c) 61.75. d) 78.75.

14) Curved surface area of a right circular cylinder is 4.4 m². If the radius of the base of the cylinder is 0.7 m, find its height. Curved surface area of a right circular cylinder is 4.4 m². If the radius of the base of the cylinder is 0.7 m, find its height.

- a) **1m** b) 3 m
c) 2 m d) 5 m

15) The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find

- (i) its inner curved surface area.
(ii) the cost of plastering this curved surface at the rate of ₹40 per m².

- a) 100m², Rs. 4400
b) 110m², Rs. 5400
c) **110m², Rs. 4400**
d) 170m², Rs. 2400

16) In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system.

- a) 5.4 m² b) **4.4 m²**
c) 3.4 m² d) 6.4 m²





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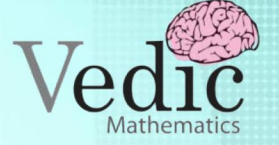
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17) Find

(i) the lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high.

(ii) how much steel was actually used, if 112 of the steel actually used was wasted in making the tank.

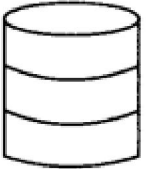
a) 79.4 m^2 , 95.04 m^2 .

b) 59.4 m^2 , 45.04 m^2

c) 59.4 m^2 , 95.04 m^2 .

d) 99.4 m^2 , 25.04 m^2 .

18) In figure, you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade.



a) 2400 cm^2 **b) 2200 cm^2**

c) 2800 cm^2 d) 2000 cm^2

19) The students of a Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base, using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with cardboard. If there were 35 competitors, how much cardboard was required to be bought for the competition?

a) 7020 cm^2 b) 7900 cm^2

c) 7920 cm^2 d) 7930 cm^2

20) Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area.

a) 165 cm^2

b) 145 cm^2

c) 195 cm^2

d) 135 cm^2

21) Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m.

a) 1344.57 m^2 (approx)

b) 1244.57 m^2 (approx)

c) 1844.57 m^2 (approx)

d) 1634.57 m^2 (approx)

22) Curved surface area of a cone is 308 cm^2 and its slant height is 14 cm. Find

(i) radius of the base and

(ii) total surface area of the cone.

a) 5 cm, 462 cm^2

b) 7 cm, 402 cm^2

c) 7 cm, 462 cm^2

d) 9 cm, 432 cm^2

23) A conical tent is 10 m high and the radius of its base is 24 m. Find

(i) slant height of the tent.

(ii) cost of the canvas required to make the tent, if the cost of 1 m^2 canvas is ₹70.

a) 26 m, Rs. 137280

b) 24 m, Rs. 137280

c) 26 m, Rs. 187280

d) 23 m, Rs. 137280

24) What length of tarpaulin 3 m wide will be required to make conical tent of height 8 m and base radius 6m? Assume that the extra length of material that will be required for stitching margins and wastage in cutting is approximately 20 cm. (Use $\pi = 3.14$)

a) 63 m

b) 64 m

c) 66 m

d) 69 m

25) The slant height and base diameter of a conical tomb are 25 m and 14 m respectively. Find the cost of white-washing its curved surface at the rate of ₹ 210 per 100 m^2 .





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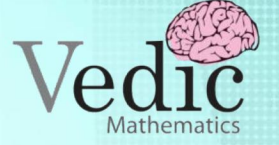
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- a) Rs. 1255 b) Rs. 1355
c) **Rs. 1155** d) Rs. 1755

26) A joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.

Ans : 5500 cm²

27) A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is ₹12 per m², what will be the cost of painting all these cones? (Use $\pi = 3.14$ and take $\sqrt{104} = 1.02$)

- a) Rs. 284.34 (approx.).
b) **Rs. 384.34 (approx.).**
c) Rs. 584.34 (approx.).
d) Rs. 484.34 (approx.).

28) Find the surface area of a sphere of radius

- (i) 10.5 cm
(ii) 5.6 cm
(iii) 14 cm

- a) **1386cm², 394.24cm², 2464cm²**
b) 4386cm², 364.24cm², 2064cm²
c) 1306cm², 364.24cm², 2464cm²
d) 1386cm², 324.24cm², 2564cm²

29) Find the surface area of a sphere of diameter

- (i) 14 cm
(ii) 21 cm
(iii) 3.5 m

- a) 606cm², 1386cm², 38.5cm²
b) 616cm², 1086cm², 38.5cm²
c) 616cm², 1386cm², 30.5cm²
d) **616cm², 1386cm², 38.5cm²**

30) Find the total surface area of a hemisphere of radius 10 cm. (Use $\pi = 3.14$)

- a) 922 cm² b) 912 cm²
c) **942 cm²** d) 992 cm²

31) The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.

- a) 676 cm², 3 : 4
b) 616 cm², 5 : 4
c) 646 cm², 1 : 3
d) **616 cm², 1 : 4**

32) A hemispherical bowl made of brass has inner diameter 10.5 cm. Find the cost of tin-plating it on the inside at the rate of ₹16 per 100 cm².

- a) Rs. 20.72 b) Rs. 37.72
c) **Rs. 27.72** d) Rs. 17.22

33) Find the radius of a sphere whose surface area is 154 cm².

- a) **3.5 cm.** b) 3 cm
c) 4.6 cm d) 4.1 cm

34) The diameter of the Moon is approximately one-fourth of the diameter of the Earth. Find the ratio of their surface areas.

- a) 1 : 13 b) **1 : 16.**
c) 11 : 12 d) 12 : 8

35) A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.

- a) 123.25cm² b) 113.25cm²
c) 179.25cm² d) **173.25cm²**

36) A right circular cylinder just encloses a sphere of radius r. Find

- (i) surface area of the sphere,
(ii) curved surface area of the cylinder,
(iii) ratio of the areas obtained in (i) and (ii).
a) $4\pi R^2$, $4\pi r^2$, 3:1
b) **$4\pi R^2$, $4\pi r^2$, 1:1**





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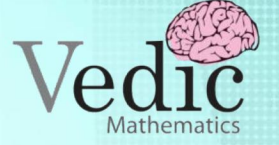
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- c) $2\pi R^2, 4\pi r^2, 1:1$
d) $4\pi R^2, 2\pi r^2, 8:1$

37) A matchbox measures 4 cm x 2.5 cm x 1.5 cm. What will be the volume of a packet containing 12 such boxes?

- a) 110 cm^3 b) 150 cm^3
c) **180 cm^3** d) 140 cm^3

38) A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold? ($1 \text{ m}^3 = 1000 \text{ L}$)

- a) 115000 litres. b) **135000 litres.**
c) 145000 litres. d) 195000 litres.

39) A cuboidal vessel is 10 m long and 8 m wide. How high must it be made to hold 380 cubic metres of a liquid?

- a) **4.75 m** b) 3.75 m
c) 1.75 m d) 7.75 m

40) Find the cost of digging a cuboidal pit 8 m long, 6 m broad and 3 m deep at the rate of ₹30 per m^3 .

- a) Rs. 4440 b) Rs. 4620
c) Rs. 4220 d) **Rs. 4320**

41) The capacity of a cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its length and depth are 2.5 m and 10 m, respectively.

- a) 3 m b) **2 m**
c) 5 m d) 1 m

42) A village, having a population of 4000, requires 150 litres of water per head per day. It has a tank measuring 20 m x 15 m x 6 m. For how many days will the water of this tank last?

- a) **3** b) 4 c) 1 d) 7

43) A godown measures 40 m x 25 m x 10 m. Find the maximum number of wooden crates each measuring 15 m x 125 m x 0.5 m that can be stored in the godown.

- a) 12365 b) **10667.**
c) 10876 d) 15464

44) A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube? Also, find the ratio between their surface areas.

- a) 3 : 2 b) 4 : 2
c) **4 : 1** d) 5 : 3

45) A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?

- a) 5000 m^3 b) 7000 m^3
c) 2000 m^3 d) **4000 m^3**

46) The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. How many litres of water can it hold? ($1000 \text{ cm}^3 = 1 \text{ L}$)

- a) 54.65 litres b) 24.65 litres
c) **34.65 litres** d) 84.65 litres

47) The inner diameter of a cylindrical wooden pipe is 24 cm and its outer diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if 1 cm^3 of wood has a mass of 0.6 g.

- a) **3.432 kg** b) 9.432 kg
c) 1.432 kg d) 0.432 kg

48) A soft drink is available in two packs

(i) a tin can with a rectangular base of length 5 cm and width 4 cm, having a height of 15 cm.

(ii) a plastic cylinder with circular base of diameter 7 cm and height 10 cm. Which container has greater capacity and by how much?

- a) $600 \text{ cm}^3, 55 \text{ cm}^3$
b) $300 \text{ cm}^3, 75 \text{ cm}^3$





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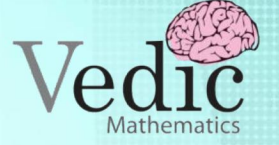
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c) 300 cm³, 85 cm³

d) 200 cm³, 35 cm³

49) If the lateral surface of a cylinder is 94.2 cm² and its height is 5 cm, then find

(i) radius of its base,

(ii) its volume. (Use $\pi = 3.14$)

a) 3 cm, 141.3 cm³

b) 4 cm, 111.3 cm³

c) 4 cm, 121.3 cm³

d) 3 cm, 117.3 cm³

50) It costs ₹2200 to paint the inner curved surface of a cylindrical vessel 10 m deep. If the cost of painting is at the rate of ₹20 per m², find

(i) inner curved surface area of the vessel,

(ii) radius of the base,

(iii) capacity of the vessel.

a) 120 m², 1.75m, 96.25kl

b) 110 m², 1.75m, 96.25kl

c) 110 m², 2.75m, 96.25kl

d) 110 m², 1.75m, 46.25kl

51) The capacity of a closed cylindrical vessel of height 1 m is 15.4 litres. How many square metres of metal sheet would be needed to make it?

a) 1.4708 m² b) 5.4708 m²

c) 3.4708 m² d) 0.4708 m²

52) A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is 7 mm and the diameter of the graphite is 1 mm. If the length of the pencil is 14 cm, find the volume of the wood and that of the graphite.

a) 5.28 cm³ b) 3.88 cm³

c) 2.28 cm³ d) 6.98 cm³

53) A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much

soup the hospital has to prepare daily to serve 250 patients?

a) 48.5 litres b) 50.5 litres

c) 38.5 litres d) 33.5 litres

54) Find the volume of the right circular cone with

(i) radius 6 cm, height 7 cm

(ii) radius 3.5 cm, height 12 cm

a) 200cm³, 150cm³

b) 250cm³, 156cm³

c) 224cm³, 174cm³

d) 264cm³, 154cm³

55) Find the capacity in litres of a conical vessel with

(i) radius 7 cm, slant height 25 cm

(ii) height 12 cm, slant height 13 cm

a) 4.232 litres., 12/35 litres.

b) 1.232 litres., 11/35 litres.

c) 2.232 litres., 11/37 litres.

d) 3.232 litres., 15/35 litres.

56) The height of a cone is 15 cm. If its volume is 1570 cm³, find the radius of the base. (Use $\pi = 3.14$)

a) 10 cm

b) 20 cm

c) 33 cm

d) 25 cm

57) If the volume of a right circular cone of height 9 cm is 48 cm³, find the diameter of its base.

a) 6 cm

b) 8 cm

c) 7 cm

d) 4 cm

58) A conical pit of top diameter 3.5 m is 12 m deep. What is its capacity in kilolitres?

a) 35.5 kl.

b) 36.5 kl.

c) 33.5 kl.

d) 38.5 kl.

59) The volume of a right circular cone is 9856 cm³. If the diameter of the base is 28 cm, find (i) height of the cone





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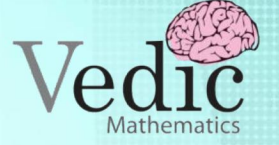
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(ii) slant height of the cone
(iii) curved surface area of the cone

a) 48 cm., 50 cm., 2200 cm².

b) 58 cm., 30 cm., 2200 cm².

c) 48 cm., 10 cm., 5200 cm².

d) 38 cm., 20 cm., 2800 cm².

60) A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 12 cm. Find the volume of the solid so obtained.

a) $150\pi\text{cm}^3$. b) $100\pi\text{cm}^3$.

c) $200\pi\text{cm}^3$. d) $190\pi\text{cm}^3$.

61) If the triangle ABC in Question 7 above is revolved around the side 5 cm, then find the volume of the solid so obtained. Find also the ratio of the volumes of the two solids obtained in Questions 7 and 8.

a) 5: 13

b) 3: 6

c) 5: 12.

d) 5: 18

62) A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

a) 91.825 m².

b) 99.825 m²

c) 98.825 m²

d) 93.825 m²

63) Find the volume of a sphere whose radius is
(i) 7 cm

(ii) 0.63 cm

a) $1137 \frac{1}{3}\text{cm}^3$, 4.05 m³ (approx.)

b) $1737 \frac{1}{5}\text{cm}^3$, 2.05 m³ (approx.)

c) $1427 \frac{1}{3}\text{cm}^3$, 1 m³ (approx.)

d) $1437 \frac{1}{3}\text{cm}^3$, 1.05 m³ (approx.)

64) Find the amount of water displaced by a solid spherical ball of diameter

(i) 28 cm

(ii) 0.21 m

a) $12498 \frac{2}{3} \text{ cm}^3$, 0.004851 m³.

b) $15498 \frac{2}{3} \text{ cm}^3$, 0.004851 m³.

c) $11498 \frac{2}{3} \text{ cm}^3$, 0.004851 m³.

d) $16498 \frac{2}{3} \text{ cm}^3$, 0.004851 m³.

65) The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm³?

a) 345.39 g (approx.)

b) 395.39 g (approx.)

c) 300.39 g (approx.)

d) 325.39 g (approx.)

66) The diameter of the Moon is approximately one-fourth of the diameter of the Earth. What fraction of the volume of the Earth is the volume of the Moon?

a) $\frac{1}{64}$

b) $\frac{1}{66}$

b) $\frac{3}{45}$

d) $\frac{5}{26}$

67) How many litres of milk can a hemispherical bowl of diameter 10.5 cm hold?

a) 0.303 litres (approx.)

b) 1.303 litres (approx.)

c) 0.003 litres (approx.)

d) 0.03 litres (approx.)

68) A hemispherical tank is made up of an iron sheet 1 cm thick. If the inner radius is 1 m, then find the volume of the iron used to make the tank.

a) 1.06348 m³ (approx.)

b) 3.06348 m³ (approx.)

c) 0.06348 m³ (approx.)

d) 0.0348 m³ (approx.)

69) Find the volume of a sphere whose surface area is 154 cm².

a) $180 \frac{2}{3} \text{ cm}^3$

b) $199 \frac{2}{3} \text{ cm}^3$

c) $139 \frac{2}{3} \text{ cm}^3$

d) $179 \frac{2}{3} \text{ cm}^3$

70) A dome of a building is in the form of a hemisphere. From inside, it was white washed





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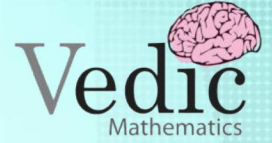
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at the cost of ₹498.96. If the cost of white washing is ₹2.00 per square metre, find the

- (i) inside surface area of the dome,
(ii) volume of the air inside the dome.

a) 249.48 m², 523.9 m³ (approx).

- b) 250.48 m², 523.9 m³ (approx).
c) 249.48 m², 530.9 m³ (approx).
d) 239.48 m², 520.9 m³ (approx).

71) Twenty seven solid iron spheres, each of radius r and surface area S are melted to form a sphere with surface area S' . Find the

- (i) radius r' of the new sphere,
(ii) ratio of S and S' .

- a) $3r$, $2 : 9$ **b) $3r$, $1 : 9$**
c) $4r$, $1 : 9$ d) $5r$, $1 : 3$

72) A capsule of medicine is in the shape of a sphere of diameter 3.5 mm. How much medicine (in mm³) is needed to fill this capsule?

a) 22.46 mm³(approx.) b) 20.46 mm³(approx.)

c) 23.46 mm³(approx.) d) 25.46 mm³(approx.)

73) A wooden bookshelf has external dimensions as follows :

Height = 110cm, Depth = 25cm, Breadth = 85cm (see figure). The thickness of the plank is 5 cm everywhere. The external faces are to be polished and the inner faces are to be painted. If the rate of polishing-is 20 paise per cm² and the rate of pointing is 10 paise per cm², find the total expenses required for palishing and painting the surface of the bookshelf.

- a) Rs. 6675 b) Rs. 5275
c) Rs. 6275 d) Rs. 6285

74) The front compound wall of a house is decorated by wooden spheres of diameter 21 cm, placed on small supports as shown in figure. Eight such spheres are-used for this purpose, and are to be painted silver. Each support is a cylinder of radius 1.5 cm and height 7 cm and is to be painted black. Find the cost of paint

required if silver paint costs 25 paise per cm² and black paint costs 5 paise per cm².

- a) Rs. 2784.25** b) Rs. 6784.25
c) Rs. 2984.25 d) Rs. 4784.25

75) The diameter of a sphere is decreased by 25%. By what per cent does its curved surface area decrease?

- a) 40.75% b) 45.75%
c) 43.75% d) 44.75%

Heron's Formula Based Problems

1) A traffic signal board, indicating 'SCHOOL AHEAD', is an equilateral triangle with side ' a '. Find the area of the signal board, using Heron's formula. If its perimeter is 180 cm, what will be the area of the signal board ?

- a) $900\sqrt{3}$ Sq. feet **b) $900\sqrt{3}$ Sq. feet**
c) $900\sqrt{3}$ Sq. feet d) $900\sqrt{3}$ Sq. feet

2) The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 122 m, 22 m and 120 m. The advertisements yield an earning of Rs. 5000 per m² per year. A company hired one of its walls for 3 months. How much rent did it pay?

- a) Rs. 1650000.** b) Rs. 1650000.
c) Rs. 1650000. d) Rs. 1650000.

3) There is a slide in a park. One of its side walls has been painted in some colour with a message "KEEP THE PARK GREEN AND CLEAN". If the sides of the wall are 15m, 11m and 6 m, find, the area painted in colour.

- a) $50\sqrt{2}$ Sq.m b) $30\sqrt{2}$ Sq.m
c) $27\sqrt{2}$ Sq.m **d) $20\sqrt{2}$ Sq.m**

4) Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

- a) $20\sqrt{11}$ sq.cm **b) $21\sqrt{11}$ sq.cm**
c) $25\sqrt{11}$ sq.cm d) $23\sqrt{11}$ sq.cm





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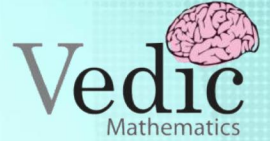
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5) Sides of a triangle are in the ratio of 12: 17: 25 and its perimeter is 540 cm. Find its area.

- a) 5000 Sq.cm b) 7000 Sq.cm
c) **9000 Sq.cm** d) 3000 Sq.cm

6) An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

- a) $2\sqrt{15}$ Sq.cm b) $4\sqrt{15}$ Sq.cm
c) $10\sqrt{15}$ Sq.cm d) **$9\sqrt{15}$ Sq.cm**

7) A park, in the shape of a quadrilateral ABCD, has $\angle C = 90^\circ$, $AB = 9$ m, $BC = 12$ m, $CD = 5$ m and $AD = 8$ m. How much area does it occupy?

- a) **65.46 sq.m.** b) 60.46 sq.m
c) 35.46 sq.m d) 55.46 sq.m

8) Find the area of a quadrilateral ABCD which $AB = 3$ cm, $BC = 4$ cm, $CD = 4$ cm, $DA = 5$ cm, and $AC = 5$ cm.

- a) **20.16 sq. cm.** b) 25.16 sq. cm.
c) 19.16 sq. cm. d) 13.16 sq. cm.

09) A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 26 cm, 28 cm and 30 cm, and the parallelogram stands on the base 28 cm, find the height of the parallelogram.

- a) 11 Cm b) 10 Cm
c) 14 Cm d) **12 Cm**

10) A rhombus shaped field has green grass for 18 cows to graze. If each side of the rhombus is 30 m and its longer diagonal is 48 m, how much area of grass field will each cow be getting ?

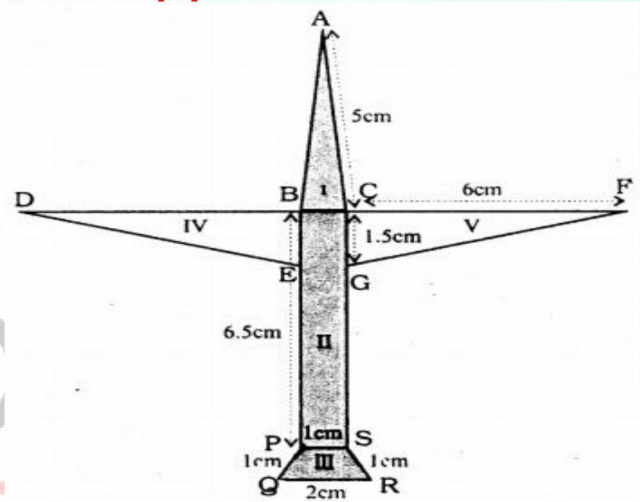
- a) 46 sq.m. b) 43 sq.m.
c) **48 sq.m.** d) 47 sq.m.

11) An umbrella is made by stitching 10 triangular pieces of cloth of two different colours, each piece measuring 20 cm, 50 cm and

50 cm. How much cloth of each colour is required for the umbrella?

- a) $4000\sqrt{6}$ Sq. cm
b) **$2000\sqrt{6}$ Sq. cm**
c) $1000\sqrt{6}$ Sq. cm
d) $8000\sqrt{6}$ Sq. cm

12) Radha made a picture of an aero plane with colored paper as shows in Fig. Find the total area of the paper used.



- a) 10.275 sq. cm. b) **9.275 sq. cm.**
c) 13.275 sq. cm. d) 6.275 sq. cm.

13) A floral design of a floor is made up of 16 tiles which are triangular, the sides of the triangle being 9 cm, 28 cm and 35 cm. Find the cost of polishing the tiles at the rate of 50p per cm^2 .

- a) Rs 775.6 b) Rs 725.6
c) Rs 745.6 d) **Rs 705.6**

14) A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field.

- a) **196 sq.cm.** b) 106 sq.cm.
c) 146 sq.cm. d) 166 sq.cm.

