

# "One Vision"

S1-S3

Third /  
Fourth  
Level

Using mobile phones to learn more about human colour vision

Level 3 & 4:  
Vibrations & Waves  
linked with Body  
Systems; Topical  
Science looking at  
innovations.

A simple and effective use of microscopy is to image the display of a mobile phone or other modern LED imaging device. With a standard school light microscope, it is possible to observe how the RGB Bayer filter is used to generate all the colours. This can be linked to human colour vision.

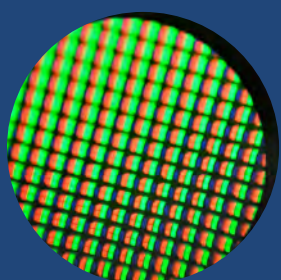
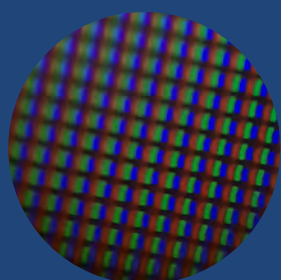
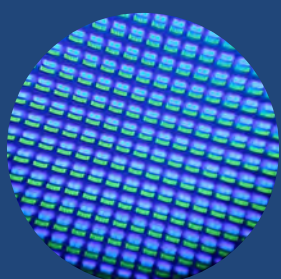
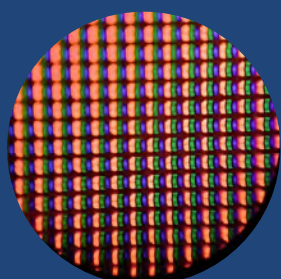
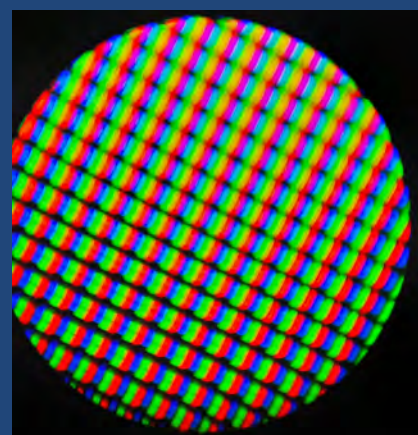
## Materials

- Light microscope
- Mobile phone or modern LED-based imaging device, e.g. some watches.



1

On your smartphone, change the background to plain white, or use Google to search for "white screen". Place the smartphone (or equivalent) onto the microscope stage and position the x10 objective lens over the "white screen" area to magnify by 100.

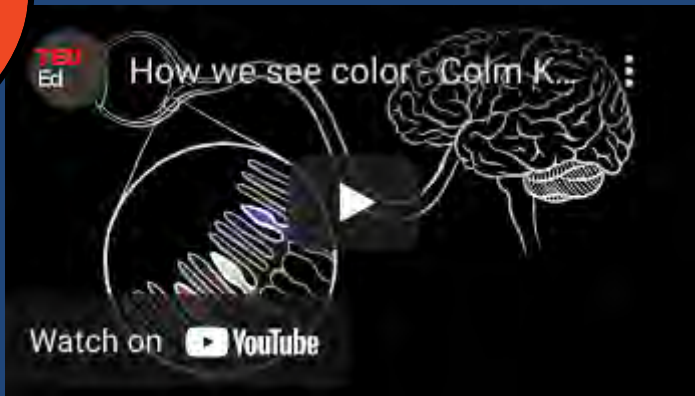
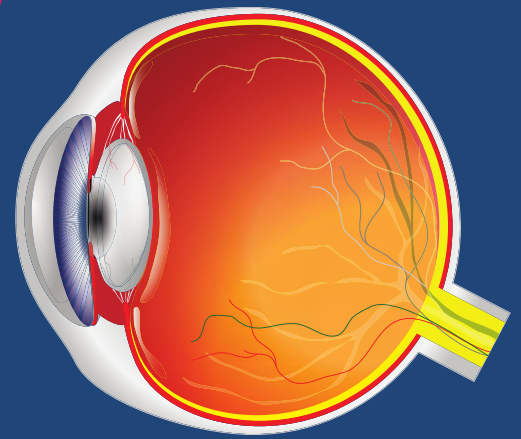


2

Repeat this for various other screen colours and observe the difference in the RGB filter. Can you match our microscope images of smartphone screens to the display colour?

Answers: top left=red; top right=blue; bottom left=black; bottom right = yellow)

What connection can you make between the human eye and a digital display screen?



The retina at the back of our eyes is made up of rod cells and cone cells. There are three types of cones cells, each with varying sensitivities to light of different wavelengths: for this reason, they are often referred to as "blue," "green," and "red". The image below shows how each of the cones absorb the wavelengths of light to varying degrees. Screens on our digital devices are not too dissimilar to this - engineering inspired by human perception of light.

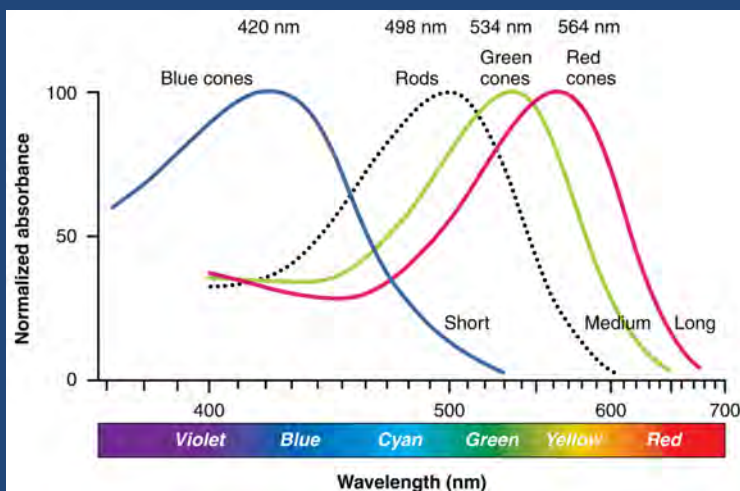
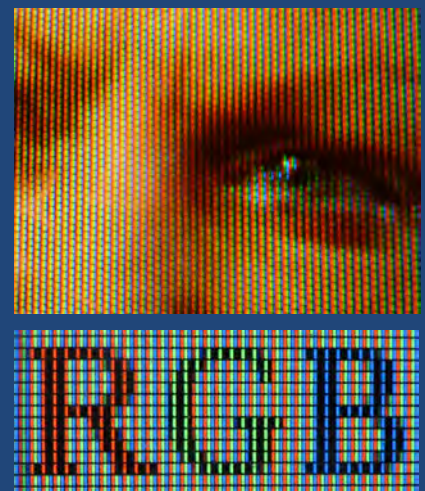


Image: Wikipedia Commons



**Push Yourself Further:** While you have the smartphones out, why not try out the activity explored in the [SSERC Bulletin 273](#) - combine a smartphone, some cling film and a few drops of water to construct a simple microscope. The original publication by OpenFlexure can be found [here](#).

