

Y1 - Seasonal Changes

SKILLS

- Beginning to observe closely, using simple equipment
- Performing simple tests
- Identifying and classifying
- Using their observations and ideas to suggest answers to questions
- Gathering and recording data to help in answering

SCIENTISTS

John Dalton
British weather pioneer



Alex Beresford
Weather presenter
(meteorologist)



CAREERS

Meteorologist (studies the atmosphere and weather)
Climatologist (studies climate patterns)

ENQUIRIES

- What if the weather we have today never changed?
- What if the order of the seasons changed?
- What if it rained for a month?
- What if we stopped the wind?
- What if we didn't predict the weather?

Months of the year

Summer clothing Spring

Winter clothing Autumn

KEY VOCABULARY

season Autumn

Spring Summer

overcast shadows

Winter weather

KEY LEARNING

- Pupils will know the seasons, **how they make us feel**, and how weather changes within them.
- Observe and describe weather associated with the seasons and how day length varies
- **Understanding that extreme weather is becoming more common and problematic.**

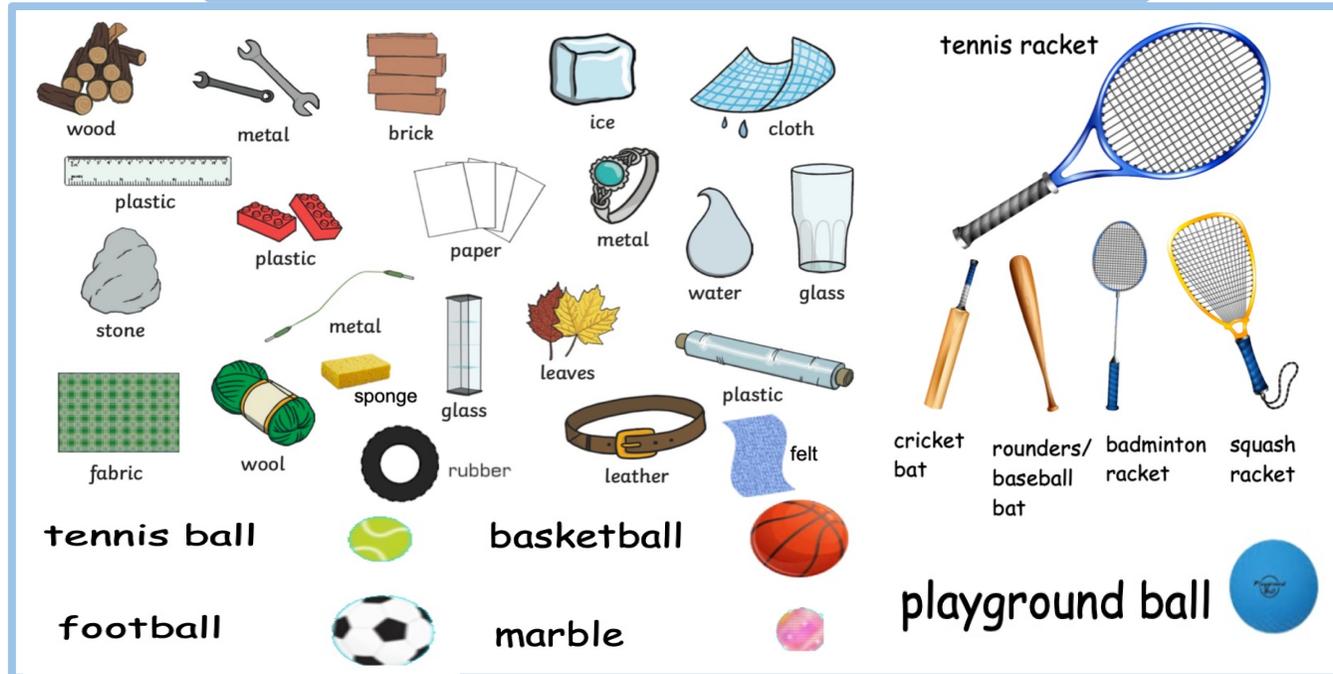
WHAT YOU SHOULD ALREADY KNOW

EYFS - Children comment and ask questions about aspects of their familiar world such as the place where they live or the natural world.

SKILLS

- Observing closely, using simple equipment
- Performing simple tests
- Identifying and classifying
- Using their observations and ideas to suggest answers to questions
- Gathering and recording data to help in answering questions

Y2 - Materials – Playground Games



SCIENTISTS

August Krogh
(Danish professor of
Physiology)



Ross Tucker Ph.D.
(Science and
Research consultant - rugby)



CAREERS

Sports scientists
Sports physiologists

ENQUIRIES

Which ball will bounce the highest?

What are the properties of different bats and balls?

What if we couldn't use wood anymore?

KEY LEARNING

- Pupils will learn how to identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- Find out how the shapes of solid objects made from some materials can be change by squashing, bending, twisting and stretching

KEY VOCABULARY



WHAT YOU SHOULD ALREADY KNOW

EYFS - Which tools to use on which materials.
Year 1 -
Everyday Materials

SKILLS

- Beginning to prepare and carry out a simple investigation which is fair, with one changing factor
- Be able to predict the outcome of investigations and ask questions
- Be able to use simple scientific equipment
- Be able to test ideas using evidence from observation and measurement
- Report findings from enquiries (written and oral)
- Be able to use evidence to draw conclusions
- Present data using drawings, diagrams, keys, bar charts and tables
- Use evidence to answer questions
- Identify and compare simple scientific ideas and processes

SCIENTISTS

William Gilbert
(Magnetism and electricity)



Priti Parikh (Head of UCL Engineering and Research)



CAREERS

Architect (designs buildings)
Seismologist (studies earthquakes)

ENQUIRIES

- What is magnetism?
- What forces do magnets produce?
- How are magnets used in everyday life?
- How does a compass work?
- How do different surfaces effect movement?

Y3 – Forces and Magnets

North and North repel.
North and South attract.
South and South repel.

Magnetic Field
A magnetic field is invisible. You can see the magnetic field below. This is what happens when iron filings are placed on top of a piece of paper with a magnet underneath.

Non-magnetic

Magnetic

These objects contain iron, nickel or cobalt. Not all metals are magnetic.

The needle in a compass is always **magnetic**. A compass always points north-south on Earth.

Push

Pull

KEY LEARNING

- Pupils will compare how things move on different surfaces
- Notice that some forces need contact between two objects, but magnetic forces can act at a distance
- Observe how magnets attract or repel each other and attract some materials and not others
- Compare and group together a variety of everyday materials on the basis of whether, they are attracted to a magnet, and identify some magnetic materials
- Describe magnets as having two poles
- Predict whether two magnets will attract or repel each other, depending on which poles are facing

KEY VOCABULARY

 attract	 force meter	 non-magnetic
 compass	 friction	 magnetic poles
 electro-magnetic	 iron (metal)	 repel
 force	 magnetic field	 water resistance

WHAT YOU SHOULD ALREADY KNOW

EYFS - Children learn how objects float or sink through play.

SKILLS

- Be able to prepare and carry out a simple investigation which is fair, with one changing factor
- Be able to predict the outcome of investigations and ask questions
- Be able to use simple scientific equipment
- Be able to test ideas using evidence from observation and measurement
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SCIENTISTS

Daniel Farenheit
(Invented the thermometer)



Dr Fangxian Fang
(Earth scientist)



CAREERS

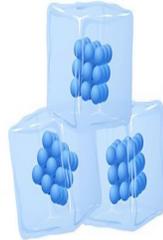
Nano scientist (studies incredibly small things such as atoms)
Science teacher (teaches others about science)

ENQUIRIES

- What are solids, liquids and gases?
- Can we make objects change state?
- How can I use changes of state to make something new?
- How does water change state?
- What is the water cycle?
- What temperature does it melt?

Y4 – States of Matter

SOLID



- Rigid
- Fixed Shape
- Fixed Volume
- Cannot be squashed

LIQUID



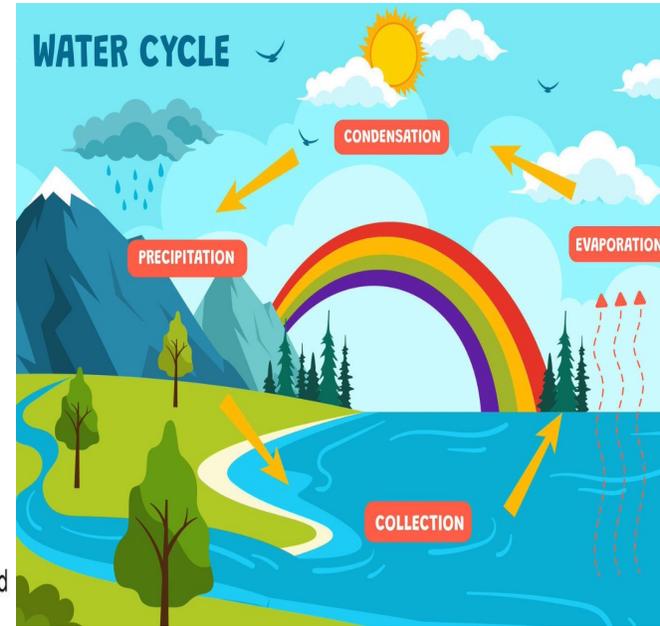
- Not Rigid
- No Fixed Shape
- Fixed Volume
- Cannot be squashed

GAS



- Not Rigid
- No Fixed Shape
- No Fixed Volume
- Can be squashed

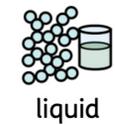
WATER CYCLE



KEY VOCABULARY



change of state



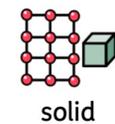
liquid



precipitation



condensation



solid



water cycle



cooling



melting point



water droplets



gas



particles of matter



water vapour



sustainability

KEY LEARNING

- Pupils will compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius ($^{\circ}\text{C}$)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

WHAT YOU SHOULD ALREADY KNOW

EYFS - Exploring changes I notice: jelly, cooking – toast, freezing – ice lollies, ice cubes.
Year 1 – Everyday Materials
Year 2 - Everyday Materials

SKILLS

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Making measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- Using test results to make predictions to set up further comparative and fair tests
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- Identifying scientific evidence that has been used to support or refute ideas or arguments

SCIENTISTS

Dr Nira Chamberlain
(Polymath – mathematician who studies applied mathematics in science)



Becky Schroeder (inventor of the glow sheet)



CAREERS

- Chemical engineer (solves problems involving chemicals)
- Biochemist (investigates chemical processes that take place inside living things)

ENQUIRIES

- How are materials made?
- How much does this impact on the environment?
- What is conductivity?
- How can I separate mixtures?
- Which changes are irreversible?
- What if we carry on as usual?

Y5 - Properties of Materials and Reversible Changes

<p>solid particles</p>	<p>liquid particles</p>	<p>gas particles</p>	<p>Heat Cool</p>	<p>Irreversible changes often result in a new product being made from the old materials (reactants). For example, burning wood produces ash and this cannot be turned back into wood.</p>	
<p>Dissolving</p> <p>A solution is made when solid particles are mixed with liquid particles. Materials that will dissolve are known as soluble. Materials that won't dissolve are known as insoluble. A suspension is when the particles don't dissolve.</p>			<p>Reversible changes</p> <p>Reversible changes such as mixing and dissolving can be reversed.</p>		
<p>Sugar is a soluble material.</p>		<p>Sand is an insoluble material.</p>	<p>Reversible changes, such as mixing and dissolving solids and liquids together, can be reversed by:</p>		
<p>Sieving</p> <p>Smaller materials are able to fall through the holes in the sieve, separating them from larger particles.</p>	<p>Filtering</p> <p>The solid particles will get caught in the filter paper but the liquid will be able to get through.</p>	<p>Evaporating</p> <p>The liquid changes into a gas, leaving the solid particles behind.</p>	<p>dissolving</p>		
<p>solid</p> <p>The solid melts.</p>	<p>liquid</p> <p>The liquid freezes.</p>	<p>liquid</p> <p>The liquid evaporates.</p>	<p>gas</p> <p>The gas condenses.</p>	<p>dissolving</p> <p>solvent + solute → solution</p>	
<h2>KEY LEARNING</h2> <ul style="list-style-type: none"> • Pupils will compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda 					

KEY VOCABULARY

<p>chemical</p>	<p>evaporate</p>	<p>permeability</p>
<p>condense</p>	<p>filter</p>	<p>reversible</p>
<p>material conductivity</p>	<p>insoluble</p>	<p>soluble/solubility</p>
<p>dissolving</p>	<p>irreversible</p>	<p>thermal</p>
<p>transparency</p>	<p>fossil fuels</p>	<p>global emissions</p>

WHAT YOU SHOULD ALREADY KNOW

EYFS - How things work e.g., which tools to use on which materials.
Year 1 – Everyday materials (properties)
Year 2 – Everyday materials (properties)

SKILLS

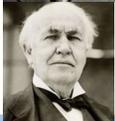
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SCIENTISTS

C.V. Raman (Physicist)



Thomas Edison (a pioneer of the light bulb)



CAREERS

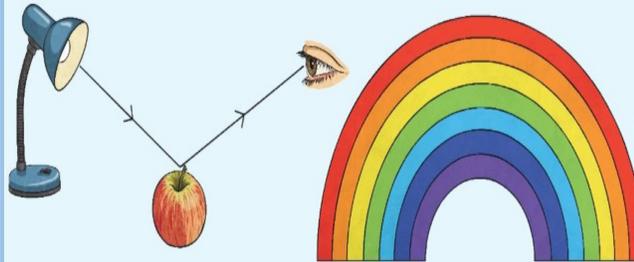
Architect (designs buildings)
Ophthalmologist (a doctor specializing in vision and eye health)

ENQUIRIES

- What do we need to see?
- What is a shadow and how are they affected?
- Why are shadows the same shape as the object that cast them?
- How do reflections work?
- How can I see objects out of sight?
- What is colour and how is it made?

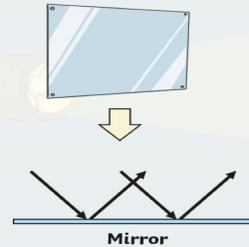
Y6 - Light

We usually see light as being white, but it actually contains all the colours of the **spectrum**.

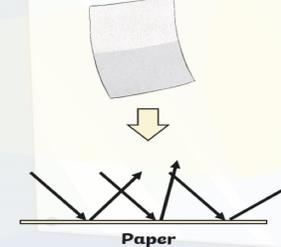


Scattered and Reflected Light

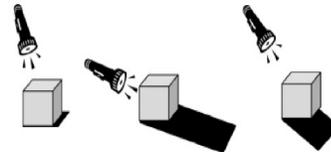
Completely smooth surfaces like a mirror will reflect light in a specific direction.



Rougher surfaces scatter light in many different directions – this is called a diffuse reflection.



The angle of the light source also makes a difference to the size of the shadow.



KEY LEARNING

- Pupils will 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

KEY VOCABULARY



shadow/absence of light



light source



opaque



translucent



transparent

WHAT YOU SHOULD ALREADY KNOW

EYFS, Y1 and Y2 Plants unit links
Year 3 - Light (and Plants unit)

- 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.