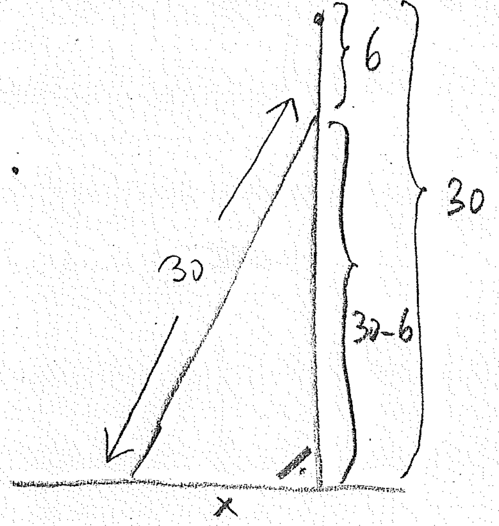
Ma1 Ch9 Pythagore Applications Corrigé

1.



Pythagore : $x^2 + (30-6)^2 = 30^2$

$x^2 + 24^2 = 30^2$

$x^2 = 30^2 - 24^2$

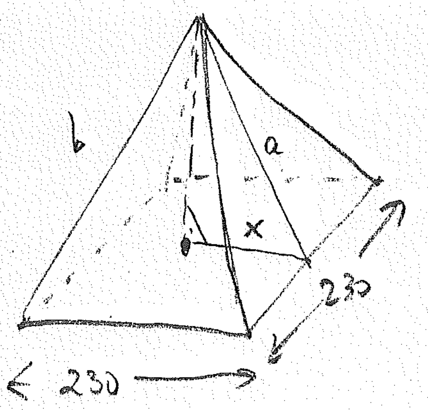
$x^2 = 324$

$\Leftrightarrow x = \pm\sqrt{324}$

$x = \pm 18$

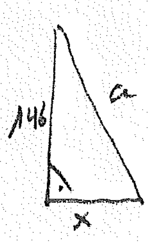
donc $x = 18$ unités

2.



On a : $x = \frac{230}{2} = 115$ m

donc :



Pythagore : $a^2 = 146^2 + x^2$

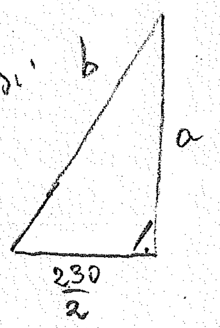
$a^2 = 146^2 + 115^2$

$a^2 = 34541$

$\Leftrightarrow a = \pm\sqrt{34541}$

donc $a \cong 185{,}85$ m

et aussi



Pythagore : $b^2 = a^2 + \left(\frac{230}{2}\right)^2$

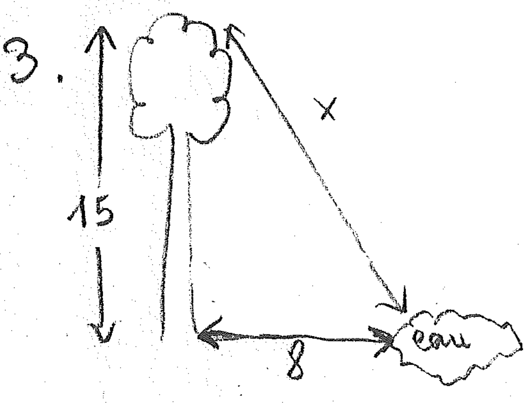
$b^2 = 34541 + 115^2$

$b^2 = 47766$

$\Leftrightarrow b = \pm\sqrt{47766}$

donc $b \cong 218{,}55$ m

3.



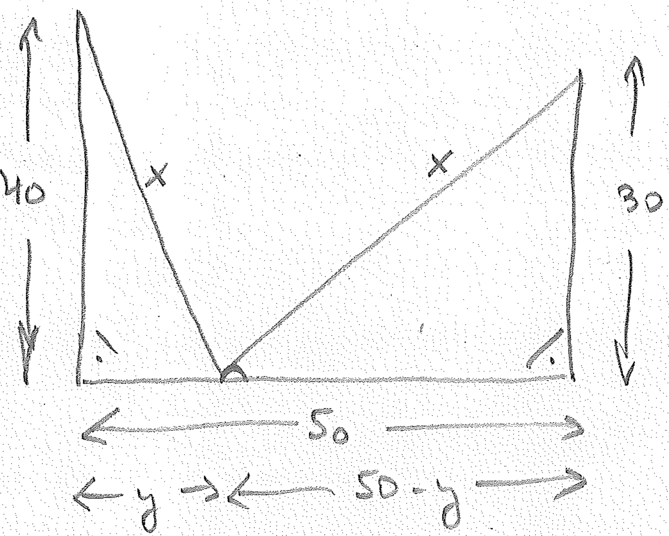
Pythagore : $x^2 = 15^2 + 8^2$

$x^2 = 289$

$\Leftrightarrow x = \pm 17$

donc $x = 17$ coudées

4.



Pythagore :

$$x^2 = 30^2 + (50-y)^2$$

et $x^2 = 40^2 + y^2$

donc :

$$30^2 + (50-y)^2 = 40^2 + y^2$$

$\Leftrightarrow 900 + 2500 - 100y + \cancel{y^2} = 1600 + \cancel{y^2}$

$\Leftrightarrow 1800 = 100y$

$\Leftrightarrow 18 = y$

et aussi : $50 - y = 50 - 18$
$= 32$

Donc les 2 distances cherchées sont 18 pas et 32 pas.

5. a) Pythagore : $\overline{OA}^2 + \overline{OB}^2 = \overline{AB}^2$

$16^2 + 12^2 = \overline{AB}^2$

$400 = \overline{AB}^2$

$\Leftrightarrow \overline{AB} = \pm\sqrt{400}$

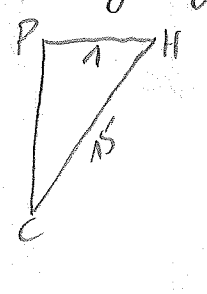
donc $\overline{AB} = 20$ m

b) Réciproque de Pythagore : $7{,}8^2 \overset{?}{=} 7{,}2^2 + 3^2$

$60{,}84 \overset{?}{=} 60{,}84$

donc l'angle est bien droit

c) Pythagore : $\overline{CH}^2 = \overline{CP}^2 + \overline{PH}^2$



$15^2 = \overline{CP}^2 + 1^2$

$\overline{CP}^2 = 224$

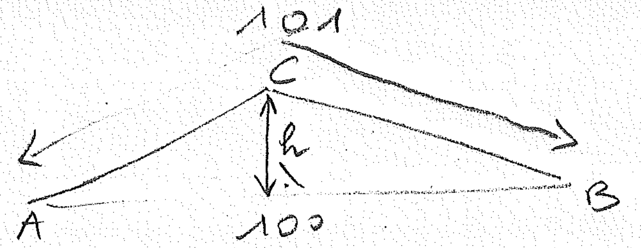
$\Leftrightarrow \overline{CP} = \pm\sqrt{224}$

$\overline{CP} \cong 14{,}9666$

$\overline{CH} - \overline{CP} \cong 0{,}03337$ (erreur absolue maximum)

$\dfrac{\overline{CH} - \overline{CP}}{\overline{CP}} \cong 0{,}0022297 \cong 0{,}22\,\%$ (erreur relative)

6.



Pythagore : $h^2 = \overline{CB}^2 - \left(\frac{AB}{2}\right)^2$

$h^2 = \left(\frac{101}{2}\right)^2 - \left(\frac{100}{2}\right)^2$

$h^2 = \frac{10201}{4} - \frac{10000}{4}$

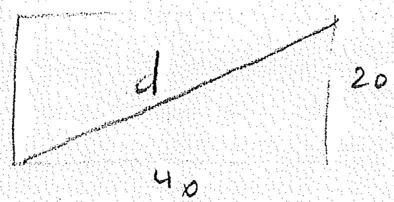
$h^2 = \frac{201}{4}$

$h^2 = 50{,}25$

$\Leftrightarrow \quad h = \pm\sqrt{50{,}25}$

donc $h \simeq 7{,}09$ m

8. fond la la boîte :



Pythagore : $d^2 = 40^2 + 20^2$

$d^2 = 1600 + 400$

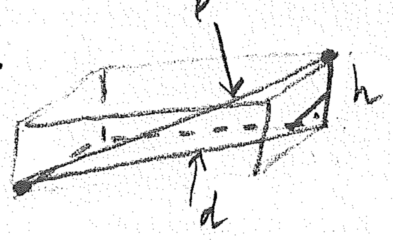
$d^2 = 2000$

$\Leftrightarrow \quad d = \pm\sqrt{2000}$

$d = \pm 20\sqrt{5}$

donc $d = 20\sqrt{5}$

boîte 3D :



Pythagore : $l^2 = h^2 + d^2$

$l^2 = 12^2 + (20\sqrt{5})^2$

$l^2 = 2144$

$\Leftrightarrow \quad l = \pm\sqrt{2144}$

$l = \pm\sqrt{16 \cdot 134}$

$l = \pm 4\sqrt{134}$

donc $l = 4\sqrt{134}$

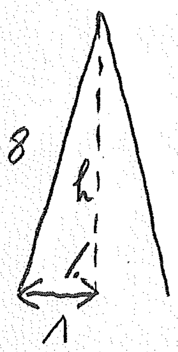
$l \simeq 46{,}3$ cm

9. a) $d = \sqrt{48{,}7^2 + 40} \simeq 63$ cm

b) $d = \sqrt{39{,}4^2 + 32{,}4^2} \simeq 51$ cm

c) $d = \sqrt{27{,}8^2 + 22{,}9^2} \simeq 36$ cm

10.



Pythagore : $8^2 = h^2 + 1^2$

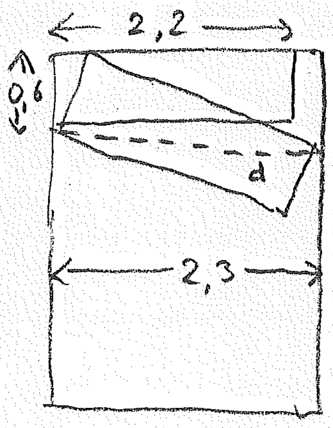
$h^2 = 63$

$\Leftrightarrow h = \pm\sqrt{63}$

donc $h = \sqrt{63}$

$h \cong 7{,}94$ m

11. Vu du plafond :



Pour pouvoir faire pivoter l'armoire, il faut que la diagonale de sa base soit $\leqslant 2{,}3$ m :

Pythagore : $d^2 = 0{,}6^2 + 2{,}2^2$

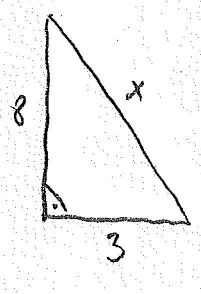
$d^2 = 5{,}2$

$\Leftrightarrow d = \pm\sqrt{5{,}2}$

$d \cong 2{,}28$ m

Ça passe !

12.



Pythagore : $x^2 = 8^2 + 3^2$

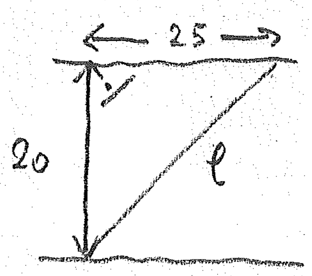
$x^2 = 73$

$\Leftrightarrow x = \pm\sqrt{73}$

donc $x = \sqrt{73}$

$\cong 8{,}54$ m

13.



Pythagore : $\ell^2 = 20^2 + 25^2$

$\ell^2 = 1025$

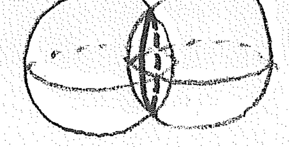
$\Leftrightarrow \ell = \pm\sqrt{1025}$

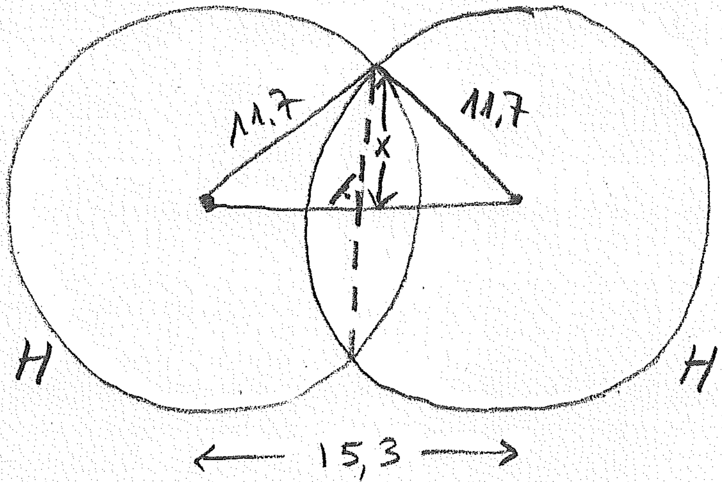
$\ell = \pm 5\sqrt{41}$

donc $\ell = 5\sqrt{41}$

$\cong 32$ m

14. a)





Pythagore : $11{,}7^2 = x^2 + \left(\frac{15{,}3}{2}\right)^2$

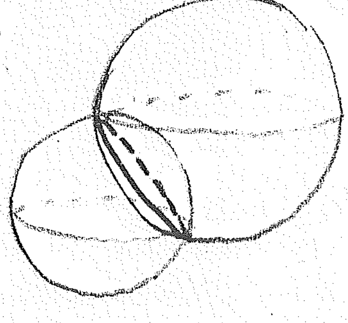
$$x^2 = 11{,}7^2 - 7{,}65^2$$

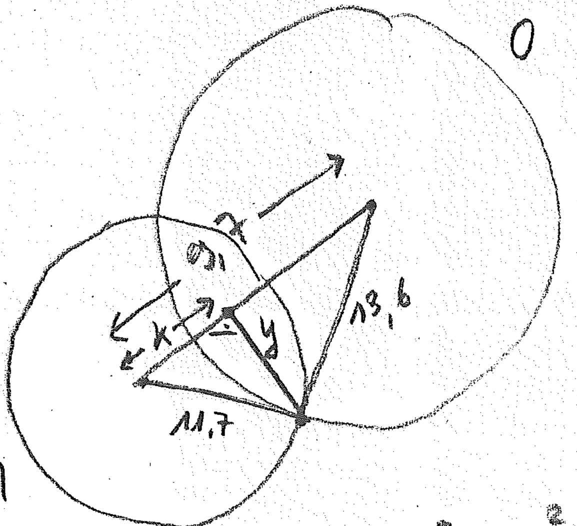
$$x^2 = 78{,}3675$$

$$\Leftrightarrow x = \pm\sqrt{78{,}3675}$$

$$x \cong 8{,}85 \text{ nm}$$

b)





Pythagore : $11{,}7^2 = y^2 + k^2$ et $13{,}6^2 = y^2 + (9{,}7-k)^2$

$$y^2 = 11{,}7^2 - k^2 \qquad y^2 = 13{,}6^2 - (9{,}7-k)^2$$

donc $11{,}7^2 - k^2 = 13{,}6^2 - (9{,}7-k)^2$

$$11{,}7^2 - k^2 = 13{,}6^2 - (9{,}7^2 - 19{,}4k + k^2)$$

$$11{,}7^2 - \cancel{k^2} = 13{,}6^2 - 9{,}7^2 + 19{,}4k - \cancel{k^2}$$

$$k \cong 2{,}37 \text{ nm}$$

d'où $y^2 = 11{,}7^2 - k^2$

$$\cong 11{,}7^2 - (2{,}37)^2 \cong 131{,}27$$

donc $y \cong 11{,}46$ nm