Subject: Science **Year: 3** **Term: 2** **Duration:** 4
Unit Title: Light

Y3 Light - Lesson 1

Main focus	Initial teaching	Pupil activity
Understand that we need light in order to see things and that dark is the absence of light. **Understand that light comes from a source and recall some sources of light.**	Give the children a short period of time to discuss with other children what light and dark are. Then, gather some of their ideas - this will help you to find out what they already understand, and identify any incorrect ideas they may have. Get feedback from a range of children - including those who are usually higher, middle and lower ability. Explain that they will be learning about light in science over the next few weeks - about what it is, where it comes from and its effect on objects. Introduce to the children the idea that *dark* is the *absence* of *light* - there are no sources of dark, only a lack of light!	Ask the children what light is - at this stage, they need to understand that they need light to use their eyes in order to see. Ask next where light comes from - they may give examples such as the Sun, candles, torches, fire, phone screens, etc. Explain that these are called *light sources*, and that this means anything that gives us light. Ask them to repeat the phrase a few times back to you. Children may suggest the Moon, mirrors or other reflectors; do not explain why these are incorrect yet - ask them to 'hold' their idea until next week, when you will discuss what a mirror, etc. does. When discussing the Sun, remind children that the amount of light that it gives us can be *dangerous*. To keep our eyes safe, we must never look directly at the Sun. Look at *Sources of Light*. For the moment, you can ignore the 'reflectors' section - ask children only to think about light sources. Discuss each one with the children - does this thing give us light? Does light come from it? How? Does it use *electricity*? Ask the children to make a picture or written list of *light sources.*
Key Vocabulary light, dark, absence, light source, sun, dangerous, candle, fire, electricity, see		

Additional activity:
Concept Sentences activity - these could be printed out, displayed on a screen or simply written on the board. Ask the children to create sentences using the words - they may choose one or two per sentence. They can record these sentences in their books. While they are writing, check their ideas - challenge any that are not correct by asking the child to explain them.
Have some children read out the sentences they have created to the rest of the class. These may be some of the ones you have seen whilst checking the students' work.

PLSC Objectives:
Understand that we use our eyes to see, and explain the difference between what they see in light and dark.
Explain that dark is the absence of light, and that light comes from sources.
Give examples of light sources – e.g. the Sun, candles, torches, lightbulbs.
Suggested Resources: Year 3, Light and shadows 1, Concept sentences
Year 3, Light and shadows 1, Sources of light

Y3 Light - Lesson 2

<table>
<tr><th>Main focus</th><th>Initial teaching</th><th>Pupil activity</th></tr>
<tr><td>Explain that although some objects can reflect light, they are not light sources.</td><td rowspan="3">Begin by briefly going over what the children learned in their last science lesson - that light comes from light sources, that we use our eyes to see, and that dark is the absence of light. Ask them to think about a mirror - what is the word that we use to describe what a mirror does? Explain that mirrors reflect light, but they do not make it for themselves - a mirror in the dark cannot make its own light. Explain that we call objects that light bounces off reflectors. Ask the children to repeat this word, then tell the child next to them what a reflector is. Explain that reflectors often, but not always, have shiny or polished surfaces, which helps the light to bounce off them.</td><td rowspan="3">Discuss other examples of reflectors with the children. They may describe glass, puddles, metal or gems as being reflectors. Look at the picture on the activity Light sources and reflectors (poster) with the children. Ask the children first to point out examples of light sources in the picture, then reflectors. Can they ‘match’ the light source to the reflector? For example, glass in the window could reflect the television, or a reflector on the child’s bike may reflect the car’s headlights. Ask the children to write a list of reflectors from this image, and match them to a light source - some may have more than one. Children who finish this more quickly could then expand this list with their own ideas.</td></tr>
<tr><td>Key Vocabulary</td></tr>
<tr><td>reflect, surface, light source, moon, mirror, polished, shiny, reflector</td></tr>
<tr><td colspan="3">Additional activity:
Ask the children to look at the pictures on the activity Light sources and reflectors (sheet). Discuss what each picture shows. Ask the children to draw a line down the middle of a page in their books, and write ‘light source’ and ‘reflector’ as a heading on either side. The children can then write words, draw or stick in the appropriate object on each side. When the children have completed this activity, go through their answers - ask a different child for each object. The children could tick each one they have put on the correct side. Make a note of any common objects that children have put on the wrong side; you can revisit these at the end of the unit to check their understanding.</td></tr>
<tr><td colspan="3">PLSC Objectives:
Explain that reflectors and light sources are not the same thing, and that reflectors do not make their own light.
Give some examples of reflectors, e.g. mirrors, the Moon, stars, polished surfaces.
Consider the likely light sources for these reflectors - the Moon reflects the Sun, a mirror could reflect a lightbulb.
Suggested Resources: Year 3, Light and shadows 1, Light sources and reflectors
Year 3, Light and shadows 2, Light sources and reflectors</td></tr>
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Y3 Light - Lesson 3

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<tr><th>Main focus</th><th>Initial teaching</th><th>Pupil activity</th></tr>
<tr><td>Understand that some materials block light and are described as being opaque. Distinguish between the terms transparent, translucent and opaque.

Key Vocabulary

opaque, light, block, shadow, translucent, some, through, transparent, clear</td><td>Start the lesson by asking children for a definition of the words ‘light source’ and ‘reflector’, and some examples of these. Ask the children to first tell the person next to them, then ask a few different children what their partner has said. Check that they have understood what the terms mean and can describe them accurately. Look at the resource Lights at night - can the children identify the reflectors and light sources in the picture? Ask them to think about the material that the windscreen on the car is made of (glass). Why do car makers choose this material? What would happen if the windscreen was made of the same materials as the rest of the car?</td><td>Introduce the term transparent to describe glass, and tell the children that a transparent object is a clear one we can see all of the way through, like water, glass or some plastics. Ask the children if they can think of any other examples. Say that we can put objects into groups based on how much light we can see through them - as well as transparent, scientists use the words translucent and opaque.
Describe translucent as meaning an object that some light comes through, but that we cannot see everything clearly through - such as thin fabric, sunglasses or paper - ask the children if they can think of any other translucent objects - encourage them to answer in a full sentence, by saying e.g. “Coloured glass is a translucent object.”
Finally, explain that an opaque object is one that no light can pass through. Ask the children to think about an example such as a tree. What happens when sunlight hits a tree? Tell the children that opaque objects cast a shadow. This happens because no light can pass through it, so it cannot reach the other side of the object, creating darkness in the shape of the object. Ask the children to write down in their own words what each word means in their books - write the spellings on the board to support them.</td></tr>
<tr><td colspan="3">Additional activity:
Watch the video What can you see?, then ask the children to draw and label an example of a transparent, translucent and opaque object in their books. They should draw the object, label what it is and/or what material it is made from, and state whether it is transparent, translucent or opaque. More able children could add in a light source and draw what happens to the light as it passes through the object.</td></tr>
<tr><td colspan="3">PLSC Objectives:
Explain what transparent, translucent and opaque mean.
Give some common examples of materials or objects for each term - "Glass is transparent", "Wood is opaque", "Some plastic is translucent".
Explain what happens when a light source is shined on an opaque object, and that this is called a shadow.
Suggested Resources: Year 3, Light and shadows 1, What can you see?
Year 3, Light and shadows 1, Lights at night</td></tr>
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Y3 Light - Lesson 4

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<tr><th>Main focus</th><th>Initial teaching</th><th>Pupil activity</th></tr>
<tr><td>Understand that when light from a source is blocked by an opaque object, a shadow can form that is the same shape as the object.

Key Vocabulary

opaque, shadow, light, block, shadow, through, around, blocked, solid, silhouette</td><td>Ask the children to talk to the student next to them about the three new words they learned last week to describe light passing through objects. Ask different children for each word and its definition - you are hoping to hear descriptions such as “transparent means that you can see through it”, “translucent means some light can go through it, but it is not clear” and “opaque means no light can come through it, so there is a shadow instead.”</td><td>Explain to the children that today, they will be thinking about opaque objects. Give the children a moment to think, then collect some examples of opaque objects and materials - encourage a range of answers. Describe the objects they suggest as being solid. Ask them to recall what happens when light hits an opaque object, and that this is called a shadow. Explain that when light is blocked by an opaque object, it makes a shadow in the same shape as the object. Show the children the activities Making Shadows and Silhouettes. Ask them to identify the objects, and how they knew - note also that only the outline is visible in a shadow, not any details - you cannot tell what colour an object is, or if it has a pattern, for example. Have the children choose an object and sketch its shadow in their book - they can have the child sitting next to them try to guess what it is.</td></tr>
<tr><td colspan="3">Additional activity:
If possible, take children outside to observe shadows of objects in the school grounds - noting what makes a shadow - living and non -living things, objects of all shapes and sizes. If this is not possible, do the same in the classroom - note the light source, whether this is the Sun or a lightbulb. You could encourage children to make ‘shadow puppets’ using their hands, to notice movement in shadows as they move.
Have children make notes about what they have observed in their books - about what they saw that cast a shadow, what its light source was, and how it moved, for example.</td></tr>
<tr><td colspan="3">Objectives:
Understand that a shadow is always the same shape as the object blocking the light.
Identify some common objects from their shadows.
Use classroom objects, hands etc to cast shadows.
Suggested Resources: Year 3, Light and shadows 2, Making shadows
Year 3, Light and shadows 2, Silhouettes</td></tr>
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Y3 Light - Lesson 5

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<tr><th>Main focus</th><th>Initial teaching</th><th>Main activity</th></tr>
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<td rowspan="3">Investigate patterns in the ways that the sizes of shadows change.

Key Vocabulary

shadow, light source, opaque, pass through, around, bigger, smaller, closer, further, angle, prediction</td>
<td rowspan="3">Ask the children to describe what they learned about shadows in their previous science lesson - have they noticed any interesting shadows since then? Explain that today, they will be investigating how shadows can change. The experiment can be done either as a whole class or in groups - you could ask one child to help you with each stage for a whole class, or divide the children up into smaller groups to conduct their own experiments. For this, you will need a light source such as a torch, and an opaque object. If the children are conducting the experiment in groups, you will need one light source and one object per group - they do not all have to be the same.</td>
<td>Children should make notes in their books throughout the experiment, drawing and labelling diagrams as needed.
For the experiment, show the children Shadow puppets. Then, do the following.
1) Show the children the light source/s and have the children identify it, then choose an opaque object to conduct the experiment with - a small object such as a book would be best, as the object must be moveable. Have the children write a sentence or draw and label a picture identifying the light source and the opaque object.
2) Have a child shine the light source onto the object, and recall that a shadow is made because light cannot pass through it. Ask the children to draw the object, the light source, and shade in a shadow being cast in the same shape.
3) Ask the children what they think would happen to the shadow if the torch was moved further away. Explain that this is called a prediction - a sensible guess using what we already know. Encourage the use of words that compare throughout this experiment, such as bigger, smaller, closer and further.
4) Ask the child to move a few steps back. Discuss with the children what has changed, and ask them to draw and label what has happened to the shadow.
5) Repeat with another child moving the light source closer, having the children record what they see.
6) Repeat with moving the light source higher, by holding it up - you could ask a taller child to help with this. Explain that you are changing the angle of the light.
7) Repeat with moving the light source lower, by having a child crouch down.
8) Finally, ask the children to write a short conclusion about what happens when a light source is moved up, down, closer and further. Higher ability children may be able to write another sentence about why the shadows change.

Discuss with the children why it is important to only change one thing at a time when doing an experiment - that you did not change the angle and the distance at the same time, for example, because scientists must find out what each change does on its own. This is the same reason you did not move the object during the experiment - it would not be a fair test if the object kept moving, as this would affect the size of the shadow.

This experiment can also be done outside - you could also draw chalk outlines around the shadow to observe the changes.</td>
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Additional activity:
Another version of this experiment can be done outside, using the children as the objects. Make a chalk mark on the ground, and have the same child return to it throughout the school day. Draw an outline of their shadow in chalk to see how it changes.

PLSC Objectives:
Identify that distance from a light source changes the size of a shadow.
Identify that distance from a light source affects show sharp the shadow is.
Show that as the light source moves, so does the shadow.
Digital Resources: Year 3, Light and shadows 3, Shadow puppets
Year 3, Light and shadows 2, Playing with shadows