5.2 Seeing Colour

EXPLORE

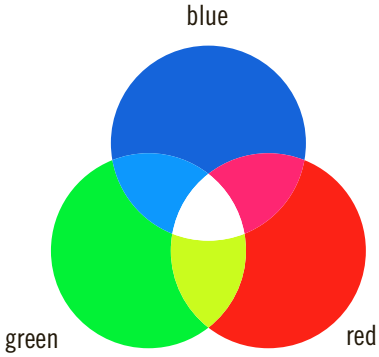
The technological breakthrough that led to colour television involved making a screen that contained tiny dots of colour. When these dots glow in different combinations, different colours appear on the screen.

Examine this close-up view of a television picture. You will see that the picture is made up of tiny dots of colour.

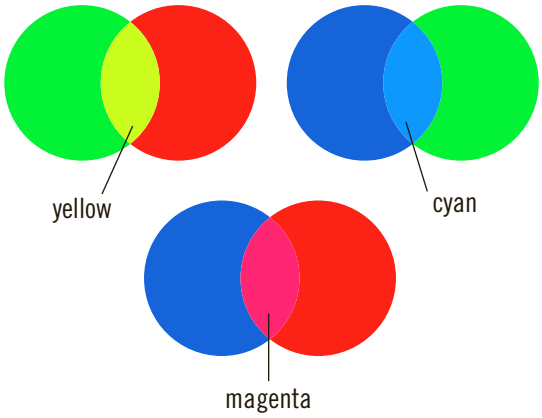
DEVELOP

Adding Colours of Light Together

Mixing coloured lights together to produce other colours can be explained using the **addition model of colour**. When red, green, and blue lights are put together in various combinations, as you saw in the Investigator activity, your eyes add these colours together and see an average, or secondary, colour.



Primary colours



Secondary colours

The **primary colours of light** are red, green, and blue. When you put all the primary colours of light together, you produce white light. **Secondary colours of light** are produced when you mix pairs of primary colours of light together. The secondary colours of light are yellow, cyan, and magenta. Yellow is produced by mixing green and red light. How are cyan and magenta produced?

Recall that the retina is the lining at the back of your eye that reacts to light. The retina itself is made up of specialized cells. Some of these cells are called **cones**. There are three types of cones, each sensitive to different ranges of colour: red, green, and blue. When light hits the cones, the cones send messages to your brain. The colour that you see depends on the type and number of cones responding to the light entering your eye.

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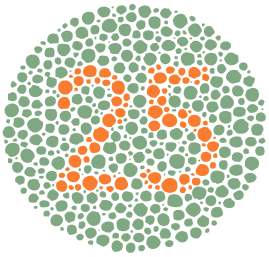
After-image

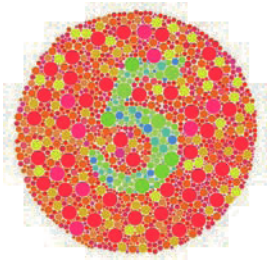
Sometimes, after you have stared at a particular colour for a long time, you will see an "after-image." Look at this circle for about 30 s, then, immediately look at a piece of white paper. What do you see?

After 30 s, the cones in your retina that are sensitive to red light had become tired. So when you looked at the white paper, which reflects light that contains all the colours, you saw light without any red.

- How does this explain the colour you did see?



People who are green and yellow colour-blind will not see the number "25."



People who are red and green colour-blind will not see the number "5."

Some people do not see all colours. The cone cells within the eye may be defective causing a condition known as **colour blindness**. Look at the images on the left to determine if you are colour blind.

COMMUNICATE

1 If you stare at one colour for a while, then look at a white page, you will see a different coloured after-image. Use the diagram of colour addition on the previous page to predict which colours you would see after staring at each of the following colours for a while. Explain what is happening within your eye in each case.

a) blue
b) green
c) red
d) yellow (Hint: What colours make up yellow?)

5.3 What Colour Is It?

EXPLORE

Have you ever tried on different pairs of sunglasses? Depending on the colour of their lenses, sunglasses can give the world a coloured tint. Some can make everything look yellowish. Others seem to make greens and blues more intense. Why does this happen? Is this an effect on your eyes or on the light? In your Science Journal, write down what you think might be happening as light passes through a coloured lens or filter.

Sunglasses are not only "cool." They subtract some part of the light.

DEVELOP

Subtracting Colour

A filter lets some parts through and keeps other parts out. A coffee filter lets water and the flavour of coffee pass into a pot, while keeping out the coffee grains. Coloured sunglasses are like filters that act to take out, or subtract, some part of light.

You know that white light contains all of the colours in the spectrum. But why do objects have colour? For example, why is a tomato red or why is the grass green? What would you see if you looked at a red tomato using a filter that allowed only green light to pass through? if you looked at green grass through a filter that allowed only blue light to pass through? Start exploring!