Measuring refraction and total internal reflection – transcript

A ray box can be used to investigate the properties of light.

When a ray of light passes between air and a transparent material it changes speed and refraction is observed

A ray diagram can be constructed. A line is drawn perpendicular to the edge of the block. This is called the normal.

The angle of incidence is identified.

The angle of refraction is identified.

Refraction also occurs as the ray of light leaves the block.

At an angle of incidence of 0°, no refraction is observed.

As the angle of incidence increases, the angle of refraction increases. The ray of light slows as it enters the block, so it always changes direction towards the normal.

The ray of light leaving the block is always parallel to the ray of light entering the block.

A rectangular block can also be used to determine the refractive index of a transparent material.

The ray box is positioned so the angle of incidence is 10°.

Optical pins are used to mark the path of the ray of light.

The angle of incidence is increased by intervals of 10° and the path of the ray of light is marked each time.

A pencil and ruler are used to draw the paths taken by the rays of light.

Each angle of refraction is measured using a protractor and the values are added to a table.

The refractive index of a material can be calculated using the equation *n* equals sin *i* over sin *r*.

Values are calculated for the refractive index of the material.

The refractive index is determined by calculating a mean value.

The refractive index of a material is linked to the critical angle. This is best investigated using a semi-circular block of the same material.

The angle of incidence is increased until total internal reflection occurs.

An optical pin is used to mark the path of the ray of light.

A protractor is used to determine the critical angle.

The critical angle and refractive index are linked by the equation, n equals one over sine C. The greater the refractive index of a material, the smaller the critical angle.

This experiment has demonstrated the refraction of light. The refractive index and critical angle of the material have been determined.