

Light

Background information:

- We need light in order to see things and that dark is the absence of light.
- Light is reflected from surfaces (eg mirrors)
- Light is absorbed by other materials.
- Light from the sun can be dangerous and that there are ways to protect our eyes.
- Objects can be labelled as transparent, translucent, or opaque, depending on the amount of light that they let through.
- Shadows are formed when the light from a light source is blocked by an opaque object.
- There are patterns in the way a light source affects the size of an object's shadow.



Key Vocabulary

Incident ray	A ray of light that hits a surface
Light	The natural agent that stimulates sight and makes things visible
Light source	Something that provides light, whether it be a natural or artificial source of light (e.g. the sun, a torch)
Periscope	An apparatus consisting of a tube of attached to a set of mirrors or prisms through which an observer can see things that are otherwise out of sight
Rainbow	An arch of colours visible in the sky, caused by the refraction and dispersion of the sun's light by rain or other water droplets in the atmosphere
Reflection	When light bounces off a surface, changing the direction of a ray of light.
Reflected ray	A ray of light that has bounced back after hitting a surface
The law of reflection	The law states that the angle of the incident ray is equal to the angle of the reflected ray

Isaac Newton

Isaac Newton was the famous scientist who discovered theories around light. One of his biggest achievements was his creation of a reflecting telescope.



Isaac Newton shone a light through a transparent prism, separating out light into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) – the colours of the spectrum. All the colours merge together and make visible light.



Our eyes:

Our eyes have a small window at the front called a pupil, through which light can enter. The pupil looks as though it is black because it is dark inside our eyes. When it is dark, our pupils go larger, in order to let more light in so that we can see better. In bright lights, our pupils go smaller. At the back of our eye is a sensitive sheet of nerves called a retina. They can detect light when it comes in through the pupil and send messages to the brain about what we can see.

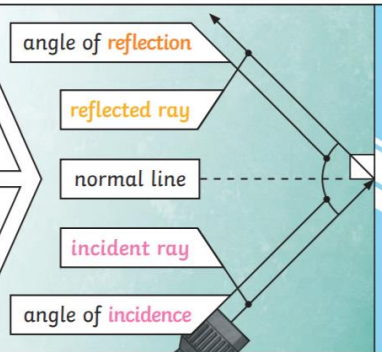
Light

How light travels:

The law of reflection states that the angle of **incidence** is equal to the angle of **reflection**. Whenever **light** is **reflected** from a surface, it obeys this law.

The angle of **reflection** is the angle between the normal line and the **reflected ray** of **light**.

The angle of **incidence** is the angle between the normal line and the **incident ray** of **light**.

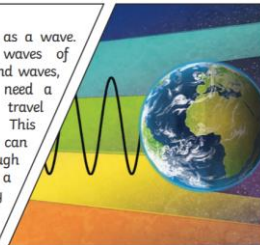


All objects reflect light; smooth and shiny surfaces reflect all the rays of light at the same angle, rather than scattering the rays of light like rough or dull surfaces.

Waves:

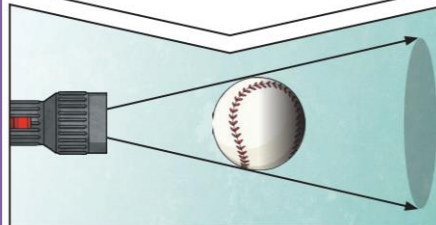
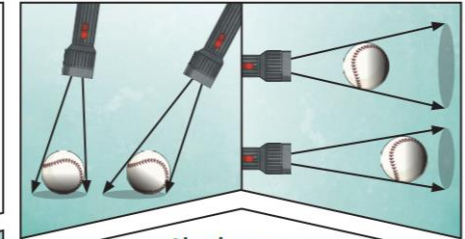
In 1678, Dutch physicist, **Christiaan Huygens**, believed that **light** was made up of waves vibrating up and down perpendicular to the direction of the **light** travels, and therefore formulated a way of visualising wave propagation

Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means **light** can travel through a vacuum - a completely airless space.



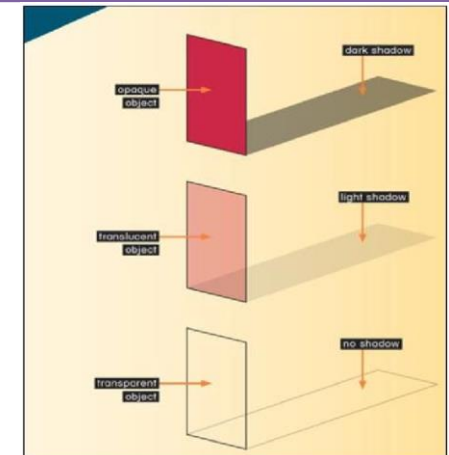
Shadows:

A **shadow** is always the same shape as the object that casts it. This is because when an **opaque** object is in the path of **light** travelling from a **light source**, it will block the **light** rays that hit it, while the rest of the **light** can continue travelling.



Shadows can also be elongated or shortened depending on the angle of the **light source**. A **shadow** is also larger when the object is closer to the **light source**. This is because it blocks more of the **light**.

Opaque objects let no light through (creating the darkest shadows), translucent objects let some light through (creating fainter shadows), transparent objects let all light through (no shadow).



Theories:

Isaac Newton argued that the geometric nature of reflection and refraction of **light** could only be explained if **light** was made of particles, referred to as corpuscles, because waves do not tend to travel in straight lines. **Newton** sought to disprove Christiaan Huygens' **theory** that **light** was made of waves.