

# Year 1 -Seasons and how they change.

## National Curriculum Objectives:

- Observe changes across the four seasons
- Observe and describe weather associated with the seasons and how day length varies. •

Pupils should observe and talk about changes in the weather and the seasons.

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: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.

**Key Ideas** 

with *Earth and space*.

Prior Learning	Seasons		
In Early Years:       L         • Developing an understanding of change.       C         • Observe and explain why certain things may occur (e.g leaves falling off trees, weather changes).       W         • Look closely at similarities, differences, patterns and change.       W         • Comments and questions about the place they live or the natural world.       He         • (Autumn 2 Bee Me)       Tr	Longitudinal Studies Children should carry out a study of the envi- he ideas of change. Children should draw of change. In tracking temperature and rainfall, year. Tipping points of temperature are vital visibly present in the local area. Why do more frequent days of rainsaturate the ground? How long does it take for the ground to dry after it has been raining? (Does morewater take longer to dry?) Do countries with a higher temperature have ess rain? (compare UK and one other country as a minimum) Track rain fall and temperature in different areas of the school grounds.	ironment over the entire year. This should be conclusions from what they find and make su pupils can make suggestions for why certain as two degree change can impact a wide rang Investigate the properties of leaves ( <i>Which</i> <i>leaf is strongest? Which is most effective at</i> <i>shade cover? Which is most effective at</i> <i>directing water? Which turns brown</i> <i>quickest? What do you notice aboutthe</i> <i>different leaves? (Use ID cards to identify trees</i> <i>in grounds) What purpose toleaves serve for</i> <i>the tree? Why do you thinkleaves turn brown</i> <i>in Winter?)</i> Sticky Cards– collect colours from the outdoors (Why did you choose to select that object to add to your card? Why did you choose to select <i>that colour to add to your card? Will you be</i>	carried out in both Year 1 and 2 to embed ggestions for how they expect things to a things happen and certain times in the ge of organisms meaning they are no longer And down came the rain ( <i>What effect does</i> <i>rain have on the environment?</i> <i>How might it be change on different soil type</i> <i>How does it differ in the nature trail?What</i> <i>would the effect on the environment be if</i> <i>there was too much rain? What wouldthe</i> <i>effect on the environment be if there was not</i> <i>enough rain?</i> )

#### In Year 3:

- 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 a solid object.
- Find patterns in the way that the sizes of shadows change. .

Children need to learn about how a number of things change with the seasons, including the weather, the temperature and the number of daylight hours. They do not need to know why these things change. It would be best to teach these phenomena through exploring the local environment rather than on topics to do

# Vocabulary Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature s?



# Year 3 – Light and Sight

#### **National Curriculum Objectives:**

- 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 a solid object.
- Find patterns in the way that the sizes of shadows change. .

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.

Prior Learning	Light		
<ul> <li>In Year 1:</li> <li>Name the seasons and know about the type of weather in each season</li> <li>May have some knowledge of were light comes from.</li> <li>Will most likely have seen their shadows and may know they appear when it is sunny.</li> <li>Some understanding of a reflection.</li> <li>May understand they need light to be able to see things.</li> </ul>	<ul> <li>Concept 1: Light and sight</li> <li>We can only see things when there is light and the light had to come from somewhere. All light originally comes from a light source</li> <li>? The shiny coin problem. A coin is lostwhat would be the best way to find it, turn out the lights and see it shine or use a torch to see it reflect? How does the distance from a light source affect how bright it looks?</li> <li>? How does being in darkness affect your sense of hearing? Is this how nocturnal animals survive?</li> </ul>	<ul> <li>Concept 2: What light does when it hits materials</li> <li>When light hits an object, it can do a number of things <ul> <li>If the object is transparent it will go through it and we will be able to see through it.</li> <li>If the object is opaque it will block the light and no light will get through.</li> <li>If the object is perfectly reflective light will bounce back off it and we will see reflect</li> <li>If the material is translucent it will allow light through but we won't be able to see through reflective (Do they notice that many materials exhibit more than one property or partial p Encourage them to think about how they might display this information).</li> <li>What colour would be best to make a safety jacket from? How does the colour of a materiar reflective it is?</li> <li>What would be the best material to make a blind for a baby's room? How does the thicknes of a material affect how much light can pass through it.</li> <li>How many pieces of tracing paper are as translucent as a single piece of whitepaper?How</li> <li>the size of a candle affect its brightness?</li> <li>How does the shape of a mirror affect how the light reflects?</li> </ul> </li> </ul>	

#### In Year 5:

- 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. •
- Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

#### **Key Ideas:**

- a) There must be light for us to see. Without light it isdark.
- b) We need light to see things even shiny things.
- let light through.

- f) Light comes from a source.

c) Transparent materials let light through them and opaque materialsdon't

d) Beams of light bounce off some materials (reflection). e) Shiny materials reflect light beams better than non-shiny materials.

## Vocabulary

Light source, dark,

reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, ctions of objects. opaque, shadow, ough it. block, transparent, translucent or translucent. roperties. (Year 3 Autumn 2 **Polar Express**) al affecthow ess orcolour does



		Year 4 – Sound		
<ul> <li>National Curriculum Objective</li> <li>Know how sound is made</li> <li>Know what happens to a</li> <li>Know the correlation best</li> <li>Know how sound travelse</li> <li>Know the correlation best</li> <li>Know the correlation best</li> <li>Pupils should explore and identify the way the pitch and volume of sounds can be chapupils might work scientifically by: finding different thicknesses. They might make ead make and play their own instruments by the second second</li></ul>	es: le associating some of them with vibrating. a sound as it travels from its source to our tween the volume of a sound and the stren s from a source to our ears. tween pitch and the object producing a source y sound is made through vibration in a range of different anged in a variety of ways. g patterns in the sounds that are made by different object rmuffs from a variety of different materials to investigat using what they have found out about pitch and volume.	ears. ngth of the vibrations that produced it. und. t musical instruments from around the world; and find o as such as saucepan lids of different sizes or elastic bands e which provides the best insulation against sound. They	<ul> <li>Key Ideas: <ul> <li>a) Sound travels from its source in all directions and wour ears.</li> <li>b) Sound travel can be blocked.</li> <li>c) Sound spreads out as it travels.</li> <li>d) Changing the shape, size and material of an object word produces.</li> <li>e) Sound is produced when an object vibrates.</li> <li>f) Sound moves through all materials by making them source of g) Changing the way an object vibrates changes it's south) Bigger vibrations produce louder sounds and smaller sounds.</li> <li>i) Faster vibrations (higher frequencies) produce higher</li> </ul> </li> </ul>	hear it when it travelsto ll change the sound it ibrate. id. r vibrations produce quiet er pitchedsounds.
Prior Learning		How sound is made, travels	and can be changed.	Vocabulary
<ul> <li>In KS1:</li> <li>May have some understanding that objects make different sounds.</li> <li>Some understanding that they use their ears to hear sounds.</li> <li>Know about their different senses.</li> </ul>	<ul> <li>Concept 1: Describing sounds</li> <li>Sounds can be made in many different ways and individual sounds have the properties of pitch and volume.</li> <li>When a sound is made it immediately spreads out in all directions. As it travels its volume decreases but its pitch remains the same.</li> </ul>	<ul> <li>Concept 2: How sounds are made and travel.</li> <li>Sound is made when an object is made to vibrate (move backwards and forwards or up and down).</li> <li>As the material vibrates it makes whatever it is in contact with vibrate, including air. As the air vibrates it makes whatever it is in contact with vibrate also, which might be a wall or even your eardrum. Sound moves through materials vibrating making other materials they are in contact with vibrate.</li> </ul>	<ul> <li>Concept 3: Why does pitch and volume change?</li> <li>Pitch and volume are determined by how the material vibrates: <ul> <li>Pitch is determined by how fast an object vibrates, i.e. the freque of vibration. The higher the frequency the higher the pitch.</li> <li>Volume is determined by how big the movement of each vibratio (the amplitude of vibration). The bigger the amplitude the higher volume.</li> </ul> </li> <li>Smaller objects and tighter strings and surfaces tend to vibrate with a higher frequency.</li> </ul>	Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave. (year 4 Spring 2 How to train your dragon)
	<ul> <li>Given a variety of objects (e.g. water in bottles, elastic bands, rulers, tuning forks, those wind up music box things). Children try and change the pitch of thenotes and try and summarise what theyhave found.</li> <li>If the volume of a sound decreases withdistance what happens to it? If it spreads out how could you prove it?</li> <li>How does the size of an ear trumpet affect the volume of sound detected?</li> </ul>	<ul> <li>How does the type of material affecthow well it blocks sound?</li> <li>How does the thickness of a materialaffect how well it blocks sound?</li> <li>Which materials vibrate better and produce louder sounds? Can we identifyany patterns?</li> <li>Which materials make the best string telephone components? Tin cans, plasticcups, paper cups; or for the cable wire, string or elastic. Predict and test.</li> </ul>	<ul> <li>Blow up a balloon with a 10p coin inside it. Swirl the balloon so the corolls around the inside (not slides). See clip <a href="https://www.youtube.com/watch?v=aAMW_3kWUhE">https://www.youtube.com/watch?v=aAMW_3kWUhE</a> Challenge child to use their knowledge of pitch and volume to investigate what made squealing noise.</li> <li>Make a straw oboe. See clip <a href="https://www.youtube.com/watch?v=yCmXhDZhqKQ">https://www.youtube.com/watch?v=yCmXhDZhqKQ</a> There are many exciting investigations this can be used for, a simple one is how does a length of the tube affect the pitch and volume?</li> <li>Partially fill a glass bottle (or use test tubes) with water. Tap it to make sound and blow across it to make a sound. What is vibrating to make a sound in each case? Plan and carry out an investigation to find out. Can you predict the relative pitch of tuning forks from the patterns of ripples they make when struck and placed in water?</li> </ul>	n ren the he e a he

### In KS3:

- frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound
- sound needs a medium to travel, the speed of sound in air, in water, in solids
- sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
- auditory range of humans and animals.

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	Vocabulary
rial vibrates: rates, i.e. the frequency her the pitch. hent of each vibration is mplitude the higher the d to vibrate with a	Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave. (year 4 Spring 2 How to train your dragon)
e balloon so the coin	
<u>UhE</u> Challenge children estigate what made the	
(Q There are many le one is how does the	
vater. Tap it to make a vibrating to make the ation to find out. om the patterns of er?	



## Year 5 – Light and how it travels.

#### **National Curriculum Objectives:**

- 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. •
- Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. •

Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions. Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

Prior Learning	How light behaves and how we see.			
<ul> <li>In Year 3:</li> <li>Recognise that they need light in order to see things and that dark is the absence of light.</li> <li>Notice that light is reflected from surfaces.</li> <li>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</li> <li>Find patterns in the way that the sizes of shadows change.</li> </ul>	<ul> <li>Concept 1: How light travels</li> <li>When light is emitted from a light source it travels in straight lines until it hits an object. This can be represented by an arrow.</li> <li>Shadows form when light hits an opaque object, the area behind is in darkness because light can only travel in straight lines</li> </ul>	<ul> <li>Concept 2: How light behaves when it hits objects</li> <li>When light hits a transparent object it goes through it in a straight line so we can see a clear image through it. When light hits a translucent material it goes through it but is scattered, this means light can pass through but we can't see an image through it.</li> <li>When light hits a mirrored surface it reflects off it in straight lines, so we can see an image in the reflective material Some times when light hits a material it reflects off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them.</li> </ul>		Con Anir light obje throu pupi allov much Too the e resu



	K	ey Ideas:	
	a)	Animals see lig	ght sources when light
		travels from th	e source into their eyes.
	b)	Animals see of	ojects when light is
		reflected off th	at object and enters
		their eyes.	
	c)	Light reflects of	off all objects (unless
		they are black)	. Non-shiny surfaces
		scatter the ligh	t so we don't see the
		beam.	
	d)	Light travels in	n straight lines.
			Vocabulary
ot	3: ]	How we see.	

mals see objects when is reflected off the ect and enters the eye ugh the pupil. The changes its size to w enough, but not too h light into the eye. much light damages eye and too little lts in poor quality

Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction (Year 5 Autumn 2 Lion. Witch Wardrobe





- How does the amount aluminium foil is scrunched affect how much lightis scattered?
- How does the amount of polishing affect how well a piece of metalscatters light?
- How perfect are our mirrors? Do some scatter more light than others?
- What happens to light when it is shone through water? How is the affected by putting glitter in the water, or salt in the water, or talc in the water?

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does the eye adaptto rent light conditions? ict how nocturnal hals are adapted to g in low light itions; check ictions through arch. Ip some mirrors soyou ee a candle that is en behind several ers. children a cope that doesn't work well, they work out what ongand try to correct it.	