

Test: Refraction

1. What is meant by refraction of light? [2008] [2006]
2. State Snell's law of refraction. [2008]
3. Define *Refractive Index of a medium*.
4. A ray of light *enters air from glass*. The angle of incidence is 35° and the angle of refraction is 69° . Find the refractive index of the glass.
5. Draw a labelled diagram of the apparatus used to verify Snell's Law.
6. Sketch the graph which you would expect to obtain when verifying Snell's Law. What is the significance of the slope of graph?
7. A block of glass of refractive index 1.6 is placed on top of a mark on a sheet of paper. When the mark is viewed perpendicularly from above, a virtual image of it appears 4 cm from the top of the block? What is the thickness of the glass block?
8. What is the refractive index of a medium in which light travels at a speed of $1.25 \times 10^8 \text{ ms}^{-1}$?
9. Define the term *Critical Angle*.
10. Calculate the critical angle for diamond. The refractive index of diamond is 2.4 [2003]
11. The refractive index of a liquid is 1.35, what is the critical angle of the liquid? [2007]
12. Show how a prism can be used to turn a ray of light through (i) 90° , and (ii) 180° .
13. What is the apparent depth of an object in a block of a material whose critical angle is 40° , and whose real depth is 12 cm?
14. Give two reasons why the telecommunications industry uses optical fibres instead of copper conductors to transmit signals. [2004]
15. Explain how a signal is transmitted along an optical fibre. [2004]
16. An optical fibre has an outer less dense layer of glass. What is the role of this layer of glass? [2004]
17. An optical fibre is manufactured using glass of refractive index of 1.5. Calculate the speed of light travelling through the optical fibre. [2004]
18. [2005]
In an experiment to verify Snell's law, a student measured the angle of incidence i and the angle of refraction r for a ray of light entering a substance.
This was repeated for different values of the angle of incidence. The following data was recorded.

$i/\text{degrees}$	20	30	40	50	60	70
$r/\text{degrees}$	14	19	26	30	36	40

- (i) Describe, with the aid of a diagram, how the student obtained the angle of refraction
- (ii) Draw a suitable graph on graph paper and explain how your graph verifies Snell's law.
- (iii) From your graph, calculate the refractive index of the substance.
- (iv) The smallest angle of incidence chosen was 20° . Why would smaller values lead to a less accurate result?