



Crossflatts Science Curriculum – Chemical Processes

Early Years Development Matters statements		Year 1 Everyday Materials	Year 2 Use of everyday materials	Year 3 Rocks	Year 4 Changes of state	Year 5 Properties and changes of materials
<ul style="list-style-type: none"> Explore collections of materials with similar and/or different properties. Talk about what they see, using a wide vocabulary. Provide interesting natural environments for children to explore freely outdoors. Make collections of natural materials to investigate and talk about. Suggestions: <ul style="list-style-type: none"> contrasting pieces of bark different types of leaves and seeds different types of rocks different shells and pebbles from the beach. Talk about the differences between materials and changes they notice. Provide children with opportunities to change materials from one state to another. Suggestions: <ul style="list-style-type: none"> cooking – combining different ingredients, and then cooling or heating (cooking) them melting – leave ice cubes out in the sun, see what happens when you shake salt onto them. Explore how different materials sink and float. Explore how you can shine light through some materials, but not others. 	<p>Vocabulary used <i>(clearly used in books and on Working walls)</i></p>	<ul style="list-style-type: none"> 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"> Properties of materials - as for year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching 	<ul style="list-style-type: none"> Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil 	<ul style="list-style-type: none"> Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle 	<ul style="list-style-type: none"> Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material
	<p>National Curriculum Objectives</p>	<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 	<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 	<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 	<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 	<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>Knowledge Key Learning</p>	<ul style="list-style-type: none"> All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms 	<ul style="list-style-type: none"> All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, 	<ul style="list-style-type: none"> Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic 	<ul style="list-style-type: none"> A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each 	<ul style="list-style-type: none"> Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation.



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	with very different properties	<p>identified through simple tests and classifying activities.</p> <ul style="list-style-type: none"> - A material can be suitable for different purposes and an object can be made of different materials. - Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness. 	<p>matter). The type of rock, size of rock piece and the amount of organic matter affect the property of the soil.</p> <ul style="list-style-type: none"> - Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to 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. 	<p>individual grain demonstrates the properties of a solid.</p> <ul style="list-style-type: none"> - 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°C. 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°C. - Evaporation is the same state change as boiling (liquid to gas) but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. - Condensation is the change back from a gas to a liquid caused by cooling. - Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle. 	<ul style="list-style-type: none"> - Some changes to materials such as dissolving, mixing and changes of state are reversible, but 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.
<u>Understanding at the expected standard</u>	<ul style="list-style-type: none"> - Can label a picture or diagram of an object made from different materials - Can describe the properties of different materials 	<ul style="list-style-type: none"> - Can name an object, say what material it is made from, identify its properties and make a link between the properties and a particular use - Can label a picture or diagram of an object made from different materials - For a given object can identify what properties a suitable material needs to have - Whilst changing the shape of an object can describe the action used - Can use the words flexible and/or stretchy to describe materials that can be changed in shape and stiff and/or rigid for those that cannot - Can recognise that a material may come in different forms which have different properties 	<ul style="list-style-type: none"> - Can name some types of rock and give physical features of each - Can explain how a fossil is formed - Can explain that soils are made from rocks and also contain living/dead matter 	<ul style="list-style-type: none"> - Can create a concept map, including arrows linking the key vocabulary - Can name properties of solids, liquids and gases - Can give everyday examples of melting and freezing - Can give everyday examples of evaporation and condensation - Can describe the water cycle 	<ul style="list-style-type: none"> - Can use understanding of properties to explain everyday uses of materials. For example, how bricks, wood, glass and metals are used in buildings - Can explain what dissolving means, giving examples - Can name equipment used for filtering and sieving - Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving - Can describe some simple reversible and non-reversible changes to materials, giving examples
<u>Understanding at greater depth</u>	<ul style="list-style-type: none"> - Can sort objects and materials using a range of properties - Can choose an appropriate method for testing an 	<ul style="list-style-type: none"> - Can sort materials using a range of properties - Can explain using the key properties why a material is suitable or not suitable for a purpose 	<ul style="list-style-type: none"> - Can classify rocks in a range of different ways using appropriate vocabulary - Can devise tests to explore the properties of rocks and use data to rank the rocks 	<ul style="list-style-type: none"> - Can give reasons to justify why something is a solid liquid or gas - Can give examples of things that melt/freeze and how their melting points vary 	<ul style="list-style-type: none"> - Can create a chart or table grouping/comparing everyday materials by different properties - Can use test evidence gathered about different properties to suggest an



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		<p>object for a particular property</p> <ul style="list-style-type: none"> - Can use their test evidence to answer the questions about properties e.g. Which cloth is the most absorbent? 	<ul style="list-style-type: none"> - Can begin to choose an appropriate method for testing a material for a particular property - Can use their test evidence to select appropriate material for a purpose e.g. Which material is the best for a rain hat? 	<ul style="list-style-type: none"> - Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily - Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc. - Can identify plant/animal matter and rocks in samples of soil - Can devise a test to explore the water retention of soils 	<ul style="list-style-type: none"> - From their observations, can give the melting points of some materials - Using their data, can explain what affects how quickly a solid melts - Can measure temperatures using a thermometer - Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup - From their data, can explain how to speed up or slow down evaporation - Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet 	<p>appropriate material for a particular purpose</p> <ul style="list-style-type: none"> - Can group solids based on their observations when mixing them with water - Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water - Can explain the results from their investigations involving dissolving and non-reversible change
	<p><u>Working scientifically skills</u></p>	<ul style="list-style-type: none"> - 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 - 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 	<ul style="list-style-type: none"> - Classify materials - Make suggestions about alternative materials for a purpose that are both suitable and unsuitable - Test the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat 	<ul style="list-style-type: none"> - Observe rocks closely - Classify rocks in a range of ways based on their appearance - 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 - 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 	<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 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 - Investigating 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 	<ul style="list-style-type: none"> - Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat - Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate - Investigate rates of dissolving by carrying out comparative and fair test - Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture - Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning - Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? - Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton)
-	- Maths in science reference	- Maths in Science Reference 1.2	- Maths in Science Reference 2.4	- Maths in Science Reference 3.3	- Maths in Science Reference 4.3	- Maths in Science References - 5.1 - 5.2 - 5.3