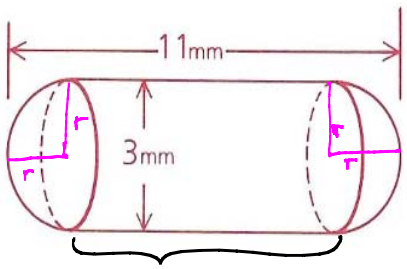
Note Title 5/12/2016

9 A cold capsule is 11 mm long and 3 mm in diameter. Find, to the nearest cubic millimeter, the volume of medicine it contains.



$11-2\left(\frac{3}{2}\right)=8$

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

2 hemispheres

1 sphere + cylinder

$\frac{4}{3}\pi r^3 + \pi r^2 h$

$\frac{4}{3}\left(\frac{3}{2}\right)^3\pi + \left(\frac{3}{2}\right)^2 \cdot 8\pi$

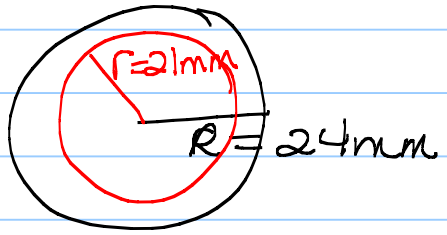
$\frac{\cancel{4}}{\cancel{3}} \cdot \frac{\cancel{3}\cdot 3\cdot 3}{\cancel{2}\cdot\cancel{2}\cdot 2}\pi + \frac{3\cdot 3}{\cancel{2}\cdot 2}\cdot \cancel{2}\cdot\cancel{2}\cdot 2\pi$

$\frac{9}{2}\pi + 18\pi$

$\frac{45}{2}\pi \text{ mm}^3 \approx 22.5\pi \approx 71 \text{ mm}^3$

exact — estimate

6 A rubber ball is formed by a rubber shell filled with air. The shell's outer diameter is 48 mm, and its inner diameter is 42 mm. Find, to the nearest cubic centimeter, the volume of rubber used to make the ball.



$V_R - V_r$

$\frac{4}{3}R^3\pi - \frac{4}{3}r^3\pi$

$\frac{4}{3}24^3\pi - \frac{4}{3}21^3\pi$

(4/3)24^3π-((4/3)21^3π)
19113.4497

$19113.4\ mm^3 \cdot \left(\frac{1\ cm}{10\ mm}\right)^3$

Ans/10^3
19.1134497 ≈ $19\ cm^3$

7 **a** $V_{\frac{1}{2}sphere} = \frac{1}{2}(\frac{4}{3}\pi r^3)$ $\quad V_{cone} = \frac{1}{3}Bh$

$V_{\frac{1}{2}sphere} = \frac{1}{2}(\frac{4}{3}\pi)(216) = 144\pi$ $\quad = \frac{1}{3}(36\pi)(8)$

$V_{cone} = 96\pi$

Total volume $= 144\pi + 96\pi = 240\pi$

b $A_{\frac{1}{2}sphere} = \frac{1}{2} \cdot 4\pi r^2$

$A_{\frac{1}{2}sphere} = \frac{1}{2}(4\pi)(36) = 72\pi$

$A_{cone} = \pi r \ell$ $\quad \ell$ = slant height = 10

$A_{cone} = \pi \cdot 6 \cdot 10$ $\quad$ (Pythagorean triple 6-8-10)

$A_{cone} = 60\pi$

Total surface area $= 72\pi + 60\pi = 132\pi$

8 **a** $V_{hemisphere} = \frac{1}{2}V_{sphere}$

$= \frac{1}{2}(\frac{4}{3}\pi r^3)$

$= \frac{2}{3}\pi(30)^3$

$= \frac{2}{3}\pi(27{,}000)$

$V_{hemisphere} = 18{,}000\pi \approx 56{,}549$ cu m

b $A\odot = \pi r^2$

$A\odot = \pi(30)^2$

$A\odot = 900\pi \approx 2827$ sq m

c $A_{hemisphere} = \frac{1}{2}A_{sphere}$

$= \frac{1}{2}(4\pi r^2)$

$= 2\pi(30)^2$

$A_{hemisphere} = 1800\pi$ sq m, $A\odot = 900\pi$ sq m

Twice as much paint is needed to cover the area of the hemisphere.

d $1800\pi = \pi r^2$

$1800 = r^2$

$r = 30\sqrt{2} \approx 42$ m