

Homework 14

1. Yellow light travels 0.680 times as fast in a certain type of plastic than in a vacuum. What is the index of refraction for yellow light in the plastic?
2. Red light travels at 2.07×10^8 m/s in a particular type of oil. What is the index of refraction for red light in the oil?
3. A beam of light travels from a medium with an index of refraction of 1.25 to a medium with an index of refraction of 1.46. If the incoming beam makes an angle of 14.0° with the normal, at what angle from the normal will it refract?
4. A beam of light travels from a medium with an index of refraction of 1.65 to a medium with an index of refraction of 1.30. If the beam refracts at an angle of 23.5° from the normal, at what angle to the normal did it enter the second medium?
5. A beam of light travels from one medium to another, with the incident beam making an angle of 19.0° from the normal. The beam then refracts at an angle of 32.0° . How many times faster does the light travel in the second medium than the first?
6. A glass of water ($n = 1.33$) has a layer of vegetable oil ($n = 1.47$) floating on top. A beam of light enters the oil from above the glass with an incident angle of 57.0° . What is the refraction angle of the light leaving the oil-water interface?
7. A ring consists of a diamond ($n = 2.42$) and another jewel mounted side by side on a flat plate. Their top surfaces are also parallel to the plate. When laser light is aimed at the ring at 80.0° to the normal, the refraction angle in the diamond is 11.1° less (from the normal) than the refraction angle in the other jewel. What is the index of refraction of this other jewel?
8. A point source of light is at the bottom of a koi pond, at a depth of 0.525 meters. What is the radius of the circle of light formed on the water's surface? Take the index of refraction of water to be 1.33.