

Assignment 1

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Question 9(c)

The following figure represents a solid consisting of a right circular cylinder with a hemisphere at one end and cone at the other. Their common radius is 7cm . The height of the cylinder and the cone are each of 4cm . Find the volume of the solid.

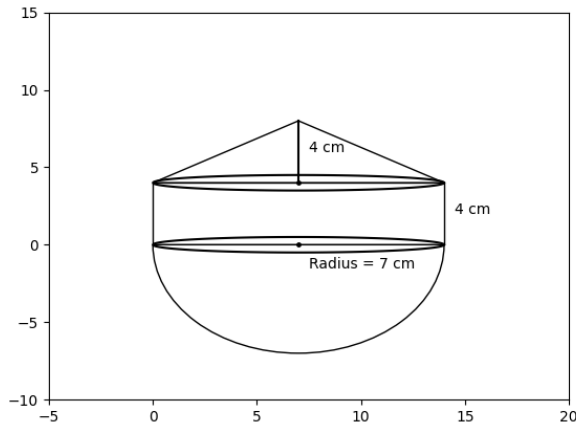


Fig. 1. Solid

Solution :

The various parameters considered in this problem are listed in Table (I)

Symbol	Formulae/Value	Description
r	7cm	common radius
h	4cm	height of cone and cylinder
V_1	$\frac{1}{3}\pi r^2 h$	Volume of cone
V_2	$\pi r^2 h$	Volume of cylinder
V_3	$\frac{1}{3}\pi r^3$	Volume of hemisphere
V	?	Volume of the figure

TABLE I

cylinder and hemisphere. Thus,

$$\begin{aligned}
 V &= V_1 + V_2 + V_3 \\
 \Rightarrow V &= \frac{1}{3}\pi r^2 h + \pi r^2 h + \frac{2}{3}\pi r^3 \\
 \therefore V &= \frac{2}{3}\pi r^2 (2h + r)
 \end{aligned}$$

By substituting h and r ,

$$\begin{aligned}
 V &= \frac{2}{3} \times 49(8 + 7)\pi \\
 &= 490\pi \\
 &\approx 1539.38\text{cm}^3
 \end{aligned}$$

From the given information, the volume of the figure is equal to the sum of the volume of the cone,