

## Refraction: Review I

State if the following are True or False, if it is False, then correct the statement.

1. The difference between the speed of light in a vacuum and the speed of light in *water* is very small. \_\_\_\_\_
2. The angle of refraction is the angle between the *refracted* light ray and the normal.  
\_\_\_\_\_
3. The change in the *colour* of a light ray at the boundary of a substance causes refraction.  
\_\_\_\_\_
4. The *index of refraction* of a medium is the ratio of the speed of light in a vacuum to the speed of light in that medium. \_\_\_\_\_
5.  $n = \frac{\sin i}{\sin r}$  is the formula for the index of refraction. \_\_\_\_\_
6. In order for refraction to occur, two media must have *the same* index of refraction.  
\_\_\_\_\_
7. When you calculate an index of refraction, the values you use in your calculations will have *different* units. \_\_\_\_\_
8. Glass has a greater index of refraction than vegetable oil, so light moving from a glass medium to a vegetable oil medium will bend \_\_\_\_\_ the normal.

### Problems

9. Clearly explain what is meant by the term 'refraction'.
10. Explain why refraction takes place
  - a. What condition must be present for refraction to take place?
  - b. Explain what determines the direction in which a light ray will be refracted.
11. Explain what the index of refraction is and how to calculate it.
12. Which way will light bend if it is travelling:
  - a. faster in a medium ?
  - b. slower in a medium ?
13. Use the diagram to explain what happens to light rays that come from:
  - a. water into air.
  - b. a medium with a refractive index of 1.52 to air ( $n = 1.00$ )
14. The speed of light in vegetable oil is  $2.04 \times 10^8$  m/s. What is the index of refraction of vegetable oil?
  - a. 1.47
  - b. 2.42
  - c. 1.49
  - d. 2.01
15. Olive oil's index of refraction is 1.48. The speed of light in olive oil is:
  - a.  $2.23 \times 10^8$  m/s
  - b.  $4.93 \times 10^8$  m/s
  - c.  $2.03 \times 10^8$  m/s
  - d.  $2.03 \times 10^7$  m/s
16. The speed of light in ice is  $2.29 \times 10^8$ . Ice's index of refraction is \_\_\_\_\_.