Year 1 Term 2 – Energy – Light and Seasons

National Curriculum Objectives

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies.

Context + Outcome

There are 2 parts to this unit: seasons and Light (including animals) but they are very closely linked. Noticing the world around us – it is getting darker and colder. How can science help us understand this and how to keep safe in the dark/cold. How do animals and plants survive in the dark and cold? If you wish, you could use Nature's calendar to report findings of autumn to track the effects of weather and climate change on UK wildlife. This is a 7 lesson unit to allow for Christmas plays. There is an extra Christmas unit which allows for more science in the term (ideally done in the last week of term).

Sticky Year 1 knowledge

- That it is autumn and it gets darker and colder than in the summer.
- Identify objects that make light
- Understand that light is needed to see
- How to keep safe around light and fire
- Different animals (including humans) have different senses that are adapted to their needs

Key vocabulary

- Season, autumn, temperature
- Light, safe, dark, dim, reflect, shiny, thick
- Bulb, tree, flower, plant
- Identify

Common misconceptions

- we see objects because light comes from our eyes
- It doesn't ever get dark
- Trees die in the winter
- The moon produces light
- It is only night if the moon is visible

Focussed progression of skills

PLAN	DO	RECORD	REVIEW
• Children ask questions about the world around them. • Children can plan for health and safety issues in their science work • Children can suggest ways of answering a question with a given selection of equipment	• Children can use their senses to compare items	• Children can record results in a pre-made chart – may include a tally chart • Children can use photos/videos to record their results/findings	• Children can show their understanding through models • Children start to see how their results relate to their question.

Assessment opportunities

1. Children can respond to stimuli by sharing their thoughts and developing their questioning.
2. Children can explain how they know it is autumn, drawing on their own experiences and observations.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	2, 3	1, 4				5, 6, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson		4	1, 7	2	3, 5, 6	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
1	Bulb planting for the spring Children use real objects for identification purposes	Starter: Spring Flowers Lots of spring flowers grow from bulbs. The bulbs need to be planted in the autumn because they bulb has to get cold to let it know it will soon be spring and to get ready to grow.. Model how to plant a bulb. Have one example of each bulb type labelled. All other bulbs are mixed. Children choose a bulb and identify. Children plant bulbs to grow outside (if possible) in groups. Other activities include going on a flower hunt. Can the children find any flowers growing outdoors? If they do, take photos/ draw to compare throughout the year. Also, write labels for the bulbs. Use autumn identification sheets to prep real life versions. Can children find any the same?	Bulbs planted. Floor book – photos/drawings of any flowers or comments on how you didn't find any. **Assessment opportunity 2**
2	Do trees die in the winter? Children can record results in a pre-made chart – may include a tally chart	Starter: Green texture Do trees die in winter? Have you ever had a real Christmas tree? Did it die? Lots of trees are losing their leaves – are they dying? How can we find out? Take children to evaluate trees outside. Do any of them look like the fir trees we saw in the starter? Which ones are losing their leaves and which ones aren't? Some evergreen trees (such as holly or cotoneaster) don't have pine needles – their leaves could be waxy or very small. **Note: yew is poisonous.** Children to do a tally of deciduous and evergreen trees. You could take photos of children with thumbs up or thumbs down to show whether they think the tree is dying. When will we know if we are right?	Tally charts, photos of whether we think the tree is dying or not. **Assessment opportunity 1 and 2**

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	2, 3	1, 4				5, 6, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson		4	1, 7	2	3, 5, 6	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
3	Do all animals like living outside in the cold? Children start to see how their results relate to their question.	Show a picture of a monarch butterfly that shows the scale of it. Has anyone ever seen a large butterfly before or held one? (There is a butterfly house at Blenheim). Show Far from home and discuss. Establish that the butterflies went to live somewhere else because it got too cold. Let's see if we can find any animals in our playground. Use magnifying pots to collect any animals you find. Ensure children know how to look after the animals and to return them to where they found them. (Teacher knowledge) What might have happened to the animals. Read (or watch)When the Snow comes by Jonathan Allen Introduce weather chart to the children. Record what the weather is like and the temperature each day this term. Use a digital outdoor thermometer.	Weather chart Photos in floor book **Assessment opportunity 2**
4	What different objects could Little Bear use to see in the dark? Children can suggest ways of answering a question with a given selection of equipment Plan for H&S issues	Read (or show) Can't you sleep, Little Bear'. Which items in the story make light? (fire, lanterns, stars). Children will probably say the moon (and maybe the snow). These items reflect the light (the moon reflects light from the sun and the snow reflects it again). Big Bear's lanterns have broken so he needs to find something else to light his cave. Some objects make light and some don't – how could we find out which ones? How could we test if the moon makes light? Have a selection of objects that do and don't make light. Include things such as glow in the dark stars, mirrors, rocks (the moon), torches, fake candles.. Discuss why we can't use real candles or flames. Have lots of sheets/materials to make dens under tables to test their light sources. Can they make it completely dark?	Floor book entry – pics of dens, chart/sorting rings of items that make light and ones that don't.
5	Is there more night in the winter than in the summer? Children show understanding through models	Have you ever gone to bed when it was still light? Show a summer/winter day time lapse. Ask children to comment on what they are seeing. When is June and December in the year? What's different about the 2 videos? Have they noticed that it gets darker earlier in the winter and it gets light later? Did this change what they do after school? Show autumn seasonal changes disk Show slide with all backgrounds and ensure children can identify the autumn one.	Floor book comments Seasonal changes disks **Assessment opportunity 1**

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	2, 3	1, 4				5, 6, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson		4	1, 7	2	3, 5, 6	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
6	How do we keep safe when it is darker? Children can show their understanding through video	What do children have that they use to keep them safe when it is darker? Might have lights on bikes, reflective strips on coats/bags, lights on cars, wear warmer clothes to keep warm. Demo these things. Design a 'keep you safe and warm' outfit for the winter. Is it better to wear dark clothes or light ones? Children might choose thicker materials, water proof ones, reflective ones. Elicit from them why they have made the choices they have.	QR code video of children explaining their choice of materials for their outfit.
7	How do nocturnal animals stay safe at night in low light? Children use their senses to compare items	Odd one out – Spooky animals – Explorify These animals spend a lot of time awake at night. Discuss why that might be (safety from predators, temperature, easier to sneak up on prey). How are their bodies adapted to live when there isn't much light? To avoid misconceptions, try to avoid calling night 'dark'. There is always some light. Animals that live underground, live in complete darkness. Show a variety of nocturnal animals that have heightened sense of touch, smell, sight, hearing to help them in low light. How good are our senses in the dark? Carousel of activities to do **whilst blind folded** to test our senses. E.g. taste diff food, build a lego model, smell test, identify different sounds played to them, which part of your body is the most sensitive to touch?	Floor book. **Assessment opportunity 1**

Year 2 Term 3 – Materials 1

National Curriculum Objectives

- 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.

Context + Outcome

This unit uses chocolate as it's overarching theme – using a link to Charlie and the Chocolate Factory as a story link. Children will investigate that heat can be transferred and some materials melt when they get warmer. They will see that some material can be re-shaped by using different forces and understand the negative impact of plastics on the environment. They will spend time to report their findings to Mr Wonka and will look at how their learning is used by scientists in real life.

Sticky Year 2 knowledge

- That different materials have different properties that can be tested and evaluated
- That heat/light/water can travel through some materials better than others
- Some materials melt when they get warm
- Forces can be used to change materials
- Scientists identify problems and try to find solutions
- That real scientists study materials to make products better and to be more environmentally friendly

Key vocabulary

- Squash, bend, twist, stretch, firm, force
- Melt, heat, fragile
- plastic

Common misconceptions

- All materials are fabrics

Focussed progression of skills

PLAN	DO	RECORD	REVIEW
• Consider more than one way to find out the answer to a science question • Choose from a variety of equipment to design a method	• Research using images or video • Using a stop watch correctly and being able to read the time shown • Children follow methods planned as a class and understand the purpose of the investigation	• Plan how to record which material is the best for the given purpose	• Explain how they know which material was the best or worst. • Children can give a response to a given context/question.

Assessment opportunities

1. Can children suggest different ways to solve a science problem?
2. Can children make comparisons between results using comparative words such as quicker, stronger, cooler, stretchier?
3. Can children explain their conclusions to an investigation and communicate it to others?

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	1, 2	5	6	3, 4		9

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	1, 9		2, 5, 6	3	4	7, 8

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
1	How can you hold chocolate buttons without them melting? Skill: Children use their prior knowledge to help develop their questions	Discuss which foods are messy to eat and why. Food is a familiar concept so all children should be able to share different foods that they eat. Explain that you always find chocolate messy to eat – why? What happens when you hold chocolate in your hand? Hand out a variety of chocolate buttons (dark, milk, white). Will they all melt? At the same time? How can we find out? Why did they melt? Now hand out chocolate buttons with hundreds and thousands, Smarties/M&Ms/ Minstrels. What do children notice? In 1800s, the French started to add 100s&1000s to their chocolate drops to stop them from melting on the white gloves of rich ladies. Why do you think the Smartie was invented?	Floor book – images and comments
2	How can I make my chocolate square melt the fastest? Skill: Children can use a stop watch correctly	Introduce Willy Wonka and say he has a number of problems in his chocolate factory. The first one is that his oven has broken so he can't use it to melt his chocolate to make his different shaped sweets. What other ways could he use? What would be the quickest way? Who can melt their chocolate the fastest? Skill: using a stop watch and reading the time taken.	Children choose 2 different ways to melt their chocolate and measure which is the quickest. They record the time. Assessment opportunity 1
3	Which material should Mr Wonka use to mix his liquid chocolate? Skill: Plan how to record which material is the best for the given purpose	Starter: Fascinating Forks Mr Wonka's next problem is in the hot chocolate room. The hot chocolate needs to be stirred but Mr Wonka's fabric spoon doesn't work. Demonstrate this. Which material would be best to make the spoon from? What properties should the spoon have? Children suggest a selection of materials to test. Ensure heat conductor, insulator, fragile, flexible, easily melt, bad for the environment… **How will they set the experiment up? Plan experiment as a class. What will they record and how will they test it? Suggestion for this on ppt but adapt this to meet the needs of your class.**	Whole class plan and class chosen definition of 'best'. – Floor book Results chart prepared.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	1, 2	5	6	3, 4		9

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	1, 9		2, 5, 6	3	4	7, 8

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
4	Which material should Mr Wonka use to mix his liquid chocolate? Skill: Children recognise the 'best' or 'worst' from their results (e.g. the brick was the worst material for a blanket)	Carry out experiment in groups.	Group record of results Assessment opportunity 2
5	What properties do plastics and rubbers have? Skill: Children can classify items in different ways, justifying their choices	Starter: give children items like **chewing gum**, basketballs, blu-tac, tyres/ tyre inner tubes, rubber bands, other items made from rubber or plastics. What properties do they share/ are different? Think about ease to stretch, bend, twist. Can the children order them in bendiness/stretchiness? What have all of these items got in common? Watch this video on how chewing gum is made. Think about what the poly iso-butylene (the rubber at the start) is also used to make. Note that it is stretchy and look at what happens to the different ingredients as they melt and mix. To make it in to gum, flavourings are added. Mr Wonka is worried about his bubble gum room. He has heard that bubble gum is not very good for people or the environment but he is not sure if this is true. Let's investigate next lesson.	Classifying plastics and rubbers on their different properties. Assessment opportunity 2
6	Are plastics bad for the environment? Skill: Research using images, video or prepared resources.	Children research in groups to find out more about chewing gum and its impact on the environment. Is Mr Wonka right about chewing gum being bad for the environment? (Teacher info). Children share their findings with the class.	Shared class discussion on what Mr Wonka should do. Record research in a way that is best suited to your children.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	1, 2	5	6	3, 4		9

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	1, 9		2, 5, 6	3	4	7, 8

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
7 & 8	Reporting back to Mr Wonka to tell him your findings Skill: Children can give a response to a given context/question.	Ask children how they can tell Mr Wonka all of their findings. They could write him a letter, make a poster, record a video.	Group presentations of their science knowledge to Mr Wonka Assessment opportunity 3
9	Why do scientists look for new ways to do things? Skill: Consider more than one way to find out the answer to a science question	Some scientists are working to create chewing gums that are not made of rubber and plastic (e.g. Chewsy gum). Scientists look for better solutions all the time. Look at a scientist like me – Dr Raquel Prado. Discuss her job with the children to help them see that they could do a job like this in the future. Give the children different images and ask them if they have already been improved or if they could be improved and what would they do. (e.g. photo of wired phone with dial – improved to be wireless, with buttons, can take a photo…)	Children generate ideas about how they might improve different things in their life – it might be a way to turn off their light without getting out of bed or a way to make sweets last for longer…

Year 3 Term 3 – Rocks and Fossils

National Curriculum Objectives

- 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.

Context + Outcome

This unit looks into how rocks can tell us about our past. Children use models to show how different rocks and fossils are created and evaluate the models to see how reliable they are. They test rocks to identify them and evaluate soils to see if they impact flooding. They look at the work of Mary Anning by working scientifically as she would have done.

Sticky Year 3 knowledge

- Rock is a naturally occurring material
- There are different types of rock which are formed in different ways and have different properties
- Soil is a mixture of ground down rock and organic (plant) matter.
- Fossils are sometimes found in rocks.
- Fossils are millions of years old and give us clues to our past

Key vocabulary

- Rock, stone, pebble, boulder, soil, fossil
- grain, crystals, layers. texture
- marble, chalk, granite, sandstone, slate
- soil, peat, sandy/chalk/clay soil, silt

Common misconceptions

- All rocks are hard/heavy
- Bricks and concrete are rocks
- Fossils are bits of actual extinct living matter

Focussed progression of skills

PLAN	DO	RECORD	REVIEW
• Children identify control variables in a comparative/fair test	• Children can research using pre-prepared resources specific to their task • Children can use measuring cylinders and beakers to measure volume accurately.		• Children can solve science problems by communicating their findings with others • Children can use a model to represent a science concept

Assessment opportunities

1. Children can explain how different rocks and fossils are created.
2. Children can make a model to explain a scientific concept and understand the limitations of their model.
3. Children can use measuring cylinders pipettes and stop watches correctly.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9-11	2, 3	4, 8	5, 6		1, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	5		2, 4, 6		1, 3, 7, 8-11	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
1	What is under our feet? What is a rock? Skill: Children can use a model to represent a science concept	Have you ever… dug a deep hole at the beach or in a garden? What was it like? Did you find anything? Elicitation – ask children to draw a labelled diagram of what they think is under the ground. How deep is the ground? This video shows how far humans have been able to dig underground. (sadly in feet so have a 12 inch ruler handy). Most of the Earth's crust is made from rock. Rock is a natural material and there are different types made in different ways. Demonstration – how different rocks are made. Kitchen Geologist or starburst activity. Children match their demos with real images of the different rock types.	Children create their own metamorphic and sedimentary rocks. Floor book images Assessment opportunity 1 how rocks are formed
2	How do we know that there are different types of rocks? Skill: Children can use measuring cylinders and beakers to measure volume accurately.	Starter: Zoom in zoom out – Kaleidoscope of colour Rocks behave in different ways that shape our landscape (waterfalls, river trajectory, coastal needles…) How do we know that rocks are different? We will examine 4 rocks over the next couple of lessons – labelled A – D. Do not tell children what they are. A= chalk, B = granite, C = limestone/marble, D= sandstone. Today observe to see if they have grains or crystals. Are they porous (put in measured amount of water for a minute and see if the water volume is the same at the end. If it is less, the rock is porous). Teach skill of how to use measuring cylinders. Are their any striations (model with slate)? Does the rock fizz when vinegar is added? Children record their findings.	Individual results recorded in books. Assessment opportunity 3 – use of measuring equipment
3	How do we know that there are different types of rocks? Skill: Children can interpret their data to make comparative statements.	Starter: what do we use that are made out of rocks? Hardness test: Find out if the rocks are harder than your fingernail, copper coin, an iron nail, glass (Gu pots work well). Teacher guidance on this test Children find this hard and need to be very careful to see if a mark has been made. Can they use these results to order the rocks from hardest to softest? Give the children facts about each rock type (e.g granite is harder than glass, limestone fizzes in vinegar) and see if they can use their results from the last 2 sessions to identify each rock.	Individual results recorded in books. Identified rocks

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9-11	2, 3	4, 8	5, 6		1, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	5		2, 4, 6		1, 3, 7, 8-11	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
4	Do rocks change over time? Skill: Children can research using pre-prepared resources specific to their task	Starter: Video of White cliffs of Dover cliff fall. What is happening? Why do you think it happened? Do you think the cliffs might be made from any of the rocks you tested last lesson? Show picture of Isle of Wight Needles, Durdle Door. These features are made because some rocks are weathered more easily than others. They are worn away by the sea, wind and heat. Show children different images of rocks that have changed over time and ask them to find evidence that rocks change over time. (e.g. pyramids, statues, Easter Island Heads). Show video of sea defences to protect cliff edges. What sort of rocks do the children think they are using and why?	Individual work on evidence of how rocks change over time.
5	Why doesn't water drain away in some areas? Skill: Children identify control variables in a comparative/fair test	Starter: Separate different soils through sedimentation. Teacher demo with pupil help of 3 types of soil. Show water logged path/field. Why is the water in some places but not others? Is it because of the type of soil? Show funnels, filter paper, beakers, stop watches. Ask the children if they can think how they could use this equipment to answer today's question. (Teacher support: this video (4:05 – end of permeability expt). Will this test need to be fair? What things will need to stay the same to keep it fair? Which thing will change to answer the question (the type of soil). Use this planning tool as a class to write these down. These are your control variables (because we have to control them)!	Children to draw their equipment set up in books and label their control variables.
6	Why doesn't water drain away in some areas? Skill: Children follow methods planned as a class and understand the purpose of the investigation	Do experiment planned above. Show children how to correctly fold filter paper to fit the funnel. Ensure children know how to use a stop watch. Children complete results chart. Do their results help find out whether the type of soil is likely to make a difference to flooding?	Conclusion as to whether soil might contribute to amount of flooding. Results chart. Assessment opportunity 3 – using stop watches

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9-11	2, 3	4, 8	5, 6		1, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	5		2, 4, 6		1, 3, 7, 8-11	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
7	How did scientists work together to solve problems in the past? Skill: Children can solve science problems by communicating their findings with others	Starter: Video of candles being extinguished by sulphur hexafluoride. Sometimes things exist that we can't see or understand so we have to investigate. Show the Ichthyosaurus fossil that Mary Anning found. Ensure children understand that no-one really knew much about dinosaurs at that time. Look at some images of what she found. What do you think they could be? How could she find out? Palaeontologists often find part of a fossilised skeleton – not a whole one. If another partial fossil is found somewhere else, how do the scientists work out what a whole on looks like?	Make a couple of copies of an image (not an obvious picture) and draw a grid on it. Cut both images into different size shapes along the grid lines. Make sure the squares belong to different shapes from each copy of the image. Give each child on a table some of the cut outs. Children look at the images of others to work out the whole picture. Ensure you give out enough bits to create a full copy of the image but not to make 2.
8	How can fossils tell us about the history of our planet? H&S – Using plaster of Paris Skill: Children can use a model to represent a science concept	Explain that a fossil is a print from where an animal or plant used to be. Sometimes the space is filled with minerals which become rock. Fossils help us to see what life was like in the past. By looking at how deeply the fossil is buried, we can start to find out how long ago the animal or plant lived on our planet. Play this game as a class (watch video first). Make a layered fossil record. Teacher info: Video on how to make the fossil record Student instruction sheet also available on this page. Extension – fossil timescale sheet page 1 – ordering fossils by age and placing in the fossil record.	Fossil record models – 1 per 3 children.
9	How are fossils made? Skill: Children can use a model to represent a science concept	Starter: Which of these have been found as fossils? Teach process of how a fossil is made. (Teacher guidance) Using fossil records made in the last lesson, try to find their fossils. Can they find any cast fossils (prints from where the object was). Is this model a perfect analogy to fossil formation? (No as the things we used to be fossils are still there but this isn't true in real life)	Floor book photos and comments Assessment opportunity 3 – model use

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9-11	2, 3	4, 8	5, 6		1, 7

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	5		2, 4, 6		1, 3, 7, 8-11	

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
10-11	Demonstrating how fossils are made. Skill: Children can use a model to represent a science concept	Using Scratch, children create animation of how fossils are made.	Scratch animations. – QR codes in Floor book. Assessment opportunity 1 – how fossils are formed.

Year 4 Term 1 – Electricity

National Curriculum Objectives

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.

Context + Outcome

What is electricity, where does it come from, what uses it and how much do we use? Power is becoming more expensive and can be bad for our climate. This unit helps children to see how electricity is made and how we use it in society. It is important to make links with children and their use of electricity (beware not to compare 'I have more computers that you'). Children should be aware that electricity can be made by green methods (good for the climate) and by non-sustainable methods. By understanding how electricity works (complete circuit, electrical conductors), children can then understand how much electricity we use and how we can reduce our usage.

Sticky Year 4 knowledge

- Identify and define electrical conductors and insulators
- Make a simple circuit
- Electricity is a way of transferring energy
- Different devices use different amounts of electricity to work.
- There is a financial and climate cost to using electricity
- How to use electricity safely

Key vocabulary

- Circuit, cell, battery, wire, bulb, buzzer, motor
- Conductor, insulator
- Switch
- Solar, wind turbine

Common misconceptions

- Batteries store electricity that gets used up.
- Devices with plugs don't need to be a complete circuit

Focussed progression of skills

PLAN	DO	RECORD	REVIEW
• Children can break a 'big question' into smaller parts, understanding that the parts may be answered in different ways	• Children can plan for health and safety issues in their science work	• Children can suggest the best way to record their results • Children can make Venn diagrams and Carroll tables to represent data	• Children create leaflets, e-books and dioramas to demonstrate their understanding • Children can interpret their data to make comparative statements.

Assessment opportunities

1. Can children create a simple circuit and explain how it works, giving reasons why it might not be working.
2. Can children sort materials into electrical conductors and insulators?
3. Can children interpret their data and present it to others in a way that is easy to understand?

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9	1, 5, 6				2, 4, 7, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	1,	2, 7	4, 9	6	10	11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
1	What if there was no electricity? A lesson to relate electricity to their own lives. Break question into smaller parts	Power cut starter Use this to differentiate between mains powered devices and battery powered. What would happen if there were a power cut in the classroom/school? What if it lasted all week (e.g. wouldn't be able to charge battery operated items)? Children may suggest things you could follow up on, such as 'how long does a battery last in a phone? Or Can we run our class for a day with no electricity? **If we wanted to find out how to save electricity, what would we need to know?** (Maybe what electricity is, how much electricity different items use, how we know how much power is used, how we turn electricity on and off).	Classify items into non-electrical, battery powered and mains powered. Questions that can be answered in the term to answer the big question of 'How can we reduce how much electricity we use?'
2	Understanding what electricity is Problem solving, keeping safe.	Exploring - Give them battery, foil (can tear up etc **NB don't wrap up battery – it will get hot, possible burns**) and a light bulb – can you make the light bulb light? Common misconception – the battery has electricity in it which runs out when you use the battery. Practical demo of what electricity is – children sitting around in a circle etc (See book – Primary Science Teaching the Tricky bits) CB Brief prep for brook trip – look at website	Photos in floor book Assessment opportunity 1
3	Brook trip	Brook trip	
4	Can you make a light bulb light using wires and a battery? Using observations to problem solve.	Starter https://explorify.uk/en/activities/odd-one-out/battery-bonanza What is a wire – ensure children know there is metal on the inside and plastic on the outside. Give children equipment to make a simple circuit to make a bulb light. Can they make 2 bulbs light? How can we switch the bulb for a motor? What changes? Can you make the motor change direction?	Floor book – images of circuits. Assessment opportunity 1

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9	1, 5, 6				2, 4, 7, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	1,	2, 7	4, 9	6	10	11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
5	Which materials conduct electricity? Does air conduct electricity?	Starter https://explorify.uk/en/activities/zoom-in-zoom-out/curly-coil or energy stick Give time to make a circuit with a bulb. What do they notice about all of the parts in the circuit? What are they all made of? Would it work if the 'wires' were just made out of plastic? Discuss that today we are investigating materials and that some are conductors and some insulators. What will happen if the material is a conductor? What will happen if it is an insulator? Children to test the different materials in their circuits using materials provided and other items around classroom. Record results on sheet. Take some photos. **Could use this activity** https://explorify.uk/en/activities/problem-solvers/to-the-wire	Floor book pictures and title page answer Assessment opportunity 2
6	What is the best way to share our results?	Scientists need to share their results with other people. What is the best way to share our results? Could we use a table, graph, Caroll diagram, Venn Diagram? Children could experiment with different ways. Hopefully they will see that a graph won't help. A Caroll diagram would work well by separating into metal/non-metal and conductor and insulator. This will help children see that not all conductors are metal. Can they make predictions from their results about untested materials?	Results set out in different methods. Could be physical (e.g. outlines of recording types provided and children write the words in or put the objects in the correct space).
7 & 8	Can you turn the power off? **Long lesson**	Starter https://explorify.uk/en/activities/zoom-in-zoom-out/inside-out Our school has lots of circuits in it. Look at the symbols in a simple circuit that show where things go. In the circuits we made, the light/motor is always on so it is always using energy. If we want to save energy, we need to turn the power off. How do we do that at school or home? Make a simple circuit following a circuit diagram on the board. Can they make the light bulb turn on and off? Show a circuit with a paperclip switch – metal and then one with a plastic covered paperclip – why doesn't it work? Using a variety of resources, can they make a switch to add to their circuit so they can turn the light on and off.	Completed switch – possible video showing how it works. – QR code in books or floor book. Assessment opportunity 1
9	How much energy do different devices use?	Using energy consumption sockets, measure how much energy different devices use. Children can predict how much energy they think different devices use. How much energy does a device use on standby? Evaluate results. What is the best way to share them? How do we know how much power the school is using? Can we reduce this?	Results table. Children are able to make comparisons between the energy consumption of different devices.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	9	1, 5, 6				2, 4, 7, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	1,	2, 7	4, 9	6	10	11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
10	Can we reduce the amount of energy used by school? Interpreting data	Why is it important to reduce our energy usage? Look at the different ways electricity can be generated. This video has some good visuals and analogies. This website is also good. Some ways are more climate friendly than others. This website shows a breakdown of how our power is generated in the UK. Discuss costs of power too. Maybe speak to member of staff who pays the electric bill to speak to the children. Children think of practical ways they can reduce electricity use in school. Who should they share this information with and how?	Children to design a way to report their findings to their own target group (other pupils, Mrs Rooke, the Governors, teachers, kitchen staff…) Assessment opportunity 3
11	Continue lesson previous lesson Presenting results	Continue communicating science results to chosen people.	Complete communication of their science findings. Assessment opportunity 3
12 (& 13 if visitor)	I am an electrician Can I explain why some circuits are not working and repair them?	Starter https://explorify.uk/en/activities/zoom-in-zoom-out/power-up Possible visit from an electrician to talk about their job – what sort of things do they do? What skills do they need? Provide pictures of circuits – some with problems shown in the pictures (e.g. no battery, switch open etc) and then some that have a complete circuit and they need to think of unexpected problems eg E.g. battery dud. Get them to build the circuits to test them. What's wrong with it? What could be wrong with it? How will you fix it?	Sheet with circuit What's wrong with it? What could be wrong with it? How will you fix it? Show me and then draw it Assessment opportunity 1
14		Possible lesson using interactive game – totaldarkness.sciencemuseum.org.uk	

Year 5 Term 1 – Materials – separating materials (page 1)

National Curriculum Objectives	Context + Outcome	Sticky Year 5 knowledge
• 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.	This unit concentrates on a lot of working scientifically skills and these should be at the forefront of this unit. Children should be able to give reasons for their experiment choices and should be encouraged to take control of their own methods and ideas. The unit is a chemistry based unit and looks at how different mixtures can be separated or how materials change on mixing. It also builds on work in Y4 on change of state and reversible reactions. Separating materials can be related to recycling and climate issues to make it relevant to the children. Contexts can be changed to meet the interests of the children in the class.	• The difference between reversible and irreversible reactions • That mixtures can sometimes be separated in different ways and that this can be useful in the real world • To understand what dissolving is and to know some solids which dissolve in water. • To know that a new product is formed in an irreversible reaction and that carbon dioxide is produced in the reaction between an acid and an alkali.

Year 5 Term 1 – Materials – separating materials

Key vocabulary

- Mixture, separate, filter
- Irreversible, reversible
- Reaction
- Acid, alkali
- Dissolve, evaporate

Common misconceptions

- Dissolving means disappearing – the solid is no longer there
- Dissolving is the same as melting
- Evaporating water produces smoke

Focussed progression of skills

PLAN

- Children can choose the independent variable for their question
- Children can identify possible dependant variables and justify their choice of measurement
- Children choose what to measure and how long for and at what intervals
- Children understand that there are a number of scientific enquiry methods to answer a question and can identify which method they will use

DO

- Children can use measuring cylinders and beakers to measure volume accurately.
- Children can use filter paper correctly.
- Children can use an analogue thermometer accurately.

RECORD

- Children can record 3 sets of data and suggest why they might be different. They would keep the median result.
- Children can choose which type of graph to use to represent data and explain the advantages of this choice

REVIEW

- Children can use results from investigations to answer their questions. Their conclusions are consistent with their results.
- Children can make causal statements from their data (e.g. the ……. the surroundings, the ……. the chocolate melted).
- Children identify if and how they adapted their method and how that benefited their investigation
- Children can suggest results for elements not tested (e.g. result for a temperature not tested)

Assessment opportunities

1. Children can choose an independent variable to match their question and plan an investigation to answer it.
2. Children can draw relevant conclusions from their experiments, which may include causal statements.
3. Children can identify different reactions as either reversible or irreversible.

Year 5 Term 1 – Materials – separating materials (page 2)

Focussed progression of skills

PLAN	DO	RECORD	REVIEW
• Children can choose the independent variable for their question • Children can identify possible dependant variables and justify their choice of measurement • Children choose what to measure and how long for and at what intervals • Children understand that there are a number of scientific enquiry methods to answer a question and can identify which method they will use	• Children can use measuring cylinders and beakers to measure volume accurately. • Children can use filter paper correctly. • Children can use an analogue thermometer accurately.	• Children can record 3 sets of data and suggest why they might be different. They would keep the median result. • Children can choose which type of graph to use to represent data and explain the advantages of this choice	• Children can use results from investigations to answer their questions. Their conclusions are consistent with their results. • Children can make causal statements from their data (e.g. the ……. the surroundings, the ……. the chocolate melted). • Children identify if and how they adapted their method and how that benefited their investigation • Children can suggest results for elements not tested (e.g. result for a temperature not tested)

Assessment opportunities

1. Children can choose an independent variable to match their question and plan an investigation to answer it.
2. Children can draw relevant conclusions from their experiments, which may include causal statements.
3. Children can identify different reactions as either reversible or irreversible.

Key vocabulary

- Mixture, separate, filter
- Irreversible, reversible
- Reaction
- Acid, alkali
- Dissolve, evaporate

Common misconceptions

- Dissolving means disappearing – the solid is no longer there
- Dissolving is the same as melting
- Evaporating water produces smoke

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson		9		3, 4, 5		1, 2, 7, 10, 11

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	3	2, 3	4, 7	5	5	6, 9, 11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
1	How can we separate different materials?	Scenario: In the holidays you went to the beach and were saddened to see all of the rubbish that had been left there. Show mixture of sand, salt, pasta (representing someone's lunch), paperclips, bits of plastic (e.g. clingfilm), stones (large to pick out by hand). Could also add something between the size of the pasta and the sand to add a layer of sieving. Ask the children how they can separate the materials. Which would be the quickest way? How about for the whole beach? Children use hands, tweezers, sieves (or things with holes in such as orange bags), magnets to separate the items. Evaluate. Leave sand and salt as a mixture and say we will come back to it later in the unit. What other times do we need to separate materials in our lives? Collect ideas. Recycling should be mentioned. Recap what can be recycled. Show this video which shows how the different materials are separated. Were any the same as the methods you used?	Floor book comments and photos.
2	Which materials dissolve in water? Understand there are different scientific enquiries to solve a problem and choose one with reason.	Have a variety of solids to dissolve in water (nothing that reacts). Choose things that will and won't dissolve (e.g. sugar, salt, coffee, flour, sand). You can extend this by seeing if some liquids dissolve in water (try oil, squash/fruit juice, paint, glue). Ask the children if this needs to be a fair test? Allow children to choose to do as a fair test or not. Children test different materials. Compare results – did it make a difference if the test was made fair? Children often think it should be fair but it does not. You are finding out if the solid dissolves, not comparing the different solids. This is an exploration. Vocab – solution. Teacher A believes that when you mix sugar in water that the sugar disappears. Teacher B believes that it is still there. How can we prove which teacher is correct? 2 possible ways – weighing and tasting (don't do with science equipment).	Title page entry – Did you make today's test a fair test? Explain why.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson		9		3, 4, 5		1, 2, 7, 10, 11

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	3	2, 3	4, 7	5	5	6, 9, 11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
3	How can I dissolve my sugar in the quickest possible time? Children can choose the independent variable for their question Children choose their dependent variable (what to measure and how)	Add a sugar cube to a glass of water at around 40 degrees. Leave in view of the children. **Starter** – Dissolving in the real world. This article explains the issues with delivering the measles vaccine to people in rural parts of the world. Outline these issues. What do the children think could solve the problem? Share the current work on dissolving needles (do they think the needles are made from metal?) to deliver the vaccine. **Our dissolving dilemma**: Person X is always late to lessons/meetings because they have to wait for their sugar to dissolve in their tea. They add one sugar lump and it takes ages to dissolve. Check the cup you wet up earlier – has the sugar lump dissolved? Is there something that could be done to make the process quicker? Children list all things that could be changed – temp of water, type of sugar, how frequently you stir, shape of the container… Draw out that these are the control variables. Each group to choose their own independent variable (what they will change) and create their investigation question to match e.g. Does the temperature of the water affect the rate of dissolving? What will children measure? Time to dissolve.	Diagram of equipment for experiment. Label control variables in one colour. Label independent variable in another. Children choose volume of water and sugar that they will use and frequency of stirring (they should all stir if not using stirring as independent variable). **Assessment opportunity 1**
4	How can I dissolve my sugar in the quickest possible time? Children can use measuring cylinders and analogue thermometers correctly	Model how to use measuring cylinders accurately. Model use of analogue thermometers (if children are not ready for this, use digital thermometers). Can also use analogue and digital thermometers so children can check their analogue readings. Children complete experiment in groups of 3s. Each child to do a version of the same experiment to give 3 results for the same test. Provide different sugar grain sizes (e.g. cubes, icing sugar, granulated, demerara) Provide mid temp water (around 50/60 degrees), cold water and hot water for temp group (around 80 degrees – risk assessment)	Results chart with 3 results per group per experiment e.g. Experiment / Person A / Person B / Person C Icing sugar / 21 secs / 13 secs / 18 secs Granulated sugar / 45 secs / 51 secs / 62 secs Demerara sugar / 83 secs / 82 secs / 78 secs

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson		9		3, 4, 5		1, 2, 7, 10, 11

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	3	2, 3	4, 7	5	5	6, 9, 11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
5	• How can I dissolve my sugar in the quickest possible time? • Children can record 3 sets of data and suggest why they might be different. They would keep the median result. • Children can choose which type of graph to use to represent data and explain the advantages of this choice • Children can make causal statements from their data (e.g. the ……. the surroundings, the ……. the chocolate melted).	Starter: Stringy patterns Look at data from previous session. Evaluate whether group results are the same for each person and if not, why not? Why do scientists repeat tests? Which of the 3 results should you use (use mean in Y6 – just use the median/middle result here). What do the results show? What would be the best graph to use to show your results. Use J2data to plot graphs Use the resulting graph to draw a conclusion to the answer to your question. Write a causal statement in book e.g. The bigger the sugar particles, the slower it takes to dissolve.	Graph of results Causal statement that answers their question **Assessment opportunity 2**
6	How can I dissolve my sugar in the quickest possible time? Presentation skills	Scientists work with each other from all over the world. They need to share their data with others. Children compare their data with children in the class who tested different independent variables. Can they make a 'super instructions' to make the quickest sugar dissolving time? How will they present it? Work in their groups to present their work (could be a poster, video, drama…)	Presentation to share their science findings. **Assessment opportunity 2**

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson		9		3, 4, 5		1, 2, 7, 10, 11

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	3	2, 3	4, 7	5	5	6, 9, 11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
7&8 – long lesson	Can I separate salt and sand? Children use filter paper correctly	What have we learned about salt and sand. How do they behave in water? Can we use this knowledge to separate salt and sand. Teach how to use filter paper. Check if this needs to be a fair test (it doesn't). **Use a small amount of water to mix with the salt and sand.** Whilst the sand and salt solution are filtering, discuss if we can get the salt out of the solution. Draw on Y4 knowledge of evaporation. How could we do this? Set up equipment to evaporate the salt solution. You could also leave some salt solution on the window sill to compare what happens. Risk assessment.	Labelled diagram of equipment and brief explanation of how you separated the salt and sand. Follow up question – could you use the same method for salt and sugar, sugar and sand, sand and flour?
9	Can I get my material back? Children can use results from investigations to answer their questions. Their conclusions are consistent with their results	When we mixed the salt and water it was a reversible reaction. Are all reactions reversible? What about burning items? Risk assessment Give children: paper, lolly pop stick (3rd of), dead leaf, twig. Compare how these burn. Check speed, ease to light, ease to put out. What do these have in common? Give the children: cotton wool, wool fabric, acrylic yarn, polyester (or similar). Display material burning flow chart to see if children can use their observations to identify the fabrics. Do children think they could get the materials back again? Burning is irreversible – it uses oxygen to combine with the material and produces new chemicals, including carbon.	Observations of different materials burning. **Assessment opportunity 2 and 3**
10	Carousel of different irreversible reactions	Making butter – shaking double cream in an air-tight container Making bath bombs Making sherbet Tasting popping candy Making slime – PVA glue and 'slime mix' or cornflour slime Rusting nails/dirty 1p coins and cleaning in coke Plaster of Paris with water (heat shows reaction) Vinegar and bicarb to fill a balloon	Floor book photos **Assessment opportunity 3**

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson		9		3, 4, 5		1, 2, 7, 10, 11

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	3	2, 3	4, 7	5	5	6, 9, 11

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
11	Can you identify these powders? Children can use results from investigations to answer their questions. Their conclusions are consistent with their results.	Starter: Watch this video on caramelising sugar (the sugar initially melts (reversible) but then caramelises (burns – irreversible). Why did she use a metal spoon? Would this work with salt on the top? What are acids and alkalis? Acids and alkalis react with each other to produce carbon dioxide. Last lesson we saw vinegar (acid) and bicarb (alkali) react. What are other household acids (lemon juice, fizzy drinks). What would happen if we added bicarb to lemonade? What would happen if we added citric acid powder to lemonade? Demonstrate. Give the children 3 out of 5 possible white powders to identify: Tell the children that they can use water and vinegar (or lemonade) to help them identify the powders. Ask them to think about what would happen to each of the powders if they were mixed with water or vinegar/lemonade. How could that help them identify them? 5 powders are: sugar, salt, flour, bicarbonate of soda, citric acid. Give children sugar, bicarb and flour. Bicarb and flour will be easy to identify. Sugar will be harder. If it is citric acid it will react with the bicarb solution. To differentiate between salt and sugar they could taste (not a good idea in a science lab with unidentified solid) or heat (teacher demo not for kids to do) (link to starter).	Identified solids with logical progression in their books. Assessment opportunity 3
12			
13			

Year 6 Term 3 – Classification

National Curriculum Objectives

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics

Context + Outcome

This follows on from Y4 where children have classified ocean animals as the 5 different vertebrates, crustaceans, insects and arachnids. Children have used and created branching databases. They are extended in this unit by also using dichotomous keys, Carroll diagrams and Venn diagrams. Children research the work of Carl Linnaeus and understand why scientists classify living things.

Sticky Year 6 knowledge

- Living things can be divided into animals, plants, micro-organisms and fungi
- Animals can be subdivided into vertebrates and invertebrates.
- Know the features of different vertebrate groups and use this to classify them.
- That classification can be used to help scientists solve real issues around conservation.
- That micro-organisms can cause disease and how we can protect ourselves.

Key vocabulary

- vertebrate, invertebrate
- mammal, bird, fish, reptile, amphibian
- crustacean, insect, arachnid

Common misconceptions

- All micro-organisms are bad
- Vaccines give you autism

Focussed progression of skills

PLAN	DO	RECORD	REVIEW
• Children ask questions in different forms (e.g. what will happen to X if I change Y, which is the best…, how do these compare?) • Children can identify possible dependant variables and justify their choice of measurement	• Children can research using a limited number of given websites/resources • Children can use a dichotomous key to identify living things	• Children can make a branching database manually • Children draw detailed and labelled observational drawings	• Children understand that science understanding often changes due to new evidence being found

Assessment opportunities

1. Children can research different living things and make detailed observations and use that information to classify them.
2. Children can identify living things by using classification keys.
3. Children understand that some micro-organisms are helpful and some aren't and can describe some ways that humans can protect themselves against disease.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	8	1, 4-7	2, 3	9, 10		11, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	8 - 10		1, 2 -4, 7	5, 6	11	12

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
1	Why is classification important? Skill: To observe carefully and explain in detail, asking clarifying questions.	Have you ever…been blackberry picking? How did you know what the berries were? Have you picked any other foods in the wild before. You may have picked foods at a pick your own. Did you know that you can cook a whole meal by foraging food from the wild? Some foods in the wild are poisonous (toxic) and could cause skin irritations, stomach aches and, in some cases, death. One child expert to two 'foragers'. Experts have pictorial identification sheet, foragers have picture of one of the berries. Foragers and experts can not look at each other's sheets. Foragers describe their berries, experts give them the identifying number. Foragers look up what the number is and decide whether to eat the berry.	Floor book comments. Assessment opportunity 2
2	Who created the classification charts that we use today? Skill: Children can research using a limited number of given websites/resources	Elicitation: Give children framework of an animals classification chart. Blank out some of the words (e.g. vertebrate, mammals, amphibians, insects, arachnids…) Can either give children the missing words and ask them to put in correct place or ask them to remember the words. Note children are not expected to know all the different invertebrates but they should know arachnids, crustaceans and insects are invertebrates. Introduce Carl Linnaeus – a botanist and zoologist from the mid 1700s. Children need to know that he separated living things into different sections but do not need to remember the terminology (order, class etc). Children research using these given websites: Mensa – lesson 2 section and Kiddle. Give children guidance on what to find out.	Individual research/answers to questions on Carl Linneus.
3	Can you classify some unknown animals? Skill: Children can research using a limited number of given websites/resources	Look at classification of polar bear from this website. What would we need to know about an animal before we could classify it? Show a list of ideas (backbone, cold-blooded, live birth, feeds young with milk, eggs, endoskeleton, fur, size, diet…) Possible research websites: SanDiego zoo, Kiddle encyclopedia, National Geographic Children research a given animal and complete the Top Trumps card for it. Plenary – bingo. Children on table with their animal info. Teacher read a description of a classification – if children think they have an animal that fits, they can add it to their bingo board.	Top Trump cards in floor book. Assessment opportunity 1

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	8	1, 4-7	2, 3	9, 10		11, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	8 - 10		1, 2 -4, 7	5, 6	11	12

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
4	Can I follow a key to identify an animal? Skill: Children can use a dichotomous key to identify living things	Starter: Children use keys in different forms (branching, Venn Diagram, Carroll) to identify different animals and to answer questions.	Identifying animals. Assessment opportunity 2
5 & 6	Create a key to identify penguins. Skills: Children draw detailed and labelled observational drawings Children can make a branching database manually	Starter: There are 18 species of penguins. To help others identify them, you need to concentrate on the details. Give children a sheet with 6-12 penguin species on. Children label the penguins with their distinguishable features. Use these to create questions to separate the penguins.	A key to identify their penguins. Assessment opportunity 1
7	How are scientists using classification now? Skill: making careful observations	Starter: Introduce Zooniverse penguin watch. Scientists have noticed that penguin numbers are declining in some regions. They want to work out why this is by classifying the penguins and counting the number of chicks and eggs. They also look for predators. Today we are going to help these scientists. – children complete some of the penguin watch task.	Floor book comments, photos, screen shots.

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	8	1, 4-7	2, 3	9, 10		11, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	8 - 10		1, 2 -4, 7	5, 6	11	12

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
8	What are micro-organisms and where do we find them? Skill: Children ask questions in different forms	Starter: Green for Growth Explain have good and bad microorganisms. Bacteria, viruses, penicillin and yeast are all micro-organisms. We have millions in our body. Where do you think their might be a lot of germs/micro-organisms in the school? Micro-organisms can cause mould to grow. Going to wipe damp bread in different places around the school to compare how much mould grows over a period of time. Bread to go in sealed bags to prevent spread of mould.	Photos and comments in floor book
9	Does temperature affect the amount of gas produced by yeast? Skill: Children ask questions in different forms (e.g. what will happen to X if I change Y,	Starter: Have you ever made bread? Timelapse dough rising (or bring in some for the kids to watch over the lesson). Yeast is activated by water and warmth but what is the best temperature to activate the yeast? We could ask this question as Does increasing the temperature increase the amount of gas that yeast produces? How will we do this experiment? How can we measure how much gas is produced? Could set out some equipment (some useful, some not). Bottle with balloon on the top and measure the circumference of the balloon at different intervals. Children decide on title for experiment and how they are going to undertake the experiment. They might include a diagram of equipment and a results table.	Groups of 3 – experiment design.
10	Does temperature affect the amount of gas produced by yeast? Skill: Children can identify possible dependant variables and justify their choice of measurement	Conduct experiment.	Results tables - individual

Enquiry type	Observing over time	Identifying and classifying	Research	Fair and Comparative testing	Pattern seeking	Exploring/ Problem Solving
Lesson	8	1, 4-7	2, 3	9, 10		11, 12

Skills focus	Asking questions and planning enquiries	Setting up and doing enquiries	Observe and measure	Recording	Interpreting + communicating results	Evaluating
Lesson	8 - 10		1, 2 -4, 7	5, 6	11	12

Lesson	Purpose of lesson (incl key question)	Activity	Outcome
11	How is disease spread? Skill: Children can use results from investigations or research to answer their questions. Their conclusions are consistent with their results.	Starter – Milk and food colouring experiment (either demo or in small groups) Explain how the soap works by having different parts to the molecules. Discuss how germs are spread. During COVID the main advice was to wash hands. Teacher info. How does this link to the experiment that we did at the start? Could do sneezing demo (no recording of results – visual should be enough). Teacher info on bad microbes	Floor book comments and photos Assessment opportunity 3
12	How do vaccines work and why are they important? Skill: Children understand that science understanding often changes due to new evidence being found	Look at the bread – which place in school has the most germs? Role play the role of Edward Jenner in vaccines. (Guidance here) Could use script for the play or improvise. Also a document that explains the history. How did the COVID vaccine work. Scientists are always improving vaccines and medicines to make them as effective as possible.	Role play photos floor book Assessment opportunity 3