GOLDSBOROUGH SICKLINGHALL FEDERATION

INSPIRE NURTURE BELIEVE ACHIEVE

*Working **together** to be the **best** that we can be.*

Happiness | Perserverance | Resilience | Kindness | Friendship | Respect

Science: Everyday Materials Progression of Skills and Milestones Document

EYFS: Everyday Materials

- Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. (30-50 months)
- Can talk about some of the things they have observed such as plants, animals, natural and found objects. (30-50 months)
- Looks closely at similarities, differences, patterns and change. (40-60months)
- Children know about similarities and differences in relation to places, objects, materials and living things. (Early Learning Goal)

Notes:

Teach skills and knowledge in the context of practical activities, e.g. learning about the characteristics of liquids and solids by involving children in melting chocolate or cooking eggs.

Provide opportunities to observe things closely through a variety of means, including magnifiers and photographs.

Year 1: Everyday Materials

- 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

Notes:

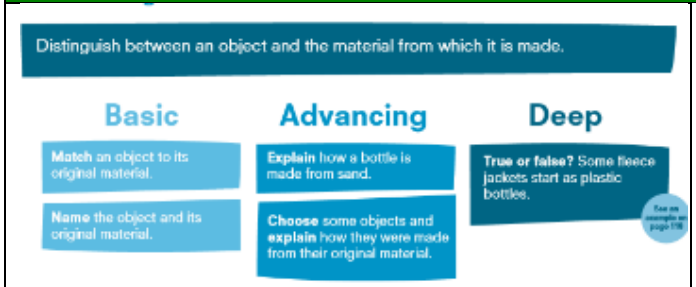
Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

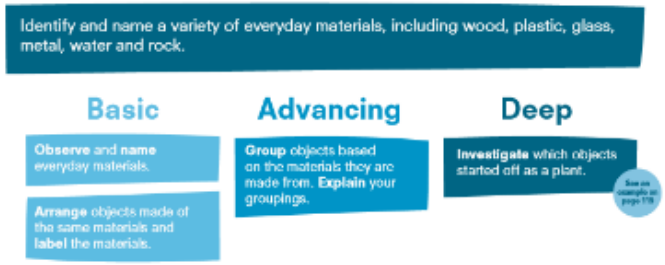
Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? … for lining a dog basket? … for curtains? … for a bookshelf? … for a gymnast's leotard?'

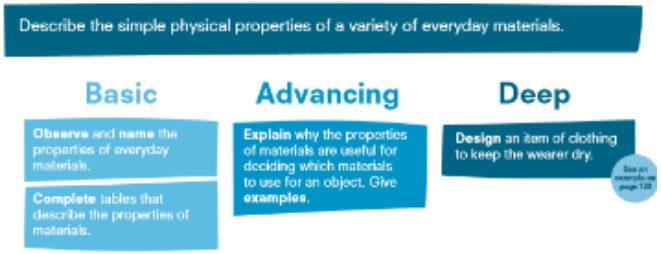
Key Vocabulary	Common Misconceptions
Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through	Some children may think: • only fabrics are materials • only building materials are materials • only writing materials are materials • the word 'rock' describes an object rather than a material • 'solid' is another word for hard.
Activities	**Possible Evidence**
• 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.	• Can label a picture or diagram of an object made from different materials • Can describe the properties of different materials • Can sort objects and materials using a range of properties • Can choose an appropriate method for testing an object for a particular property

• 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. *TAPS practical assessments to be used at the end of each unit.*	• Can use their test evidence to answer the questions about properties e.g. "Which cloth is the most absorbent?" *'Concept Cartoons' and 'Exit Cards' to be used at the end of lessons to assess understanding.*

Y1 Proof of Progress - Working Towards (Basic), Age Related (Advancing) and Greater Depth Expectations (Deep)







Year 2: Uses of 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
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

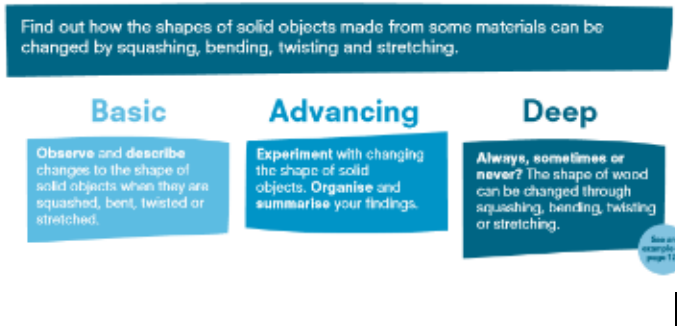
Notes:

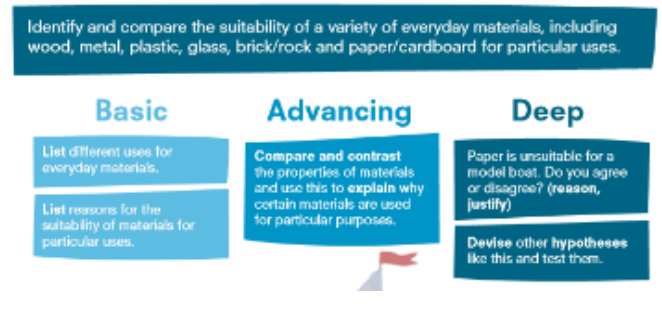
Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.

Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.

Key Vocabulary	Common Misconceptions
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	Some children may think: • only fabrics are materials • only building materials are materials • only writing materials are materials • the word ‘rock’ describes an object rather than a material • ‘solid’ is another word for hard.
Activities	**Possible Evidence**
• 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. *TAPS practical assessments to be used at the end of each unit.*	• Can label a picture or diagram of an object made from different materials • Can describe the properties of different materials • Can sort objects and materials using a range of properties • Can choose an appropriate method for testing an object for a particular property • Can use their test evidence to answer the questions about properties e.g. “Which cloth is the most absorbent?” *‘Concept Cartoons’ and ‘Exit Cards’ to be used at the end of lessons to assess understanding.*

Y2 Proof of Progress - Working Towards (Basic), Age Related (Advancing) and Greater Depth Expectations (Deep)





End of Key Stage 1 Age Related Expectations

Milestone indicator	Basic	Advancing	Deep
Distinguish between an object and the material from which it is made.	**Match** an object to its original material. **Name** the object and its original material.	**Explain** how a bottle is made from sand. **Choose** some objects and **explain** how they were made from their original material.	**True or false?** Some fleece jackets start as plastic bottles.
Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.	**Observe** and **name** everyday materials. **Arrange** objects made of the same materials and **label** the materials.	**Group** objects based on the materials they are made from. **Explain** your groupings.	**Investigate** which objects started off as a plant.
Describe the simple physical properties of a variety of everyday materials.	**Observe** and **name** the properties of everyday materials. **Complete** tables that describe the properties of materials.	**Explain** why the properties of materials are useful for deciding which materials to use for an object. Give **examples**.	**Design** an item of clothing to keep one dry.
Compare and group together a variety of everyday materials on the basis of their simple physical properties.	**Place** materials into groups under the headings given to you. **Describe** the different properties of materials.	**Decide** how to group materials on the basis of their properties. **Explain** your reasons for your groups. **Compare** and **contrast** the different properties of materials.	**Create** a 'guess the material' game based on the properties of materials.
Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Observe** and **describe** changes to the shape of of solid objects when they are squashed, bent, twisted or stretched.	**Experiment** with changing the shape of solid objects. **Organise** and **summarise** your findings.	**Always, sometimes or never?** The shape of wood can be changed through squashing, bending, twisting or stretching.
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.	**List** different uses for everyday materials. **List** reasons for the suitability of materials for particular uses.	**Compare and contrast** the properties of materials and use this to **explain** why certain materials are used for particular purposes.	Paper is unsuitable for a model boat. Do you agree or disagree **(reason, justify)** **Devise** other **hypotheses** like this and test them.

Year 4: States of Matter

- 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

Notes:

Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.

Note: teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.

Key Vocabulary	Common Misconceptions
Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	Some children may think: • 'solid' is another word for hard or opaque • solids are hard and cannot break or change shape easily and are often in one piece • substances made of very small particles like sugar or sand cannot be solids • particles in liquids are further apart than in solids and they take up more space • when air is pumped into balloons, they become lighter • water in different forms – steam, water, ice – are all different substances • all liquids boil at the same temperature as water (100 degrees) • melting, as a change of state, is the same as dissolving • steam is visible water vapour (only the condensing water droplets can be seen
Activities	**Possible Evidence**
• 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.	• 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

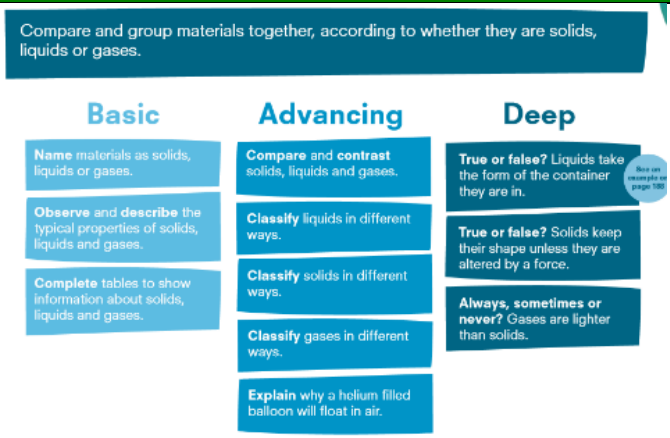
- Classify materials according to whether they are solids, liquids and gases.
- Observe a range of materials melting e.g. ice, chocolate, butter.
- Investigate how to melt ice more quickly.
- Observe the changes when making rocky road cakes or ice-cream.
- Investigate the melting point of different materials 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.

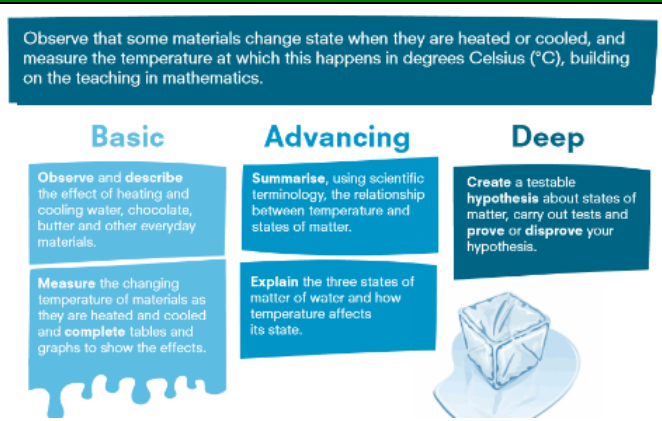
TAPS practical assessments to be used at the end of each unit.

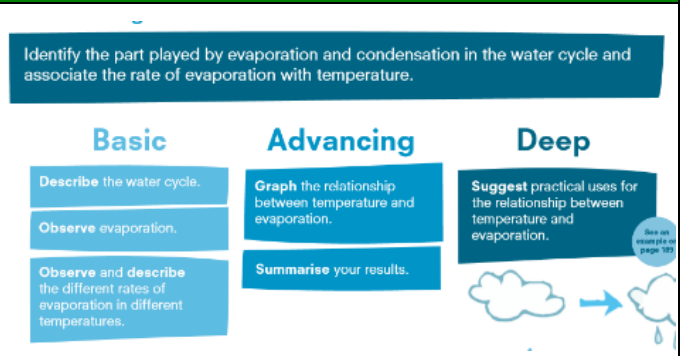
- Can give reasons to justify why something is a solid liquid or gas
- Can give examples of things that melt/freeze and how their melting points vary
- From their observations, can give the melting points of some materials
- Using their data, can explain what affects how quickly a solid melts
- Can measure 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

'Concept Cartoons' and 'Exit Cards' to be used at the end of lessons to assess understanding.

Y4 Proof of Progress - Working Towards (Basic), Age Related (Advancing) and Greater Depth Expectations (Deep)







End of Lower Key Stage 2 Age Related Expectations

Compare and group materials together, according to whether they are solids, liquids or gases.	**Name** materials as solids, liquids or gases. **Observe** and **describe** the typical properties of solids, liquids and gases. **Complete** tables to show information about solids, liquids and gases.	**Compare** and **contrast** solids, liquids and gases. **Classify** liquids in different ways. **Classify** solids in different ways. **Classify** gases in different ways. **Explain** why a helium filled balloon will float in air.	**True or false:** liquids take the form of the container they are in? **True or false:** solids keep their shape unless it is altered by a force? **Always, sometimes or never:** gases are lighter than solids?
Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics.	**Observe** and **describe** the effect of heating and cooling water, chocolate, butter and other everyday materials. **Measure** the changing temperature of materials as they are heated and cooled and **complete** tables and graphs to show the effects.	**Summarise**, using scientific terminology the relationship between temperature and states of mater. **Explain** the three states of matter of water and how temperature affects its state.	**Create** a testable **hypothesis** about states of matter, carry out tests and **prove** or **disprove** your hypothesis.
Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	**Describe** the water cycle. **Observe** evaporation. **Observe** and **describe** the different rates of evaporation in different temperatures.	**Graph** the relationship between temperature and evaporation. **Summarise** your results.	**Suggest** practical uses for the relationship between temperature and evaporation.

Year 5: Properties of Materials

- 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.

Notes:

Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

Note: pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them.

Safety guidelines should be followed when burning materials.

Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'

They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

Key Vocabulary	Common Misconceptions
Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed. Some children may think: • thermal insulators keep cold in or out • thermal insulators warm things up

	• solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change.
Activities	**Possible Evidence**
• 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). *TAPS practical assessments to be used at the end of each unit.*	• 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 • Can create a chart or table grouping/comparing everyday materials by different properties • Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose • 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 *'Concept Cartoons' and 'Exit Cards' to be used at the end of lessons to assess understanding.*

Y5 Proof of Progress - Working Towards (Basic), Age Related (Advancing) and Greater Depth Expectations (Deep)

Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets.

Basic

Observe and **describe** materials on the basis of their hardness, solubility, conductivity and their response to magnets.

Carry out comparative tests to group materials (follow instructions).

Carry out fair tests to group materials (follow instructions).

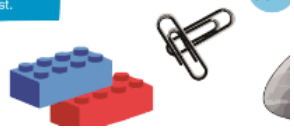
Advancing

Adapt a comparative test to group materials. **Predict** the outcomes of your test.

Modify a fair test to group materials. **Predict** the outcomes of your test.

Deep

Devise an experiment that **proves** or **disproves** a **hypothesis** you have created about the properties of materials.



Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.

Basic

Observe (through direct experience) and **describe** materials as soluble or non-soluble.

Observe and **describe** the effect of evaporation of a solution on a substance (solute) that has dissolved in a liquid (solvent).

Advancing

Apply your knowledge of solutions to **explain** how a substance has not disappeared when it forms a solution.

Modify a fair test to **demonstrate** your knowledge.

Deep

Relate, citing evidence, your understanding of solutions to your understanding of the water cycle.

Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.

Basic

Observe and **describe** how items may be separated through filtering, sieving and evaporation.

Advancing

Experiment with ways to separate pebbles and silt in a solution of salt.

Explain your methods and **summarise** your results.

Deep

Is there a way to recover water after recovering a substance from a solution after evaporation? **(propose) Prove it.**

Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.

Basic

Observe and **describe** materials on the basis of their hardness and conductivity.

Label materials, including insulators and conductors using a range of scientific vocabulary.

Carry out comparative tests to assess the suitability of everyday materials for a purpose (follow instructions).

Carry out fair tests to assess the suitability of everyday materials for a purpose (follow instructions).

Advancing

Apply your understanding of the properties of materials to **explain** why a range of everyday items have been made from a particular material.

Deep

What might happen if a bird sits on a live, uninsulated power line? **(propose)**

Explain the concepts you are using to give your answer.

Demonstrate that dissolving, mixing and changes of state are reversible changes.

Basic

Observe and **describe** how mixing is reversible.

Observe and **describe** how dissolving a substance into a solution is reversible.

Observe and **describe** how changes of state are reversible.

Advancing

Demonstrate reversible changes by **graphing** the temperature of water as it changes state from a liquid to a solid and from a solid to a liquid, and identify patterns between temperature and state.

Summarise your findings.

Deep

Always, sometimes or never? changes to materials that are reversible require something else to change first before they can change? **Cite evidence.**

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, oxidisation and the action of acid on bicarbonate of soda.

Basic

Observe and **describe** how burning a material creates a new material and is not reversible.

Observe and **describe** how oxidisation of (e.g. of steel) creates a new material and is not reversible.

Observe and **describe** how adding an acid (e.g. to bicarbonate of soda) creates a new material and is not reversible.

Advancing

Categorise changes as reversible or not reversible, and **give examples.**

Experiment with making plaster of Paris moulds. Observe, record and **explain** what happens to the material as water is added to the powder. **Summarise** your findings.

Deep

True or false? Changes in temperature cause only reversible and not irreversible changes. **Cite evidence.**

End of Upper Key Stage 2 Age Related Expectations

Milestone indicator	Basic	Advancing	Deep
Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets.	**Observe** and **describe** materials on the basis of their hardness, solubility, conductivity and their response to magnets. **Carry out** (follow instructions) comparative tests to group materials. **Carry out** (follow instructions) fair tests to group materials.	**Adapt** a comparative test to group materials. **Predict** the outcomes of your test. **Modify** a fair test to group materials. **Predict** the outcomes of your test.	**Devise** an experiment that **proves** or **disproves** a **hypothesis** you have created about the properties of materials.
Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.	**Observe** (through direct experience) and **describe** materials as soluble or non-soluble. **Observe** and **describe** the effect of evaporation of a solution on a substance (solute) that has dissolved in a liquid (solvent).	**Apply** your knowledge of solutions to **explain** how a substance has not disappeared when it forms a solution. **Modify** a fair test to **demonstrate** your knowledge.	**Relate, citing evidence,** your understanding of solutions to your understanding of the water cycle.
Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	**Observe** and **describe** how items may be separated through filtering, serving and evaporation.	**Experiment** with ways to separate pebbles and silt in a solution of salt. **Explain** your methods and **summarise** your results.	**Is there a way** (propose) to recover water after recovering a substance from a solution after evaporation? **Prove** it.
Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.	**Observe** and **describe** materials on the basis of their hardness and conductivity. **Label** materials using a range of scientific vocabulary, including insulators and conductors. **Carry out** (follow instructions) comparative tests to assess the suitability of everyday materials for a purpose. **Carry out** (follow instructions) fair tests to assess the suitability of everyday materials for a purpose.	**Apply** your understanding of the properties of materials to **explain** why a range of everyday items have been made from a particular material.	**What might happen** (propose) if a bird sits on a live, uninsulated power line? **Explain the concepts** you are using to give your answer.
Demonstrate that dissolving, mixing and changes of state are reversible changes.	**Observe** and **describe** how mixing is reversible. **Observe** and **describe** how dissolving a substance into a solution is reversible. **Observe** and **describe** how changes of state are reversible.	**Demonstrate** reversible changes by **Graphing** the temperature of water as it changes state from a liquid to a solid and from a solid to a liquid and identify patterns between temperature and state. **Summarise** your findings.	**Always, sometimes or never:** changes to materials that are reversible require something else to change first before they can change? **Cite evidence.**
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, oxidisation and the action of acid on bicarbonate of soda.	**Observe** and **describe** how burning a material creates a new material and is not reversible. **Observe** and **describe** how oxidisation of (e.g. steel) creates a new material and is not reversible. **Observe** and **describe** how adding an acid to (e.g. bicarbonate of soda) creates a new material and is not reversible.	**Categorise** and **give examples** of changes as reversible or not reversible. **Experiment** with making Plaster of Paris moulds. Observe, record and **explain** what happens to the material as water is added to the powder. **Summarise** your findings.	**True or false:** changes in temperature cause only reversible and not irreversible changes? **Cite evidence.**