Year 3
Science Curriculum

Whole-school definition of science

Science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments.

Year 3 Overview

Block 1	Physics: Light
Block 2	Chemistry and Earth Science: Rocks and Fossils
Block 3	Biology: Animals including humans
Block 4	Physics: Light
Block 5	Biology: Plants
Block 6	Physics: Forces and Magnets

Year 3 Working Scientifically

Revision
properties, observe, test, magnifying glass, object, record, equipment

- **Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science**
- **Know that we can use magnifying glasses to observe objects closely**
- **Know that we can test our questions to see if they are true**
- **Know that objects can be identified or sorted into groups based on their observable properties**
- **Know that we can write down numbers and words or draw pictures to record what we find**

New learning and vocabulary
prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

- **Know that we can ask questions and answer them by setting up scientific enquiries**
- **Know how to make relevant predictions that will be tested in a scientific enquiry**
- **Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same**
- **Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches**
- **Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table**
- **Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion**
- **Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry**
- **Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true**
- **Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry**
- **Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)**
- **Know that they can draw conclusions from the findings of other scientists**
- **Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry**

Year 3 Working Scientifically

- Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them
- Sc4/1.2 setting up simple practical enquiries, comparative and fair tests
- Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes
- Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.

THE BIG IDEAS OF SCIENCE

Physics
P1: The universe follows unbreakable rules that are all about forces, matter and energy.
P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.
P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Chemistry
C1: All matter (stuff) in the universe is made up of tiny building blocks.
C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).
C3: Matter can change if the arrangement of these building blocks changes.

Biology
B1: Living things are special collections of matter that make copies of themselves, use energy and grow.
B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.
B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

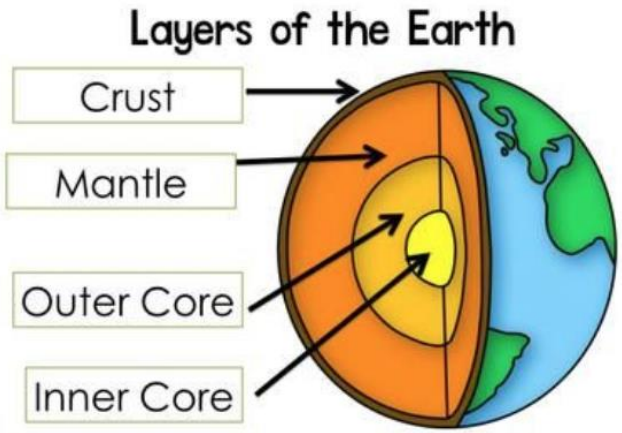
Earth science
E1: The Earth is one of eight planets that orbit the sun.
E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.
E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

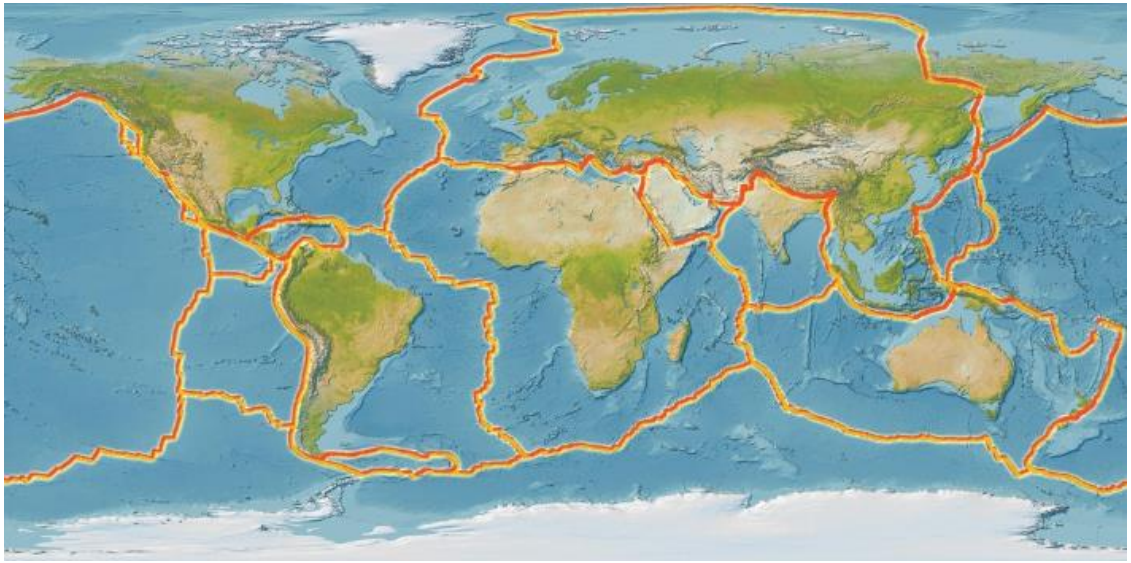
Block 1
Physics
Light

Year 3 Block 1 Light Big Idea(s): P1, P3	**Retrieval vocab:** absorption, energy, property, reflection **New vocab:** wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger (NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)
	Composites: I can describe what light is and why we need it
Week 1 (retrieval)	• **Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments** • **Know that light is a form of energy**
Week 2	• **Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another**
Week 3	• **Know that we need light to see things and that darkness is the absence of light**
Week 4	• **Know that light travels in straight lines**
Week 5	• **Know that light is reflected when it travels from a light source and then 'bounces' off an object**
Week 6	• **Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes**

Block 2
Chemistry and Earth Science
Rocks and Fossils

Year 3 Block 2 Rocks and Fossils Big Idea(s): C1, C2, C3, E3	**Retrieval vocab:** decay, matter, melting, material, **New vocab:** extinction, particle, igneous, metamorphic, sedimentary, paleontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil How has Zhang Heng's creation helped the world?
	Composites: I can group and compare rocks, I can describe how fossils are formed, I can explain how soil is made
Week 1	• **Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments (retrieval)** • **Know that rock is a type of solid material. (Retrieval)** • **Know that applying forces to objects can change their shape, by squeezing, stretching, bending and twisting (retrieval)** • **Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath (see diagram below)**
Week 2 **Week 3**	• **Know that there are three kinds of rocks: igneous, sedimentary and metamorphic** • Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust • Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers • Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other
Week 4	• Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there • **Know that fossils can help us learn about things that lived long ago**
Week 5	• **Know that soil is made from tiny particles of rock broken down by the action of weather (weathering)**
Week 6	• Know that Zhang Heng was a genius in many areas: he was a scientist, mathematician, poet, inventor and artist • Know that Zhang Heng invented the world's first seismoscope that was able to detect where and when earthquakes had happened (when the Earth's tectonic plates suddenly shift causing massive vibrations


Layers of the Earth
Crust
Mantle
Outer Core
Inner Core



Block 3
Biology
Animals including humans

Year 3 Block 3 Plants and Animals Big Idea(s): B1, B2, B3	**Retrieval vocab:** component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton **New vocab:** extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, rib cage, insect Each person is unique and irreplicable All things are connected
	Composites: I can identify that animals, including humans, need the right types and amount of nutrition, I can identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Week 1 (retrieval)	• **Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments.** • **Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)** • **Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet**
Week 2 (retrieval)	• **Know that lack of a nutrient can cause ill health**; for example, a lack of vitamin D leads to a disease called rickets
Week 3	• **Know that animals, including humans, have a skeleton made up of solid objects** • **Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body** • **Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which acts like a skeleton**
Week 4	• **Know that skeletons provide support for muscles and protect the body; for example, the rib cage protects the vital organs in the human body** • **Know that human skeletons are made up of bones and cartilage** • **Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens**

Week 5	• **Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar** *NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area* • **Know that excess fat from fatty foods such as butter and cheese - and created in the body from excess calories – builds up in the body and can cause obesity** • **Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones**
Week 6	• Know that there are many kinds of jobs as a scientist including communicator scientist, teacher scientist, technician scientist, explorer scientist, entrepreneur scientist and regulator scientist • Know that entrepreneur scientists are people who use things learned in science to start new businesses and make money • Know that regulator scientists use science to make sure things that people use are reliable and safe

Block 4
Physics
Light

Year 3 Block 4 Light Big Idea(s): P1, P3	**Retrieval vocab:** absorption, energy, property, reflection **New vocab:** wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger
	I can describe what light is and why we need it I can describe how shadows are formed
Week 1	• **Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun** • **Know that many light sources give off light and heat** • Know that the Sun gives off light and heat when hydrogen turns into helium
Week 2	• Know that filaments in traditional bulbs heat up until they glow, giving off light and heat • Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb
Week 3	• **Know that opaque objects block light creating shadows and that light passes easily through transparent objects** • **Know that opacity/transparency and reflectiveness are properties of a material** • **Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes**
Week 4	• **Know that as objects move towards a light source, the size of the shadow increases** • **Know how to show the changing of shadow size by drawing a diagram with straight lines representing light**
Week 5	• Know that a data logger can keep track of light levels and that this can be plotted on a graph to show how this changes over the course of a day
Week 6	• **Know that Hasan Ibn al-Haytham - sometimes known as Alhazen - was a scientist and mathematician during early Islamic civilisation** • **Know that al-Haytham was the first to explain that we see objects because light reflects from objects into our eyes** • **Know that al-Haytham was an early pioneer of the scientific method which used evidence to find things out about the world**

Block 5
Biology
Plants

<table>
<tr><td rowspan="2">Year 3 Block 5
Plants and Animals
Big Idea(s): B1, B2, B3</td><td>Retrieval vocab: component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton

New vocab: extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect
Stewards of Gods world, Option for the ppor and vunerable – GMO crops Stewardship every body’s need not everybody’s greed</td></tr>
<tr><td>Composites:I know what plants need to live and grow well, I can identify and describe the functions of different parts of flowering plants I can describe and investigate the way in which water is transported within plants, I can describe the life cycle of flowering plants</td></tr>
<tr><td>Week 1
(retrieval)</td><td rowspan="2">Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments
Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn
Know that flowering plants consist of roots, stem, leaves and flowers, and that a tree’s stem is called a trunk
Know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things.
Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.
Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)
Know that the arrows on a food chain show the direction that the energy travels.
Know that plants that are deprived of light, food or air will not grow and will die.
Know that animals, including humans, need food, water and air to survive
Know that there are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods
Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables
Know that fats and sugary foods should be eaten rarely and in small amounts</td></tr>
<tr><td>Week 2
(retrieval)</td></tr>
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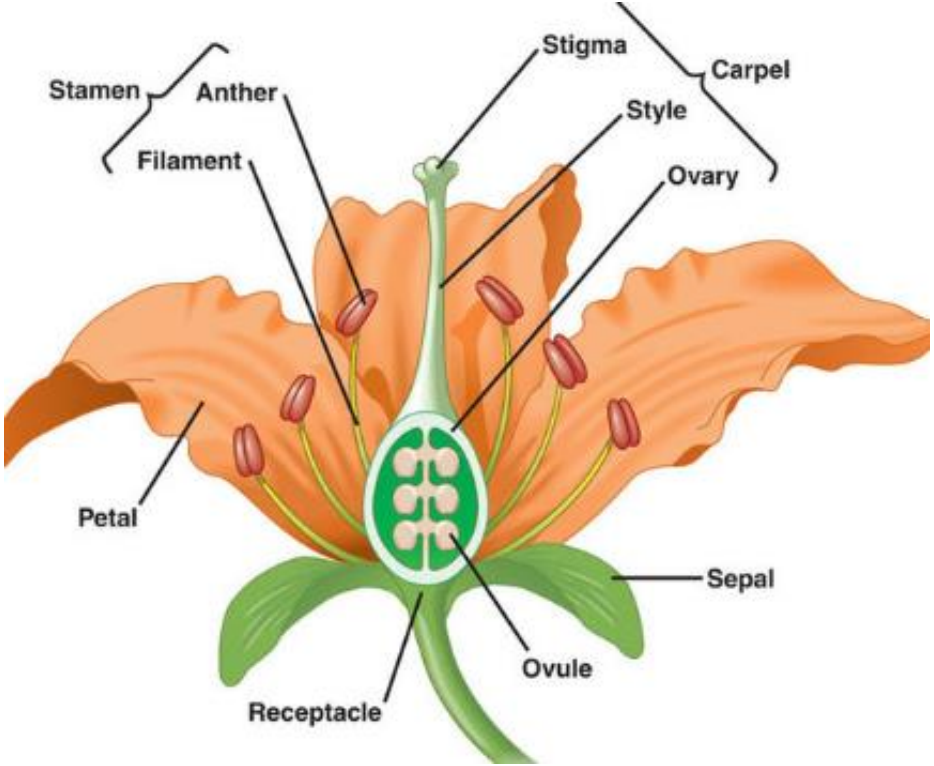
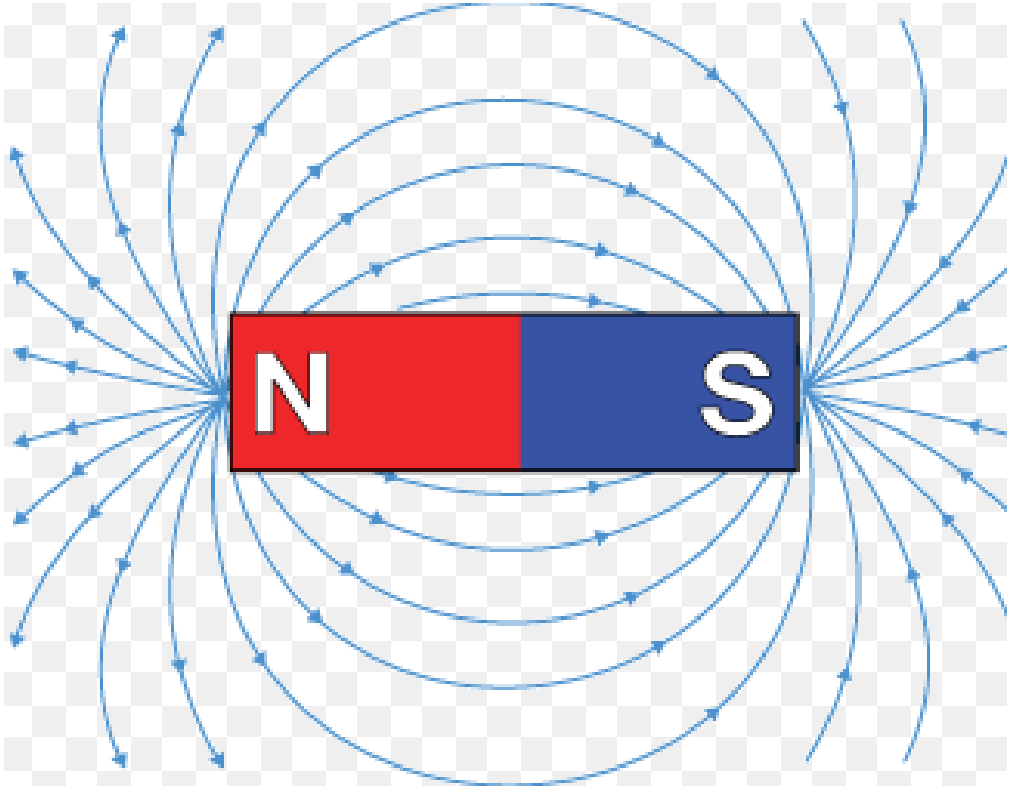
Week 3 **Week 4** **Week 5**	• **Know that different parts of plants have one or more functions (jobs)** • **Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground** • **Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant** • **Know that the leaves make food by absorbing light and using its energy to turn carbon dioxide and water into carbohydrates**
Week 6	• **Know that the function of a flower is reproduction**, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal (see diagram below)


Stamen
Anther
Filament
Stigma
Style
Carpel
Ovary
Petal
Sepal
Ovule
Receptacle

Block 6
Physics
Forces and Magnets

Year 3 Block 6 Forces and Magnets Big Idea(s): P2	**Retrieval vocab:** energy, matter, property, wave, metal, material, surface, friction, force, stretch, squash, rough, smooth **New vocab:** magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion
	Composites: I can compare how objects move on different surfaces, I can describe how magnets attract and repel materials , I can describe the poles of magnets
Week 1 (retrieval)	• **Know that science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments** • **Know that metal is a material from which objects can be made** • **Know that as objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller** • **Know that applying forces to objects can change their shape** • **Know that the roughness of a material is an example of a propert**y
Week 2	• **Know that a force can be thought of as a push or a pull** • **Know that there are different types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed)**
Week 3	• **Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves**
Week 4 **Week 5**	• **Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force** • **Know that magnets have two poles called north and south** • **Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other** • Know that there is a magnetic field around a magnet which is strongest at each pole (see diagram below)
Week 6	• **Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic**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Working Scientifically: Enquiries

Area of Science	Small Question	Enquiry	Big Idea(s)	Enquiry Type	Working Scientifically Skill
Light	Does the amount of light we experience only change a lot at night?	Using '**Lux'** ipad app, chn gather data on light levels over the period of an hour and over the period of 24 hours. Chn interpret the gathered data.	**P3:** Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (In this case, the rule is that light energy travels in straight lines and doesn't pass through some objects.)	Observing over time	Sc4/1.3, Sc4/1.4, Sc4/1.5 **Sc4/1.6 (Enquiry write up), Sc4/1.7 (Enquiry write up),** Sc4/1.8, Sc4/1.9
Light	Why do shadows change during the day?	On a sunny day, using a metre stick, chn note the changing length of a shadow thrown by a metre stick or other object.	**E2:** The Earth spins on its axis. **P3:** Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it. (In this case, the rule is that light energy travels in straight lines and doesn't pass through some objects.)	Observing over time	Sc4/1.1, Sc4/1.2, Sc4/1.3, Sc4/1.4, Sc4/1.5, Sc4/1.9
Rocks and Fossils	Are all rocks made in the same way?	Using criteria, chn sort rock samples (and pictures) into the three types.	**C1, C2:** All matter (stuff) in the universe is made up of tiny building blocks. Matter can change if the arrangement of these building blocks changes.	Grouping and classifying	Sc4/1.4, Sc4/1.8
Forces and Magnets	Are all metals attracted to magnets?	Chn sort materials into magnetic and non-magnetic materials using a magnet and find other materials around the room that	**P2:** Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. (Magnets can exert a force.)	Grouping and classifying	Sc4/1.2, Sc4/1.4, Sc4/1.7, Sc4/1.8, Sc4/1.9
Plants and Animals	Do all plants need exactly the same things?	Chn give both a parsley plant and a small cactus minimal water over a two week period and observe the changes (perhaps drawing the result)	**B3:** The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.	Observing over time Comparative test	Sc4/1.1, Sc4/1.2, Sc4/1.4, Sc4/1.5, **Sc4/1.6 (Enquiry write up), Sc4/1.7 (Enquiry write up),** Sc4/1.9
Plants and animals	How does our body move and stand up?	Chn use information from science encyclopaedias / textbooks to label a human skeleton and answer simple questions about it.	**B3:** The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live	finding out things from secondary sources	Sc4/1.5