SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution

Coimbatore-35

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF CIVIL ENGINEERING

23GET276 – VQAR II

II YEAR/ IV SEMESTER

UNIT 2 – QUANTITATIVE ABILITY IV

TOPIC – MENSURATION

MENSURATION

1. CUBOID

Let length = l, breadth = b and height = h units. Then

i. **Volume** = (l x b x h) cubic units.

ii. **Surface area** = $2(lb + bh + lh)$ sq. units.

iii. **Diagonal** = $\sqrt{l^2 + b^2 + h^2}$ units.

2. CUBE

Let each edge of a cube be of length a. Then,

i. **Volume** = a^3 cubic units.

ii. **Surface area** = $6a^2$ sq. units.

iii. **Diagonal** = $3a$ units.

MENSURATION

3. CYLINDER

Let radius of base = r and Height (or length) = h. Then,

i. **Volume** = $(\pi r^2 h)$ cubic units.

ii. **Curved surface area** = $(2\pi rh)$ sq. units.

iii. **Total surface area** = $2\pi r(h + r)$ sq. units.

4. CONE

Let radius of base = r and Height = h. Then,

i. **Slant height,** $l = \sqrt{h^2 + r^2}$ units.

ii. **Volume** = $\left(\frac{1}{3}\pi r^2 h\right)$ cubic units.

iii. **Curved surface area** = (πrl) sq. units.

iv. **Total surface area** = $(\pi rl + \pi r^2)$ sq. units.

MENSURATION

5. SPHERE

Let the radius of the sphere be r. Then,

i. **Volume** = $\left(\frac{4}{3}\pi r^3\right)$ cubic units.

ii. **Surface area** = $(4\pi r^2)$ sq. units.

6. HEMISPHERE

Let the radius of a hemisphere be r. Then,

i. **Volume** = $\left(\frac{2}{3}\pi r^3\right)$ cubic units.

ii. **Curved surface area** = $(2\pi r^2)$ sq. units.

iii. **Total surface area** = $(3\pi r^2)$ sq. units.

Note: 1 litre = 1000 cm^3.

MENSURATION

A right triangle with sides 3 cm, 4 cm and 5 cm is rotated the side of 3 cm to form a cone. The volume of the cone so formed is:

A. $12\pi\ cm^3$

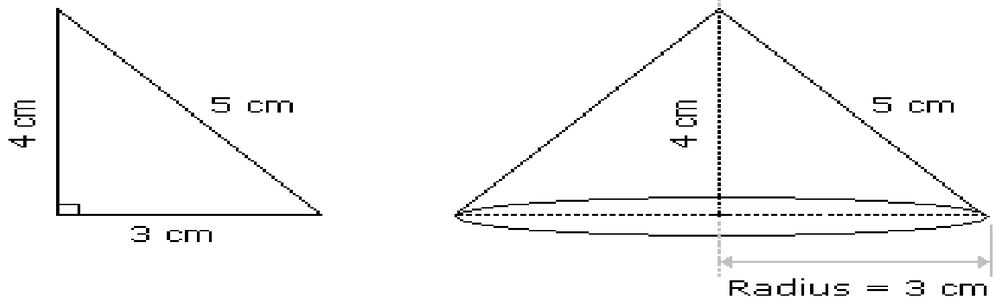
B. $15\pi\ cm^3$

C. $16\pi\ cm^3$

D. $20\pi\ cm^3$

Answer: Option **A**

Explanation:



Clearly, we have $r = 3$ cm and $h = 4$ cm.

$\therefore$ Volume $= \frac{1}{3}\pi r^2 h = \left(\frac{1}{3} \times \pi \times 3^2 \times 4\right) cm^3 = 12\pi\ cm^3.$

MENSURATION

In a shower, 5 cm of rain falls. The volume of water that falls on 1.5 hectares of ground is:

A. 75 cu. m

B. 750 cu. m

C. 7500 cu. m

D. 75000 cu. m

Answer: Option **B**

Explanation:

1 hectare = 10,000 m^2

So, Area = (1.5 x 10000) m^2 = 15000 m^2.

Depth = $\frac{5}{100}$m = $\frac{1}{20}$m.

$\therefore$ Volume = (Area x Depth) = $\left(15000 \times \frac{1}{20}\right) m^3 = 750\ m^3$.

MENSURATION

66 cubic centimetres of silver is drawn into a wire 1 mm in diameter. The length of the wire in metres will be:

A. 84

B. 90

C. 168

D. 336

Answer: Option **A**

Explanation:

Let the length of the wire be h.

Radius = $\frac{1}{2}$mm = $\frac{1}{20}$cm. Then,

$\Rightarrow \frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times h = 66.$

$\Rightarrow h = \left(\frac{66 \times 20 \times 20 \times 7}{22}\right) = 8400 \text{ cm} = 84 \text{ m}.$

MENSURATION

A hall is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the sum of the areas of four walls, the volume of the hall is:

A. 720

B. 900

C. 1200

D. 1800

Answer: Option **C**

Explanation:

$2(15 + 12) \times h = 2(15 \times 12)$

$\Rightarrow h = \frac{180}{27}\text{m} = \frac{20}{3}\text{m}.$

$\therefore$ Volume $= \left(15 \times 12 \times \frac{20}{3}\right)\text{m}^3 = 1200\ \text{m}^3.$

MENSURATION

A hollow iron pipe is 21 cm long and its external diameter is 8 cm. If the thickness of the pipe is 1 cm and iron weighs 8 g/cm^3, then the weight of the pipe is:

A. 3.6 kg

B. 3.696 kg

C. 36 kg

D. 36.9 kg

Answer: Option **B**

Explanation:

External radius = 4 cm,

Internal radius = 3 cm.

$$\text{Volume of iron} = \left(\frac{22}{7} \times [(4)^2 - (3)^2] \times 21\right)\text{cm}^3$$

$$= \left(\frac{22}{7} \times 7 \times 1 \times 21\right)\text{cm}^3$$

$$= 462\ \text{cm}^3.$$

$\therefore$ Weight of iron = (462 x 8) gm = 3696 gm = 3.696 kg.

MENSURATION

A boat having a length 3 m and breadth 2 m is floating on a lake. The boat sinks by 1 cm when a man gets on it. The mass of the man is:

A. 12 kg

B. 60 kg

C. 72 kg

D. 96 kg

Answer: Option **B**

Explanation:

Volume of water displaced $= (3 \times 2 \times 0.01)\ m^3$

$= 0.06\ m^3.$

$\therefore$ Mass of man = Volume of water displaced x Density of water

$= (0.06 \times 1000)$ kg

$= 60$ kg.

MENSURATION

50 men took a dip in a water tank 40 m long and 20 m broad on a religious day. If the average displacement of water by a man is 4 m^3, then the rise in the water level in the tank will be:

A. 20 cm

B. 25 cm

C. 35 cm

D. 50 cm

Answer: Option **B**

Explanation:

Total volume of water displaced = (4 x 50) m^3 = 200 m^3.

$\therefore$ Rise in water level = $\left(\frac{200}{40 \times 20}\right)$ m 0.25 m = 25 cm.

MENSURATION

The slant height of a right circular cone is 10 m and its height is 8 m. Find the area of its curved surface.

A. $30\pi\ m^2$

B. $40\pi\ m^2$

C. $60\pi\ m^2$

D. $80\pi\ m^2$

Answer: Option **C**

Explanation:

$l = 10$ m,

$h = 8$ m.

So, $r = \sqrt{l^2 - h^2} = \sqrt{(10)^2 - 8^2} = 6$ m.

$\therefore$ Curved surface area $= \pi rl = (\pi \times 6 \times 10)\ m^2 = 60\pi\ m^2$.

MENSURATION

. A metallic sheet is of rectangular shape with dimensions 48 m x 36 m. From each of its corners, a square is cut off so as to make an open box. If the length of the square is 8 m, the volume of the box (in m^3) is:

A. 4830

B. 5120

C. 6420

D. 8960

Answer: Option **B**

Explanation:

Clearly, $l = (48 - 16)m = 32$ m,

$b = (36 - 16)m = 20$ m,

$h = 8$ m.

∴ Volume of the box = $(32 \times 20 \times 8)\ m^3 = 5120\ m^3$.

MENSURATION

A large cube is formed from the material obtained by melting three smaller cubes of 3, 4 and 5 cm side. What is the ratio of the total surface areas of the smaller cubes and the large cube?

A. 2 : 1

B. 3 : 2

C. 25 : 18

D. 27 : 20

Answer: Option **C**

Explanation:

Volume of the large cube = $(3^3 + 4^3 + 5^3) = 216\ cm^3$.

Let the edge of the large cube be a.

So, $a^3 = 216 \Rightarrow a = 6$ cm.

$\therefore$ Required ratio = $\left(\frac{6 \times (3^2 + 4^2 + 5^2)}{6 \times 6^2}\right) = \frac{50}{36} = 25 : 18.$

MENSURATION

. How many bricks, each measuring 25 cm x 11.25 cm x 6 cm, will be needed to build a wall of 8 m x 6 m x 22.5 cm?

A. 5600

B. 6000

C. 6400

D. 7200

Answer: Option **C**

Explanation:

$$\text{Number of bricks} = \frac{\text{Volume of the wall}}{\text{Volume of 1 brick}} = \left(\frac{800 \times 600 \times 22.5}{25 \times 11.25 \times 6}\right) = 6400.$$

THANK YOU