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Colégio Imaculado 23/07/86

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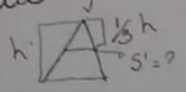
Avaliação de Compl. Matemática

1) Uma pirâmide regular hexagonal de aresta da base 8 cm é seccionada por um plano paralelo à base. Sendo a distância da secção ao vértice igual a $\frac{1}{3}$ da altura da pirâmide, qual é a área da secção?



$\frac{S'}{S} = \left(\frac{h'}{h}\right)^2$

$\frac{S'}{96\sqrt{3}} = \left(\frac{1/3\,h}{h}\right)^2$

$S' = \frac{1}{9} \cdot 96\sqrt{3}$

$S' = \frac{32\sqrt{3}}{3}$ cm²

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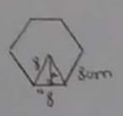


$S_b = p \cdot a$

$8^2 = 4^2 + a^2$ $\quad 2p = 8 \cdot 6$

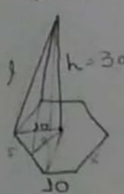
$64 = 16 + a^2$ $\quad 2p = 48$

$a^2 = 48$ $\quad p = \frac{48}{2}$

$a = 4\sqrt{3}$ cm $\quad p = 24$

$S_b = 24 \cdot 4\sqrt{3} = 96\sqrt{3}$ cm²

2) Calcule a aresta lateral e a área total de uma pirâmide regular hexagonal de 3cm de altura e 10cm a medida da aresta da base.



$l = ?$

$A_t = ?$

$l^2 = h^2 + x^2$

$l^2 = 9 + 100$

$l^2 = 109$

$l = \sqrt{109}$ cm

$A_t = ?$

$A_b = p \cdot a = 5\sqrt{3} \cdot 30 = 150\sqrt{3}$ cm²

$2p = 10 \cdot 6$ $\quad a = ?$

$2p = 60$ $\quad 10^2 = a^2 + 5^2$

$p = 30$ cm $\quad 100 = a^2 + 25$

$a^2 = 75 \Rightarrow a = \sqrt{75} = 5\sqrt{3}$ cm

$A_l = 6 A_\Delta$

$(5\sqrt{3})^2 = 25 \cdot 3 = 75$

$m'^2 = h^2 + a^2$

$m'^2 = 9 + 75$

$m'^2 = 84$

$m' = 2\sqrt{21}$

$A_\Delta = \frac{10 \cdot 2\sqrt{21}}{2} = 10\sqrt{21}$

$A_l = 6 \cdot 10\sqrt{21}$

$A_l = 60\sqrt{21}$

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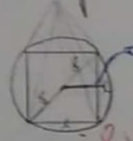
$A_t = A_b + A_l$

$A_t = 150\sqrt{3} + 60\sqrt{21}$ cm²

3) O apótema de uma pirâmide regular é igual ao semiperímetro da base, e esta é um quadrado inscrito num círculo de 8 m de raio. Calcule o volume desta pirâmide.

$V = ?$ $\quad V = \frac{1}{3} A_b \cdot h$

$m' = p$



$4\sqrt{2}$ $\quad l^2 + l^2 = (16)^2$

$8\sqrt{2}$

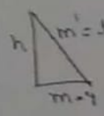
$2l^2 = 256$

$l^2 = 128$

$l = 8\sqrt{2}$

$2p = 8\sqrt{2} \cdot 4$

$2p = 32\sqrt{2} \Rightarrow p = 16\sqrt{2} = m'$



$\sqrt{2} \Rightarrow$

$h^2 + m^2 = m'^2$

$h^2 + 16 = (16\sqrt{2})^2$

$h^2 + 16 = 512$

$h^2 = 496 = 4\sqrt{31}$

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

$V = \frac{1}{3} \cdot 64 \cdot 4\sqrt{31} = \frac{256\sqrt{31}}{3}$ m³

4) Determine a aresta de um octaedro regular de $8\sqrt{6}\ m^3$ de volume.

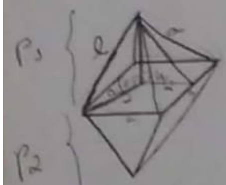
( ) $2\sqrt[6]{3}$ ( ) $2\sqrt[3]{27}$

(X) $2\sqrt{3}$ ( ) $24\sqrt{3}$

(x) n.d.a.

Obs: Demonstre e depois assinale a alternativa correta

$l = ?$ $V = 8\sqrt{6}\ m^3$



$V = V_{p_1} + V_{p_2}$

$V = 2 \cdot \frac{1}{3} A_b \cdot h$

$A_b = a^2$

$S_\Delta = \frac{a^2\sqrt{3}}{4}$

$\frac{a^2\sqrt{3}}{4} = \frac{a\, m'}{2}$

$2a^2\sqrt{3} = 4m'$

$m' = \frac{2a\sqrt{3}}{4} = \frac{a\sqrt{3}}{2}$

$(2x)^2 = a^2 - a^2$

$4x^2 = 2a^2$

$a^2 = 2x^2$

$x^2 = \frac{a^2}{2}$

$x = \frac{a}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} = \frac{a\sqrt{2}}{2}$

$h^2 + \frac{a^2}{4} = \left(\frac{a\sqrt{3}}{2}\right)^2$

$h^2 + \frac{a^2}{4} = \frac{3a^2}{4}$

$h^2 = \frac{3a^2}{4} - \frac{a^2}{4}$

$h^2 = \frac{2a^2}{4}$

$h = \frac{a\sqrt{2}}{2}$

1,0

$V = \cancel{2} \cdot \frac{1}{3} \cdot a^2 \cdot \frac{a\sqrt{2}}{\cancel{2}}$

$8\sqrt{6} = \frac{a^3\sqrt{2}}{3}$

$24\sqrt{6} = a^3\sqrt{2}$

$a^3 = \frac{24\sqrt{6}}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} = \frac{24\sqrt{12}}{2} = 12\sqrt{12}$

$a^3 = 24\sqrt{3}$

$a = \sqrt[3]{24\sqrt{3}}$ cm

$\left(\frac{a\sqrt{2}}{2}\right)^2 + \left(\frac{a\sqrt{2}}{2}\right)^2 = l^2$

$\frac{2a^2}{4} + \frac{2a^2}{4} = l^2$

$l^2 = \frac{a^2}{2} + \frac{a^2}{2} \Rightarrow \frac{2a^2}{2} = a^2 = \left(\sqrt[3]{24\sqrt{3}}\right)^2$

$l = \sqrt[3]{24\sqrt{3}}$ cm

termine!

5) Calcule o volume de um tronco de pirâmide triangular regular onde as arestas das bases são 5cm e 11cm e, a aresta lateral do tronco é 4cm. Qual é a altura da pirâmide? (2pts)

$V = ?$ $\frac{H}{3}\left[B + \sqrt{Bb} + b\right]$

2,0

$S_B = \frac{11 \cdot 11 \cdot \sqrt{3}}{4}$

$S_B = \frac{121\sqrt{3}}{4}$

$S_b = \frac{5 \cdot 5 \cdot \sqrt{3}}{4}$

$S_b = \frac{25\sqrt{3}}{4}$

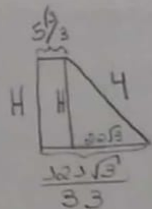
$H = ?$

$S_B = \frac{11 \cdot h}{2} = \frac{121\sqrt{3}}{4}$

$44h = 242\sqrt{3}$

$h_B = \frac{242\sqrt{3}}{44} = \frac{121\sqrt{3}}{22}$

$\frac{2}{3} h_B = \frac{2}{3}\cdot\frac{121\sqrt{3}}{22} = \frac{121\sqrt{3}}{33}$



$\frac{121\sqrt{3}}{33} - \frac{5\sqrt{3}}{3} =$

$\frac{121\sqrt{3} - 55\sqrt{3}}{33}$

$\frac{66\sqrt{3}}{33} = \frac{22\sqrt{3}}{11}$

$\frac{2}{3} h_b$ $\frac{2}{3}\cdot\frac{5\sqrt{3}}{2} = \frac{5\sqrt{3}}{3}$

$S_b = \frac{25\sqrt{3}}{4} = \frac{5 \cdot h_b}{2}$

$50\sqrt{3} = 20 h_b$

$h_b = \frac{5\sqrt{3}}{2}$

$V = \frac{2}{3}\left[\frac{201\sqrt{3}}{4}\right]$

$\boxed{V = \frac{67\sqrt{3}}{2}\ cm^3}$

$H^2 + \left(\frac{22\sqrt{3}}{11}\right)^2 = 4^2$

$H^2 + \left(\frac{1452}{121}\right) = 16$

$H^2 = 16 - 12$

$H^2 = 4$

$\boxed{H = 2cm}$

$V = \frac{2}{3}\left[\frac{121\sqrt{3}}{4} + \sqrt{\frac{121\sqrt{3}}{4}\cdot\frac{25\sqrt{3}}{4}} + \frac{25\sqrt{3}}{4}\right]$

$V = \frac{2}{3}\left[\frac{121\sqrt{3}}{4} + \frac{55\sqrt{\sqrt{3}\sqrt{3}}}{4} + \frac{25\sqrt{3}}{4}\right]$

$V = \frac{2}{3}\left[\frac{121\sqrt{3}}{4} + \frac{55\sqrt{3}}{4} + \frac{25\sqrt{3}}{4}\right]$

Boa sorte!
Edeny