**National Curriculum Objectives:**
(*Statutory requirements)*

a) recognise that they need light in order to see things and that dark is the absence of light
b) notice that light is reflected from surfaces
c) recognise that light from the sun can be dangerous and that there are ways to protect their eyes
d) recognise that shadows are formed when the light from a light source is blocked by an opaque object
e) find patterns in the way that the size of shadows change.

**Experimental and investigative work focuses on:**

| **Planning an investigation:** | **Obtaining and evaluating evidence:** |
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| 1. Asking relevant questions and using different types of scientific enquiries to answer them.<br>2. Setting up simple practical enquiries, comparative and fair tests. | 3. Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment.<br>4. Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.<br>5. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.<br>6. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions<br>7. Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.<br>8. Identifying differences, similarities or changes related to simple scientific ideas and processes.<br>9. Using straightforward scientific evidence to answer questions or to support their findings. |

**Most children will:**

- Recognise you need light in order to see things
- Understand darkness is the absence of light
- Understand light is reflected from surfaces
- Understand it is dangerous to look at the sun & how to protect your eyes
- Recognise shadows are formed when light from a light source is blocked by an opaque object
- Notice patterns in the way shadow size can be changed

**Some will progress less and will:**

- Begin to recognise you need light in order to see things
- Begin to understand darkness is the absence of light
- Begin to understand it is dangerous to look at the sun & how to protect your eyes
- Recognise shadows are formed when light from a light source is blocked by an opaque object
- Notice patterns in the way shadow size can be changed

**Others will progress further and will also:**

As most with:

- Recognise and understand how shadows are formed when light from a light source is blocked by an opaque object
- Notice and explain patterns in the way shadow size can be changed

***Key vocabulary:***

**Previously taught:**

**New:** Sun, light, dark, moon, stars, day, night, shadows, source of light, block, rotate, transparent, translucent, opaque, direction, light travels, reflects, surfaces.

| Session | Learning Objectives | Introduction | Main activity | Application and review | Resources |
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| 1 | I can recognise that I need light to see things, and that dark is the absence of light. Assessment: a | What is light? Complete mind map sheet to show prior knowledge and discuss as a class. What is a light source? Discuss & children to identify light sources around the classroom.<br><br>Discuss what dark is. (Absence of light). Cannot see in complete darkness. | Activity 1: Light source sorting activity. In pairs children to separate the cards into those that are light sources and those that aren't. Photograph and stick into book as evidence. Differentiated cards – e.g. moon, mirror, window. Not light sources.<br>Activity 2: Feely bags with objects in. Pupils rotate. Fill in activity sheet "what's in the bag?" by feeling the outside. Showing the absence of light. Then revisit allowing them to open it and complete their sheet. | Complete light and dark activity sheet (Differentiated) to show understanding of why we need light and what darkness is. | 5 'feely bags' - drawstring bags for children to feel inside without looking. • 5 objects to place inside them - some ideas include an orange, a shell, a pine cone, bubble wrap, pumice stone, a dice, an avocado or cotton wool |
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| 2 | I can investigate which surfaces reflect light Assessment: b, 1, 6 | Watch film clip about how reflective surfaces and materials work when outside at night. Children to jot down questions or ideas about the video and discuss after. Discuss what reflection is and its benefits/uses. (link to Road Safety). | Activity 1: Look at the range of materials on your table. Investigate their effectiveness at reflecting.<br><br>Activity 2: design a book bag using the reflective materials you investigated to ensure safety when traveling to and from school. | | Torch per pair • A5 piece of white card per pair • 6 materials to test such as CDs, tin foil, paper, different fabrics, bubble wrap, cardboard. • Short film |
| Session | Learning Objectives | Introduction | Main activity | Application and review | Resources |
| 3 | I can use a mirror to reflect light and explain how mirrors work<br><br>Assessment:b, | Recap reflective surfaces as a class. How is a mirror similar? What happens if you look in the mirror? (reversed).<br><br>Discuss emergency vehicles have ambulance for example written backwards so it appears correct in the drivers mirror. | Mirror Games<br>1) write a message → what happens to your message when you look in the mirror? What can you see?<br>2) follow the masking tape → put mirror over their head and look up trying to follow the masking tape on the floor. | | A mirror per child • A wavy chalk line (approximately 3-5m long) drawn on the floor, either outside or in the School Hall. • Interactive Game |

| Session | Learning Objectives | Introduction | Main activity | Application and review | Resources |
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| 4 | • I know that light from the sun can be dangerous and that there are ways we can protect our eyes.<br><br>Assessment:c | Put up Hero & Villain sign. Children to go and stand under the correct sign for the statements displayed on the board; deciding whether they are beneficial or dangerous. Discuss each one as a class.<br><br>Go through what UV light is and how it affects us. Activity 1 to be started.<br><br>Your eyes react to light, especially bright sunlight. Get the pupils to look at their eyes in a mirror. Shut them and count to 30. Open them and look quickly at their pupils. They should be big and get smaller. The pupil is small as there is a lot of light. It gets bigger in the dark to allow more light into the retina. Discuss the importance of protecting your eyes in sunlight and wearing sunglasses and never look into direct light. (link to solar eclipse) | Activity 1: investigation. Set up an investigation (in direct sun) with sugar paper and a 2D plastic shape put on it. Come back to this after a week to see the difference. This is the UV light altering the colour of the paper, the same way it alters our skin tone.<br><br>Activity 2: Children to design their own sunglasses to protect their eyes the best they can. Bring in glasses and discuss their suitability. (Choose some that aren't tinted, don't wrap around the eye enough etc). | Create an information leaflet or advert about sun safety. | • A mirror per child • Coloured paper and card • Colouring pens or pencils |
| Session | Learning Objectives | Introduction | Main activity | Application and review | Resources |
| 5 | I can investigate which materials block light to form shadows.<br>Assessment:d, 1, 2, 3, 4, 6,7 | Explain and discuss how light travels. It travels in a straight line: demonstrate this idea using two pieces of card with a hole punched in them and when lined up the light travels through. What happens if we block light? Introduce vocab: opaque, translucent and transparent and the effect these different material characteristics can have on allowing light to travel. | Activity 1: Investigation.<br>We need to make some curtains for a baby's room. They need to block out light so the baby doesn't wake up too early. Using the materials on the table, a torch and looking at the shadow it creates decide whether the material is opaque, translucent and transparent. Record ideas on differentiated sheet.<br><br>Draw and label the curtains on the blank window and write an explanation to support their material choice. | | 3 equal sized pieces of card per group • Hole punch • A torch per pair • Range of different materials to test - ideas include cotton, cling film, net curtains, voile, upholstery fabric, blackout curtain lining, muslin, tracing paper. |

| Session | Learning Objectives | Introduction | Main activity | Application and review | Resources |
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| 6 | I can find patterns when investigating how shadows change size<br><br>Assessment:e, 1, 2, 3, 4, 6 | Display the concept cartoon on the flipchart and ask pupils to discuss in pairs and feedback their thoughts to the class. Discuss and explain the ideas from the cartoon whilst children think about how and when shadows change.<br><br>*Watch BGT video saved on network at the end, showing how shadows can differ in size depending how close to the light source etc.* | Activity 1: Investigation<br>How do shadows change when the distance between the light source and the object change?<br>Little input for investigation (guide emerging) with equipment out ready. Children set up and investigate this statement.<br><br>Is there a pattern? After a suitable amount of time, bring children together to discuss and draw out findings. Hopefully should notice that the closer the opaque object is to the light source the bigger it will appear.<br><br>Children to complete their investigation sheet. (Expected and exceeding should refer to data from their experiment). | | torch per pair<br>ruler or metre stick per pair<br>Objects to make shadows<br>Video (in science planning folder) |