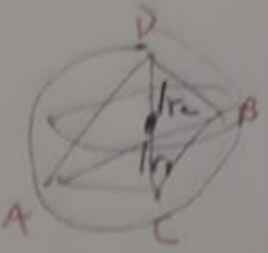
3-) r_1 = raio da esfera inscrita no tetraedro
r_2 = raio da esfera que tangencia as arestas do tetraedro
r_3 = raio da esfera circunscrita ao tetraedro

Dividindo o tetraedro em 4 tetraedros, onde a base será uma base logo, o volume é definido

$$V_{ABCO} = \frac{1}{3} A_{base} \cdot h = \frac{1}{3} \cdot \frac{a^2\sqrt{3}}{4} r_1 = \frac{a^2\sqrt{3}}{12}$$

$$V_{Total} = 4 \cdot V_{ABCO} \Rightarrow V_{Total} = 4 \frac{a^2\sqrt{3}}{12} r_1 = \frac{a^2\sqrt{3}}{3} r_1$$

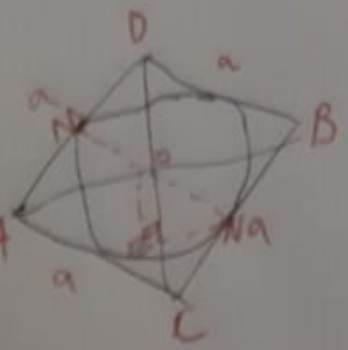
$$\therefore r_1 = \frac{a\sqrt{6}}{12} = \frac{h}{4}$$



$$V_{Total} = 4 \cdot V_{ABCO} \Rightarrow r_1 = \frac{h}{4}$$

$r_1 + r_2 = h$, pois as esferas são concentricas

$$r_1 + r_2 = h \Rightarrow \frac{h}{4} + r_2 = h \Rightarrow r_2 = h - \frac{h}{4} \Rightarrow r_2 = \frac{3}{4}h \Rightarrow r_2 = \frac{a\sqrt{6}}{4}$$



$\Delta_{DOM} \cong \Delta_{EON}$ por (AA)

$$\frac{r_3}{r_2} = \frac{r_1}{r_3} \Rightarrow r_3^2 = r_1 r_2 \Rightarrow r_2 = \frac{r_3^2}{r_1} \Rightarrow r_2 = \frac{a\sqrt{6}}{4}$$