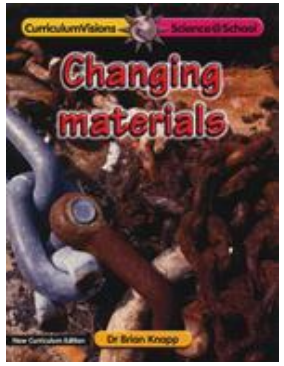
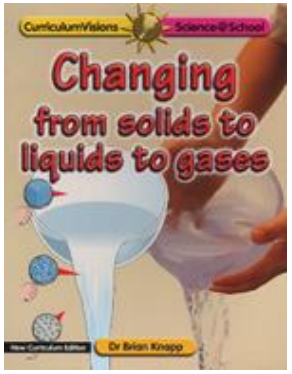
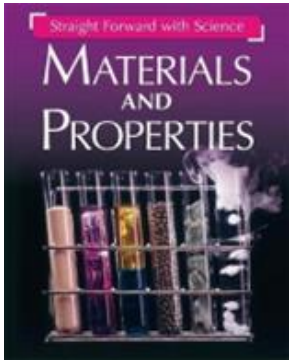
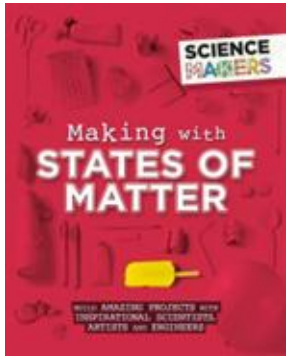
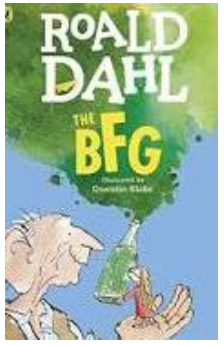
BILSTON CHURCH OF ENGLAND PRIMARY

MEDIUM TERM PLANNING

Subject	Topic/Key Question	Year Group	Term	Time Allocation
Science	Marvelous Mixtures Materials: All Change!	5	Autumn 2	18 hours
 Library service	 Library service	 Library service	 Library service	 Author box
End of upper Key stage 2 Outcomes	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. 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. Reporting and presenting findings from enquiries, including conclusions, causal			

	relationships and explanations of and 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.
End of Unit Outcomes	I can 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. I can know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. I can demonstrate that dissolving, mixing and changes of state are reversible changes. I can 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.
Vocabulary	material, compare, contrast, separate, mixture, sieve, filter, evaporate, solid, liquid, gas, powder, particle, dissolve, soluble, solution, contamination, contaminate, contaminated, impurity, pure, purity, suspension, saturated, saturation, reversible, non-reversible, microbes, bacteria, types of oil, liquid, solid, detergent, sticky, filter, mechanical, boom, residue, environment, biological, marine life, purify, drinkable, sterilise

Lesson Sequence	Time Allocation	Key Question/WALT	Teaching Activities	Resources
Lesson 1 Are the changes that happen around us reversible or non-reversible?	2 hour	WALT: investigate materials. **Success criteria:** • I can identify familiar examples of materials changing state. • I can describe what causes some materials to change. • I can explain, using examples, that some changes are reversible while others are nonreversible.	Working scientifically links: Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. Show children the Busy kitchen image (Interactive 1), which shows a kitchen scene featuring materials in different stages of change – a boiling kettle, toast in the toaster, some cans of drink with beads of condensation on the outside, tall glass beakers with ice cubes, an open bottle of fizzy pop, a freezer with its door open, a frying pan on the stove with egg cooking, bread cooking in the oven, melted butter on toast, milk in a jug to pour on cereal, a teapot with a sugar bowl and mugs, and a box of eggs dropped and broken on the floor. Ask children to talk about the cartoon with their partner. Encourage them to identify examples of materials and whether they have (or are about to) change. Ask: What is changing? How is it changing? Do you think you can get back to the original materials? Encourage children to give reasons for their answers. Click on the interactive to reveal whether the changes identified are reversible or non-reversible.	Small bottles of lemonade, shaving foam canisters, salt, water, chocolate buttons, beakers and small plates, paper towels. Resource sheets 1,2 7& 3 collins connect website. Interactive 1
Lesson 2	2 hour	WALT: work scientifically.	Working scientifically links:	Disposable latex gloves;

How much gas can be produced by non-reversible change?		**Success criteria:** • I can test different combinations of materials to find out which produces the most gas. • I can vary a mixture so that sufficient gas is produced to inflate a plastic glove. • I can use the terms 'physical' and 'chemical' change correctly.	Using test results to make predictions to set up further comparative and fair tests Remind children that in the last lesson they identified different types of changes: reversible changes (dissolving, evaporating and freezing) where the original material can be retrieved; and nonreversible changes that produce a new material. Explain that in this lesson they are going to investigate a non-reversible change. Show them some bicarbonate of soda and white vinegar. Ask: What do you think they are? Why? When several ideas and reasons have been given, allow one child to taste each one and then ask again: What do you think they are? Establish that the bicarbonate of soda is not salt or sugar and that the vinegar is not water. Add the vinegar to the bicarbonate of soda and ask children to observe very carefully what happens. Establish that bubbles are given off containing a gas. Explain that a chemical reaction has taken place.	solids: bicarbonate of soda, tartaric acid, baking powder, effervescent vitamin C tablets, effervescent indigestion tablets; liquids: water, white vinegar, lemon juice; small beakers, disposable cups, plastic teaspoons, milk bottles or cartons, small pop bottles. Resource sheets 1 & 2 Interactive 1
Lesson 3 How long does it take for	2 hour	WALT: investigate materials. **Success criteria:** • I can recognise that metals	Working scientifically links: Planning different types of scientific enquiry to answer questions, including recognising and controlling variables where necessary.	Iron nails, metal paint, paint brushes, petroleum jelly (or similar

iron nails to rust?		corrode; for iron and steel this is called rusting. • I can describe the process of rusting in iron and steel. • I can set up an observation over time. • I can explain why the amount of rusting and the time taken to rust can vary according to the conditions.	Show children Slideshow 1, Lucy's birthday bike. Establish whether children have noticed rust on cars or other items. Do they know what it looks like? What do they think it is? Do they know what causes it? Why do people try to prevent it? Ask: What do you think of the advice the children are giving Lucy? Do you agree or disagree with what they are saying? What do you know already that can help you decide whether the advice is useful or not? Is what Granddad says true? Are there other ways to prevent metal rusting? Explain that some metal parts are painted and some need oiling or grease to stop them rusting. Ask: What about a non-metal bike? What other materials can bikes be made from? Remind them of the lesson in Module 4, Enrichment Lesson 1, Are all bikes the same?, where they learned about bikes made from different materials.	thick grease), oil, salt, lemon juice, vinegar, lemonade, water, plastic disposable beakers (transparent), clingfilm, objects made of metal, including washers, key, spoons, copper wire, aluminium foil, tin can, zinc and copper nails. Resource sheets 1 & 2 Slideshow 1 Video 1
Lesson 4 What happens when a	2 hour	WALT: investigate materials. **Success criteria:**	Working scientifically links: Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	Candles (see below), metal containers filled with sand, glass jars of varying size,

candle burns?		• I can observe changes involved in burning a candle. • I can describe the reversible and nonreversible changes that take place. • I can identify the three things that must be present for burning to take place. • I can explain what happens if the amount of oxygen is reduced or runs out, or if fuel is removed.	Explain to children that they are going to find out more about another non-reversible change which also involves air/oxygen during this lesson: burning. Ask them to give examples of things that burn. Ask: What do you think happens when something burns? What do we need to start it burning? Why does something stop burning? Explain that because candles are dangerous, can cause burns and set fi re to things if mishandled, you, the teacher, are going to light the candles and they are going to make careful observations of what they see. Provide children with paper and pencils to draw observations and make notes. A digital camera would be useful to record additional evidence of the changes taking place. Challenge children, working together in pairs, to come up with as many observations as possible using scientific vocabulary to describe the changes that they see taking place. Suggest they draw a sketch of the candle and annotate it to show their observations. How many changes do they notice? Allow children to observe. Ask: When the candle was first lit, what did you notice? What colours can you see in the flame? Do they change? Does the flame size stay the same or does it change? What do you think the wick does? What do you think the wax does? What is burning – the wick or the wax? What do you notice after the candle has burned for some time? Where	paper, pencils, digital camera, mini whiteboards. Resource sheets 1,2 7& 3 collins connect website.

			has the wax gone? What do you think is happening to the wax? Allow children to complete their observations. Ask: What do you think is needed for something to burn? Establish that three things are needed: fuel, oxygen and heat. In a burning candle, where are those things? Children should be able to identify the fuel as the wax, the oxygen in the air, and the heat as the flame.	
Lesson 5 How long does it take for things to rust?	2 hour	WALT: work scientifically. **Success criteria:** • I can recognise that metals corrode; for iron and steel this is called rusting. • I can describe the process of rusting and identify it as a non-reversible change (requiring water and air). • I can explain what conditions are needed for something to rust. • I can interpret the results of my observations over time and draw	Working scientifically links: Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. Revisit the problem of Lucy's birthday bike (Lesson 3, Slideshow 1). Remind children of the question she asked: How can I keep my bike looking as good as new? and discuss the different responses she received. Ask children to think about these ideas again and what advice they might give Lucy now that they have done their investigations. Children do not need to respond at this point in the lesson because they will do so as part of their challenge, but they should think about the evidence their observations over time will provide to support or refute the statements in the image.	The beakers containing iron and other materials that were being observed in different conditions to investigate rusting; the children's observation records.

		conclusions from them. • I can present my conclusions and relate them to a real life context.		
Lesson 6 How can we separate mixtures?	2 hour **Last 4 lessons taken from Collins snap science MARVELOUS MIXTURES.**	WALT: investigate materials. **Success criteria:** • I can explain that materials can be mixed but often they can be separated. • I can describe the process of sieving mixtures to remove particles of different sizes. • I can successfully separate a complex dry mixture, identifying and separating the materials or explaining why they are impossible to separate in this way.	Working scientifically links: Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Set up a small demonstration of pairs of materials, such as rice and peas, paperclips and small plastic cubes, sugar and sand, gravel and water, salt and water. Ask: What do you think these pairs of materials are? What would happen if we mixed them together? Do you think it is possible to separate them again? How might this be done? Establish that the combinations can be separated in different ways. Explain to children that in this lesson they will be looking at the dry mixtures. Those involving water will be looked at again in the next three lessons. Some of these and other materials might be explored using Interactive 1, in which children can match mixtures to equipment to see if their suggestions would work, but it is essential that they have first-hand experience of the mixtures above first.	Disposable plates of different kinds – these can be pierced with nails, hole punches or bodkins to form makeshift sieves; selection of fabrics, nets and gauzes; Cupboard Catastrophe mixture – rice, raisins, large pasta, flour, dried lentils, dried peas, fi ne sand, white sugar, paperclips,

				wood shavings, plus three or four plastic spiders; large foil trays, plastic beakers, magnets, spoons. Resource sheet 1 Interactive 1 Animation 1 Challenge slides.
Lesson 7 What happens what we mix liquids and solids?	2 hour	WALT: work scientifically. **Success criteria:** • I can identify and name some solids that dissolve and some that do not. • I can describe my observations accurately using key vocabulary, such as using the term 'dissolve'	Working scientifically links: Using test results to make predictions to set up further comparative and fair tests. Show children the pairs of materials that include water from the last lesson: sand and water, salt and water and ask children to recall what happened when they mixed the materials. Encourage children to watch carefully, then in turn mix the water with sand and then the water with salt. Can children explain what is happening? Ask them to compare what was the same and what was different for the sand and salt, and whether they think they can get	Sand, salt, fruit syrup, brown sugar, large transparent beakers, collection of solids – powder paint, fl our, sugar, sand, coffee granules, bath salts, tea

		correctly, distinguishing between a solid that forms a suspension and one that dissolves. • I can use what I have found out to make predictions for further tests. • I can identify when a solution has become saturated and explain why.	the solids back from the water. This can be easily demonstrated for sand by filtering, which is the same as sieving used in the previous lesson. Explain that they need to think a little more about what happens to the salt before they can try to separate it. Ask: Can you think of any other solids that 'disappear'/dissolve when they are put into water? Why do you think this happens? Show children a number of beakers containing water. Mark the level of the water. Ask them to predict what will happen to the level of the water if you add sand to one of the beakers. Ask: What will happen if I add fruit syrup? What about some brown sugar?	leaves, baby powder, sugar substitute, bicarbonate of soda; collection of solvents – oil, vinegar, water; beakers, spoons, weighing equipment, measuring jugs. Resource sheet 1 Interactive 1 Challenge slides.
Lesson 8 What makes a difference to how fast salt or sugar dissolves?	2 hour	WALT: work scientifically. **Success criteria:** • I can identify variables that might affect the rate at which a solid dissolves.	Working scientifically links: Planning different types of scientific enquiries to answer questions, including recognising and controlling variables, where necessary. Use the drag and drop interactive (Lesson 2, Interactive 1) from the previous lesson to remind children of the discussion they had at the end of Lesson 2 and the true/false statements they discussed.	Rock salt, table salt, icing sugar, Demerara sugar, granulated sugar, water, disposable transparent

		• I can predict which variable I think will make the most difference. • I can plan a comparative to investigate a question about the dissolving rate of salt and/or sugar.	Ask them to share their ideas about what will make a difference to the time it takes for a solid to dissolve, and prompt with further questions, if necessary: Ask: What will happen if we change the temperature of the water to dissolve a solid? Will the difference be large or small? What difference will stirring make? Would the amount of solid make a difference? The volume of liquid we use? The shape and size of the pieces of the solid? At this point, encourage children who investigated saturation point during Lesson 2 (Challenge 3) to explain that there is a limit to how much solid will dissolve in a given volume of water.	beakers, saucers, teaspoons, measuring equipment, timers, hand lenses, mini microscopes. Resource sheet 1 Interactive 1 Slide show 1 Challenge slides.
Lesson 9 How can we get drinkable water from seawater?	2 hour	WALT: investigate materials. **Success criteria:** • I can describe how dissolved material can be separated from a liquid. • I can follow instructions to set up equipment to produce drinkable water from seawater.	Working scientifically links: Planning different types of scientific enquiries to answer questions, including recognising and controlling variables. Discuss the children's observations of what happened to their solutions from the previous lesson. Ask: What do you think happened to the liquid? Is the material left there now the same as you originally put into the liquid? Remind them of the work on changes of state and evaporation they did in Years 3 and 4. You might suggest that they have managed to get the solid back from the solution but not the liquid, and that is what they are going to look at today. Show children the cartoon (Slideshow 1) to set the scene.	Large bowls, saucers, salt solution, water jugs, desk lamps or other strong light sources, cling fi lm, plastic sheeting. Resource sheet 1,2,3 & 4. Slideshow 1.

		• I can develop my own method to produce drinkable water from seawater. • I can explain why the amount of water produced varies.	Explain that an adventurer has been shipwrecked on a desert island. His fresh water supply is running out and he needs to find a way to provide himself with drinkable water while he waits to be rescued. He has very little equipment available, but there is plenty of water – the only problem is, it's sea water! Ask: What do you know already that might help you? Ask children to talk to a partner to come up with some ideas. Use the Prompt question cards (Resource sheet 1) to structure the discussion. Collect ideas from children and note them on the interactive whiteboard.	