TEACHER RESOURCE

SCIENCE CONTENT/ CURRICULUM LINK
- ASTRONOMICAL SYSTEMS
- PHYSICAL INQUIRY AND PHYSICS CONCEPTS
- INVESTIGATING IN SCIENCE

STARDOME OBSERVATORY & PLANETARIUM
FACTS, RESOURCES AND ACTIVITIES ON...
LET'S LEARN ABOUT LIGHT

Light is cool! It is a form of energy that can bend and bounce, and it comes in all different colours. When light bounces, it is called reflection, and when it bends, it is called refraction.

REFLECTION: Look into a mirror, and you see an image of yourself because light is bouncing back at you from the mirror. While mirrors are fantastic reflectors just about everything reflects 'some' light – if an object doesn't reflect light you won't see it at all. Turn a light on in a dark room, and you see things because 'some' of the light is bouncing off them and entering your eyes.

REFRACTION: Light bends when it travels from one material into another – for example, through water then air. That is why when you see someone standing in a swimming pool their legs look short!

Magnifying glasses bend light in another way that makes objects look large.

Refraction also causes rainbows. White light (like the Sun's light) is a mixture of seven colours. Each colour bends differently so when the Sun shines into a raindrop the light gets split up and seven colours come out!

In addition to these colours, there are many other 'colours' that our eyes cannot see. Ultraviolet light is invisible to human eyes, but it is very real - too much gives us a sunburn. Infrared light is also invisible but we feel it as heat on our skin.

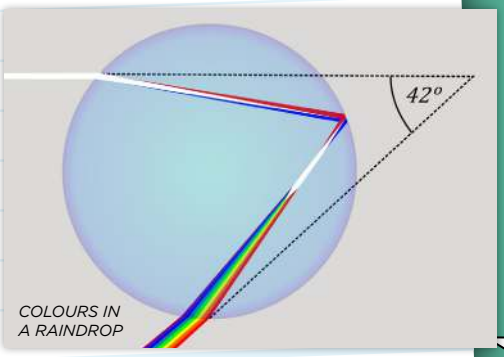
ELECTROMAGNETIC SPECTRUM: All this light is just a tiny part of a kind of energy called Electromagnetic (EM) Radiation. This energy moves through space, like waves in a pond, starting at a point and spreading out. They're called EM waves. The distance between the crests of the waves is called wavelength. Different colours have different wavelengths, eg: blue light has a shorter wavelength than red, and ultraviolet shorter still.

X-rays and radio waves are other examples of EM waves. The difference is that x-ray wavelengths are a thousand times shorter than visible light and radio wavelengths are a million times longer, as demonstrated here.

SUPREMELY FAST: There is nothing in the Universe faster than light. In a vacuum (like in space) it travels 300,000 kilometres per second – fast enough to go around the Earth seven times a second. It travels through different materials at different slower speeds. Light passing through air is slightly slower than through space, through water it is slower again, and through glass still slower. Still very fast though!

Check out these other resources...

- http://www.ducksters.com/science/light_spectrum.php
- https://science.hq.nasa.gov/kids/imagers/ems/waves3.html



COLOURS IN A RAINDROP


LIGHT IS LIKE A WAVE

We've seen that light acts like a wave, but did you know that sometimes it acts like a particle? These particles are called photons.

DISCUSSION POINTS

- Why do things appear in different colours?
- What is light made of? (Somehow light is both a particle and a wave) how can this be?
- How is it that some kinds of light are invisible?

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ACTIVITY

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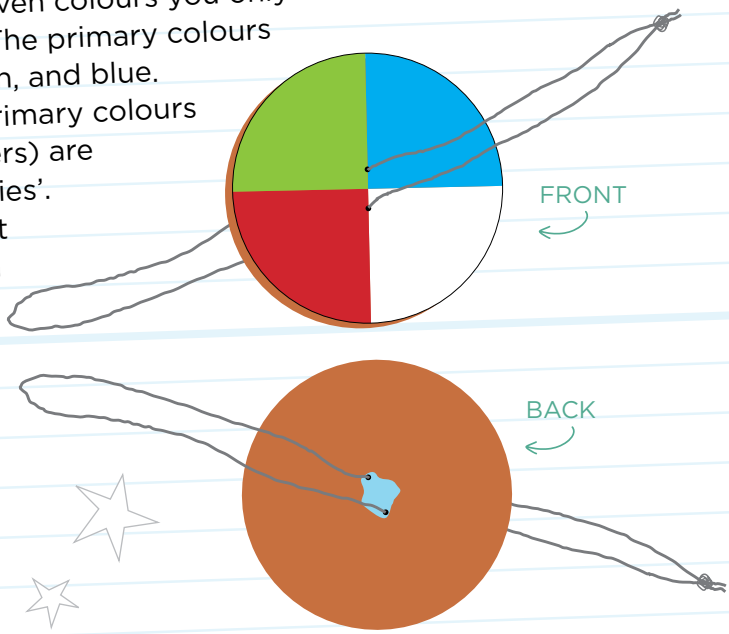
OPTICAL LIGHT ILLUSION

While the sun's white light is made up of seven colours you only need three primary colours to make white light. The primary colours of 'light sources' (e.g.: TV etc) are red, green, and blue. These are called 'Additive Primaries'. The primary colours of 'reflected light' (e.g.: from paint or printers) are different and are called 'Subtractive Primaries'. Here is the how and why. In this experiment your students will create what looks like an illusion. They will create a close approximation to white light.

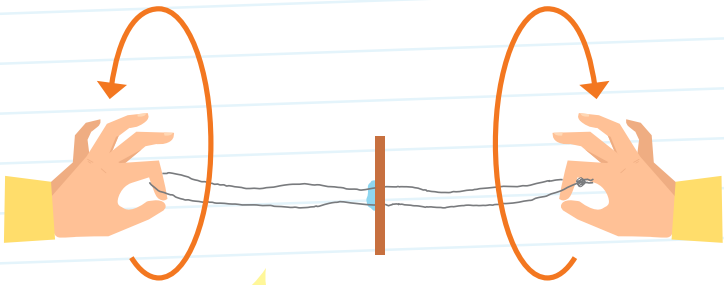


You'll need:

- white paper
- thick cardboard (like cardboard box material)
- ruler
- compass
- 90cm of string
- crayons or felts
- scissors
- pencil
- blue tak

Instructions:

1. Using the compass, draw and then cut a 10cm diameter circle from the cardboard and white paper.
2. On the white paper, using the centre mark made by the compass, draw straight lines to the outside of the circle, so that there are even pie-shape sections.
3. Colour each section a different colour: red, blue, green and leave one section white.
4. Glue the coloured white paper circle onto the cardboard disc.
5. When the glue is dry, make two small holes either side of the centre mark, about 15mm apart.
6. Cut a length of string to 90cm.
7. Thread the string through the holes and tie the ends together, so it has formed a loop.
8. Centre the disc on the string and put the blue tak in the centre of the non-coloured side of the circle so that the string is fixed in place. The blue tak will add weight and help with the spinning.
9. Twist the disc around (a bit like a skipping rope) until the string is twisted tightly around your fingers holding the string. Make sure your disc is straight before beginning.
10. Pull the twisted ends of the string apart so that the string unwinds and observe the colours on the disc.
11. Keep making small pulling movements and it will keep spinning.



Practice makes perfect! Need help, watch this!

- **What happened to the colours on the plate?**
- **Why do you think this happened?**
- **What would happen if you did a different pattern on the plate?**

Take a photo of your activity and send it to us. We'd love to see it! education@stardome.org.nz

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