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RÉVISION

EXERCICE : Révisions lentilles épaisses.

Deux dioptries

$$D_1: + \overline{S_1F_1} = -4 \text{ cm}$$

$$\overline{S_1F'_1} = 6 \text{ cm}$$

$$D_2: + \overline{S_2F_2} = -6 \text{ cm}$$

$$\overline{S_2F'_2} = 5,3 \text{ cm}$$

$$\overline{S_1S_2} = 7 \text{ cm}$$

$$n_1 = 1,525$$

1. Vergence de chaque dioptrie :

$$D_1 = \frac{n_1}{\overline{S_1F'_1}} = \frac{1,525}{6 \cdot 10^{-2}} = +25,42 \text{ D}$$

$$D_2 = -\frac{n_1}{\overline{S_2F_2}} = -\frac{1,525}{(-6 \cdot 10^{-2})} = +25,42 \text{ D}$$

Rq: D_1 : dioptrie convergente ; le centre C_1 est dans le milieu le + réfringent

D_2 : dioptrie convergente ; le centre C_2 est dans le milieu le + réfringent.

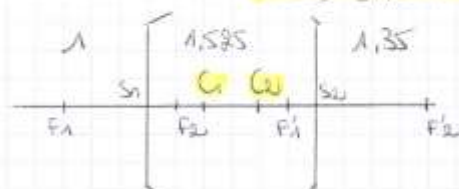
2. Indices d'entrée et de sortie :

$$D_1 = -\frac{n_2}{\overline{S_1F_1}} \text{ alors } n_2 = -D_1 \times (\overline{S_1F_1}) = -25,42 \times (-4 \cdot 10^{-2})$$

$$n_2 = 1$$

$$D_2 = \frac{n_3}{\overline{S_2F'_2}} \text{ alors } n_3 = D_2 \times (\overline{S_2F'_2}) = 25,42 \times (5,3 \cdot 10^{-2})$$

$$n_3 = 1,35$$



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$$4. \quad \overline{AB} = 20 \text{ mm} \quad \overline{SA} = -6 \text{ cm}.$$

$$AB \xrightarrow{S_1} A_1B_1 \xrightarrow{S_2} A'B'$$

$$+ \quad \overline{F_1A} \times \overline{F_1A_1} = f_1 \times f'_1$$

$$\text{avec } \overline{F_1A} = \overline{F_1S_1} + \overline{S_1A} = 4 - 6 = -2 \text{ cm}.$$

$$\overline{F_1A_1} = \frac{-4 \times 6}{-2} = 12 \text{ cm}.$$

$$\begin{aligned} \alpha_{t1} &= \frac{\overline{A_1B_1}}{\overline{AB}} = -\frac{f_1}{\overline{F_1A}} = -\frac{\overline{F_1A_1}}{f'_1} \\ &= -\frac{-4}{-6} = -0,67. \end{aligned}$$

$$\overline{A_1B_1} = \alpha_{t1} \times \overline{AB} = -0,67 \times 20 = -13,33 \text{ mm}.$$

$$+ \quad \overline{F_2A_1} \times \overline{F_2A'} = f_2 \times f'_2$$

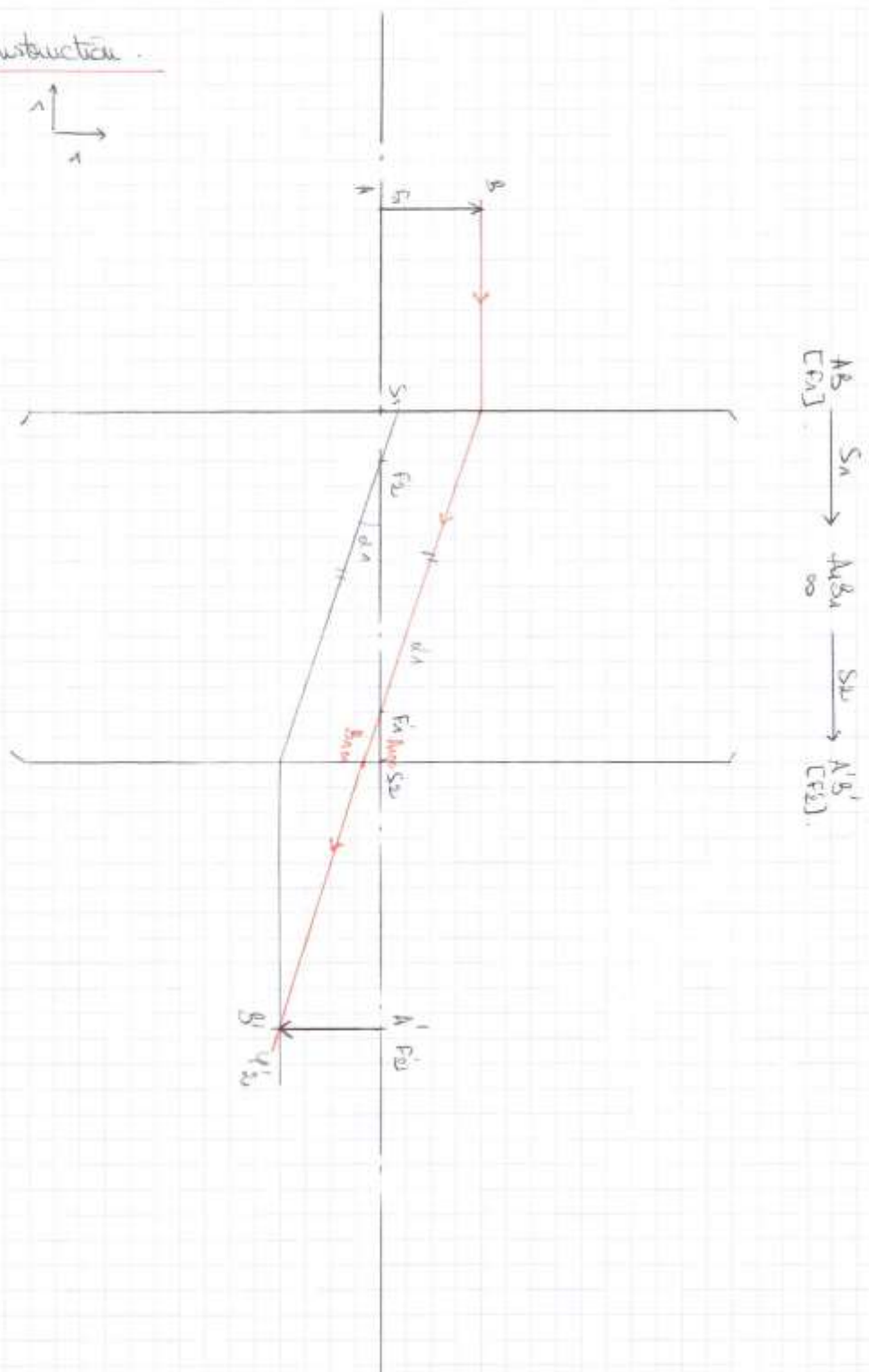
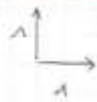
$$\begin{aligned} \text{avec } \overline{F_2A_1} &= \overline{F_2S_2} + \overline{S_2S_1} + \overline{S_1F_1} + \overline{F_1A_1} \\ &= 6 - 7 + 6 + 12 = 17 \text{ cm}. \end{aligned}$$

$$\overline{F_2A'} = \frac{-6 \times 5,3}{17} = -1,87 \text{ cm}.$$

$$\begin{aligned} \alpha_{t2} &= \frac{\overline{A'B'}}{\overline{A_1B_1}} = -\frac{f_2}{\overline{F_2A_1}} = -\frac{\overline{F_2A'}}{f'_2} \\ &= -\frac{-6}{17} = 0,35 \end{aligned}$$

$$\overline{A'B'} = \alpha_{t2} \times \overline{A_1B_1} = 0,35 \times (-13,33) = -4,71 \text{ mm}.$$

5. Construction.



EXERCICES : Révisons lentilles minces et doublet.

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EXERCICE 1:

1 oculaire l_1 et l_2 (4;3;2). $f_{oc} = 48 \text{ mm}$.

1- Calcul de f'_1 , f'_2 et e .

$$\frac{f'_1}{4} = \frac{e}{3} = \frac{f'_2}{2} = a.$$

$$\begin{cases} f'_1 = 4a \\ e = 3a \\ f'_2 = 2a \end{cases}$$

$$\begin{aligned} \text{avec } f_{oc} &= \frac{f'_1 \times f'_2}{f'_1 + f'_2 - e} = \frac{4a \times 2a}{4a + 2a - 3a} \\ &= \frac{8a^2}{3a} = \frac{8}{3}a. \end{aligned}$$

$$\frac{8}{3}a = 48$$

$$a = 18 \text{ mm.}$$

$$\begin{cases} f'_1 = 4 \times 18 = 72 \text{ mm} \\ e = 3 \times 18 = 54 \text{ mm} \\ f'_2 = 2 \times 18 = 36 \text{ mm} \end{cases}$$

$$f_{oc} = -f'_{oc} = -48 \text{ mm.}$$

2- Position des plans principaux.

$$+ \quad l_{H'oc} = e \times \frac{f'_{oc}}{f'_2} = 54 \times \frac{48}{36} = 72 \text{ mm.} \quad F'_1 \equiv H'_{oc}.$$

$$+ \quad l_{Hoc} = -e \times \frac{f_{oc}}{f'_1} = -54 \times \frac{48}{72} = -36 \text{ mm.} \quad F_2 \equiv H_{oc}.$$

Distances frontales:

$$+ \quad l_{Foc} = l_{Hoc} + H_{oc}F_{oc} = 72 - 48 = 24 \text{ mm}$$

$$+ \quad l_{F'oc} = l_{H'oc} + H'_{oc}F'_{oc} = -36 + 48 = 12 \text{ mm}$$

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EXERCICE 2 : Objectif photographique :Doublet L_1 et L_2 (8,5;-4). $L_F \text{ Foc} = 75 \text{ mm}$

$$1- \frac{d'_1}{8} = \frac{e}{5} = \frac{d'_2}{-4} = a$$

$$\begin{cases} d'_1 = 8a \\ e = 5a \\ d'_2 = -4a \end{cases}$$

$$f'_{\text{ob}} = \frac{d'_1 \times d'_2}{d'_1 + d'_2 - e} = \frac{8a \times (-4a)}{8a - 4a - 5a} = \frac{-32a^2}{-a} = 32a$$

$$L_F \text{ Foc} = L_H \text{ Foc} + H \text{ ob Foc}$$

$$\text{avec } L_H \text{ Foc} = -e \times \frac{f'_{\text{ob}}}{d'_1} = -5a \times \frac{32a}{8a} = -20a$$

$$L_F \text{ Foc} = -20a + 32a = 12a \quad \text{et } L_F \text{ Foc} = 75 \text{ mm}$$

$$\text{alors } 12a = 75$$

$$a = 6,25 \text{ mm}$$

$$\begin{cases} d'_1 = 8 \times 6,25 = 50 \text{ mm} \end{cases}$$

$$\begin{cases} e = 5 \times 6,25 = 31,25 \text{ mm} \end{cases}$$

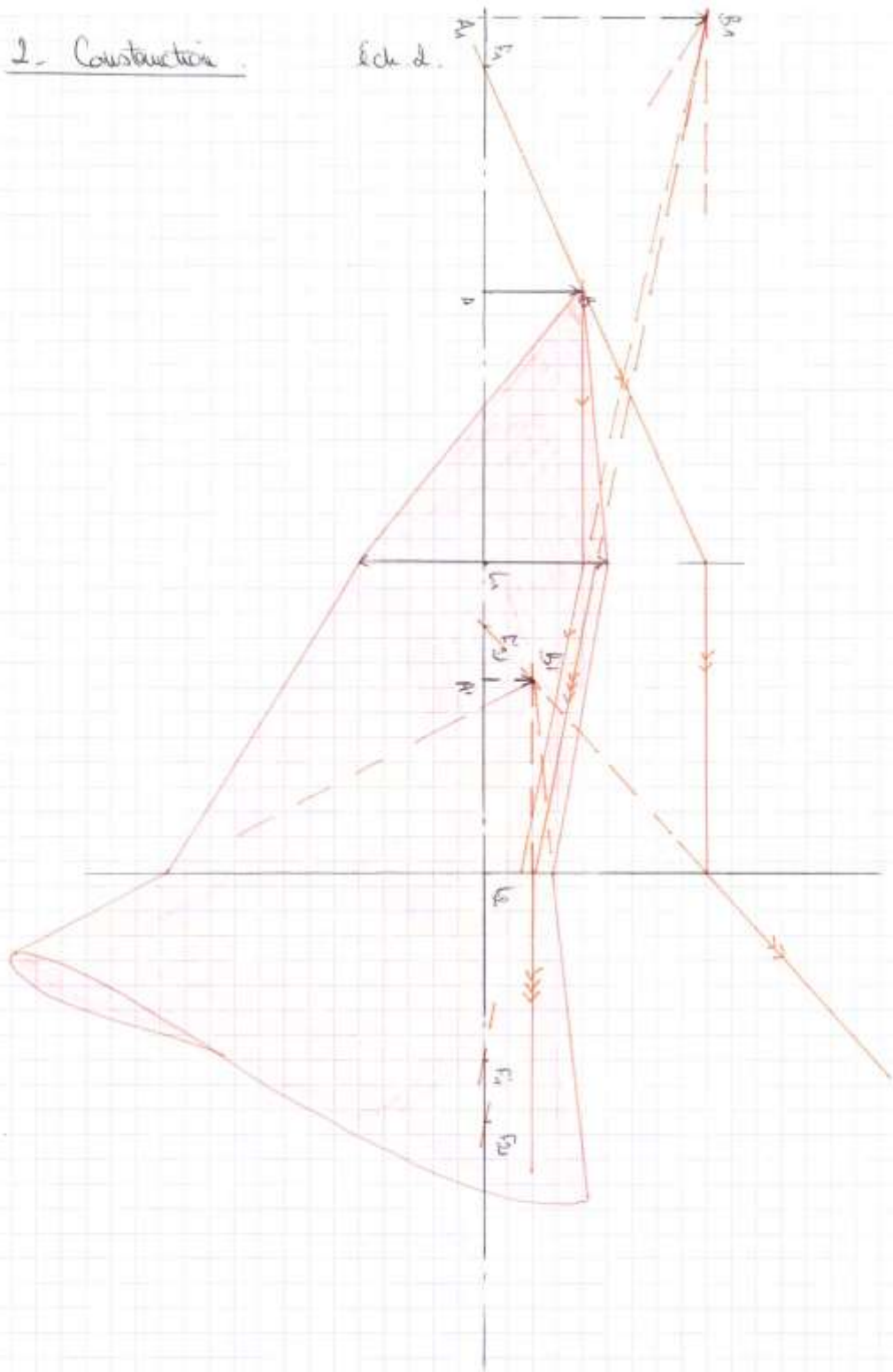
$$\begin{cases} d'_2 = -4 \times 6,25 = -25 \text{ mm} \end{cases}$$

$$f'_{\text{ob}} = 32 \times 6,25$$

$$= 200 \text{ mm}$$

2. Construction

Éch. 2.



AB $\xrightarrow{U_1}$ A'B' $\xrightarrow{U_2}$ A''B''