



Science

Knowledge and Skills Organiser: Materials(Y1,Y2, Y3,Y4,Y5)

Our Science Knowledge and Skills organisers are primarily a planning guide for the teachers. They include the statutory statements (**Subject Knowledge to be covered**) and the non statutory guidance (in blue). They offer suggestions (in red) for how these statements might be taught **working scientifically** – which is a requirement of the National Curriculum.

The Knowledge and Skills Organisers map out how and when these areas are taught and help to build a clear, progressive scientific statement of intent for our children as they progress through the school.

We have added additional ideas and guidance for the teachers, which they can choose to use and interpret i.e. how the local area might be used, key questions and ideas which might be pursued, outdoor learning opportunities and cross curricular links as these are features we recognise are important in terms of our holistic curriculum provision.

Parental/ carer support:

By mapping out our curriculum in this way we hope that these documents also help parents and carers support the learning of their child/ren by

- Showing the knowledge being covered
- Offering some suggestions which might also be investigated at home
- Sharing key vocabulary, which can be discussed to ensure your child's understanding
- Suggestions of places to visit

Outdoor Learning:
Forest School – “Nature Sculptures” explore the work of Andrew Goldsworthy.

Observation around the school – what materials can we find? Which is the most common/least common?

Science skills (**Working Scientifically**) to be covered

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- **performing simple tests e.g performing simple tests to explore questions, for example: ‘What is the best material for an umbrella? ... for lining a dog basket? ... for curtains? ... for a bookshelf? ... for a gymnast’s leotard?’**
- **identifying and classifying – e.g grouping objects made of different materials**
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions

Subject Knowledge to be covered:

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties

Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent.

Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

Local Links

Looking at materials in local school environment. (material walk?)
Photograph and caption different materials

Year 1 – Materials **Aut1: Toys**

Key Vocabulary for topic

Material (wood, plastic, glass, metal, water, rock brick, paper, fabrics, elastic, foil.)

Properties (hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent)

Object surface liquid

Subject specific vocabulary

Test, group,

Resources – Materials box

Materials cards RSC

Possible Questions/ experiences

What does material mean?

What material is the toy/object made out of?

Why was that material chosen?

Can you group the materials? Explain why you have grouped them in this way?
(start to use scientific language)

Cross -Curricular links

Art - “Nature Sculptures” explore the work of Andrew Goldsworthy.

History: Change of materials of toys and changes in materials over the years. (time line)

DT: Design a toy – choose materials

Maths – Venn Diagram, grouping
English – class book about materials and toys

Science skills (**Working Scientifically**) to be covered

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying – e.g comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions

Outdoor Learning:

How many different ways can we find ...metal/wood, fabric etc used in outdoor area.

Forest School: How can we make shelters? What materials should we choose and why?

Local Links

Walk to school survey – different materials seen.
Visit to Museum of London
History off the page re houses. – why did the fire spread so quickly.

Key Vocabulary for topic

Material (wood, plastic, glass, metal, water, rock brick, paper, fabrics, elastic, foil.)

Properties (hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent)

Changing the material: Squashing, bending, twisting and stretching, heating/ freezing

Resources Materials box

Year 2 – Materials **Aut1: Long Ago in London** **Aut 2: Frozen world**

Possible Questions

What materials were Tudor and Stuart houses made of?
Why did this help the Great Fire of London?
How can fire be extinguished?
What does fire need to burn? (candle demonstration)
Investigate the different uses of...(specify material)
Which material is the best to mop up a spillage?
Which fabric is the most waterproof / protective etc. Set up a scenario for investigation. (pirate- letter from Blackbeard)
How can materials be changed?
How can we change water?

Subject Knowledge to be covered:

- 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 changed by squashing, bending, twisting and stretching

(e.g children should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.)

Cross -Curricular links

History: Great Fire of London

DT: using materials to build Houses?

Candles burning and how to extinguish fire.

(cover candle with jar to use up the oxygen
Ice lollies making and melting in different areas of the school and outside.(measure temp)

DT: Design a sport's kit – considering flexibility, strength and absorbency (letter from teacher)

English – letter to Blackbeard/ Mr Cooper reporting findings.

Maths – graphs stretching fabric
graph amount of water absorbed
scale on a thermometer

Science skills (**Working Scientifically**) to be covered

- asking relevant questions and using different types of scientific enquiries to answer them
- **setting up simple practical enquiries, comparative and fair tests** – e.g . Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed.
- **making systematic and careful observations** and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers e.g **observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them**
- 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** – e.g Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed
- 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.

Outdoor Learning:

Collect soil samples and investigate what soil is made up of.

Is the school soil the same as soil at home?

Local Links

Look at building materials locally where have they come from? (eg Easyneye estate – brick - flint – St andrew’s church)

Websites – a lot of sites tracking active volcanoes around the world (link Geography)

https://www.volcanodiscovery.com/erupting_volcanoes.html

Key Vocabulary for topic

Soil, (clay, chalky, sandy, peat) rocks, (sedimentary, metamorphic, igneous) crystals, fossils, sediment, organic matter , magma, erosion

Resources rock and gem collection in year 3 classroom.

Year 3 – Rocks Spring: Natural Disasters and Volcanoes

Subject Knowledge to be covered:

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter

pupils should explore different kinds of rocks and soils, including those in the local environment.

Possible Questions

How are rocks formed?
What is soil made of?
How are rocks eroded?
What do fossils tell us?
How are fossils formed?
Investigation – Mrs Gillingham needs to build, make..... what materials would be best. Explain your findings.
Soil investigation using a collection of different soils.(textures and water retention)
Use overhead magnifier to zoom in on dry soil particles. – what do you observe?

Cross -Curricular links

History: Mary Anning –who was she? How did she contribute to our understanding?

Literacy- Biography
report back to Mrs Gillingham

Art – making “fossils”

DT- chocolate rocks to demonstrate the 3 types
build a volcano

Geography: map of Britain – fossil finds and latest finds around the world.

Where are the volcanoes? Ring of Fire.

Maths- Use dates, heights etc of volcanoes in maths for larger numbers. Compare differences

Science skills (**Working Scientifically**) to be covered

- asking relevant questions and using different types of scientific enquiries to answer them – e.g grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party)
- setting up simple practical enquiries, comparative and fair tests e.g research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.
- 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.

Subject Knowledge to be covered:

- 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 (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature
- Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.

Note: teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Outdoor Learning/ local links

Measuring evaporation of puddles
Measuring changes of frozen water

Year 4 – Materials: States of matter

Key Vocabulary for topic

Water cycle – evaporation, condensation
freeze/melt, solid, liquids , gases,
temperature, celsius, water vapour

Possible Questions

What happens to puddles in the sun?
How would you explain the difference between a gas, liquid or a solid?
What happens to water when it is heated/cooled?

Cross -Curricular links

Geography: Link with water cycle/rivers
Art: marbling art – what happens with the oil and water?

Science skills (Working Scientifically) to be covered

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary – e.g ‘Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?’
- taking 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 e.g They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a 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 e.g . They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

Year 5 – Properties and changes of Materials

Outdoor learning/ Local Links

Forest school - How does the wood change on the fire?
Melting marshmallows.

Key Vocabulary for topic

Mixture, liquid, solution, reversible
irreversible insulator conductor, magnetic,
opaque, transparent
solubility, transparency, conductivity
(electrical and thermal),
filtering, sieving and evaporating
Reversible – irreversible

Possible Questions

Which material would stop ice cream melting?
How are chemical changes used in cooking?
What new materials being are developed and how is this helping, impacting our world?
How can materials be separated and how is this helpful
(eg link to water filtration etc)

Cross -Curricular links

Geography: How is the development of materials (e.g plastics affecting the world?)
English – Biographies of Spencer Silver, who invented the glue for sticky notes or Ruth Benerito
Art – recycled materials art work/sculpture

Subject Knowledge to be covered:

- compare and group together everyday materials on the basis of their properties, including their hardness, 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 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

Children should explore reversible changes, including evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. T

They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

Note: pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials