UDAAN

2026

Surface Area and Volumes

MATHS LECTURE-2

BY-RITIK SIR

Topics *to be covered*

A Important Questions Part-01

Volume (V)	Total Surface Area	Lateral Surface Area
$V = a^3$	$TSA = 6a^2$	$LSA = 4a^2$
$V = l \times b \times h$	$TSA = 2(lb + bh + hl)$	$LSA = 2h(l + b)$
$V = \pi r^2 h$	$TSA = 2\pi r(h + r)$	$CSA = 2\pi rh$
$V = \frac{4}{3}\pi r^3$	$TSA = 4\pi r^2$	$CSA = 4\pi r^2$
$V = \frac{2}{3}\pi r^3$	$TSA = 3\pi r^2$	$CSA = 2\pi r^2$

#Q. A decorative block shown in figure is made of two solids — a cube and a hemi-sphere. The base of the block is a cube with edge 5 cm, and the hemisphere fixed on the top has a diameter 4.2 cm. Find the total surface area of the block. (Take $\pi = 22/7$)

NCERT, CBSE 09, 16, 19

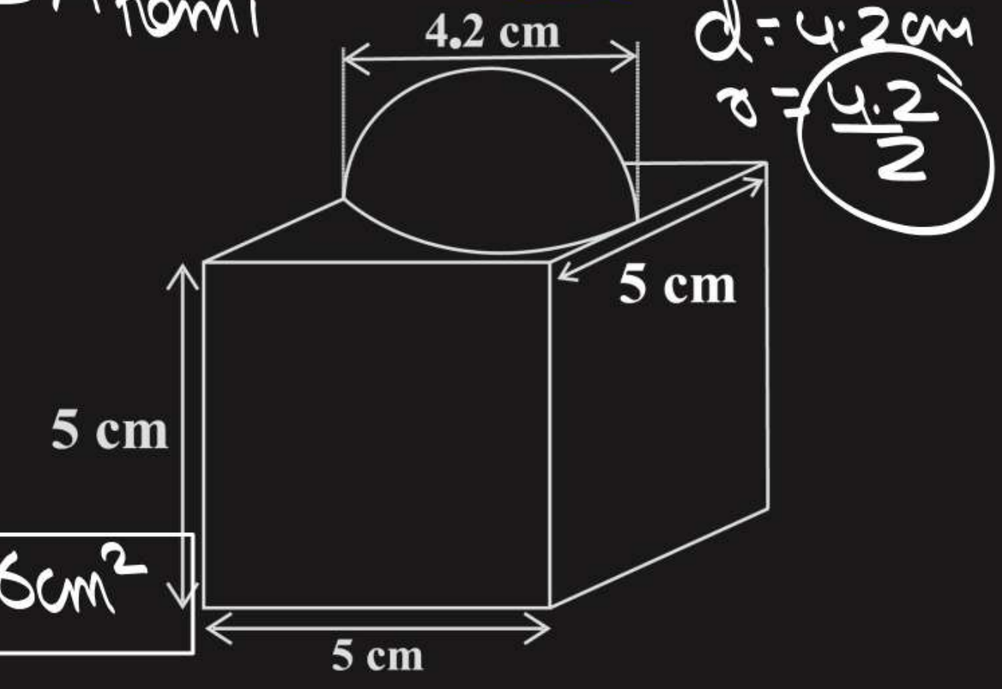
T.S.A = T.S.A cube − base area of hemisphere + C.S.A hemi

$= 6a^2 - \pi r^2 + 2\pi r^2$

$= 6a^2 + \pi r^2$

$= 6(5)^2 + \frac{22}{7}\left(\frac{42}{10}\right)\left(\frac{21}{10}\right)$

$= 150 + \frac{1386}{100} = 150 + 13.86 = 163.86\ cm^2$



d = 4.2 cm

$r = \frac{4.2}{2}$

gadhha

#Q. A hemispherical depression is cut-out from one face of the cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

NCERT, CBSE 10, 14

S.A of remaining solid = T.S.A cube − πr² + C.S.A hemi.

$= 6a^2 - \pi r^2 + 2\pi r^2$

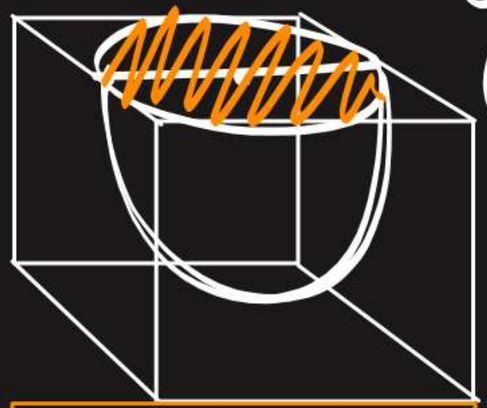
$= 6a^2 + \pi r^2$

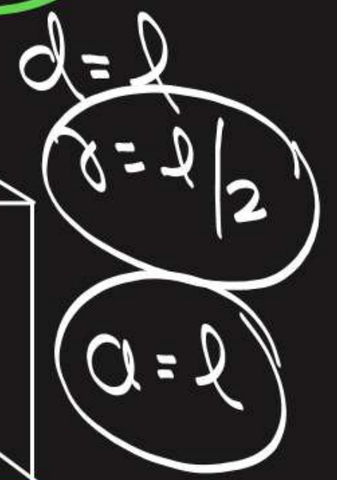
$= 6(l)^2 + \frac{22}{7}\left(\frac{l}{2}\right)^2$

$= 6l^2 + \frac{22}{7} \cdot \frac{l^2}{4}$

$= 6l^2 + \frac{11l^2}{14}$

$= \frac{84l^2 + 11l^2}{14} = \frac{95l^2}{14}$ sq. units





#Q. A golf ball is spherical with about 300-500 dimples that help increase its velocity while in play. Golf balls are traditionally white but available in colours also In the given figure golf ball has diameter 4.2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm.

Find the total surface area exposed to the surroundings.

$1\,cm = 10\,mm$

$D = 4.2\,cm$

$R = \frac{4.2}{2}\,cm$

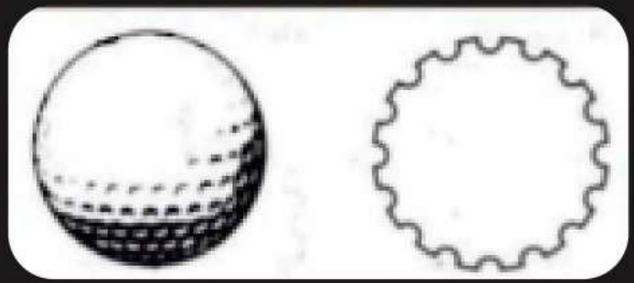
$R = \frac{42}{20} = \frac{21}{10}\,cm$

$r = 2\,mm = \frac{2}{10}\,cm$

$1\,cm = 10\,mm$

$\frac{1}{10}\,cm = 1\,mm$

$\frac{2}{10}\,cm = 2\,mm$



T.S.A exposed to surrounding $= 4\pi R^2 - 315\pi r^2 + 315(2\pi r^2)$

$= 4\pi R^2 - 315\pi r^2 + 630\pi r^2$

$$= 4\pi R^2 + 3\pi r^2$$

$$= \pi\left[4R^2 + 3r^2\right]$$

$$= \frac{22}{7}\left[4 \cdot \frac{21}{10} \cdot \frac{21}{10} + 3 \cdot \frac{2}{10} \cdot \frac{2}{10}\right]$$

$$= \frac{22}{7}\left[\frac{1764}{100} + \frac{12}{100}\right]$$

$$= \frac{22}{7} \cdot \frac{1776}{100} = \frac{9504}{100} = \boxed{95.04\ cm^2}$$

$= 100 - 6(2)$

$= \boxed{88\ cm^2}$

$500\ cm^2$

$0 \to 1\ cm^2$

$00 \cdots 315$

1 circle $= 1\ cm^2$

2 circle $= 2\ cm^2$

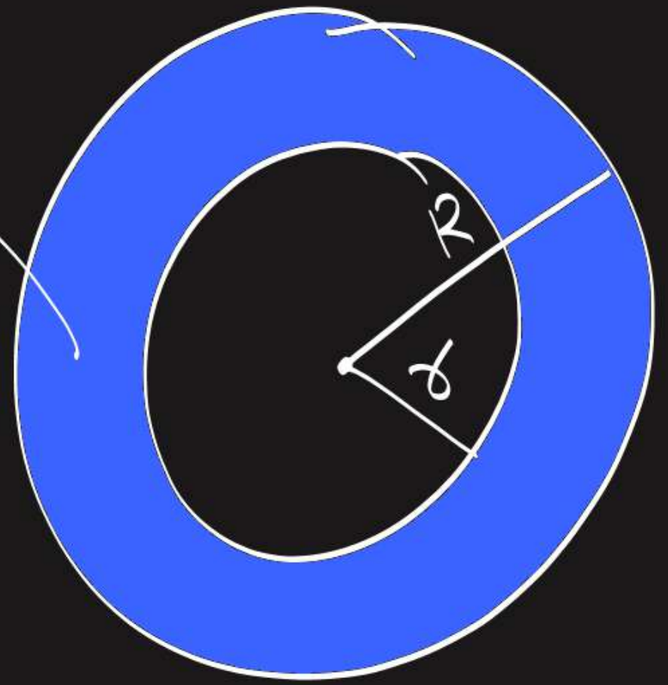
⋮

315 circle $= 315\ cm^2$

$= 500 - 315$

$= \boxed{185\ cm^2}$

$\pi R^2 - \pi r^2$



#Q. A wooden toy rocket is in the shape of a cone mounted on a cylinder as shown in figure. The height of the entire rocket is 26 cm, while the height of the conical part is 6 cm. The base of the conical portion has a diameter of 5 cm, while the base diameter of the cylindrical portion is 3 cm. if the conical portion is to painted orange and the cylindrical portion yellow, find the area of the rocket painted with each of these colours. (Take $\pi = 3.14$)

Area to be painted yellow = base area of cylinder + C.S.A cylinder

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

$= \pi r [r + 2h]$

$D = 5\text{cm}$

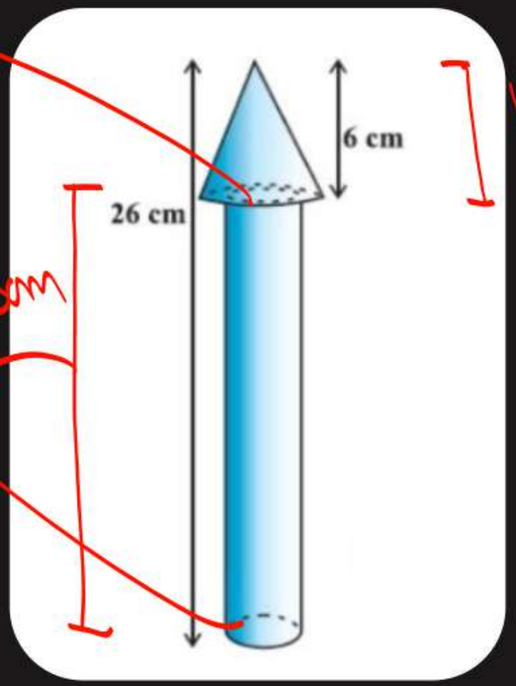
$R = \frac{5}{2}\text{cm}$

$d = 3\text{cm}$

$r = \frac{3}{2}\text{cm}$

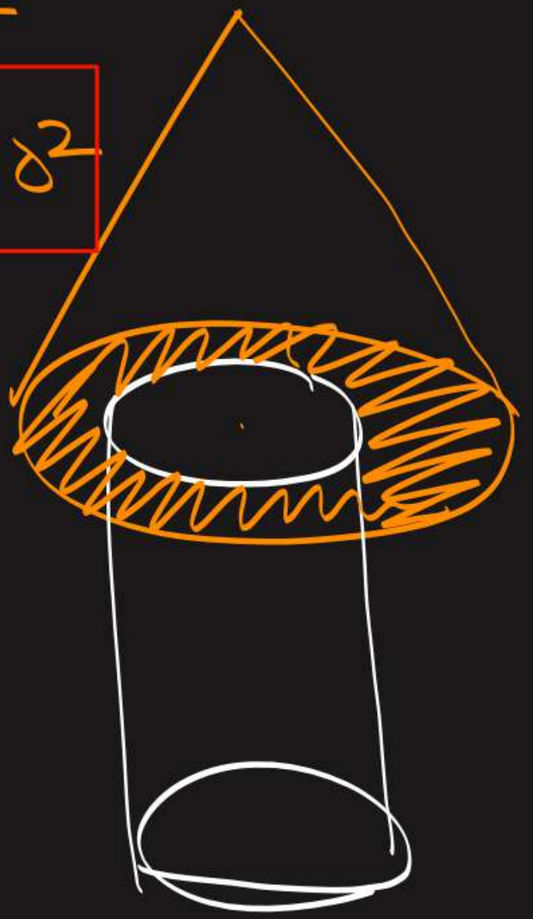
$H = 20\text{cm}$

$h = 6\text{cm}$

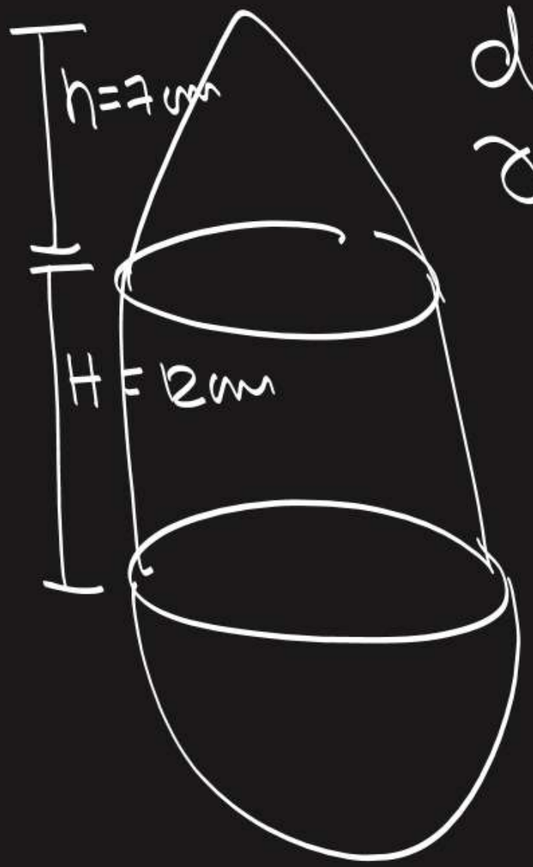


Area to be painted orange = C.S.A cone + $\pi R^2 - \pi r^2$

$= \pi R l + \pi R^2 - \pi r^2$



#Q. A solid toy is in the form of a right circular cylinder with a hemispherical shape at one end and a cone at the other end. Their common diameter is 4.2 cm and the height of the cylindrical and conical portions are 12 cm and 7 cm respectively. Find the volume of the solid toy. (Use $\pi = 22/7$)



$d = 4.2\,cm$

$r = \frac{4.2\,cm}{2}$

$= \frac{42}{20}$

$r = \frac{21}{10}\,cm$

CBSE 2002

$V_{solid\ toy} = V_{cone} + V_{cy.} + V_{hemi}$

$= \frac{1}{3}\pi r^2 h + \pi r^2 H + \frac{2}{3}\pi r^3$

$= \pi r^2 \left[\frac{h}{3} + H + \frac{2}{3}r\right]\ cm^3$

#Q. A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The diameter of each of the depression is 1 cm and the depth is 1.4 cm. Find the volume of the wood in the entire stand.

NCERT, CBSE 2017

$l = 15\text{cm}$
$b = 10\text{cm}$
$h = 3.5\text{cm}$

$d = 1\text{cm}$

$r = \frac{1}{2}\text{cm}$
$h' = 1.4\text{cm}$

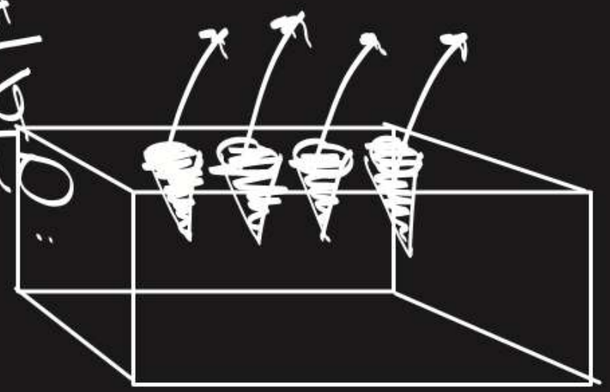
$V_{wood} = V_{cuboid} - 4 \cdot V_{cone}$

$= lbh - 4\left(\frac{1}{3}\pi r^2 h'\right)$

$= 15 \times 10 \times 3.5 - \frac{4}{3} \cdot \frac{22}{7} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{14}{10}$

$= \left(525 - \frac{44}{30}\right) \text{cm}^3$

$= \boxed{523.5\text{cm}^3}$



#Q. A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of ₹2 per square metre, if the radius of the base is 14 metres

CBSE 2005

Rate = 2 RS = 1 m^2

$r = 1\,cm$

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

$l^2 = \left(\frac{132}{10}\right)^2 + (14)^2$

$= \frac{441}{25} + 196$

$= \frac{441 + 784}{25}$

$= \frac{1225}{25}$

$h' = 10.5\,m$

$h = 3\,m$

Area to be painted = CSA$_{cyl}$ + CSA$_{cone}$

$= 2\pi rh + \pi rl$

$= \boxed{\pi r[2h + l]}$

$$l^2 = \frac{1225}{4}$$

$$l = +\sqrt{\frac{1225}{4}}$$

$$\boxed{l = \frac{35}{2}\text{ cm}}$$

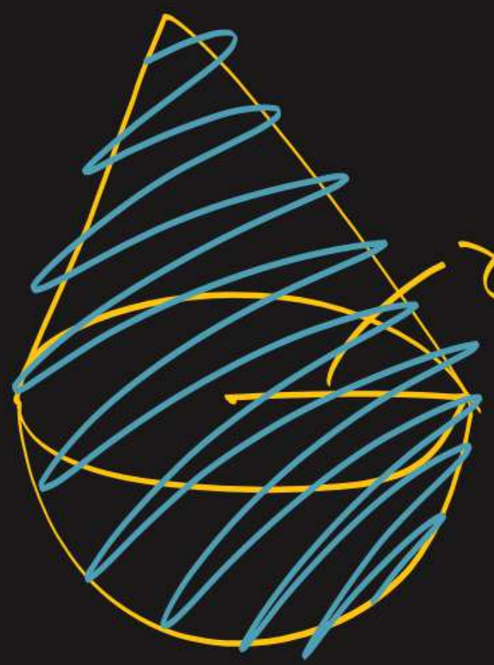
#Q. A circus tent is cylindrical upto a height of 3 m and conical above it. If the diameter of the base is 105 m and the slant height of the conical part is 53 m, find the total canvas used in making the tent.

CBSE 2004

#SPL

#Q. A solid is in the shape of a right circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid.

CBSE 2023



$r = 7\text{cm}$

$d = 14\text{cm}$

$h = 14\text{cm}$

$$V_{solid} = V_{cone} + V_{hemi}$$

$$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$$

$$= \frac{\pi r^2}{3}\left[h + 2r\right] \text{ cm}^3$$

WORK HARD
DREAM BIG
NEVER GIVE UP

1S → 6/7 → Revision

3:4

9:am → Utho

10:1S → 1 sp

1Smin Reading

10:30 — 1:30

lunch

check

1. 300+ Questions
2. Mixed problems
3. Time management
4. Silly mistakes
5. Confidence
6. Temperament

PWston

Thank You