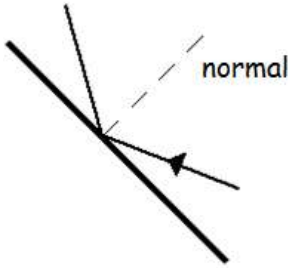
N5

Light

Reflection

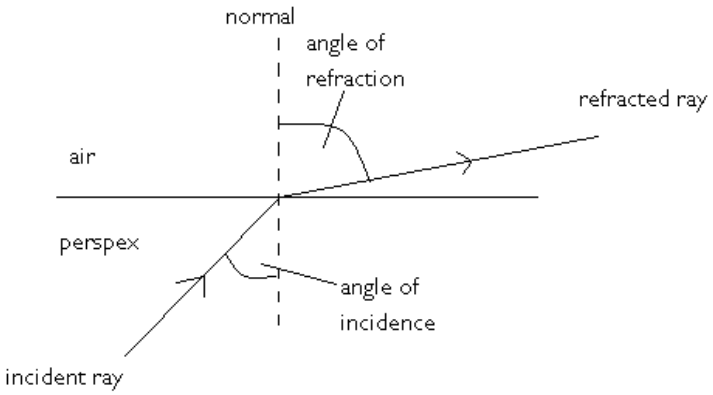
The law of reflection states that the angle of incidence is equal to the angle of reflection. Remember that all angles in a ray diagram are measured from the normal.



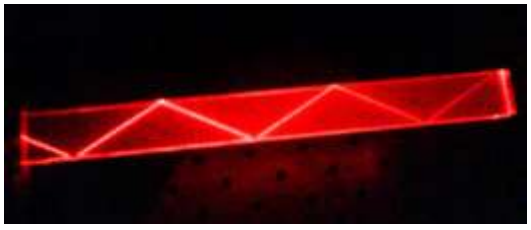
Refraction

At the boundary between different types of materials, the speed of the light wave changes. This results in a change in wavelength, and can often cause the direction of a wave to change.

The change in light speed when going from one medium into another is known as **refraction**. This effect is used in lenses.



Above a certain angle of incidence, refraction no longer occurs, and instead the light wave is reflected back into the medium where it came from. This is known as **total internal reflection.** The minimium angle of incidence that causes the wave to undergo total internal reflection is called the **critical angle.**



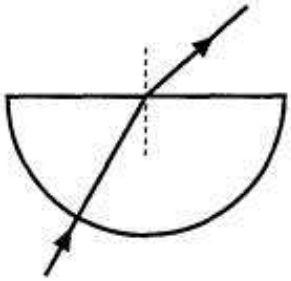
Total internal reflection is used in optical fibres. Optical fibres can be used for communication or in medical applications to allow doctors to see into the body. One bundle of fibres carries light into the body whilst another carries the light back out of the body. This instrument is known as an **endoscope**.

N5

Measuring the critical angle

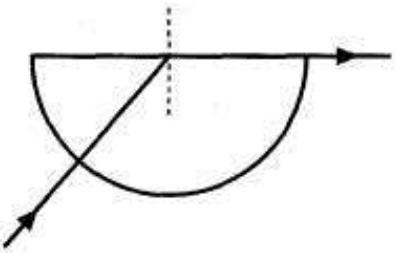
When light travels from a more dense to a less dense material (medium) e.g. from Perspex to air, it bends away from the normal. If the angle inside the Perspex is increased a point is reached where the angle in air equals 90 degrees. The angle in the Perspex which causes this is called the **critical angle.**

Diagram A



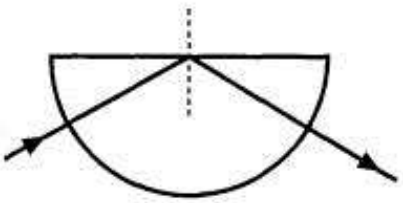
When the angle of incidence is smaller than the critical angle most of the incident

Diagram B



When the incident angle is equal to the critical angle light is refracted into the

Diagram C



When the incident angle is greater than the critical angle no light is refracted into