

Light and colour



How much do you know about light? Well, for starters, it's the **fastest** thing in the **Universe** and can travel around the Earth **7.5 times** in one second! Let's find out more...

Light is how we see the world around us and why different things are different colours. When we see the things around us in the **daytime**, we are seeing the light that comes from the **Sun** bouncing off whatever we are looking at!



DID YOU KNOW?

There is **no air** in space, so sound can't travel through it. Light waves are special because they don't need a medium to travel through so they can travel through outer space just fine.

WHITE LIGHT FROM THE SUN CONTAINS ALL THE COLOURS MIXED UP

So how come there are so many different colours around us when the light from the Sun appears to be just one colour? Even though light from the Sun is **white**, it actually contains **all the colours of the rainbow**.

LEAVES ABSORB ALL THE WHITE LIGHT EXCEPT GREEN

GREEN LIGHT REFLECTED INTO OUR EYES

WHAT MAKES SOMETHING ONE COLOUR RATHER THAN ANOTHER?

This is all to do with how the light **bounces off an object**. Some colours are **absorbed** in the surface of the object, while other colours are **reflected** back out.

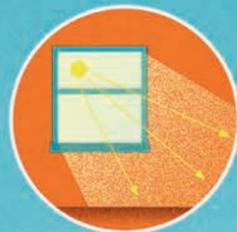
A green leaf looks green because it reflects the **green part** of the white light back to you, while it absorbs all the other colours.

SHADY SHADOWS

We cast a shadow because light **shines in straight lines** and cannot bend around objects unless they are **transparent**, like a window, or are **reflective**, like a mirror.



OBJECTS CAST SHADOWS BECAUSE LIGHT CANNOT BEND AROUND THEM



LIGHT CAN PASS THROUGH A GLASS WINDOW BECAUSE IT IS SEETHROUGH



LIGHT WILL BOUNCE OFF A MIRROR BECAUSE IT IS REFLECTIVE

REMEMBER!

Never look directly at the Sun because it's so bright it can damage your eyes. On a sunny day it's a good idea to wear sunglasses to protect your eyes – but even then you still shouldn't look directly at the Sun.



BENDING THE LIGHT FANTASTIC

You can **split** white light into all the different colours by shining it through a **triangular piece of glass** called a **prism**. Each colour **bends a different amount** – at one end is **red**, which gets bent the **least**, and at the other end is **purple**, which bends the **most**. Bending light is called **refraction**.

WHITE LIGHT FROM THE SUN REFRACTION
GLASS PRISM

IN RAINBOWS

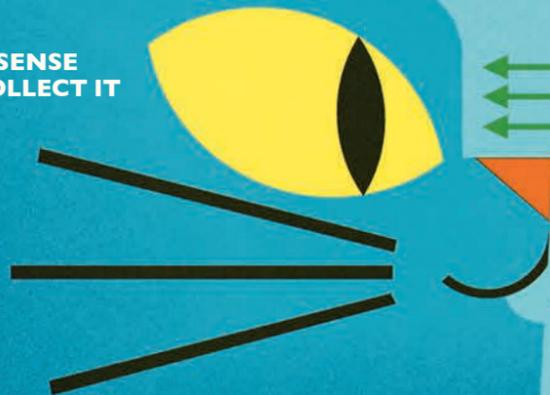
Rainbows appear because of **refraction** – but it's a **raindrop** that splits white light into its different colours. The light then **reflects**, bouncing off the back of the raindrop and spreading out as it comes out of the raindrop. When we see the light coming from all of the raindrops at once, we see a rainbow!

The best way to see a rainbow is if the Sun is **behind** you and the rain is **in front** of you. The light flies over your head, bounces off the rain and comes back into your eyes.

WHITE LIGHT FROM THE SUN RAINDROP

WHITE LIGHT SPLITS INTO DIFFERENT COLOURS AND IS REFLECTED BACK INTO OUR EYES

OUR EYES SENSE LIGHT AND COLLECT IT



THE ELECTROMAGNETIC SPECTRUM

Light is an **electromagnetic wave**. It's just one of a whole range of different electromagnetic waves, all of which have different **wavelengths** – some waves are bigger than others (see above).

Scientists organise the biggest to the smallest wavelengths on a scale called the **electromagnetic spectrum**. Here are some of the waves that the electromagnetic spectrum contains...



Radio waves are used for radio and TV signals. They have the biggest wavelengths.



Microwaves are used to heat up food or to transmit our mobile phone signal.



Infrared (also known as heat) is given off by hot things, like our own bodies or a fireplace.



Ultraviolet comes from the Sun and can hurt our skin – it's why we wear suncream!



Visible light lets us see the world around us.



X-rays go right through you and bounce off your bones, so they're useful for scanning inside your body in a hospital.



Gamma rays have the highest energy and the smallest wavelengths. They're used in hospitals to help kill cancers, but they can also be harmful. We use a radiation symbol to warn others if something is radioactive and dangerous.



This feature is taken from **Professor Astro Cat's Atomic Adventure**, by Dr Dominic Walliman and Ben Newman.