Subject: Science
Year3: Light and Shadows
NC/PoS:

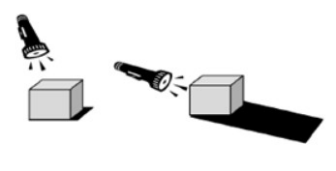
- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light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

Prior Learning (what pupils already know and can do)
Check the children can recall some of the following key facts from the unit *Science, Year 2, Materials: Uses of everyday materials*:

- A material is what an object is made from.
- Examples of materials include glass, stone, water and plastic.
- A property of a material is something that describes a material or substance (for example, hard, flexible, red, stretchy or opaque).
- You can see through something transparent.
- You cannot see through something opaque.

End Goals (what pupils MUST know and remember)

- Know that light is a form of energy
- Know that the eyes take in light so we can see
- Know that you cannot see anything when there is no light
- Know light sources give out light
- Know natural light sources are sun, stars, candle flame, fire
- Know artificial light sources are light bulbs, florescent lighting, computer screens
- Know some objects seem bright but are reflecting light from elsewhere, for example the Moon, mirrors, and shiny objects
- Know that light from the Sun is very strong and can damage your eyes
- Know the eyes can be protected by wearing dark glasses
- Know to never look directly at the sun
- Know that light can pass through materials that are transparent like glass
- Know that some light passes through materials that are translucent like frosted glass
- Know that light cannot pass through opaque materials
- Know that when light is blocked by an opaque object, a shadow is formed
- Know that the size of the shadow changes depending on the position of the light source
- Know that the closer the light source to the object the larger the shadow will be



Key Vocabulary: opaque, translucent, transparent, natural sources, artificial light, reflected, absorb, reflective, dangerous, ultraviolet light, radiation, sunburn, protection, blocked, opaque, light rays, overhead, midday

Session 1:
Use resources from Kapow Lesson 1: Sources of light- today's session focuses on the sun.
Recap and recall: You can see through something transparent. You cannot see through something opaque.
LO: To recognise the dangers of sunlight
Use the 'Attention Grabber' to explain to the children that something that gives out light is **luminous** or a **source of light.**
Start at the section that begins 'Discuss with the class that light is essential for us to see but it can be dangerous as there is a risk of harm' within the *Main Event* section. Children learn the dangers of the sun: know that light from the Sun is very strong and can damage your eyes; know the eyes can be protected by wearing dark glasses; know to never look directly at the sun.
ultraviolet light - is a form of **radiation** which is not visible to the human eye. sunburn - ultraviolet rays can burn our skin cells, the skin gets red and feels warm.
In their books children answer the question:
What advice would you give people about protecting themselves from the Sun? (Protect the eyes by not directly looking at bright lights or the Sun; wear sunglasses and brimmed hats in sunny weather; protect skin by covering up and using sunscreen.)
Vocabulary: dangerous, ultraviolet light, radiation, sunburn, protection

Session 2:
Use resources from Kapow Lesson 1: Sources of light
Recap and recall: properties of materials –opaque, translucent, transparent
LO: To explain the role of light sources.
Use the *Main Event* section of the lesson to explore that we need light to see:
Know that light is a form of energy
Know that the eyes take in light so we can see
Know that you cannot see anything when there is no light
Know natural light sources are sun, stars, candle flame, fire
Know artificial light sources are light bulbs, florescent lighting, computer screens.
You can create the table for the activity as a class in the Floorbook and complete it together after their 'light hunt' and watching the pupil video.
In their books children can create their own table or list/draw Luminous objects and Non-luminous objects (adaption).
Do not move onto the 'Presentation; Choosing sunglasses'
Vocabulary: opaque, translucent, transparent, natural sources, artificial light, luminous

Session 3:
Use resources from Kapow Lesson 2: What is reflection?
Recap and recall: What can you see in the absence of light?
LO: To compare light reflecting on different surfaces.
Know some objects seem bright but are reflecting light from elsewhere, for example the Moon, mirrors, and shiny objects
What sources of light are there in school?
What reflective surfaces or materials are in our school?
Children sort a selection of objects into light sources and reflectors. Choose one object and the children answer the following questions:

- **What object and material are you looking at?**
- **What property of the material makes it reflective?**
- **Why do you think the reflection you can see is not perfect?**

Use the questions to write in their books. For example, 'The metal spoon is reflective because it is smooth and shiny. My reflection is not perfect because it is curved and has scratches on.'
N.B. black objects absorb the most light so are not very reflective

Vocabulary: reflected, absorb, reflective

Session 4:
Use resources from Kapow Lesson 3: Where do shadows come from?
Recap and recall: Use 'Odd one Out' from Kapow Lesson 3. Identifying light sources- both natural and artificial- and reflective objects/surfaces.
LO: To recognise which materials cast a shadow.
Working scientifically LO: To ask testable questions and plan how to answer them.
Children learn how shadows are formed by exploring the following.
Know that light can pass through materials that are transparent like glass
Know that some light passes through materials that are translucent
Know that light cannot pass through opaque materials
Know that when light is blocked by an opaque object, a shadow is formed
Once the children have investigated, they should record an example of each of the following in their books:

- **Opaque** (no light passes through).
- **Translucent** (some light can pass through).
- **Transparent** (most light can pass through).

Vocabulary: opaque, shadow, translucent, transparent, investigate

Session 6:
Use resources from Kapow Lesson 5: Investigating shadows
Recap and recall: How is the sun dangerous? What can you do to protect your eyes?
LO: To identify how the distance of the light source affects the size of its shadow.
Working scientifically LO: To find patterns in data and from conclusions.
Children are learning to look for patterns in the size of shadows and carry out the 'Investigating shadows' activity to explore the following:
Know that the size of the shadow changes depending on the position of the light source
Know that the closer the light source to the object the larger the shadow will be
Know the more directly overhead the light source is, the shorter the shadow (midday)
Children record their conclusions in their books.
Vocabulary: light source, shadow, distance, pattern, variable

Link to career scientist:
https://pstt.org.uk/application/files/3616/3525/6983/Laser_Physicist_-_Professor_Colin_Webb.pdf

Scientists who have helped develop understanding in this field: Sir Isaac Newton – light was made up of tiny particles