

VOLUME CALCULATION - SOLVED EXAMPLES

Advertisements

Q 1 - The diagonal of a cube is $12\sqrt{6}$ m. Find its surface area.

- A - 1624 m^2
- B - 1728 m^2
- C - 2564 m^2
- D - $1254\sqrt{2} \text{ m}^2$

Answer - B

Explanation

Let the edge of the cube be X.

$$\sqrt{3} X = 12\sqrt{6}$$

$$\Rightarrow X = 12\sqrt{2}$$

$$\text{Surface area} = 6X^2 = (6 \times 12\sqrt{2} \times 12\sqrt{2}) \text{ m}^2 \equiv 1728 \text{ m}^2.$$

Q 2 - The surface area of a cube is 1728 cm^2 . Find its volume.

- A - $3456\sqrt{2} \text{ cm}^3$
- B - $256\sqrt{2} \text{ cm}^3$
- C - $125\sqrt{2} \text{ cm}^3$
- D - $144\sqrt{2} \text{ cm}^3$

Answer - A

Explanation

Let the edge of the cube be X. Then,

$$6X^2 = 1728$$

$$\Rightarrow X^2 = 288$$

$$\Rightarrow X = 12\sqrt{2} \text{ cm.}$$

$$\text{Volume} = X^3 = (12\sqrt{2})^3 \text{ cm}^3$$

$$= 3456\sqrt{2} \text{ cm}^3.$$

Q 3 - Find the number of bricks, each measuring 24 cm x 12 cm x 8 cm, required to construct a wall 24 m long, 8m high and 60 cm thick.

- A - 12500
- B - 11500
- C - 12000
- D - 10000

Answer - A

Explanation

Volume of the wall = $(1800 \times 600 \times 90) \text{ cm}^3$.
Volume of 1 brick = $(36 \times 18 \times 12) \text{ cm}^3$.
Number of bricks = $((1800 \times 600 \times 90) / (36 \times 18 \times 12)) = 12500$

Q 4 - A right triangle with sides 6 cm, 8 cm and 10 cm is rotated the side of 6 cm to form a cone. The volume of the cone so formed is:

- A - 96 cm^3
- B - $96\pi \text{ cm}^3$
- C - $96/\pi \text{ cm}^3$
- D - $96\pi^3$

Answer - B

Explanation

We have $R = 6 \text{ cm}$ and $H = 8 \text{ cm}$.
Volume = $(1/3)\pi R^2 H = (1/3)\pi \times 6^2 \times 8 = 96\pi \text{ cm}^3$

Q 5 - A room is 30 m long and 24 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 - 96 m^3
- B - 960 m^3
- C - 9600 m^3
- D - 96000 m^3

Answer - C

Explanation

Let the height be H
 $2(30 + 24) \times H = 2(30 \times 24)$
 $\Rightarrow H = (2(30 \times 24)) / (2(30 + 24)) = (30 \times 24) / 54 = 40/3 \text{ m}$
 $\Rightarrow \text{Volume} = 30 \times 24 \times 40/3 = 9600 \text{ m}^3$

Q 6 - A hollow steel pipe is 42 cm long and its external diameter is 16 cm. If the thickness of the pipe is 2 cm and steel density weighs 12 g/cm^3 , then the weight of the pipe is:

- A - 51.744 kg
- B - 45.834 kg
- C - 48.225 kg
- D - 55.565 kg

Answer - A

Explanation

External radius = 8 cm,

Internal radius = 6 cm.

Volume of steel = $(\pi \times (8^2 - 6^2) \times 42) = 1176 \pi \text{ cm}^3$

Weight of steel = $(1176 \pi \times 12) \text{ gm} = 51744 \text{ gm} = 51.744 \text{ kg}$.

Q 7 - Find the area of right circular cone curved surface if slant height is 20 m and height is 16 m.

A - $100\pi \text{ m}^2$

B - $200\pi \text{ m}^2$

C - $320\pi \text{ m}^2$

D - $240\pi \text{ m}^2$

Answer - D

Explanation

$L = 20 \text{ m}$, $H = 16 \text{ m}$.

So, $R = \sqrt{(L^2 - H^2)} = \sqrt{(20^2 - 16^2)} = 12 \text{ m}$.

\Rightarrow Curved surface area = $\pi RL = (\pi \times 12 \times 20) \text{ m}^2 = 240\pi \text{ m}^2$.

Q 8 - Find the volume & curved surface area of a cylinder with diameter of base 14 cm and height 60 cm.

A - 4640cm^3 & 1340 cm^2

B - 9240cm^3 & 1340 cm^2

C - 4640cm^3 & 2640 cm^2

D - 9240cm^3 & 2640 cm^2

Answer - D

Explanation

Volume = $\pi R^2 H = \pi \times 7^2 \times 60 = 9240 \text{ cm}^3$

Curved surface area = $2\pi RH = (2 \pi \times 7 \times 60) \text{ cm}^2 = 2640 \text{ cm}^2$

Q 9 - If the volume of a cylindrical tank is 3696 m^3 and the diameter of its base is 28 m, then find the depth of the tank.

A - 5 m

B - 6 m

C - 8 m

D - 14 m

Answer - B

Explanation

Let the depth of the tank be H meters. Then,

Volume = $\pi R^2 H = \pi \times 14^2 \times H = 3696 \text{ m}^3$

$\Rightarrow H = 6 \text{ m}$

Q 10 - How many steel rods, each of length 14 m and diameter 4 cm can be made out of 1.76 cm³ of steel?

- A - 80
- B - 100
- C - 110
- D - 120

Answer - B

Explanation

Volume of 1 rod = $\left(\left(\frac{22}{7}\right) \times \left(\frac{2}{100}\right) \times \left(\frac{2}{100}\right) \times 14\right) \text{ m}^3 = \frac{11}{625} \text{ m}^3$
Volume of steel = 1.76 m³
Number of rods = $(1.76 \times 625/11) = 100$.

Q 11 - Find the volume and surface area of a Box 32 m long, 28 m broad and 14 m high.

- A - 12544 m³ & 3472 m²
- B - 12500 m³ & 3472 m²
- C - 12600 m³ & 3400 m²
- D - 12000 m³ & 3000 m²

Answer - A

Explanation

Volume = $(32 \times 28 \times 14) \text{ m}^3 = 12544 \text{ m}^3$.
Surface area = $[2 (32 \times 28 + 28 \times 14 + 32 \times 14)] \text{ m}^2 = (2 \times 1736) \text{ m}^2 = 3472 \text{ m}^2$.

Q 12 - Find the length of the longest pole that can be placed in a room 24 m long 16 m broad and 18 m high.

- A - 34 m
- B - 24 m
- C - 14 m
- D - 4 m

Answer - A

Explanation

Length of the longest pole = $\sqrt{(24^2 + 16^2 + 18^2)} = 34 \text{ m}$

Q 13 - A wheel makes 2000 revolutions in covering a distance of 44 km. Find the radius of the wheel.

- A - 12 m
- B - 14 m
- C - 13 m

D - 15 m

Answer - B

Explanation

Distance covered in one revolution = $((44 \times 2000)/1000) = 88\text{m}$.
 $2\pi R = 88$
 $2 \times (22/7) \times R = 88$
 $\Rightarrow R = 88 \times (7/44) = 14 \text{ m}$.

Q 14 - A rectangular block 35 cm x 42 cm x 70 cm is cut up into an exact number of equal cubes. Find the least possible number of cubes.

A - 300

B - 200

C - 100

D - 50

Answer - A

Explanation

Volume of the block = $(35 \text{ cm} \times 42 \text{ cm} \times 70 \text{ cm}) \text{ cm}^3 = 300 \times 73 \text{ cm}^3$.
Side of the largest cube = H.C.F. of 35 cm, 42 cm and 70 cm = 7 cm.
Volume of this cube = $(7 \times 7 \times 7) \text{ cm}^3 = 73 \text{ cm}^3$.
Number of cubes = $300 \times 73 / 73 = 300$.

Q 15 - Two cubes have their volumes in the ratio 8: 125. Find the ratio of their surface areas.

A - 4:25

B - 2:25

C - 1:25

D - 3:25

Answer - A

Explanation

Let their edges be X and Y. Then,
 $X^3/Y^3 = 8/125$ (or) $(X/Y)^3 = (2/5)^3$ (or) $(X/Y) = (2/5)$.
Ratio of their surface area = $6X^2/6Y^2 = X^2/Y^2 = (X/Y)^2 = 4/25$, i.e. 4:25.

Q 16 - Find the volume and surface area of a sphere of radius 21 cm.

A - 38008 cm^3 & 5444 cm^2

B - 38808 cm^3 & 5544 cm^2

C - 38888 cm^3 & 4544 cm^2

D - 30008 cm^3 & 5544 cm^2

Answer - B

Explanation

$$\text{Volume} = \left(\frac{4}{3}\right)\pi r^3 = \left(\frac{4}{3}\right) * \left(\frac{22}{7}\right) * (21) * (21) * (21) \text{ cm}^3 = 38808 \text{ cm}^3.$$
$$\text{Surface area} = 4\pi r^2 = (4 * \left(\frac{22}{7}\right) * (21) * (21)) \text{ cm}^2 = 5544 \text{ cm}^2$$

Q 17 - The volume of a wall, 10 times as high as it is broad and 16 times as long as it is high, is 25.6 m^3 . Find the breadth of the wall.

A - $\frac{2}{5}$ m

B - $\frac{5}{2}$ m

C - $\frac{5}{3}$ m

D - $\frac{3}{2}$ m

Answer - A

Explanation

Let the breadth of the wall be X meters.
Then, Height = 10X meters and Length = 160X meters.
 $X \times 10X \times 160X = 25.6$
 $\Rightarrow X^3 = 25.6/1600$
 $= 2/125$
 $\Rightarrow X = \frac{2}{5}$ m

Q 18 - Two metallic right circular cones having their heights 4.1 cm and 4.3 cm and the radii of their bases 2.1 cm each have been melted together and recast into a sphere. Find the diameter of the sphere.

A - 2 cm

B - 3 cm

C - 4 cm

D - 5 cm

Answer - A

Explanation

Volume of sphere = Volume of 2 cones
 $= \left(\frac{1}{3}\pi \times (1^2) \times 2.2 + \frac{1}{3}\pi \times (1)^2 \times 1.8\right) = \frac{4}{3}\pi$
Let the radius of sphere be R
 $\frac{4}{3}\pi R^3 = \frac{4}{3}\pi$ or $R = 1$ cm
Hence, diameter of the sphere = 2 cm

Q 19 - The diameter of garden roller is 2.8 m and it is 3 m long. The area covered by the roller in 10 revolutions is?

A - 132 m^2

B - 264 m^2

C - $132/5 \text{ m}^2$

D - $264/5 \text{ m}^2$

Answer - B

Explanation

Curved surface area of roller = $(2 \pi R H) = 2 \times \pi \times 1.4 \times 3 = 132/5$.
Area covered by the roller = $10 \times (132/5) = 264 \text{ m}^2$

Q 20 - The curved surface area of a cylindrical pillar is 440 m² and its volume is 1540 m³. Find the ratio of its diameter to its height.

A - 7:5

B - 6:5

C - 5:7

D - 6:7

Answer - A

Explanation

Curved surface area = $(2 \pi R H) = 440$
 $\Rightarrow R \times H = 70 \dots (1)$
Volume = $\Rightarrow R^2 H = 1540$
 $\Rightarrow R^2 \times H = 1540 \dots (2)$
Solving 1 & 2 we get $R = 7 \text{ m}$ $H = 10 \text{ m}$
Required ratio = $2R/H = 14/10 = 7/5 = 7:5$