272/2

$\lambda_1 = 750\,nm$

$\lambda_2 = 400\,nm$

$f_1, f_2 = ?$

SVĚTLO SE ŠÍŘÍ RYCHLOSTÍ $3 \cdot 10^8\,m\,s^{-1}$.

/Z KMITŮ A VLNĚNÍ VÍME $v = \frac{\lambda}{T}$ $f = \frac{1}{T}$

$v = \lambda f$ /

RYCHLOST SVĚTLA

$c = \lambda f$

$f_1 = \frac{c}{\lambda_1} = \frac{3 \cdot 10^8}{750 \cdot 10^{-9}} = 4 \cdot 10^{14}\,Hz$

$f_2 = \frac{c}{\lambda_2} = \frac{3 \cdot 10^8}{400 \cdot 10^{-9}} = 7{,}5 \cdot 10^{14}\,Hz$

273/3

$n_1 > n_2$ $\quad n = \frac{c}{v}$ $\quad n_1 = \frac{c}{v_1}$ $\quad n_2 = \frac{c}{v_2}$

$\frac{c}{v_1} > \frac{c}{v_2} \Rightarrow v_2 > v_1$

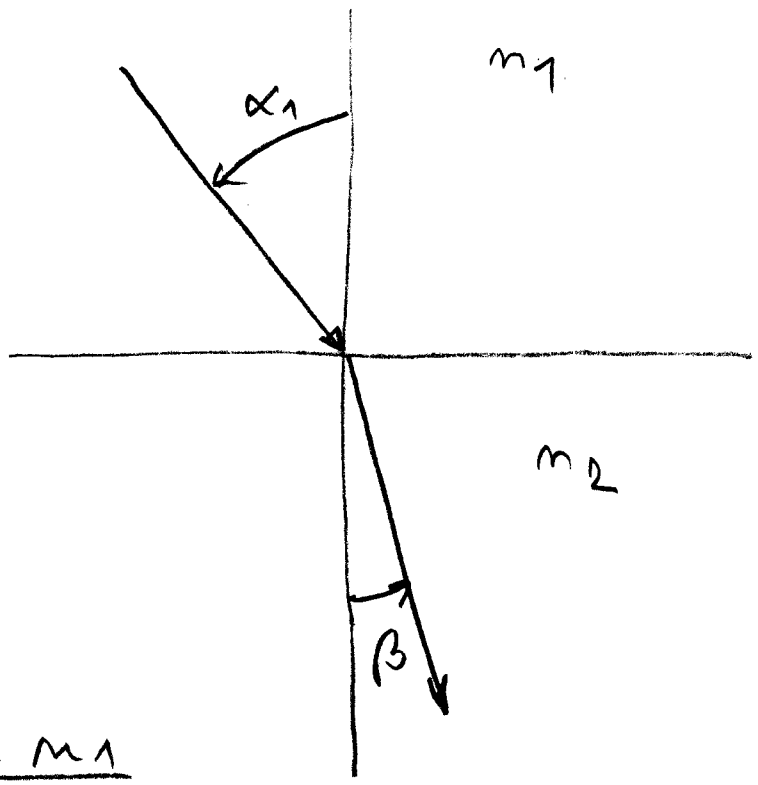
27613

$n_2 = 1{,}5$ – sklo

$\alpha = 45°$

$n_1 = 1$ – vzduch

$\beta = ?$



$$\frac{\sin\alpha}{\sin\beta} = \frac{n_2}{n_1}$$

$$\sin\beta = \frac{\sin\alpha \, n_1}{n_2}$$

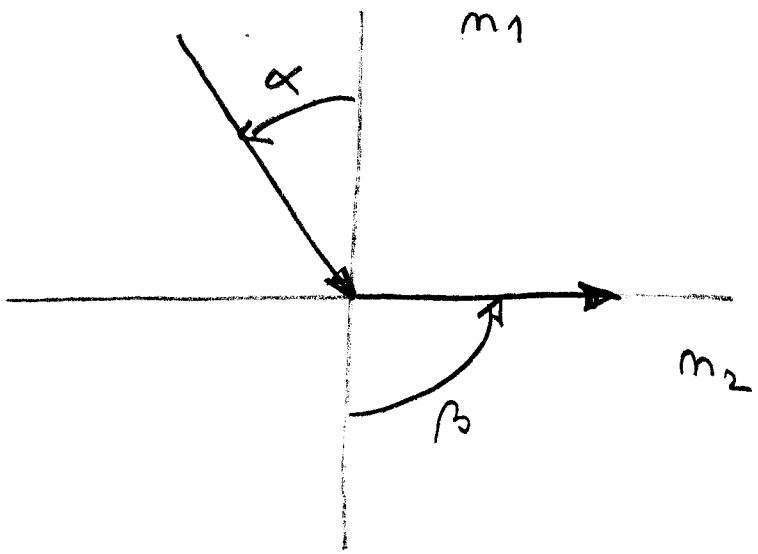
$$\sin\beta \doteq 0{,}471 \Rightarrow \beta = 28{,}13° \equiv 28°7'$$

276/4

$n_1 = 1{,}5$ - sklo

$\alpha = ?$

$n_2 = 1$ - vzduch



$n_1 > n_2$

$\Rightarrow$ LOM OD KOLMICE

PŘI $\beta = 90°$ NASTÁVÁ ÚPLNÝ ODRAZ

$$\frac{\sin\alpha}{\sin\beta} = \frac{n_2}{n_1} \Rightarrow \sin\alpha = \frac{1}{1{,}5}\sin\beta$$

$$\sin\alpha \doteq 0{,}666 \Rightarrow \alpha \doteq 41{,}81° \doteq \underline{41° 48'}$$

285/3

$a = 60\,cm$

$y = 12\,cm$

$f = 30\,cm$

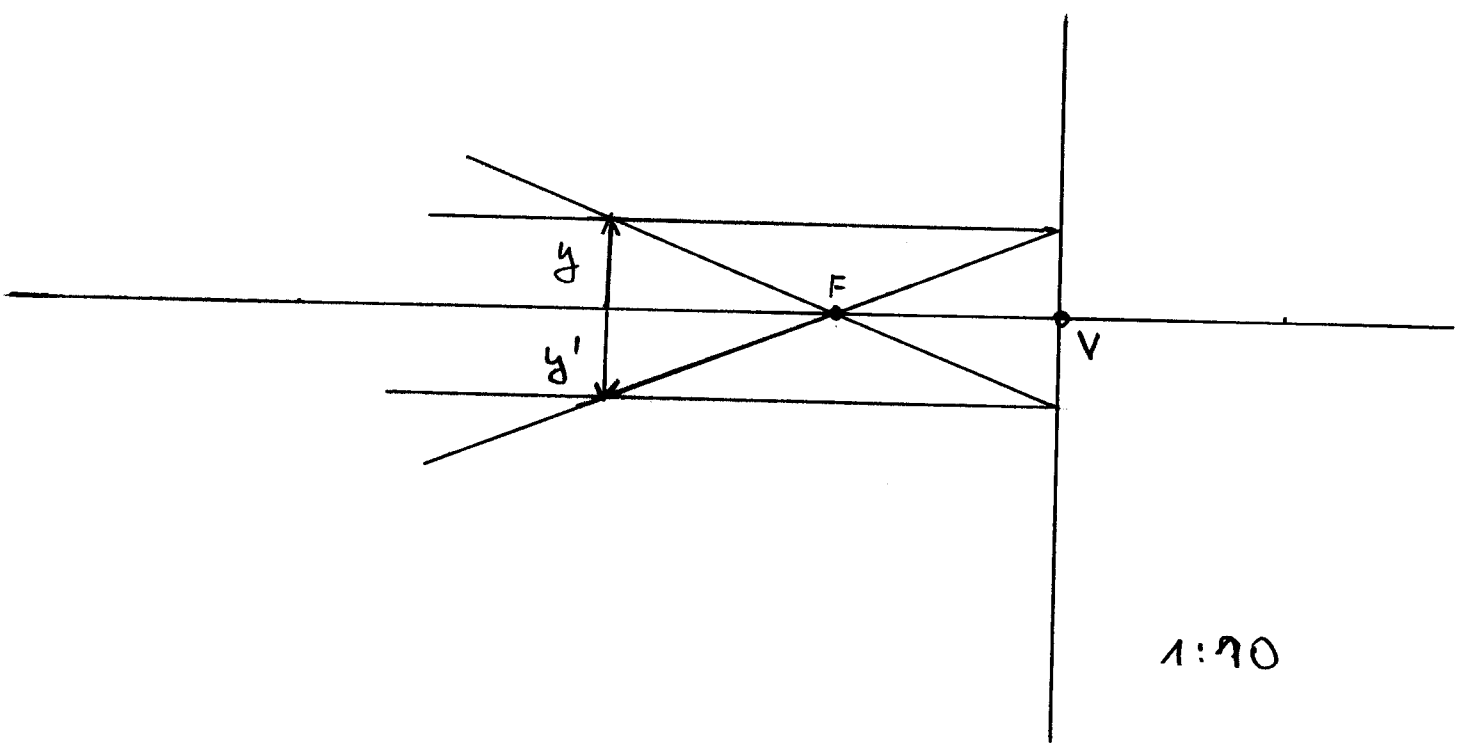
$a', y' = ?$

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

$$a' = \frac{30 \cdot 60}{60-30} = \underline{60\,cm}$$

$$z = \frac{y'}{y} \equiv -\frac{a'}{a} \qquad z = -\frac{60}{60} = \underline{-1}$$

$$y' = z \cdot y \equiv -1 \cdot 12 \qquad y' = \underline{-12\,cm}$$



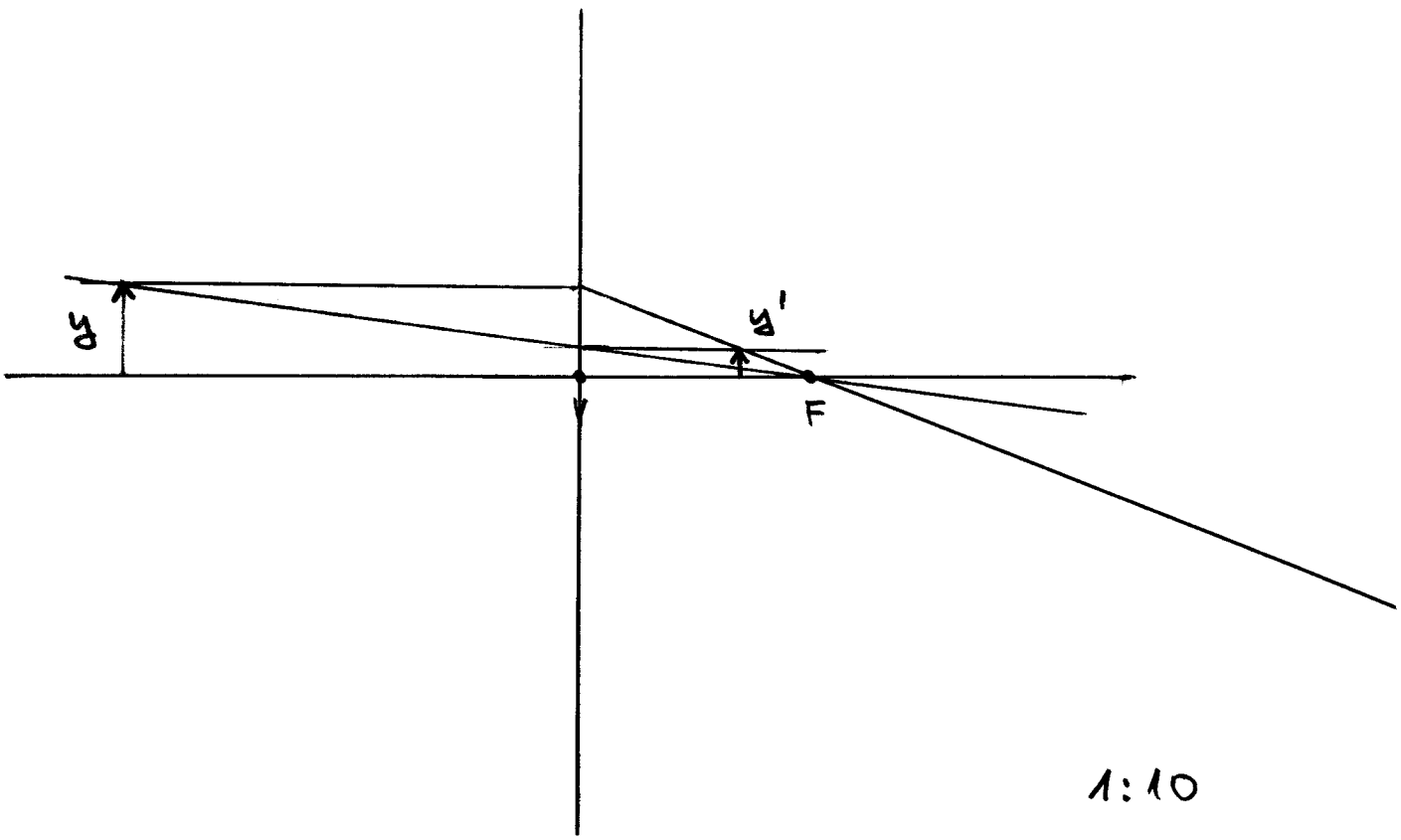
1:90

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

$$a' = \frac{-30 \cdot 60}{60-(-30)} = -20\ \text{cm}$$

$$z = \frac{y'}{y} = -\frac{a'}{a} \qquad z = -\frac{-20}{60} = 0{,}333$$

$$y' = z \cdot y = 0{,}333 \cdot 12 = 4\ \text{cm}$$



1:10

288/2

$a = 40\,cm$

$y = 2\,cm$

$f = 24\,cm$

$a', z, y' = ?$

$$\frac{1}{a} + \frac{1}{a'} = \frac{1}{f}$$

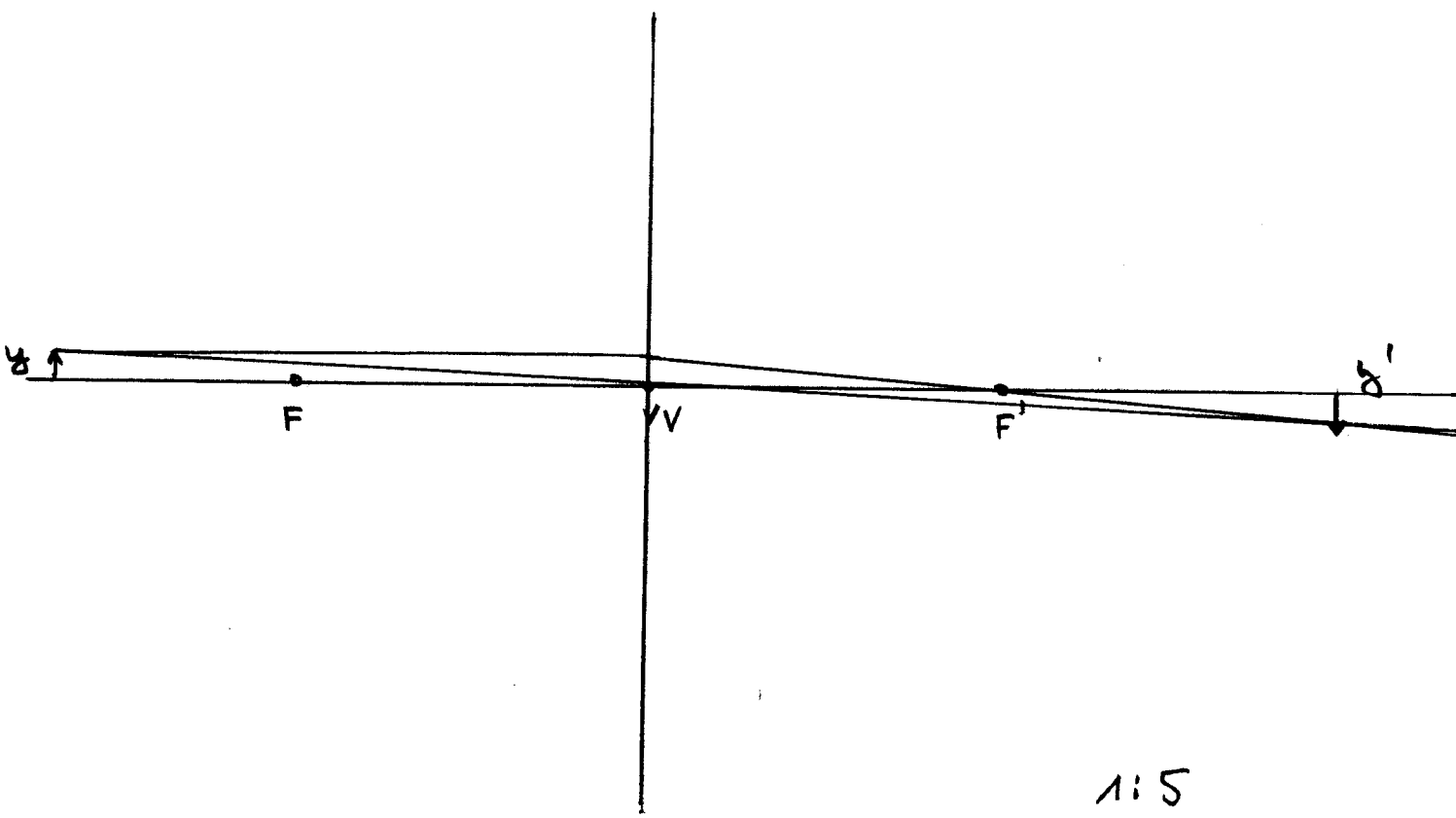
$$a' = \frac{af}{a-f}$$

$$a' = \frac{40 \cdot 24}{40-24} = \underline{60\,cm}$$

$$z = \frac{y'}{y} = -\frac{a'}{a}$$

$$z = -\frac{60}{40} = -\frac{3}{2}$$

$$y' = z\,y = -\frac{3}{2}\,2 = \underline{-3\,cm}$$



1:5

2881 3

$a = 40\,cm$

$f = -24\,cm$

$y = 2\,cm$

$a', z, y' = ?$

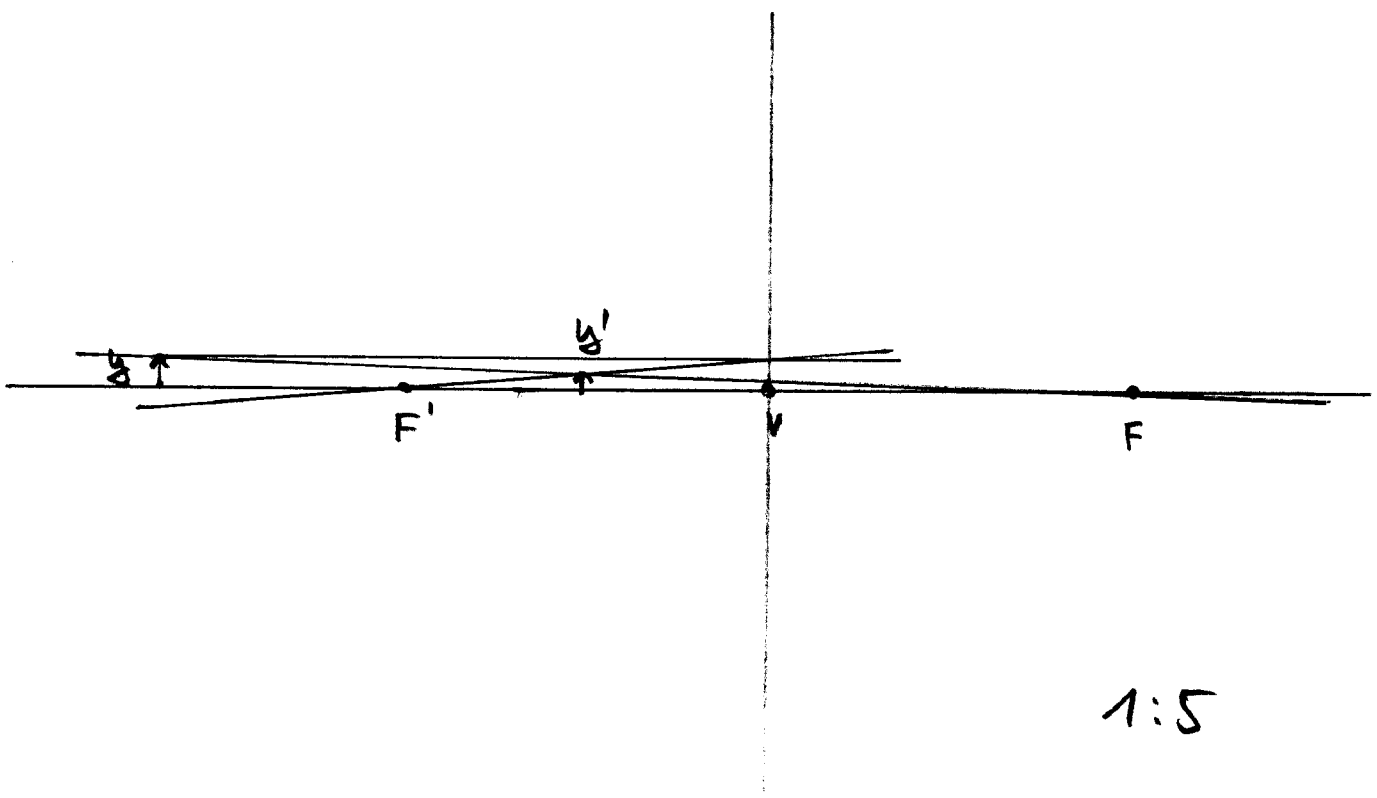
$$\frac{1}{a} + \frac{1}{a'} = \frac{1}{f}$$

$$a' = \frac{f\,a}{a - f}$$

$$a' = \frac{-24 \cdot 40}{40 - (-24)} = -15\,cm$$

$$z = \frac{y'}{y} = -\frac{a'}{a} \Rightarrow z = -\frac{-15}{40} = \frac{3}{8}$$

$$y' = z\,y = \frac{3}{8}\,2 = \frac{3}{4}\,cm$$



1:5

298/1

$S = 1\,cm^2$

$I = ?$

$1\,cd \sim \frac{1}{600\,000}\,m^2$

$/ 1\,m^2 = 10\,000\,cm^2 /$

$600\,000\,cd \sim 1\,m^2$

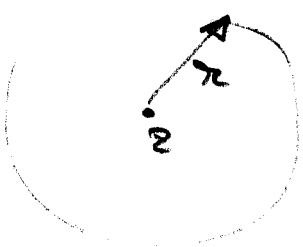
$600\,000\,cd \sim 10\,000\,cm^2$

$60\,cd \sim 1\,cm^2$

298/3

$I = 100\,cd$

$\Phi = ?$



$S = 4\pi r^2$

$\Omega = \frac{S}{r^2}$

PROSTOROVÝ ÚHEL

$\Phi = \Omega I$

$\Phi = 4\pi \cdot 100 = 1257\,lm$

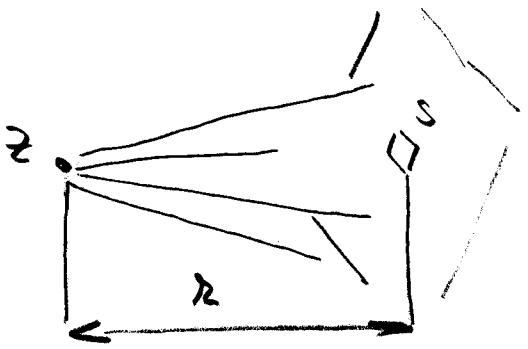
298/4

$S = 1\,cm^2$

$r = 30\,cm$

$I = 60\,cd$

$\Phi = ?$



$$\Phi = \Omega \cdot I$$

$$\Phi = \frac{S}{r^2} I = \frac{1 \cdot 10^{-4}}{0{,}3^2} 60 \doteq 6{,}7 \cdot 10^{-2}\ lm$$

301/1

$S = 0{,}75\,m^2$

$\Phi = 90\,lm$

$E = ?$

$$E = \frac{\Phi}{S} = \frac{90}{0{,}75} = 120\ lx$$

301/2

$r = 0{,}8\,m$

$\Phi = 1220\,lm$

$E = ?$

$$\Phi = \Omega I$$

$$I = \frac{\Phi}{\Omega} \qquad E = \frac{I}{r^2}$$

$$E = \frac{\Phi}{\Omega r^2} = \frac{1220}{4\pi\, 0{,}8^2} = 151{,}7\ lx$$

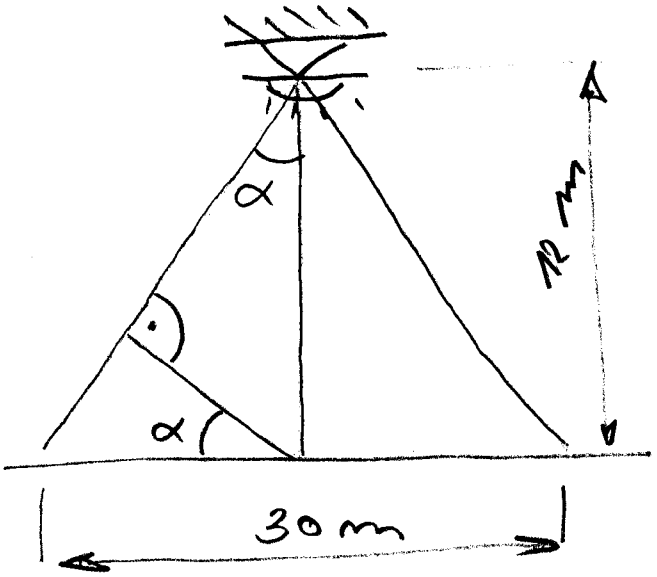
30113

$I = 200\ cd$

$d = 30\ m$

$r = 12\ m$

$E_1, E_2 = ?$



$$E_1 = \frac{I}{r^2} = \frac{200}{12^2} = \underline{1{,}38\ lx}$$

$$E_2 = \frac{I}{r^2} \cos\alpha$$

$$tg\,\alpha = \frac{15}{12}$$

$$\alpha = 51{,}34°$$

$$E_2 = \frac{200}{12^2} \cos 51{,}34$$

$$E_2 = \underline{0{,}87\ lx}$$