

YEAR 4 SCIENCE – STATES OF MATTER

KNOWLEDGE ORGANISER



What have we learnt in this topic before, what we will learn this year and what will we learn next?

In Year 2, we learnt in our topic: Uses of everyday materials (Materials for different uses)

- 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
- To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
- Our Focus Scientist was **John McAdam-building roads**

In Year 4, we will learn:

- To compare and group materials together, according to whether they are solids, liquids or gases
- To 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 (°C)
- To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- Our focus Scientist will be: **Spencer Silver – Materials - Post it notes**

In Year 5, we will develop this further and learn about Properties and Changes of materials including

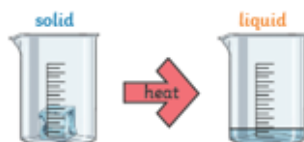
Dissolving, reactions & separation.

PARTICLES – FREEZING AND MELTING

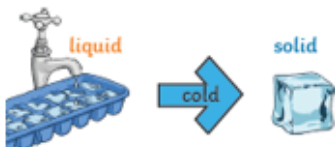
Particles are what materials are made from.

- They are so small that we cannot see them with our eyes.
- The **properties** of a substance depend on what its particles are like, how they move and how they are arranged
- Particles behave differently in **solids, liquids**

Solids and liquids can be changed from one state to another by heating or cooling.



If a solid is heated to its **melting point**, it **melts** and changes to a liquid. This is because the particles start to move faster and faster until they are able to move over and around each other.



When **freezing** occurs, the particles in the liquid begin to slow down as they get colder and colder. They can then only move gently on the spot, giving them a **solid** structure. The **temperature** at which water turns to ice is called the **freezing point**. This happens at 0 degrees C.

FOCUS SCIENTIST – SPENCER SILVER – POST IT NOTES

Dr. Spencer Silver, a 3M scientist, was busily researching adhesives in a laboratory. In the process, he discovered something peculiar: an adhesive that stuck lightly to surfaces but didn't bond tightly to them. "It was part of my job as a researcher to develop new adhesives, and at that time we wanted to develop bigger, stronger, tougher adhesives," said Silver. "This was none of those." What Silver discovered was something called **microspheres** which retain their stickiness but with a "removability characteristic," allowing attached surfaces to peel apart easily.

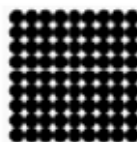


Key Vocabulary

melt freeze evaporate condense precipitation cooling condensation evaporation solids liquids gases particles water cycle process

SOLIDS, LIQUIDS AND GASES

What is a solid?



- In the **solid** state, the material holds its shape.
- Solids** have **vibrating particles** which are closely packed in and form a regular pattern.
- This explains the fixed shape of a solid and why it can't be poured.
- Solids** always take up the same amount of space.

What is a liquid?



- In the **liquid** state, the material holds the shape of the container it is in.
- This means that **liquids** can change shape, depending on the container.
- Liquids** have **particles** which are close together but random.
- Liquid particles** can move over each other.
- Liquids** can be poured.

What is a gas?



- In the **gas** state, **particles** can escape from open containers.
- Gases** have **particles** which are spread out and move in all directions.

THE WATER CYCLE

Water on Earth is constantly moving. It is recycled over and over again. This recycling process is called the water cycle.

- Water evaporates into the air**
The sun heats up water on land, in rivers, lakes and seas and turns it into water vapour. The water vapour rises into the air.
- Water vapour condenses into clouds**
Water vapour in the air cools down and changes back into tiny drops of liquid water, forming clouds.
- Water falls as precipitation**
The clouds get heavy and water falls back to the ground in the form of rain or snow.
- Water returns to the sea**
Rain water runs over the land and collects in lakes or rivers, which take it back to the sea. The cycle starts all over again.



YEAR 4 GEOGRAPHY — HOW IS VILLAGE LIFE DIFFERENT TO LIFE IN THE CITY?

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What have we learnt before in Geography and what we will learn next?

In Year 1, we looked at the key features of a town and a village and compare the different types of building located in them. These include; a church, a shop and different types of houses.

In Year 2, we developed our knowledge what facilities a town or village might require.

In year 5, we will extend our knowledge of this topic by comparing the UK and South America

Types of settlements

In the UK we classify settlements into four different groups depending on their size.

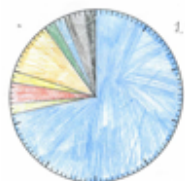
- A **HAMLET** is a very small group of homes. It is unlikely that there will be any other facilities.
- A **VILLAGE** contains more facilities than a hamlet, for example a few shops, a post office, a primary school and maybe a doctor's surgery. Villages can vary in size from a few hundred to a few thousand.
- A **TOWN** may contain tens of thousands of people. They have shopping centres, secondary schools, railway stations and hospitals.
- A **CITY** is even bigger. They are areas with large numbers of people. They provide a very wide range of facilities including more specialised functions like universities, large hospitals and sport stadiums. In the past cities were identified as places that contained a cathedral, but today the Queen is the person who decides whether a town becomes a city or not. She bases her decision on a number of different factors including the size of the population.



FIELDWORK/ INSPIRATIONAL DAY/ HOOK LESSON

Conducting a Survey – Why do people visit Hemel Hempstead Town Centre?

A survey is a way of gathering information on a topic. It involves: creating questions, asking questions, recording the information (usually tallying) and presenting the information. If you survey a small group you can ask everybody (called a Census). If you want to survey a large group, you may not be able to ask everybody so you should ask a sample of the population (called a Sample). When sampling, it is important that you choose people randomly.



2. Key: How would you describe your survey? A legend describing the survey.

Key Vocabulary

United Kingdom city town village hamlet settlement agriculture retail materials
 leisure industrial essential desirable unwanted water supply land early settlers

Why do people choose to live where they do?

When early settlers came to the UK, there was much to consider when choosing the perfect spot to settle. Some important factors were:

Terrain: The land itself is essential when choosing a settlement site. Early settlers knew that it was important that there is some flat fertile land for farming. However, a settlement on a hill is easier to defend as you are more likely to see enemies approaching.

Materials: To build dwellings and thrive, village settlers required access to resources such as clay, wood or tin.

Water Supply: Fresh water was also necessary, and new settlements were often built around a supply such as a river. However, it could not be too close as land prone to flooding was not suitable for farming and building.

Shelter: This includes natural shelter from the wind and rain, such as mountains.

Transport links: Often villages, towns and cities were linked together to make trade easier.

Essential	Desirable	Unwanted
shelter 	entertainment/shops 	open to attack
water supply 	education 	exposure to weather
food 	neighbours 	prone to flooding
electricity/fuel supply 	healthcare 	
	transport links 	

Land use in settlements

Land use is the way in which land is used by people. This includes things such as housing, industry or green spaces (such as parklands or farming).

Agriculture - The farming of crops or animals.

Industrial - Businesses that provide product and services e.g. Amazon in Maylands

Housing - flats, terraced, semi-detached, detached.

Healthcare - Doctors surgery, dentists, hospitals (Urgent Care) in Hemel and A&E in Watford

Leisure - The activities available to people when they are not working e.g. gyms, football pitches, ski centre, cinema

Retail - shops that sell products to people e.g. Mark and Spencer, Primark, TK Maxx, Wilko, The Entertainer.



YEAR 4 GEOGRAPHY – WHERE DO WE COME FROM?

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What have we learnt before in Geography and what we will learn next?

In Year 1, through our topic 'Where in the world do we live', we learnt about where we live and began to use atlases and maps to identify countries and Cities in the UK.

In Year 4, during the autumn term, we will extend our knowledge through our topic 'Where do we come from' by looking at the UK in more detail, as well as understanding the European Union and finding out about our own background and heritage.

In Year 5, we will extend this through our topic 'Locating continents and oceans of the world.'

THE EUROPEAN UNION

The European Union (EU) was formed to bring together the countries of Europe. The EU helps its member countries with issues such as trade, security, and the rights of citizens. By 2013 the group had 28 member countries. However, in 2016, one member—the United Kingdom—voted to leave the EU. The country officially left the union on January 31st 2020.

The EU countries are: Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.



THE BRITISH ISLES, THE UK AND GREAT BRITAIN



What is the difference between the British Isles, the UK and Great Britain?

The United Kingdom of Great Britain and Northern Ireland is a sovereign state (meaning it is ruled by a King or Queen) in the north west of Europe.

Great Britain is an island consisting of England, Wales and Scotland that is separated by the English Channel and North Sea. Northern Ireland is not a part of Great Britain. On a map, Great Britain is the larger of the two British Isles, on the right hand side.

The British Isles are a group of islands consisting of the islands of Great Britain, Ireland, the Isle of Man, the Inner and Outer Hebrides and over six thousand smaller islands. They have a total area of 315,159 km² (121,684 sq mi) and a combined population of almost 72 million, and include two sovereign states, the Republic of Ireland and the United Kingdom of Great Britain and Northern Ireland.

FIELDWORK/ INSPIRATIONAL DAY/ HOOK LESSON

WHAT MAKES ME, ME?

There are many things that make us who we are today. Each of us has a unique background and this is what makes us special and valued. There are lots of things that have made us who we are today, such as our:



- **Nationality** – where was I born? Where were my trusted adults born? This is our nationality.
 - **Ethnicity** – the Government currently lists 18 different ethnicities in the UK. These are words used to describe groups of people who have something in common and who see themselves as distinctive in some way by having a common heritage or background.
- As a class, we will carry out a survey to find out about our nationality and ethnicity and find out about our family background so that we can celebrate what makes us, us!

CITIES IN THE UNITED KINGDOM

There are currently a total of 69 such cities in the United Kingdom: 51 in England, 7 in Scotland, 6 in Wales, and 5 in Northern Ireland. Cities are those places that have been granted city status by letters patent or royal charter.

These include: Bath, Belfast, Birmingham, Bradford, Brighton, Bristol, Cambridge, Cardiff, Carlisle, Dundee, Durham, Edinburgh, Manchester, Leeds, London and Glasgow.



Key Vocabulary

Great Britain	British Isles	United Kingdom	city	town	village	capital city	island	The European Union	country
nationality	ethnicity	tropic of cancer	tropic of Capricorn	equator	continent	nationality	ethnicity	heritage	

YEAR 4 ART – MOUNTAINS AND REFLECTIONS

KNOWLEDGE ORGANISER



What have we learnt before in Art and what we will learn next?

In Year 3, we studied the artist 'Monet' and created our own watercolour paintings, focusing on using brushes for different effects as well as developing our sketching and pencil skills.

In Year 4, in our drawing and painting topic, we will further develop our sketching skills to be able to show reflections, studying the work of Adrienne Pavelka as our inspiration. We will continue to develop our painting skills by using watercolour paints, concentrating on being able to mix the colours and shading these to create mood in our art work.

In Year 5, we will extend this to sketching our own 'Dragon's eye' to show mood and feeling, as well as studying the artist 'Hockney' and further developing our ability to paint landscapes and reflections.

DRAWING REFLECTIONS IN WATER

We can use pencil techniques to draw landscapes which are being reflected by a water source, such as a lake or river. To do this:



- Sketch out the main outlines of the objects using a pencil using the **center** of the page as your reflection line
- Use symmetry to sketch the objects in their original position and in the mirror line (to reflect them)
- Shade the sky, adding layers of colour
- Repeat process for the general landscape
- Use a darker pencil to highlight edges to create contrast and shade to create shadows
- Add in finer details over the top of the original colours

FOCUS ARTIST – ADRIENNE PAVELKA



Adrienne Pavelka is a New Zealand artist whose special love is **watercolour paintings**. She began her artist career as a graphic designer. Her art is inspired by the **effect of light on the landscape** and the patterns of the sky.



Adrienne Pavelka's policy is not to let herself be influenced by other artists. She thinks that watercolours "**create their own unexpected surprise**". <http://www.adrienne-pavelka.com/>

WATERCOLOUR PAINTING

Watercolour paint consists of fine pigment particles suspended in a water-soluble binder (adhesive substance). It is usually used on paper. As watercolour is **semi-transparent**, the white of the paper gives a natural **luminosity** to the washes of colour. White areas of the image often are merely left unpainted to expose the paper. **Watercolours are sold as cakes of dry paint or as liquid in tubes, to which water is added.**

The paint can be applied in various techniques such as **wet-on-wet** and **wet-on-dry** to obtain different effects. It can be used very effectively to paint landscapes, including reflections, skies and people and can be used to **create a sense of movement and mood.**



CREATING MOOD



To create mood in our paintings, we use things like colour selection, subject matter, brush technique, positioning of objects (composition).

Colour selection, including mixing our own colours, can help to give a distinctive mood to a piece of art work as Color can represent many different emotions. Blue can bring about depressing feelings while yellow might bring out happiness.

Shading is a technique used in art to represent light and shade by **varying the colour and intensity of the medium being used**. This helps create the illusion of depth and shape in an otherwise flat work and can also help to create mood. We can use techniques such as:

- Using a **watercolour wash** (a very light overall color)
- **Glazing** – letting the was dry and then layering a darker colour, where needed, over the top
- Add shadows – **cast shadows and shadows**



Key Vocabulary

pencil	shading	reflection	outline	detail	landscape	mirror line	light	dark	mood	day/night
watercolour	first wash	glazing	watercolour wash	colour palette	wet-on	wet-dry	draw	paint	fine	

YEAR 4 DT – MAKING BUNTING

KNOWLEDGE ORGANISER



What have we learnt before in DT and what we will learn next?

HISTORY OF TEXTILES/ SEWING

In Year 2, through our topic 'Construction/Use of Materials' we designed and made our own emergency vehicles.

In Year 4, we will design and make our own cross stitch keyring, as well as making our own bunting.

In Year 5, we will extend our skills through our topic 'Electrical and Mechanical components' by incorporating hydraulics and pneumatics.

Textiles are flexible materials woven from fibres, which have been used by humans throughout history for a number of purposes.

Textiles are used to make clothing, sheets, towels, linen, carpets, rugs and a wide variety of other products.

Sewing involves the joining of different textile fabrics using a needle and thread, either by hand or by a sewing machine.

Sewers can use a range of different sewing styles to produce strong joins as well as adding to the overall appearance and design. Thinking about the way a product looks is called 'aesthetics', and is highly important in textiles.



BUNTING

Bunting was originally a specific type of lightweight wool fabric generically known as *tammy* which was manufactured from the turn of the **17th century** and used for making **ribbons and flags**, including **signal flags for the Royal Navy**. Amongst other properties that made the fabric suitable for ribbons and flags was its **high glaze**, achieved by a process including hot-pressing. The origin of the word 'bunting' is uncertain but **bunt means colourful in German**.

Today, bunting is typically used to **decorate homes** and used **at celebrations as a decoration**.



Key Vocabulary

textiles material join decorate sew needle thread by hand sewing machine bunting flag
running stitch back stitch over sew blanket stitch cross stitch template grid applique aesthetic

TYPES OF STITCHES

Running Stitch – This is the simplest stitch. It creates a dotted line effect. Remember to leave a space from the previous stitch.

Back Stitch – Similar to the running stitch, except that the thread doubles back so that there is no visible spacing between stitches. It is a very strong and secure stitch.

Over Sew Stitch – The over sew stitch is a good way to neaten the raw edge of fabrics. It involves sewing over the edge of the fabrics.

Blanket Stitch – Another way to reinforce the edges of thick materials. This stitch is popular as it is thought to be aesthetically pleasing.



APPLIQUE

Appliqué is ornamental needlework in which pieces or patches of fabric in different shapes and patterns are sewn or stuck onto a larger piece to form a picture or pattern. It is commonly used as decoration, especially on garments. The technique is accomplished either by hand stitching or machine.

Appliqué is commonly practiced with textiles, but the term may be applied to similar techniques used on different materials. In the context of ceramics, for example, an appliqué is a separate piece of clay added to the primary work, generally for the purpose of decoration.





COMPUTING: CREATING MEDIA

KNOWLEDGE ORGANISER



Overview



Photo Editing

- You should already know that we can use digital devices to help us to take and edit photographs.
- There are many different apps and programs to edit and improve photos, for example Photoshop, Luminar and paint.net.
- There are lots of different ways that we can edit photographs, for example cropping, rotating, flipping, and changing colours and styles.
- We should understand the not all photographs that we see are real – they may have been edited.



Using Software

Paint.net is one example of photo editing tool, but many others are available. Below is how to select, copy and paste in new elements to edit your photograph.

1. Open the photo and use the 'lasso select' tool to select the area that you need.



2. Right click on the image and select 'copy.'



3. Open the image that you want your copied photo in. Select 'paste.'



4. Use the handles to resize the image, and drag into position.



The 'Adjustments' tab allows us to turn the photo black and white, and change contrast & brightness.



The 'clone stamp' copies pixels from one part to another. 'Recolor' is used to replace colours. 'Magic wand' allows areas with a similar colour to be selected.



When we want to save our edit, we should click on this icon or the 'save' button. We can reverse the last thing we have done with the undo tool.



Editing Techniques

Below are a number of different ways that we can edit photographs.



When we only need a part of a photograph, we can crop the image. We can also enlarge and reduce the parts that we need.



We can make more than one of an image by copying it. We can also rotate and flip images to create different effects.



Photograph editing programs often have filters. These can change the colours in a photograph. Different colours can give us different feelings.



When the lighting of the photograph is not quite right, we can change the brightness of the photograph.



We can add and remove parts of a photograph by using cut, copy and paste tools.



We can change the contrast of photographs, making the subjects clearer.

Considerations of Edited Photos

-As photographers and editors become more skillful, and editing programs become more advanced, it can be hard to tell if images are real or edited.

-We therefore need to be alert, and not believe everything we see. We should also edit photos for positive, and not negative reasons (see right).



Positive Reasons for Editing Photos

- To make things clearer;
- To highlight the important things;
- To show things in a nice way;
- To avoid embarrassment.

Negative Reasons for Editing Photos

- To try to deceive people;
- To embarrass or put down others;
- To spread fake news or dishonest ideas.

Important Vocabulary

Photography

Editing

Software

Crop

Rotate/Flip

Copy

Brightness

Contrast

Enlarge

Reduce

COMPUTING: DATA AND INFORMATION KNOWLEDGE ORGANISER

Overview

Data Logging



- Data is raw numbers and figures. Information is what we can understand from **analysing** data.
- There are lots of different ways that we can collect, log and interpret data, including by using data loggers.
- Data loggers and logging software can be used to automatically capture data. We can then draw conclusions in answer to our research questions.

Data Collection

Asking Questions: Data gathered over time can be used to answer important questions.

For example, the class register can be used to answer questions about children's attendance. Before collecting data, we need to carefully consider which questions we are trying to answer.

	EMMA	ELIASH	EMERIE
Jan			
April			
May			
June			
July			
Aug			
Sept			
Oct			
Nov			
Dec			

-Sensors: Our senses (sight, hearing, smell, taste, touch) detect things in our environment. Computers have input device sensors which help them to sense things.

Some examples are:

- Microphones (sound)
- Camera (light)
- Touchscreen (touch)



- Data Loggers: Data loggers have sensors built into them. They can be used to detect and record data. Data loggers often contain:

- A heat sensor (to record the temperature)
- A light sensor (to record brightness)
- A sound sensor (to record the noise).



Data Recording

-One way for us to record data is by writing it down. Some data loggers can also record data themselves, which we can download later. Computers can also help us to record data, e.g. by connecting our data loggers to computers and opening data logging software.



-An advantage of this is that computers can record data automatically, meaning that someone does not need to sit waiting for a long period of time. Data loggers can be set to measure at different intervals (points in time).

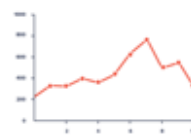


-Data logger software can also be used to show different charts and graphs. This can save the user a lot of time!



Analysing Data

- When scientists collect data, they usually store it so that it can be **analysed** at any time. The data can also be shared so that other scientists can use it.
- Tables and graphs can be used to present the data in a useful way for reading and understanding it. It is important to be able to see trends as clearly as possible.



Answering Questions

- Remember that data should be collected for a reason: to answer questions.
- It is very important to ensure that the testing that you do is fair and reliable, otherwise the data that you get back may not give you the accurate answers that you need.
- It is important to interpret your data carefully. You can then write a report detailing what your conclusions are.

Important Vocabulary

Information

Data

Collection

Sensor

Logging

Analysis

Data Logger

Software

Interpret

Conclusion

Prior Learning

Identified similarities and differences in sequences. Developed body management over a range of floor exercises. Attempted to bring explosive movements into floor work.

Unit Focus

Become increasingly competent and confident to perform skills more consistently. Perform in time with a partner and group. Use compositional ideas in sequences.

We are learning...

1. to perform a 6-element sequence that uses changes in speed and direction.
2. to use the STEP principle to create and perform a partner sequence.
3. to take weight on our hands, showing control.
4. to develop a sequence using compositional ideas, e.g. changing speed.
5. to co-operate as a group to refine a short sequence.
6. to compare and judge sequences.

Key Questions

1. How many compositional elements can you identify?
2. Did you use different pathways in your sequence?
3. What safety aspects do you need to consider when performing a cartwheel?

Equipment

Mats, hoops, cones, wall bars, bean bags, low apparatus, skipping ropes, ropes, action cards.

Vocabulary

Control, group, similar, different, direction, speed, partner, actions, compositional, stamina, leap, refine, progression.

Concepts

Basic gymnastics shapes are tuck, straddle, pike, star, dish, arch, L-sit, back support, front support, v-sit, bridge, straight, arabesque.

Assessment Overview

Head - Decide on ways to improve a piece of work using compositional elements and implement changes.

Hand - Demonstrate some control when taking weight on hands.

Heart - Adapt actions and sequences to work with partners and small groups.

