Year 1 Seasonal Changes

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.

Killer Facts:

- Many things change throughout the calendar year.
- We have four seasons: spring, summer, autumn and winter.
- The weather can vary throughout the year.
- The day length also changes throughout the year – we have more daylight hours in summer and less daylight hours in winter.

Prior EYFS Learning

- Developing an understanding of change.
- Make observations about things that happen in their everyday environment.
- Look closely at similarities and differences, pattern and change.
- Make comments about and question the place they live and the natural world.
- Talk about the features of their own environment and how environments vary from one another

Seasons

Create rainbow colour hunts – which colours can they find in their local environment. Does this vary throughout the year? This could be repeated each term to compare.

Are there plants in every season? Can they collect samples? Allow children to collect different leaves – can they create observational drawings and describe the differences between them? Go on nature hunts during each season using clipboards and magnifying glasses. What can they find that shows the season?

Create simple tally charts to record everyone's favourite season/weather type - Link with literacy – simple acrostic poems for each season.

Create/compare diary entries across the year – are there changes in bed times/activities due to the amount of sunlight hours?

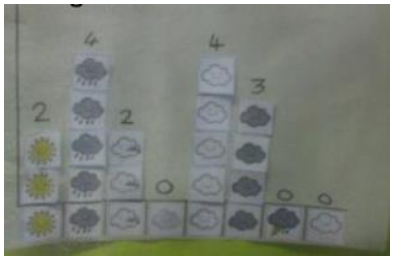
Weather

Do countries with a higher temperature have less rain? Compare the UK to at least 1 other country.

In which season does it rain the most?
What would happen if there was too much rain?
What would happen if there was not enough rain?

Create charts and symbols that record the weather over a few weeks. Choose the most appropriate symbol then add to the chart each day. Use scientific vocabulary to discuss their choices.

- Could they record the data from this in a simple bar chart/pictogram?



What conclusions can they draw?

Create simple tally charts to record everyone's favourite season/weather type.

Create outfits that may be required for different weather conditions and explain their choices.

Does the wind always go in the same direction? Create simple windsocks to investigate. Are there any patterns between wind direction and rainfall?

Longitudinal Study

All children should take part in a longitudinal study throughout the year where children can add their observations and continual data. This could include:

- Tracking rainfall
- Tracking temperature
- Tracking wildlife observations
- Tracking colour change

Key Vocabulary

seasons
change
spring
summer
autumn
winter
day
night
weather
sun
snow
rain
clouds
overcast
rain
rainfall
wind
forecast
temperature

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 an opaque object
- find patterns in the way that the size of shadows change.

Year 3 Light

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 an opaque object
- find patterns in the way that the size 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.

Killer Facts:

- We need light in order to see things. Without light it is dark.
- Dark is created by the absence of light.
- We even need light to see shiny things.
- Rays of light bounce off of some materials – this is called reflection.
- Light is reflected from surfaces.
- Transparent materials let light through, opaque materials do not let light through and translucent materials let some light through.
- Shiny materials reflect light better than non-shiny materials.
- Light comes from a source.
- Shadows are formed when an opaque object blocks the light source.

Prior Year 1 Learning

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

Light and Sight

Assess: The Shiny Coin Problem. If a coin is lost, we can find it by turning out the lights and watch for it shining. Discuss.

Use boxes and add objects inside. Add small holes to control how much light can enter the box – can object be seen with only a little light? Some objects may be easier to see with little light because they are shiny/reflective.

Give children many objects and a torch – can they identify whether the material is opaque, transparent, translucent or reflective. Can they identify that many materials exhibit more than one of these properties? Encourage children to consider what would be the best way to record this information. A table/Venn diagram?

Questions linked to this:

What would be the best material to make a bikers jacket from?
What would the best material to make a blind for a bedroom be?
Does polishing metal affect how light reflects?
Which is the best material to make sunglasses out of? *DT link.*
How many pieces of translucent tracing paper would we need to create an opaque sheet?

Allow children to experience complete darkness (a black out tent). Organise light sources into artificial or natural. Misconception: The moon is a light source.

Play around with the properties of mirrors – create 'secret code' using mirror writing, create mirror mazes and mirror multiplying games (see Hamilton planning).

Why do we see shadows?

Use outdoor areas to explore making shadows with their bodies. Make observations about the shadows that they created.

Make predictions and record using diagrams what happens with a shadow created by translucent/transparent and opaque objects. You could also consider what about coloured transparent and translucent materials.

Give children single objects and allow them to explore a range of questions.
How does the shape/size of a shadow change when:

- Shining straight onto it from nearby
- Shining straight onto it from far away
- Shining from above near to the object
- Shining from above from far away

Use a range of translucent/transparent and opaque objects to create shadow puppets.

Key Vocabulary

seasons*
day*
night*
weather*
sun*
rain*
clouds*
overcast*
opaque*
transparent*
light
dark
absence
shadow
reflect
bounce
reflected
reflective surface
light source
mirror
translucent

prior learning*

In Year 4 (Sound):

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

Year 4 Sound

National Curriculum Objectives:

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.
Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.

Killer Facts:

- Sounds are made through vibrations in a range of objects and instruments around the world.
- Sound is a form of energy.
- Vibrations travel tour ears, which is why we can hear things.
- Sound spreads out as it travels.
- Sound can be blocked.
- Sound moves through materials by making them vibrate.
- Changing the way an object vibrates alters the sound.
- Bigger vibrations produce louder sounds, smaller vibrations produce quieter sounds.
- Faster vibrations (high frequency) produce high-pitched sounds; lower pitched sounds are produced by lower frequencies.

Prior Learning

No prior science specific sound objectives in any year group.

EYFS:

- Children sing songs and make music and experiment with ways of changing this.

Year 1:

- Identify which body part is associated with which sense.

See previous objectives that will have been covered by the music curriculum.

What is sound and how does it travel?

As the material vibrates it makes whatever it is in contact with vibrate, including air. Which materials vibrate better and produce louder sounds?

Give children the opportunity to experience a range of sounds. Using their senses, discuss/record what they can see, hear and feel. Allow them to make observations about what happens to grains of rice on a drum skin when hit.

Which materials make the best string telephone components - tin cans, plastic cups, paper cups, or for the cable, wire, string or elastic? Which works better – taut or loose cable? Make predictions and test the components.

Why does an animal prick its ears up to hear a sound? Why are their ears shaped in particular ways? *Allows them to detect more sound waves and focus their hearing.*

Musicians at concerts and builders on building sites often need to block sound. What is the best material to use insulate against noise?

How can sound change?

Give children a variety of materials including containers, water, elastic bands, tuning forks, bottles etc. Can they alter the pitch of the sound?

https://www.youtube.com/watch?v=zlAHSpLoejU Show children the idea of 'screaming balloons.' Can they explain why this might happen using scientific vocabulary? Children could recreate the screaming balloons in groups and consider how they could change the sound – making the hexagonal knut larger/smaller or making the balloon larger/smaller.

https://www.youtube.com/watch?v=yCmXhDZhqKQ Experiment by considering what happens when:

- you shorten the straw?
- you alter the diameter of the straw?
- you alter the size of the cone?
- you cut holes to try to create notes?

Make water glass xylophones. How does the level of water alter the pitch?

Is there a link between the volume in school and the time of day? Children could plot graphs to show how volume changes throughout the school day in different areas. This should be measured using data loggers is possible that measure decibels.

The biggest drum will make the biggest sound. The smmallest drum will make the highest sound. The sound will last longer on a larger drum. If you hit two drums in the same way they will make the same sound. Discuss and investigate these statements.

Key Vocabulary

instruments*
sound*
senses*
ears*
loud*
quiet*
vibration
pitch
high pitch
low pitch
volume
noise pollution
air particles
sound wave
amplitude
sound insulation
high frequency
low frequency

prior learning*
Note: some key vocabulary maybe familiar from prior music lessons.

In Year 6 (Light):

- 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.

Year 6 Light

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.

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).

Killer Facts:

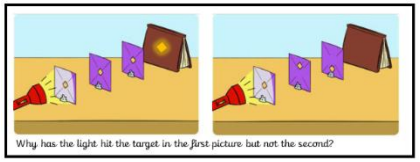
- Light travels in straight lines from a light source.
- We can see things because they give out light or reflect light into the eye.
- Light travels from the source, to the object and then into the eye through the pupil. The lens focuses the light on the retina.
- Shadows are created when light travelling in straight lines is blocked.
- Light can bend (refract) and spread (disperse) into the colour spectrum creating a rainbow.
- Light reflects off all objects (unless they are black).
- Non-shiny surfaces scatter the light so we do not see the beam.

Prior Year 3 Learning

- 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.

How do we see?

Building on work from Year 3, show how light travelling from a light source travels in straight lines and can be represented pictorially as an arrow. Demonstrate this using a target board. Can they get the light to hit the target through a number of cardboard walls? Add small holes – which must be in a straight line for the light to hit. This could also be done with a length of hosepipe and coloured acetate. Shine a torch down it when straight and bent.




Build on Year 3 vocabulary with scientific diagrams and explanations. Transparent – light goes through in a straight line so we see a clear image.


Translucent – light goes through but is scattered so we cannot see the image clearly.


Mirrored – light is reflected off in a straight line so we see a clear image in the mirror. Sometimes light is scattered from reflective surfaces. Here a clear image is not seen (scrunched aluminium can be used to demonstrate).

Set up mirrors so that a candle can be seen behind several corners/objects. Give children periscopes that do not work – can they fix and explain how it works/why it did not work?

Look at the parts of the eye. How does the eye adapt to different light conditions? Predict how nocturnal animals may be adapted to low light conditions. Research animal eyes.

What are shadows?

Why does a shadow change length throughout the day?

When creating shadow puppets:

- Why does the distance between the object and light affect the size of the shadow?
- How does the distance between the object and the screen affect the size of the shadow?

Build on Year 3 observations by explaining scientifically why this might happen (more/less light being blocked by the opaque object).

Record data for changing lengths and widths of shadows – could be presented scientifically as a graph.

Rather than making individual shadow puppets, consider making a shadow scene, where puppets and backgrounds need to be different sizes/distances from the light source.

Phenomena of Light

Investigate the effect of refraction and the interesting images that can be produced. Children can explore this using straws, pens, patterned paper and clear beakers of water. Extend: How will the liquid alter refraction – salt water, oil, coloured liquid etc.

Create rainbows using white light and prisms. This can also be done with water, mirrors and some reflective surfaces like CDs.

- Refraction and dispersal of light to create rainbows.

https://www.youtube.com/watch?v=lil4co0z7QA Children could make colour wheel illusion spinners using string card and coloured felt tips to demonstrate that all colours together create white.

Use green, blue and red transparent films and experiment with colour mixing different lights.

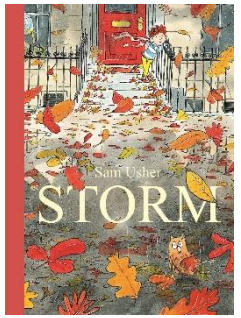
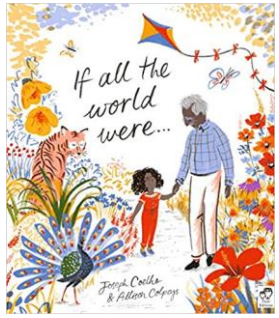
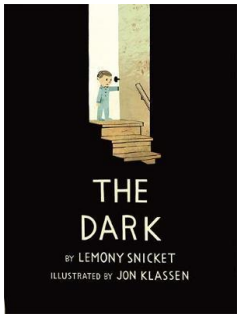
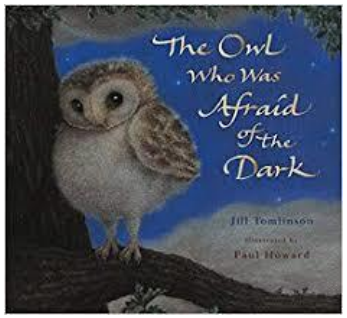
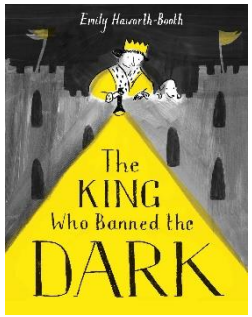
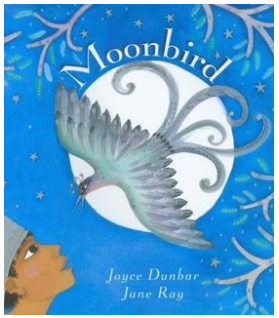
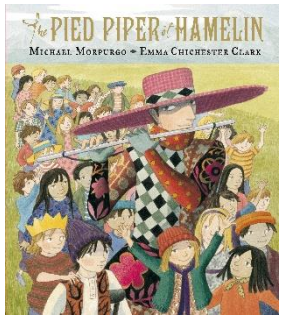
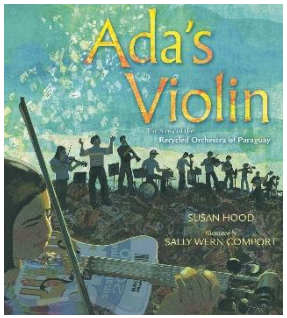
Key Vocabulary

sun*
opaque*
transparent*
light*
dark*
shadow*
reflect*
light source*
mirror*
translucent*
periscope
refraction
dispersal
rainbow
colour spectrum
absorbed
scattered
pupil
retina
iris
lens
optic nerve

prior learning*

In KS3:

- https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335174/SECONDARY_national_curriculum_-_Science_220714.pdf

Year Group	Common Misconceptions	Recommended Linked Texts for Seasons, Light and Sound	
Year 1	- it always snows in winter - it is always sunny in the summer - there are only flowers in spring and summer - it rains most in the winter	**After the Storm** by Nick Butterworth **Storm** by Sam Usher **If the World were…** by Joseph Coelho	  
Year 3	- we can still see even where there is an absence of any light - the moon and reflective surfaces are light sources - a transparent object is a light source - shadows contain details of the object, such as facial features on their own shadow - shadows result from objects giving off darkness.	**The Dark** by Lemony Snicket **The Owl who was Afraid of the Dark** by Jill Tomlinson **The King who Banned the Dark** by Emily Haworth-Booth	  
Year 4	- sound is only heard by the listener - sound only travels in one direction from the source - sound can't travel through solids and liquids - high sounds are loud and low sounds are quiet	**Moonbird** by Joyce Dunbar **The Pied Piper of Hamlin** by Michael Morpurgo **Ada's Violin** by Susan Hood	  
Year 6	- we see objects because light travels from our eyes to the object - light bends	**Blackout** by John Rocco **Letters from the Lighthouse** by Emma Carroll **Goodnight Mister Tom** by Michelle Magorian