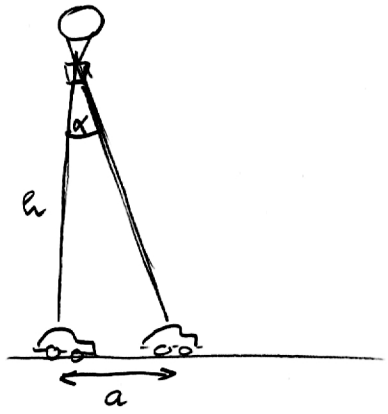
Interference and Diffraction

12.



$$\tan \alpha_{min} = \frac{a_{min}}{h} \approx \sin \alpha_{min} = z_1 \cdot \frac{\lambda}{d_{pupil}}$$

$$\Rightarrow a_{min} = z_1 \cdot \frac{\lambda \cdot h}{d_{pupil}} = 1{,}22 \cdot \frac{650 \cdot 10^{-9}\,m \cdot 350\,m}{4 \cdot 10^{-3}\,m}$$

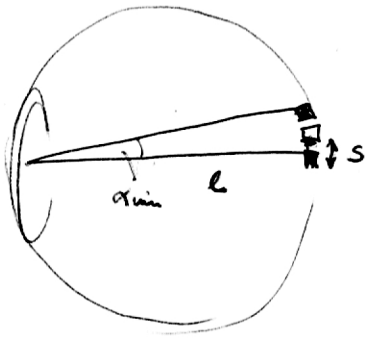
$$= \underline{70\,cm}$$

13. a) $$\sin \alpha_1 = z_1 \cdot \frac{\lambda}{d}$$

$$\Rightarrow \alpha_1 \approx 1{,}22 \cdot \frac{600 \cdot 10^{-9}\,m}{3 \cdot 10^{-3}\,m} = \underline{2{,}44 \cdot 10^{-4}\ rad}$$

$$(= 50'')$$

b)



■ active receptor
□ inactive receptor

$$\alpha_{min} \approx \frac{2s}{l} = \frac{2 \cdot 1{,}5 \cdot 10^{-6}\,m}{0{,}02\,m} = \underline{1{,}5 \cdot 10^{-4}\ rad}$$

$$(= 30'')$$

→ Even in bright light (d rather small) the receptors are dense enough to resolve the image to a physically reasonable level.