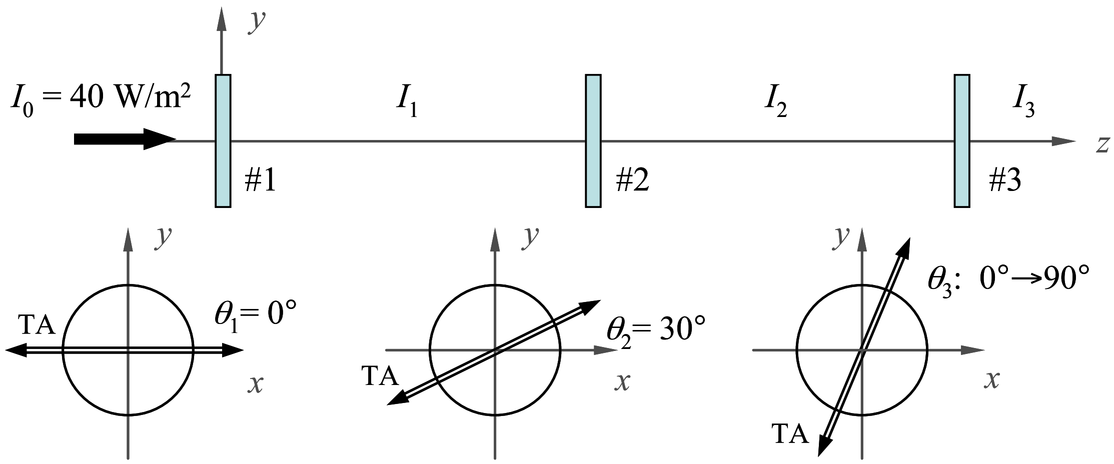
Name: ________________________Sec. _______ **P212: Quiz 10B Week 13**

A beam of light of intensity I_0 **= 40 W/m²** is incident in the +*z* direction upon a set of three linear polarizers, each oriented perpendicular to the beam. The transmission axes (TA) of the first two polarizers make angles of $\theta_1 = 0°$ and $\theta_2 = 30°$ with respect to the *x* axis (see figure). The angle θ_3 of polarizer #3 can be varied from 0° to 90°.



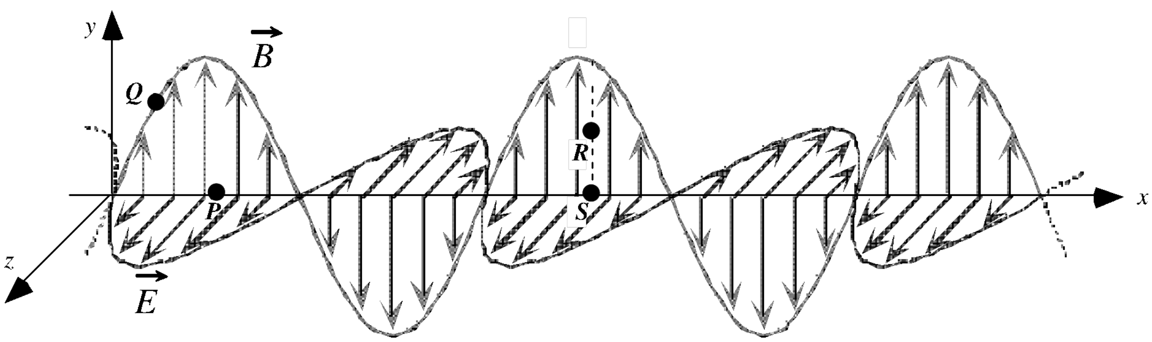
1. Calculate the intensity I_1 of the light after the first polarizer if the incident beam I_0 is linearly polarized at an angle $\theta = 60^{\circ}$ to the *x*-axis. **[5]**

2. The incident beam is now linearly polarized along the *x*-axis. Consider polarizer #3: at what angle θ_3 between 0° and 90° will the final intensity I_3 will be maximized? Determine both the angle and the maximum intensity. **[5]**

3. The incident beam is again linearly polarized along the *x*-axis. At what angle θ_3 between 0° and 90° will the final intensity I_3 be minimized? Determine both the angle and the minimum intensity. **[5]**

Shown below are mathematical and pictorial representations of an electromagnetic plane wave propagating through empty space. The electric field is parallel to the *z*-axis.

$$\vec{E}(x, y, z, t) = E_o \sin(kx + \omega t)\,\hat{z}$$



4. If E_o = 150 V/m, what is the average intensity of the plane wave? **[5]**