Science – Materials – Year 2 and Year 5

Year 2 NC - pupils should be taught to:	How we do this in Year 2	Year 2 Vocabulary	Year 5 NC - pupils should be taught to:	How we do this in Year 5	Year 5 Vocabulary
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses <u>How working scientifically can be met</u> • identify and explain • give suggestions	Ask children which everyday materials they can remember learning about in Year 1. Record any materials, properties, keywords and concepts children already know. Can children identify and name everyday materials? Remind children of some everyday materials using photos and actual materials. Explain some materials are natural and are found in the world around us, such as wood and rock and others are man-made such as plastic and glass. Think Again… Look at some of the photos again, this time allowing children to discuss what some of the materials may be used for. Encourage children to look and/or move around the classroom to identify where different materials have been used to make familiar objects. Are children able to spot where everyday materials have been used to make familiar objects?	Identify, materials, wood, plastic, glass, metal, rock, brick, paper, cardboard, uses, used, properties, hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, not bendy, absorbent, not absorbent, waterproof, not waterproof, transparent, opaque.	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 <u>How working scientifically can be met</u> • sorting and classifying • record results	*Children have studied materials and their properties in earlier year groups, including transparency, magnetism and states of matter in Y3 and Y4.* Explain what materials are, and discuss the difference between natural and synthetic materials. Point out the feely bags filled with different materials. Ask the children to feel the materials and try to identify them. Explain that the words used to describe a material are its properties. Discuss the importance of knowing a material's properties. Ask the children to look again at the items from the feely bags, and discuss in pairs why these materials were chosen for these items based on their properties. Children will be testing the properties of several different materials. Explain that they will test	material, property, magnetic, hard, transparent, flexible, permeable.

	Children to explain what 3 different materials can be used for? Same Material, Different Uses: Go through some of the uses children have identified. Discuss with the children that the same materials can be used for a number of different things, for example metal can be used for coins, keys, cars, cans and bridges.			each material for magnetism, hardness transparency, flexibility and permeability. Record results. Properties and Purposes: Children to share their ideas on the possible uses for the materials they tested, based on their properties.	
• identify and classify • gather and record data • record observations	*Children will have identified some uses of everyday materials in lesson 1.* ***Arrange a short local area walk*** Explain that today children will be going on a short local walk and doing their science learning outside. Go through rules. Explain that they will be looking out for everyday materials being used in different ways. Children go on a short local area walk. Can children explain what different materials can be used for?	Observations, record, classify, group, similar, safe, unusual.			

	Encourage higher ability children to see if they can group similar uses together. Can children make observations? Are they able to record their observations? Grouping Uses: When back in the classroom, ask the children to feed back their observations. What different uses did they find? Is there any way we can group some similar uses together? Encourage children to think of materials which may be used for similar purposes, for example materials used for building. Are children able to group similar uses of materials together? Go through any unusual uses of materials they spotted and discuss why those materials might have been chosen for that purpose. Encourage children to be on the lookout for different uses of materials at home and out and about.				
• identify and compare • explain difference	*Children will have identified a variety of*	Compare, suitability, suitable, unsuitable,			

	everyday materials and identified their uses in lesson 1. Remind children of the properties of everyday materials (learned in Year 1). Quickly go through them to recap and check children's understanding of them. Encourage children to think of others and add them to the list. Discuss why children think objects are made out of particular materials, for example why are window panes made out of glass? Spoons: In their groups, children discuss which material spoons are made from (hopefully they will realise spoons are made from a variety of different materials). Are children able to explain why different materials can be used to make the same object? Introduce the word suitability and discuss using examples, encouraging them to ask questions and make suggestions. Comparing Suitability: Children to compare and explain which properties make some materials	purpose.			

	suitable or unsuitable for different purposes? Discuss which materials can be/are used to make coat hangers. Are children able to explain why different materials can be used to make the same object? Encourage children to discuss which material would be the most suitable in different situations. Can they identify which properties wood, plastic and metal have which make them a suitable material for coat hangers?				
Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching <u>How working scientifically can be met</u> • explain • record findings	Go through meaning of the words squashing, bending, twisting and stretching. Children think about how the shape of objects made from some materials can be changed e.g. squashing a cardboard box. Squashing, Bending, Twisting and Stretching: Go through the different ways in which materials can be manipulated. Encourage children to do each action with their hands. Are children able to demonstrate each of the actions?	Change, squashing, bending, twisting, stretching, squash, bend, twist, stretch.	Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic <u>How working scientifically can be met</u> • compare and group • plan and carry out an investigation - variables • record results • draw conclusions	Show the children the diagram of materials. How have they been sorted? Reveal that they have been sorted into thermal conductors and insulators. Explain thermal conductors and insulators. Design a New Lunch Box: Explain the context of the investigation – finding the best thermal insulator for a new lunch box. Testing Materials: Show the children the list of equipment and ask them how they could test the conductivity of different materials.	Thermal, conductor, insulator, heat, material, variable

	Explain how to try and change the shape of the objects on the tables and record findings. Are children able to tell you four ways in which the shape of some objects can be changed? Are children able to demonstrate each of the actions? Explain that not all objects can change shape in the ways children have explored today and discuss why they think this is.			Identifying the Variables: Explain what the variables of an investigation are and discuss independent, dependent and controlled variables. Identify the variables of this investigation. Investigate: Ask the children to plan their investigation and set up and carry out their investigation, recording their results. Report back: Children to make a conclusion about which material would be best for the lunch box, and why. Look for children who can explain their reasons for their choice of material.	
• explain • give reasons	*Children will have explored how materials can change shape in lesson 4.* Children to discuss what recycling means to them. Briefly discuss why it is important to recycle materials. Go through which materials can be recycled and look at examples that are easily found at home and school. Can children tell you which materials can be recycled? How to Recycle: Discuss your local area's recycling	Recycle, recycling, reuse, biodegradable, environment, landfill site, recycling depot, shredded, melted, pellets, raw materials, greenhouse gases.	• plan and carry out an investigation • record results • draw conclusions	Recap electrical conductors and insulators from Y4 by watching https://www.bbc.co.uk/bitesize/clips/zy2qxnb Identify materials as conductors or insulators. Explain that different conductors have different levels of resistance, and therefore some materials conduct electricity better than	Material, electric, conductor, insulator, resistance, circuit.

	arrangements, for example 'Do you use coloured wheelie bins/bags/boxes? How do you dispose of garden materials/food?' Explain different areas in the country (local authorities) have a slightly different system but the goal is the same. Also discuss what your school does to recycle - do you have recycling bins? Do you have recycling monitors or eco monitors? Does recycling get discussed at your school council meetings? Are children able to explain how to recycle? Sort the items (cards) into the appropriate place. Discuss which items groups had put where, were there any which groups disagreed on? Explain what happens after the recycling has been collected. Children to show and explain the recycling process. Can the children explain how plastic materials are sorted and then changed into new products? Discuss what happens to			others. Football Floodlights: Share the context of the investigation. Explain that the children should present their recommendations for the best material to use to make the floodlights as bright as possible. Brighter Bulbs: Children to work in groups to investigate the conductivity of different materials. They should set up a simple circuit with a battery and a bulb, and use different metals to complete the circuit. They can either observe the brightness of the bulb with each material, or measure the light levels using a data logging box with a light sensor. They should order the materials on the basis of their conductivity and plan their presentations. The groups could film their presentations or show them to the rest of the class. Look for children who can explain that different materials have different levels of conductivity, and can	

	rubbish that isn't recycled. Discuss why it is so important to recycle materials.			investigate the best conductor for a purpose. Football Feedback: Ask the children whether their groups all recommended the same material as the most conductive. Discuss any differences in their results.	
Compare how things move on different surfaces <u>How working scientifically can be met</u> • explain impact	Inventor John McAdam: Give children information about him. Explain the process of macadamisation and emphasise that this was a significant change in road building. Until then rural roads were often muddy, slippery and dangerous and urban roads were cobbled making them bumpy and uncomfortable to travel over. Read through further information about the inventor, explaining the meaning of words patent, Parliament, compensated and royalties. Explain how macadam roads were developed and how the use of tar was added to stabilise them. These roads then became known as tarmacadam roads and then tarmac. Children discuss where	Invent, macadamisation, macadam road, patent, Parliament, compensated, royalties, knighthood, tar, tarmacadam, tarmac.	Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution <u>How working scientifically can be met</u> • compare and group • records results on bar chart • make conclusions referring to results	Discuss and explain dissolving. Explain the difference between dissolving and melting. These processes are commonly confused by children. Ask the children to test whether different materials are soluble or insoluble in Water. Complete the given table with their findings. Investigating Dissolving: Discuss possible variables that may affect dissolving. Ask the children to work in pairs to choose an independent variable and dependent variable to investigate. Find the Answer: The children should carry out their investigations and record their results in a bar chart on the axes. Make a conclusion based	Dissolve, soluble, insoluble, liquid, solid.

	they think tarmac is used today. Are children able to explain how his invention has impacted on life today? Create fact file.			on their results. Look for children who can identify the factors that affect dissolving. Organise the children so that they can share their results with those who did different investigations, and then those who did the same investigation. Ask them to compare their findings and discuss whether they agree or disagree.	
			Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating <u>How working scientifically can be met</u> • explain using accurate scientific language	*Children will have learnt about magnets in Year 3, and solids, liquids and evaporation in Year 4. They will have learnt about dissolving in Lesson 4 of this unit.* Supermarket Chaos! Explain the context of the lesson: various goods from a supermarket have been mixed up and the children need to separate them. Describe the four different mixtures. Ask the children to discuss how the materials have been mixed and how they could separate them. Separating Processes: Ask the children to move around the classroom to read each of the	Separate, mixture, solution, suspension, soluble, insoluble, dissolve, evaporate, solid, liquid, filter, sieve, magnet, attract, particles.

				Separating Mixtures Explanations provided. They should place a tally on the tally chart under each explanation to show which mixture that process would be best suited to. Explain the different processes and how they work with the different mixtures. Separate the Mixtures: Organise the children into 4 approximately even groups. Ask them to move around the classroom in their groups to try to separate each of the mixtures using the processes described. An adult to lead the 'Evaporation' activity if you choose to boil the salt water solution for immediate effects, rather than leave it for several days for the water to evaporate. Look for children who understand how to use the different processes to separate mixtures, and who can explain which process is suitable for each different mixture. A Message from the	

				Manager: Show the children a message of thanks from the supermarket manager. Share the manager's final challenge: separating sand, salt and water. Ask the children to discuss how they could separate this mixture. Encourage them to think of the processes they have used today. They could filter the mixture to separate the sand, then evaporate the water to leave the salt behind.	
			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 <u>How working scientifically can be met</u> • identify and explain	Ask the children to watch the clip to find out more about chemical changes. https://www.bbc.co.uk/bitesize/clips/z9wkjxs Explain the irreversible changes seen in the clip. Ask the children to identify the reactant and the product of the chemical change seen on the clip. Children to sort the pictures of materials changing. Look for children who can identify reversible and irreversible changes. Explain how the reversible changes can be reversed, and identify the	Reversible, irreversible, physical, chemical, reaction, reactant, product.

				reactant(s) and product(s) of the irreversible changes. Seeing Changes: Children to carry out two irreversible chemical changes to make new materials (mix warm milk with vinegar, and then bicarbonate of soda with vinegar). As they complete each activity, explain the new materials they have made and their uses. The children to describe the irreversible changes and explain the new materials created. Look for children who can explain the irreversible changes and identify the useful new materials created.	