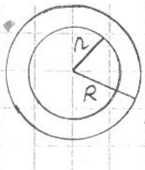
16.5



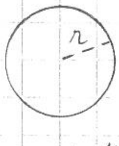
$2R = 12\,cm \iff R = 6\,cm$

$r = R - 6\,mm = 6\,cm - 0{,}6\,cm = 5{,}4\,cm$

kuorta: $\frac{V_R - V_r}{V_R} = \frac{V_R}{V_R} - \frac{V_r}{V_R} = 1 - k^3 = 1 - \left(\frac{r}{R}\right)^3$

$= 1 - \left(\frac{5{,}4\,cm}{6{,}0\,cm}\right)^3 = 0{,}271 \approx \underline{27\,\%}$

16.13



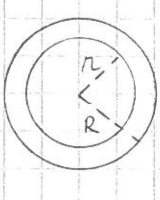
a) $A = 4\pi r^2 = 1660\,m^2 \quad |:4\pi \quad |\sqrt{\ }$

$\iff r = (\pm)\sqrt{\frac{1660\,m^2}{4\pi}} \approx 11{,}493\,m$

$\Rightarrow d = 2r \approx 22{,}987\,m \approx \underline{23\,m}$

b) $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(11{,}493\,m)^3 \approx 6359{,}69\,m^3 \approx \underline{6360\,m^3}$

16.14



$R = \frac{29\,cm}{2} = 14{,}5\,cm$

$r = R - 2{,}0\,cm = 12{,}5\,cm$

a) $V = V_R - V_r = \frac{4}{3}\pi R^3 - \frac{4}{3}\pi r^3$

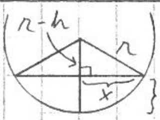
$= \frac{4}{3}\pi\left[(14{,}5\,cm)^3 - (12{,}5\,cm)^3\right]$

$\approx 4588{,}820\,cm^3 \approx \underline{4600\,cm^3}$

b) $m = \rho V = 2100\,\frac{kg}{(100\,cm)^3} \cdot 4588{,}820\,cm^3$

$\approx 9{,}63652\,kg \approx \underline{9{,}6\,kg}$

16.15



$\}h$

$h = 4{,}0\,cm \quad , \quad x = \frac{18\,cm}{2} = 9\,cm$

Pythagoras:

$x^2 + (r-h)^2 = r^2$

$\iff x^2 + r^2 - 2rh + h^2 = r^2 \iff x^2 + h^2 = 2rh$

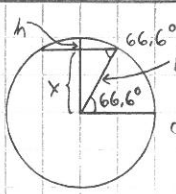
$\iff r = \frac{x^2 + h^2}{2h} = \frac{9^2 + 4^2}{2 \cdot 4} = 12{,}125\,(cm)$

$V = \pi h^2\left(r - \frac{h}{3}\right) = \pi(4{,}0\,cm)^2\left(12{,}125\,cm - \frac{4{,}0\,cm}{3}\right)$

$\approx 542{,}448\,cm^3 \approx 540\,cm^3$

16.16

leikataan $\Rightarrow$ tasolle



$\sin 66{,}6° = \frac{x}{R}$

$\iff x = R\sin 66{,}6°$

$h = R - x = R - R\sin 66{,}6° = R(1 - \sin 66{,}6°)$

$\frac{A_a}{A} = \frac{2\pi R h}{4\pi R^2} = \frac{2\pi R \cdot R(1 - \sin 66{,}6°)}{4\pi R^2} = \frac{1 - \sin 66{,}6°}{2}$

$\approx 0{,}04112 \approx \underline{4{,}1\,\%}$