Cilindros

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1

$V_1 \rightarrow$ maior

$V_1 = \pi \cdot r^2 \cdot \frac{1}{5} h$

$V_1 = \pi \cdot 10^2 \cdot \frac{1}{5} h$

$V_1 = 100\pi \cdot \frac{1}{5} \cdot 40$

$V_1 = 800\pi \text{ cm}^3$

O líquido a ser despejado, terá seu volume igualado e acrescentado ao cilindro menor. Então:

$V_1 = V_2$

$V_2 = \pi \cdot 5^2 \cdot h$

$V_2 = 25\pi \cdot h$

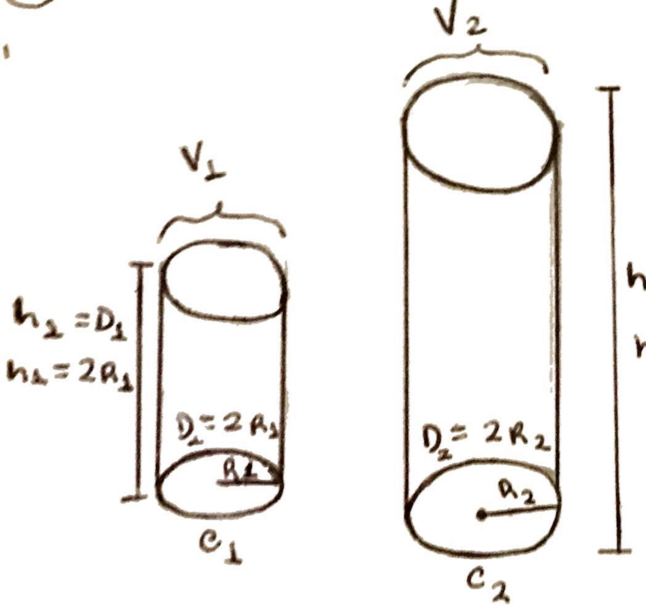
$\Rightarrow 800\cancel{\pi} = 25\cancel{\pi} \cdot h$

$h = 800/25$

$h = 32 \text{ cm}$

$\rightarrow$ nova altura do líquido menor

②



$h_2 = 8D$

$h_2 = 2(8R_2)$

$h_2 = 16R_2$

$\frac{V_1}{V_2} = \frac{1}{27} \Rightarrow \frac{\pi(R_1)^2 \cdot h_1}{\pi(R_2)^2 \cdot h_2} = \frac{1}{27}$

$\Rightarrow \frac{\cancel{\pi}(R_1)^2 \cdot 2R_1}{\cancel{\pi}(R_2)^2 \cdot 16R_2} = \frac{1}{27}$

$R_1^2 \cdot 2R_1 = R_1^3$

$R_2^2 \cdot 16R_2 = 16R_2^3$

$$\left(\frac{R_1}{R_2}\right)^3 = \frac{8}{27} \Rightarrow \frac{R_1}{R_2} = \frac{2}{3}$$

③

$$\left.\begin{aligned} A_L &= 2\pi R h \\ A_T &= 2\pi R(R+h) \\ V &= \pi R^2 h \end{aligned}\right\}$$

$C_1 \Rightarrow R_1$

$C_2 \Rightarrow R_2 = R_1 + \frac{1}{2} R_1$

$C_2 \Rightarrow R_2 = \frac{3}{2} R_1$

$$\left\{\begin{aligned} V_{C_1} &= \pi R_1^2 h \\ V_{C_1} &= \cancel{\pi} R_1^2 h \\ R_1^2 h &= 16 \end{aligned}\right.$$

$$A_{L\,C_{II}} = A_{t\,C_{I}}$$

$$\cancel{2\pi}\left(\frac{3}{2}\right)\cancel{R_1}\cdot h = \cancel{2\pi}\,\cancel{R_1}(h+R_1)$$

$$\frac{3h}{2} = h + R_1$$

$$3h = 2(h+R_1)$$

$$3h = 2h + 2R_1$$

$$3h - 2h = 2R_1$$

$$(I)\; h = 2R_1$$

$\rightsquigarrow V = \pi R_1^2 h$

$16\pi = \pi R_1^2 h$

$(II)\; h = \frac{16}{r_1^2}$

$$\mathrm{I} = \mathrm{II}$$

$$2R_1 = \frac{16}{R_1^2} \Rightarrow 2R_1^3 = 16$$

$$R_1 \Rightarrow 2^3 = 16$$

$$R_1 = \sqrt[3]{8}$$

$$R_1 = 2$$

$$\pi R_1^2 . h = 16\pi$$

$$\pi . 4 . h = 16\pi$$

$$h = \frac{\cancel{\pi} 16}{\cancel{\pi} 4}$$

$$h = 4$$

④

$V = \pi r^2 \cdot h$

↳ para calcular o raio original, os volumes devem ser igualados, uma vez que a altura se mantém a mesma para ambas alterações.

$V_1 = \pi (r + 12)^2 \cdot 4$

$V_2 = \pi r^2 (4 + 12)$

$$\cancel{\pi}(r+12)^2 \cdot 4 = \cancel{\pi} r^2 (4+12)$$

$$(r^2 + 24r + 144)4 = r^2 \cdot 16$$

$$4r^2 + 96r + 576 = 16r^2$$

$$16r^2 - 4r^2 - 96r - 576 = 0$$

$$12r^2 - 96r - 576 = 0 \quad (:12)$$

$$r^2 - 8r - 48 = 0$$

$$\underline{12} + \underline{-4} = \frac{-b}{a} = \frac{-(8)}{1} = 8$$

$$\underline{12} \cdot \underline{-4} = \frac{c}{a} = \frac{-48}{1} = -48$$

$r = 12$ cm

↳ original

(5)

$V_p = \pi r^2 \cdot h$

$h = 0,8\,mm = 0,8\,cm \Rightarrow$ altura do volume da pedra

$r = 20\,cm$

$V_p = \pi \cdot 20^2 \cdot 0,8$

$V_p = 400\pi \cdot 0,8$

$V_p = 400 \cdot 3,14 \cdot 0,8$

$V_p \cong 100,48 \cong 100,5\,cm^3$

Triângulos

2)

$$V = \frac{1}{3} \cdot Ab \cdot h \Rightarrow Ab = a \cdot b = x \cdot 2x$$

$$V = 48\,cm^3$$

$$48 = \frac{1}{3} \cdot x \cdot 2x \cdot 8$$

$$48 = \frac{16x^2}{3}$$

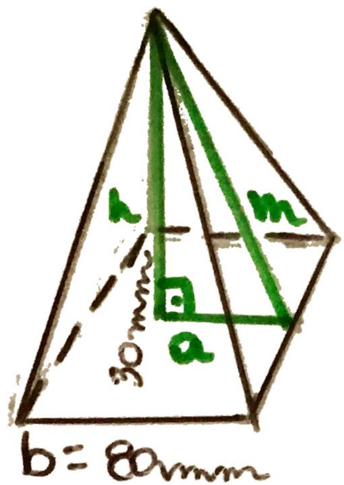
$$144 = 16x^2$$

$$x^2 = \frac{144}{16}$$

$$x^2 = 9$$

$$x = \sqrt{9} \Rightarrow \boxed{x = 3}$$

②



$a = \frac{b}{2} \Rightarrow \frac{80}{2} = 40\,mm$

$m \Rightarrow m^2 = h^2 + a^2$

$m^2 = (30)^2 + (40)^2$

$m^2 = 900 + 1600$

$m = \sqrt{2500}$

$m = 50\ mm$

$At = b(b + 2m)$

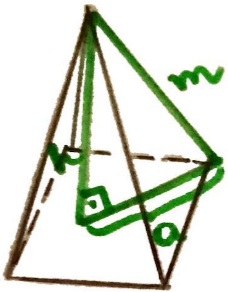
$At = 80(80 + 2.50)$

$At = 80(80 + 100)$

$At = 80 \cdot 180$

$\boxed{At = 14400\ m^2}$

3



b = √2 cm

$$a = \frac{\overbrace{\text{diagonal } b}^{l\sqrt{2}}}{2} \Rightarrow a = \frac{\sqrt{2}\,.\,\sqrt{2}}{2} = \frac{2}{2} = 1 \text{ cm}$$

$$m = \text{aresta} = \sqrt{2} \text{ cm}$$

$$h^2 \Rightarrow m^2 = a^2 + h^2$$

$$(\sqrt{2})^2 = 1^2 + h^2$$

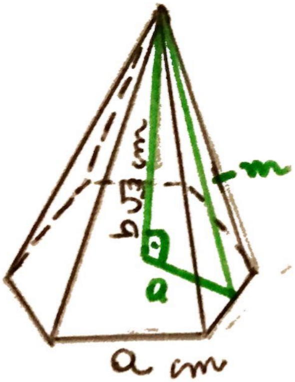
$$2 = 1 + h^2$$

$$1 = h^2$$

$$h = \sqrt{1}$$

$$\boxed{h = 1} \text{ cm}$$

4



$$V = \frac{1}{3} \cdot Ab \cdot h$$

$$Ab = 6\,\frac{a^2\sqrt{3}}{4}$$

$$V = \frac{1}{3} \cdot 6\,\frac{a^2\sqrt{3}}{4} \cdot b\sqrt{3}$$

$$V = \frac{6a^2\cancel{\sqrt{3}} \cdot b\cancel{\sqrt{3}}}{12}$$

$$V = \frac{6a^2 \cdot 3 \cdot b \cdot}{12}$$

$$V = \frac{18\,a^2 b^2}{12} : 6$$

$$V = \frac{3a^2 b}{2} \text{ cm}^3$$

(5)

$V = \frac{1}{3} \cdot Ab \cdot h$

$\Rightarrow V = \frac{1}{3} \cdot 24\cancel{\sqrt{3}} \cdot 6\cancel{\sqrt{3}}$

$Ab = 6 \cdot \frac{a^2\sqrt{3}}{4}$

$V = \frac{1}{3} \cdot 24 \cdot 6 \cdot 3$

$Ab = 6 \cdot \frac{4^2\sqrt{3}}{4}$

$V = \frac{24 \cdot 6 \cdot 3}{3}$

$\boxed{V = 144\ cm^3}$

$Ab = 6 \cdot \frac{16\sqrt{3}}{4}$

$Ab = 24\sqrt{3}\ cm^2$

$h = 6\sqrt{3}\ cm$

6

perímetro $= 6 . a$

$P = 6 . a$

$6 = 6 . a$

$a = 6/6 = 1$

$h = 8\,cm$

$V = Ab . h . \frac{1}{3}$

$Ab = 6 . \frac{a^2\sqrt{3}}{4}$

$Ab = 6 . \frac{1^2\sqrt{3}}{4}$

$Ab = \frac{6\sqrt{3}}{4}$

$\Rightarrow V = \frac{6\sqrt{3}}{4} . 8 . \frac{1}{3}$

$V = \frac{48\sqrt{3}}{12}$

$\boxed{V = 4\sqrt{3}\ cm^3}$

7

Pirâmide:

$V_1 = \frac{1}{3} \cdot Ab \cdot h_1 \Rightarrow V_1 = \frac{1}{3} \cdot 4a \cdot h_1$

$Ab = (2a)^2$

$Ab = 4a$

$V_1 = \frac{4a \cdot h_1}{3}$

Prisma:

$V_2 = Ab \cdot h_2$

$Ab = a^2$

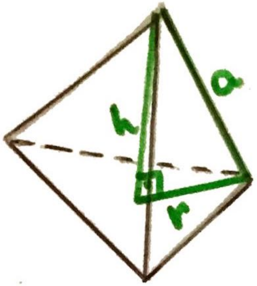
$V_2 = a^2 \cdot h^2$

$\hookrightarrow V_1 = V_2$

$\frac{4a \cdot h_1}{3} = a^2 \cdot h_2^2 \Rightarrow 3a^2 \cdot h^2 = 4a \cdot h_1 \Rightarrow \frac{h_1}{h_2} = \frac{3\cancel{a^2}}{4\cancel{a^2}}$

$$\frac{h_1}{h_2} = \frac{3}{4}$$

⑧



$h = \dfrac{a\sqrt{6}}{3}$

$At = a^2\sqrt{3}$

$6\sqrt{3} = a^2\sqrt{3}$

$a^2 = \dfrac{6\sqrt{3}}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{6.\cancel{3}}{\cancel{3}}$

$a^2 = 6$

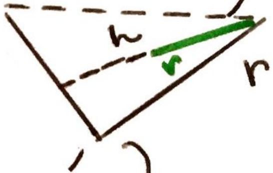
$a = \sqrt{6} =$

$h = \dfrac{\sqrt{6}.\sqrt{6}}{3}$

$h = \dfrac{\sqrt{36}}{3}$

$h = \dfrac{6}{3}$

$h = 2\ cm$



$\Rightarrow$ baricentro, incentro, circuncentro e ortocentro

$r = \dfrac{2}{3} \cdot h = \dfrac{2}{3} \cdot \dfrac{a\sqrt{3}}{2} = \dfrac{a\sqrt{3}}{3}$

$At = \cancel{4} \cdot \dfrac{a^2\sqrt{3}}{\cancel{4}} = At = a^2\sqrt{3}$

$\Rightarrow h^2 + r^2 = a^2$

$h^2 = a^2 - \left(\dfrac{a\sqrt{3}}{3}\right)^2 \Rightarrow h^2 = \dfrac{9a^2 - 3a^2}{9} = \dfrac{6a^2}{9} \Rightarrow h = \sqrt{\dfrac{a^2 6}{9}} = \dfrac{a\sqrt{6}}{3}$