Portfields Primary School Medium Term Plan

Year Group – **3** Subject - **Science** Topic – **Light** Term – **Summer 1**

National Curriculum

Pupils should be taught to:

- 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.

Non-Statutory

Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves.

They should think about why it is important to protect their eyes from bright lights.

They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

Key Questions

Have you ever noticed when you can't see things properly? Why does this happen?
How does distance from a light source affect how bright it looks?
Can you think of any light sources?
What happens if something is in the way of the light source?
What materials can you see your reflection in?
Why is the reflection in some surfaces better?
Why can't I see darker objects as clearly?
Why is a reflection clearer on a polished floor compared to a wall?
Which material is the most reflective?
When have you seen mirrors being used?
What could this shape mirror be used for?
How has the shape of the mirror affected how the light reflects?
How do the emergency services use reflection to stay safe.

Why might you change the shape, or angle of a reflection?
How do you protect yourself from the sun?
Can you look at the sun during a solar eclipse?
Is your shadow always connected to you?
What shadows can you see around you?
Can you cast any shadows?
Is that material transparent, translucent or opaque?
What might cause a shadow to change?
How can you make this shadow bigger/smaller?
How can you make this shadow strong/fainter?
How can you change the shape of this shadow?
What is your shadow like in the morning/afternoon?
What is your shadow like in the middle of the day?

Technical Questions

What is light?
Light is a form of energy that we can see. Dark is the absence of light.

How do we have light?
Light is produced by light sources. It travels from the light source and into our eyes.

Are the sun and moon sources of light?
The sun is a natural source of light. The moon is not as it does not produce light, it reflects light from the sun.

What is reflection?
When light bounces (reflects) off a surface.

Do all surfaces reflect light?
Smooth surfaces reflect the light evenly. Rough surfaces scatter the reflected light in different directions.

Does the colour of an object affect how well it can reflect light?
Light-coloured surfaces reflect most of the light that hits them. Dark-coloured surfaces absorb most of the light, reflecting very little.

Will a smooth or rough surface reflect an image more clearly?
A smooth surface because it reflects the light evenly whereas rough surfaces scatter the reflected light in different directions.

What is a mirror?
A smooth polished surface that forms an image by reflecting light. The flatter the surface, the clearer the image.

Does the shape of a mirror matter?
Differently-shaped mirrors reflect light in different ways.
Concave mirrors = curve inwards like a cave. They can make objects look bigger or smaller depending on how close you are to them.
Convex mirrors = curve outwards. They make objects look smaller and wider.

How are mirrors used in our daily lives?
Mirrors are used for many different functions in our daily lives and in a variety of technologies: personal grooming; rear-view and side mirrors in vehicles; optical instruments like telescopes or dentists' mirrors; solar energy.

What is the sun?
The sun is a star at the centre of our solar system. It releases huge amounts of energy as light and heat.

Why is looking at the sun dangerous?
The sun's ultraviolet (UV) rays can damage the retinas in your eyes which are sensitive to light. The best way to protect eyes is to wear sunglasses that provide 100% UV protection.

How else is the sun dangerous?
If you don't wear hats or sun cream, your skin could get burned. UV rays can also damage DNA in your skin cells and cause skin cancer.

How does light travel?
Light travels out from a light source in straight lines. It can be reflected off objects but cannot bend around them.

How do shadows form?
A shadow is a dark area that appears on a surface when an opaque object blocks light.

What is the different between transparent, translucent and opaque materials?
Transparent = lets light through
Translucent = lets some light through
Opaque = lets no light through

How can shadows be made bigger and smaller?
If an object is closer to the light source, it blocks more light, making a bigger shadow. As the object moves further away from the light source, it blocks less light, making a smaller shadow.

How can shadows be made fainter or stronger?
Increase the light source's intensity to lighten the shadow, or decrease it to darken the shadow. Translucent objects have fainter shadows and opaque objects have stronger shadows.

How can shadows change shape?
Change the angle or position of the light source and the object.

How do shadows outside change shape over the course of a day?
Early in the morning or late in the afternoon, the sun is lower in the skt so shadows are longer. In the middle of the day, the sun is higher in the sky so shadows are shorter.

Substantive Knowledge

Understand that we need light to see things and that darkness is caused by the absence of light.

Identify a range of light sources including the sun.

Understand that reflection is when light bounces off a surface.

Know that smooth surfaces reflect light evenly whereas rough surfaces scatter the reflected light in different directions.

Know that light surfaces reflect more light than dark surfaces.

Know that mirror is a smooth polished surface that forms an image by reflecting light. The flatter the surface, the clearer the image.

Describe how the shape of mirrors (concave and convex) can distort reflection.

Know that the sun is a star and its ultraviolet (UV) rays can damage the retinas in your eyes which are sensitive to light.

Understand that light from the sun can be dangerous and that sunglasses, sun cream and hats can protect you from its rays.

Know that light travels in straight lines from a light source.

Know that a shadow is a dark area that appears on a surface when an opaque object blocks light.

Understand how shadows can be made bigger/smaller, fainter/stronger and different.

Know that if an object is closer to the light source, it blocks more light, making a bigger shadow. As the object moves further away from the light source, it blocks less light, making a smaller shadow.
shapes.

Disciplinary Knowledge

Shine a torch into a box with holes to observe how light travels. Block the beams of light to demonstrate that in the absence of light, we cannot see objects.

Use torches to test and order materials according to how reflective they are.

Use mirrors to reflect light in different directions.

Sort different materials according to whether they are opaque, transparent or translucent.

Investigate which materials block light to form shadows (transparent, translucent, opaque).

Investigate how shadows outside change shape over the course of a day.

Key Vocabulary

Bigger
Dark
Distance
Fainter
Light
Material
Moon
Rough
Scatter
Shadow
Shape
Smaller
Smooth
Stronger
Sun

Technical Vocabulary

Concave
Convex
Light source
Opaque
Reflection
Translucent
Transparent
UV rays

Real-Life Links

Bathroom mirror
Cat's eyes
High-vis jackets
Emergency vehicles
Street signs

Key Scientists

Percy Shaw
Invented 'cat's eyes' for roads that reflect car headlights and make the road more visible for drivers.

Working Scientifically

Use torches to test and order materials according to how reflective they are.

Investigate which materials block light to form shadows (transparent, translucent, opaque).

Investigate how shadows outside change shape over the course of a day.

Lesson Breakdown

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Learning Objective To recognise the difference between light and dark. Success Criteria I understand that we need light to see things. I know that darkness is caused by the absence of light. I can identify a range of light sources. I can use a torch to explore how light moves. Star Knowledge Light is energy that allows us to see. Darkness is the absence of light.	Learning Objective To explore reflection of light. Success Criteria I can explain what happens when light hits a surface. I can compare how smooth and rough surfaces reflect light. I can compare how light and dark surfaces reflect light. I can order materials according to how reflective they are. Star Knowledge Reflection is when light bounces off a surface. Smooth surfaces reflect the light evenly. Rough surfaces scatter the reflected light in different directions.	Learning Objective To understand how mirrors can be used to distort reflection. Success Criteria I can explain how light reflects on rough and smooth surfaces. I can explain why mirrors are good reflectors. I understand how the shape of mirrors can distort reflection. I can use mirrors to reflect light in different directions. Star Knowledge A mirror is a smooth polished surface that forms an image by reflecting light. The flatter the surface, the clearer the image.	Learning Objective To recognise that light from the sun can be dangerous. Success Criteria I know that the sun is a natural light source. I know the dangers of the sun. I can describe ways to protect our eyes and skin from the sun. Star Knowledge The sun is a star and its ultraviolet (UV) rays can damage the retinas in your eyes which are sensitive to light.	Learning Objective To understand how shadows form. Success Criteria I understand that light travels in straight lines from a light source. I can sort different materials according to whether they are opaque, transparent or translucent. I can investigate which materials block light to form shadows. Star Knowledge A shadow is a dark area that appears on a surface when an opaque object blocks light.	Learning Objective To explore how shadows change. Success Criteria I can find patterns when investigating how shadows change size. I understand how shadows can be made bigger/smaller, fainter/stronger and different shapes. I can investigate how shadows outside change shape over the course of a day. Star Knowledge If an object is closer to the light source, it blocks more light, making a bigger shadow. As the object moves further away from the light source, it blocks less light, making a smaller shadow.

Flashback Four

Lesson 1		Lesson 2		Lesson 3		Lesson 4		Lesson 5		Lesson 6	
	Last Topic Y3 Plants L1 What essential resource do plants absorb from sunlight? a) Water b) Energy c) Nutrients **Energy**	**Last Lesson** Y3 Light L1 What makes it possible for us to see?  **Light is energy that allows us to see.**	**Last Topic** Y3 Plants L2 Which of the following is essential for plant growth? a) Cold temperatures b) Lack of water c) Sunlight **Sunlight**	**Last Lesson** Y3 Light L2 True or False: Reflection is when light is absorbed by a surface.  **False**	**Last Topic** Y3 Plants L3 Which is not part of a scientific investigation? Question, Hypothesis, Ignoring Data, Conclusion **Ignoring Data**	**Last Lesson** Y3 Light L3 True or False: The flatter the surface, the more distorted the image.  **False**.	**Last Topic** Y3 Plants L4 How does water get into a plant? **Water is absorbed by the roots and is moved around the plant.**	**Last Lesson** Y3 Light L4 What is the Sun.  **The Sun is a star and is incredibly powerful.**	**Last Topic** Y3 Plants L5 Which part of a plant is known for its blossom? a) Leaf b) Stem c) Flower **Flower**	**Last Lesson** Y3 Light L5 What is a shadow?  **A shadow is a dark area that appears when an object blocks light.**	**Last Topic** Y3 Plants L6 Why do plants try to disperse their seeds far away from the plant? **They don't have to compete for resources.**
Last Year Y2 Plants L1 What do all living things do?  Stay the same size. They grow. They avoid change. **They grow.**	**Previous Key Stage** Y1 Seasonal L1 Which is not an animal group? mammals, fungi, amphibians, reptiles. **fungi**	**Last Year** Y2 Plants L2 How do plants make their own food?  **Their leaves catch sunlight which gives them energy.**	**Previous Key Stage** Y1 Seasonal L2	**Last Year** Y2 Plants L3 What is Seed dispersal?  **Seed dispersal is when the seed moves away from its plant.**	**Previous Key Stage** Y1 Seasonal L3 Why are fish, amphibians, reptiles, birds and mammals not the same? **They have different bodies and behaviours.**	**Last Year** Y2 Plants L4 Plants need water, air, light to grow well. What else? **The right temperature and space.**	**Previous Key Stage** Y1 Seasonal L4 What do Omnivores eat?  **Omnivores eat both plants and meat.**	**Last Year** Y2 Plants L5 What will eventually happen to a plant that does not receive light?  **It will die.**	**Previous Key Stage** Y1 Seasonal L5 True or False: Animals of the same groups all have the same diet. **False.** Owls are carnivores while sparrows are herbivores.	**Last Year** Y2 Plants L6 True or False: Plants that grow in cold places move to follow the sun so that they get enough sunlight.  **True**	**Previous Key Stage** Y1 Seasonal L6 Where do animals live? **Animals live in different places some live on the ground and some live up high in trees.**