

ACET Junior Academies'

Scheme of Work for Science

Big Idea – Electricity, Sound & Light

Year 6 – Light



About this unit:

PoS – Light

Students will have studied light in Y3, and at first glance, there doesn't seem to be much difference in the content that is taught. Students need to know that light travels in straight lines, and that shadows are formed when the passage of light is blocked.

The theme of Y6 – Systems and Interconnections – is well applied here. The main aim is to reinforce the concepts above, but instead of looking at them in isolation, as will have happened in Y3, we will study how the application of these concepts are important in real life contexts, such as road safety. We will also review some work from Earth & Space (Y5), and consider how the behaviour of light is important in the effects of the Sun and Moon on the Earth.

Students may have made a puppet show in Y3, to illustrate how shadows are formed by blocking light, and will be doing the same in Y6. However there should be a more detailed application of science here. Students will be using maths skills to investigate the relationship between the size of shadows and the distance from a light source – and then using that to plan their puppet show with shadows of different sizes. There is also opportunity for the students themselves to decide what and how to investigate, in terms of rainbows and light, giving them the opportunity to consolidate their 'asking questions' and 'making predictions' skills, which when applied in this way are higher level scientific skills.

Unit structure

This unit is structured around six science enquiries:

1. Investigating shadows
2. Can you design a puppet show?
3. Can mirrors save lives?
4. How is the moon like a mirror?
5. Mayans and light
6. Investigate light

Links to previous and future National Curriculum units

Y3 – Light

KS3&4 - Physics

Enquiry 1: Investigating shadows			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 Light	EA – Pattern seeking Asking questions Making predictions Recording data	Can your children: <ul style="list-style-type: none"> - State the relationship between the position of an object and size of its shadow - Interpret a line graph to discuss the relationship it shows 	Horizontal: Maths – graphs and relationships Vertical: KS3&4 Physics
	Key concepts:		
	The closer an object is to a light source, the larger the shadow will be. We can use graphs to investigate the relationship between the size of a shadow and how far it is from a light source.		
Key terms		Common misconceptions	
Light, shadow, straight lines, closer, further, larger, smaller, scale			
Suggested activities		Resources	Useful links
Investigation - Straight lines and shadows – Maths skills IN Y3 the students learnt that light travels in straight lines. Review this, and look at how this fact leads to shadows forming. <i>Books/experiences of shadow puppets?</i> Students should investigate how much bigger and smaller they can make shadows? If you double the distance of the light source from the object, do you double the size of the shadow? Line graphs – can you draw a line graph to show the relationship between distance from light source (x axis) & size of shadow (y axis)? Can you use this to make predictions?		Light sources Objects for casting shadows Equipment for measuring distance Graph paper	https://www.stem.org.uk/resources/elibrary/resource/315603/what-factors-affect-size-shadow-shadow-theatre

Enquiry 2: Can you design a puppet show?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 Light	EA – Problem solving Asking questions Making predictions	Can your children: <ul style="list-style-type: none"> - Estimate how large a shadow will be, based on the distance of an object from a light source - Explain how they made some shadows bigger than others 	Horizontal: D&T Vertical: KS3&4 Physics
	Key concepts:		
	You can decide how large a shadow will be based on how close you hold an object to the light. You need to take practise measurements in order to design shadows of different sizes.		
Key terms		Common misconceptions	
Light, shadow, straight lines, closer, further, larger, smaller, scale			
Suggested activities		Resources	Useful links
Make a shadow puppet show, but plan how to make some characters bigger/smaller than others. This will involve planning and team work.		Light source(s) Objects for casting shadows 'Stage', or area for casting the shadows on to Darkened room	https://www.stem.org.uk/resources/elibrary/resource/315603/what-factors-affect-size-shadow-shadow-theatre

Enquiry 3: Can mirrors save lives?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 Light	EA – Problem solving Asking questions Making predictions Interpreting & communicating data Key concepts: We see light that is reflected off objects. Mirrors are used in cars and trucks to see objects without us having to turn our head, therefore making driving safer.	Can your children: - Tell you that when we see objects, we're seeing light reflected off them - Explain how mirrors are used for safety in cars	Horizontal: Maths - angles Vertical: KS3&4 Physics
Key terms		Common misconceptions	
Light, straight, mirror, reflection, corner, bend		<i>Students forget that everything we see is reflected from surfaces. What we see is light – reflected in a straight line – from the surface of different objects.</i>	
Suggested activities		Resources	Useful links
<p>Can you see the back of your head? Students work in pairs, using mirrors, so that an individual student can see the back of their own head. After they have experimented, point out that the individual 'looking' can't have the mirror directly in front of them. Look at halls of mirrors/experiences where you get a repeating image in mirrors.</p> <p>Simulate being in the driving seat of a car, with a rear view mirror and two wing mirrors. Demonstrate that there is a 'blind spot' where objects cannot be seen. The students can then produce a safety poster/leaflet/presentation for cyclists. Consider the effect on a truck, and how likely cyclists are to be hit by trucks. The students could investigate methods of keeping cyclists safe by enabling truck drivers to see them.</p> <p>Students to explain to someone else how to hold two mirrors in order to see the back of their own head. They could do this in words, or in diagrams. <i>Greater depth – can they stipulate the angles at which the mirrors should be held?</i></p> <p>Not being able to see round corners is a difficult concept to understand. We see light that is reflected – in straight lines – from objects, even if those objects are dark. If an object is around a corner, the light being reflected off it won't bend around the corner into our eyes. Students do NOT need to be taught this, but it should be reinforced at every opportunity that light</p>		Mirrors – various handheld mirrors Lamps/light sources	https://www.flickr.com/photos/secretbean/2178631471 Repeating images from mirrors facing each other. This wouldn't work if the woman was looking straight ahead and held the camera in front of her https://www.drivingtesttips.biz/car-blind-spot.html Car blind spots https://www.youtube.com/watch?v=IV-rhiGRFTE Truck blind spot – British Safety Council https://www.youtube.com/watch?v=IV-rhiGRFTE Truck blind spot – USA so applies to opposite sides. Useful statement 'If you can't see a truck drivers face in the side mirror, he can't see you'

travels in straight lines, so anything we see has reflected light in a straight line to our eyes.



Enquiry 4: How is the moon like a mirror?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 Light Y4 Earth & Space	EA – Pattern seeking	Can your children: - Describe how light reaches the Earth from both the Sun and the Moon - Tell you how solar and lunar eclipses happen	Horizontal: Maths – distances & scale Angles Vertical: KS3&4 Physics
	Asking questions Making predictions Observing and measuring		
	Key concepts: Light travels in straight lines between the Sun, Earth & Moon. Solar & lunar eclipses happen because of the way light travels in straight lines.		
Key terms		Common misconceptions	
Sun, Earth, Moon, source, reflected, straight, blocked, shadow,			
Suggested activities		Resources	Useful links
<p>Review 'Space' from Y5. The Sun is a light source, and the Moon reflects light.</p> <p>Investigate, and model, how eclipses can happen. Students can 'act out' being the Sun, Moon and Earth (this is useful, as the person 'being' the Earth can see what a human on earth would see), or model using balls etc.</p> <p><i>Greater Depth – distances and relative sizes of the Earth and Moon – relate the sizes of the shadows, and whether the eclipses are total or not, to the distances involved.</i></p> <p>Students could also investigate phases of the moon.</p>		Metre ruler Clay for making balls 2 toothpicks 2 binder clips	https://www.youtube.com/watch?v=csBRqOuSCw8 Making a model of an eclipse 30 inches is 76cm 1" is 2.5cm ¼" is 0.6cm https://www.bbc.co.uk/newsround/49000228

Enquiry 5: Mayans and light			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 Light	EA – Research	Can your children: - Tell you of a way in which light was important to the Mayans - Describe a way in which Mayans made use of sunlight and/or shadows <i>GD – explain how Mayans used the light</i>	Horizontal: History - Mayans Vertical: KS3&4 Physics
	Asking questions Making predictions		
	Key concepts: Light from the sun has been important for many cultures over time. Mayans used the changing angle of the Sunlight to tell the time, design architecture and in other ways.		
Key terms		Common misconceptions	
Sun light, angle, shadows, size, change			
Suggested activities		Resources	Useful links
Investigate what the Mayans thought about light, how they used light. How did it affect their architecture? How did they use changing shadows to tell the time? Can the students separate myths concerning the Sun from the way the Mayans used scientific facts?			

Enquiry 6: Investigate light			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 Light	EA – Pattern seeking Asking questions Setting up tests Observing & measuring	Can your children: <ul style="list-style-type: none"> - Think of a question that they could investigate - Decide what observations they need to make in order to answer their question 	Horizontal: Vertical: KS3&4 Physics
	Key concepts:		
	Scientists use their observations to think of questions so that they can find out more. When they have thought of a question, they decide what observations they could make in order to answer that question. <i>Their observations may not actually lead to an answer – but they should at least lead to ideas for further observations.</i>		
Key terms		Common misconceptions	
		Students often think that scientists just learn or 'know' knowledge. They should understand that science is a structured process of figuring things out, in small steps.	
Suggested activities		Resources	Useful links
<p>What can you find out about light?</p> <p>The students are NOT required to find out 'reasons' – this could easily lead to misconceptions around refraction etc. The aim is that the students make connections between what they are doing, and the result.</p> <p>Can they explain what they did and the result it has (e.g when we add more soap the rainbow changes – how does it change?). The aim is for the students to link cause and effect, and to try different things, giving reasons for why they are trying it.</p> <p>1 – Can you make a rainbow? Can you explain how you do it? Can you make it bigger/smaller?</p> <p>2 – where can you make a rainbow? On the ground, on a bubble? Are all the colours in there? Can you make it move around? What makes it move around?</p>			<p>All the colours of the rainbow combine to make white light: https://www.stem.org.uk/resources/elibrary/resource/34165/rainbow-spinner-science</p> <p>Light in the cinema – looking at 3D https://www.stem.org.uk/resources/elibrary/resource/425635/over-rainbow#&gid=undefined&pid=1</p> <p>General resource – support for investigating light https://www.stem.org.uk/resources/elibrary/resource/27044/light-teachers%E2%80%99-guide-ages-7-12</p>