CREST Olympiads

#CRESTInnovator

CREST Mathematics Olympiad (CMO) Worksheet for Class 9

Topic

Surface, Area and Volume

Worksheet on Surface, Area and Volume

1. Based on the statement, which of the conclusions is valid?

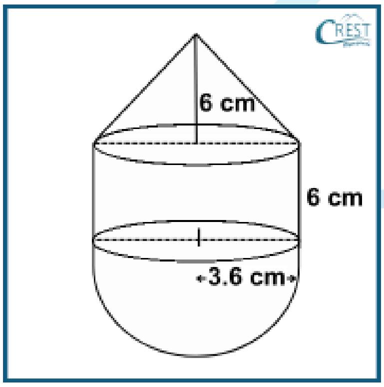
Statement: The inner diameter of a circular well is 4 m and its depth is 17.5 m. The cost of plastering this curved surface area is \$8.35 per m^2.
Conclusion A: The total cost of plastering is \$484.5π.
Conclusion B: The total cost of plastering is \$684.5π.

a. Only A
b. Only B
c. Both A and B
d. Neither A nor B

2. What is the volume of the cone that has the same radius and height as that of the cylinder if the volume of a cylinder is 555 cm^3?

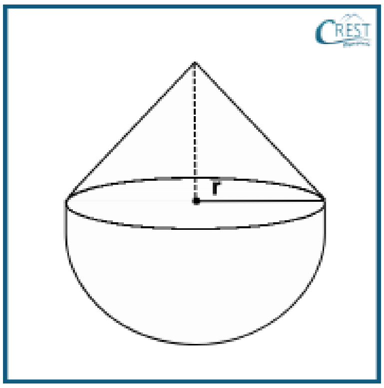
a. 165 cm^3
b. 185 cm^3
c. 205 cm^3
d. 225 cm^3

3. What is the volume of the given figure?



a. (12.96 × 6.4π) cm^3
b. (12.96 × 8.4π) cm^3
c. (12.96 × 10.4π) cm^3
d. (12.96 × 12.4π) cm^3

4. What is the total surface area of the given figure?



a. $\sqrt{2}(1 - \sqrt{2})\pi r^2$ cm^2
b. $\sqrt{2}(1 + \sqrt{2})\pi r^2$ cm^2
c. $\sqrt{2}(2 - \sqrt{2})\pi r^2$ cm^2
d. $\sqrt{2}(2 + \sqrt{2})\pi r^2$ cm^2

5. The diameter of Mars is approximately one-fourth of the diameter of Mercury. What fraction of the volume of Mercury is the volume of Mars?

a. 1/8
b. 1/16
c. 1/32
d. 1/64

Answer Key

1. d - Neither A nor B

Explanation: Radius (r) = ½ × 4 m = 2 m
Depth (h) = 12.5 m
Inner curved surface area of the well (CYLINDER) = 2πrh
= 2 × π × 2 × 17.5
= 70π m^2
Total cost of plastering = Area to be plastered × cost of plastering per m^2
= 70π × \$8.35
= \$584.5π

2. b - 185 cm^3

Explanation: Volume of cone = ⅓ $\pi r^2 h$ = ⅓ × Volume of Cylinder = ? × 555 cm^3 = 185 cm^3

3. c - (12.96 × 10.4π) cm^3

Explanation: Common radius (r) = 3.6 cm
Height (h) = 6 cm
Total volume of the figure = Volume of cone + Volume of cylinder + Volume of hemisphere
= ⅓ $\pi r^2 h + \pi r^2 h$ + ⅔ πr^3
= πr^2 (⅓ h + h + ⅔ r)
= $\pi(3.6)^2$ (⅓ × 6 + 6 + ⅔ × 3.6)
= π × 12.96 (2 + 6 + 2.4)
= π × 12.96 × (2 + 6 + 2.4)
= π × 12.96 × 10.4
= π × 12.96 × 10.4
= (12.96 × 10.4π) cm^3

4. b - √2(1 + √2)πr² cm²

Explanation: Height (h) of the cone = Radius of the cone = r

Slant height (l) of the cone = $\sqrt{(r^2 + h^2)}$

$= \sqrt{(r^2 + r^2)}$

$= \sqrt{(2r^2)}$

$= r\sqrt{2}$

Required surface area = Curved surface area of hemisphere + Curved surface area of cone

$= 2\pi r^2 + \pi rl$

$= 2\pi r^2 + \pi r \times r\sqrt{2}$

$= 2\pi r^2 + \pi r^2\sqrt{2}$

$= \sqrt{2} \times \sqrt{2}\pi r^2 + \sqrt{2}\pi r^2$

$= \sqrt{2}\pi r^2 (\sqrt{2} + 1)$

$= \sqrt{2}(1 + \sqrt{2})\pi r^2$ cm²

5. d - 1/64

Explanation:

Diameter of Mars is approximately one-fourth of the diameter of Mercury.

$\Rightarrow d_{mar} = \frac{1}{4} d_{mer}$

$$\frac{\text{Volume of Mars}}{\text{Volume of Mercury}} = \frac{\frac{4}{3}\pi r^3_{mar}}{\frac{4}{3}\pi r^3_{mer}}$$

$$= \frac{r^3_{mar}}{r^3_{mer}}$$

$$= \frac{\frac{(d^3_{mar})}{2}}{\frac{(d^3_{mer})^3}{2}}$$

$$= \frac{(d_{mar})^3}{(d^3_{mer})^3}$$

$$= \frac{\left(\frac{1}{4} d_{mer}\right)^3}{(d^3_{mer})^3}$$

$$= \left(\frac{1}{4}\right)^3$$

$$= \frac{1}{64}$$

More Questions Coming Soon – Keep Learning!

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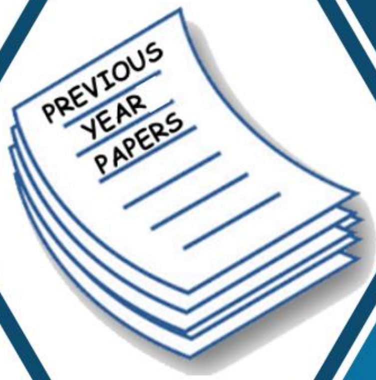

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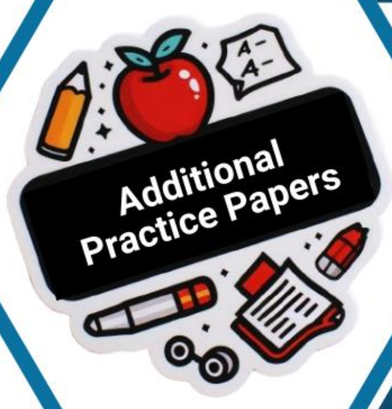

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