

1. Water has an index of refraction of 1.33. Determine the speed that light travels in water.

$$n = 1.33 \quad 1.33 = \frac{c}{v}$$

$$v = \frac{3 \times 10^8}{1.33}$$

$$v = 2.25 \times 10^8 \text{ m/s}$$

index of refraction	$n = \frac{c}{v}$	velocity of light in vacuum
		velocity of light in the medium

2. Diamond has an index of refraction of 2.42. Determine the speed that light travels in diamond.

$$n = 2.42 \quad v = \frac{c}{n} \quad v = 1.24 \times 10^8 \text{ m/s}$$

$$v = \frac{3 \times 10^8}{2.42}$$

3. It is determined that light travels at a speed of 1.87×10^8 m/s in a substance. Determine the index of refraction of the substance.

$$n = \frac{c}{v} \quad n = \frac{3 \times 10^8}{1.87 \times 10^8}$$

$$n = 1.60$$

4. An unknown substance has light travel through it at 2.23×10^8 m/s. Determine the index of refraction of the substance. (Round to two decimal places).

$$n = \frac{c}{v} \quad n = \frac{3 \times 10^8}{2.23 \times 10^8}$$

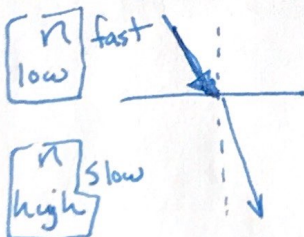
$$n = 1.35$$

5. If a substance has a higher index of refraction, does light travel faster or slower in that medium? Explain why.

$n = \text{greater}$ $v = \frac{c}{n}$ ← as "n" gets larger, "v" gets smaller

$n = 2.4$ slower than $n = 1.6$

6. If a light ray passes from a substance with low index of refraction to another substance with high index of refraction, will the ray bend away from or closer to the normal? Include a **diagram** to support your answer.



Ray will bend towards Normal. ✓✓
(fast to slow medium)

7. What is the index of refraction in a medium where the speed of light is 1.5×10^8 m/s?

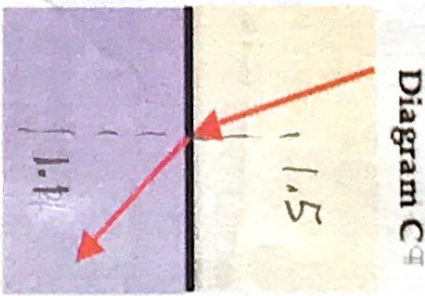
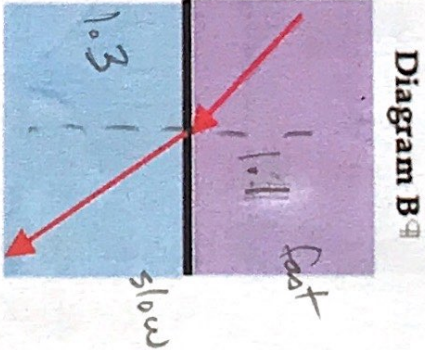
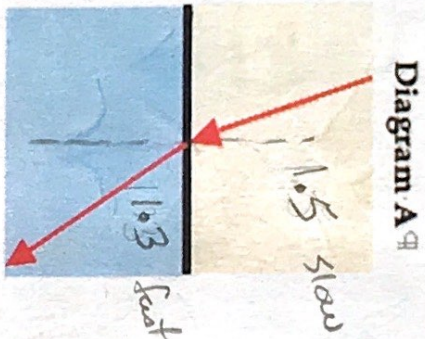
$$n = \frac{c}{v}$$

$$n = \frac{3 \times 10^8}{1.5 \times 10^8}$$

$$n = 2$$

8. (a) In which diagram is light being refracted the most? The least? (drawing the normal, and using a protractor will help greatly)

The most = C ✓
 The least = B ✓



(b) In which diagram(s) is the light moving into a second medium with a HIGHER index of refraction?

~~fast~~ fast

slow



bending towards

Diagram B only

slower

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