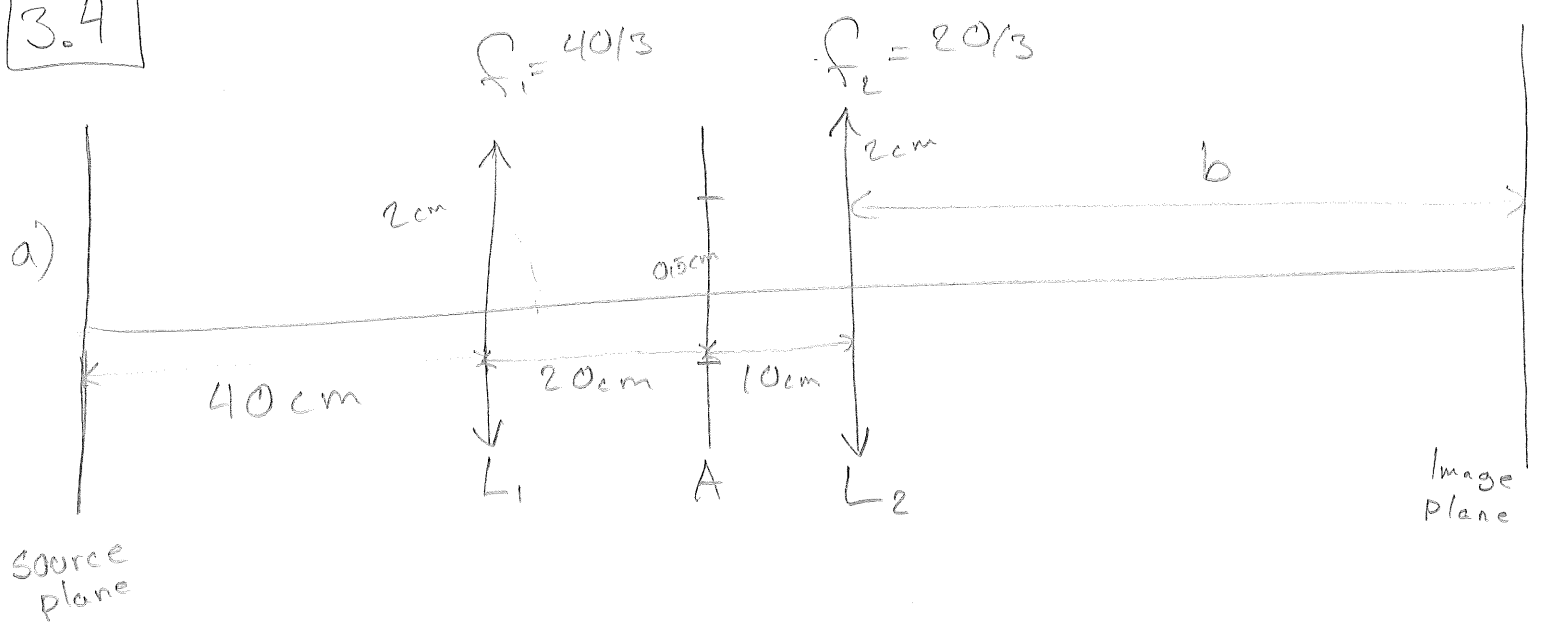


3.4

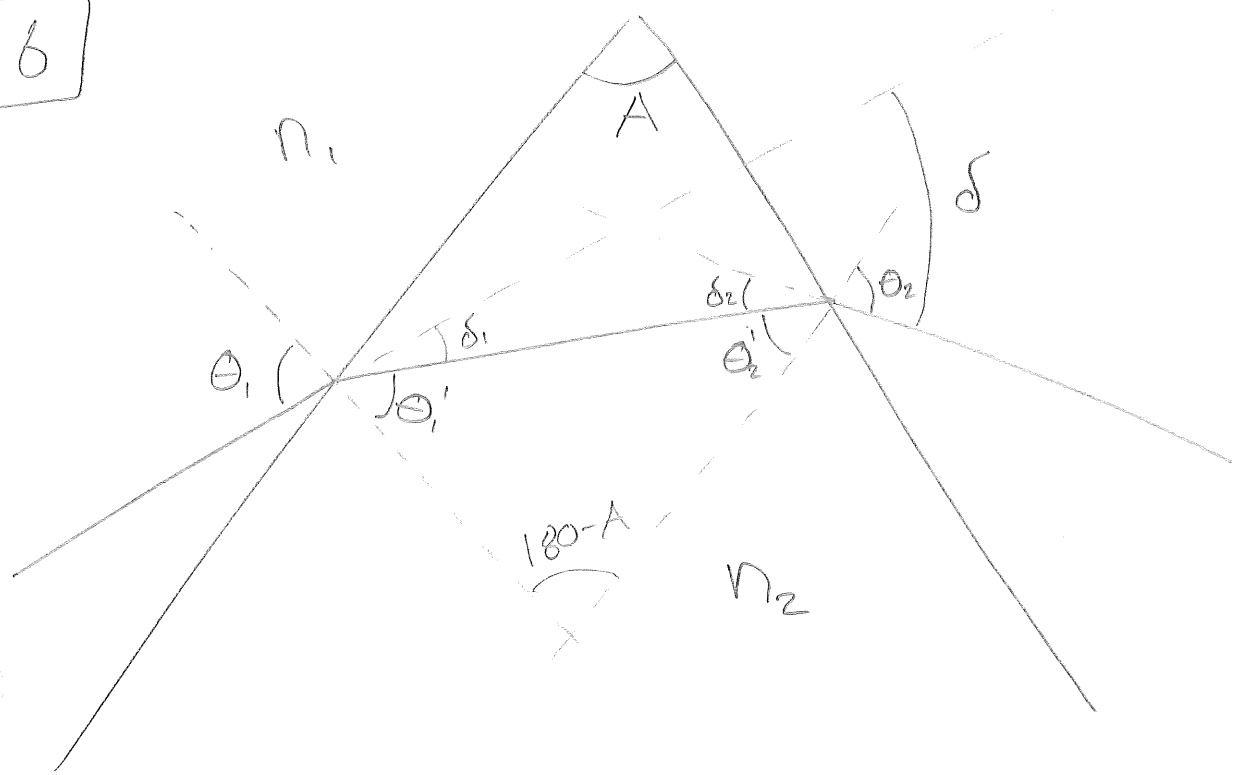


b) $\frac{1}{f_2} = \frac{1}{10} + \frac{1}{b} \Rightarrow b = 20 \text{ cm}$

c) A kan ej vara AS

Overkurs -

3.6



$$\delta = \delta_1 + \delta_2$$

$$n_1 \sin \theta_1 = n_2 \sin \theta'_1$$

$$n_2 \sin \theta'_2 = n_1 \sin \theta_2 \Rightarrow \theta_2 =$$

$$\theta_1 = \delta_1 + \theta'_1, \quad \theta_2 = \delta_2 + \theta'_2$$

\Updownarrow

$$\delta_1 = \theta_1 - \theta'_1, \quad \delta_2 = \theta_2 - \theta'_2$$

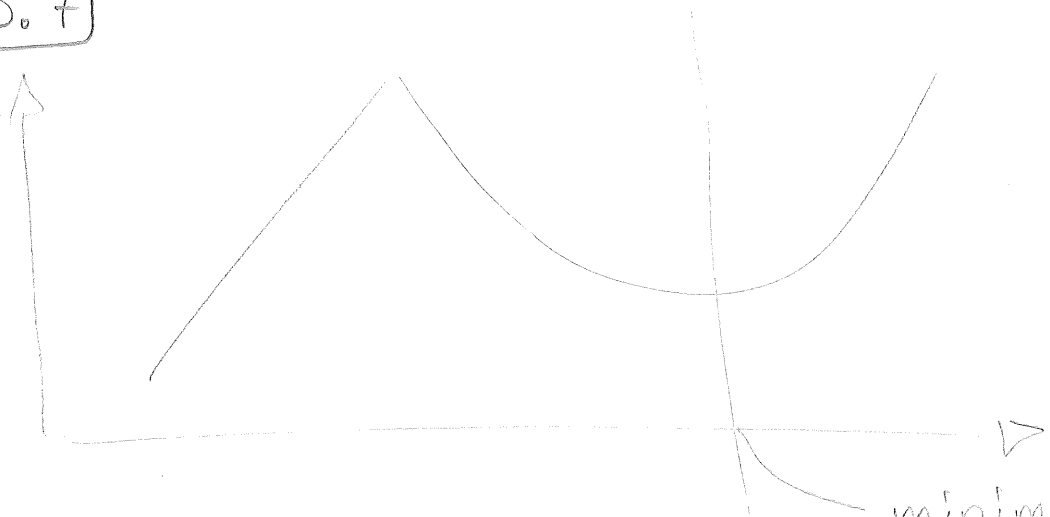
$$\theta'_1 + \theta'_2 + (180 - A) = 180 \Rightarrow \theta'_1 + \theta'_2 = A$$

$$\delta = \delta_1 + \delta_2 = \theta_1 + \theta_2 - (\theta'_1 + \theta'_2) = \theta_1 + \theta_2 - A =$$

$$= \theta_1 - A + \arcsin \left(\frac{n_2}{n_1} \sin(\theta'_2) \right) =$$

$$= \theta_1 - A + \arcsin \left(\frac{n_2}{n_1} \sin(A - \theta'_1) \right) = \theta_1 - A + \arcsin \left(\frac{n_2}{n_1} \sin \left(A - \arcsin \left(\frac{n_1}{n_2} \sin \theta_1 \right) \right) \right)$$

3.7



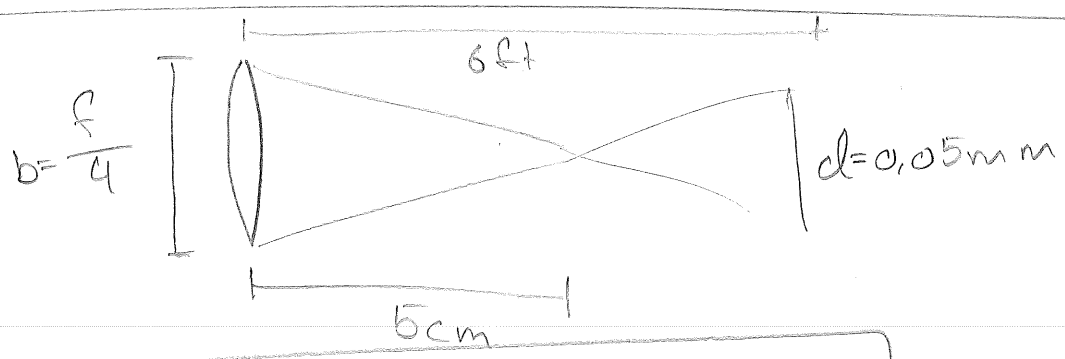
minimum deviation,
 $= 49,685^\circ$

$\Rightarrow \delta_{n=1,525} = 39,37^\circ$ (formel på förra sidan)

$\delta_{n=1,535} = 40,2623^\circ$

$\delta_{n=1,535} - \delta_{n=1,525} = 0,89285^\circ \approx 53'$

3.17



Depth of field = $\frac{2 A d s_0 (s_0 - f) f^2}{f^4 - A^2 d^2 s_0^2}$

RÄTT I
 RÄKNAREN

3.20

a) $f = 50\text{mm}$ $\frac{f}{D} = 1,8$

$\Rightarrow D = \frac{50}{1,8} = \boxed{27,8\text{mm}}$

Arean av bländaren:

$A = \pi \cdot \left(\frac{27,8}{2}\right)^2 = \underline{608\text{mm}^2}$

För att minska irradiansen till 1/3 minskar vi arean till 1/3.

$\frac{608}{3} = 202\text{mm}^2 \Rightarrow \text{radie} = \sqrt{\frac{202}{\pi}} = 8\text{mm}$

$r = 8\text{mm} \Rightarrow D = 16\text{mm} \Rightarrow \frac{f}{D} = \frac{50}{16} = \boxed{3,125}$

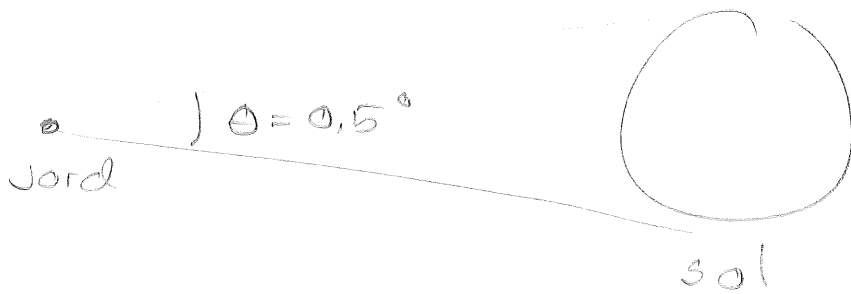
$\frac{202}{3} = 67\text{mm}^2 \Rightarrow \text{radie} = \sqrt{\frac{67}{\pi}} = 4,6\text{mm}$

$r = 4,6\text{mm} \Rightarrow D = 9,2\text{mm} \Rightarrow \frac{f}{D} = \frac{50}{9,26} = \boxed{5,4}$

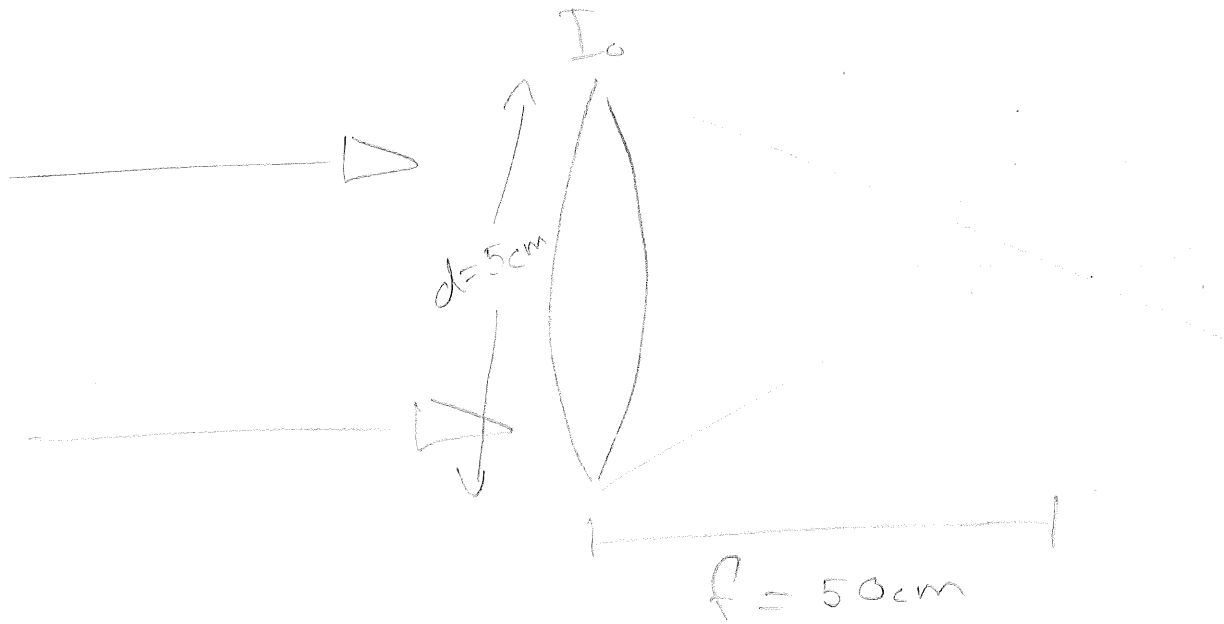
$\frac{67}{3} = 22,3 \Rightarrow \text{radie} = \sqrt{\frac{22,3}{\pi}} = 2,66\text{mm}$

$r = 2,66\text{mm} \Rightarrow D = 5,33\text{mm} = \frac{f}{D} = \frac{50}{5,33} = \boxed{9,38}$

3.18

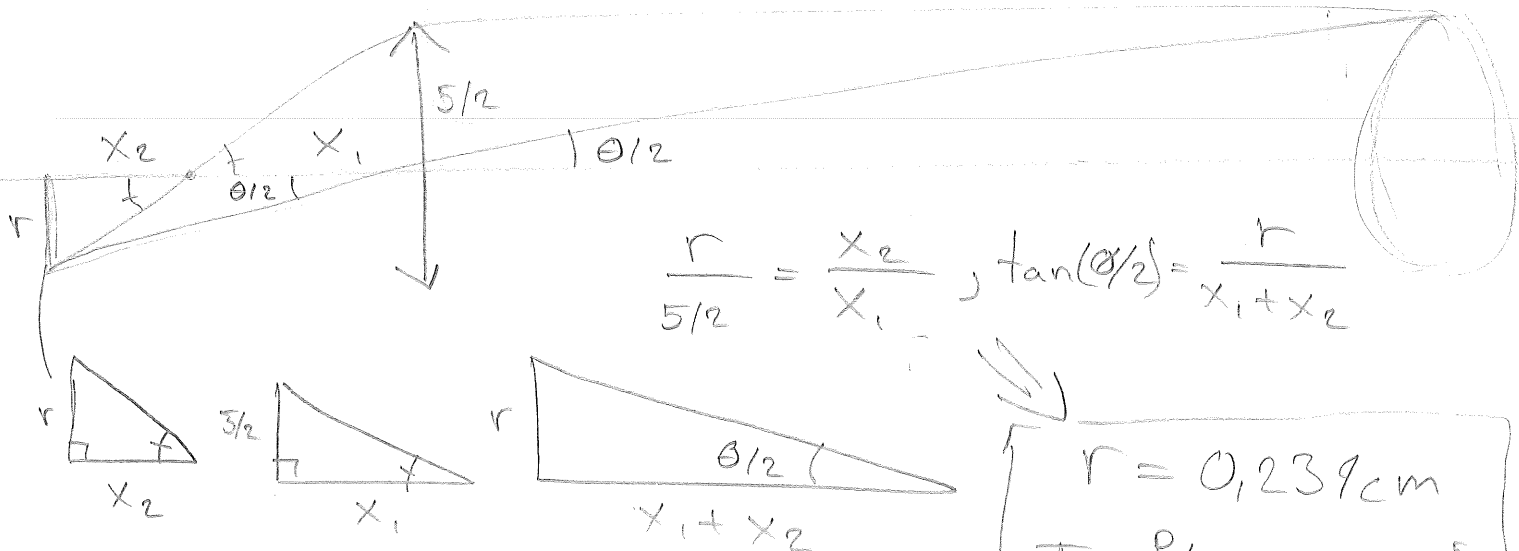


$$I = 1000 \text{ W/m}^2$$



$$P = I \cdot \left(\frac{51 \text{ r}_0^2 [\text{m}^2]}{1 \text{ m}^2} \right) = 1000 \cdot 51 \cdot 0,025 = 1,9635 \text{ W}$$

$$P = I \cdot A$$



$$\frac{r}{5/2} = \frac{x_2}{x_1}, \quad \tan(\theta/2) = \frac{r}{x_1 + x_2}$$

$$r = 0,239 \text{ cm}$$

$$I = \frac{P}{51 \text{ r}^2} = 1,09 \cdot 10^5 \text{ W/m}^2$$

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