Volume Calculation - Solved Examples

Q 1 - The diagonal of a cube is 12√6m .Find its surface area.

A - 1624 m^2

B - 1728 m^2

C - 2564 m^2

D - 1254√2m^2

Answer - B

Explanation

```
Let the edge of the cube be X.
√(3 )X=12√(6)
⇒ X=12√(2)
Surface area = 6X2 = (6 x 12√(2) x12√(2)) m² ≡ 1728 m².
```

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

A - 3456√2 cm^3

B - 256√2 cm^3

C - 125√2 cm^3

D - $144\sqrt{2}$ cm^3

Answer - A

Explanation

```
Let the edge of the cube be X. Then,
6X² = 1728
⇒ X² = 288
⇒ X = 12√2 cm.
Volume = X³ = (12√2)3 cm³
= 3456√2 cm³.
```

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 x 600 x 90) cm³.
Volume of 1 brick = (36 x 18 x 12) cm³.
Number of bricks=((1800 x 600 x 90)/( 36 x 18 x 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 - 96π cm^3

C - 96/π cm^3

D - 96π^3

Answer - B

Explanation

```
We have R = 6 cm and H = 8 cm.
Volume = (1/3)πR2H= (1/3)πx62x8=96π cm³
```

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) x H = 2(30 x 24)
⇒ H=(2(30 x 24))/(2(30 + 24))=(30 x 24)/54=40/3 m
⇒ Volume = 30 x 24 x 40/3 = 9600 m³
```

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 = ( π x (8²-6²) x42) =1176 π cm³
Weight of steel = (1176 π x 12) gm = 51744 gm = 51.744 kg.
```

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

A - 100π m^2

B - 200π m^2

C - 320π m^2

D - 240π m^2

Answer - D

Explanation

```
L = 20 m, H = 16 m.
So, R = √(L²-H²) = √(20²-16²) = 12 m.
⇒ Curved surface area = πRL = (π x 12 x 20) m² = 240π m².
```

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 =   πR²H= π x 72 x 60 = 9240       cm³
Curved surface area = 2πRH = (2 π x 7 x 60) cm² =2640 cm²
```

Q 9 - If the volume of a cylindrical tank is 3696 m3 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 =  πR²H= π x 14² x H = 3696 m³
⇒ H=6 m
```

Q 10 - How many steel rods, each of length 14 m and diameter 4 cm can be made out of 1.76 cm^3 of steel?

A - 80

B - 100

C - 110

D - 120

Answer - B

Explanation

```
Volume of 1 rod = (( 22/7) x (2/100) x (2/100) x 14 ) m³= 11/625 m³
Volume of steel = 1.76 m³
Number of rods = (1.76 x 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 m^3 & 3472 m^2

B - 12500 m^3 & 3472 m^2

C - 12600 m^3 & 3400 m^2

D - 12000 m^3 & 3000 m^2

Answer - A

Explanation

```
Volume = (32 x 28 x 14) m³ = 12544 m³.
Surface area = [2 (32 x 28 + 28 x 14 + 32 x 14)] m² = (2 x 1736) m² = 3472 m².
```

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=√(24²+16²+18²)=34 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 X 2000)/1000) = 88m.
2πR = 88
2 x (22/7) x R = 88
⇒ R = 88 x (7/44) = 14 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 cm x 42 cm x 70 cm) cm³ = 300x73 cm³.
Side of the largest cube = H.C.F. of 35 cm , 42 cm and 70 cm = 7 cm.
Volume of this cube = (7 x 7 x 7) cm³ = 73 cm³.
Number of cubes = 300x73/73 = 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,
X³/Y³ = 8/125 (or) (X/Y)³ = (2/5)³ (or) (X/Y) = (2/5).
Ratio of their surface area = 6X²/6Y² = X²/Y² = (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

```
Volume = (4/3)πr³ =(4/3)*(22/7)*(21)*(21)*(21) cm³ = 38808 cm³.
Surface area = 4πr² =(4*(22/7)*(21)*(21)) cm² = 5544 cm²
```

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 - $\sqrt[3]{2}$/5 m

B - $\sqrt[3]{5}$/2 m

C - $\sqrt[3]{5}/3$ m

D - $\sqrt[3]{3}/2$ m

Answer - A

Explanation

```
Let the breadth of the wall be X meters.
Then, Height = 10X meters and Length = 160X meters.
X x 10X x 160X = 25.6
⇒ X³=25.6/1600
=2/125
⇒X = ³√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
= (1/3 π x (1²) x 2.2 + 1/3 π x (1)² x 1.8) =    4/3 π
Let the radius of sphere be R
4/3 π R³ = 4/3 π or R = 1cm
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 m^2

C - 132/5 m^2

D - 264/5 m^2

Answer - B

Explanation

```
Curved surface area of roller = (2 π R H) = 2 x π x 1.4 x 3=132/5.
Area covered by the roller = 10 x (132/5) =264 m²
```

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 π R H) = 440
⇒ R x H=70        ... (1)
```

Volume = $\Rightarrow$ R^{2}H=1540

$\Rightarrow$ R^2 x H =490 ... (2)

Solving 1 & 2 we get R=7 m H= 10 m

Required ratio = 2R/H =14/10 =7/5 =7:5