

Primary colours

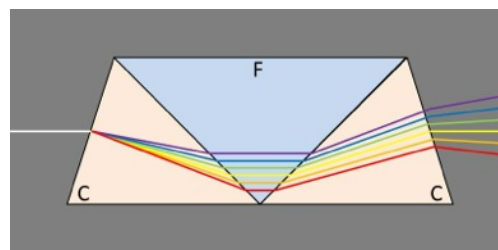
Shannon and Ian Jacobs

I was asked to show my class of ten year olds how light is absorbed. I knew that red cellophane looks red but when I thought about that I realised I didn't understand it.



Everything looks red through a red filter.

I asked Dad what he had in his boxes. He came back with a direct vision prism and a small fluorescent table lamp.



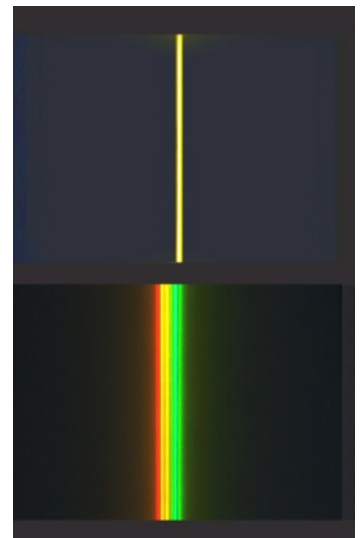
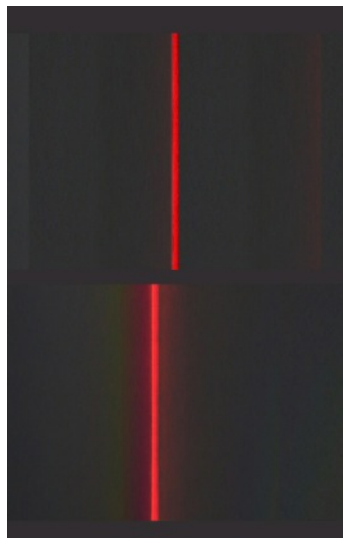
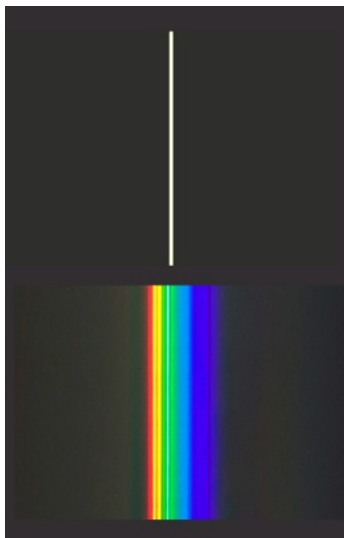
The direct vision prism and the light paths through it.

The prism is quite small. Really it's three prisms stuck together. When you look through it you see rainbow colours everywhere.

The table lamp gave a bright white line of light.

I looked at the white light in a darkened room through the direct vision prism. There was a spectrum of red, yellow, green, blue and violet lines.

The photographs below show what happens to the light when red and yellow cellophane filters are placed over the lamp.



Left: with no coloured cellophane over the lamp red, yellow, green, and blue light reaches the prism.

Middle: with red cellophane over the lamp only red light reaches the prism. All the other colours are blocked.

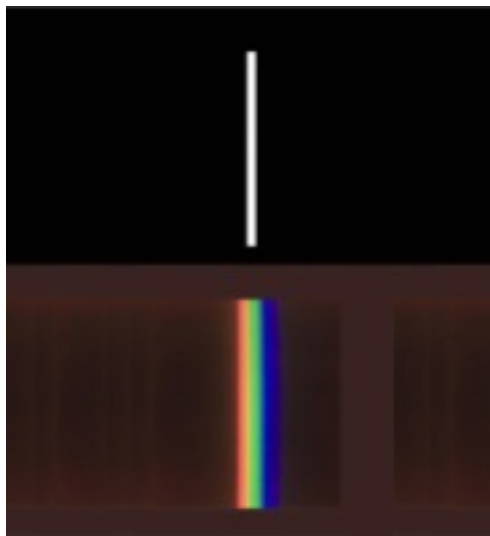
Right: with yellow cellophane over the lamp red, yellow and green reach the prism. The blue and the violet are blocked.

On the day I did this with my class, I passed out ordinary glass prisms and showed them how to see the coloured lines when looking at the desk lamp. I then added one filter at a time. We all had fun.

The red filter absorbed every colour except red. The yellow one absorbed only the blue and the violet. They all agreed with me. Red and green light at the same time looks yellow. Now I know that everyone sees what I see, and we know that filters absorb (block) some colours and not others. That is what I'd been asked to show them.

Primary colours: red green and blue

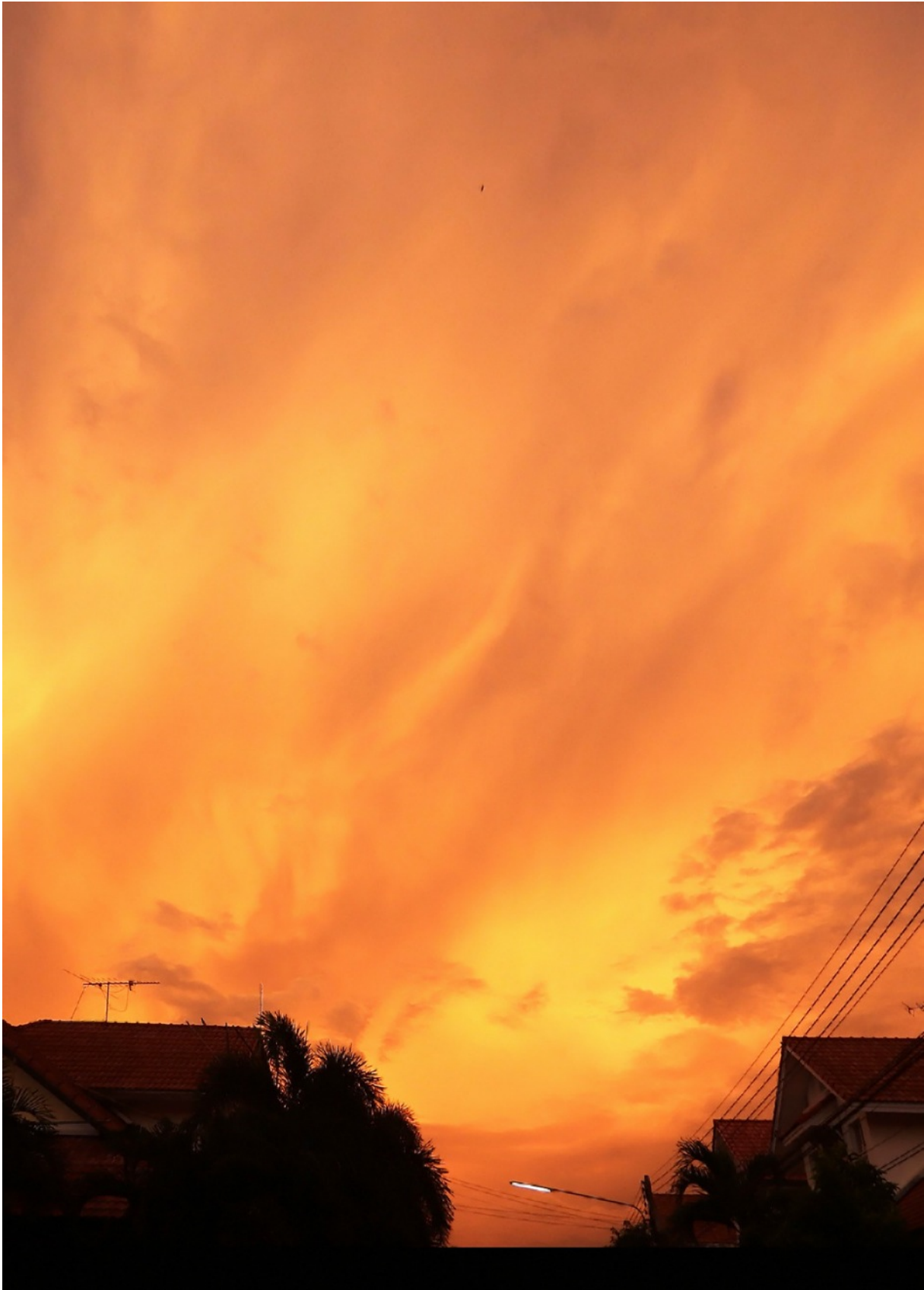
My school has an iPad program so we all have iPads. I realised after I'd done this with my class that there was another way I could have done it. A white monitor screen has just three phosphors, red, green and blue. The phosphors each activate one of the three sets of colour sensors in our eyes and are called *primary* colours.



Make a black image on the iPad screen and put a white line in the middle.

The white line is split into three colours with a prism. The red filter passes only red. The yellow filter passes red and green and absorbs the blue.

Note: blue is removed from sunlight near sunset. The remaining mixture of red and green light turns the sky yellow to our eyes. The sky can be yellow to orange and clouds can look red at sunset but the sky is never green.



Sunset sky in Bangkok from the road outside our front gate. Yellow and orange to our eyes, but in reality a mixture of the remaining red and green sunlight.