

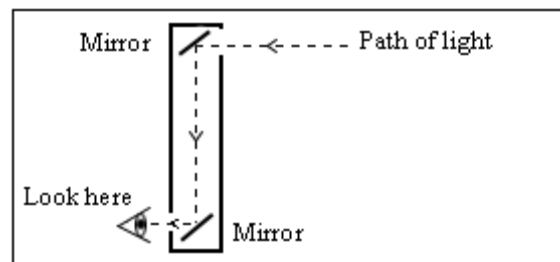
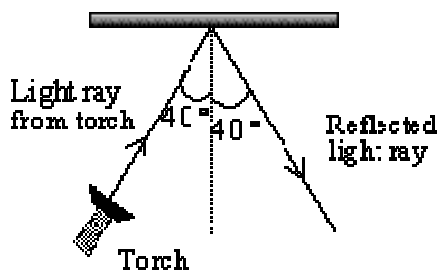
Light & Sound

LIGHT

- ❑ We see things when light from a source enters our eyes. Light travels very fast. 300 million metres a second.
- ❑ If something is in the way of the light you get a shadow. You do not get clear (visible) shadows on dark backgrounds. If an object is moved closer to a light source the shadow gets bigger.
- ❑ Opaque objects blocks all light. An opaque object blocks the light causing shadows eg. Wood, metal, stone, you. Transparent objects let light through eg. Glass, clear plastic. Translucent objects block some light eg. Tissue paper, frosted glass.
- ❑ Light travels from a light source such a lamp or the Sun. Light sources are things that can make their own light. Some objects seem bright, but they are only reflecting light from elsewhere. The moon is NOT a light source as “moonlight” is the reflected light of the sun.

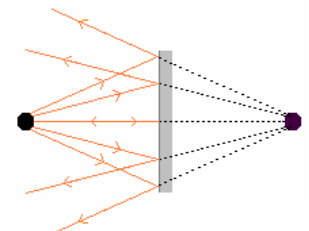


- ❑ Light travels in straight lines. The law of reflection states that the angle of incidence is equal to the angle of reflection. The line drawn at right angles (90°) to the mirror is called the normal.

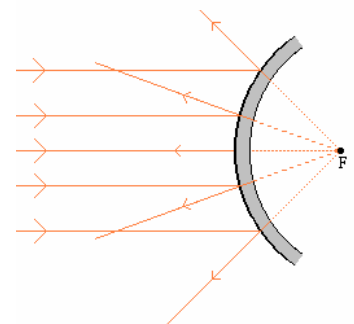
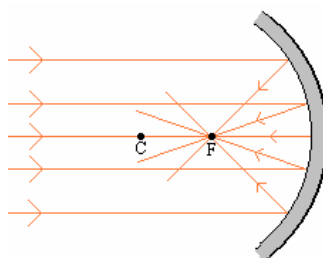





The commander of a submarine that is below the sea can find out what is happening above the surface by raising a special tube called a **periscope** up out of the water. A periscope uses two mirrors angled to see around corners or to look at things that are too high for them to see. Light bounces/is reflected off the mirrors. It bounces off the top mirror down to the bottom mirror. The 45° angles of the mirrors allow this to happen.

- ❑ Ray diagrams: A solid line on a ray diagram is used to illustrate the path of a light ray. Arrows are used on the solid lines to show the direction of the light ray.
- ❑ Ray diagrams for plane, concave and convex mirrors. F is the

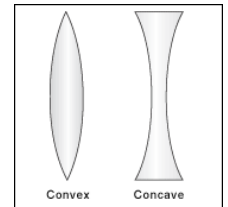


“focal point”. An image that can be focused onto a screen is called a real image. An image that can be seen behind the surface of a mirror, and cannot be focused onto a screen, is called a virtual image.

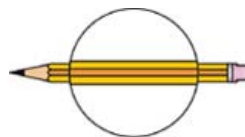


Mirror	Image	Image	Size	Used for
Plane 	virtual	Right way up but image is reversed, i.e., the left side appears on the right side	Same size	Anywhere where you need the image to be the same shape (same proportions) as the object
Concave 	Real	image is right way up, if eye is very close to the mirror	image is larger, if close to mirror.	Make up mirror, shaving mirror, dentist mirror
		image is upside down if eye is away from mirror	image is smaller if eye is away from mirror	
Convex 	Virtual	image is right way up, image appears distorted	image appears smaller	where a wide view is required, e.g., shop-lifting mirror, road corner

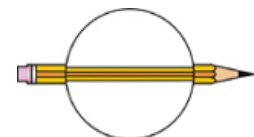
- Convex or **Converging lenses** (positive lenses) are thicker at the centre than at the edges. Concave or **Diverging lenses** (negative lenses) are thicker at the edges than at the centre.



Convex lens - The light rays that go through a convex lens are brought to a focus. Uses: To magnify an object and used in glasses for someone who is long-sighted.



Concave lens - The light rays that go through a concave lens are diverged (spread out). Uses: Lenses used in glasses for someone who is short-sighted.



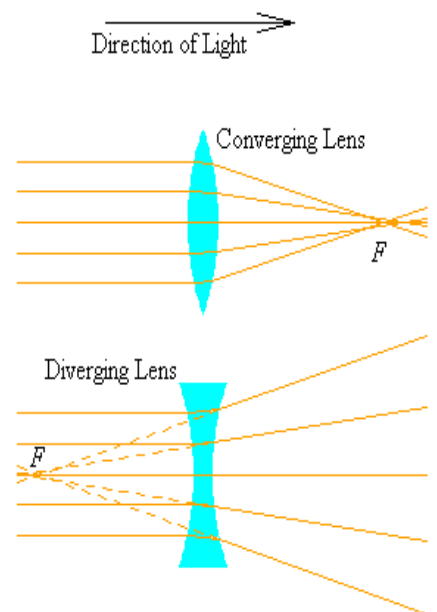
- Ray diagrams for concave and convex lenses (see opposite)
- Refraction of light occurs when a beam of light passes from one transparent substance into another, eg from air to water. The amount of refraction depends on the substance (called "the medium") When a light ray enters another (transparent) substance it is bent (changes speed), altering the image. The spoon looks bent in the middle and larger/magnified.



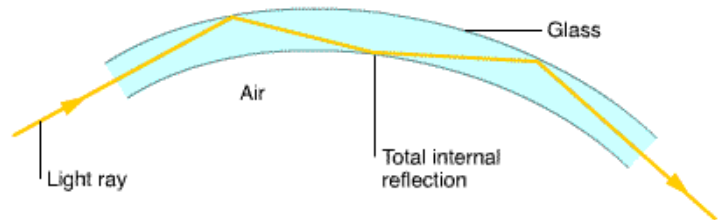
Spoon on table



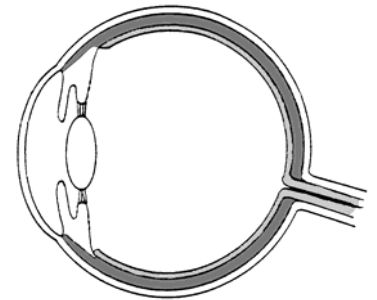
Spoon in glass of water



- ❑ An optical fibre is a thin rod of high-quality glass. Very little light is absorbed in the glass. Light getting in at one end is totally internally reflected, even when the fibre is bent. Optical fibres can carry enormous amounts of information in light pulses trapped inside them.



- ❑ White light can be dispersed by a glass prism into the seven colours of the spectrum. ROYGBIV. Violet light is the most violently bent, red the least.
- ❑ A coloured object reflects some colours and absorbs the rest. The colour you see depends upon the colours that are reflected. Different colours can be made by mixing different coloured lights (addition). This is different from the colours obtained by mixing paints.
- ❑ The human eye: parts of the eye and their function - iris, lens, cornea, pupil, optic nerve, blind spot, retina.
- ❑ Your eye contains two types of vision receptors. One type detects colours and the other detects the brightness of the light. Vision problems can be caused by an out-of-shape eyeball, or a faulty lens. These problems can usually be corrected with spectacles or contact lenses. Long and short sightedness.



SOUND

- ❑ Sound waves are produced by vibrating objects and travels through gases, liquids and solids. The speed of sound depends on the type of substance and on the temperature.
- ❑ Sounds travel through air e.g. hearing someone speak. Sounds can travel through liquids, eg you can hear sounds even when you are under the water in the swimming pool. Sounds travel through solid materials like wood or concrete, eg you can hear sound through walls. Sound cannot travel through a vacuum. You can feel the vibrations of your throat and if you put your hand next to a stereo speaker you can feel the vibrations of loud music.
- ❑ Quiet or loud: A vibrating object can make a quiet sound or a loud sound. To make a louder sound from a drum, hit the skin harder. To make a louder sound from a string, pluck it with a greater force.
- ❑ Pitch: A vibrating object can be made to change pitch. If the length of a vibrating string is shortened then the pitch will rise (it will have a higher pitch). If the tension (amount it is stretched) in a vibrating drum skin is less, then the pitch will fall (it will have a lower pitch).
- ❑ Echo: When sound bounces off objects you can sometimes hear an echo eg near a cliff face, in a tunnel or cave. The sound waves bounce off a hard smooth surface to cause an echo. A carpeted floor and curtains on the windows are helpful in **reducing** the noise level in a room. These rough materials absorb the sound waves and don't reflect them.
- ❑ Constant loud sounds can damage the hearing and cause a hearing loss. Sound is measured in decibels, dB.