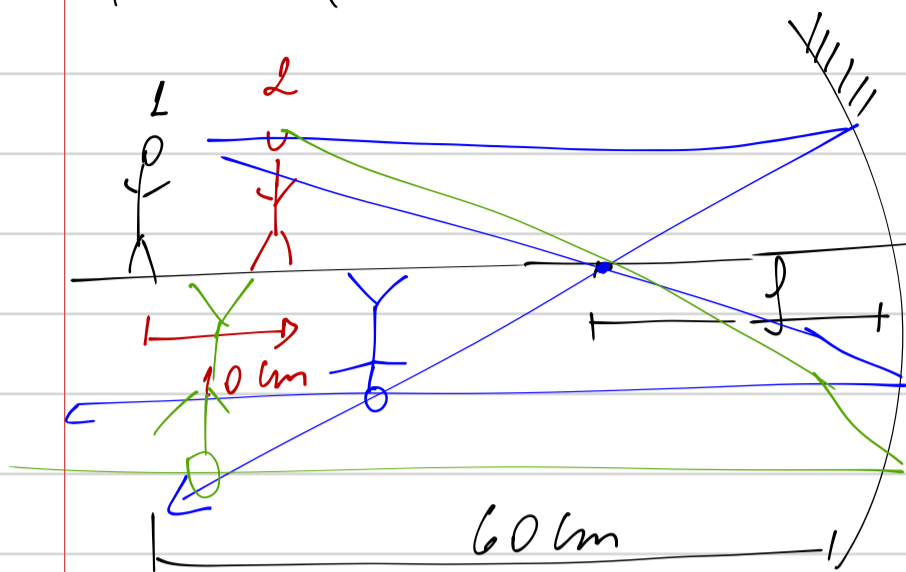


P2-Q3



$$\frac{1}{0} + \frac{1}{i} = \frac{1}{f}$$

$$\frac{1}{O_1} + \frac{1}{i_1} = \frac{1}{f} \Rightarrow \frac{1}{60} + \frac{1}{i_1} = \frac{1}{f}$$

$$\frac{1}{O_2} + \frac{1}{i_2} = \frac{1}{f} \Rightarrow \frac{1}{50} + \frac{1}{i_2} = \frac{1}{f}$$

$$(O_2 - i_2) = \frac{5}{2} (O_1 - i_1) \Rightarrow (50 - i_2) = \frac{5}{2} (60 - i_1)$$

$$\frac{1}{60} + \frac{1}{i_1} = \frac{1}{50} + \frac{1}{i_2}$$

$$i_2 = 50 - \frac{5}{2} (60 - i_1)$$

$$= 50 - \frac{5 \cdot 60}{2} + \frac{5}{2} i_1$$

$$\frac{1}{60} + \frac{1}{i_1} = \frac{1}{50} + \frac{2}{5i_2 - 200}$$

$$i_2 = -100 + \frac{5}{2} i_1 = \frac{-200 + 5i_1}{2}$$

$$\frac{1}{i_1} = \frac{1}{50} - \frac{1}{60} + \frac{2}{5i_2 - 200}$$

$$\frac{1}{i_1} = \frac{60 - 50}{3000} + \frac{2}{5i_2 - 200} = \frac{1}{300} + \frac{2}{5i_2 - 200} = \frac{5i_2 - 200 + 600}{300(5i_2 - 200)}$$

$$1500i_2 - 60000 = 5i_1^2 + 400i_1$$

$$5i_1^2 - 1100i_1 + 60000 = 0$$

$$i_1 = \frac{1100 \pm \sqrt{1210000 - 4 \cdot 5 \cdot 60000}}{10} = \frac{1100 \pm 1200}{10}$$

$$i_2 = \frac{1100 \pm \sqrt{120000}}{10} = 110 \pm \frac{100}{10}$$

$$\frac{120}{100}$$

$$\frac{1}{60} + \frac{1}{120} = \frac{1}{f} = \frac{2+1}{120} = \frac{1}{f}$$

$$f_1 = 40 \text{ cm}$$

$$\frac{1}{60} + \frac{1}{100} = \frac{1}{f} = \frac{100+60}{6000} = \frac{1}{f}$$

$$f_2 = \frac{6000}{160}$$

$$= 37.5 \text{ cm}$$