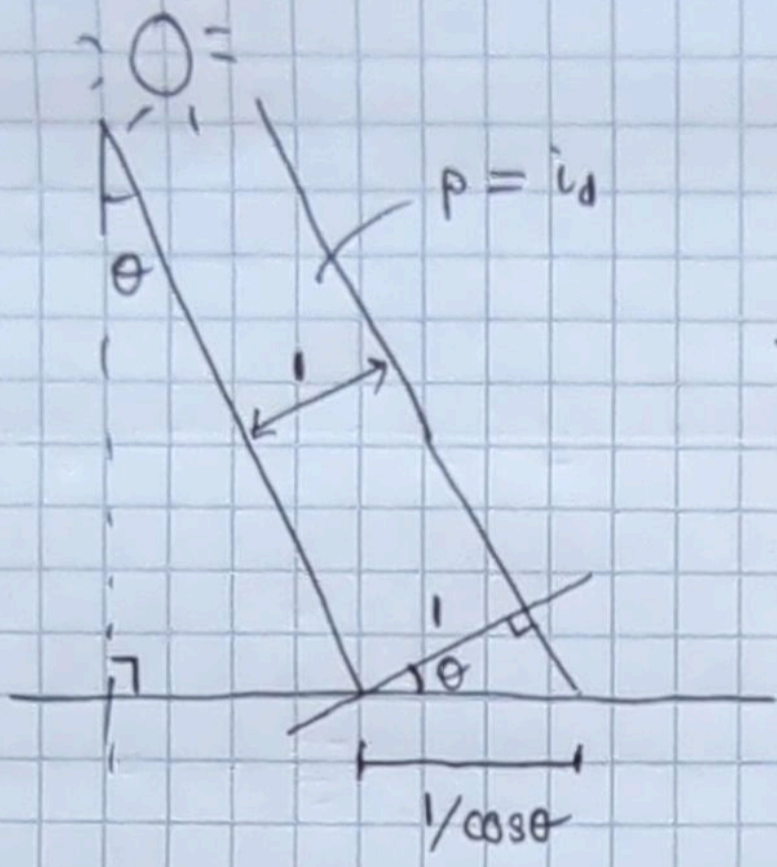


2.1



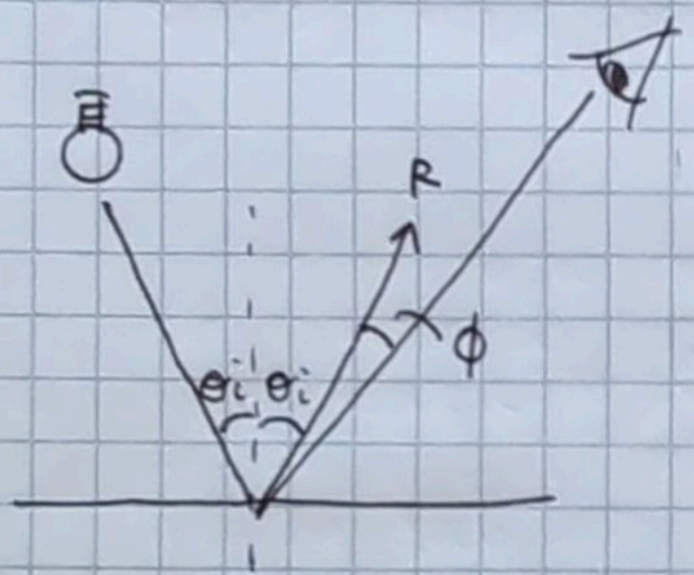
at surface light power/length

$$= P / \frac{1}{\cos\theta} = P \cos\theta$$

$$I_d = \frac{k_d i_d \cos\theta}{\text{observed intensity}}$$

diffuse reflection coeff.

2.2

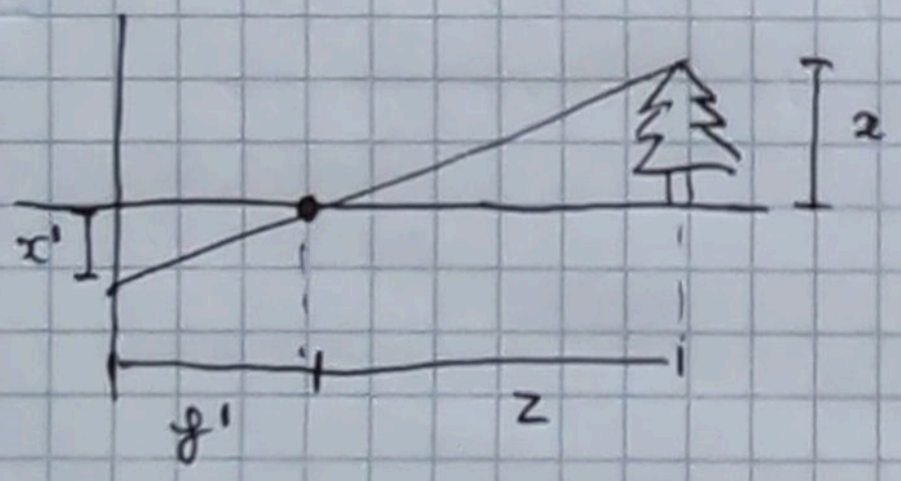


$$I_s = \frac{k_s i_s \cos^{\alpha}\phi}{\text{specular refl coeff}}$$

specular light power

$\alpha = \text{shininess}$

2.3



$$\frac{x'}{f'} = \frac{x}{z}$$

$$x' = f' \frac{x}{z}$$

$$y' = f' \frac{y}{z}$$

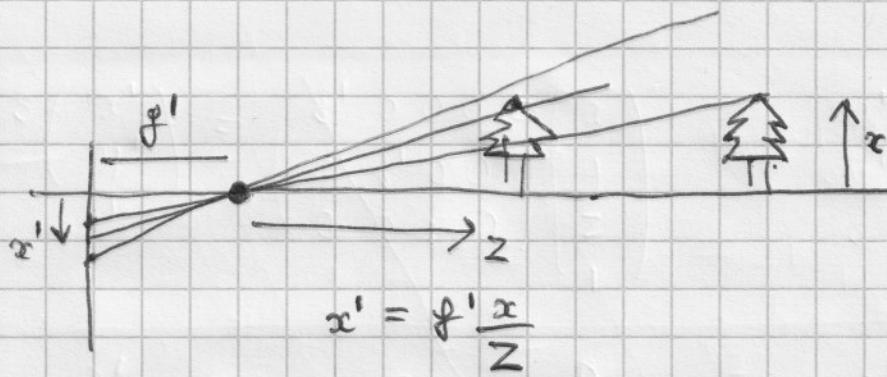
2.4

$$S \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \begin{pmatrix} f' & 0 & 0 & 0 \\ 0 & f' & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \\ 1 \end{pmatrix}$$

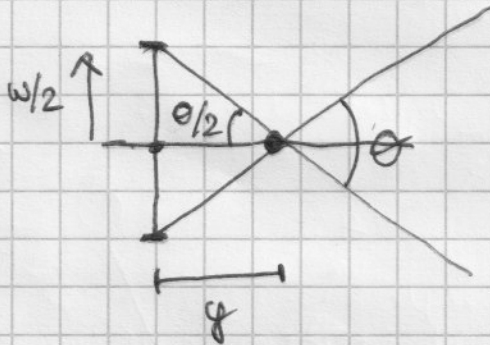
$$Sx' = f'x$$
$$Sy' = f'y$$
$$S = z$$

$$SP' = C \quad P$$

$$x' = f' \frac{x}{z}$$
$$y' = f' \frac{y}{z}$$



2.5



$$\tan \frac{\theta}{2} = \frac{w}{2f}$$

$$\theta = 2 \arctan \frac{w}{2f}$$

$$w = 35 \text{ mm}, f = \frac{50 \text{ mm}}{100 \text{ mm}} \rightarrow \theta = 2 \arctan 0.35 = \frac{38.6^\circ}{19.9^\circ}$$