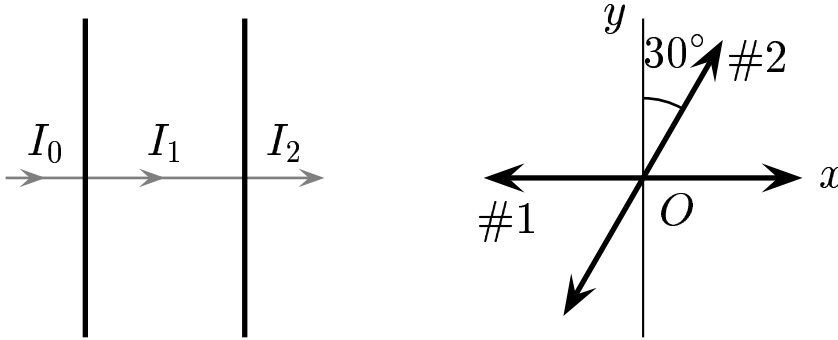


Consider the setup shown. Incident beam with intensity  $I_0$  is unpolarized. Assume #1 transmission axis is along the  $x$ -axis and #2 is  $30^\circ$  with respect to  $y$ -axis.



Find the intensity  $I_1$  and  $I_2$ .

- A)  $I_1 = \frac{I_0}{2}$  and  $I_2 = \frac{I_1}{4}$ .
- B)  $I_1 = \frac{3I_0}{4}$  and  $I_2 = \frac{I_1}{4}$ .
- C)  $I_1 = \frac{I_0}{2}$  and  $I_2 = \frac{3I_1}{4}$ .
- D)  $I_1 = \frac{3I_0}{4}$  and  $I_2 = \frac{3I_1}{4}$ .

Polarized light  $I = I_0 \cos^2 \alpha$ .

Unpolarized light  $I = \frac{I_0}{2}$

Since the incident light is unpolarized,  $I_1 = \frac{I_0}{2}$ .

When the intermediate ray passes through the second polarizer,

$$I_2 = I_1 \cos^2 60^\circ = \frac{I_1}{4}.$$

Answer **A**.