Key Stage 4
Wave or particle?

Pupil worksheet

What is light?

This is a question that scientists have struggled with for centuries. Light has no mass but it is obvious that it exists. It can travel from place to place at incredible speeds but how does it move? If you were to magnify a ray of light what would you see?

Following many years of investigation, we have got to the point where we have a good understanding of the nature of light. This knowledge has unlocked the potential for light to be used for many exciting new applications. Scientists at the University of Oxford are amongst those developing new ways of using light which could be used to produce driverless cars, super-computers and powerful telescopes.

Light investigations

Isaac Newton famously carried out many investigations into light. He passed white light through a prism and saw that it split into a spectrum. He also studied how light obeyed strict rules such as the law of reflection. Light bounces off a mirror at the same angle that it hit it - much like a pool ball hitting a cushion. He concluded that therefore, light must consist of particles - like lots of tiny balls.

In 1801 Thomas Young decided to test this theory and carried out the double slit experiment.

Your task

You are going to see a simple version of Thomas Young’s experiment. The hypothesis you are testing is ‘Light is made up of tiny particles’.

1. On the next page, fill in the boxes to write your prediction, method, results and conclusion.
2. Complete your conclusion by using the information on the final page to write a scientific explanation for your results.

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**Prediction**
On the diagram draw what you would expect to see if light was made up of tiny particles. Imagine that tiny balls are being shot through the slits, what would you see on the screen?

![Diagram of laser, double slit, and screen]

**Method**
Now, test your prediction by carrying out the experiment. Briefly describe it below.

**Results**
On the diagram draw what you saw.

![Diagram of laser, double slit, and screen]

**Conclusion**
Do the results match with your prediction? Is the light acting as though it is made up of particles? Explain why you think this.

Is the light behaving like a wave? The images and weblinks on the next page will help you explain what is happening.

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When waves pass through a gap they form a pattern. This is called diffraction.

If waves pass through two gaps then interference occurs. We observe areas of light, and areas of dark.

This happens because of the way the waves interact when they meet.