



## What Colour is White Light? - Teacher's Notes

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Looking into the Sun can damage our eyes so most of these activities are carried out using man-made lights indoors.

The sun emits a broad range of energies we call the electromagnetic spectrum. This spectrum includes all radio waves, microwaves, infra red light, the rainbow colours of light we can see, ultraviolet radiation, X rays and gamma rays. The light range our eyes register is called the **visible spectrum**. It is a small fraction (about  $1 \times 10^{-26}$ ) of the energy range emitted by the Sun.

These streams of energy constantly radiate in all directions from the sun, hence "solar radiation". Luckily our planet's magnetic field not only provides us with a North and South Pole for navigation, with the atmosphere it also screens us from the more harmful types of radiation with a magnetic energy shield. Telescopes are sent into orbit above the atmosphere because they can scan the whole electromagnetic spectrum from space.

Fireworks glasses or refraction glasses can be cheaply bought from OZ 3D Optics (70c - \$1.10 each) and other Internet suppliers. You may wish to share the expense with other classes as the more you buy the cheaper they become. These have optical grids which bend or refract light so that different wavelengths (colours) are separated. Artificial light sources, lamps or strip lights appear to have multicolour rays radiating from them.

**Never allow students to look at the Sun with these glasses on.**

Ask your students what colour the light in the room is. Usually they will reply "white" or "yellowish".

Explain that, as scientists, our ideas can change with changes in technology. Provide each group with glasses and ask them to report on what they





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observed.

The white light became a rainbow of colours - the visible spectrum.

White light is made up of a mixture of all of these colours, When white light travels through raindrops it is split up into its colours and is called a **rainbow**.

### Alternative Activity

Give students a CD and ask them to slowly spin the mirrored surface round under a ceiling light. The white light will be diffracted into all the colours of the rainbow.

The curved surface of a raindrop or a bubble acts in a similar fashion to split white light and emit the separate colours of the rainbow.

Some birds, insects, fish and snakes can see ultra violet and infrared light. Pit pythons and rattlesnakes, which hunt at night, cannot see their prey but sense heat from pits in their jaws. Most living things emit heat. If you use infrared glasses you can "see" living things in the darkest night. Soldiers also use these glasses to spot the enemy at night. Many flowers which appear white to humans, actually have ultra violet emitting markers which direct insects to "landing pads" so that they can be efficiently fertilised. Butterflies use UV light markings on their wings to attract mates but their predators cannot see the attractive patterns. Reindeer recognise edible lichen by its UV emission and can differentiate white-coated wolves (who do not produce UV light) from snow, which reflects it.

