

Seeing Colour

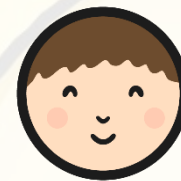


LO: to investigate how light enables us to see colours.

Success Criteria

- I can explain what Isaac Newton discovered about colour.
- I can investigate and understand how light enables us to see colours.
- I can use my knowledge of light and colour to create a secret message.

Newton's Discovery




Isaac Newton made many famous discoveries and had lots of important ideas.

Read the Fact Sheet on your Isaac Newton Comprehension Activity Sheet and answer the questions to learn more about his work.

Isaac Newton's Colour Experiments

Use the Fact Sheet above to answer these questions about Isaac Newton and his discovery.

1. When was Isaac Newton born?
2. When was he born?
3. Why did he conduct his experiments at home?
4. How did people in the 1600s believe colours were created?
5. What did Newton use to create a beam of light?
6. Why do you think his experiment is known as a prism?
7. What did he prove about how we see an object's colour?
8. What did you think Newton meant when he says he 'invented' the rainbow in his experiment?
9. Can you think of a situation that explains the idea of Newton's second experiment?
10. Look at this painting of Isaac Newton that hangs in the RSCA Museum. What do you think he may be thinking about as he carries out his usual experiment?



Isaac Newton's Colour Experiments Fact Sheet

Isaac Newton (1642 – 1726) was a famous scientist and mathematician. His experiments into light and colour were extremely important in improving our understanding of these areas of science.

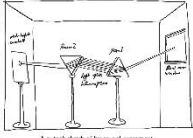

Newton started looking into light's behaviour in the late 1660s. At the time, the 'young Isaac Newton' was still in Cambridge, where Newton usually worked on his studies but from September at his home in Lincolnshire.

People then believed that colour was created, in a way of light and colour, that red was the lightest colour and blue was the darkest colour. Newton's experiment proved that colour is not created but is a property of light itself. Newton used a glass prism to split white light into its constituent colours. Newton set up a second glass inverted prism to recombine the colours back into white light. He used a screen to catch the light and observed that the spectrum of colours was the same as the spectrum of colours that came from the sun. This proved that light is made up of colours, the prism simply allows them to be seen.

Newton created the 'show' the 'colour spectrum', and he chose to split the spectrum into the seven colours we know today: red, orange, yellow, green, blue, indigo and violet. Although the spectrum is continuous, with no boundaries between one individual colour, he selected the number seven, because he believed it to be a special number.

He was able to show that each colour was its own angle of reflection, and used this to prove that an object's colour is a property of the light reflecting off it, rather than something inherent to the object itself.

Newton continued to carry out further investigations into light and colour, as well as publishing his book 'Opticks' in 1704. Some scientists consider his most influential book of that time, a book just as he has done, as it explained how molecules reflect sunlight on their surfaces, such as Galileo's experiments on the Moon's surface.


Colour investigation

Look at your results.

Do you notice anything significant or interesting?

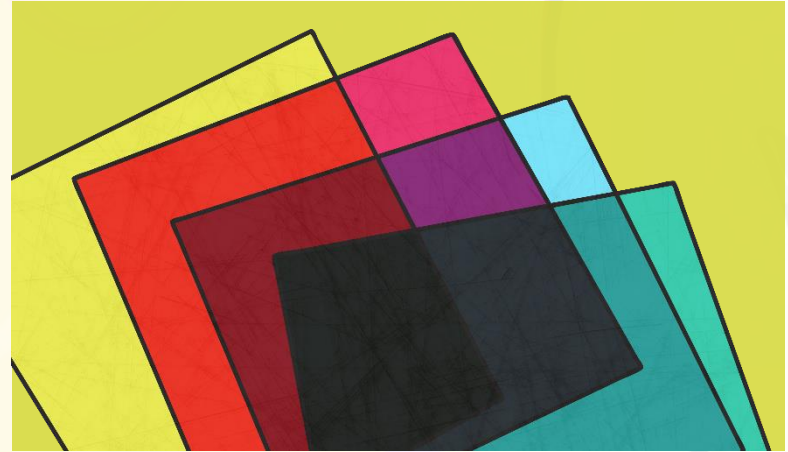
Can you make any conclusions from your investigation?

Filtering Facts

Did you notice that when you look at a green object through a green filter, it still looks green?

But did you discover that a green object looks black through another colour of filter?

Why does this happen?



Filtering Facts

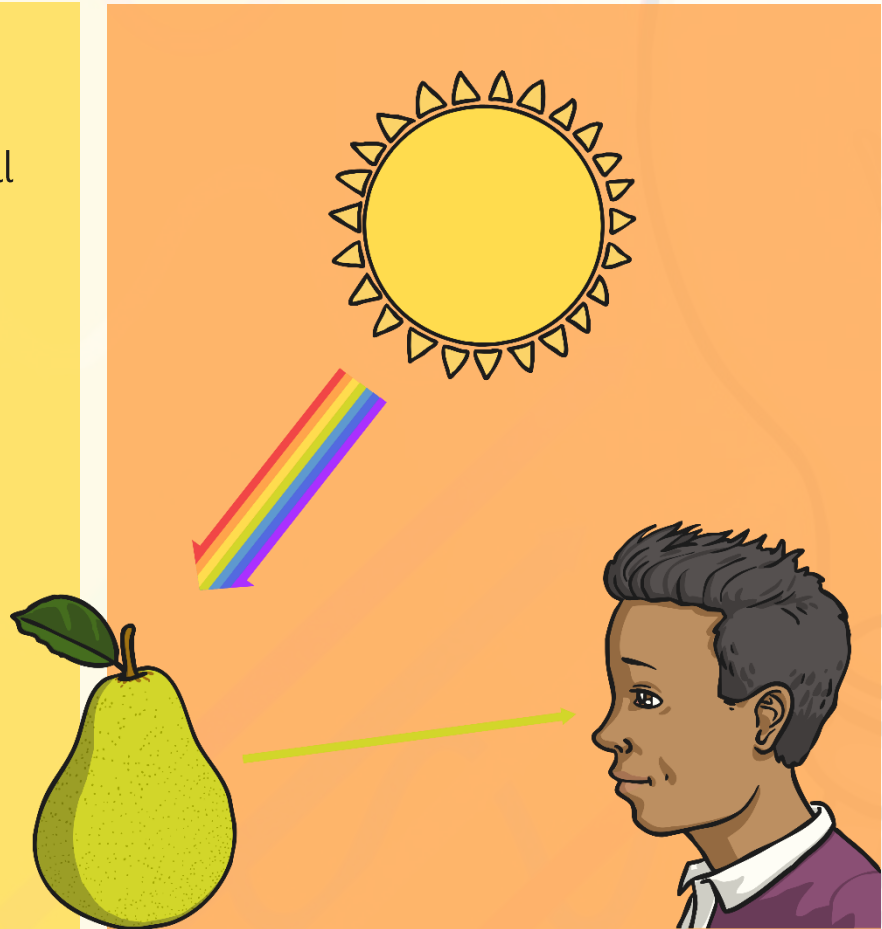
As you found out in the last lesson, white light is actually made up of all the colours of the rainbow.

This is called the 'visible spectrum'.

When a ray of white light shines on an object, the object absorbs some colours and reflects others.

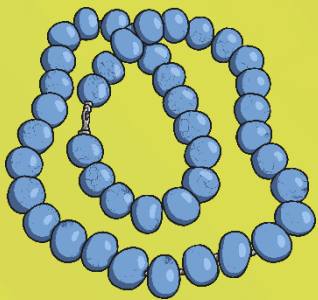
A pear reflects the green light and absorbs the other colours of light. It is only the green light that bounces back into our eye.

The pear looks green to our eyes!



Filtering Facts

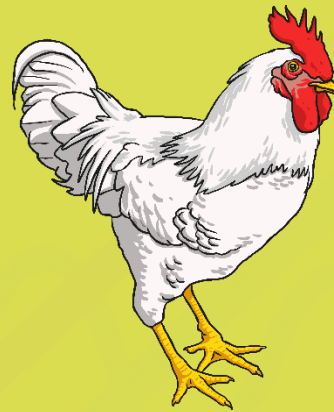
Blue objects absorb all colours of light but blue, which they reflect.



Red objects absorb all colours of light but red, which they reflect.



White objects reflect all the colours of light.



Black objects absorb all the colours of light.

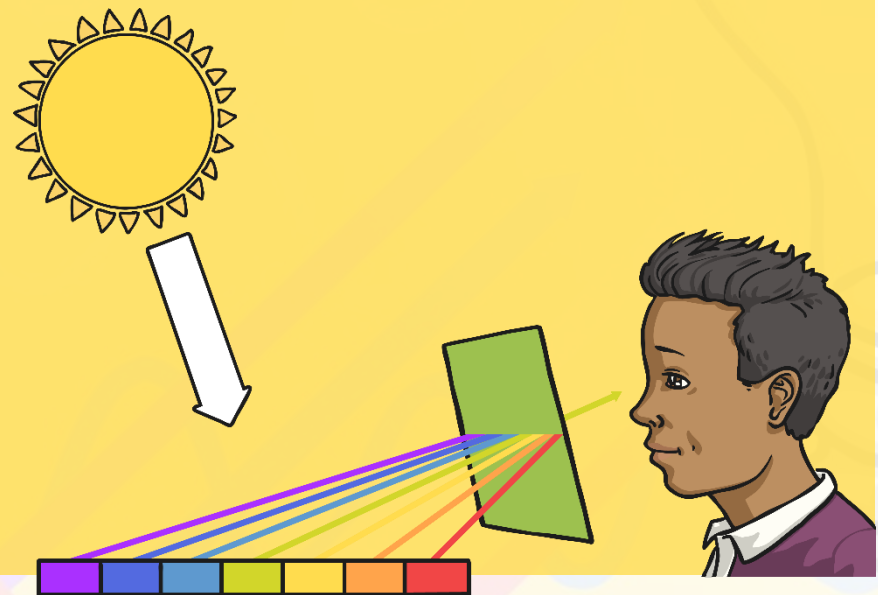


Filtering Facts

A filter only allows certain colours of light through. For example, a green filter allows green light through, but absorbs the other colours.

So if you look at a green pear through a green filter, it will still look green, because the green light will get through the filter to your eyes.

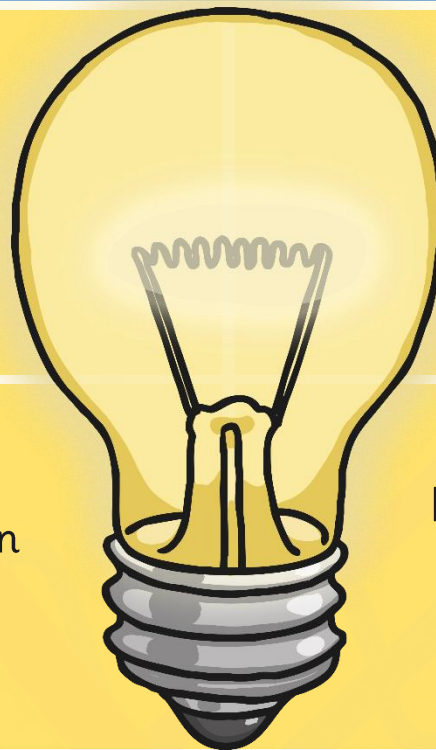
But if you look at it through a red filter, it will look black, because there is no red light reflecting off the pear, and the green light that is reflecting off it will be absorbed by the filter.



Filtering Facts

Look again at your results and your conclusion.

Do they support this explanation?

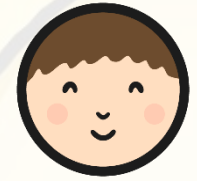


Are there any results that don't make sense?

Can you think of a reason for this?

How could you check your results to be sure they are reliable?

Secret Messages


















Your challenge is to use your knowledge of light, colour and filters to create a secret message!

The message should be impossible to read unless you look at it through a coloured filter.

Follow the instructions on your Secret Message Activity Sheet to prepare your message.

Then swap with a partner and use filters to try to read each other's messages.

 Can you Use a lig red and should b	 Can you Choose colour th colours t pattern o message	 Secret Message <input type="text"/> Can you write a secret message that says one thing when looked at through one colour of filter, but says something else when viewed through a different coloured filter? Choose two coloured filters and try looking at different colours of pens or pencils through them. Choose the best colours to write your messages, checking them through the filters to make sure they stand out. Then choose colours that look light or disappear when you look at them through the filters, and use these to draw a pattern around and over your messages, hiding them from view. Your partner should be able to decode the messages by looking at them through your different filters. <input type="text"/> Ask your partner to decode the message and complete this sentence: The secret message says _____ How does the red filter make your message easy to read? Explain your ideas below. _____ _____ _____ _____ _____ _____             <small>Science Year 6 Light Energy Crosses Lesson 5</small>
--	--	--

How does this work? Explain your ideas on the Activity Sheet.

Aim



- I can investigate how light enables us to see colours.

Success Criteria

- I can explain what Isaac Newton discovered about colour.
- I can investigate and understand how light enables us to see colours.
- I can use my knowledge of light and colour to create a secret message.

