TERMS
Be able to define or discuss the following terms with their SI units, if any.

1. wave front
2. ray
3. reflection
4. refraction
5. angles of incidence, reflection, and refraction θ_a, θ_r, and θ_b
6. index of refraction n
7. Snell's law Eq. (33.4)
8. critical angle θ_{crit}
9. total internal reflection
10. dispersion
11. polarizer
12. polarizing axis
13. analyzer
14. polarizing angle θ_p
15. Huygens' principle

EQUATIONS
Understand the meaning and know the SI units of all the symbols in these equations—and be able to use the equations to solve problems.

1. Eq. (33.1)
2. Eq. (33.2)
3. Eq. (33.4)
4. Eq. (33.5)
5. Eq. (33.6)
6. Eq. (33.7)
7. Eq. (33.8)

SKILLS
Use the material in these sections to be able to:

1. sketch the paths of incident, reflected, and refracted rays; showing the angle of incidence θ_a, the angle of reflection θ_r, and the angle of refraction θ_b.
2. explain why refraction does not change the frequency of the wave.
3. know that total internal reflection occurs *only* for reflection off an optical material of lower index of refraction–and explain why.
4. sketch a new wave front by the application of Huygens' principle.

Training engineers and scientists without teaching them the environmental and moral consequences of their actions is like giving them a blazing torch and setting them loose in a gunpowder factory. From Thomas Berry