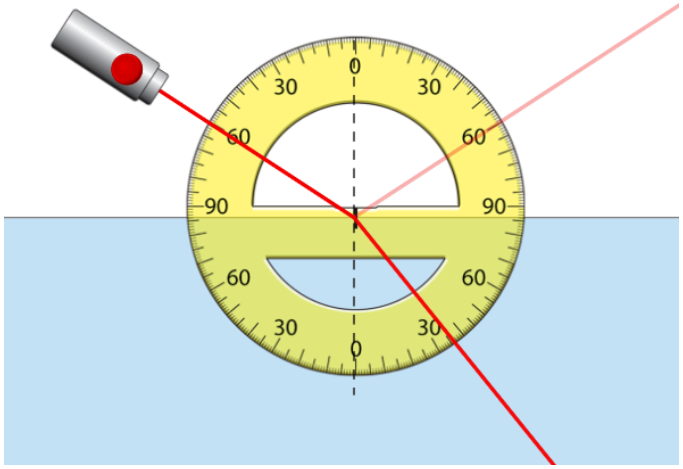
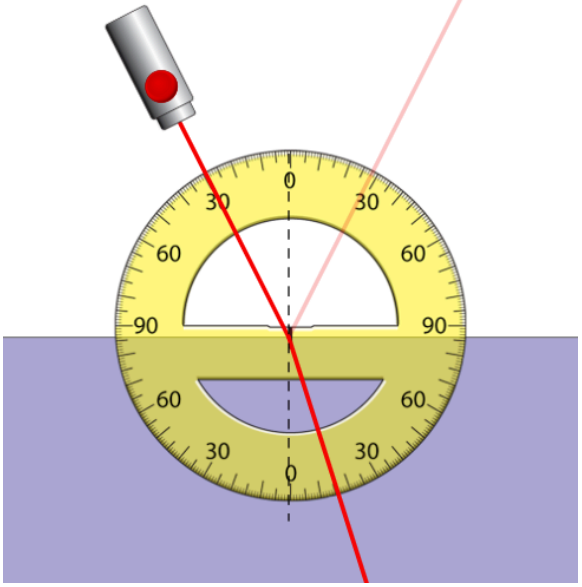
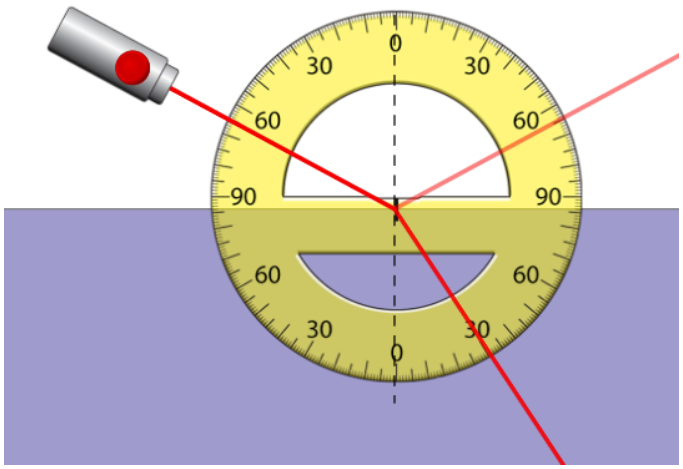
Particles and Waves

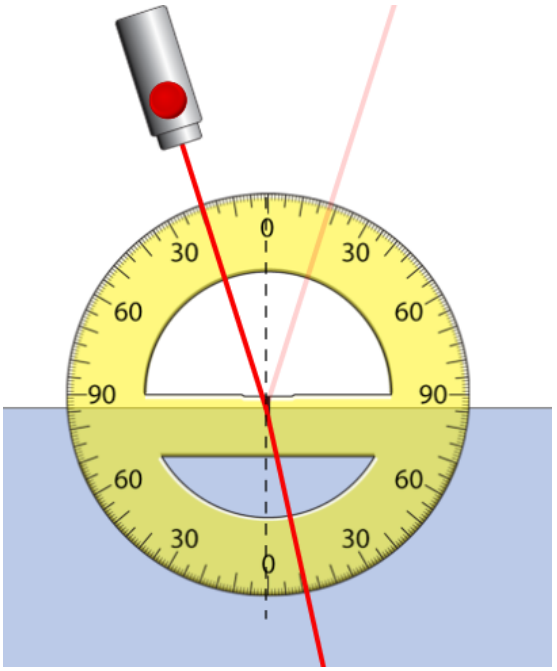
Snell's Law

1) Determine the refractive index of the following materials.

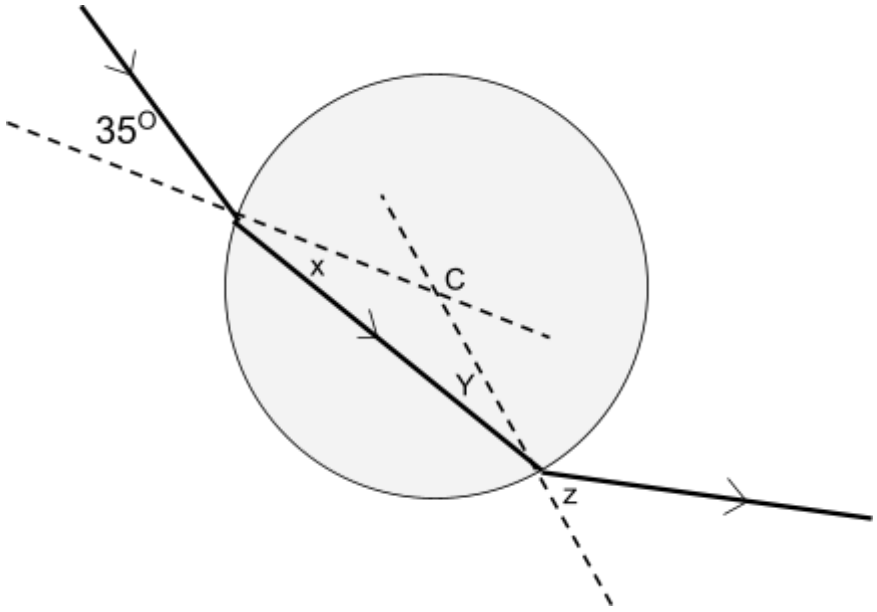






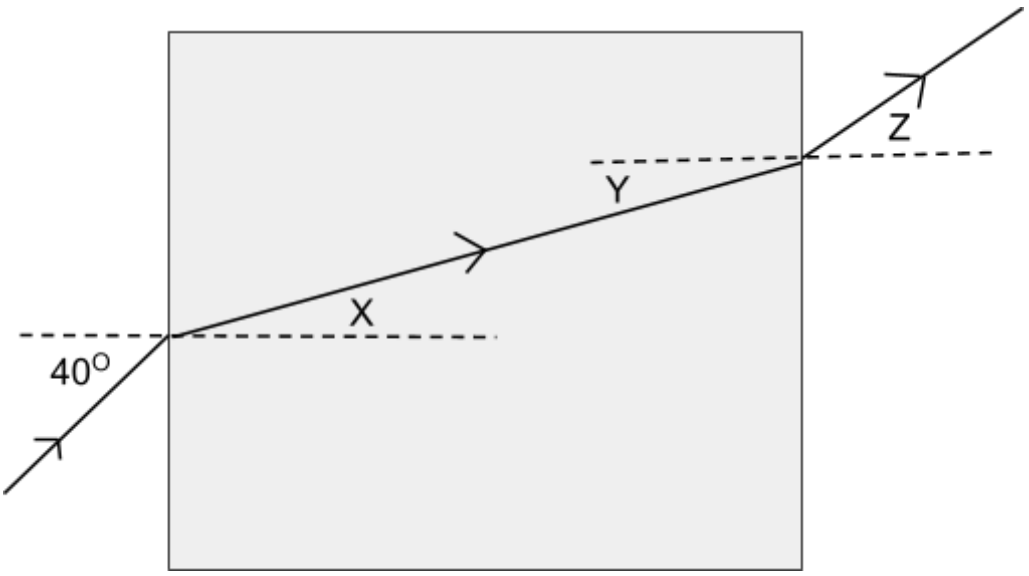


2) A ray of monochromatic light passes through a small glass bead which has refractive index 1.50



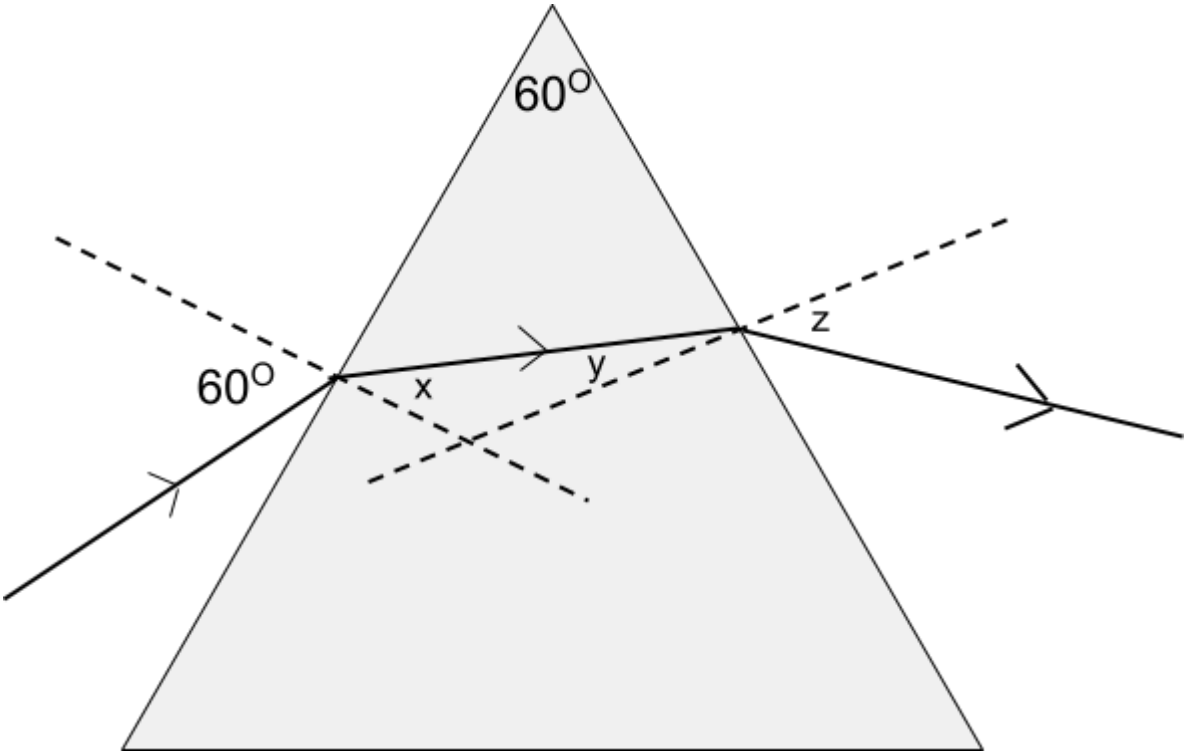
Determine the angles x, y and z. C is the centre of the circle.

3) A ray of monochromatic light is sent through a glass shape of refractive index 1.6 as shown below.



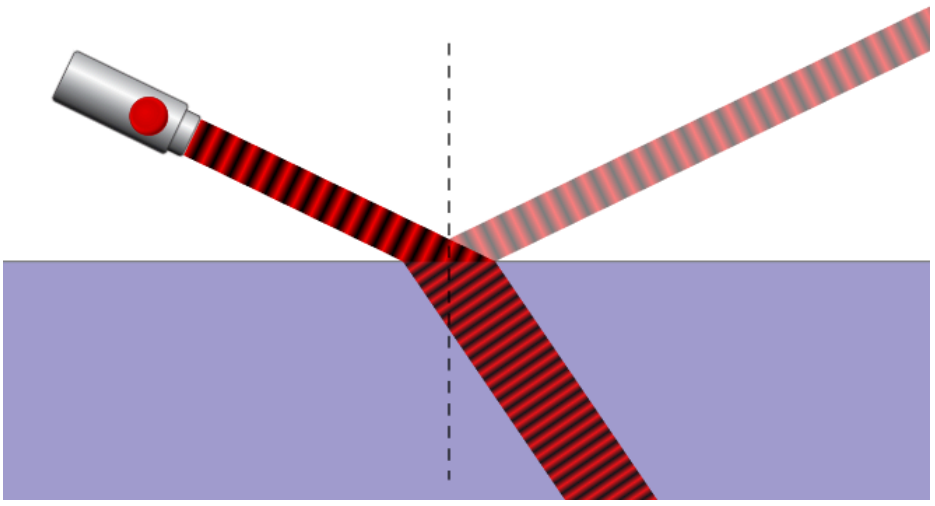
Determine angles X, Y and Z.

4) A monochromatic ray of light is shone into a glass prism, refractive index = 1.5
Determine the angles marked on the diagram.



5) The diagram below shows the wavefronts of a beam of light going from air into glass.

a) State what happens to the wavelength of the light as it goes from air to glass.



b) The frequency of the light is unchanged when going from air to glass. State how the speed of the light is affected in the glass.

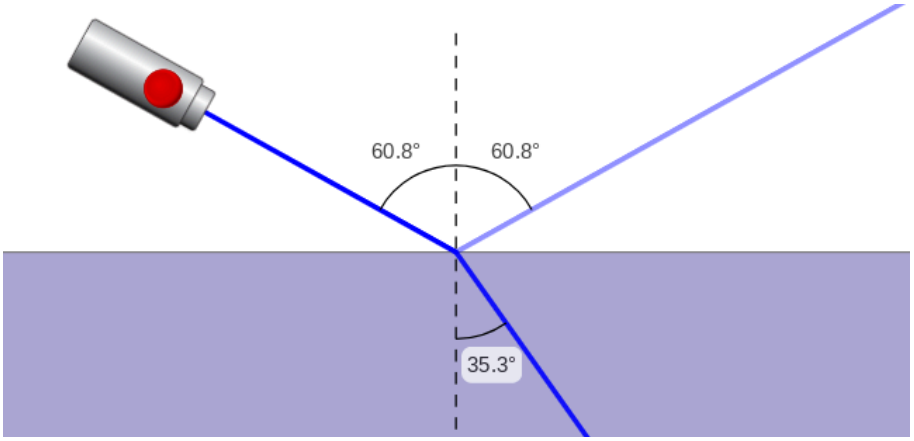
c) If the refractive index of the glass is 1.6, determine the speed of the light beam in the glass.

6) The refractive index of a plastic block is 1.58. A ray of red light of wavelength 700 nm is shone into the block.

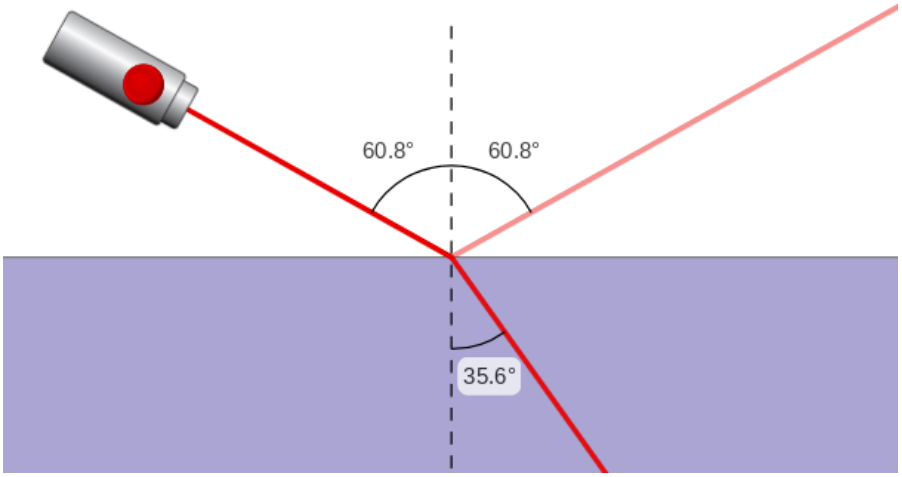
   a) Determine the wavelength of the red light in the block.
   b) Find the speed of the red light in the block.
   c) State the frequency of the red light in the plastic block.

7) Monochromatic light of wavelength 440 nm is shone from air into glass.

   a) Determine the refractive index for the blue light.



   b) Another beam of light, this time with wavelength 662 nm is shone into the **same** glass block.



   c) Determine the refractive index for the glass using wavelength 662 nm

   d) What does this tell you about light of different wavelengths and the refractive index of the material it passes through.

   e) Determine the wavelength of the 662 nm light when it is travelling in the glass.

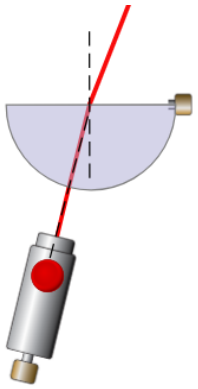
8) The following table of data was constructed by measuring the angle of incidence and the angle of refraction of a ray of monochromatic light passing through a glass block.

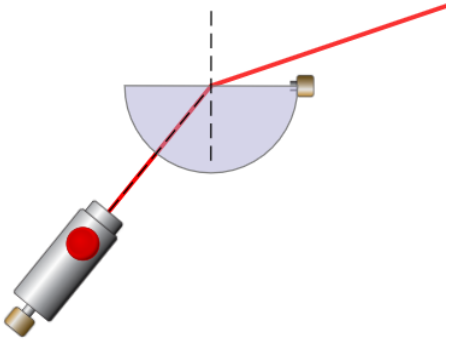
Angle of incidence degrees	Angle of refraction degrees
10.0	6.7
20.0	13.2
30.0	19.5
40.0	25.4
50.0	30.7
60.0	35.3

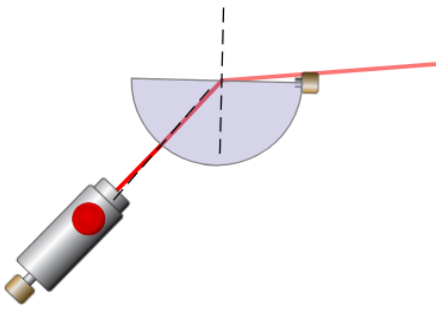
Using the above data determine the refractive index of the glass.

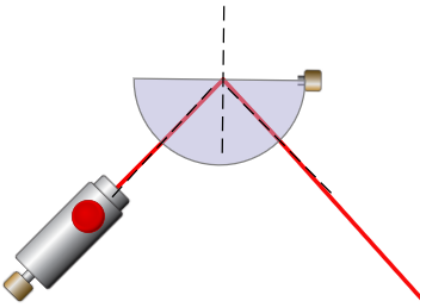
9) A physics student shone a red laser beam through a semicircular prism. The beam was arranged to strike the middle of the semicircular block. This ensured the beam went along the normal inside the block.

The student shone the angle at different angles and recorded them below.









Using your knowledge of the physics of refraction explain the last ray diagram.

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