CDS 1 2025

LIVE

MATHS

MENSURATION 3D

CLASS 3

NAVJYOTI SIR

Crack
EXAMS

15 Nov 2024 Live Classes Schedule

9:00AM	15 NOVEMBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

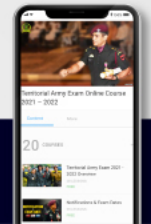
9:30AM	COMPLETE PSYCHOLOGICAL TESTS	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

1:00PM	CHEMISTRY MCQ - CLASS 8	SHIVANGI MA'AM
4:00PM	MATHS - SEQUENCE & SERIES - CLASS 3	NAVJYOTI SIR
5:30PM	ENGLISH - SENTENCE COMPLETION - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

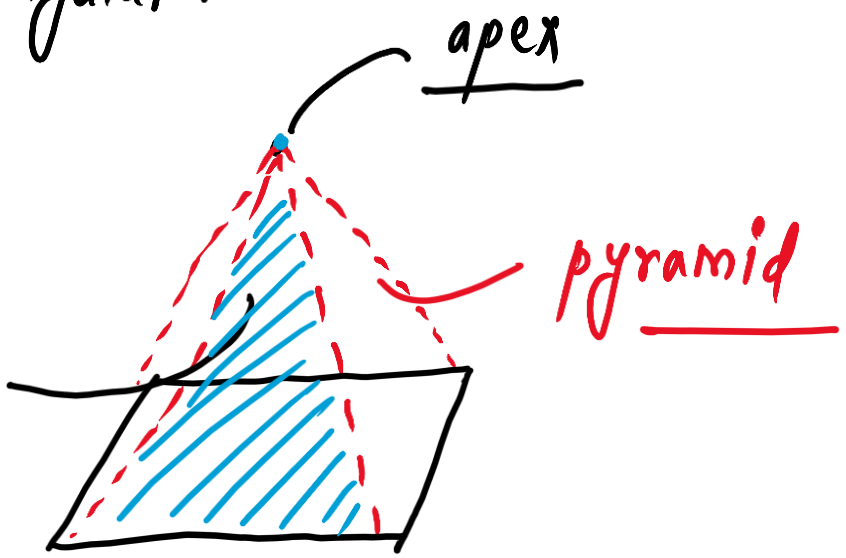
1:00PM	CHEMISTRY MCQ - CLASS 8	SHIVANGI MA'AM
5:30PM	ENGLISH - SENTENCE COMPLETION - CLASS 2	ANURADHA MA'AM
7:00PM	MATHS - MENSURATION 3D - CLASS 3	NAVJYOTI SIR



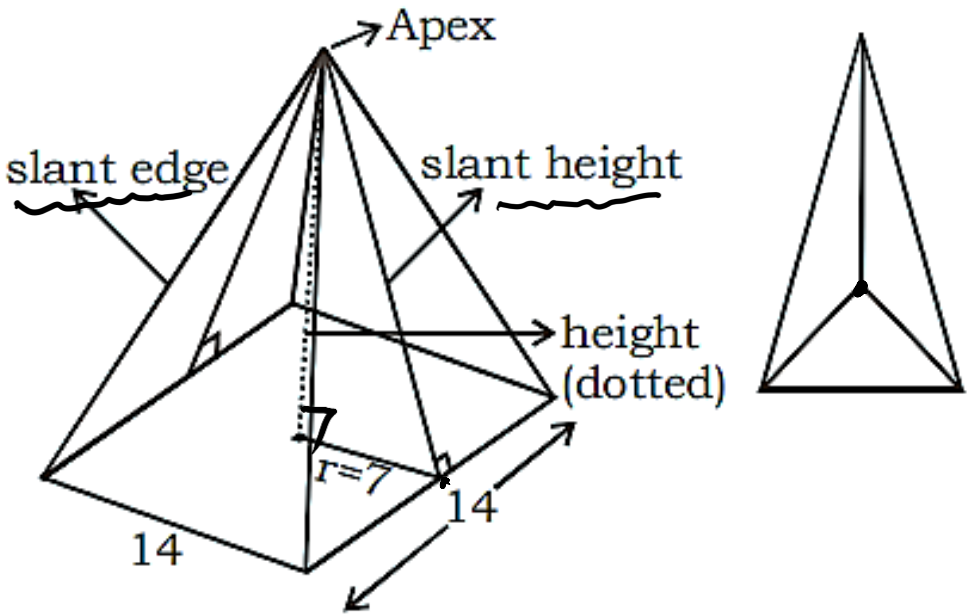
PYRAMID

→ base is polygon.

→ Lateral surfaces are triangular.



PYRAMID



Slant edge — apex to each vertex.

height — apex to centre of base.

Slant height — apex to side of base.

FORMULA

LSA = sum of areas of triangles formed

$= \frac{1}{2} \times side_1 \times l + \frac{1}{2} \times side_2 \times l$

$= \frac{1}{2} (side_1 + side_2 + side_3 + \dots) \times l$

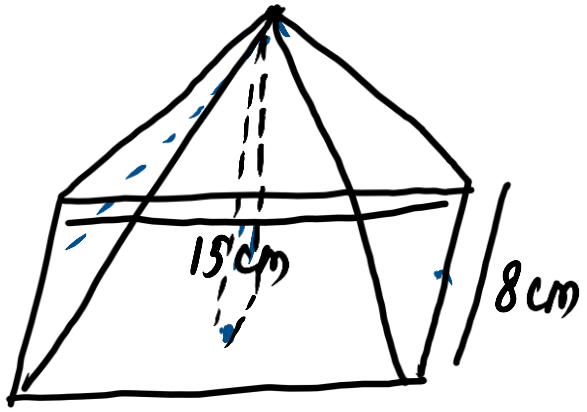
any side of base $= \frac{1}{2} \times$ (perimeter of base) $\times l$

$$TSA = LSA + \text{area of base}$$

$$\text{Volume} = \frac{1}{3} \times (\text{area of base}) \times \text{height}$$

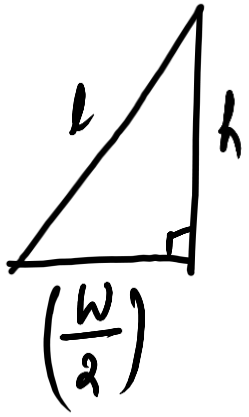
QUESTION

A rectangular base pyramid has base length 15 cm and width 8 cm. The height of the pyramid is 20 cm. Find volume. LSA and TSA.



$$\text{volume} = \frac{1}{3} \times \text{area of base} \times \text{height}$$

$$= \frac{1}{3} \times 15 \times 8 \times 20 =$$

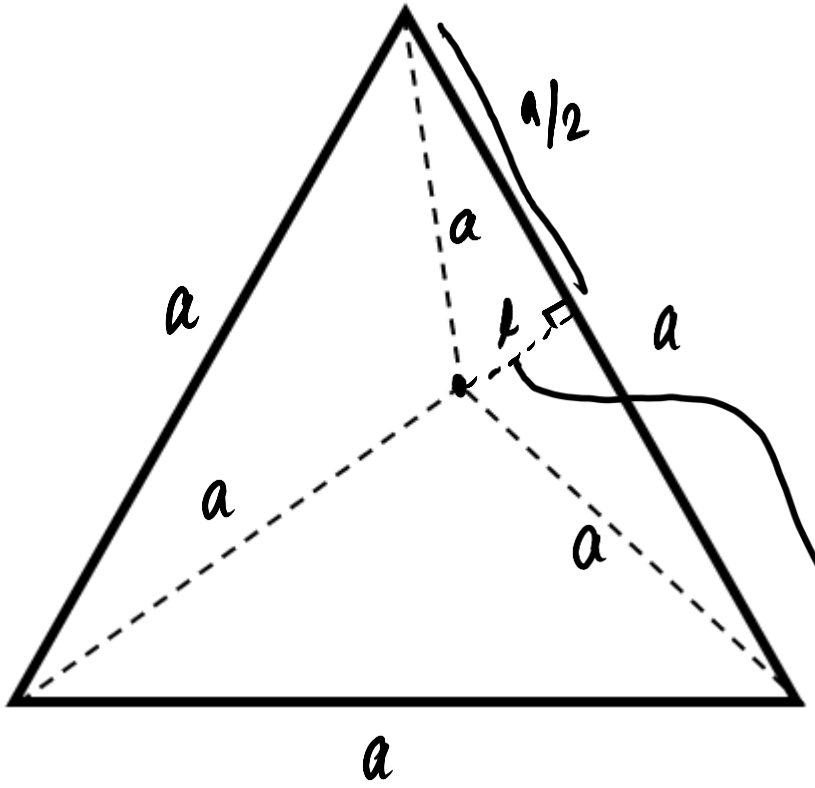


$$l = \sqrt{h^2 + \left(\frac{\text{width}}{2}\right)^2}$$

$$LSA = \frac{1}{2} \times 2 \times (15+8) \times l$$

$$TSA = LSA + (15 \times 8) =$$

TETRAHEDRON (Regular Triangular pyramid)



$$LSA = 3 \times \frac{\sqrt{3}}{4} a^2 = \frac{3\sqrt{3}}{4} a^2$$

$$h = \frac{\sqrt{2}}{\sqrt{3}} a \qquad l = \frac{\sqrt{3}}{2} a$$

$$TSA = 4 \times \frac{\sqrt{3}}{4} a^2 = \sqrt{3} a^2$$ (3 Lateral surface + 1 base (all equilateral triangles))

$$\text{Volume} = \frac{1}{3} \times \frac{\sqrt{3}}{4} a^2 \times \frac{\sqrt{2}}{\sqrt{3}} a = \frac{a^3}{6\sqrt{2}}$$

QUESTION

The base perimeter of a regular tetrahedron is 24 cm. Find h , l , LSA, TSA and volume.

$3a = 24 \Rightarrow a = 8$ cm

$h = \frac{\sqrt{2}}{\sqrt{3}} a = \frac{8\sqrt{2}}{\sqrt{3}}$ cm

$l = \frac{\sqrt{3}}{2} a = \frac{8\sqrt{3}}{2} = 4\sqrt{3}$ cm

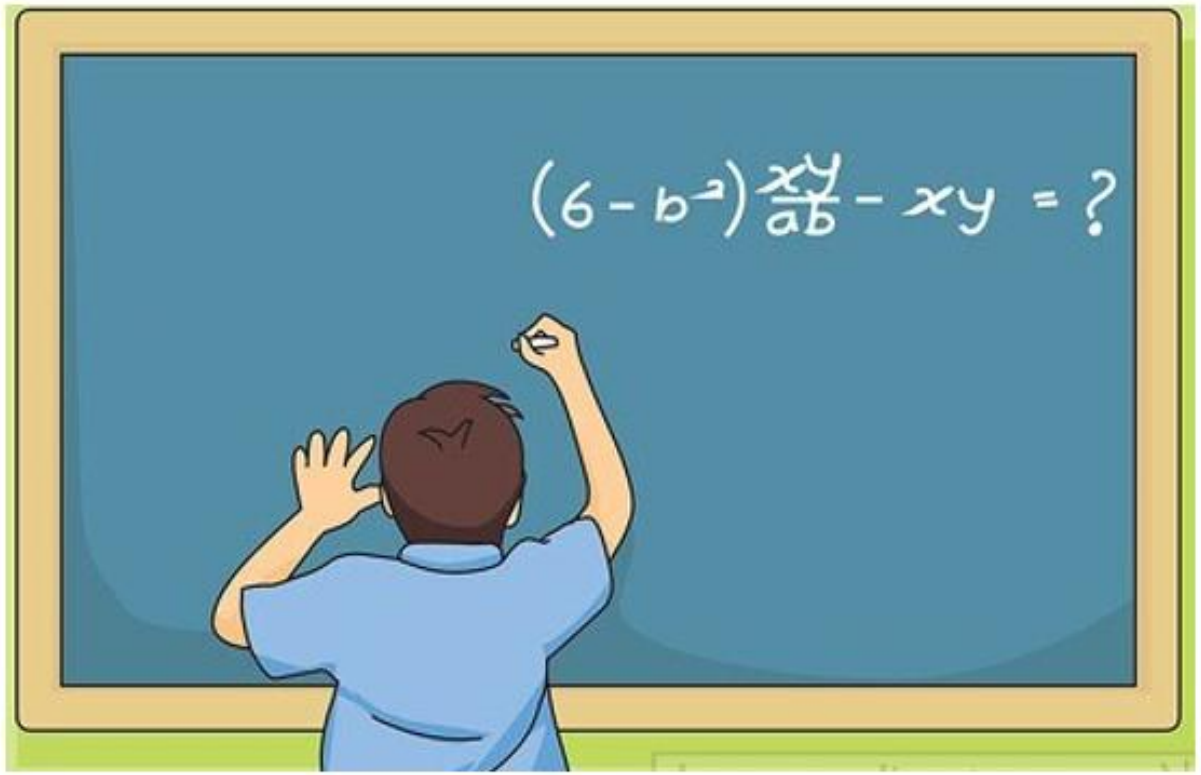
$LSA = \frac{3\sqrt{3}}{4} a^2 = 48\sqrt{3}$ cm^2

$TSA = \sqrt{3} a^2 = 64\sqrt{3}$ cm^2

$Volume = \frac{a^3}{6\sqrt{2}}$ cm^3

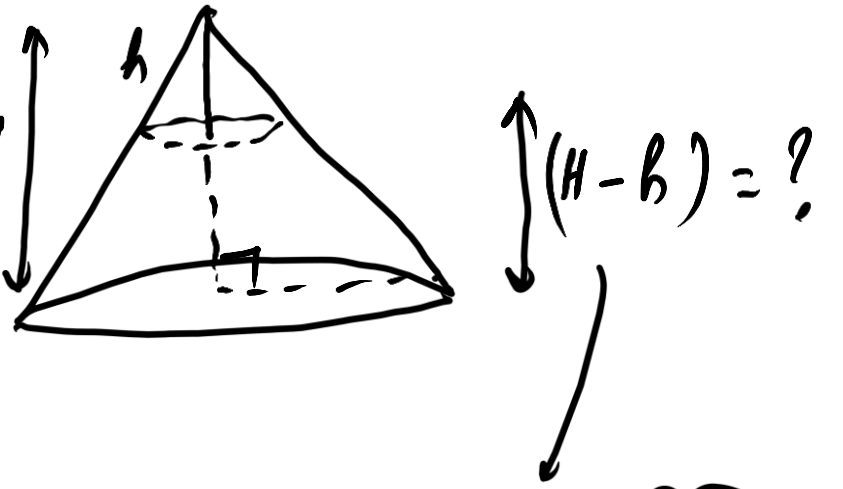
$= \frac{512}{6\sqrt{2}}$ cm^3

PRACTISE TIME !



Q) The height of a cone is 60 cm. A small cone is cut off at the top by a plane parallel to the base and its volume is $\frac{1}{64}$ the volume of original cone. What is the height from the base at which the section is made ?

(a) 15 cm (b) 20 cm
(c) 30 cm (d) 45 cm



$$\left(\frac{h}{H}\right)^3 = \frac{1}{64}$$

$$\frac{h}{H} = \frac{1}{4} \Rightarrow h = \frac{1}{4} \times 60 = 15\text{cm}$$

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(a) 15 cm
(b) 20 cm
(c) 30 cm
(d) 45 cm

Ans: (f)

Q) Rain water from a roof 22m × 20m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just full, what is the rainfall?

(a) 3.5 cm (b) 3 cm

(c) 2.5 cm (d) 2 cm

height

$$22m \times 20m \times h = \frac{22}{7} \times 1^2 \times \frac{7}{2}$$

$$h = \frac{11}{22 \times 20} \text{ (m)}$$

$$h \text{ (in cm)} = \frac{11}{2 \times 22 \times 20} \times 100^{5} = 2.5 \text{ cm}$$

Q) Rain water from a roof 22m × 20m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just full, what is the rainfall?

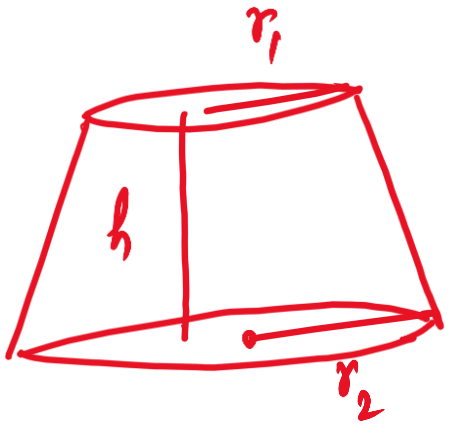
(a) 3.5 cm
(b) 3 cm
(c) 2.5 cm
(d) 2 cm

Ans: (c)

Q) A drinking glass of height 24 cm is in the shape of frustum of a cone and ' diameters of its bottom and top circular ends are 4 cm and 18 cm respectively. If we take capacity of the glass as πx cm^3, then what is the value of x ?

(a) 824 (b) 1236

(c) 1628 (d) 2472



$$\text{Vol.} = \frac{1}{3}\pi h\left(r_1^2 + r_2^2 + r_1 r_2\right)$$

$$\pi x = \frac{1}{3}\pi(24)\left[2^2 + 9^2 + 2\times 9\right]$$

$$x = 8\left(85 + 18\right)$$

$$= 8 \times 103 = 824$$

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(a) 824 (b) 1236

(c) 1628 (d) 2472

Ans: (a)

Q) The cost of painting a spherical vessel of diameter 14 cm is ₹8008. What is the cost of painting per square centimetre ?

(a) ₹8
(b) ₹9
(c) ₹13
(d) ₹14

$$\frac{8008}{4 \times \frac{22}{7} \times 7 \times 7} = \frac{182 \times 11 \times 13}{2002} = \frac{2002}{\frac{22}{7} \times 7 \times 2} = ₹13$$

$$\left(\frac{\text{cost}}{\text{surface area of sphere}}\right)$$

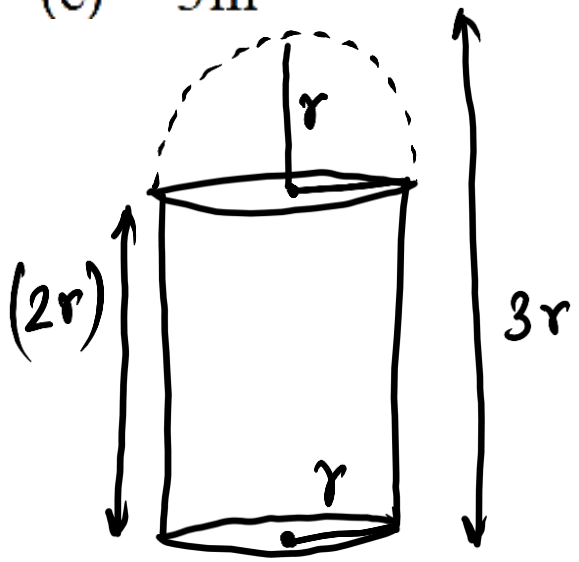
Q) The cost of painting a spherical vessel of diameter 14 cm is ₹8008. What is the cost of painting per square centimetre ?

(a) ₹8
(b) ₹9
(c) ₹13
(d) ₹14

Ans: (c)

Q) A building is in the form of a cylinder surmounted by a hemispherical dome on the diameter of the cylinder. The height of the building is three times the radius of the base of the cylinder. The building contains $67\frac{1}{21}\text{m}^3$ of air. What is the height of the building ?

(a) 6m
(b) 4m
(c) 3m
(d) 2m



$67 \frac{1}{21}$

$\frac{1408}{21}$ ← volume

Total volume $= \frac{1408}{21}$

$\pi r^2(2r) + \frac{2}{3}\pi r^3 = \frac{1408}{21}$

$\pi r^3\left(2 + \frac{2}{3}\right) = \frac{1408}{21}$

$\pi r^3 = \frac{1408}{21} \times \frac{3}{8}$ (176, 21→7, 8→1)

$r^3 = \frac{176}{7} \times \frac{7}{22}$ (16, 7→1, 22→2)

$r^3 = 8$

$r = 2$

$2r = 4\text{m}$

Q) A building is in the form of a cylinder surmounted by a hemispherical dome on the diameter of the cylinder. The height of the building is three times the radius of the base of the cylinder. The building contains $67\frac{1}{21}\text{m}^3$ of air. What is the height of the building ?

(a) 6m
(b) 4m
(c) 3m
(d) 2m

Ans: (a)

Q) A cubic metre of copper weighing 9000 kg is rolled into a square bar 9 m long. An exact cube is cut off from the bar; How much does the cube weigh ?

(a) 1000 kg

(b) $\frac{1000}{3}$ kg

(c) 300 kg

(d) $\frac{500}{3}$ kg

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(a) 1000 kg

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(c) 300 kg

(d) $\frac{500}{3}$ kg

Ans: (b)

Q) If the radius of a right circular cone is increased by p% without increasing its height, then what is the percentage increase in the volume of the cone ?

(a) p2

(b) $2P^2$

(c) $\frac{p^2}{100}$

(d) $p\left(2+\frac{p}{100}\right)$

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(c) $\frac{p^2}{100}$

(d) $p\left(2+\frac{p}{100}\right)$

Ans: (d)

SSBCrack EXAMS

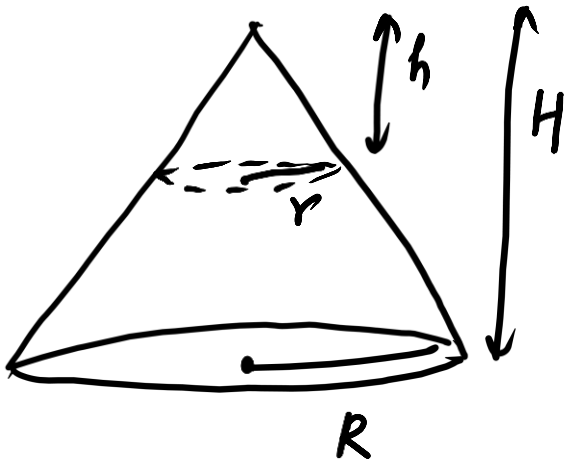
Q) A plane divides a right circular cone into two parts of equal volume. If the plane is parallel to the base, then the ratio, in which the height of the cone is divided, is

(a) $1:\sqrt[3]{2}$

(b) $1:\sqrt{2}$

(c) $1:\sqrt[3]{2}-1$ ✓

(d) $1:\sqrt[3]{2}+1$



$\pi r^2 h = \pi R^2 H - \pi r^2 h$

$2\pi r^2 h = \pi R^2 H$

$2r^2 h = R^2 H$

$2 = \left(\frac{R}{r}\right)^2 \left(\frac{H}{h}\right)$

$2 = \left(\frac{H}{h}\right)^3$

$\frac{H}{h} = \sqrt[3]{2}$

$\frac{h}{H} = \frac{1}{\sqrt[3]{2}}$

$\frac{h}{H-h} = ?$

$\frac{h}{H} = \frac{1}{\sqrt[3]{2}-1}$

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(a) $1:\sqrt[3]{2}$

(b) $1:\sqrt{2}$

(c) $1:\sqrt[3]{2}-1$

(d) $1:\sqrt[3]{2}+1$

Ans: (c)

Q) A water tank, open at the top, is hemispherical at the bottom and cylindrical above it. The radius is 12m and the capacity is $3312\pi\ m^3$. The ratio of the surface areas of the spherical and cylindrical portions is

(a) 3 : 5 (b) 4 : 5

(c) 1 : 1 (d) 6 : 5

hemispherical

$$\pi(6)^2 h + \frac{2}{3}\pi(6)^3 = 3312\pi$$

$$36h + 144 = 3312$$

$$h =$$

$$\frac{CSA\ (cylinder)}{CSA\ (hemisphere)}$$

$$= \frac{2\pi rh}{4\pi r^2} = \frac{h}{2r}$$

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(a) 3 : 5 (b) 4 : 5

(c) 1 : 1 (d) 6 : 5

Ans: (b)

Q) The areas of three mutually perpendicular faces of a cuboid are x, y, z. If V is the volume, then xyz is equal to

(a) V
(b) V^2
(c) 2V
(d) $2V^2$

$V = \sqrt{xyz}$

$xyz = V^2$

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(a) V (b) V^2

(c) $2V$ (d) $2V^2$

Ans: (b)

Q) If the height of a right circular cone is increased by 200% and the radius of the base is reduced by 50%, then the volume of the cone

(a) remains unaltered
(b) decreases by 25%
(c) increases by 25%
(d) increases by 50%

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(a) remains unaltered
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(c) increases by 25%
(d) increases by 50%

Ans: (b)

Q) If a hemisphere is melted and four spheres of equal volume are made, the radius of each sphere will be equal to

(a) radius of the hemisphere

(b) $\frac{1}{6}$ th of the radius of the hemisphere

(c) $\frac{1}{2}$ of the radius of the hemisphere

(d) $\frac{1}{4}$ th of the radius of the hemisphere

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(c) $\frac{1}{2}$ of the radius of the hemisphere

(d) $\frac{1}{4}$ th of the radius of the hemisphere

Ans: (c)

Q) A large water tank has the shape of a cube. If 128 m^3 of water is pumped out, the water level goes down by 2 m. Then the maximum capacity of the tank is

(a) 512 m^3 (b) 480 m^3

(c) 324 m^3 (d) 256 m^3

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(a) 512 m^3 (b) 480 m^3

(c) 324 m^3 (d) 256 m^3

Ans: (a)

Q) The trunk of a tree is a right cylinder 1.5 m in radius and 10 m high. The volume of the timber which remains when the trunk is trimmed just enough to reduce it to a rectangular parallelopiped on a square base is

(a) $44\,m^3$ (b) $46\,m^3$

(c) $45\,m^3$ (d) $47\,m^3$

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(a) $44\,m^3$ (b) $46\,m^3$

(c) $45\,m^3$ (d) $47\,m^3$

Ans: (c)

Q) A hemispherical bowl is filled to the brim with a beverage. The contents of the bowl are transfered into a cylindrical vessel whose radius is 50% more than its height. If the diameter is same for both the bowl and the cylinder, the volume of the beverage in the cylindrical vessel is:

(a) $66\frac{2}{3}\%$

(b) $78\frac{1}{2}\%$

(c) 100%

(d) More than 100%

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(a) $66\frac{2}{3}\%$

(b) $78\frac{1}{2}\%$

(c) 100%

(d) More than 100%

Ans: (c)

Q) In a swimming pool measuring 90 m by 40 m, 150 men take a dip. If the average displacement of water by a man is 8 cubic metres, what will be the rise in water level?

(a) 33.33 cm
(b) 30 cm
(c) 20 cm
(d) 25 cm

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(a) 33.33 cm
(b) 30 cm
(c) 20 cm
(d) 25 cm

Ans: (a)

Q) There are two cones. The curved surface are aof one is twice that of the other. The slant height of the latter is twice that of the former. The ratio of their radii is

(a) 4 : 1
(b) 4 : 3
(c) 3 : 4
(d) 1 : 4

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(a) 4 : 1 (b) 4 : 3

(c) 3 : 4 (d) 1 : 4

Ans: (a)

Q) A rectangular piece of paper of dimensions 22 cm by 12 cm is rolled along its length to form a cylinder. The volume (in cm^3) of the cylinder so formed is $\left(\text{use } \pi = \frac{22}{7}\right)$

(a) 562
(b) 412
(c) 462
(d) 362

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(a) 562
(b) 412
(c) 462
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Ans: (c)

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