Year 6 Physical Science: Light (Shadows, Reflection and Refraction) Unit 2

Scientific Model (KS2):

Energy Transfer Model

- Ensure the children understand that light is a type of energy by referring to it as light energy throughout the unit.
- Remind children that energy is not created from scratch but is instead transferred from one form to another (energy from the sun and electricity is transferred into light energy).

Scientific Investigations:

- Looking for Naturally- Occurring Patterns and Relationships
- Comparative and Fair Testing

Scientists:

- Isaac Newton - carried out experiments about light. Using a dark room and a prism, Newton was the first to discover that light is made up of different colours.

Scientific Skills Applied:

ASK
- To ask different kinds of questions
- To make predictions based on evidence

BREAKDOWN
- To recognise and control variables in tests
- To plan different enquiries to answer questions
- To recognise when to use comparative and fair tests
- To plan when to take repeat readings

CAPTURE
- To choose and use a range of equipment precisely
- To decide how to record data
- To decide what observations and measurements to make

DESCRIBE
- To use evidence from enquiry to support or refute ideas being tested
- To use varied ways to present data
- To explain how scientific ideas develop over time
- To identify and comment, using appropriate language, on patterns they notice
- To use relevant scientific language and illustrations in reports and when drawing conclusions

Prior Learning:

- Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light)
- Notice that light is reflected from surfaces. (Y3 - Light)
- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)
- Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)
- Find patterns in the way that the size of shadows changes. (Y3 - Light)

Curriculum	Learning Intention	Knowledge and Key Vocabulary
Making links to learning and discuss the model (if needed) Ensure the children understand that light is a type of energy by referring to it as light energy throughout the unit. Remind children that energy is not created from scratch but is instead transferred from one form to another (energy from the sun and electricity is transferred into light energy).	How does light energy help us see? Recap energy transfer model linked to light (Year 3) and sound (year 4). Define and give examples of light sources. Know that light is an energy. Without light energy there is no life.	

Knowledge and skills through investigations

Pupils should be taught to:

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Notes and guidance (non-statutory):

- Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection, and shadows.
- They should talk about what happens and make predictions.

Pupils might work scientifically by:

- deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works.
- They might investigate the relationship between light sources, objects, and shadows by using shadow puppets.
- They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

How does light energy help us see?

- Demonstrate that light energy travels in a straight line.
- Create a model to show how light travels from a light energy source to our eyes, or to an object and then our eyes.
- Explain how we see things.

How is light energy reflected?

- Explain how light energy is reflected.
- Measure the angles of incidence and reflection.
- Use understanding of reflection to create a working periscope.
- Understand how mirrors reflect light energy, and how they can help us see objects.
- Explain how the periscope allows you to see objects you would not usually be able to see.

How can refraction alter what we see?

- Understand how light energy is refracted.
- Investigate the effects of refraction.
- Understand the way refraction alters the direction of light energy.
- Investigate how refraction changes the direction in which light energy travels.

What colour is light energy?

- Investigate how a prism changes a ray of light energy to show the spectrum.
- Understand how a prism affects a ray of light energy.
- Explain what this tells us about the visible spectrum.
- Describe what Isaac Newton discovered about light.
- Make a colour wheel and explain what it shows about light energy.

How do we see colour?

- Explain what Isaac Newton discovered about colour.
- Investigate and understand how light energy enables us to see colours.
- Use knowledge of light energy and colour to create a secret message.

How are shadows formed?

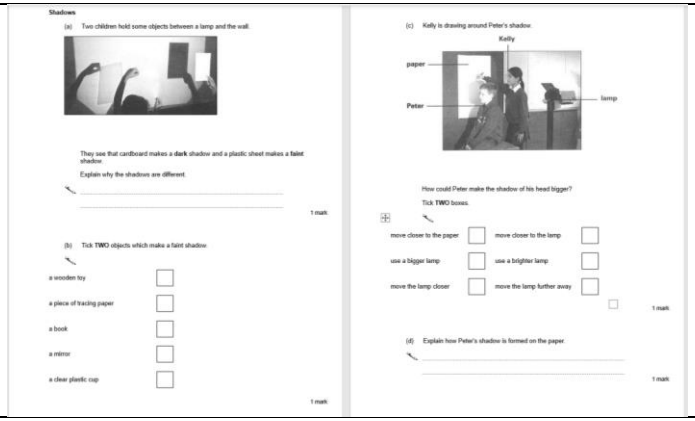
- Explain how a shadow is formed.
- Explain why shadows are the same shape as the object that casts them.

Knowledge:

- Know light is an energy known as electromagnetic radiation.
- Know energy is not created but transferred.
- Name four light energy sources.
- Know light energy travels in straight lines.
- Know light energy can travel through a vacuum.
- Know that a vacuum is a space with nothing in it—not even air.
- Explain how some light energy must be reflected from an object into our eye for the object to be seen.
- Name the seven colours of the spectrum white light energy is composed of.
- Know a shadow is formed when an object blocks the light path.
- Explain how we see colours.
- Know what effects the size of a shadow.

Vocabulary:

- Light, source, travel, straight line, waves, ray, beam, wave, photon, energy, vacuum.
- Reflection, angle, incidence, normal, periscope.
- Refraction, bend, lens, focus, focal point, transparent.
- Refract, spectrum, wavelength, colour, prism, visible, transparent, rainbow, Isaac Newton.
- Filter, colour, light, see, reflect, absorb.
- Shadow, light, source, opaque, size, distance, change, tilt, cast.

	• Use knowledge of Isaac Newton's ideas about light energy to create a shadow puppet play.	
Application and Assessment Activity		

Thinking Deeper:
Children can label parts of the eye and explain how each part is involved in seeing an object from which light energy is reflected.

Links to other subjects:

- Subject Specific links –
  - Maths measuring lengths and distances
- Personal Development – To know not to look at the sun for health and safety.
- SMSC – To know about other cultures which use light as a part of celebration, Diwali, Hanukkah etc
- Cultural Capital –To be exposed to the Chinese culture of shadow puppetry
- Careers – Electricians, opticians
- British Values – Working together in groups valuing contributions and ideas to develop an investigation
- Equality – All children within the groups working together will have high expectations with regards to group investigation outcomes