Knowledge Organiser Light and Perception

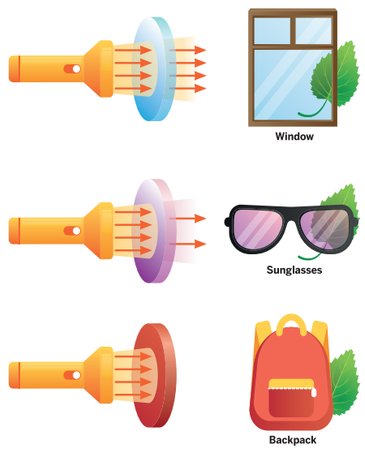
Glossary

1	**Light wave**	An electromagnetic wave which travels in a straight line.	11	**Angle of Reflection**	The angle between the reflected ray of light and the normal ray.
2	**Rod cells**	A part of the eye that helps us to see in the dark.	12	**Law of reflection**	When light is reflected the angle of incidence is equal to the angle of reflection.
3	**Cone cells**	A part of the eye that helps us to see colour.	13	**Refraction**	The bending of light that occurs when light travels through an object.
4	**Optic Nerve**	Takes electrical signals from our eye to our brain.	14	**Wave frequency**	Each colour of the visible spectrum has a different frequency so they bend differently.
5	**Prism**	A triangular piece of glass that splits light into the seven colours of the visible spectrum.	15	**Vacuum**	A space where all the air particles have been removed like outer space.
6	**Visible Spectrum**	Made up of seven colours: red, orange, yellow, green, blue, indigo, and violet.	16	**Light Pollution**	The unnecessary use of light especially outdoors.
7	**Reflected ray**	The light ray reflected back from a surface.	17	**Glare**	Too much background light.
8	**Incident ray**	The light ray that goes towards a surface.	18	**Light Trespass**	Unwanted light that spills into an area.
9	**Normal ray**	The normal ray is perpendicular to a surface — e.g. it hits the surface at 90° and is also reflected at 90°	19	**Skyglow**	Reflected light and upward-directed light escaping up into the sky. This brightens the sky.
10	**Angle of Incidence**	The angle between a ray of light and the normal ray.	20	**Shielding**	Covering light so it is directed down instead of up reducing light pollution.

How are shadows formed?

Shadows are formed by blocking light. Light rays travel from a source in straight lines. If light hits an opaque object, like metal, the light rays are stopped from travelling through it. This results in an area of darkness appearing behind the object. The dark area is called a shadow.

Some objects allow light to pass through them. Transparent objects like glass let nearly all light rays pass through them. This means that they cannot create shadows. Translucent objects, like a plastic bottle, allow only part of the light to pass through. Therefore, the shadows they cast are less clear.



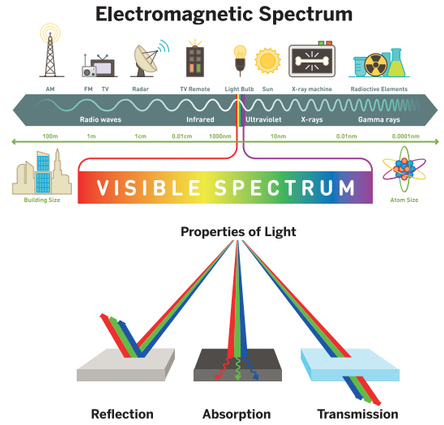
What colour is light?

The visible spectrum is the only part of the electromagnetic spectrum that humans can see.

Isaac Newton used a prism and sunlight to discover that white light is made up of seven visible colours. The seven colours are red, orange, yellow, green, blue, indigo and violet.

Objects that **absorb** all wavelengths of light and reflect no colours create black. Objects that do not absorb any visible wavelengths of light and **reflect** all the colours create white.

In most cases, objects will absorb some portions of light. If we shine light on a green object, all the other colours are absorbed and only the colour green is reflected.



What is refraction?

Light waves travel at a different speed when they go through transparent materials, such as water or glass. When the light rays hit the water, they slow down. This causes the rays of light to change direction and bend. This is known as **refraction**. The angle of refracted light and the angle of incidence are not equal.

Refraction creates illusions. An illusion is when we see something incorrectly. Because light bends when it travels between air and water or glass, objects seen through these materials look bent or distorted.

What is light pollution?

Light pollution is the unnecessary use of light mostly outdoors.

There are three types of light pollution. **Glare** is too much background light which makes it difficult to see things. An example of this is glare from car headlights which leads to unsafe driving conditions. **Light trespass** is light that spills into an area where it is unwanted. An example of this could be unwanted light shining into a bedroom window of a person trying to sleep. **Skyglow** is when all the reflected light and upward-directed light escapes up into the night sky and causes it to look brighter or 'glow'.

How does the human eye help us to see?

Light enters our eyes through the pupil which is the black hole in the middle of the eye. The pupil can change sizes with the help of the coloured part around it, a muscle called the iris. By opening and closing the pupil, the iris can control the amount of light that enters the eye.

When the light passes through, it lands on the retina at the back of the eye. The lens and cornea allow light to be focused on the retina. The brain sends signals to the muscles around the lens to tell it how to focus on the light.

The retina uses light sensitive cells called rods and cones to see. The rods are extra sensitive to light and help us to see when it is dark. The cones help us to see colour. There are three types of cones each helping us to see a different colour of light: red, green, and blue. The rods and cones of the retina change light into electrical signals for our brain. The optic nerve takes these signals to the brain.