Speed of Light/Index of Refraction Calculations

This formula gives the index of refraction for a substance based on the speed of light in the substance.

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

    n = index of refraction
    c = speed of light in vacuum (3×10^8 m/s)
    v = the reduced speed of light in any substance

Example: How fast does light travel in water, given the index of refraction for water is 1.333

    n = 1.333
    C = 3×10^8 m/s $n = \frac{c}{v}$
    v = ?

                          rearrange the equation $\downarrow$

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

                          $v = \frac{3 \times 10^8 \text{ m/s}}{1.333}$

                          $v = 2.251 \times 10^8$ m/s

    Therefore light travels at 2.25×10^8 m/s in water.

Please note the inclusion of units and where ever possible. The index of refraction (I) does not have a unit. Please use the correct method for scientific notation on your calculator. Do not use the sequence " x 10 y^x ".

Problems:

1. Determine the speed of light in ruby, given that the index
    of refraction for ruby. Use the table below to find the
    index of refraction for ruby needed for this calculation.

2. If light is found to have a speed of 2.256×10^8 m/s, what
    is the substance. Use the table to identify the substance
    once you have determined the index of refraction.

3. What would the speed of light in diamond be? After you have
    calculated this, determine the percentage this speed is when
    compared to the speed of light in a vacuum.

4. If the speed of light is found to be 1.9867×10^8 m/s, what
    is the substance?

Substance (Optical Media)	Index of Refraction (n) (Optical Density)
vacuum	1.0000
air	1.0003
ice	1.31
water	1.333
Plexiglas	1.51
crown glass	1.52
ruby	1.76
diamond	2.417
gallium phosphide	3.50