Spectacular Spectrum

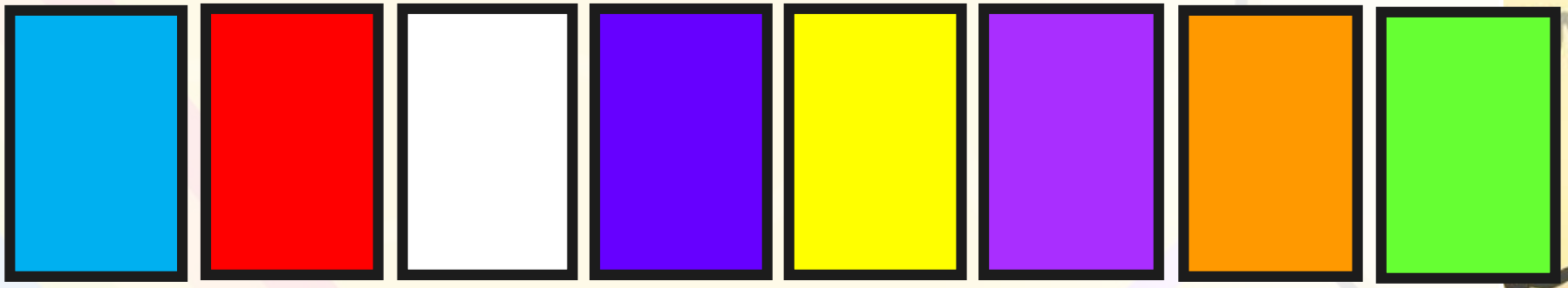
LO: to investigate how a prism changes a ray of light to show the visible spectrum.

Success Criteria

- I can understand how a prism affects a ray of light.
- I can explain what this tells us about the visible spectrum.
- I can describe what Isaac Newton discovered about light.
- I can make my own colour wheel and explain what it shows about light.

What Colour Is Light?

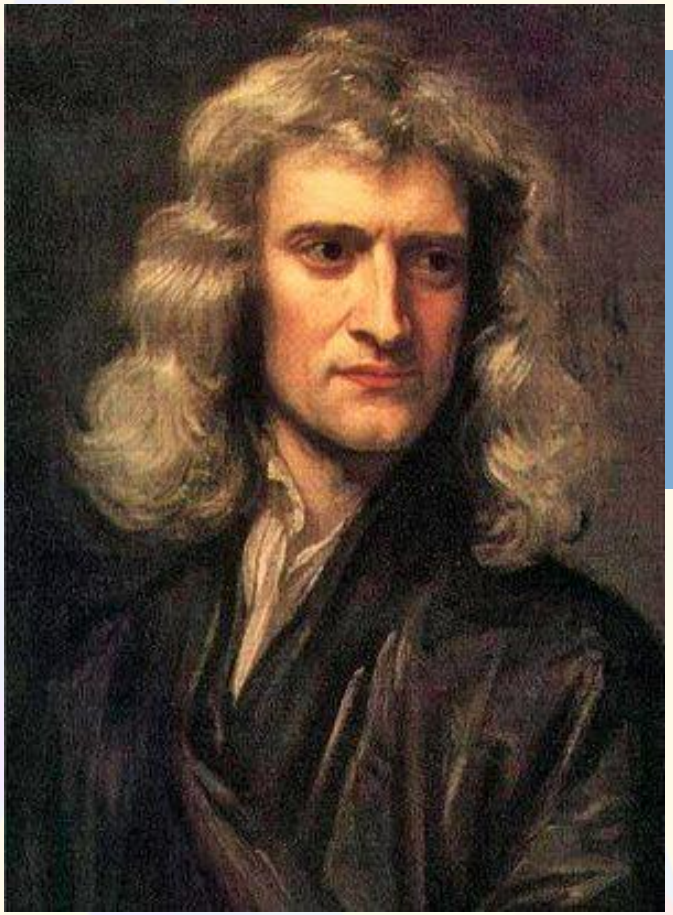
Here are several coloured rectangles. Which rectangle do you think shows what colour light is?



Write down which colour you have chosen and why you have chosen it?

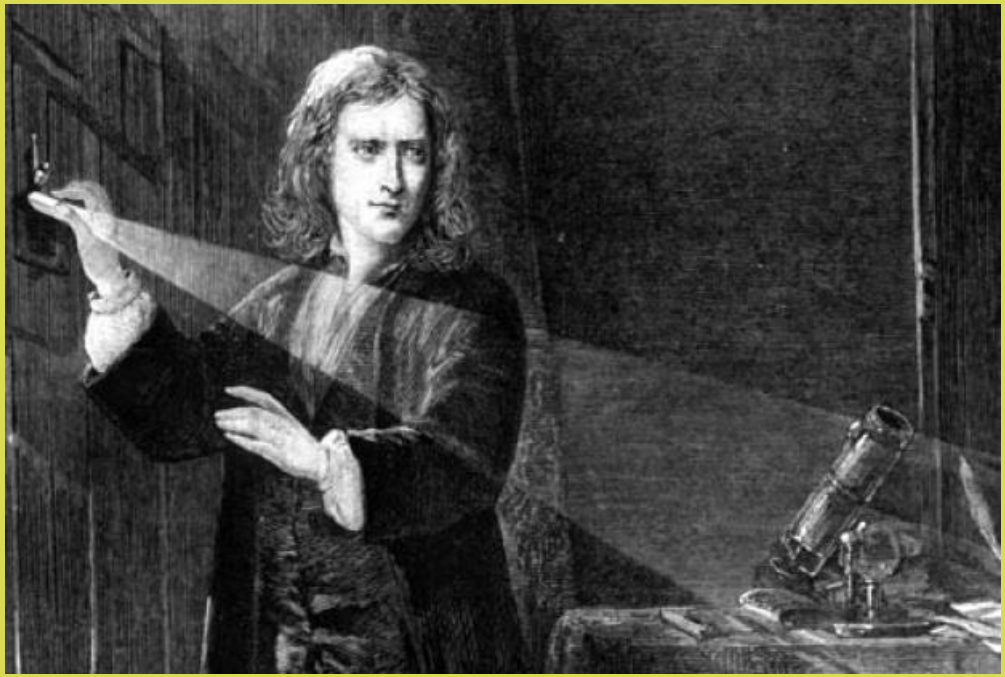
At the end of this lesson, you will answer this question again, and see if your first thoughts were accurate or not!

Isaac Newton



Isaac Newton was an English scientist and mathematician. His scientific ideas and discoveries about gravity, motion and light are still considered to be extremely important today.

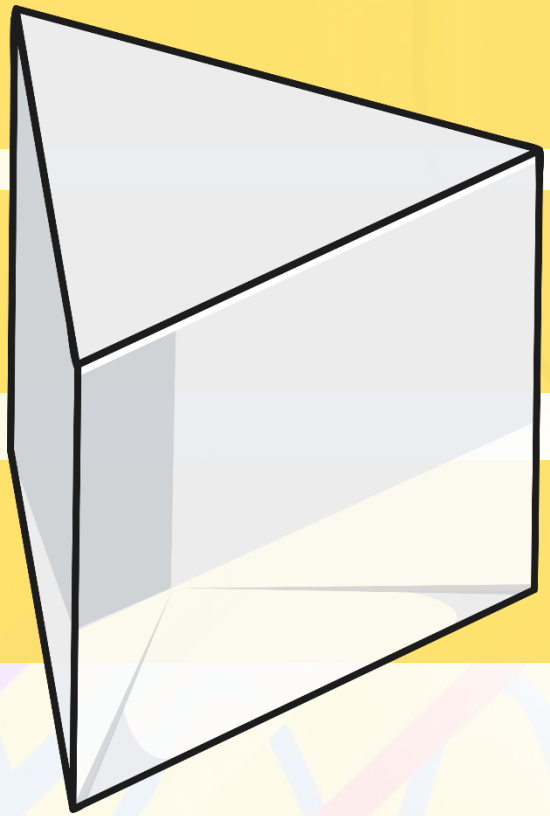
Isaac Newton



In 1666, Newton made a discovery about light that led him to develop his Theory of Colour, a theory that still informs our understanding of light today. He placed a prism in front of ray of light, and his observations were incredible.

Prisms

A prism is a solid shape whose 2 ends are the same size and shape.



Isaac Newton used a transparent triangular prism in his investigation.

What can you remember about what happens to light when it travels between air and a transparent material?

Spectrum investigation.

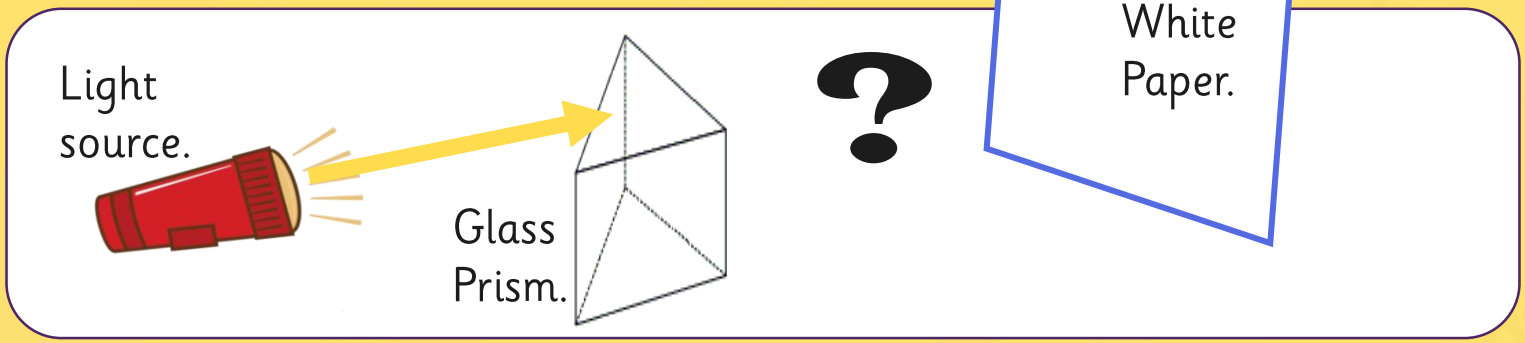
When light travels from air through a transparent material, it refracts, or bends. This is an important fact, as it is this refraction that caused the amazing effects that Newton observed.

Spectrum investigation.

Your turn!

Shine a torch through a transparent prism, and hold a piece of white card in front of the refracted ray of light as it leaves the prism.

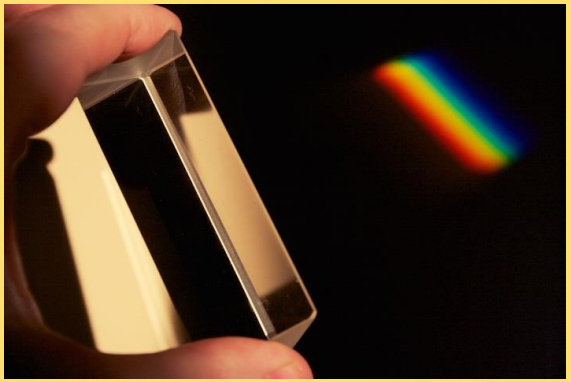
Can you see what Newton observed?



Rainbows

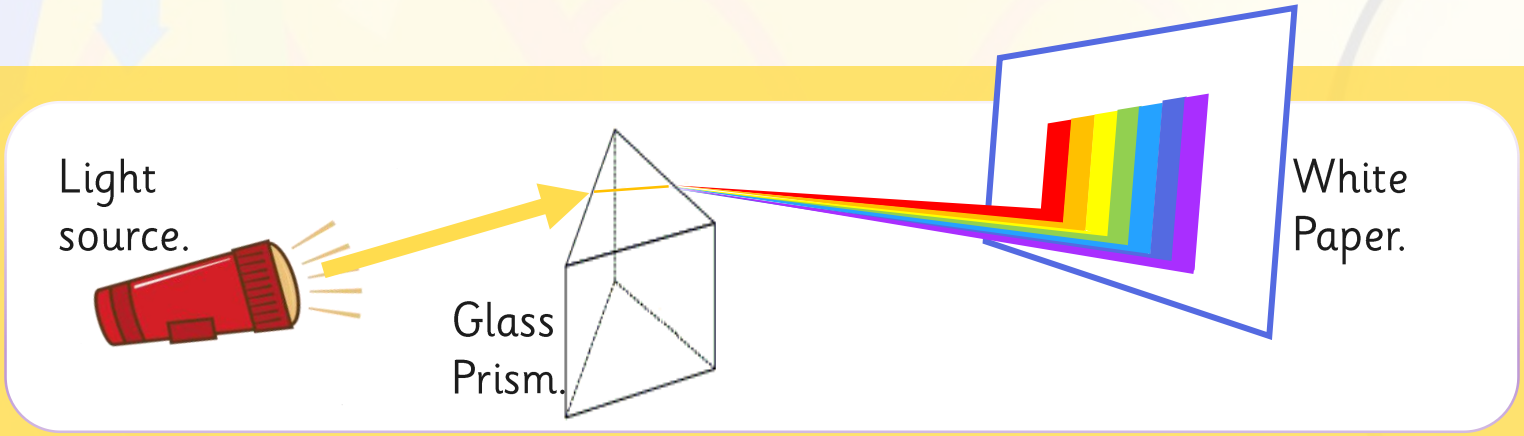
Did you see a rainbow of colours form on your white card? These colours are known as the 'Visible Spectrum'.

This is what Isaac Newton observed, and it made him realise that although light looks white, it is actually made up of all the colours of the rainbow!



When these colours merge together, it looks white to our eyes. But we can use a prism to separate the different colours of the spectrum.

Spectrum investigation.

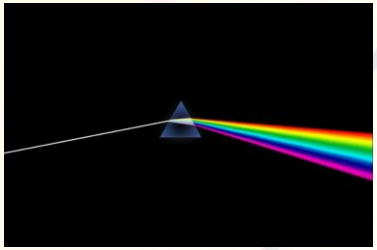


Observations.

1) Draw a labelled diagram.
2) Write a description about what you did in the investigation and explain what you saw.

Word Bank.
Glass Prism.
Light source.
Ray of light.
White light.
Refraction / refracted.
Spectrum.
Visible Spectrum.

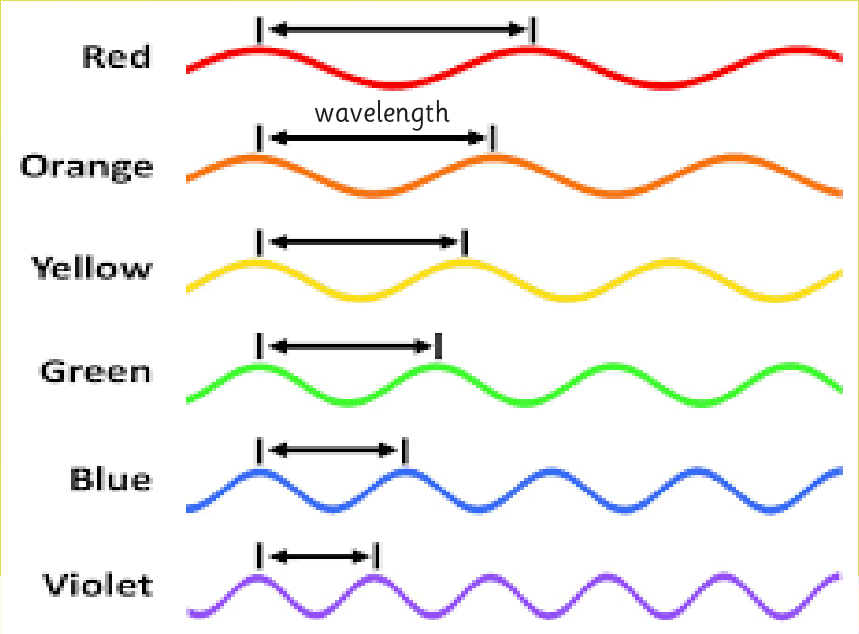
Rainbows



Why do we see a rainbow?

We see a spectrum of colours because each colour within a ray of light has a different wavelength.

Red has the longest wavelength, and violet has the shortest.



When a ray of light travels from air through a transparent material, it refracts.

Since each colour's wavelength is slightly different, the colours in the ray of light bend slightly differently. This causes them to separate and become visible to our eyes.

Red bends the least, and violet bends the most.

Rainbows

Can you remember the colours of the rainbow?

They are red, orange, yellow, green, blue, indigo and violet.

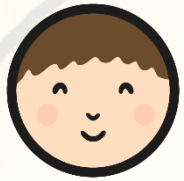
Some people remember them using this mnemonic:

Richard Of York Gained Battle In Vain.

Others use the initial of each colour to spell a name:

ROY G BIV

Newton's Colour Wheel

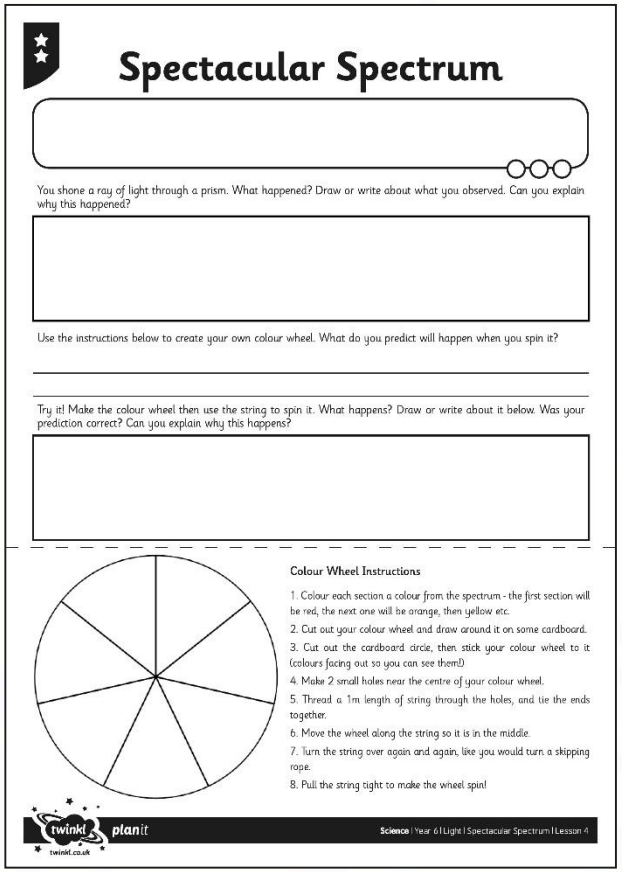


A colour wheel can be used to show the colours of the spectrum that Newton discovered.

Make your own colour wheel by following the instructions on your Spectacular Spectrum Activity Sheet.

Record your observations on your Spectacular Spectrum Activity Sheet.

Can you explain why this happened?



Spectacular Spectrum

You shone a ray of light through a prism. What happened? Draw or write about what you observed. Can you explain why this happened?

Use the instructions below to create your own colour wheel. What do you predict will happen when you spin it?

Try it! Make the colour wheel then use the string to spin it. What happens? Draw or write about it below. Was your prediction correct? Can you explain why this happens?

Colour Wheel Instructions

1. Colour each section a colour from the spectrum - the first section will be red, the next one will be orange, then yellow etc.
2. Cut out your colour wheel and draw around it on some cardboard.
3. Cut out the cardboard circle, then stick your colour wheel to it (colours facing out so you can see them!)
4. Make 2 small holes near the centre of your colour wheel.
5. Thread a 1m length of string through the holes, and tie the ends together.
6. Move the wheel along the string so it is in the middle.
7. Turn the string over again and again, like you would turn a skipping rope.
8. Pull the string tight to make the wheel spin!

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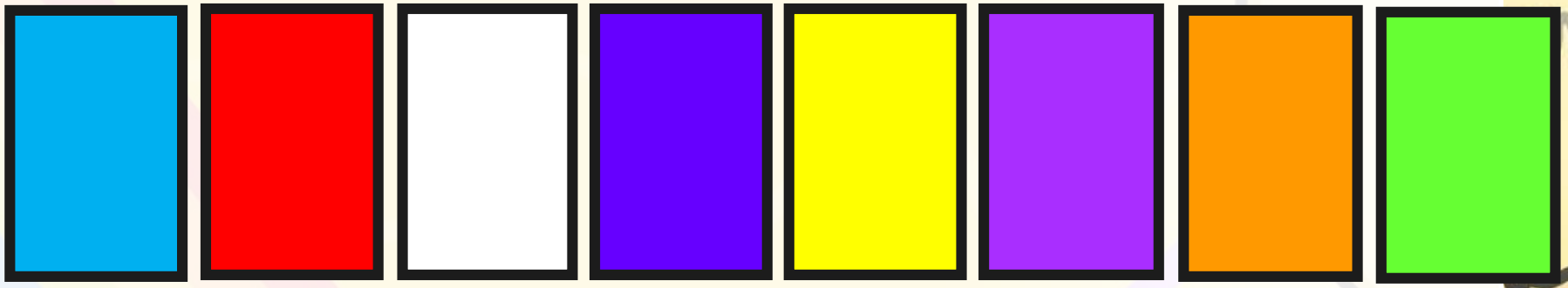
What Colour Is Light?

At the start of the lesson, you answered this question.



Was your initial answer correct?

Just like the famous Isaac Newton, have used a prism to refract a ray of light to show that light consist of a spectrum colours.

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