Year 4 Science Progression of Knowledge & Skills

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.

- **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:
analyse, bar change, 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

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:
1. Warmth from the sun causes water to evaporate from rivers, oceans etc., rise and become water vapour (evaporation)
2. As the water rises, it cools, turning into liquid again. These water droplets form clouds. (condensation)
3. When the water droplets become too heavy, they fall from the sky (precipitation)
4. 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

Electricity

BIG IDEA
2. Living and non-living things can be grouped in a variety of ways
9. Energy makes things happen and can be seen by its effects (light, sound, electricity); it can be transferred but is not used up

Enquiry Questions:

1. Where does electricity come from and what is it used for?
2. How can we light a bulb using a simple, series electrical circuit?
3. How does a simple switch work?
4. What material is the best conductor of electricity?
5. What components are needed to make a working circuit?

Identify common appliances that run on electricity

I know the precautions we should take for working safely with electricity.
I know where electricity comes from and how it is used.
I know common appliances that run on electricity.

I can make systematic and careful observations about how appliances convert electrical energy.
I can identify scientific evidence that has been used to support or refute ideas or arguments (Erik Bystrup).
I can explain how to be safe around electricity.
I can identify how science helps engineers improve the world around us.
I can sort devices according to whether they use mains or battery electricity.

Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers

I know how to construct a simple series circuit, identifying and naming its basic parts, including a cell, wire, bulb, bulb holder.
I know that a correctly built simple, series circuit creates a working device.

I can use scientific language and knowledge of circuits to design diagrams and create functional objects.

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

I know whether 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.

I can set up a simple, practical investigation – using all components to light a bulb.
I can verbally report on findings.
I can investigate questions e.g. does the order of the components matter?
I can us my knowledge and experience to form hypotheses and then test them out.

Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit

I know that a switch opens and closes a circuit and associate this with whether or not a bulb lights in a simple, series circuit.

I can use straightforward scientific evidence to answer questions e.g. how do switches work?

Recognise some common conductors and insulators, and associate metals with being good conductors

I know that some common conductors and insulators, and associate metals with being good conductors.

I can set up a comparative test to identify which materials make good electrical conductors and which make good electrical insulators.
I can use these results to draw simple conclusions, make links and identify patterns.
I can use what they know to make a prediction.
I can learn how scientists have explored, sought proof and used electricity (Benjamin Franklin) and how this has helped people (attracting lightning).
I can record the method and table I am going to use.
I can use findings to answer further questions, as scientists do.

Vocabulary:
appliance, mains electricity, battery, generated, power station, plug, plug socket, electrical energy, series circuit, component, bulb (lamp), bulb (lamp) holder, buzzer, cell, wire, crocodile clip, switch, electrical conductor, electrical insulator

Animals, including humans

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
5. Living things have characteristics and requirements for life, growth and health
7. Living things depend on each other and on the environment; humans can have both a positive and negative impact

Enquiry Questions:

1. Why do we have different shaped teeth?
2. What can we tell about an animal from looking at its teeth?
3. What happens to our food when we eat it?
4. Can models help us understand human processes?
5. Why are food chains important?

Describe the simple functions of the basic parts of the digestive system in humans

I know the simple functions of the basic parts of the digestive system in humans (mouth, tongue, teeth, oesophagus, stomach, and small and large intestine).

I can create a model of the stomach to see the properties a stomach needs if the capacity needs to increase.
I can set up a simple practical enquiry.
I can make systematic and careful observations.
I can report on findings from enquiries, including oral/written explanations.
I can create a model to show and explain a process (the digestive system).

Identify the different types of teeth in humans and their simple functions

I know the different types of teeth in humans (incisor, canine, molar, pre-molar) and their simple functions.
I know the types of teeth (incisor, canine, molar, pre-molar) in different animals (carnivore, herbivore, omnivore) and their simple functions.

I can collectively set up and monitor an experiment to see how different liquids affect our teeth.
I can set up simple practical enquiries, comparatives and fair tests (eggshells in different liquids but kept in same place).
I can collectively observe over time and draw conclusions.
I can recognise when and how secondary sources might help me to answer questions that cannot be answered through practical investigations.
I can make a judgement about an animal 's diet by looking at its teeth.

Construct and interpret a variety of food chains, identifying producers, predators and prey

I know how to construct and interpret a variety of food chains, identifying producers, predators and prey.
I know that food chains use arrows to show the movement of energy (food) through the food chain.

I can sort living things according to their role in a food chain and then according to their habitat.

Vocabulary:
teeth, incisors, molars, premolars, canines, revisit omnivore, herbivore and carnivore, adaptation, digestive system, mouth, tongue, oesophagus, stomach, small intestine, large intestine (NC); acids, nutrients, bloodstream, waste, rectum, anus, food chain, producer, primary/secondary/tertiary consumer, prey, predator, energy

Living things and their habitats

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:

1. Is it helpful to group living things?
2. What types of animals live in the local area?
3. What is special about our local environment?
4. What dangers are posed to habitats and the environment?
5. 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

Sound

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

Year 4 Assessment End Points

States of Matter

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 understand the four distinct stages of the water cycle. • I understand that warmer temperatures speed up the process of evaporation.	• 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 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.

Electricity

Knowledge	Skills
• I understand what precautions need to be taken with electricity (and why). • I know how to construct a simple series circuit, identifying and naming its basic parts, including a cell, wire, bulb, bulb holder. • I understand the function of a switch in a simple circuit. • I understand some common conductors and insulators, and associate metals with being good conductors. • I understand that a correctly built simple, series circuit creates a working device.	• I can explain how electricity is generated, distributed and converted. • I can set up a simple, practical inquiry and verbally report on findings. • I can identify changes related to simple scientific ideas, i.e. how a closed switch completes a circuit. • I can set up a comparative test and use their results to draw simple conclusions. • I can accurately record my findings using simple scientific language and drawings/labelled diagrams.

Animals, including Humans

Knowledge	Skills

• I know the name and functions of incisors, canines, premolars and molars. • I can use precise vocabulary to explain how specific teeth suit the diet requirements of different animals. • I understand the simple functions of the digestive system using precise vocabulary to describe each stage. • I know how to construct and interpret a variety of food chains, identifying producers, predators and prey.	• I can identify how a practical enquiry will help me to find out how to look after my teeth. • I can explain how secondary sources (e.g. photos) help scientists to answer questions. • I can identify the importance of taking careful measurements when representing a scientific process. • I can use and apply my knowledge to create simple working models and use these to report the process to others. • I can use models, such as food chains, to understand the natural world, including sustainability.
Living Things and their Habitats	
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.
Sound	
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.