Mendell Primary School

Aspire Challenge Achieve

Medium Term Plan Science

Year Group: 3	Term: Autumn 1	Teacher: Jessica Hindley	Subject lead: Sarah Bride

Common Misconceptions:

Some children may think:

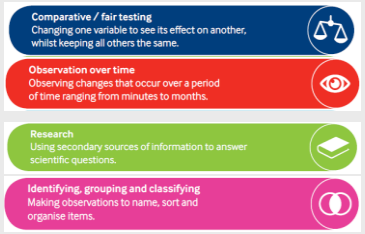
- we can still see even where there is an absence of any light
- our eyes 'get used to' the dark
- the moon and reflective surfaces are light sources
- a transparent object is a light source
- shadows contain details of the object, such as facial features on their own shadow
- shadows result from objects giving off darkness.

Unit key Vocabulary:

Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous

Overview: Light:

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



Key End Points: By the end of this unit children will be able to

- Talk about how light helps us in everyday life.
- Name some sources of light Talk about materials that reflect light and how this can be useful/not useful.
- Talk about how dark is the absence of light.
- Talk about how to protect our eyes from the sun and why this is important.
- Explain how to make a variety of shadows e.g. vary size, clarity and shape.

Links to other learning:

DT – torches

Prior Learning:

Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (**Y1 - Animals, including humans**)

- Describe the simple physical properties of a variety of everyday materials. (**Y2 - Materials)**

Future Learning:

Recognise that light appears to travel in straight lines. (**Y6 - Light**)

- 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. (**Y6 - Light**)
- 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. (**Y6 - Light**)
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (**Y6 - Light**)

High Quality Text:

The firework Makers Daughter – unit supports the following explorations:

We need light in order to see things, dark is the absence of light, light is reflected from surfaces, light from the sun can be dangerous and that there are ways to protect their eyes, shadows are formed when the light from a light source is blocked by an opaque object.

Scientists to study:

Euclid, Ibn Sahl, Roger Bacon, Willebrord Sneillus, Isaac Newton, Christian Huygens.

Risk Assessment:

No light source should be aimed at any individual. Looking directly into light sources can cause harm to the eyes.

Teacher CPD:

Examples of Work Johnny Light - Year 3

Reach Out CPD - https://www.reachoutcpd.com/ sign up for free.

	Learning Intention	Lesson Outline (Key Questions in colour)	Resources	Vocabulary	Lowest 20% Adaptations
1	L.I. I can describe the differences between dark	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is communicating results and asking questions.**	Light sources cards.	**Light, dark, light source, absence of**	

<table>
<tr>
<td></td>
<td>and light and know that we need light to be able to see.</td>
<td>Prior learning – what do the children remember about light from Y2? – Materials can be opaque, transparent or translucent they allow different amounts of light to pass through them. Pre assessment - ask children to read what they already know about light - return to this in lesson 6 to annotate what they now know.
What is light?
Ask children to create a thought shower about everything they know about light e.g. the sun gives us light, electricity gives us light etc..
• Can you name some things that give out light?
• How does light help us to see?
Share ideas as a class and encourage children to add to their thought shower after other children have shared their ideas. Use the resource concept sentences to assess what the children already know about light. Give the children the word cards and allow them to create a sentence to show what they know about light using the different word cards.

Word of the week: light source – what is a light source? Ask children to write their own definition. Answer: A light source is anything that makes light, whether natural and artificial.

In groups, ask the children to sort cards into light source and not a light source – how do they know if something is a light source? Stop to discuss cards they found tricky to sort – window, moon, mirror.

Big Question: What can you see when there is absolutely no light? Complete the cardboard box investigation and record observations.

<table>
<tr><td>What can you see without any light? (Dark)</td><td>What can you see with one hole?</td><td>What can you see with two holes?</td><td>What can you see with an additional light source (torch)</td></tr>
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Encourage the children to share what they noticed as more light was let into the cardboard box – what does this tell us? – We need light to see.

Ask the children to consider what they have learnt from the investigation – what is light? What does it help us do? So what definition would we give for dark? – The absence of light. Use the writing frame to consolidate what they have found out. – provide children with a word bank of key vocabulary to support them when answering these questions. Allow children to use secondary resources to find out about light to add to what they have found out in order to answer the big question.

WAGOLL;
A light source is something that makes light. Some examples of light sources are the sun, a torch and a light. Some objects seem to make light but they are not light sources like the moon. Dark is the absence of light therefore we cannot see in the dark. It is dark at night time because light form the sun is not visible. When it is dark, there is no light to illuminate objects, so we cannot see them. We need light to be able to see things.

Repeat concept sentences activity, can we make a new sentence using what we have found out today.</td>
<td>Light Investigation PowerPoint.

Cardboard boxes one between each table

Concept sentences</td>
<td>light, sunlight illuminate.</td>
<td></td>
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<tr>
<td>2</td>
<td>L.I. I can investigate which materials are reflective.</td>
<td>This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is setting up a test and communicating results.

Recap previous learning - Explorify - https://explorify.uk/en/activities/odd-one-out/sources-of-light
Ask the children to study the three different sources of light – what is a source of light? Which one is the odd one out and why? Encourage discussions and challenge the children to discuss their different ideas and opinions with justification and appropriate scientific vocabulary.

Big Question – what happens to light on different materials?
Word of the week – reflector – what is a reflector? A reflector is a material that allows light to bounce off it. Can you name any examples? mirror – do the children recall the moon and mirror from previous sorting activity.

In groups on tables, complete a sorting activity for light sources and reflectors. – discuss as a class any images the children struggled with.
Which materials are reflective?
Give the children a range of different materials and a torch and allow them to explore their reflectiveness. Ensure the children record the object, properties of the material it is made from and how reflective it is – this could be in a scale or simple yes or no. See example below.

<table>
<tr><td rowspan="2">PLAN</td><td>Year</td><td>3</td><td>Topic</td><td>Light</td></tr>
<tr><td colspan="4">Focus of assessment (National Curriculum statements)
• Notice that light is reflected from surfaces.
Description of activity</td></tr>
</table>
</td>
<td>Explorify – sources of light – odd one out</td>
<td>Source of light, reflector, shiny, dull, matt, surface.</td>
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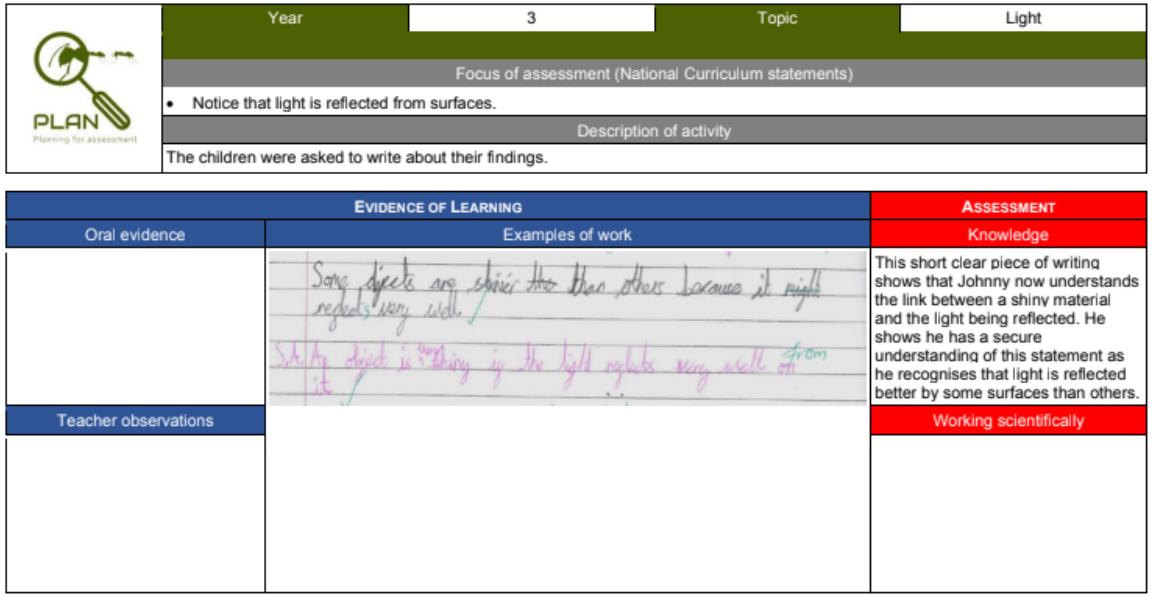
					
3	L.I. I can identify and sort materials using	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is making predictions.** Recap previous knowledge – light sources, reflector. **Words of the week** – translucent, opaque, transparent – recap what children found out about materials being see through in Year 2. What prior knowledge of these words do the children have? Gather ideas and possibly examples of materials that are translucent, opaque, transparent and then watch: https://www.youtube.com/watch?v=8rrnMOjIGjI	Torches, various objects for sorting.	**Material Translucent, transparent, opaque, reflect, passes**	Print the sentence stems for children who struggle to copy from the board.

PLAN
Planning for assessment

Year	3	Topic	Light

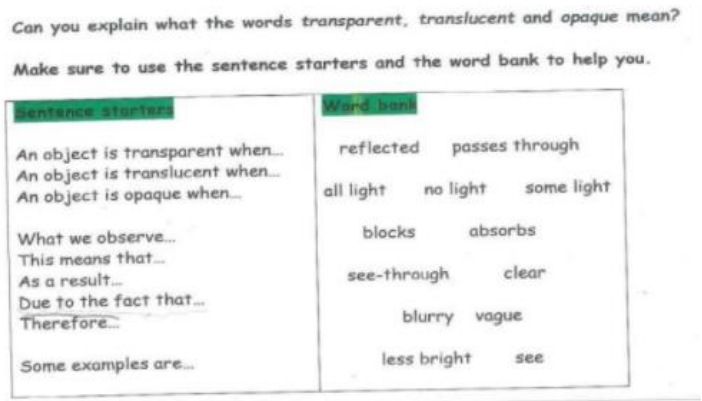
Focus of assessment (National Curriculum statements)

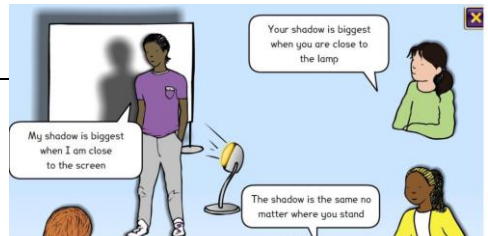
- Notice that light is reflected from surfaces.

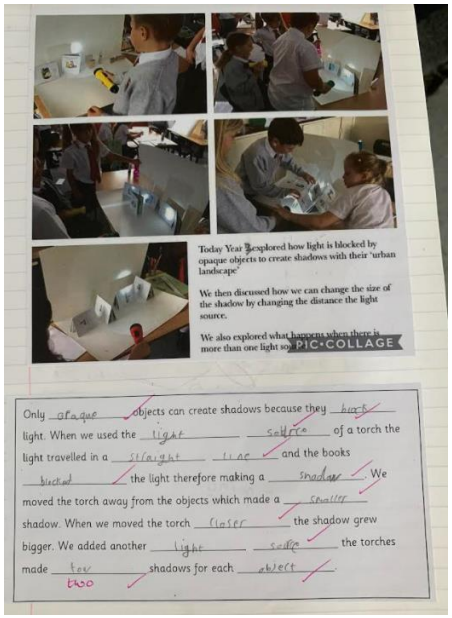
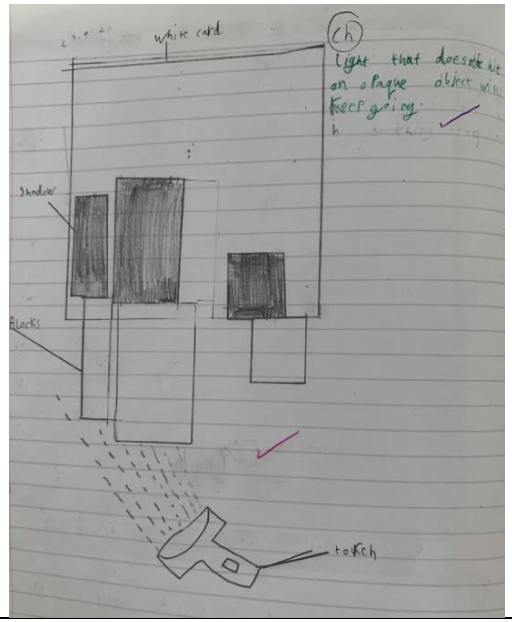
Description of activity

The children were asked to write about their findings.

Evidence of Learning		Assessment
Oral evidence	Examples of work	Knowledge
	Some objects are shinier than others because it might reflects very well. Shiny object is shiny is the light reflects very well on from it	This short clear piece of writing shows that Johnny now understands the link between a shiny material and the light being reflected. He shows he has a secure understanding of this statement as he recognises that light is reflected better by some surfaces than others.
Teacher observations		Working scientifically

	scientific vocabulary.	**Big Question: can light pass through all materials?** Allow the children time to explore the classroom for objects and sort them into opaque, translucent and transparent as a predictions, Then provide the children with a light source and allow them to test their predictions – children to record in their own way e.g. table or Venn diagram both before and after testing objects with a light source. Give the children time to write the definitions of these key words – use stimulus below – display on the board for children to refer to when working in books.  Can you explain what the words *transparent*, *translucent* and *opaque* mean? Make sure to use the sentence starters and the word bank to help you. Sentence starters An object is transparent when... An object is translucent when... An object is opaque when... What we observe... This means that... As a result... Due to the fact that... Therefore... Some examples are... Word bank reflected passes through all light no light some light blocks absorbs see-through clear blurry vague less bright see		**through, absorbs.**	
4	L.I. I can explain why light from the sun is dangerous and investigate which material is best for a pair of sunglasses.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is setting up a test and communicating results.** Recap previous learning using a kahoot quiz – create before the lesson, questions can be multiple choice or true or false using the following definitions; light source - A **light source** is anything that makes light, whether natural and artificial. , reflector - A reflector is a material that allows light to bounce off it , translucent - a material that allows some light to pass through it., transparent - a material that allows light to pass through it to show clear shapes. opaque - a material that does not allow light to pass through it. **Big question: Which material can best protect our eyes from the sun?** Odd one out Explorify – in the shade. https://explorify.uk/en/activities/odd-one-out/in-the-shade Ask the children to discuss the good and bad things related to the sun e.g. good: source of light, helps plants grow, vitamin D – bad – sunburn, skin cancer, wrinkles. Create a thought shower of ideas in pairs and record in books. Now discuss how we can keep ourselves safe in the sun. Explain the dangers of UV light to the children using the PowerPoint. Show the children a range of sunglasses – **how do these keep us safe in the sun?** Using the light sensitive paper place the sunglasses on the paper and watch as the UV light changes the colour of the paper. **What do they notice when they lift the sunglasses up**? - The sunglasses have blocked the UV light, which protects our eyes. Take photographs and ask the children to explain what the light sensitive paper showed them WAGOLL: We need to protect our eyes from the sun because the uv light enters our pupils and can damage the retina. We used different sunglasses to test if they protect our eyes from the sun. The uv from the sun stained the light sensitive paper white but the sunglasses blocked this light keeping it blue, which proved to us that the sunglasses can block the uv light. CH: **Do sunglasses block all light?**	Sunglasses, iPad, different materials to test, light sensitive paper. Sun safety PowerPoint. Odd one out Explorify – in the shade. Data loggers.	**Material translucent, transparent, opaque, reflect, passes through, absorbs.**	

		Challenge the children to test a variety of materials to see if they would make a suitable material for the lenses of sunglasses. Use the data log boxes to record the amount of light that can pass through the different materials. Ensure this investigation is done in a dark location. Example table below: **Object** / **Transparent, Translucent or Opaque?** / **Torch brightness (lx)** / **Amount of light allowed through the object (lx)** **Drinking glass** **Plastic bottle** **Exercise book** **Wooden table** **Piece of Paper** **Greaseproof paper** **Green Cellophane** **Red Cellophane** **Aluminium Foil** Ensure children conclude which materials would make suitable sunglasses and why.			
5	L.I. I can explain, using words or diagrams, how shadows are formed when a light source is blocked by an opaque object.	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is setting up a test and communicating results. .** **Recap of prior learning:** **Why Is the sun dangerous for our eyes?** **What light sources can you name? Which are man made which are natural?** Take the children out onto the playground and observe their shadows. **What do they notice about its size and position?** **Big questions – How are shadows made?** Explorify – odd one out – in the shadows – https://explorify.uk/en/activities/odd-one-out/in-the-shadows ask the children to discuss what each image shows them. Ask them to think about the vocabulary we have discussed so far – transparent, opaque, translucent. Can they think of a statement using the pictures as evidence e.g. opaque materials cast shadows. **Do the children notice that opaque materials make shadows?** Use Explorify what's going on video – shadows shapes. After you've watched the video, lead a discussion with your class: • **Do the children know how shadows are made?** • **Did the light behave in the way they expected it to each time?** • **Can they think of any objects that don't have a shadow?** • **What did they notice about the size and shape of the shadow as the torch moved?** Allow the children time to investigate shadows using small world objects and a torch. Use large white card as a background. – **what do they notice? How are shadows formed? What is happening when you shine the torch on the object?** Discuss the concept cartoon:  	Explorify odd one out – in the shadows https://explorify.uk/en/activities/odd-one-out/in-the-shadows Explorify what's going on video – shadows shapes. https://explorify.uk/en/activities/whats-going-on/shadow-shapes		

		Allow the children time to investigate which statements in the concept cartoon are correct. Further investigations: **How can you change the size of the shadow? What happens when there is more than one light source?** See example below – DO NOT limit the children's explanations with a missing word paragraph. Model with the children and then allow them to record their thinking in a similar way. ENSURE CHILDREN COMMMENT ON LIGHT TRAVELLING IN A STRAIGHT LINE. **CH: what happens to the light that doesn't hit the object?**  Only opaque objects can create shadows because they block light. When we used the light source of a torch the light travelled in a straight line and the books blocked the light therefore making a shadow. We moved the torch away from the objects which made a smaller shadow. When we moved the torch closer the shadow grew bigger. We added another light source the torches made two shadows for each object.  			
6	L.I. I can investigate the length of shadows at different	**This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is observing.** **Recap of prior learning:** **How are shades formed?** **Do all objects block light?**	chalk Research cards of famous scientist.	**opposite, light source, behind, opaque, lower, higher, shorter,**	

	times of the day.   L.I. I can research contributions to light throughout history. 	**What is a reflector? Can you name an example?** This lesson must be set up first thing in the morning and be completed alongside the Light throughout History lesson during the afternoon. **Big question: why do shadows change size and position throughout the day?** Watch a time lapses of shadows throughout the day. https://www.youtube.com/watch?v=LgZbhogv9Q8 – **what do the children notice? What statements can they make about the position of the sun and the shadow it casts?** Allow children time to discuss and provide some key words for oral explanations – opposite, light source, behind, opaque, lower, higher, shorter, longer, directly above, shadow. Allow children time to repeat their shadow exploration using small world objects to re-create the suns movements throughout the day – **what do they notice?** How could we set up an experiment that proves shadows change size and position throughout the day? – take feedback of ideas. 9am – children mark a spot to stand on and draw around their shadow. (Ensure the same child is used in each group) Measure the length. 10am – children stand on the same spot and draw around their shadow. Measure the length. 11am – children stand on the same spot and draw around their shadow. Measure the length. 12, 1, 2pm children stand on the same spot and draw around their shadow. Measure the length. Children present their data using a line graph and answer these key questions – At what time of day is the shadow the shortest? Longest? What is the sun at its highest point/ how do you know? What is the difference in shadow length between 12am and 2pm? **This is a Science lesson. In Science, we study nature and the behaviour of natural things. The skill we will be using this lesson is researching.** **Light throughout history –famous scientists**. Using the research cards allow the children time to explore their secondary source about a particular scientist and explore their contributions in science linked to light. Each table will be given one of the following scientist to explore: Euclid, Ibn Sahl, Roger Bacon, Willebrord Sneillus, Isaac Newton, Christian Huygens. – this resources provide a range of diversity. Each groups completes the research questions framework sheet and gives a mini presentation to the class about their scientist and their contributions to light. Post assessemnt: Repeat concept sentences and add to pre assessment mind map.		**longer, directly above, shadow**	