



Albert Village Primary School Science Curriculum
Materials and Their Properties



Year 1 Everyday Materials

National Curriculum Learning Objectives	<ul style="list-style-type: none"> • 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 		
Prior learning	Future learning		
RECEPTION	<ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) 		
Key learning	Possible experiences	Vocabulary	
<ul style="list-style-type: none"> • All objects are made of one or more materials • Objects are things in the world around us • A material is the 'stuff' something is made of • Some objects can be made from different materials, like wood, plastic, glass, metal, water, and rock • Materials can be described by their properties • 'Properties' is a scientific word for describing something <p>Materials, ways to describe them and examples of real objects:</p> <ul style="list-style-type: none"> • Wood: hard, strong, stiff, not see-through – trees, bench • Plastic: strong, shiny, bendy, some see-through, some not see-through – toys, bottle, packaging • Glass: see-through, smooth, hard, stiff – window, jar • Metal: hard, strong, shiny – tools, cutlery • Water: runny, wet, clear, see-through – ocean, from the tap 	<ul style="list-style-type: none"> • Explore everyday materials in the world around them • Explore, name, discuss, raise and answer questions about everyday materials • Observe and compare objects • Sort different objects into different groups based on properties • Go on a walk around school, take photos of objects and label materials • Classify objects made of one material in different ways e.g. a group of object made of metal. • Classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials. • Classify materials based on their properties. 	Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through	

<ul style="list-style-type: none"> Rock: hard, strong, not see-through – stepping stones, pebbles 	<ul style="list-style-type: none"> Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters 	
--	--	--

Possible Enquiry Coverage

Classifying	<ul style="list-style-type: none"> Classify objects made from the same material (e.g. lots of things made from plastic). Classify one object made from different materials (e.g. cups made of different materials). Classify different fabrics based on texture (e.g. to make a feely-book for a child). Classify paper/plastics/fabrics.
Observing over time	
Pattern seeking	
Comparative/fair testing	<ul style="list-style-type: none"> Test objects made of different materials to see how effective they are e.g. umbrellas/hats/coats for waterproofness, cloths/nappies for absorbency, socks for elasticity, bounciness of balls, sunglasses for protection from the sun, picnic plates for stiffness, door mats for wiping your feet, different papers for writing on/painting etc.
Researching	

Scientists across the curriculum	Chester Greenwood: inventor of earmuffs Becky Schroeder: inventor of glo-sheets
---	--

Year 2 Use of everyday materials

National Curriculum Learning Objectives	<ul style="list-style-type: none"> 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 	
Prior learning	Future learning	
<ul style="list-style-type: none"> Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) 	<ul style="list-style-type: none"> Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) 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. (Y5 - Properties and changes of materials) Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) 	
Key learning	Possible experiences	Vocabulary
<ul style="list-style-type: none"> An object can be made from one or more materials The material/s of an object have been specifically chosen because they have properties that are suitable for the task, e.g. a water bottle is made of plastic because it is transparent, allowing you to see the drink inside and waterproof so it holds the water. A material can be suitable for different tasks When choosing what to make an object from, different materials must be compared to find the most suitable Objects made of some materials can be changed in shape by squashing, bending, twisting and/or stretching 	<ul style="list-style-type: none"> Identify and discuss uses of different everyday materials so they become familiar with how some materials are used for more than one thing, e.g. metal for coins, cans, cars, table legs, etc. Think about the properties of a material and the reasons for why they are/aren't suitable for a task/purpose Suggest alternative materials that would also be suitable for the object based on properties Encouraged to think about unusual or creative uses for everyday materials 	<p>Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard</p> <p>Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, non- reflective, flexible, rigid</p>

<ul style="list-style-type: none"> An object can be changed in shape because of it being a property of the material, or because of how it has been made, e.g. thickness – thin plastics can be bent, thick ones can't 	<ul style="list-style-type: none"> Compare uses of everyday materials in different places, e.g. school, journey to school, home, visits/trips, in stories or song Close observations, identification and classification of materials and their uses For a given object, identify what properties a suitable material needs to have 	Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching
--	---	---

Possible Enquiry Coverage	
Classifying	<ul style="list-style-type: none"> Based on the children's own criteria, classify materials e.g. samples of wood, metal, plastic, etc.
Observing over time	
Pattern seeking	
Comparative/fair testing	<ul style="list-style-type: none"> Test materials for different uses (e.g. Which material can you use to make an aeroplane? Which fabric would you use for curtains? Which materials are best for Cinderella's mop? Which fabric would you choose for Elastigirl's costume? Which paper can be used for a book, fabrics for a child's dungarees, materials for aeroplanes etc?)
Researching	

Scientists across the curriculum	<p>John Dunlop: inventor who developed rubber for tyres</p> <p>Charles Macintosh: chemist and inventor of waterproof clothing</p> <p>John McAdam: inventor of the modern road surface</p> <p>Victoria Callaghan: developed sustainable packaging for BASF plc</p> <p>Dr Pearl Agyakwa: materials scientist who studies why some materials wear out and others don't</p>
---	---



Year 5 Properties and changes of materials

<p>National Curriculum Learning Objectives</p>	<ul style="list-style-type: none"> • 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.
<p>Prior learning</p>	<p>Future learning</p>
<ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) • 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. (Y3 - Forces and magnets) • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) • 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). (Y4 - States of matter) 	<ul style="list-style-type: none"> • Chemical reactions as the rearrangement of atoms. (KS3) • Representing chemical reactions using formulae and using equations. (KS3) • Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) • Defining acids and alkalis in terms of neutralisation reactions. (KS3) • The pH scale for measuring acidity/alkalinity; and indicators. (KS3)

<ul style="list-style-type: none"> Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter) 		
Key learning	Possible experiences	Vocabulary
<p>Recap from Y4 States of Matter:</p> <ul style="list-style-type: none"> Solids: keep their shape, stay in one place, can be held easily and have a fixed volume Liquids: has a fixed volume but changed shape to fit the container, can be poured easily and keeps a level, horizontal surface Gases: fill all available space, have no fixed shape or volume, often invisible Materials have different uses depending on their properties and state Properties (simple properties introduced in KS1) include hardness, transparency, electrical and thermal conductivity and attraction to magnets Thermal conductors allow heat to travel through them easily Thermal insulators do not allow heat to travel through them easily (common misconception: children think thermal insulators keep cold in or out) Some materials will dissolve in a liquid and form a solution Some materials will not dissolve in a liquid (insoluble) and will form sediment Mixtures can be separated by filtering, sieving and evaporation Some changes to materials such as dissolving, mixing and changes of state are reversible Some changes such as burning wood, rusting, and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible 	<p>The entire unit must be covered by children physically exploring different materials as a lot of the content is abstract.</p> <ul style="list-style-type: none"> Children explore and compare a broad range of materials, including those relating to magnetism in year 3, and electricity in year 4) Explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving (recognising that melting and dissolving are different processes) Explore burning, rusting, and vinegar mixed with bicarbonate of soda to find out that they are not reversible Investigate properties of different materials in order to recommend materials for particular functions, e.g. test waterproofness and thermal insulation to identify fabric for a coat Explore adding a range of solids to water and other liquids, e.g. cooking oil Select the correct equipment to separate mixtures by sieving, filtering and evaporating 	<p>Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material</p>

Possible Enquiry Coverage

Classifying	<ul style="list-style-type: none"> Based on the children's own criteria: classify the materials themselves e.g. samples of wood, metal, plastic, etc., or after observing what happens when solids are added to liquids, classify materials based on the outcomes.
Observing over time	<ul style="list-style-type: none"> Observe rusting with uncoated nails in different liquids. (This can be achieved by removing coating with sandpaper.) What happens to a hot liquid in one specific container?
Pattern seeking	
Comparative/fair testing	<ul style="list-style-type: none"> Which material would be good for a tent? Which material would be good to make a tea bag from? Which materials keep things warm/cold? Which material would be good for a bag for different purposes? Test solids for solubility, e.g. adding different amounts of sugar/salt to water Compare rates of solubility. Burn different materials (not plastic or toxic substances). Investigate non-reversible changes, e.g. what affects the rate of rusting?
Researching	

Scientists across the curriculum	<p>Spencer Silver and Arthur Fry: Chemical Engineer and Chemist who invented the post-it note</p> <p>Ruth Benerito: Chemist who developed wrinkle-free cotton fabric</p>
---	--



Albert Village Primary School Science Curriculum States of Matter



Year 4 States of Matter

National Curriculum Learning Objectives	<ul style="list-style-type: none"> • 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. 	
Prior learning	Future learning	
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) 	<ul style="list-style-type: none"> • 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. (Y5 - Properties and changes of materials) • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials) • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) • Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials) • 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. (Y5 - Properties and changes of materials) 	
Key learning	Possible experiences	Vocabulary
<ul style="list-style-type: none"> • Solids: keep their shape, stay in one place, can be held easily and have a fixed volume • Liquids: has a fixed volume but changed shape to fit the container, can be poured easily and keeps a level, horizontal 	<ul style="list-style-type: none"> • Observe closely and classify a range of solids • Observe closely and classify a range of liquids • Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their 	solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point,

surface (granular and powdery solids like sand can be confused with liquids as they can be poured, but when they are poured, they form a heap and do not keep a level surface when tipped – each individual grain demonstrates the properties of a solid)

- Gases: fill all available space, have no fixed shape or volume, often invisible
- Melting is a state change from solid to liquid
- Freezing is a state change from liquid to solid
- The freezing point of water is 0 degrees Celsius
- Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid
- Water boils when it is heated to 100 degrees Celsius
- Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at a lower temperature, and only at the surface of the liquid
- Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it's windy
- Condensation is the change back from a gas to a liquid and is caused by cooling

Water cycle:

- Water at the surface of seas, rivers, etc. evaporate into water vapour (a gas)
- This rises and then cools and condenses back into a liquid, forming clouds
- When too much water has condensed, water droplets in the cloud get too heavy and fall back down as rain, snow, sleet, etc. Known as precipitation.
- This re-enters the sea, rivers, etc.

effect e.g. using straws to blow objects, trees moving in the wind

- Classify materials according to whether they are solids, liquids and gases
- Observe a range of materials melting e.g. ice, chocolate, butter
- Investigate how to melt ice more quickly
- Observe the changes when making rocky road cakes or ice-cream
- Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate
- Explore freezing different liquids e.g. tomato ketchup, oil, shampoo
- Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration)
- Observe water evaporating and condensing e.g. on cups of icy water and hot water
- Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers
- Use secondary sources to find out about the water cycle

boiling, boiling point, evaporation, condensation, temperature, water cycle

Possible Enquiry Coverage

Classifying	<ul style="list-style-type: none"> Based on the children's own criteria: classify solids (including grains, crystals, powders: physical properties), or classify liquids.
Observing over time	<ul style="list-style-type: none"> Watch ice melt (ice hands). Watch hand prints dry e.g. water hand prints on coloured paper towel. Watch frozen liquids melt.
Pattern seeking	
Comparative/fair testing	<ul style="list-style-type: none"> What affects the melting rate of chocolate (size of pieces, temperature of water, type of chocolate)? What affects the rate an 'ice pole' melts? What affects the rate of evaporation? Test the 'runniness' of liquids.
Researching	<ul style="list-style-type: none"> Research the melting point of metals. Research the water cycle. (Children present what they've learned in different ways: create a model, write a song, write a story, create a PPT, etc.)

Scientists across the curriculum	<p>Joseph Priestley: Clergyman who discovered oxygen at about the same time as Carl Wilhelm Scheele</p> <p>Carl Wilhelm Scheele: Chemist who discovered oxygen at about the same time as Joseph Priestley</p> <p>Daniel Fahrenheit: Physicist who invented the Fahrenheit temperature scale and the thermometer</p> <p>Anders Celsius: Astronomer who invented the degrees Celsius temperature scale</p>
---	--



ALBERT VILLAGE
PRIMARY SCHOOL

Albert Village Primary School Science Curriculum Rocks



Year 3 Rocks

National Curriculum Learning Objectives	<ul style="list-style-type: none"> • 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. 	
Prior learning	Future learning	
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) 	<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance) • The composition of the Earth. (KS3) • The structure of the Earth. (KS3) • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3) 	
Key learning	Possible experiences	Vocabulary
<ul style="list-style-type: none"> • Rock is a naturally occurring material • There are different types of rock and they all have different properties • Rocks can be hard or soft • They have different sizes of grain or crystal • Some rocks can absorb water • Rocks can be different shapes and sizes (stones, pebbles, boulders) 	<ul style="list-style-type: none"> • Linking with work in geography, children should explore different kinds of rocks and soils, including those in the local environment • Observe rocks closely, using equipment like magnifying glasses to see grains or crystals • Classify rocks in a range of ways, based on their appearance 	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, soil, types of soil (e.g.

<ul style="list-style-type: none"> • Soils are made up of pieces of ground down rock which may be mixed with plant and animals material (organic matter) • The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil • Some rocks contain fossils • Fossils were formed millions of years ago • When plants and animals died, they fell into the seabed • They became covered and squashed by other material • Over time, the dissolving animal and plant matter is replaced by minerals from the water and this forms a bone-like replica • Common misconception: the fossil is not an actual piece of the dead animal or plant 	<ul style="list-style-type: none"> • Devise a test to investigate the hardness of a range of rocks • Devise a test to investigate how much water different rocks absorb • Observe how rocks change over time e.g. gravestones or old building • Research using secondary sources how fossils are formed • Observe soils closely • Compare different soils • Classify soils in a range of ways based on their appearance • Devise a test to investigate the water retention of soils • Observe how soil can be separated through sedimentation • Research the work of Mary Anning 	<p>peaty, sandy, chalk, clay)</p>
--	--	-----------------------------------

Possible Enquiry Coverage

Classifying	<ul style="list-style-type: none"> • Based on the children's own criteria, classify rocks. (At the beginning of the topic, this will most likely focus on appearance, leading to physical properties at the end of the unit.) • Look at different soils and discuss how they are similar/different.
Observing over time	<ul style="list-style-type: none"> • Observe how soil separates into different layers in water
Pattern seeking	
Comparative/fair testing	<ul style="list-style-type: none"> • Test the hardness of different rocks. • Test what happens when rocks are put in water. • Test how quickly water runs through different types of soil.
Researching	<ul style="list-style-type: none"> • Research how fossils are formed.

Scientists across the curriculum	<p>William Smith: Engineer and Geologist who developed the science of rock strata</p> <p>James Hitton: Scientist who studied rocks and the effects of natural processes on them, such as rain, running water, tides, and volcanoes, on the development of the Earth</p> <p>Florence Bascom: Geologist who studied the origin and formation of mountains</p> <p>Anjana Khatwa: Geologist who collects rocks and fossils from the beach and studies them to learn about the creatures that lived in the sea and on Earth other 150 million years ago</p> <p>Brianna Green: Biogeochemist who collects soil to see what kind of living things are in it to study the effects of climate change</p>
---	---