

### **St Peter's CE Primary School** Light/Sound Topic Overview (2 Weeks)

#### Unit Overview:

This unit fulfils the National curriculum theme of Sound and light for the KS2 programme of study.

#### Year 3 and 4

Pupils will learn that light travels in straight lines and is reflected off surfaces. Pupils will then learn how this is haw we see things because light is reflected from different light sources to objects and then reflected off surfaces into our eyes. Pupils will learn how the eye works and some of the vocabulary associated with this. Pupils will then look at sound and how sounds are made by sound waves vibrating. Pupils will then learn how these sound waves can vary in size and travel into the ear. Pupils will learn how the ear works allowing us to hear and also how sounds further away are fainter.

#### Year 5 and 6

Pupils will recognise that shadows are formed when the light from a light source is blocked by a solid/opaque object and so the shadow is in the shape of the object- pupils will compare transparent and translucent materials. Pupils will find patterns in the way that the size of shadows change and 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. Pupils will then explore the features of instruments which produce different pitches of sounds and link this with the strength of vibrations and how sound waves differ with different pitches of sound.

#### Working Scientifically

Alongside electricity and throughout the year, pupils will continue to work scientifically in lower KS2 by:

- asking relevant questions and using different types of scientific enquiries to answer them.
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

#### Key Questions:

#### <u>LKS2</u>

- 1) What is the key vocabulary associated with light/sound?
- 2) What are light sources?
- 3) How does light travel?

- 4) How do we see things?
- 5) How are sounds made?
- 6) How do we hear sounds?
- 7) How does distance effect sound?

### <u>UKS2</u>

- 1) What is the key vocabulary associated with light/sound?
- 2) How are shadows formed and why do they change size?
- 3) Why are shadows the same shape as the objects that cast them?
- 4) How do we see things?
- 5) What is the relationship between the features of objects which produce sound and the pitch of sound they produce?
- 6) How do vibrations affect the volume of the sound?

Objectives covered in this unit:			
Science	<ul> <li>LKS2:</li> <li>Notice that light is reflected from surfaces</li> </ul>		
(see progression in expectations document)	<ul> <li>Recognise that light appears to travel in straight lines</li> <li>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.</li> </ul>		
	<ul> <li>Identify how sounds are made, associating some of them with something vibrating</li> <li>Recognise that vibrations from sounds travel through a medium to the ear</li> <li>Recognise that sounds get fainter as the distance from the sound source increases</li> </ul>		
	UKS2		
	<ul> <li>Recognise that shadows are formed when the light from a light source is blocked by a solid object</li> </ul>		
	<ul> <li>Find patterns in the way that the size of shadows change</li> <li>Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the even</li> </ul>		
	<ul> <li>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ul>		
	<ul> <li>Find patterns between the pitch of a sound and features of the object that produced it</li> </ul>		
	<ul> <li>Find patterns between the volume of a sound and the strength of the vibrations that produced it</li> </ul>		



## Light/Sound Key Knowledge LKS2

What is the key vocabulary associated with Light/Sound?	See vocabulary sheet- Provide a glossary of terms linked to the topic for pupils which is discussed and then pupils complete the definition for each word.				
	<ul> <li>Notice that light is reflected from surfaces</li> <li>Recognise that light appears to travel in straight lines</li> <li>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.</li> <li>Identify how sounds are made, associating some of them with something vibrating</li> <li>Recognise that vibrations from sounds travel through a medium to the ear</li> <li>Recognise that sounds get fainter as the distance from the sound source increases.</li> </ul>				
What are light sources?	Light sources are objects which produce light. Some light sources are natural like the sun and fire/candle light and others are man made like light bulbs.				
	This doesn't need to be an entire lesson just part of the teaching about light.				
How does light travel?	<ul> <li>BBC Two - Science Clips, How We See Things, Light travels in straight lines</li> <li>Pupils need to know that light travels in a straight line and is reflected off surfaces.</li> <li>Light travels in a straight line.</li> <li>You can see this by cutting a very small sliver out of a piece of card. Using a torch, shine the light through the card. You can see that the light travels in a straight line. If you have a mirror put this in the path of the line and see how it bends. It maybe faint but you may just be able to make it out.</li> </ul>				
	light mirror				
	Use the light science box for resources.				

	Pupils need to know that light can bend (refract) in water.				
	Fun fact: light travels at a speed of: 300,000 km/sec (186,000 miles/sec) much faster than sound.				
How do we see things?	Link this with how light travels and that it travels in straight lines reflecting off surfaces into our eye.				
	Light travels in straight lines. When light hits an object, it is reflected by that object and travels in straight lines to our eyes. Our eyes take in some of this light and information is sent to the brain. This is how we see the object. <u>How does the eye detect light? - BBC Bitesize</u>				
How are sounds made?	Sounds are made when objects vibrate. The vibration makes the air around the object vibrate and the air vibrations enter your ear. You hear them as sounds. You cannot always see the vibrations, but if something is making a sound, some part of it is always vibrating. <u>How are sounds made? - BBC Bitesize</u>				
How do we hear sounds?	Sound travels through the air in waves and is made by air particles vibrating (shaking quickly back and forth). E.g. When clapping your hands, it causes vibration of the air particles around the hands, which in turn shakes the particles next to them and so on, until the air particles in the ear are vibrating. When air particles inside the ear vibrate, they travel into the ear canal until they reach the eardrum. Then the eardrum passes the vibrations through the middle ear bones (the hammer, the anvil and the stirrup) into the inner ear (cochlea), where there are thousands of tiny hair cells. They shake the tiny hairs on the inside. The hairs are connected to nerves under the skin, which send messages (Hair cells change the vibrations into electrical signals that are sent to the brain through the hearing nerve) to your brain to tell you that you heard a noise (communicating with the brain). The brain tells you that you are hearing a sound and what that sound is.				

	Sound doesn't have to move through the air, it can travel through water or metal.
How does distance effect sound?	Sounds get quieter as the distance between the sound source and your ear increases.
	Sounds travel as vibrations. As the sound waves travel, the particles of whatever they are travelling through vibrate, or move quickly on the spot. The further the vibrations travel, the more they spread out. As they spread out through more and more particles, the vibrations become smaller and smaller. This causes the sound to get quieter and quieter. This is why sounds get quieter and quieter as you move further away from the source, until you eventually can't hear the sound at all.

	Light/Sound Key Knowledge UKS2
What is the key vocabulary associated with light/sound?	See vocabulary sheet- Provide a glossary of terms linked to the topic for pupils which is discussed and then pupils complete the definition for each word.
How are shadows formed and why do they change size? Why are shadows the same shape as the objects that cast them?	Shadows are formed because light travels in a straight line and so cannot pass around an opaque/ solid object. Because light cant go around it, nor can it pass through so a shadow is cast which is the same shape as the object which cast it. Pupils need to link this with how the angle of the light can change the size of a shadow- this was already covered during the space topic so only a quick reference needed. The higher the light source above an object the shorter the shadow. The lower the light source/horizontal- the longer the shadow. Also the closer the light source the larger the shadow. This is because the object blocks more of the light. The further away from the light source an object is, the smaller the shadow will be. This is because the object blocks less of the light. Science KS2: How are shadows made? - BBC Teach
How do we see things?	Link this with how light travels and that it travels in straight lines reflecting off surfaces into our eye. Light travels in straight lines. When light hits an object, it is reflected by that object and travels in straight lines to our eyes.

	Our eyes take in some of this light and information is sent to the brain. This is how we see the object.					
	How does the eve detect light? - BBC Bitesize					
	UKS2 can learn about the parts of the ave in more detail:					
	oksz cun leum ubour me pur is of me eye in more derdit.					
	Light enters the eye through the cornea ( the bit on the front of the eye ). The pupil controls the amount of light entering the eye. If you look in the mirror on a sunny day you'll notice your pupil is small, but it becomes bigger when there's less light allowing more to enter the eye.					
	As the eye is curved it bends the light entering it and so an upside down image is created on the retina which the brain very cleverly turns the right way up.					
	Muscles around the lens allow it to slightly shape allowing the eye to focus light on the retina.					
	Cross section of Human Eye					
What is the relationship between the features of objects which produce sound and the pitch of sound they produce?	Pupils can focus on musical instruments and the size of them and link this to the pitch of sound they make. Larger musical instruments make lower sounds and smaller instruments make a higher sound. This is true of string, woodwind and brass instruments.					
How do vibrations affect the volume of the sound?	The size of the vibration (also called amplitude) determines the volume. The amplitude of the vibration carries the energy. A big vibration causes large sound waves that transmit a lot of energy. The resulting volume of sound is loud - for example, a balloon bursting or a dog barking.					

The source of a sound vibrates, bumping into nearby air
molecules which in turn bump into their neighbours, and so forth. This
results in a wave of vibrations travelling through the air to the
eardrum, which in turn also vibrates. What the sound wave will sound
like when it reaches the ear depends on a number of things such as the
medium it travels through and the strength of the initial vibration.
Sound - Science World



# Light/Sound Vocabulary

Vocabulary				
Tier 1	Vibration	Travel	Surface	Sounds
(general)	Waves	Straight	Eye	Instruments
	Pitch	Reflect	Ear	Volume
	Loud	Faint	Sun	shadow
Tier 2	Molecules	Source	Opaque	Translucent
				Transparent
Tier 3	Ear drum	Retina	Hammer	Cornea
	Anvil	Stirrup	Pupils	Lens
			Optic nerve	Iris