The Law of Refraction Worksheet

Name: _____

Medium	Refractive Index
Air	1.00
Diamond	2.42
Water	1.33
Glass	1.50
Ethanol	1.36

Refraction of Light Beam
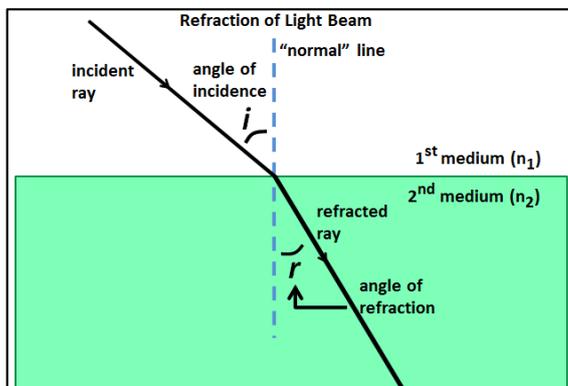
$$n_1 \sin i = n_2 \sin r \qquad \sin i_c = \frac{n_2}{n_1}$$

$$\text{speed of light in medium} = \frac{3 \times 10^8 m/s}{n_{medium}}$$

n_1 = refractive index of first medium

n_2 = refractive index of second medium

i = incident angle

r = refracted angle

i_c = critical angle (The incident angle which produces an angle of refraction of 90°. If the incident angle is greater than the critical angle, there is no refracted ray. The light totally internally reflects.)

1. A ray of light travels from air to water at an angle of incidence of 34°. What is the angle of refraction?

2. What is the speed of light in ethanol?

3. A ray of light travels from air to glycerol at an incident angle of 38° and is refracted at an angle of 24.6°. What is the refractive index of glycerol?

4. A ray of light travelling in air is incident on a plane glass surface at an angle of 30.0°. Calculate the angle of refraction and the angle of deviation (how much it turns, which is i - r).
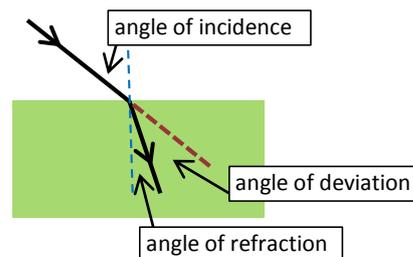
5. A ray of light makes an angle of incidence of 42.0° at the boundary of glycerine and flint glass (as it travels from glycerine to flint glass). If the refractive indices of these materials are 1.47 and 1.72 respectively, what is the angle of refraction and through what angle is the ray deviated?

6. A ray of light travels from water to air at an angle of 25.2°. What is the angle of refraction?

7. A ray of light travelling in air is incident at an angle of 47° is refracted in an unknown medium at an angle of 43°. What is the refractive index of the medium?

8. What is the critical angle for light travelling from ethanol to air?

9. What is the critical angle for light going from diamond to water?

10. The critical angle for light going from amber (fossilized tree resin) to air is 40.2°. What is the refractive index of amber?

Answers:
1. 24.9°
2. 2×10^8 m/s
3. 1.48
4. 19.5°, 10.5°
5. 34.9°, 7.1°
6. 34.5°
7. 1.07
8. 47°
9. 33°
10. 1.55

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