BILSTON CHURCH OF ENGLAND PRIMARY

MEDIUM TERM PLANNING

Subject	Topic/Key Question	Year Group	Term	Time Allocation
Science	Light Up The World	6	Autumn 1	12 hours

Lesson Sequence	Time Allocation	Key Question/WALT	Teaching Activities	Resources
Lesson 1	2 hours	To consolidate key ideas from year 3 about the behaviour of light, including light sources and shadows. Working scientifically links: Identifying scientifi c evidence that has been used to support or refute ideas or arguments Success criteria: •I can explain that we need a light source, an object and our eyes to see things. •I can explain why some objects are easier to see than others.	*What are good words to use when talking about light? What do we know about light?* For each question give them a short period of time to think about their answers on their own and then ask them to write something down. Once they have done this ask them to work in pairs to share their ideas and then in a table group of no more than four children they should try and produce a single sheet with the key ideas on which can then be shared with the class. You may wish to begin the lesson by showing some of the video assets from Year 3, Module 3, Can You See Me? Read out the questions below to the class. Explain to them that they do not need to answer all of them. Stick the individual questions on large sheets of paper around the room. How do we see things? What is darkness? Why is it easier to find a silver coin than a black button in a dark room? Is it safe to look at the sun? What is a shadow? What do I need to make a good shadow?	BBC bitesize Collins connect

		•I can describe what a shadow is and how to make one. •I know why it is dangerous to look at the sun and how we can protect ourselves. •I know what the words 'transparent', 'translucent' and 'opaque' mean.	What do the words 'transparent', 'translucent' and 'opaque' mean? Ask the children to work their way around the room and try to answer the questions. Encourage children to present their work in whatever format they wish; it could include images or diagrams as well as writing. You may wish to make available Resource sheet 1, Light questions writing frame, to support them. They can work individually or in pairs. When the Enquire activity has finished, ask children to take their answers to whatever questions they have looked at and leave their answers next to the question. Then give each group of children one question to go and look at. Ask them as a group to collect all the answers to that question, look at all the answers and be ready to share the best ideas with the class. After a short while ask each group to feed back to the class as a whole.	
Lesson 2	2 hours	To describe how a mirror reflects and image of an object. Working scientifically links: Using test results to make predictions to set up further comparative and fair tests Success criteria: •I can explain that a mirror works by reflecting light from the surface to my eye. •I can describe what an object looks like in a mirror.	Explain to the class the game 'Statues' (sometimes known as Grandmother's footsteps) where you turn your back and then one of the class start, walking towards you, trying to reach you without you noticing. When you think they have started walking towards you say STOP! Make sure you are standing so that you can see children in the mirror behind you so that you are always be able to win. Once you have won a few times ask one or two of the class in turn to play the game, which they may or may not win. Explain to the class that you know that you are always going to win because you have cheated and ask them on their own to see if they can work out how you cheated. Share the answers of all the ways you could have cheated and then show them where the mirror is. Once you have placed the mirror, give children (ideally in pairs) a mirror and ask them to write down all they can in answer to the following questions: • things that we know about mirrors • questions we want to ask about mirrors. •	Collins Connect

		•I can use evidence from my investigations with mirrors to predict what different shapes and writing will look like when reflected in a mirror.	These can be collated and referred back to during this and the next lesson. Display the following question: Does everything look exactly the same in a mirror? Explain to children that they are going to try to answer this question by looking at how mirrors work and where they are used, in the rest of the lesson. At this point you should make sure that children are familiar with the term 'image' to describe the 'picture' they see in a mirror and encourage them to use it in their work. Give each pair one mirror and copies of Mirror activities (Resource sheet 1, 2 or 3 depending on which challenge they are doing.).	
Lesson 3	2 hours	To apply understanding of how light travels to explain a periscope and other applications of mirrors work. Working scientifically links: Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs Success criteria: •I can describe what happens to the light in	Place a large mirror flat on the table in front of you with the reflective side upwards and explain to the class that you are going to turn the lights in the class down very low and shine a bright light onto the mirror. Stand in the position holding the torch (turned off) where you will be and ask them to think, pair, share as to what will happen. Then turn the lights down, turn the torch on and ask children to see if they were right. Turn the torch off and move to a different position and ask them to think, pair, share about what will happen now. At this point remind children that to make a prediction they need to give reasons, otherwise it is just a guess. Ask them to try and use what they saw the first time to help them predict. Once you have repeated this a few times, explain to children that they are now going to investigate how mirrors work and where they are used. Each challenge has two parts: 1. Round the bend – a series of activities that focus on trying to use mirrors to make light travel around objects. Children only need three mirrors for the third Round the bend activity. 2. Make a periscope.	Collins connect

		a periscope to explain how it works. •I can explain how mirrors can be used to see things that are not directly in line with the eye. •I can draw a diagram to show how light is reflected from a mirror.	The challenges are also shown on Resource sheet 1, Round the bend, and Resource sheet 2, Making a periscope. The challenges are differentiated by the level of detail that the children are required to give to describe and explain the activities that they carry out. Arrange children into groups of three or four and give each group three mirrors, a torch and a small plastic figure or similar object, plus scissors, card and sticky tape to make the periscope.	
Lesson 4	2 hours	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them I can explain how a shadow is formed and what shape it will be. •I can identify variables to consider when investigating shadow sizes. •I can decide what measurements to make. • I can decide what variables to keep the same in my investigation.	Show Video 1, Changing shadows. Ask children to think about three questions: What is staying the same? What is changing? Why is it changing? Once the video has finished, ask children in small groups to share their answers with each other and then draw together some responses from the groups. Establish that: • the object does not change in size • the distance between the object and the ground (screen) does not change • it is the apparent position of the sun relative to the Earth that changes. Explain to them that they are now going to work in groups of three or four to design a fair test to find out what affects the size of a shadow. This requires them to make accurate measurements. Remind children that fair tests need to be planned carefully, following these steps: Step 1 Identify all the variables that could be investigated Step 2 Select two variables to investigate and raise a question Step 3 Design an experiment to answer the question	Collins Connect

		Working scientifically links: Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	Step 4 Make and justify a prediction Using a torch and your hand (or another object) make a shadow on the classroom wall, keeping the shadow the same size by keeping them both still. Ask: *How could I change the size of this shadow?* Ask children to talk to a partner about the things they could change about how a shadow is formed and to write these on sticky notes. After a short while gather these independent variables together and share them with the class. Ensure that children understand that they are going to test how changing one of these independent variables affects the size of the shadow, the dependent variable. Explain to them that they are going to carry out the next three steps on their own. Model planning a fair test by raising a question using an independent variable and a dependent variable, in this case the size of a shadow, noting other variables that need to be controlled. Children select their own independent variable to test and then work independently through the next three planning stages. Ask children to agree their question in their groups and plan a fair test to collect results to answer it. The learning intention is to find out about variables that affect the size of a shadow, so it may be appropriate to steer some children towards a question that will generate valid results, for example, controlling the distance between the screen and the torch, and only changing the position of the object making the shadow.	
Lesson 5	2 hours	To recognise that whilst light does travel in straight lines, sometimes it changes direction when travelling from one thing into another	*Does light always travel in straight lines?* After the last few lessons children will be pretty confident that this is the case. Remind them that this is true but also say that sometimes light seems to do odd things. Place a pencil in the beaker/glass and ask children to look at it carefully and draw a diagram of what they can see. Then slowly pour water into the glass and ask children to watch very closely as to what is happening.	Collins connect

		Working scientifically links: Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs; using test results to make predictions to set up further comparative and fair tests Success criteria: •I can recognise situations where light does not appear to travel in straight lines •I can define refraction •I can describe situations where refraction happens	When the glass is almost full, stop and ask them to observe closely and draw another diagram. *If you look at all of the pencil does it look completely straight?* Ask children to talk to a partner about what they have noticed and why it might be happening. Then explain to the class that light can sometimes do strange things. Explain to them that the scientific word for what is happening is called 'refraction'. Explain to them that there are some experiments set up for them to do today that are going to help them discover more about refraction (and learn some cool tricks to try out at home). This part of the lesson is based around a circus of experiments that children work through, each with their own instructions and worksheets to support them in their exploration of refraction. There are four different activities but children do not have to do all of them. Set up several versions of each of them around the room so that children can take different amounts of time at each station. • Water magnifier • The Surprising Coin • Oil, water and a pencil • Amazing arrows	
Lesson 6	2 hours	Recognise that light appears to travel in straight lines To understand that white light is made of	Begin the lesson by shining a torch on the wall. *What colour is the light coming out of the torch?* *What colour is the light coming from the sun?* Explain to the class that we use the term 'white light' to describe light from the sun and torches unless they obviously have a colour. (You may	Collins Connect

		many colours and these can be separated out Working scientifically links: Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs Success criteria: •I can make careful observation of situations where white light is split into many colours. •I can explain how a rainbow is formed. •I can explain other situations where white light is split into colours.	wish to have a red bike light or some fairy lights as well to ask extra questions about.) Show children Images of rainbows (Slideshow 1) and ask them to think about the question: Where is the light coming from? Hopefully they note that the light comes from the sun and that can lead on to the question: If the light that you get from the sun is white, where do the colours come from? Inform children that today they are going to look at white and coloured light, how rainbows are made and other places where they might see a spectrum of colours There are two activities in this section: one shows how coloured light can be combined to make white light and the other shows how white light can be separated out into coloured light. Children do both. Introduce the term 'dispersion' as the scientific word for the splitting of white light into colours and suggest that this might be a useful scientific word in this lesson. Full instructions for the two activities are provided in Resource sheet 1, Making a colour wheel, and Resource sheet 2, Underwater mirror experiment instructions.	