



Lower Key Stage 2 Science Progression of Knowledge & Skills Cycle B



BIG Ideas

1. There is a relationship between structure and function.
2. Living and non-living things can be grouped in a variety of ways.
3. Humans move through different stages of growth and development.
4. All matter on Earth exists in one of three states: solid, liquid, gas and the state of matter can change.
5. Living things have characteristics and requirements for life, growth and health.
6. Changing the movement of an object requires a net force (push or pull) to be acting on it.
7. Living things depend on each other and on the environment; humans can have both a positive and negative impact.
8. The diversity of organisms, living and extinct, is the result of evolution.
9. Energy makes things happen and can be seen by its effects; it can be transferred (but is not used up)
10. The movement of the Earth affects the seasons and times of day.

Working Scientifically

These are integrated throughout the Science curriculum and appear in the Progression of Knowledge and Skills for each unit.

(Formerly Year 3)

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

(Formerly Year 4)

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings

Vocabulary:

(Formerly Year 3)

Question, observe, test, identify, classify, answer, record, data, Venn diagram, chart, equipment, safety, measure

(Formerly Year 4)

analyse, bar chart, chart, classify, comparative test, conclusion, data, data logger, diagram, display, enquiry, equipment, evidence, explain, fair test, findings, gather, group, identify, key, measurement, note, observe, pattern, predict, present, process, question, record, relationship, results, secondary source, similarity, sort, standard unit, systematic, table, thermometer, value

States of Matter (Formerly Year 4)

BIG IDEA

1. There is a relationship between structure and function
2. Living and non-living things can be grouped in a variety of ways
4. All matter on earth exists in one of three states: solid, liquid, gas and the state of matter can change
9. Energy makes things happen and can be seen by its effects; it can be transferred (but is not used up)

Enquiry Questions:

1. How many states of matter are there?
2. Can temperature change the state of an object?
3. Can all liquids be frozen to become solids?
4. What are the stages of the water cycle?
5. Does temperature/location affect rates of evaporation?

Compare and group materials together, according to whether they are solids, liquids or gases

I know that everything that exists is called matter; mass is the amount of matter in an object.
I know that all matter on earth exists in one of three states: solid, liquid or gas; the particles in each object's behavior determines whether they are a solid, liquid or gas.
I know solids have a fixed shape and volume that can't be changed unless a force is exerted on them.
I know liquids flow to take the shape of the container they are in. They have a fixed volume. They can be poured.
I know gasses can fill up the container they are in and do not stay the same shape.
I know gas has weight and can escape from an unsealed container.

I can group and classify a variety of different materials according to whether they are a solid, liquid or gas.
I can present simple scientific definitions.

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)

I know that water can come in solid, liquid or gas form.
I know that temperature has an effect on substances; heating substances causes them to melt and this is called the melting point.
I know most liquids can be frozen to become solids.
I know that some substances freeze more quickly than others.

I can set up simple comparative and fair tests - explore the effect of temperature on some substances by investigating the temperature at which a range of solids change state and become liquids.
I can make systematic and careful observations and take accurate measurements using standard units, using a range of equipment: thermometers or data loggers to measure the temperature of melting points.
I can gather and record data in a table, using the correct unit of measure.
I can report on findings from enquiries in the form of a written conclusion.
I can use results to draw simple conclusions and raise further questions e.g. What further experiments could be done to explore the changing state of these items?
I can set up a simple practical enquiry, ensuring it is a fair test, to find out the answer to whether all liquids can change state to become a solid.
I can make careful observations of freezing over time.
I can choose an appropriate way to gather and record data to help in answering questions and draw simple conclusions.

Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

I know the four stages of the water cycle:
Warmth from the sun causes water to evaporate from rivers, oceans etc., rise and become water vapour (evaporation)
As the water rises, it cools, turning into liquid again. These water droplets form clouds. (condensation)
When the water droplets become too heavy, they fall from the sky (precipitation)
This water lands on the earth or in rivers, lakes and seas. Some flows back to the sea.
I know that warmer temperatures speed up the evaporation process - warmer temperatures lead to quicker evaporation.

I can create a model of the water cycle to understand how condensation forms.
 I can set up comparative and fair tests to determine the effect of temperature on rates of evaporation.
 I can make systematic and careful observations and take accurate measurements using standard units by measuring the amount of water in ml or the space taken up by the water in cm.
 I can gather and record data in a table and line graph to show changes over time.
 I can report on results by presenting them to the class.
 I can use results to draw simple conclusions.

Vocabulary:

states of matter, solid, liquid, gas, matter, mass, volume, particles, properties, changing state, melt, temperature, freeze, water vapour, melting point, freezing, freezing point, melt, melting point, condensation, evaporation, water cycle, precipitation, water vapour, condensation, evaporation

Plants (Formerly Year 3)

BIG IDEA 2. Living and non-living things can be grouped in a variety of ways

BIG IDEA 1. There is a relationship between structure and function

Enquiry Questions:

1. How Are Seeds Dispersed?
2. What Are the Main Functions of The Different Parts of a Flowering Plant?
3. How Do Plants Make Food and How Is Water Transported?
4. Do All Plants Need the Same Things to Stay Alive?
5. Why Does a Plant Need Flowers?

Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers

I know the main functions of different parts of a flowering plant, including roots, stems, leaves, flowers.
 I know that roots keep plants steady in the soil and root hairs absorb water and nutrients
 I can make systematic and careful observations and, where appropriate, use a range of equipment (e.g. microscope).
 I can set up simple practical enquiries, comparative and fair tests to find out how quickly the roots of a seed grow.
 I can use a ruler to take measurements.

Sc3/2.1b explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant

I know that plants are alive, and they need air, light, water, nutrients from the soil and room to grow to stay alive and grow.
 I know that plants need different amounts of these things to stay healthy.

I can set up a simple practical enquiry to explore the different requirements of plants to live and grow.
 I can set up a comparative test to see how plants in different situations grow.
 I can make systematic and careful observations of the plants each week for changes in condition.
 I can measure different changes e.g. height and number of leaves over time.
 I can report on their findings and draw simple conclusions.

Sc3/2.1c investigate the way in which water is transported within plants

I know that plants need water to make their own food.
 I know the function of a plant stem, leaves and roots in absorbing and transporting water.
 I can set up simple practical inquiries to show water transport through a stem, marking the changes on a jar.
 I can calculate the growth rate.
 I can report on findings from the enquiry and answer questions about it.

Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

I know that seeds can be dispersed in a variety of ways.
 I know that seeds are dispersed so that plants do not compete and become overcrowded.
 I know that the cycle from seed to plant to flower to seed is called a lifecycle.
 I know that pollination is when pollen is moved from plant to plant.
 I know the part that flowers play in pollination.

I can make systematic and careful observations of seeds to look for properties that will help us to understand how they are dispersed.
 I can sort seeds into groups according to the dispersal method.

I can set up simple practical inquiries to show water transport through a stem, marking the changes on a jar. I can calculate the growth rate. I can report on findings from the enquiry and answer questions about it. I can make systematic and careful observations of flowers, recording colours in a table. I can gather, record and present data in a graph that shows the frequency of different colours in the plants. I can use results to draw simple conclusions and make predictions e.g. which colours are most common and why might that be?
Vocabulary: seed, parent plant, dispersal, germination, roots, root hair, stem, leaves, flowers, function, nutrients, transport, absorb, root, root hairs, stem, tubes, trunk/branches, leaves, nutrient, drought, climate, flower, pollen, nectar, pollination, reproduce
Sound (Formerly Year 4)
BIG IDEA 9. Energy makes things happen and can be seen by its effects (light, sound, electricity). Energy can be transferred but is not used up.
Enquiry Questions: 1. How do we hear sounds? 2. What patterns can you find between the strength of vibrations and volume of a sound? 3. What happens to sound as the distance from the sound source increases? 4. What material provides the best insulation against sound? 5. How do the features of an object affect the pitch of the sound it makes?
Identify how sounds are made, associating some of them with something vibrating
I know that sounds are caused by vibrations: I can make careful observations about how we see, hear and feel sound (vibrations).
Recognise that vibrations from sounds travel through a medium to the ear
I know that sounds are caused by vibrations which travel as waves through solids, liquids or gases. I know that some materials absorb sound well e.g. materials with air/space in them as sound vibrations cannot move as quickly or easily through it. I can independently plan the method and create a results table for a comparative test. I can conduct a fair test. I can carry out an experiment three times to increase reliability.
Find patterns between the pitch of a sound and features of the object that produced it
I know that different objects produce sounds of different pitches - some objects make higher sounds, and some objects make lower sounds. When vibrations are quick, they produce high sounds and when vibrations are slow, they produce low sounds. I can use scientific language about pitch and sound waves to explain how to change the pitch of a sound. I can draw conclusions about what affects the pitch of a sound. I can create models of headphones to identify materials which act as the best insulators for sound. Scientists may create prototypes like these before creating a final product. I can find patterns between the pitch of a sound and features of the object that produced it.
Find patterns between the volume of a sound and the strength of the vibrations that produced it
I know that the volume of sound depends on the strength (size) of vibrations. Stronger vibrations make louder sounds. Weak vibrations make quieter sounds. I can set up a comparative test to identify how the strength of vibrations affect the volume of a sound. I can use data loggers with teacher support to measure the sound. I can use these results to draw simple conclusions, make links and identify patterns. I understand that there are science museums around the world which provide us with valuable learning opportunities. These museums conduct research but also share with us existing findings.
Recognise that sounds get fainter as the distance from the sound source increases
I know that sounds decrease in volume as they get further from the sound source because vibrations decrease as they travel through the medium. I can make systematic and careful measurements with a data logger. I can conduct a fair test with control variables.

Vocabulary: sound, sound wave, vibrate/vibrations, medium, energy, strength of vibration, volume, distance, decrease, sound source, properties (of materials), insulator, insulation, pitch, high pitch, low pitch
Living Things and Their Habitats (Formerly Year 4)
BIG IDEA 2. Living and non-living things can be grouped in a variety of ways 7. Living things depend on each other and on the environment; humans can have both a positive and negative impact
Enquiry Questions: - Is it helpful to group living things? - What types of animals live in the local area? - What is special about our local environment? - What dangers are posed to habitats and the environment? - How can we develop the local area to protect living things?
Recognise that living things can be grouped in a variety of ways
I know that animals can be grouped into vertebrate and invertebrate groups. I know that plants can be grouped into flowering and nonflowering groups. I can use careful observation to group living things according to their characteristics. I can reflect on why this is a process followed in the world of science.
Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
I know that classification diagrams can be used to group animals with similar characteristics. I know the names of invertebrates and vertebrates that can be found in the school grounds. I know the purpose of dichotomous keys (to help identify and classify living things). I can use classification diagrams to group living things according to their characteristics. I can use dichotomous keys to identify living things and draw conclusions about what they are. I can ensure that I leave habitats as they were found. I can use observation and tools such as magnifying glasses to identify living things.
Recognise that environments can change and that this can sometimes pose dangers to living things
I know that an environment is made up of natural and human-made features. I know that environments are dependent on different factors (natural and human). I know that humans can have a negative impact on the planet; know that humans can act to protect the planet. I know that the planet is under threat from climate change due to deforestation, urbanisation, pollution etc. I know that conservation is the protection and preservation of living things. I know that we can take positive action to aid conservation in our own localities. I can identify from observation and reading how environments change over time. I can produce a guide book to inform people about the local area and threats it faces. I can explain how scientists are often committed to protecting the planet from the danger posed by human behaviour. I can use research and findings from the scientific community to understand how humans are negatively impacting the planet. I can explore the local area, using knowledge of pollution and urbanisation to identify issues that need resolving. I can devise a plan of action to protect living things in the local area.
Vocabulary: classification, group, category, key, vertebrate, invertebrate (insect, arachnid, annelid, mollusc), flowering, nonflowering, spores, seed cones, dichotomous key, environment, surroundings, conditions, natural, human-made, urbanisation, deforestation, pollution, climate change, population, fossil fuels, natural disaster, human impact, endangered, extinct, Venn diagram, positive, negative, indifferent, impact, conservation, protect, manage
Rocks (Formerly Year 3)
BIG IDEA 2. Living and non-living things can be grouped in a variety of ways BIG IDEA 8. The diversity of organisms, living and extinct, is the result of evolution

Enquiry Questions: 1. What is Rock and How Can it be Grouped? 2. How Were Rocks Formed? 3. Why Are Different Rocks Suited for Different Purposes? 4. How Are Fossils Made? 5. What Is Soil and How Is It Made?	
Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties	
I know that rocks can be grouped based on their appearance and simple physical properties (how they feel). I know that rocks form in different ways (metamorphic, sedimentary and igneous) I know that different groups of rock have their own unique appearance and set of physical properties. I know that rocks have different properties, and these relate to how they are formed. I know that some rocks are permeable, and some rocks are impermeable. I know that some rocks are more durable than other rocks. I know that the things we use rocks for, relate to their differing properties. I can make careful observations of rocks using a hand lens or magnifying glass. I can classify rocks according to whether they have grains, crystals or layers I can use video to learn how rocks were formed. Record findings using simple scientific language, drawings and labelled diagrams. With support, I can carry out a comparative test to find out which rocks are permeable (absorb water) and which rocks are impermeable (do not absorb water). I can use a stopwatch or second hand on a clock to time the length the rocks are in the water. I can make careful observations. I can record findings using scientific language.	
Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock	
I know how fossils are formed (i.e. when things that have lived are trapped within rock). I can record findings using simple scientific language, drawings and labelled diagrams. I know there is a body of scientists who share work as Mary Anning did. I can create a model of a fossil to help understand the process of fossilisation	
Sc3/3.1c recognise that soils are made from rocks and organic matter.	
I know that soils are made from rocks and organic matter. I can make careful observations using hand lenses or magnifying glasses. I can set up a simple, comparative test. I can use a simple yes/no classification key to identify the soil samples.	
Vocabulary: rock, cliff, mountain, coarse grain, fine grain, crystal, layer, names of different rocks, metamorphic, sedimentary, igneous, grains, molten, magma, lava, crystals, pressure, permeable, impermeable, durable, sedimentary rock, fossil, palaeontologist, decay, sediment, fossilisation, sedimentary rock, earthworm, leaves, soil, organic matter	

Cycle B Assessment End Points	
States of Matter (Formerly Year 4)	
Knowledge	Skills
• I understand that all matter on earth exists in one of three states: solid, liquid or gas. • I understand how temperature effects substances, i.e. heating causes them to melt and this is called the melting point. • I understand that most liquids can be frozen to become solids but some freeze more quickly than others.	• I can explain how the particles in each object behave differently depending on whether they are a solid, liquid or gas. • I can carry out a simple investigation and use my results to draw simple conclusions and raise further questions. • I can set up a simple practical enquiry, ensuring it is a fair test, to find out the answer to whether all liquids can change state to become a solid.

• I understand the four distinct stages of the water cycle. • I understand that warmer temperatures speed up the process of evaporation.	• I can use precise vocabulary and models/diagrams to describe each stage of the water cycle. • With limited support, I can carry out a simple but accurate investigation.
Plants (Formerly Year 3)	
Knowledge	Skills
• I know that seeds can be dispersed in a variety of ways. • I know the main functions of different parts of a flowering plant, including roots, stems, leaves, flowers. • I know that plants need water to make their own food. • I know that plants need air, light, water, nutrients from the soil and room to grow to stay alive and grow. • I know that pollination is when pollen is moved from plant to plant, and can describe the part that flowers play in the pollination process.	• I can make systematic and careful observations of seeds to sort and classify them by their properties. • I can make systematic and careful observations to support their explanations of the basic structure of flowering plants. • I can use my observations to explain the function of a plant stem, leaves and roots in absorbing and transporting water. • I can set up a simple practical enquiry to explore the different requirements of plants to live and grow. • I can use my observations and data to draw simple conclusions and make sensible predictions.
Sound (Formerly Year 4)	
Knowledge	Skills
• I understand how vibrations from objects through the air allow us to be able to hear sound. • I understand how the volume of sound depends on the strength (size) of vibrations. • I understand why sound decreases in volume the further away it gets from the sound source. • I understand why some materials are better at absorbing sound than others. • I understand why different objects might produce sounds of different pitches.	• I can explain (using language linked to their senses) how sound can travel as waves through solids, liquids and gases. • I can use and apply my knowledge of sound, energy and vibrations to explain my results. • I can make sensible predictions about how sound travels drawing on what I already know. I can carry out a fair test. • I can work independently to conduct a fair comparative test and record the results. • I can use scientific language (e.g. pitch and sound wave) to explain what affects the pitch of a sound.
Living Things and Their Habitats (Formerly Year 4)	
Knowledge	Skills
• I know how to use classification diagrams to group animals and plants by their unique characteristics. • I know how to accurately use a dichotomous key to identify different animals in the local area. • I understand what is meant by an 'environment'. • I understand how humans can have a positive and negative impact on the environment. • I understand the term 'conversation' in the content of the local and wider environment.	• I can explain the benefits of using a classification system to sort living things. • I can explain how and/or why classification keys are a useful tool for scientists. • I can identify the different natural and human-made features in the local area. • I can explain how the planet is under threat from climate change due to deforestation, urbanisation and pollution. • I can use and apply what I have learned to make a positive change to the local area.

Rocks (Formerly Year 3)

Knowledge	Skills
• I can explain where rocks can be found and link this to the basic structure of planet Earth. • I know three types of rock formation and can describe their basic properties. • I know that different rocks have different properties, and this makes them suitable for different uses and purposes. • I know the process of fossilisation to explain how fossils are formed. • Can pupils explain how soil is made, including reference to taught vocabulary from the session (particles, organic matter, earthworms, microorganisms)?	• I can sort and group different rocks based on their appearance and simple physical properties. • I can use my learning from modelled demonstrations to aid their thinking and explanations about natural processes (i.e. the rock cycle). • I can carry out a reliable comparative test to classify different rocks by their properties. • I can connect fossilisation to the formation of sedimentary rocks. • I can use simple equipment to make careful observations to reliably classify different types of soil.