

Snell's Law Worksheet

1054

Common Indices:

Air or vacuum: 1.00;
Water: 1.33;
CR39: 1.498;
Crown Glass: 1.523;
Barium glass: 1.60;
Flint glass: 1.70;
Polycarbonate: 1.586;
Diamond: 2.45

1. A ray of light traveling from air into crown glass strikes the surface at an angle of 30° . What will the angle of refraction be?
$$\frac{1 \times \sin 30^\circ}{1.523} = \sin \theta_r = .328 = 19.2^\circ$$
2. Light travels through a liquid at 2.25×10^8 m/s. What is the index of the liquid?
$$n = \frac{c}{v} = \frac{3 \times 10^8}{2.25 \times 10^8} = 1.2$$
3. Light traveling through air encounters a second medium which slows the light to 1.88×10^8 m/s. What is the index of the second medium?
$$n = \frac{3 \times 10^8 \text{ m/s}}{1.88 \times 10^8 \text{ m/s}} = 1.6$$
4. What is the index of refraction of a refractive medium if the angle of incidence in air is 30° and the angle of refraction is 15° ?
$$\frac{1 \times \sin 30^\circ}{\sin 15^\circ} = n$$
5. What is the index of refraction of a refractive medium if the angle of incidence in air is 40° and the angle of refraction is 29° ?
$$\frac{1 \times \sin 40^\circ}{\sin 29^\circ} = 2.06$$
6. What is the index of refraction of a liquid if the angle of incidence in air is 35° and the angle of refraction is 14° ?
$$\frac{1 \times \sin 35^\circ}{\sin 14^\circ} = n = 2.37$$
7. If the angle of incidence of light traveling through air, striking water, is 30° , what is the angle of refraction?
$$\frac{1 \times \sin 30^\circ}{1.33} = \sin \theta = .376 = 22^\circ$$
8. If the index of refraction for a certain glass is 1.50, and the angle of refraction is 15° for a ray of light traveling from air, what is the angle of incidence?
$$\sin \theta_i = \frac{1.5 \times \sin 15^\circ}{1} = .388 = 22.8^\circ$$
9. What is the velocity of light in meters per second in a material with an index of 2.0?
$$v = \frac{c}{n} = \frac{3.0 \times 10^8}{2} = 1.5 \times 10^8 \text{ m/s}$$
10. A light ray moving through CR39 at an angle of 49° exits into another medium at an angle of 41° . What is the index of the second medium?
$$\frac{1.498 \times \sin 49^\circ}{\sin 41^\circ} = n = 1.72$$
11. What is the angle of incidence for a light ray traveling from water into flint glass, if the angle of refraction is 30° ?
$$\sin \theta_i = \frac{1.7 \times \sin 30^\circ}{1.33} = .639 = 39.7^\circ$$
12. What is the refractive medium if a ray coming from air at an angle of incidence of 50° is refracted through an angle of 35° ?
$$\frac{1 \times \sin 50^\circ}{\sin 35^\circ} = n = 1.33 \text{ Water}$$
13. Light travels at 1.76×10^8 m/s through an optical medium. What is the medium?
$$n = \frac{3 \times 10^8 \text{ m/s}}{1.76 \times 10^8 \text{ m/s}} = 1.70 \text{ flint glass}$$

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3. Light traveling through air encounters a second medium which slows the light to 1.88×10^8 m/s. What is the index of the second medium?
4. What is the index of refraction of a refractive medium if the angle of incidence in air is 30° and the angle of refraction is 15° ?
5. What is the index of refraction of a refractive medium if the angle of incidence in air is 40° and the angle of refraction is 29° ?
6. What is the index of refraction of a liquid if the angle of incidence in air is 35° and the angle of refraction is 14° ?
7. If the angle of incidence of light traveling through air, striking water, is 30° , what is the angle of refraction?
8. If the index of refraction for a certain glass is 1.50, and the angle of refraction is 15° for a ray of light traveling from air, what is the angle of incidence?
9. What is the velocity of light in meters per second in a material with an index of 2.0?
10. A light ray moving through CR39 at an angle of 49° exits into another medium at an angle of 41° . What is the index of the second medium?
11. What is the angle of incidence for a light ray traveling from water into flint glass, if the angle of refraction is 30° ?
12. What is the refractive medium if a ray coming from air at an angle of incidence of 50° is refracted through an angle of 35° ?
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