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CLASS – 9

MATHEMATICS

Chapter – 11

Surface Areas and Volumes

Part – 9

Volume of a Right Circular Cone

Vikas Saini

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OVERVIEW

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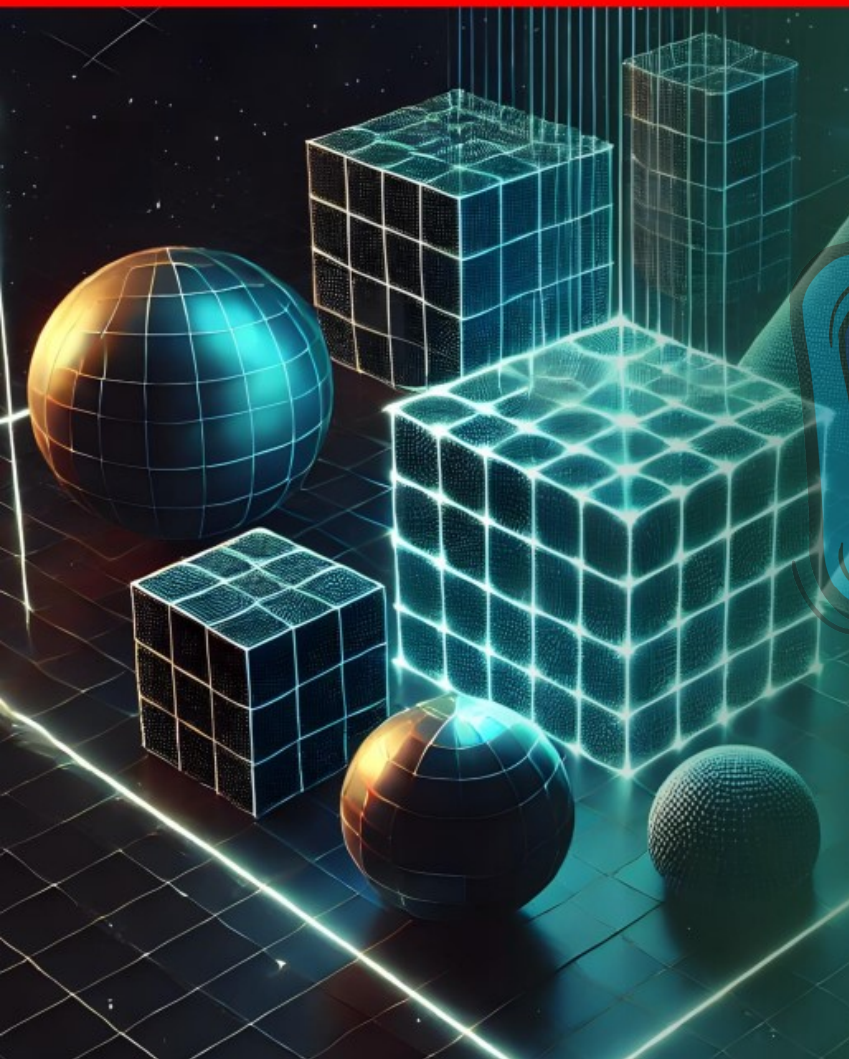

1. Surface Area of a Right Circular Cone
2. Surface Area of a Sphere
3. Volume of a Right Circular Cone
4. Volume of a Sphere

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VOLUME OF A RIGHT CIRCULAR CONE



Volume → 3D Space

Of 3-D Geometrical figure

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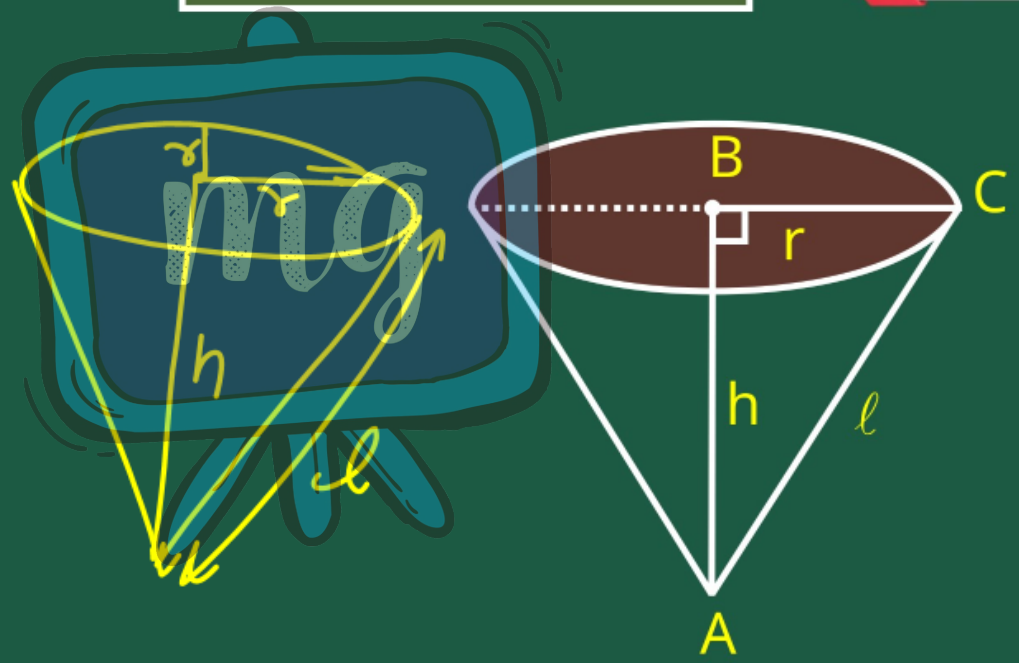
Volume of a Cone

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



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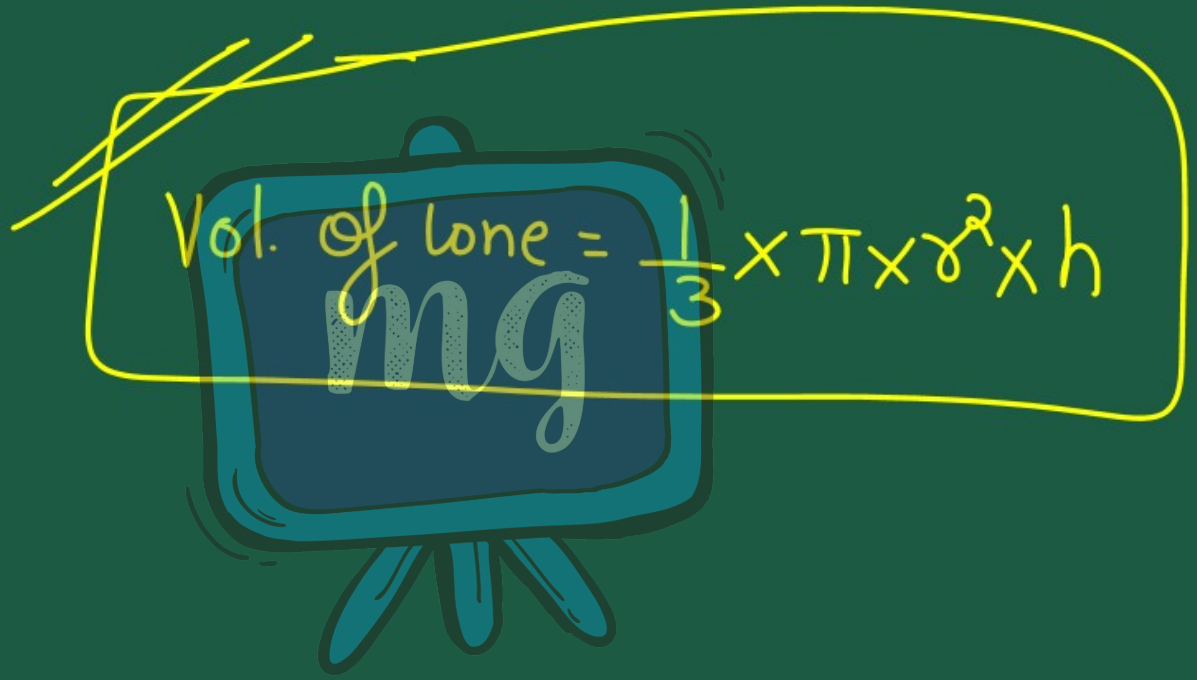

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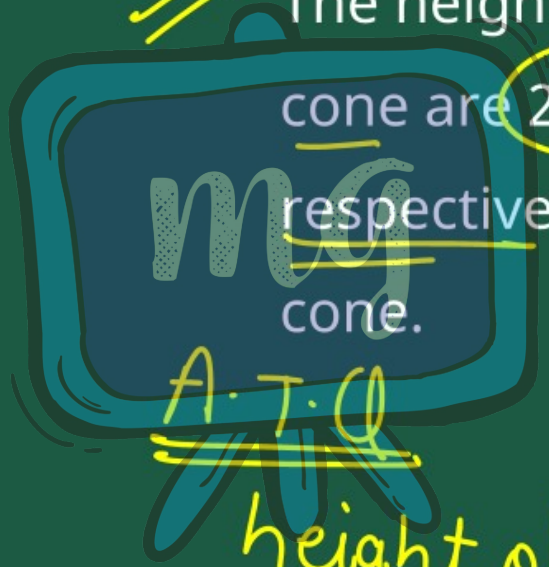
Example : 8

The height and the slant height of a cone are 21 cm and 28 cm respectively. Find the volume of the cone.



A.T.Q

height of cone (h) = 21 cm

Slant height of cone (l) = 28 cm

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We know that

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



$$(28)^2 = (21)^2 + r^2$$

$$\Rightarrow r^2 = (28)^2 - (21)^2$$

$$\Rightarrow r^2 = (28+21) \times (28-21)$$

$$r^2 = 49 \times 7 = 343$$

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$\Rightarrow r^2 = 343$

$\Rightarrow r = \sqrt{343}$

$\Rightarrow r = \sqrt{7 \times 7 \times 7}$

$\Rightarrow r = \sqrt{7^2 \times 7}$

$r = 7\sqrt{7}$ cm

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Since

Vol of cone $= \frac{1}{3} \times \pi \times r^2 \times h$

$r \times r = r^2$

$= \frac{1}{3} \times \frac{22}{7} \times 7\sqrt{7} \times 7\sqrt{7} \times 21$

$= \frac{1}{3} \times \frac{22}{7} \times 7 \times \sqrt{7} \times 7 \times \sqrt{7} \times 21$

$= 22 \times 7 \times 7 \times 7$ $\quad [\because (\sqrt{7})^2$

$= 22 \times 343$

$= 7546\ cm^3$

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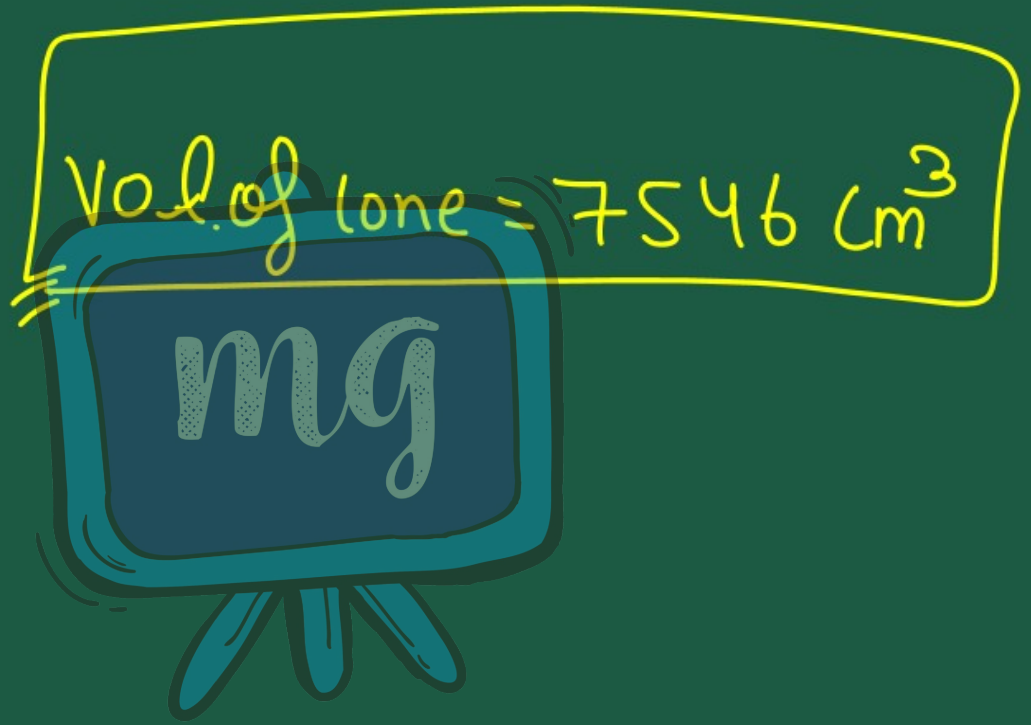

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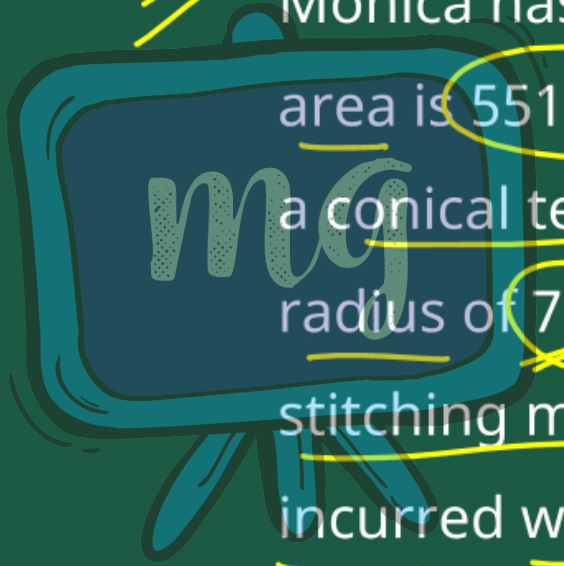
Example : 9



Monica has a piece of canvas whose area is 551 m^2. She uses it to have a conical tent made, with a base radius of 7 m. Assuming that all the stitching margins and the wastage incurred while cutting, amounts to approximately 1 m^2, find the volume of the tent that can be made with it.

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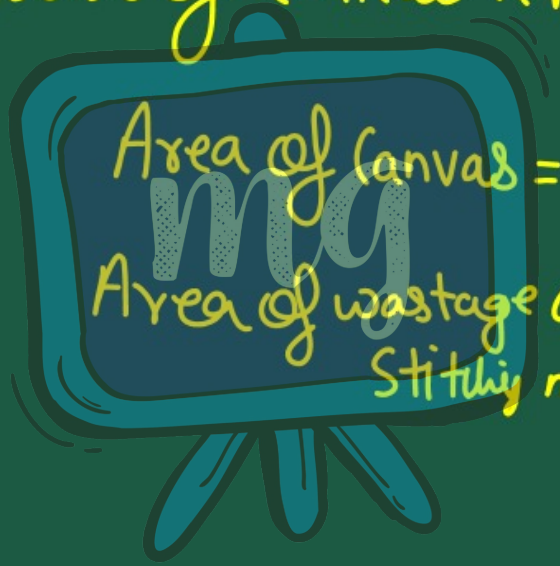
A·T·Q

Radius of Conical Tent = 7m



Area of canvas = $551 m^2$

Area of wastage and Stitching merging = $1 m^2$

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Area of Conical Tent = Area of canvas − Area of wastage and margins utilized

= 551 − 1

= 550 m^2 = C.S.A of Conical Tent

Area of Conical Tent

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we know that

C.S.A of Conical Tent $= \pi \times r \times l = 550$

$\Rightarrow \frac{22}{7} \times 7 \times l = 550$

$\Rightarrow 22l = 550$

$l = \frac{550}{22} = 25\ m.$

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(l) Slant height = 25m

(r) Radius = 7m

(h) height = ?

Now we know that

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

$$(25)^2 = h^2 + (7)^2$$

$$625 = h^2 + 49$$

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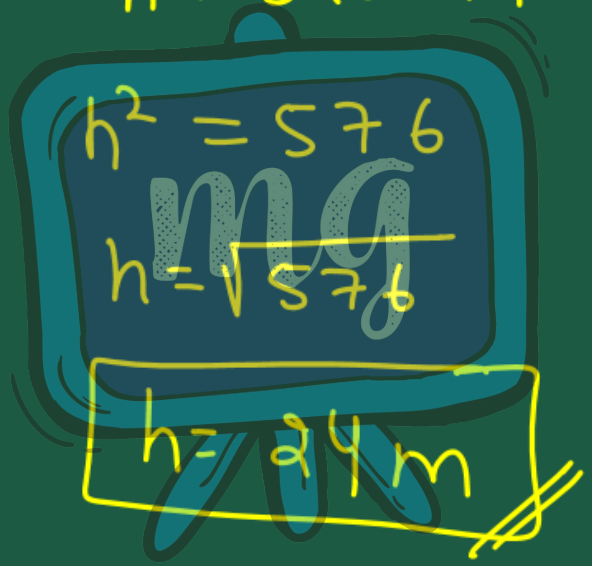
$h^2 + 49 = 625$

$h^2 = 625 - 49$



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Now

Vol. of cone $= \frac{1}{3} \times \pi \times r^2 \times h$

$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 24^{8}$

$= 22 \times 7 \times 8$

$= 2 \times 11 \times 56$

$= 11 \times 112$

$= 1232\ m^3$

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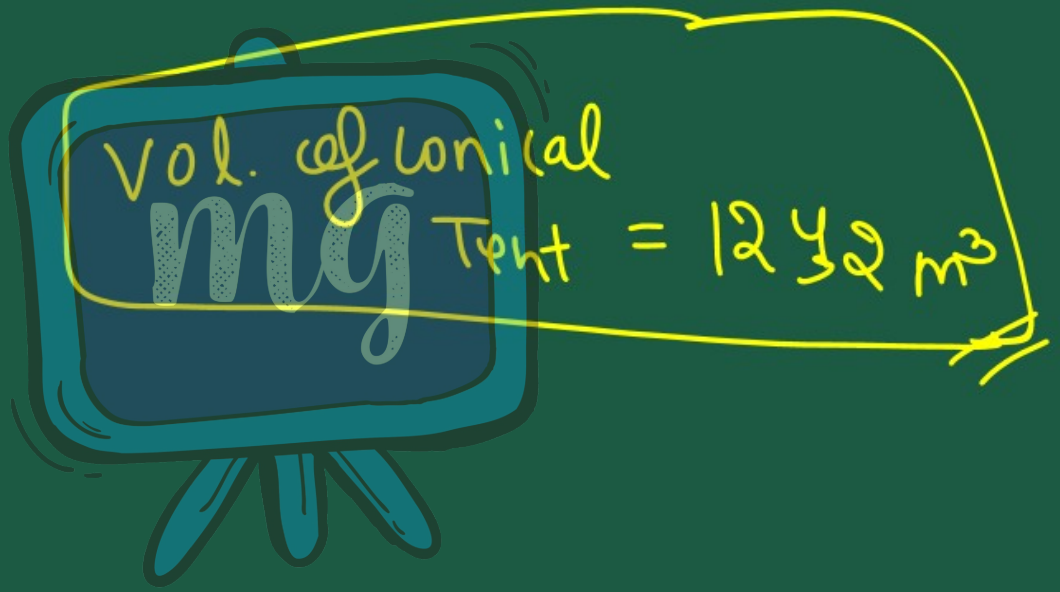

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LEARNING OUTCOME

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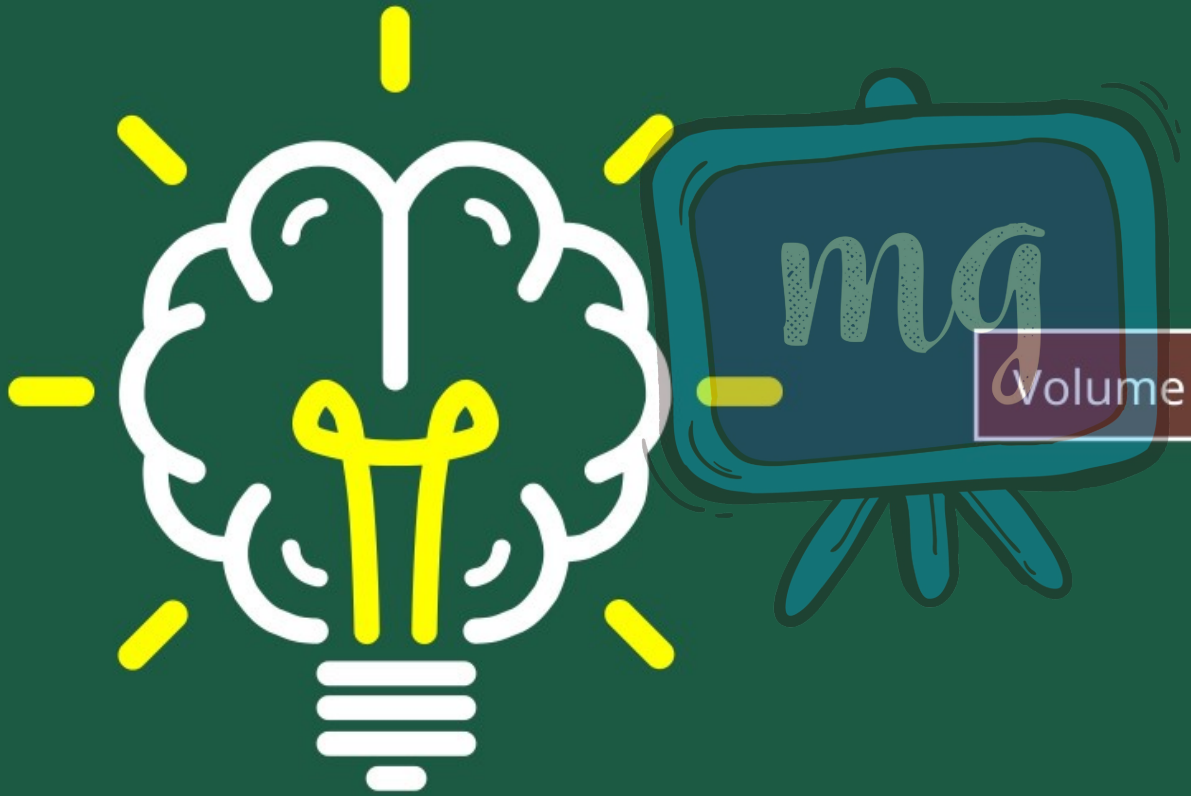

Volume of a Right Circular Cone



1 What is the volume of a cone of radius 21 cm and height 5 cm?

A. 2310 cm^3

B. 2500 cm^3

C. 2464 cm^2

D. 4664 cm^2

A.T.Q

$r = 21$ cm

$h = 5$ cm

Vol. of cone $= \frac{1}{3} \times \frac{22}{7} \times 21 \times 21 \times 5$

$= \frac{1}{3} \times \frac{22}{7} \times 3 \times 7 \times 21 \times 5$

$= 110 \times 21$

$= 2310\ cm^3$

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ASSESSMENT

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2 A cone has slant height 5 cm and height 4 cm, its volume (in cm^3) is .....

- ~~A~~ 38.71
- ~~B~~ 36.50
- ~~C~~ 37.00
- D 37.71

$l = 5\,cm$

$h = 4\,cm$

$r = ?$

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

$(5)^2 = (4)^2 + r^2$

$25 = 16 + r^2$

$r^2 = 25 - 16 = 9$

$7 \overline{)264}\,37.7$

21

54 50

49 49

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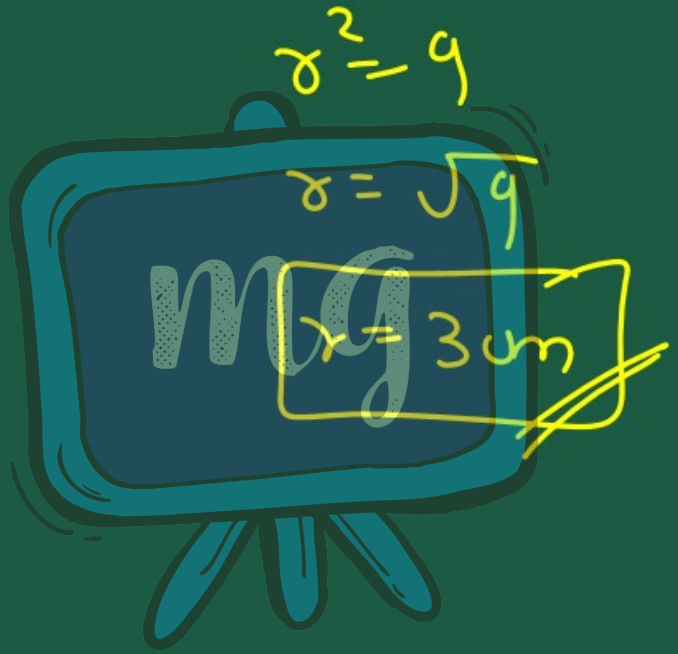

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Vol. of cone $= \frac{1}{3} \times \pi \times r^2 \times h$

$= \frac{1}{3} \times \frac{22}{7} \times 3 \times 3 \times 4$

$= \frac{22 \times 3 \times 4}{7}$

$= \frac{11 \times 24}{7} = \frac{264}{7}$