



Date : 8th Jan 2024

Quantitative Aptitude - Mensuration

English

Q:1 If the diagonal of the cube is $2\sqrt{12}$ then find the ratio of its volume to its total surface area.

1. 2 : 3
2. 3 : 2
3. 1 : 2
4. 2 : 1

Q:2 A buffalo is placed for grazing inside a rectangular field measuring 24 m and 46 m. It is tethered to one corner by a rope 15 meters long. How much area is left ungrazed?

1. 425.30 m²
2. 752.05 m²
3. 927.22 m²
4. 865.75 m²

Q:3 The radius of a spherical ball is 5 cm. If the ball is cut into two equal parts, then find the total surface area of one part.

1. 224.57 cm²
2. 235.71 cm²
3. 236.50 cm²
4. 761.79 cm²

Q:4 The perimeter of the rectangle is 70 cm, with length and breadth in a ratio 5 : 2 respectively. If the area of the rectangle is equal to the perimeter of the square, then find the side of the square.

1. 54.5 cm
2. 60.5 cm
3. 62.5 cm
4. 50.5 cm

Q:5 A big cuboid of dimension $8 \times 12 \times 16$ cm is recast into 3 small cubes. What is the side of the cube?

1. 10 cm
2. 8 cm
3. 4 cm
4. 16 cm

Q:6 What is the total surface area of a cone which has a radius of 25 cm and a height of 32 cm? (Take $\pi = 22/7$)

1. 5254.3 cm²
2. 5154.3 cm²
3. 5354.3 cm²
4. 5454.3 cm²

Q:7 If there is a cuboid whose length, breadth, and height are 12 cm, 17 cm, and 23 cm, respectively, and a circle whose radius is 14.7 cm, then find the ratio of the volume of the cuboid to the volume of the circle.

1. 204
2. 150
3. 1458
4. Cannot be determined

Q:8 The slant height of the cone is $\sqrt{1066}$ m and the radius of the base is 21 m. Find the volume of the cone.

1. 9500 m³
2. 14400 m³
3. 12500 m³
4. 11550 m³

Q:9 If the diameter of the circle is 31.5 cm, find the circumference of the semicircle formed from it.

1. 28 cm
2. 56 cm
3. 81 cm
4. 80 cm

Q:10 A factory owner has a cylindrical-shaped metal sheet with a radius of 15 cm and a height of 70 cm. The sheet is melted and recast into small pieces of the cubical box. If the length of the side of the box is 5 cm, then find the total number of boxes so formed.

1. 396
2. 248
3. 596
4. 288



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Answer Key

1. (1)	2. (3)	3. (2)	4. (3)	5. (2)
6. (2)	7. (4)	8. (4)	9. (3)	10. (1)

Answers and Solutions

Q:1 The correct answer is **Option 1** i.e. **2 : 3**.

The diagonal of the cube = $a\sqrt{3}$

The diagonal of the cube = $2\sqrt{12}$

$$a\sqrt{3} = 2\sqrt{(2 \times 2 \times 3)}$$

$$a\sqrt{3} = 4\sqrt{3}$$

$$a = 4$$

$$\text{Volume of cube} = a^3 = 4^3 = 64$$

$$\text{Total surface area} = 6a^2 = 6(4)^2 = 6 \times 16 = 96$$

$$\text{Required ratio} = 64 : 96 = 2 : 3$$

Q:2 The correct answer is **Option 3** i.e. **927.22 m²**.

We have given, in the question,

Length and breadth of the field = 24 m and 46 m

Length of the rope = 15 m

Buffalo is tethered to one corner, so $\theta = 90^\circ$

The total area of the field = $l \times b$

$$= 24 \times 46 = 1104 \text{ m}^2$$

Area of the grazed field = $\frac{\theta}{360} \times \pi r^2$

$$= \frac{90}{360} \times \frac{22}{7} \times (15)^2$$

$$= 176.78 \text{ m}^2$$

Area left ungrazed = Total area of the field - Area of the grazed field

$$\text{Area left ungrazed} = 1104 - 176.78 = 927.22 \text{ m}^2$$

Q:3 The correct answer is **Option 2** i.e. **235.71 cm²**.

Radius = 5

If the spherical ball is cut into two equal parts, then each part will be a hemisphere itself

So, The total surface area of the hemisphere = $3\pi r^2$

$$3 \times \frac{22}{7} \times 5 \times 5 = 235.71 \text{ cm}^2$$

Q:4 The correct answer is **Option 3** i.e. **62.5 cm**.

The perimeter of the rectangle = 70 cm

length and breadth in a ratio 5 : 2

The perimeter of the rectangle = 2 (length + breadth)

$$2(5x + 2x) = 70$$

$$2 \times 7x = 70$$

$$x = 5$$

$$\text{Length} = 5x = 25 \text{ cm}$$

$$\text{Breadth} = 2x = 10 \text{ cm}$$

$$\text{Area of the rectangle} = \text{length} \times \text{breadth} = 25 \times 10 = 250 \text{ cm}^2$$

The area of the rectangle = The perimeter of the square

$$250 = 4a \text{ [a = side of the square]}$$

$$a = 62.5 \text{ cm}$$

Q:5 The correct answer is **option 2** i.e. **8 cm**.

The volume of the cuboid = length \times breadth \times height

$$\Rightarrow 8 \times 12 \times 16 = 1536 \text{ cm}^3$$

$$\text{Volume of the cube} = a^3$$

$$\text{Volume of one small cube} = 1536/3 = 512 \text{ cm}^3$$

$$\Rightarrow \text{Side of a cube} = \sqrt[3]{(512)} = 8 \text{ cm}$$

Q:6 The correct answer is **Option 2** i.e. **5154.3 cm²**.

The radius of the cone (r) = 25 cm

Height of cone (h) = 32 cm

$$\Rightarrow l^2 = r^2 + h^2$$

$$\Rightarrow l^2 = 25^2 + 32^2$$

$$\Rightarrow l^2 = 625 + 1024$$

$$\Rightarrow l = \sqrt{1649}$$

$$\Rightarrow l = 40.6 \text{ cm}$$

The total surface area of a cone = $\pi r(l + r)$

$$\Rightarrow \left(\frac{22}{7}\right) \times 25 \times (40.6 + 25)$$

$$\Rightarrow \left(\frac{22}{7}\right) \times 25 \times 65.6$$

$$\Rightarrow 36080/7 = 5154.3 \text{ cm}^2$$

Q:7 The correct answer is **Option 4** i.e. **Can not be determined**.

The volume of cuboid = (l \times b \times h)

$$= 12 \times 17 \times 23 = 4692$$

But the circle has no volume because only 3D structures have volume

And the circle is a 2D structure

Hence, the volume of the circle can not be determined

Q:8 The correct answer is **Option 4** i.e. **11550 m³**.

Given,

$$\text{Slant height} = l = \sqrt{1066} \text{ m}$$

$$\text{Radius} = 21 \text{ m}$$

$$\text{Formula: Volume of the cone} = \frac{1}{3} (\pi r^2 h)$$

$$\text{Height} = h = \sqrt{(l^2 - r^2)}$$

Now,



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$$\Rightarrow h = \sqrt{(1066 - 441)} = \sqrt{625} = 25 \text{ m}$$

$$\text{Volume of the cone} = \frac{1}{3} \left(\frac{22}{7} \times 21 \times 21 \times 25 \right)$$

$$\Rightarrow (22 \times 21 \times 25) = 11550 \text{ m}^3$$

Short Trick:

In this question, the answer will be a multiple of 11. So check the option, which will be divisible by 11.

Only option 4 is divisible by 11

Q:9 The correct answer is **option 3** i.e. **81 cm**.

Given:

$$\text{Diameter} = 31.5 \text{ cm}$$

Formula used:

$$\text{Circumference of semi circle} = \pi r + 2r \quad \text{--- (i)}$$

Calculations:

$$\text{Radius} = \text{Diameter}/2$$

$$\Rightarrow \text{Radius (r)} = 31.5/2 = 15.75 \text{ cm}$$

Using equation (i), we get

$$\text{Circumference of the semi circle} = \left(\frac{22}{7} \right) \times 15.75 + 2 \times 15.75$$

$$\Rightarrow 49.5 + 31.5$$

$$\Rightarrow 81 \text{ cm}$$

Q:10 The correct answer is **Option 1** i.e. **396**.

Given,

The radius and height of the cylinder are 15cm and 70 cm, respectively

The side of the cubical box formed = 5 cm

Formula:

$$\text{The volume of the cylinder} = \pi r^2 h$$

$$\text{The volume of the cube} = a^3 \text{ [a is equal to the side of the cube]}$$

Now,

$$\text{Number of cubes (n)} = \frac{(\text{Volume of the cylinder})}{(\text{Volume of the cube})}$$

$$\Rightarrow n = \frac{(\pi r^2 h)}{(a^3)} = \frac{(22 \times 15 \times 15 \times 70)}{(7 \times 5 \times 5 \times 5)}$$

$$\Rightarrow n = (22 \times 3 \times 3 \times 2) = 396$$

Hence, 396 small cubes will be formed