Classroom Experimentation

Environment - Indoor

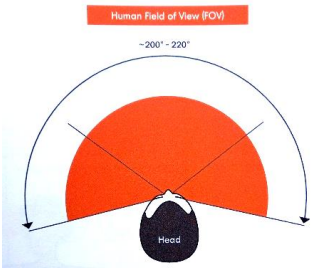
Age – 2-5, 6-8, 9-16

Cost in £– 0

Curriculum areas -Science, Optics, Biology, Art

Projects a seated class can do to explore light and vision. Several of these come from a book I wrote for primary schools called 'Discovering Light' which is sold by the ASE in the UK.

Vision exploration



Field of view – How wide can we see?

- Hold your arms straight out to either side.
- Look straight ahead whilst wiggling your fingers
- Keep looking straight ahead and slowly bring your arms forward until your eyes spot your wiggling fingers on either side

Disappearing thumb – The blind spot in the eye.

- Hold out your two thumbs in front of you at arm's length
- Close your left eye and look at your left thumb
- Slowly move your right thumb to the right but continue looking at your left thumb held out in front of you
- after a short distance (45 degrees) it will seem to disappear

This happens due to the lack of light sensitive cells where your optic nerve leaves your eye for the brain. It is known as the Fovea or the 'Blind spot'

Persistence of Vision

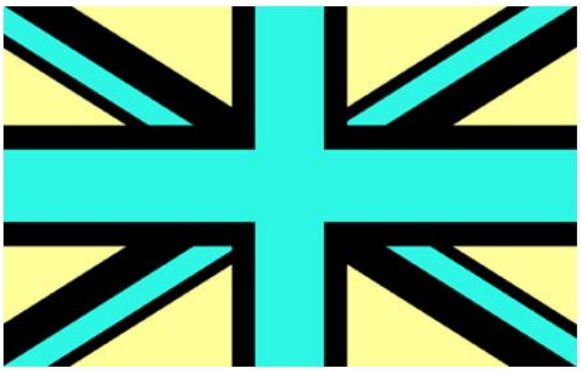
Seeing a negative. The rods and cones which detect light and colour get ‘exhauster’ after a few seconds enabling the ‘negative’ opposite of the image to appear for an instant in its place.

Many of these work best in a darkened room on a digital projector. Make sure you make your own short PowerPoint rather than having to sit through all those You tube adverts etc.

Inverted flags.

Stare at the centre of the flag for 6 seconds without blinking then look at the x to the left. You can use a flag of your choice but make sure you relate it to Blue, Green, Red becoming Yellow, Magenta, and Cyan

x

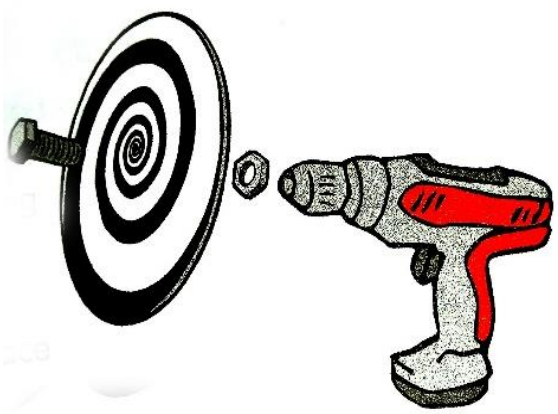


Colour Castle

This needs to be made into a 2 slide powerpoint. Students are asked to stare at the dot in the middle of the colour image. After 10 seconds the colour slide is replaced by the lined up black and white image. The castle to will appear in the correct colour for a few seconds.
https://www.youtube.com/watch?v=iL8Hw2-Lm7k

Spinning spiral,

Another excellent way to show the exhaustion of the rods and cones in an eye.



Make a card spiral (around 40cm in diameter is good) and fix it onto a power drill.
Set on a slow setting and hold in front of your face for 10 seconds whilst asking the children to look into the centre.
Tell the students to keep looking at your face when it is removed. Your head will appear to grow like a balloon!
If the spiral is turned the opposite way your head will appear to shrink.

Rope wavelength demonstration

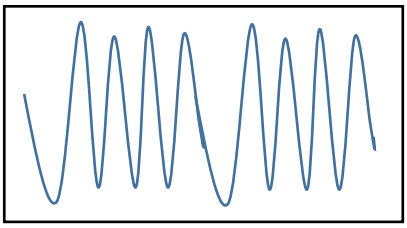
Viewing a wavelength:

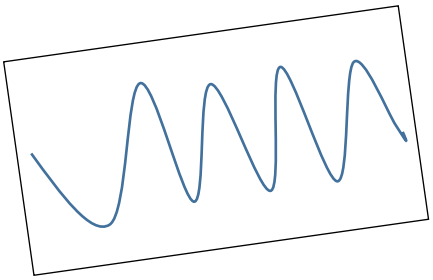
Lay the rope along the floor so all the class can see it. Hold onto one end and move the rope from side to side to make a wave motion. Begin with a wave too small to see and then slowly make larger individual waves along the rope.
Move the rope faster to create continuous multiple waves. Alter the speed of the rope, from rapid to slow eventually making big, small, slow and fast waves. This distance from the top of one wave to the other is the wavelength

(Insert 1.5 diagram of wavelengths and EMR)

Drawing a wavelength rainbow

After watching the rope the students are asked to quickly draw equal 'waves of light' freehand on a sheet of paper. The students then use a ruler to measure their own wavelength (from top of wave to next top of wave) and write the result on the top of their page in mm. Arrange the drawings from longest to shortest measurements of wavelength. Explain the connection between their drawings and the spectrum of a rainbow (to be shown on the board).





We could say this is the light we can see or the 'visible spectrum' – ROYGBIV – with each length of wave relating to a different colour.

EMR Spectrum