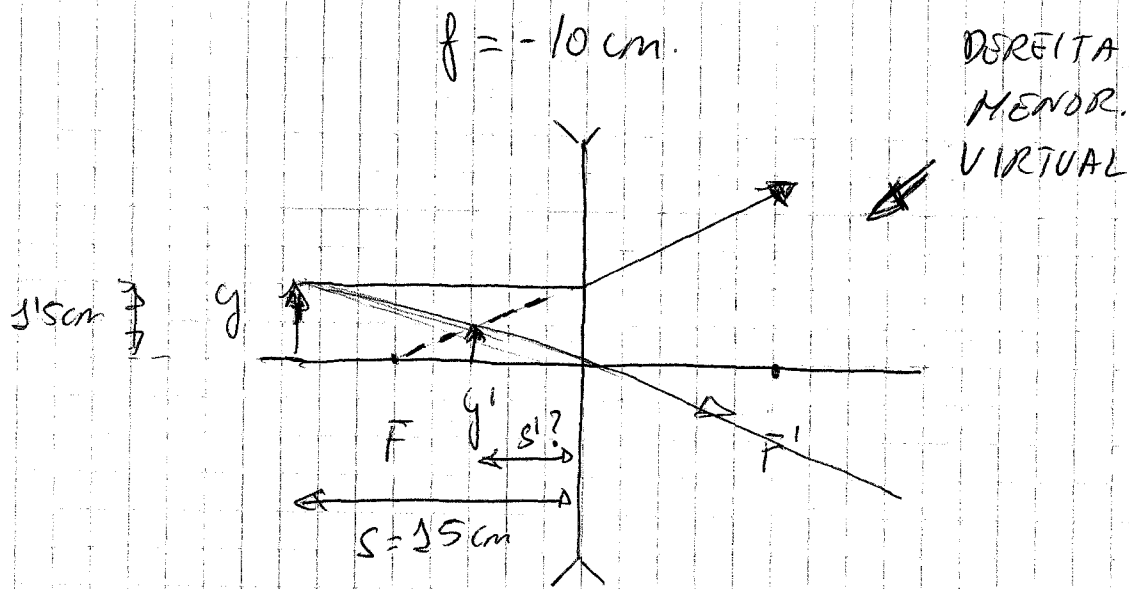


9.-



$$\frac{1}{S'} - \frac{1}{S} = \frac{1}{f} \Rightarrow \frac{1}{S'} = \frac{1}{f} + \frac{1}{S} \Rightarrow S' = \frac{1}{\frac{1}{f} + \frac{1}{S}}$$

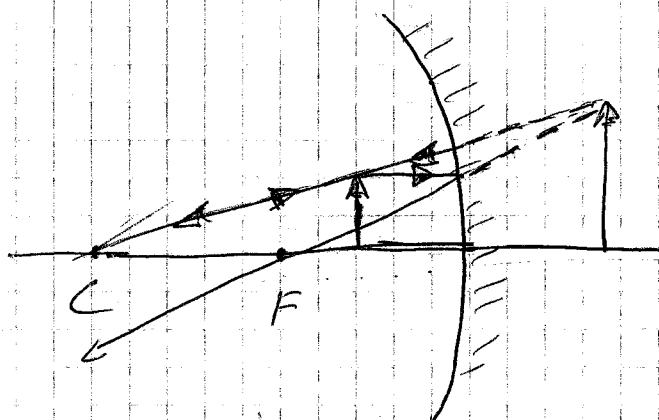
$$S' = \frac{1}{\frac{1}{-10 \text{ cm}} + \frac{1}{-15 \text{ cm}}} \quad S' = -6 \text{ cm.}$$

$$\beta = \frac{y'}{y} = \frac{S'}{S} \Rightarrow y' = y \frac{S'}{S} = 1.5 \text{ cm.} \frac{(-6 \text{ cm})}{(-15 \text{ cm})}$$

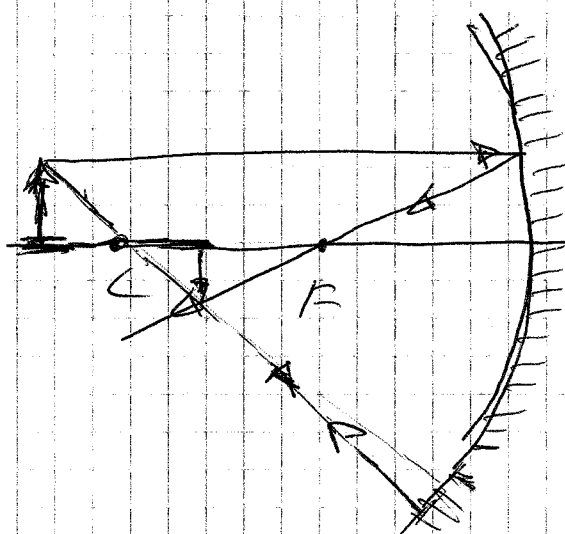
$$y' = 0.6 \text{ cm}$$

c) now.

50.-

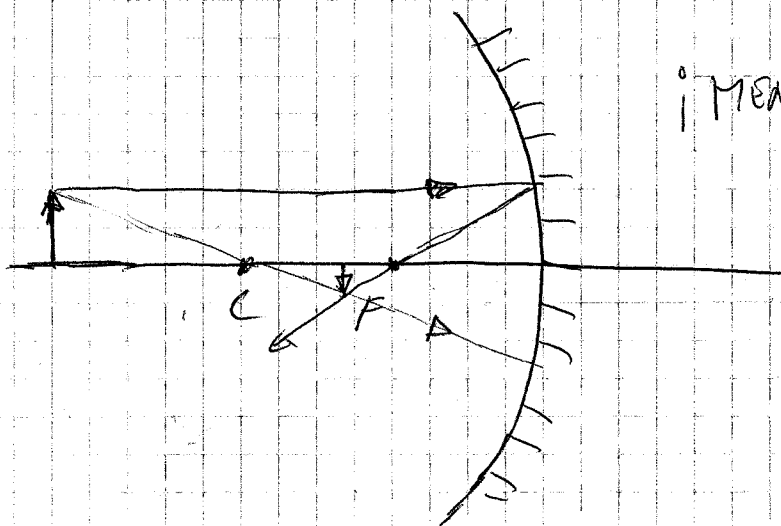


DEREITA
MAIOR
VIRTUAL

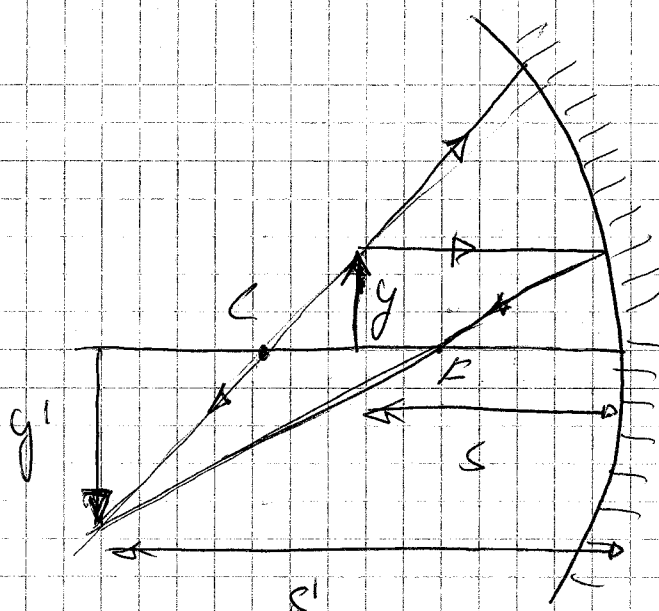


MEHOR ?

AMPLIAR A DISTANCIA



! MEHOR !



MAIOR

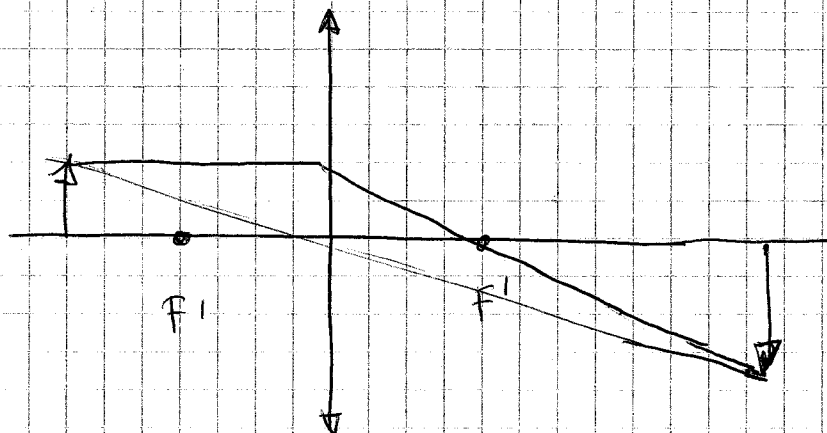
$$\frac{y'}{y} = -\frac{s'}{s} \quad \frac{1}{s'} + \frac{1}{s} = \frac{1}{f}$$

$$|y'| = |2y| \quad \text{CUIDADO} \quad |s'| = |2s|$$

$$\frac{1}{2s} + \frac{1}{s} = \frac{1}{f} \Rightarrow \frac{3}{2s} = \frac{1}{f}$$

$$s = \frac{3}{2}f; \quad s = \frac{3}{2} \left(-\frac{15\text{cm}}{2} \right) = -11,25\text{cm}$$

b)



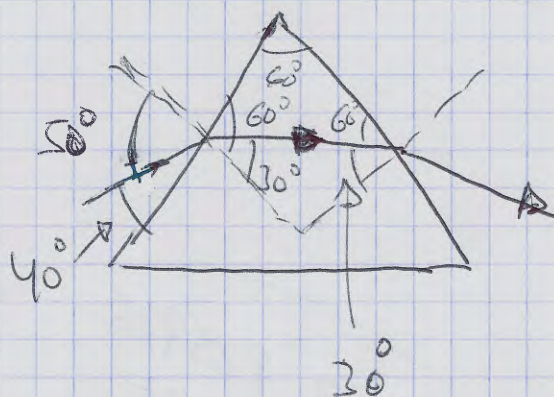
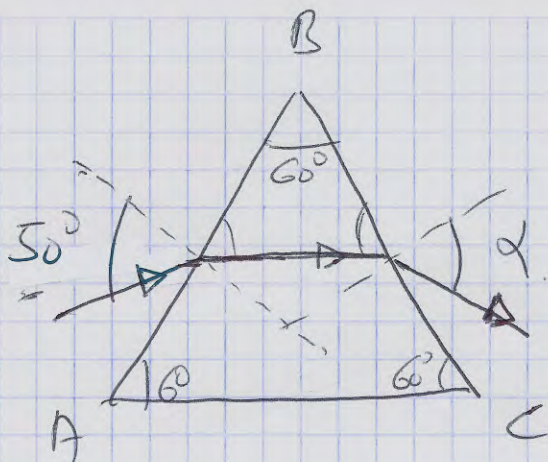
$$|y'| = |2y|$$

$$s' = |2s|$$

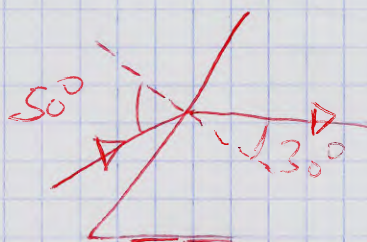
$$\frac{1}{f'} = \frac{1}{s'} + \frac{1}{s}; \quad \frac{1}{f'} = \frac{1}{2s} + \frac{1}{s}; \quad \frac{1}{f'} = \frac{3}{2s} \Rightarrow s = \frac{3}{2}f'$$

$$s = \frac{3}{2} 7,5\text{cm} = 11,25\text{cm}; \quad \text{com sinal} \quad s = -11,25\text{cm}$$

22.-



FACENDO UMA PARTE

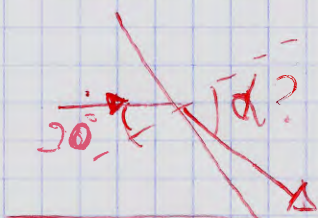


$$\frac{\sin i}{\sin r} = \frac{n_{\text{PRISMA}}}{n_{\text{AIRE}}}$$

$$\frac{\sin i}{\sin r} = n_{\text{PRISMA}}$$

$$n_{\text{PRISMA}} = \frac{\sin 50^\circ}{\sin 30^\circ} \Rightarrow n_{\text{PRISMA}} = 1,53$$

A SAÍDA DO RAIO

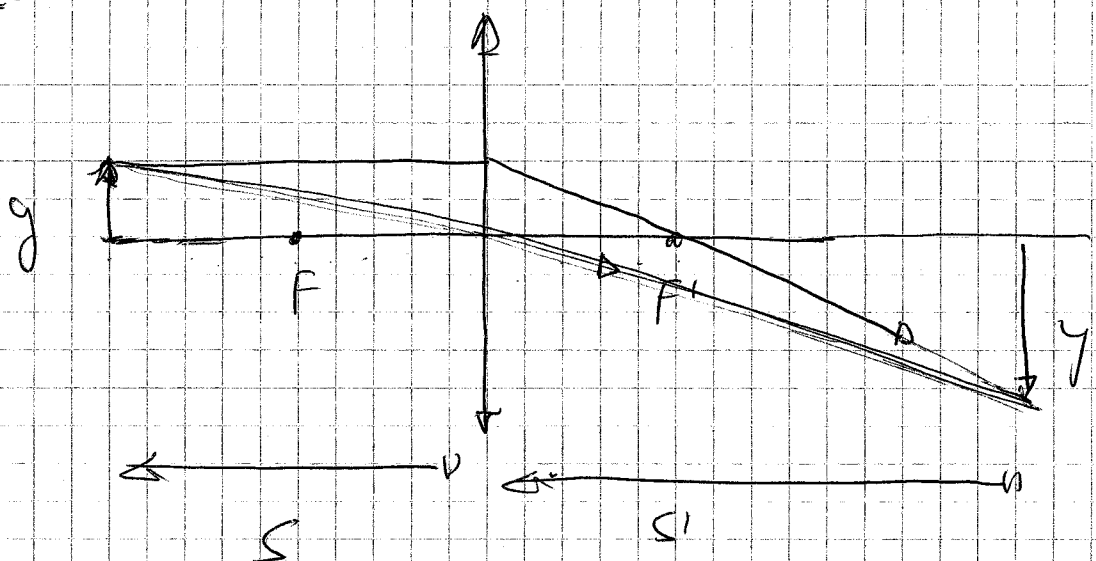


$$\frac{\sin i}{\sin r} = \frac{n_{\text{AIRE}}}{n_{\text{PRISMA}}}, \quad \frac{\sin 30^\circ}{\sin \alpha} = \frac{1}{1,53}$$

$$\alpha = 50^\circ$$

12-

a)



$$y = 3 \text{ cm}$$

$$s = -20 \text{ cm}$$

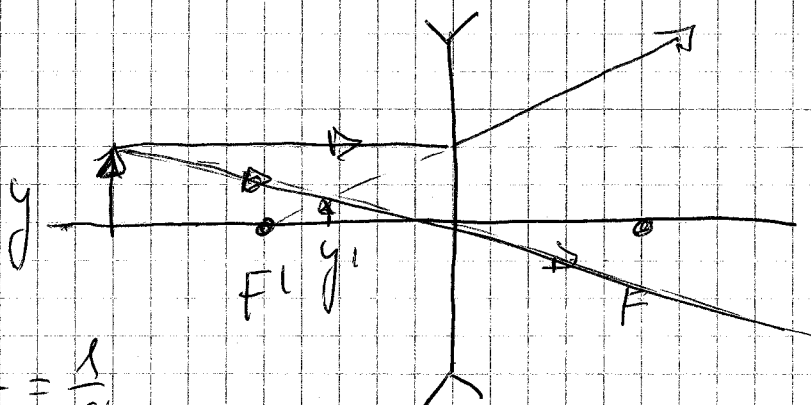
$$f' = +10 \text{ cm}$$

$$\frac{1}{s'} - \frac{1}{s} = \frac{1}{f'} \Rightarrow s' = \frac{1}{\frac{1}{f'} + \frac{1}{s}}$$

$$s' = \frac{1}{\frac{1}{10 \text{ cm}} + \frac{1}{-20 \text{ cm}}} \Rightarrow s' = 20 \text{ cm}$$

$$y' = y \frac{s'}{s} = 3 \text{ cm} \cdot \frac{20 \text{ cm}}{-20 \text{ cm}} = -3 \text{ cm}$$

b)



$$f' = -10 \text{ cm}$$

$$y = 3 \text{ cm}$$

$$s = -20 \text{ cm}$$

$$\frac{1}{s'} - \frac{1}{s} = \frac{1}{f'}$$

$$s' = \frac{1}{\frac{1}{f'} + \frac{1}{s}} ; s' = \frac{1}{\frac{1}{-10 \text{ cm}} + \frac{1}{-20 \text{ cm}}} \Rightarrow s' = -6.7 \text{ cm}$$

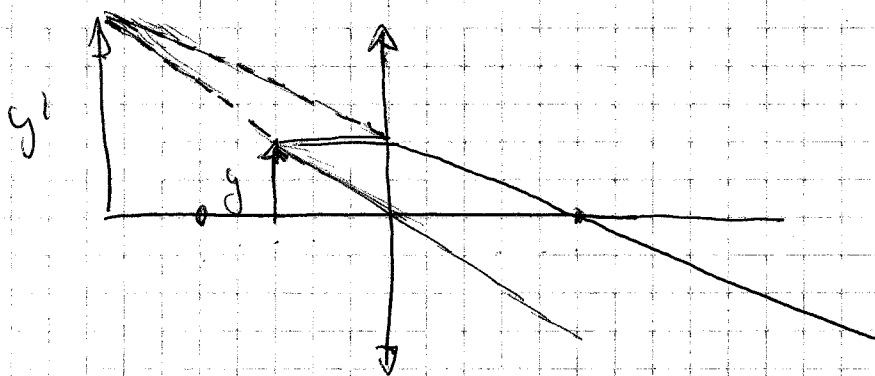
$$y' = y \frac{s'}{s} \Rightarrow y' = 3 \text{ cm} \cdot \frac{-6.7 \text{ cm}}{-20 \text{ cm}} = 2 \text{ cm}$$

13.- ^{??} distancia 2'7m

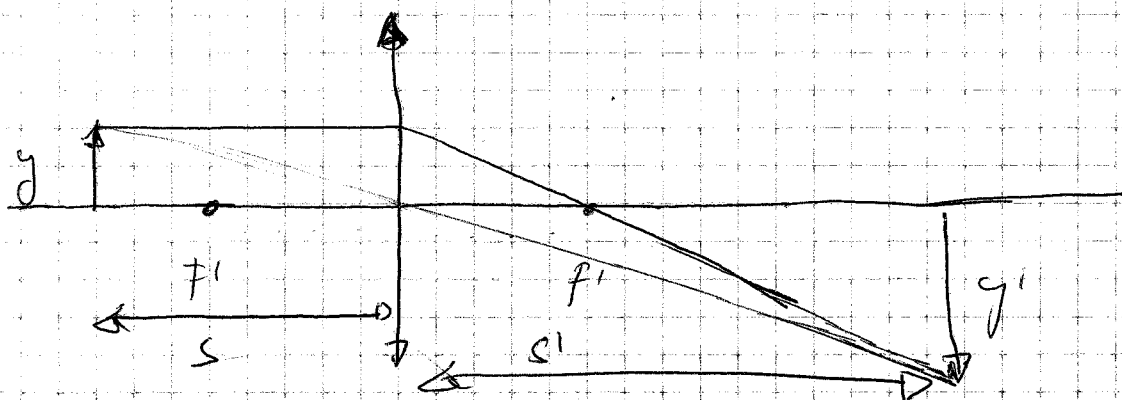
$$\frac{1}{s'} - \frac{1}{s} = \frac{1}{f} \quad \therefore \frac{s'}{s} = \frac{y'}{y}$$

$$|y'| = |10y|$$

$$|s| \geq |f|$$



Imaxe virtual (NON SE PODR RECOLLIR SOBRE UNA PANTALLA)



$$s + s' = 2'7m$$

$$|y'| = |10y| \quad s' = 10s \Rightarrow s + s' = 2'7m \Rightarrow s = 0'25m$$

sen signo $s = -2'45/10^{-1}m$; $s' = 2'45m$

$$f' = \frac{1}{\frac{1}{s'} - \frac{1}{s}} = \frac{1}{\frac{1}{2'45m} - \frac{1}{-2'45/10^{-1}m}} = 2'22/10^{-1}m$$

4'49 D