



Everyday Materials: States of Matter, Rocks and Soils, Evolution and Inheritance

<u>Nursery</u>	<u>Reception</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
<p>Developing an understanding of changes over time.</p> <p>Vocabulary and contrasts such as: Hard/soft Hot/cold</p>	<p>Understanding some important processes and changes including changes states of matter.</p> <p>Pupils will recognise objects made from: Wood, glass, plastic and metal</p> <p>Shiny/dull</p> <p>Melting freezing</p>	<p>Distinguish between an object and the material from which it is made.</p> <p>Identify and name a variety of everyday materials: Pupils will recognise and name: water, and rock, elastic, fabrics, foil, brick, paper polystyrene</p> <p>Describe the simple physical properties of a variety of everyday materials. rough/smooth; waterproof/not absorbent/not absorbent; opaque/transparent flexible/rigid, natural/manufactured</p> <p>Compare and group together a variety of everyday materials on the basis of their simple physical properties. Pupils will find properties that are the same and those that are different.</p>	<p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>It is important for children to know that metal for example can be used for many things :</p> <p>coins, cans, cars and table legs Wood, metal, plastic can be used for spoons but not glass.</p> <p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p> <p>Slime, plasticene, clay, dough, elastic bands, clothes, suitcases.</p> <p>Pupils might find out about people who have developed useful new materials: Look at Charles Dunlop.</p> <p>Discover that properties of rubber and the material that Charles</p>	<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Pupils will : Learn about how igneous, sedimentary and metamorphic rocks are made over time and investigate their properties. They will test their absorbency, hardness.</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Pupils will learn that fossils are mainly found in sedimentary rock.</p> <p>Recognise that soils are made from rocks and organic matter. Pupils will understand that soil is made from rock particles, plants and dead animals.</p> <p>Pupils will look at sandstone and discuss how sandy soils have similar characteristics.</p>

		What material would be best to make an umbrella for a teddy? Conduct a comparative experiment, testing different materials and deciding which material would be best and why.	Dunlop created. Why wouldn't we make tyres out of wood, metal (we used to) Leads on from friction in Forces.	Look at soil in our school grounds. What is it made from and why?
		Scientist: George Krum Maria Beasley	Scientist: John Dunlop, Charles Macintosh or John McAdam.	Scientist: Mary Anning
<u>Enrichment:</u>	<u>Enrichment:</u>	<u>Enrichment:</u>	<u>Enrichment:</u>	<u>Enrichment:</u> Cresswell Craggs stone centre
<p style="text-align: center;"><u>Year 4</u></p> <p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Pupils will learn; That a solid is made of particles that are very close together and cannot move, therefore solids retain their shape. That liquids are composed of particles that are further apart than solids, so they can move and crash into each other, therefore a liquid cannot maintain a shape unless within a container. A gas has particles that are widely spaced and can move about freely. Gas particles will expand to fill any space.</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research the</p>	<p style="text-align: center;"><u>Year 5</u></p> <p>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.</p> <p>Pupils will: Investigate different materials and their thermal conductivity. Fair test: What material will keep something cold or hot? Revise electrical conductivity-briefly.</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p>	<p style="text-align: center;"><u>Year 6</u></p> <p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago.</p> <p>Pupils will: Understand that evolution occurs over a long period of time and is caused by animals and plants adapting to changes in their habitat.</p> <p>Recognise that living things produce offspring of the same kind but normally offspring vary and are not identical to their parents.</p>	<p style="text-align: center;"><u>Year 7</u></p> <p><u>Substances and Properties</u> Materials are made of either a single substance or a mixture of substances, which each have distinctive properties.</p> <p>All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials. Pupil will: Know how the properties of the different components of a mixture lead to different methods of separating them.</p> <p><u>Chemical Reactions</u> During a chemical reaction, atoms are rearranged forming new substances. Pupils will: Know the difference between a chemical and physical change.</p>	

<p>temperature at which this happens in degrees Celsius (°C)</p> <p>Pupils will: Melt ice. Melt chocolate. Burn a match. Watch a fried egg change. At what temperatures do these changes happen?</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Pupils will: Observe and plot how puddles change over time, using chalk to draw around the puddle at different times. Observe the change from liquid to gas. (evaporation) Observe how to make condensation on windows and describe the change from gas to liquid. How does this happen?</p> <p>Pupils will: Be taught the changes in state that occur during the water cycle.</p> <p>Every drop of water on the planet has been here since earth began and this will remain so.</p>	<p>Pupils will:</p> <p>Dissolve: sugar, salt, flour, coffee, sand, tea. They will make close observations and know that saturation occurs when the liquid will not dissolve any more solid and solid can be seen in the liquid.</p> <p>Conduct a fair test: variables: temperature of liquid, type of liquid, amount of liquid, amount of solid, time given to dissolve, how many stirs?</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Pupils will:</p> <p>Know the role of evaporation in separating liquids and solids. Filtering muddy water. Sieving rocks and soils.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p>	<p>Pupils will:</p> <p>Look at their own families through photographs and observe similarities and differences.</p> <p>Observe different breeds of dogs and how they are different to each other but same breeds inherit similarities. Look at Labradoodles and observe from which breed they have inherited some characteristics.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation leads to evolution.</p> <p>Pupils will:</p> <p>Look at animals that survive in extreme conditions: camels, polar bears, cacti. What adaptations do they have that allows them to exist and thrive?</p> <p>Life on earth is constantly changing.</p> <p>Pupils will:</p> <p>Look at global-warming and how what is happening now will over time cause adaptations and ultimately, evolution.</p> <p>Which polar bears will fair best: those with less thick coats, less</p>	<p>Link knowledge of chemical and physical changes to reactions with acids and alkalis.</p> <p>Know how the properties of solids, liquids and gases are determined by the particle model.</p> <p><u>Evolution and Inheritance</u> Changes in the environment may leave individuals within a species and some entire species, less well adapted to compete successfully and reproduce, which may in turn lead to extinction.</p> <p>Pupils Will: Understand that differences between organisms cause species to evolve by natural selection.</p> <p>Evolution is the cause of the great variety of organisms on the planet.</p> <p>Genetic information is passed from each generation to the next. This information and the environment affect the features, growth and development of organisms.</p> <p>Pupils will: Understand the roles that genes and the environment have on characteristics.</p> <p>Understand a simple model of chromosomes, genes and DNA in heredity.</p>
---	--	---	--

	<p>Link to every life: why are wooden spoons better than metal when stirring heated food? Etc No fair testing here. Fair testing above. 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> <p>Pupils will:</p> <p>Find out about how chemists create new materials. Why do scientists bother to create new materials.</p>	<p>fat, smaller pads to enable faster running. Teeth will change to take into account that plants will eventually grow etc.</p>	
	<p>Scientist: Spencer Silver: Invented glue for sticky notes Ruth Benerito invented wrinkle free cotton. Georges de Mestral invented Velcro.</p>	<p>Scientist: Charles Darwin Alfred Wallace Lemark</p>	
<p><u>Enrichment:</u> Think Tank: exhibition and workshops</p>	<p><u>Enrichment</u> Magna Materials workshop</p>	<p><u>Enrichment:</u></p>	<p><u>Enrichment:</u></p>
<p><u>Potential Careers:</u> Gas engineer, Sound engineer, Engineer Chef, Food scientist Water treatment specialist, Forensic scientist, Designer Environmental analyst, Geologist, Miner, Builder ,Architect, archaeologist, palentologist Astronaut, Astronomer, Meteorologist Hairdresser Geneticist , doctor, pharmacist, paediatric nurse, IVF doctor</p>			

Common Misconceptions

Evolution and inheritance:

- Environmental change can be inherited, e.g. if a sheep loses its tail, its lambs will be born without a tail
- Humans used to be monkeys
- An individual can evolve during its own lifespan
- Evolution produces living things perfectly adapted to their environment
- Natural selection is an active process, ie an individual or a species can try to adapt „ Natural selection is always good for the species
- Evolution and religion are incompatible

States of Matter

- „ Steam is visible. „
- Steam and condensation are the same. „
- Evaporation only occurs when water is boiling. „
- Clouds are made of gas. „
- Boiling/evaporation are irreversible changes. „
- When a solid dissolves in water it does not contribute to the mass of the solution. „
- Liquids that evaporate/boil disappear forever. „
- A fizzy-drinks can or glass container becomes wet because liquid from the inside seeps through to the outside. „
- When a substance has dissolved it has ‘disappeared’. „
- Substances (like sugar) ‘melt’ in water.

Year groups	Vocabulary/Statements
Birth to 3	• Explore materials with different properties. • Explore natural materials, indoors and outside.
Nursery	mix, stir, cook, hot, oven, microwave, change, burn, melt, hard, runny, set, freeze, freezer, cold, blended, hard, soft, bendy, stiff, wobbly, wood, plastic, paper, card, fabric
Reception	ice, water, frozen, icicle, snow, melt, wet, cold, slippery, smooth, big, bigger, biggest, smaller, smaller, smallest, hard, soft, bendy, rigid, wood, plastic, paper, card, metal, strong, weak, hot, apply heat, waterproof, soggy, not waterproof, best, change, change back
Year 1	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
Year 2	opaque, transparent, translucent, reflective, non-reflective, flexible, rigid, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching

Year 3	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorbs water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, types of soil (e.g. peaty, sandy, chalky, clay) (Y3 - Rocks) magnetic force, magnet, attract, magnetic material, metal, iron, steel (Y3 - Forces and magnets)
Year 4	solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature, water cycle electrical conductor, electrical insulator, metal, non-metal (Y4 - Electricity)
Year 5	thermal insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material
Year 6	
KS3	<ul style="list-style-type: none"> • Chemical reactions as the rearrangement of atoms • Representing chemical reactions using formulae and using equations • Combustion, thermal decomposition, oxidation and displacement reactions • Defining acids and alkalis in terms of neutralisation reactions • The pH scale for measuring acidity/alkalinity; and indicators

Rocks

Year groups	Vocabulary/Statements
Birth to 3	Explore materials with different properties. • Explore natural materials, indoors and outside.
Nursery	natural, shells, pebbles, stones
Reception	
Year 1	object, material, rock, brick, clay, hard, soft, waterproof, absorbent, rough, smooth, shiny, dull, see-through, not see-through (Y1 - Everyday materials)
Year 2	opaque, transparent, translucent, reflective, non-reflective (Y2 - Uses of everyday materials)
Year 3	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorbs water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, types of soil (e.g. peaty, sandy, chalky, clay)
Year 4	
Year 5	
Year 6	evolution
KS3	<ul style="list-style-type: none"> • The composition of the Earth • The structure of the Earth • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks

Evolution and inheritance

Year groups	Vocabulary/Statements
Birth to 3	• Make connections between the features of their family and other families. • Notice differences between people.
Nursery	natural, plant, animal, leaves, seeds, conkers, acorns, twigs, bark, shells, feathers, pebbles, stones, same, different, pattern (Nursery - Living things and their habitats)
Reception	plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment (e.g. beach, forest) (Reception - Living things and their habitats)
Year 1	leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud (Y1 - Plants)
Year 2	light, shade, Sun, warm, cool, water, space, grow, healthy, bulb, germinate, shoot, seedling (Y2 - Plants) living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, water, air, survive, survival, conditions, light, dark, shady, sunny, wet, damp, dry, hot, cold (Y2 - Living things and their habitats)
Year 3	photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (e.g. wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil (Y3 - Plants) soil, fossil, bone, flesh, minerals (Y3 - Rocks)
Year 4	environment, habitat, human impact, positive, negative, migrate, hibernate (Y4 - Living things and their habitats) herbivore, carnivore, omnivore, producer, predator, prey (Y4 - Animals, including humans)
Year 5	life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, cuttings (Y5 - Living things and their habitats)
Year 6	offspring, sexual reproduction, vary, characteristics, adapted, inherited, species, evolve, evolution
KS3	<ul style="list-style-type: none"> • Heredity as the process by which genetic information is transmitted from one generation to the next • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection • Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction