Subject: Science Year 6: Light

NC/PoS:

- recognise that light appears to travel in straight lines
- 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
- 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
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

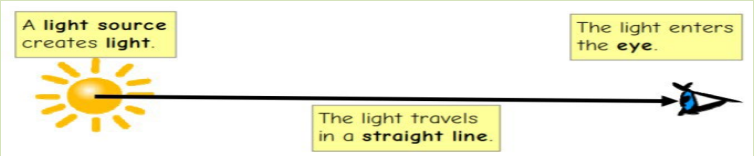
Prior Learning (what pupils already know and can do)

Check the children can recall some of the following key facts from the units *Science, Year 3, Energy: Light and shadows* and *Science, Year 5, Materials: Properties and changes*:

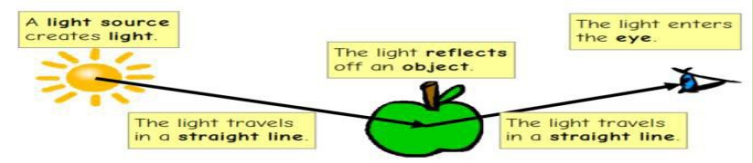
- Sources of light are those that give out light.
- Light is needed to see things.
- Dark is the absence of light.
- Light from the sun can be dangerous, and the eyes need protection.
- Opaque materials block or absorb all light, preventing objects on the other side from being seen.
- Translucent materials allow some light to pass through but scatter it, causing objects on the other side to appear fuzzy or distorted if visible.
- Transparent materials allow light to pass through with minimal scattering or reflection so objects on the other side are clearly visible.
- Shadows are formed when an opaque object blocks the light from a light source.
- Shadows change position and length throughout the day as the sun changes position in the sky.

End Goals (what pupils MUST know and remember)

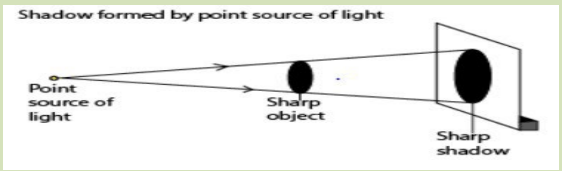
- Know light is a form of energy
- Know light travels in straight lines
- Know objects are seen because they emit or reflect light into our eyes
- Know light that is not reflected by a surface is absorbed
- know that light travels from light sources to our eyes and from light sources to objects and then to our eyes
- know because light travels in straight lines that shadows will have the same shape as the objects that cast them
- Know how to use diagrams and models to describe how light travels in straight lines



- Know how to use diagrams and models to describe how light travels in straight lines when reflected from other objects



- Know how to use models and diagrams to describe light travelling in straight lines past an opaque/translucent object to cast a shadow of the same shape



Key Vocabulary: travel, straight, light rays, light source, eye, emit, reflect, reflective, absorb, surfaces, object, cast , height, width, prism, refraction

Week 1: Use resources from Kapow Lesson 1: The pathway of light
Recap and recall: How are shadows formed? (opaque object blocks the light rays to form a shadow) How does the size of the shadow change? Name light sources: natural and artificial
LO: To describe the pathway of light (light travels in straight lines and is a form of energy).
Working scientifically LO: To use evidence to form conclusions.
Play the *Pupil video: Comparing light sources* and use it to discuss any similarities or differences between the **light sources.**
Carry out the **Practical investigation: What do we need to see?**: arrange the pupils in pairs and hand out a cardboard tube (one between two). The **Practical investigation: Can light bend?** can be carried out by the teacher using a piece of hose and a torch.
Children can experiment with a torch, a piece of card with a hole pierced through it and a whiteboard to investigate what happens when the position of the light source is changed.
Use **Presentation: Light travelling in straight lines** to model how a diagram with a light ray should be drawn.
Explain that the class will summarise this **conclusion** using **evidence** from the lesson. Display slide 2 from the *Presentation: Drawing ray diagrams* and instruct the children to use the given sentence starter (I know that light travels in straight lines because…) to describe their observations and how they support the class conclusion that light travels in straight lines. Hand out rulers (one each) and encourage the children to draw one diagram based on an observation from the lesson to support their written conclusion.
Vocabulary: travel, straight, light source, light ray, conclusion, evidence

Week 2: Use resources from Kapow lesson 2: See the light

Recap and recall: Display the *Presentation: Speak like an expert* and ask the children to take turns with a partner presenting evidence for light travelling in straight lines for one minute.

LO: To describe how we see

Give the children mirrors and use the ***Attention Grabber*** to reinforce the following facts:

- Light travels in straight lines.
- Light comes from luminous objects.

And address misconceptions:

- Light comes out of our eyes when we see.
- Light is not continuous from the light source to our eyes.

Working scientifically LO: To draw scientific diagrams.

Use the activities in the ***Main Event*** section to support the children drawing a light ray diagram that includes a mirror, a light source, an object and a person/toy with eyes.

Display slides 1–3 of the *Presentation: Representing light rays* to help prompt the pupils for each scenario.

1. **The toy sees the torch:** the string is held straight between the torch and the toy's eyes.
2. **The toy looks at its reflection in the mirror:** the string is held from the torch to the mirror in a straight line, held on the mirror at a fixed point and continues to the toy's eyes.
3. **The toy can see something behind it in the mirror:** the string passes from the torch to the object behind the toy, is reflected off the toy to the mirror and is reflected again into the toy's eyes.

Depending on ability, children choose one of the above to draw as a scientific diagram using the following rules:

- Complete the diagram in pencil and use a ruler to draw the light rays so they are straight.
- Scientific diagrams should be simple 2D line drawings.
- The light ray should be continuous from the light source to the eye (there should be no gaps when

the light reflects off a surface).

- Add arrowheads to the light rays to show the direction the light is travelling in.

To finish play the video using the link: BBC Bitesize - How does the human eye work? to summarise how our eyes work.

Vocabulary: light rays, light source, reflective, eye, emit

Session 3: Use resources from Kapow lesson 3: Measuring shadows
Recap and recall: Use the *Presentation: Spot the errors* and ask the class to look for as many mistakes as possible.
LO: To explain how shadows change.
Complete the shadow challenge activity from the ***Attention Grabber*** to investigate shadows.
Working scientifically LO: To pose questions.
Using the ***Main Event*** section children learn how to pose testable enquiry questions. The children can write their questions in their books. They must choose one to investigate and plan their investigation in groups or pairs ready to carry out during the next session.
Vocabulary: cast, shadow, opaque, variable, control variable, reliable

Session 4: Use resources from Kapow lesson 4: Reflecting light
Recap and recall: Use the *Presentation: Casting a shadow* to discuss how the appearance of a shadow can be changed.
LO: To carry out an investigation linked to their enquiry question.
Children carry out their investigations planned last week, discuss their findings as a class and write and explanation to explain how shadows change using key vocabulary. They could draw a diagram to help illustrate their explanation.
Photographs for the floorbook can be taken to show them investigating their questions.
Vocabulary: cast, shadow, opaque, variable, control variable, reliable

Session 5:
Recap and recall: 'Gimme Five' facts about how light travels and how shadows are formed using scientific vocabulary.
LO: To explore refraction and light phenomena
Children learn about objects looking bent in water - refraction
Suggested activities:

- Watch https://www.youtube.com/watch?v=95V-QJYZ2Dw Children complete refraction investigations and record their results

Children answer: What happens when light travels from air into another transparent material, such as glass, plastic or water?

- Give children torches, white card and prisms. When light travels from air through a transparent material, it refracts, or bends. Children describe and explain their observations.

https://www.youtube.com/watch?v=YcvJkzGME6I coin trick
Take pictures for the Floorbook.
Vocabulary: prism, refraction

Session 6: Use resources from Kapow Lesson 6: Using mirrors
Recap and recall: children do a 'brain dump' and create mind maps of everything learnt in the unit- eg can be stuck in florrbook.
LO: To explain how mirrors are helpful.
Science in action: To explore different jobs or inventions that depend on reflection.
Can use the ***Attention Grabber*** and the *Presentation: Looking around corners* from Lesson 5 to explore the use of mirrors/periscopes in World War 1. You can do the 'Using mirrors to communicate 'activity if time allows.
Play the link: Artist creates a mirror using glass and silver nitrate on VideoLink (lesson 6) to look more closely at mirrors.
Using the ***Main Event*** section allow the children to come up with creative ways of demonstrating the use

of mirrors, which could be:

- A dramatic reenactment.
- A song. (This could follow a nursery rhyme or familiar song melody to make it easier for the pupils.)
- An advert for the mirrors used in the chosen scenario.
- A poem. (Acrostic poems would be an easy starting point.)

Complete the Unit Quiz.

Vocabulary: periscope, purpose

Link to career scientist:
Laser technician