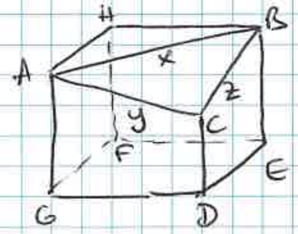
Ex. 46.1

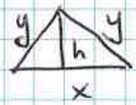
a) Aire : $3 \cdot 9^2 + \underbrace{A(\square)}_{9 \cdot 5 + \frac{1}{2} \cdot 4 \cdot 9} \cdot 2 + \underbrace{A(\triangle)}_{\frac{1}{2} \cdot 9 \cdot 9} + A(\triangle)$



$x = \sqrt{9^2 + 9^2} = 9\sqrt{2} = \sqrt{162}$

$y = \sqrt{4^2 + 9^2} = \sqrt{97} = z$

Le ΔABC est isocèle.



$h = \sqrt{y^2 - \left(\frac{x}{2}\right)^2}$

$= \sqrt{97 - \frac{162}{4}} = \frac{\sqrt{226}}{2}$.

$A(\Delta ABC) = \frac{1}{2}\sqrt{162} \cdot \frac{\sqrt{226}}{2} =$

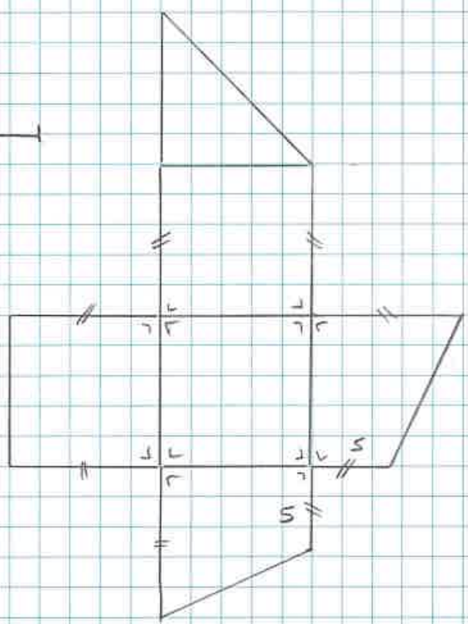
$= \frac{9\sqrt{113}}{2} \cong \underline{47{,}84}$.

$V = \text{Vol(cube)} - \text{Vol(pyramide)} =$ $\qquad A_{tot} = 394{,}34 \text{ cm}^2$

$= 9^3 - \frac{1}{3}\left(\frac{1}{2} \cdot 9^2\right) \cdot 4 = \underline{675}$.

b) Echelle :

9

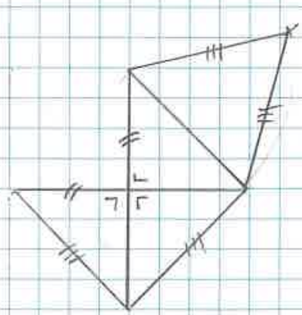


Ex. 46.2

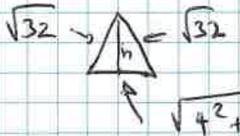
a) $V = \frac{1}{3} b h = \frac{1}{3} \cdot \frac{1}{2} \cdot 4 \cdot 4 \cdot 4 = \frac{32}{3}$

c)

4 cm
échelle



b) Surfaces : $\triangle$ $3 \cdot \frac{1}{2} \cdot 4 \cdot 4 = 24$



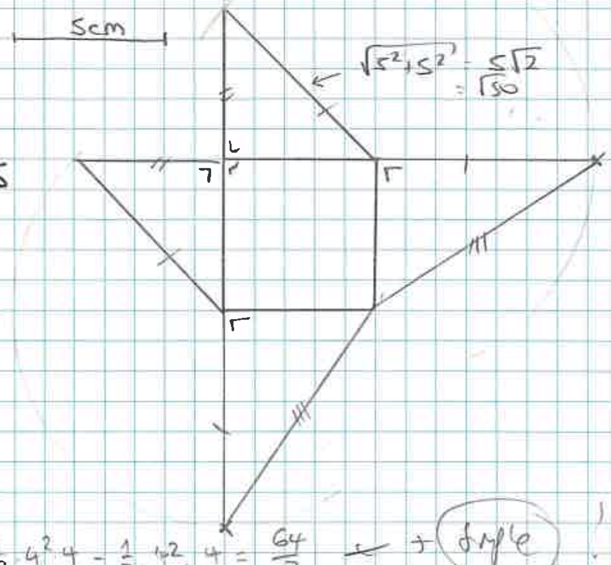
$\frac{1}{2} \cdot \sqrt{32} \cdot h$ et $h = \sqrt{32 - 8} = \sqrt{24}$

$S = 24 + \frac{1}{2} \underbrace{\sqrt{2^5} \cdot \sqrt{2^3 \cdot 3}}_{2^4 \cdot \sqrt{3}} = 24 + 8\sqrt{3}$

46.3

a) $V = \frac{1}{3} \cdot 5^2 \cdot 5 = \frac{125}{3}$

b)



c) $\square : 25$, $\triangledown : 2 \cdot \frac{1}{2} \cdot 5 \cdot 5 = 25$

$\triangledown : 2 \cdot \frac{1}{2} \cdot 5 \cdot 5\sqrt{2} = 25\sqrt{2}$

$S = 50 + 25\sqrt{2} =$

$= 25(2 + \sqrt{2})$

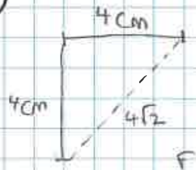
46.4 soustraction !

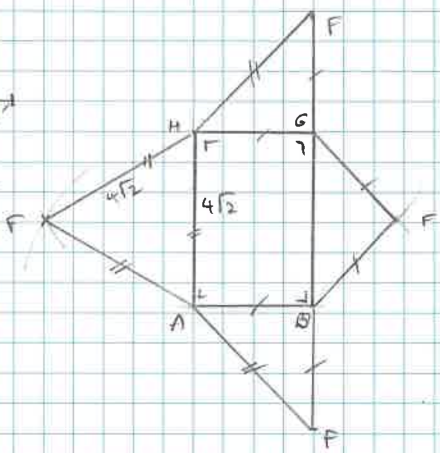
ou $V = 4^3 - \frac{1}{3} \cdot \frac{1}{2} \cdot 4^2 \cdot 4 - \frac{1}{2} \cdot 4^2 \cdot 4 = \frac{64}{3}$ ← + facile !

a) $V = \frac{1}{3} \underbrace{b}_{ABGH} h = \frac{1}{3} \cdot AB \cdot BG \cdot \underbrace{\Pi F}_{\text{milieu de } BG} = \frac{1}{3} \cdot 4 \cdot \underbrace{\sqrt{4^2+4^2}}_{\sqrt{32} = 4\sqrt{2}} \cdot \underbrace{\sqrt{4^2 - \frac{32}{4}}}_{\sqrt{8} = 2\sqrt{2}}$

$= \frac{1}{3} \cdot 4 \cdot 4\sqrt{2} \cdot 2\sqrt{2} = \frac{64}{3}$.

b)





c) surface :

$\square : 4 \cdot 4\sqrt{2}$

en tout ce sont les mêmes

$\triangledown : 2 \cdot \frac{1}{2} \cdot 4 \cdot 4 = 16$

$\triangleright : \frac{1}{2} \cdot 4\sqrt{2} \cdot \sqrt{4^2 - (2\sqrt{2})^2}$

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

$\triangleleft : \frac{1}{2} \cdot 4\sqrt{2} \cdot \sqrt{32 - (2\sqrt{2})^2}$

$= 2\sqrt{2} \cdot \sqrt{24} = 2\sqrt{2} \cdot 2\sqrt{6}$

$= 8\sqrt{3}$

$S = 16\sqrt{2} + 24 + 8\sqrt{3}$

46.5

a) $V = \frac{1}{3} \underbrace{b}_{BCD} \cdot \underbrace{h}_{CD} = \frac{1}{3} \cdot \frac{1}{2} \cdot 10^2 \cdot 10 = \frac{500}{3}$.

b) ΔBCD : isocèle, rectangle, $S = \frac{1}{2} \cdot 10^2 = 50$

ΔBCE : rectangle, $S = \frac{1}{2} \cdot 10 \sqrt{10^2 + 10^2} = 50\sqrt{2}$

ΔBDE : (isocèle), ↳ équilatéral ! $S = \frac{1}{2} \cdot 10\sqrt{2} \cdot \sqrt{\underbrace{(10\sqrt{2})^2 - (5\sqrt{2})^2}_{=200-50}} = 5\sqrt{2} \cdot 5\sqrt{6} = 50\sqrt{3}$

ΔCDE : rectangle, $S = \frac{1}{2} \cdot 10 \cdot 10\sqrt{2} = 50\sqrt{2}$

$S = 50(1 + 2\sqrt{2} + \sqrt{3})$

$V = 8^3 - \cancel{3}\,④ \cdot \frac{1}{3} \cdot \frac{1}{2} \cdot 8^2 \cdot 8 = 8^3 - \frac{1}{2} 8^3 = \frac{1}{2} 8^3$ 3C – GEOM. ②

$= 256$ + simple

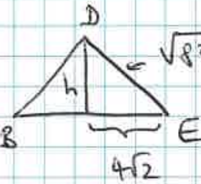
(correction)

46.6

a) $V = \frac{1}{3} \cdot \underbrace{b}_{BDE} \cdot h = \frac{1}{3} \cdot \frac{1}{2} \underbrace{\overbrace{\sqrt{8^2+8^2} \cdot 4\sqrt{6}}^{BDE \text{ est équilatéral}}}_{8 \cdot \sqrt{2} \cdot 4\sqrt{6}} \cdot \underbrace{h}_{\text{embêtant à calculer.}}$ 170.76 $(*)$

faute de copie

BDE :



$\sqrt{8^2+8^2} = 8\sqrt{2}$

$4\sqrt{2}$

donc $h = \sqrt{128 - 16 \cdot 2} = \sqrt{96} = \sqrt{2^5 \cdot 3}$
$= 4\sqrt{6}$

b) Ce sont 4 Δ équilatéraux

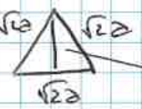
c) $S = 4 \cdot \frac{1}{2} \cdot 8\sqrt{2} \cdot 4\sqrt{6} = 2 \cdot 8 \cdot 2 \cdot 4 \cdot \sqrt{3} = 128\sqrt{3}$

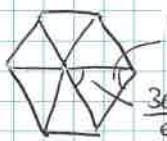
(*) Pour le volume, on soustrait au volume du cube celui des 3 tétraèdres : $8^3 - 3 \cdot \frac{1}{3} \cdot \frac{1}{2} \cdot 8 \cdot 8 \cdot 8 =$
$= 8^3 - \frac{1}{2} \cdot 8^3 = \frac{1}{2} \cdot 8^3 = 256.$

46.7

a) $IJ = \sqrt{a^2+a^2} = \sqrt{2a^2} = \sqrt{2} \cdot a$ (tout est symétrique)

Dans un hexagone régulier, les 6 Δ sont équilatéraux :





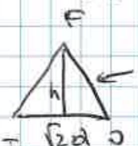
$\frac{180-60°}{2} = 60°$

$\frac{360°}{6} = 60°$

$h = \sqrt{2a^2 - \frac{2a^2}{4}} = \sqrt{\frac{8a^2 - 2a^2}{4}} = \frac{\sqrt{6} \cdot a}{2}$

$S = \frac{1}{2} \cdot \sqrt{2} \cdot a \cdot \frac{\sqrt{2} \cdot \sqrt{3} \cdot a}{2} = \frac{\sqrt{3}\, a^2}{2}$.

b) Aire totale $= 6 \cdot$ aire du $\Delta\, IJF + 6 \cdot \frac{\sqrt{3} a^2}{2}$



$\sqrt{4a^2 + a^2} = \sqrt{5} \cdot a$

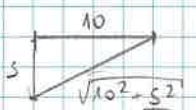
$h = \sqrt{5a^2 - \frac{2a^2}{4}} = \sqrt{\frac{20a^2 - 2a^2}{4}} = \frac{\sqrt{18} \cdot a}{2} = \frac{3\sqrt{2}\, a}{2}$

$\Rightarrow A = 6 \cdot \frac{1}{2} \cdot \sqrt{2} \cdot a \cdot \frac{3\sqrt{2}\, a}{2} + 6 \cdot \frac{\sqrt{3} a^2}{2} = 9a^2 + 3\sqrt{3}\, a^2$

correct

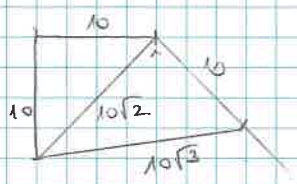
c) ?

46.8

a) 

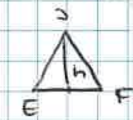
$FD = \sqrt{10^2+10^2+10^2} =$

$= 10\sqrt{3}$



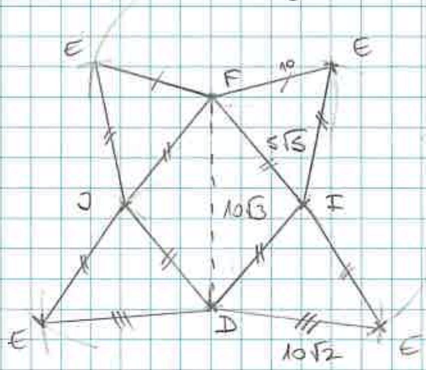
Aire losange : $\frac{1}{2} \cdot FD \cdot JI = \frac{1}{2}\, 10\sqrt{3} \cdot 10\sqrt{2}$

$= 50\sqrt{6}$

Aire ΔEFJ : 

$h = \sqrt{125-25} = 10$

donc $\frac{1}{2} \cdot 10 \cdot 10 = 50$



Aire ΔDEJ :

$h = \sqrt{125-50} = 5\sqrt{3}$

donc $\frac{1}{2} \cdot 10\sqrt{2} \cdot 5\sqrt{3} = 25\sqrt{6}$

b) Donc $A = 50\sqrt{6} + 100 + 50\sqrt{6} = 100(1+\sqrt{6})$

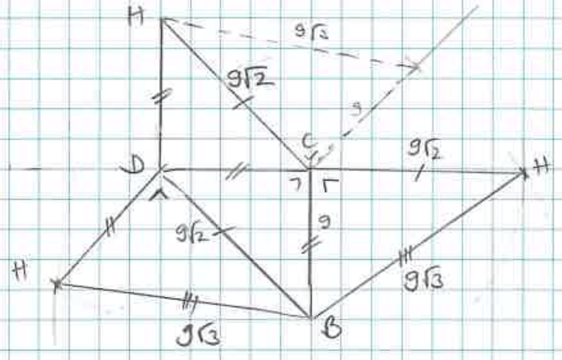
c) $V =$ Vol. du $\frac{1}{2}$-cube (FJDIHEAD) $-$ Vol(HIDE) $-$ Vol(AJDE)

$= \frac{1}{2} \cdot 10^3 - \frac{1}{3}\underbrace{\frac{1}{2}\, 10 \cdot 5}_{\text{base}} \cdot 10 - \frac{1}{3}\underbrace{\frac{1}{2}\, 10 \cdot 5}_{\text{base}}\, 10 = \frac{1000}{3}.$

46.9

46.10

a) 9cm



△ $\widehat{BCH} = 90°$

(côté $BC \perp$ au plan CGHD)

b) $\text{Aire} = \mathcal{A}(BCD) + \mathcal{A}(DCH) + \mathcal{A}(BCH) + \mathcal{A}(BDH) =$

$= \frac{1}{2}\cdot 9^2 + \frac{1}{2}\cdot 9^2 + \frac{1}{2}\cdot 9\cdot 9\sqrt{2} + \frac{1}{2} 9\cdot 9\sqrt{2} = 81 + 81\sqrt{2}$

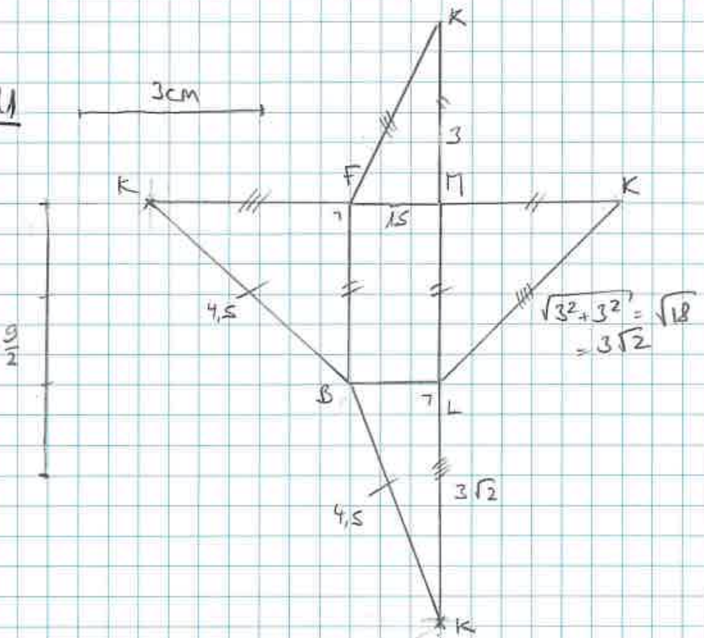
$= 81(1+\sqrt{2})$

c) $V = \frac{1}{3}\cdot\frac{1}{2}\cdot 9^2\cdot 9 = \frac{243}{2} = 121{,}5 \text{ cm}^3.$

46.11

3cm

a)



$BK = \sqrt{\frac{9}{4} + 18} = \sqrt{\frac{81}{4}} = \frac{9}{2}$

$FK = \sqrt{3^2 + \frac{3^2}{4}} =$

$= 3\sqrt{5/4} = \frac{3\sqrt{5}}{2} = \frac{\sqrt{45}}{2}$

$BL \perp LK$

$KF \perp FB$

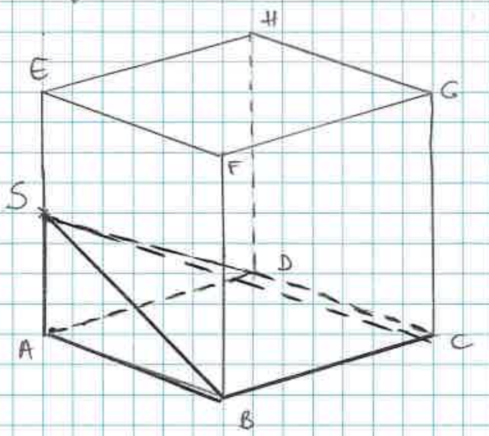
b) $\text{Aire} = \underbrace{3\cdot 1{,}5}_{FBLM} + \underbrace{\frac{1}{2}\cdot 3\cdot 3}_{\Delta KLM} + \underbrace{\frac{1}{2}\cdot 3\cdot 1{,}5}_{\Delta FMK} + \underbrace{\frac{1}{2}\cdot 1{,}5\cdot 3\sqrt{2}}_{\Delta BLK} + \underbrace{\frac{1}{2}\cdot\frac{3\sqrt{5}}{2}\cdot 3}_{\Delta KFB}$

$= \frac{45}{4} + \frac{9\sqrt{2}}{4} + \frac{9\sqrt{5}}{4} \approx 19{,}46 \text{ cm}^2.$

c) $V = \frac{1}{3}\cdot 3\cdot 1{,}5\cdot 3 = \frac{9}{2} = 4{,}5 \text{ cm}^3.$

46.12

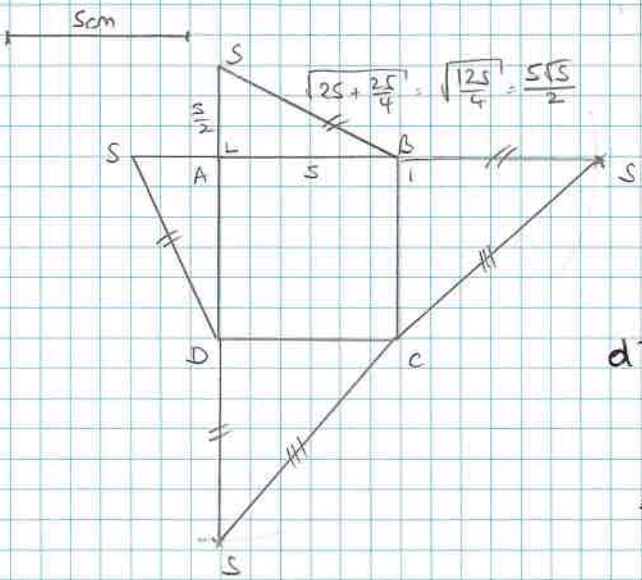
a)



b) $V = \frac{1}{3} \cdot 5^2 \cdot \frac{5}{2} = \frac{126}{6}$

$\simeq 20{,}83 \text{ cm}^3$

c)



BS ⊥ BC

DS ⊥ DC

d) Are : $5^2 + 2 \cdot \frac{1}{2} \cdot 5 \cdot \frac{5}{2} +$

$+ 2 \frac{1}{2} 5 \cdot \frac{5\sqrt{5}}{2} = \frac{75}{2} + \frac{25\sqrt{5}}{2}$

$\simeq 65{,}5 \text{ cm}^2.$