Barton Hill Academy

Science Booklet 2023-24

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS 1	All about me	Family and festivals	Traditional tales	Transport past and present	Growing and changing	Dinosaurs
EYFS 2	All about me	Light and dark	Winter –ice polar lands	Minibeasts	Fantasy and fairies	Pirates and under the sea
Year 1	Seasonal Change 1	Classification of Animals	Everyday Materials	Animals – Knowing seen parts of human body	Plants	Season Change 2
Year 2	Living things and their habitats	Humans – Healthy living	Materials and their everyday uses	Materials and their everyday uses	Plants 1 (plant bulbs in Autumn)	Plants 2
Year 3	Skeletons and muscles	Rocks and soils	Forces and magnets	Plants	Plants	Light and dark
Year 4	Sound	Digestive system and teeth	Assess and review	Electricity	States of matter	Classification of animals
Year 5	Reversible and irreversible changes	Assess and review Forces	Earth and Space	Assess and review	Life cycles of plants and animals	Human life cycles
Year 6	Classification of all living things	Evolution and inheritance	Light	Electricity	Assess and review	Heart and the circulatory system

Substantive (Science) Knowledge: Year 1

Biology			Chemistry	Physics
Animals, including Humans	**Animals, including Humans**	**Plants**	**Everyday Materials**	**Seasonal Change**
• *Name common animals* • *Carnivores, etc*	• *Human body and senses*	• *Common plants* • *Plant structure*	• *Properties of materials* • *Grouping materials*	• *The four seasons* • *Seasonal weather*
• Know how to classify a range of animals by amphibian, reptile, mammal, fish and birds • Know and classify animals by what they eat (carnivore, herbivore and omnivore) • Know how to sort by living and non living things	• Know the name of parts of the human body that can be seen • Know which part of the body associated with each of the five senses.	• Know and name a variety of common wild and garden plants • Know and name the petals, stem, leaves and root of a plant • Know and name the roots, trunk, branches and leaves of a tree	• Know the name of the materials an object is made from • Know about the properties of everyday materials	• Name the seasons and know about the type of weather associated with each season • Know the main months associated with each season

Working Scientifically: Year 1

Animals, including Humans	**Animals, including Humans**	**Plants**	**Everyday Materials**	**Seasonal Change**
Research using secondary sources • Research animals that live in a particular habitat **Grouping and Classifying** • Group/ classify animals according to what they eat	**Pattern seeking** • Height and weight changes as we get older	**Observations over time** • Changes to plants/ trees as they grow or in different seasons **Grouping and Classifying** • Identify local trees and plants	**Comparative and Fair tests** • Compare the suitability of everyday materials for a specific job, e.g., keeping us warm **Grouping and Classifying** • Identify different materials based on their properties	**Observation over time** • Changes in temperature throughout the year • Changes in rainfall throughout the year **Pattern seeking** • Length of daylight throughout the year • Leaf colour and fall and different stages

Barton Hill Academy

Science Progression 2023-24

Year 1

Long-term overview for SCIENCE

YEAR 1

Biology
- The first in a range of learning about classifying animals which is picked up again in Year 2

How are animals classified?

What are the main differences between carnivore, omnivore and herbivore?

How can we identify reptiles, mammals and amphibians?

What are the birds in our locality called?

How do we sort according to living and not living?

Science Knowledge	Working Scientifically
• Know how to classify a range of animals by amphibian, reptile, mammal, fish and birds • Know and classify animals by what they eat (carnivore, herbivore and omnivore) • Know how to sort by living and non living things	**Research using secondary sources** • Research animals that live in a particular habitat **Grouping and Classifying** • Group/ classify animals according to what they eat

Knowledge Organiser

Years 1

Subject: Science **Main Learning: Animals**

Key knowledge
Know how to classify a range of animals
Know the difference between carnivore, omnivore and herbivore
Know the difference between a mammal, reptile and amphibian
Know how to classify by living, non living and never alive
Know the names of some common birds
Begin to know why certain animals live in certain areas

Vocabulary	
amphibians	All begin their life in water with gills and tails. Examples are frogs and newts
reptiles	Are animals that are cold-blooded. Most lay eggs and their skin is covered with hard, dry scales
mammals	Are also warm blooded animals. They breath air and have a backbone
herbivore	A herbivore eats only plants
carnivore	Is a meat-eating animal that gets its food from killing other animals
omnivore	Eats plants and meat

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 1

Biology

- The first unit related to the human body. There is an unit related to the human body in each year from Y1 to Y6.
- Children will have used rhymes and songs in EYFS which relate to body parts, etc..

What are our seen body parts called and what do we mean by the five senses?

What are the names of the seen parts of the human body?

What are the names of the five senses?

Science Knowledge	Working Scientifically
• Know the name of parts of the human body that can be seen • Know about the five senses.	**Pattern seeking** • Height and weight changes as we get older

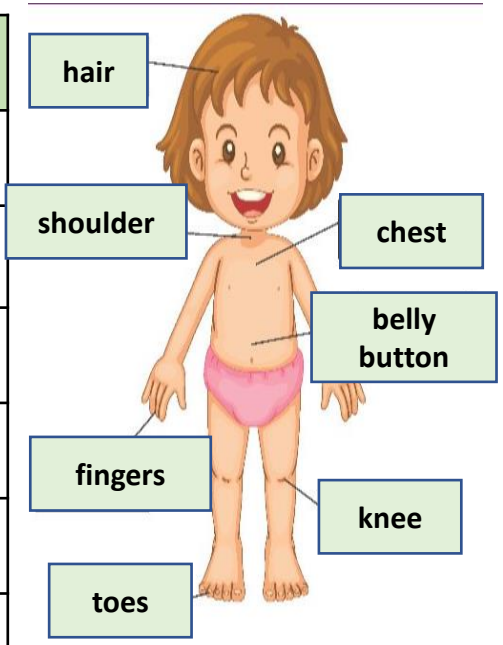
Knowledge Organiser

Years 1

Subject: Science **Main Learning: Parts of the Human Body**

Key knowledge
Know the names of the seen parts of the human body
Know the names of all seen body parts above the shoulders
Know the names of the seen body parts below the shoulders and above the legs
Know the names of all seen body parts below the hips
Know what the five senses are
Know what each of our senses does

Vocabulary	
toes	The digits at the end of our feet
fingers	The digits at the end of our fingers
touch	The sensation you get when you Brush against something
hearing	The sound made by anything around
taste	The sensation you get when you eat
chest	The part of the body below the neck and shoulders and between the arms



Prior Knowledge –

Long-term overview for SCIENCE

YEAR 1

Biology
- The first unit related to plants which is picked up again in Years 2 and 3.
- Children will have grown plants and talked about them in EYFS.

What are the names of the different parts of plants?

What are the names of the main parts of plants, including roots, stem, leaf and petal?

What part does each part of a plant plays in keeping a plant healthy?

How many wild and garden flowers do you recognise?

What are the main parts of a tree called?

How many birds can you recognise?

Science Knowledge	Working Scientifically
• Know and name a variety of common wild and garden plants • Know and name the petals, stem, leaves and root of a plant • Know and name the roots, trunk, branches and leaves of a tree	**Observations over time** • Changes to plants/ trees as they grow or in different seasons **Grouping and Classifying** • Identify local trees and plants

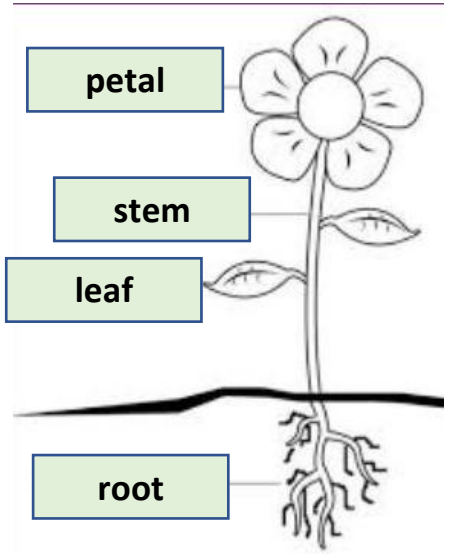
Knowledge Organiser

Years 1

Subject: Science **Main Learning: Plants**

Key knowledge
Know the names of parts of a plant
Know the names of a variety of common wild and garden plants
Know the name of the different parts of a plant, including stem, root, petal and flower
Know the difference between deciduous and evergreen trees
Know the names of a variety of common trees
Know the names of some of the plants that grow in the local environment

Vocabulary	
deciduous	Is the name given to trees that lose their leaves in autumn and are bare in the winter
evergreen	Is the name of trees that have leaves all year round
environment	The area where a plant or tree lives and thrives
blossom	Is the flower that comes before the fruit. For example, apple blossom comes before the apple starts to grow
petals	Is a part of the flower and is usually coloured. The colour attracts insects.
root	Is the part of the plant that is beneath the ground. It gives the plant food and keeps it steady



SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 1

Chemistry

- The first unit related to materials which is built upon in Year 2.
- In EYFS children will have become familiar with using many different materials which includes naming them.

What are the materials that are around us called?

What are the names of the materials that we see around the school?

Why do we use different materials to build a house?

Which materials keep us dry?

Which materials keep us warm?

Science Knowledge	Working Scientifically
• Know the name of the materials an object is made from • Know about the properties of everyday materials	**Comparative and Fair tests** • Compare the suitability of everyday materials for a specific job, e.g., keeping us warm **Grouping and Classifying** • Identify different materials based on their properties

Knowledge Organiser

Years 1

Subject: Science **Main Learning: Materials**

Key knowledge
Know the names and uses of some common materials
Know that there are many different types of materials
Know the names of many types of materials
Know what we use glass, wood and bricks for
Know that plastics are easy to bend
Know that some materials are not useful for certain things

Vocabulary	
plastic	A ‘man-made’ material that can be shaped or moulded to any shape
stretch	A material that is like elastic
stiff	A material that is firm and hard and not flexible
metal	Are usually tough and strong material and can be heated and shaped into anything
liquid	Can flow and take on the shape of their container
gas	We can’t see it, but it is all around us

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 1

Physics
- The only physics unit in Key Stage 1
- Children will have done quite a lot of seasons in EYFS (Understanding the world)

How do seasons change?

Why do we have seasons and what are the months associated with each?

Why do so many people love the spring

What do we know about the summer?

Why are there so many leaves on the floor in autumn?

Science Knowledge	Working Scientifically
• Know the name of the seasons • Know about the weather associated with each season • Know the months within each season	**Observation over time** • Changes in temperature throughout the year • Changes in rainfall throughout the year **Pattern seeking** • Length of daylight throughout the year • Leaf colour and fall and different stages

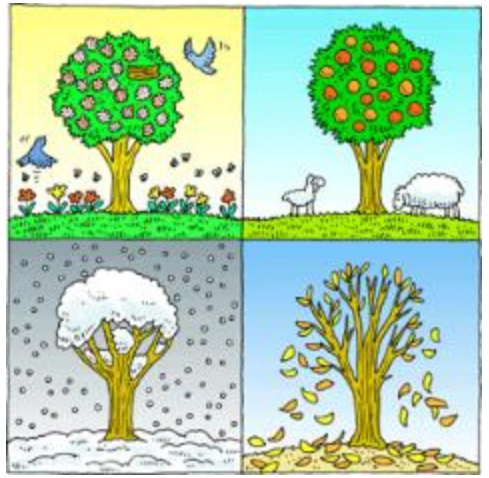
Knowledge Organiser

Years 1

Subject: Science **Main Learning: Season Change**

Key knowledge
Know the main differences between the four seasons
Know the names of the four seasons
Know the type of weather normally associated with the four seasons
Know that we have longest periods of light in summer and shortest periods of light in winter
Know that different parts of the world have their summer and winter at different times to us
Know that the temperature varies during the different seasons

Vocabulary	
Autumn	The time of year between September and November. Many leaves fall off the trees
Winter	The coldest season in the UK. We often have snow in this season. It occurs between December and February
Spring	The time of year between March and May. There is usually lots of signs of new growth in Spring
Summer	The hottest season in the UK. It happens between June and August. The longest day is June 21st
temperature	It is measurement of hot or cold that can be calculated using a thermometer
weather symbol 	These are signs used to help us understand more about our daily weather



Prior Knowledge –

Barton Hill Academy

Science Progression 2023-24

Year 2

Substantive (Science) Knowledge: Year 2

Biology

All living things and their habitats

- *Alive or dead*
- *Habitats*
- *Adaptations*
- *Food chains*

- Classify things by living, dead or never lived
- Know how a specific habitat provides for the basic needs of things living there (plants and animals)
- Match living things to their habitat
- Name some different sources of food for animals
- Know about and explain a simple food chain

Animals, including Humans

- *Animal reproduction*
- *Healthy living*
- *Basic needs*

- Know the basic stages in a life cycle for animals, (including humans)
- Know why exercise, a balanced diet and good hygiene are important for humans

Plants

- *Plant and seed growth*
- *Plant reproduction*
- *Keeping plants healthy*

- Know the main parts of plants and trees including root, stem, leaf and petal leaf, twig, branch, root, trunk
- Know names of some trees in the locality
- Know and explain how seeds and bulbs grow into plants
- Know what plants need in order to grow and stay healthy (water, light & suitable (temperature)

Chemistry

Everyday Materials

- *Identify different materials*
- *Name everyday materials*
- *Properties of materials*

- Know how materials can be changed by squashing, bending, twisting and stretching

- *Compare the use of different materials*
- *Compare movement on different surfaces*

- Know why a material might or might not be used for a specific job

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All living things and their habitats

Researching
- Research animals and how they adapt to their environment

Grouping and Classifying
- Group animals based on their natural habitats

Animals, including Humans

Investigation
- Set up an investigation to find out who is the fittest in class

Grouping and Classifying
- Identify the off-spring of different animals

Plants

Fair testing
- Investigate which conditions plants need to grow

Observation over time
- Change in plant growth over time

Grouping and Classifying
- Identify parts of a plant

Everyday Materials

Fair testing
- Compare materials to see which is the most waterproof

Grouping and Classifying
- Group different materials based on their properties

Long-term overview for SCIENCE

YEAR 2

Biology

- Although the unit deals with animals it does not carry on directly from the Y1 classification unit.
- It is the first unit related to where animals live, etc.

Why do animals choose the habitats they have?

Which animals live underground, on the ground and in trees?

Which animals live in woodlands and forests in the UK and abroad?

Which animals would we normally find in our sea, rivers, lakes and ponds and why are they there?

Which animals start their life as an egg?

Which food sources are linked to which animals?

Science Knowledge	Working Scientifically
• Classify things by living, dead or never lived • Know how a specific habitat provides for the basic needs of things living there (plants and animals) • Match living things to their habitat • Name some different sources of food for animals • Know about and explain a simple food chain	**Researching** • Research animals and how they adapt to their environment **Grouping and Classifying** • Group animals based on their natural habitats

Knowledge Organiser

Year 2

Subject: Science **Main Learning: Animals and their habitats**

Key knowledge
Know that animals have preference about the habitats they live in
Identify and name plants and animals in a range of habitats
Know how a specific habitat provides for the basic needs of things living there
Match living things to their habitat
Know how animals find their food
Name some different sources of food for animals

Vocabulary	
habitat	Is a place that an animal lives. It provides the animal with food, water and shelter
rainforest	A habitat with a tropical forest with tall trees, warm climates and lots of rain
desert	A habitat that gets very little rain each year. Very few plants or animals live in desert areas
species	A group of animals, plants or other living things that all share common characteristics and that are all classified as alike in some way
pond	A body of water smaller than a lake. Ponds provide a habitat for a very wide range of wildlife
indigenous	Produced, growing, living, or occurring naturally in a particular region or environment

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 2

Biology: Human Body

- This unit follows on well from the Y1 naming parts of the human body.
- Links to DT and PE are clear.
- Move on to Y3 skeleton and muscles unit.

Why is it important to keep our bodies healthy?

What do we mean by a balanced diet and why is it important for humans?

Why is exercise and good hygiene important for humans?

Who is the fittest in our class?

What are the main stages of growth from babies to adulthood, in humans and in in animals?

Science Knowledge	Working Scientifically
• know that animals, including humans, have offspring, which grow into adults • find out about, and describe, the basic needs of animals, including humans for survival (water, food and air) • describe the importance for humans of exercise, eating the right amount of different types of food, and hygiene	**Investigation** • Set up an investigation to find out who is the fittest in class **Grouping and Classifying** • Identify the off-spring of different animals

Knowledge Organiser

Years 2

Subject: Science **Main Learning: Heathy living**

Key knowledge
Know how important it is to keep our bodies healthy
Know why a balanced diet is important for humans
Know what is meant by a balanced diet
Know why exercise and good hygiene are also important for humans
Know that the babies will grow into adults
Know what humans need to survive (including food and water)

Vocabulary	
proteins	Is a food group which includes meat, eggs, fish, dairy products, nuts and seeds
carbohydrates	Are sugars and starches, which are found in foods such as starchy vegetables, grains, rice, breads, and cereals
off-spring	Refers to a person's children or an animal's young
fats	Are found in meat and other animal products, such as butter and cheese
nutrition	Is the process by which the body nourishes itself by transforming food into energy and body tissues
hygiene	Taking care of our body by being clean and making sure we don't smell

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 2

Biology

- The picks up on the Year 1 plants unit and focuses on growth of plants.
- However, in Y3 there is big jump up to deal with issues of germination, pollination, etc.

What do plants and trees need to grow healthily?

What are the main parts of plants or trees, including roots, stem, leaf and petal, called?

How do we know that plants and trees need light, water and soil?

What are the names of some trees in our locality?

How can we find out how old a tree is?

Science Knowledge	Working Scientifically
• Know and explain how seeds and bulbs grow into plants • Know what plants need in order to grow and stay healthy (water, light & suitable temperature) • Know the main parts of plants and trees including root, stem, leaf and petal leaf, twig, branch, root, trunk • Know names of some trees in the locality	**Fair testing** • Investigate which conditions plants need to grow **Observation over time** • Change in plant growth over time **Grouping and Classifying** • Identify parts of a plant

Knowledge Organiser

Years 2

Subject: Science **Main Learning: Plants and trees**

Key knowledge
Know what plants, including trees need to survive
Know that a plant needs light, water, air and soil to survive
Know how important trees are for the environment
Know that trees and shrubs take in water and a gas called carbon dioxide and give out a gas called oxygen
Know how to set up a fair test to find out what plants need to survive
Know the names of many of out most common trees by shape of leaf and shape of tree

Vocabulary	
trunk	Holds up the trees' crown, protects its inner parts and works like a pipeline, transporting essential materials to the different parts of the tree
stem	Is the main part of the plant. It supports the weight of the leaves, as well as the flowers or fruit
blossom	Is the mass of flowers created by a tree. Almost all fruit bearing trees have blossom
bulbs	Are underground masses of food storage from which plants grow
woodland	Is a habitat where trees are the dominant plant form
crown	Is made up of the leaves and branches at the top of the tree

oak

horse chestnut

conifer

willow

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 2

Chemistry
- This unit follows on well from the Y1 unit, but focuses on using different materials.
- Is picked to a certain extent again in Y4 with the state of matter unit.

What are the properties of different materials?

Why are some materials are more suitable than others for making our toys?

Why glass, wood, plastic, brick or metal would be used for certain jobs?

Why can some materials be squashed, twisted or bent according to need?

Why certain materials are suitable for many different uses?

Who are the important people that have developed useful new materials?

Science Knowledge	Working Scientifically
• Know how materials can be changed by squashing, bending, twisting and stretching • Know why a material might or might not be used for a specific job	**Fair testing** • Compare materials to see which is the most waterproof **Grouping and Classifying** • Group different materials based on their properties

Knowledge Organiser

Years 2

Subject: Science **Main Learning: Uses and properties of different materials**

Key knowledge
Know about the properties and uses of different materials
Know why some materials are more suitable than others for specific uses
Know why glass, wood, plastic, brick or paper would be used for certain jobs
Know that some materials can be squashed, twisted or bent according to need
Know why certain materials are suitable for many different uses
Know about the lives of important people who have developed useful new materials

Vocabulary	
stretching	Is to change shape by pulling it to make it longer or wider
squashing	Is pushing things closely together
bending	Is changing the shape and direction of something
twisting	Moving one part clockwise and the other part anticlockwise
John Dunlop	A person who improved the tyres on cars. You may see tyres on cars with the name DUNLOP on them
Charles Macintosh	He invented mackintoshes which was a special type of coat. We use the word 'mac' today because of his invention

SCIENCE

Prior Knowledge –

Barton Hill Academy

Science Progression 2023-24

Year 3

Substantive (Science) Knowledge: Year 3

Biology			Chemistry	Physics	
Animals, including humans	**Plants**	**Plants**	**Rocks**	**Forces**	**Light**
• *Skeleton and muscles* • *Nutrition* • *Exercise and health*	• *Plant life* • *Basic structure and functions*	• *Life cycle* • *Water transportation*	• *Fossil formation* • *Compare and group rocks* • *Soil*	• *Different Forces* • *Magnets*	• *Reflections* • *Shadows*
• Know about the importance of a nutritious, balanced diet • Know how nutrients, water and oxygen are transported within animals and humans • Know about the skeletal and muscular system of a human	• Know the function of different parts of flowing plants and trees	• Know how water is transported within plants • Know the plant life cycle, especially the importance of flowers	• Compare and group rocks based on their appearance and physical properties, giving reasons • Know how soil is made and how fossils are formed • Know about and explain the difference between sedimentary, metamorphic and igneous rock	• Know about and describe how objects move on different surfaces • Know how a simple pulley works and use to on to lift an object • Know how some forces require contact and some do not, giving examples • Know about and explain how magnets attract and repel Predict whether magnets will attract or repel and give a reason	• Know that dark is the absence of light • Know that light is needed in order to see and is reflected from a surface • Know and demonstrate how a shadow is formed and explain how a shadow changes shape • Know about the danger of direct sunlight and describe how to keep protected

Working Scientifically

Animals, including humans	Plants	Plants	Rocks	Forces	Light
Experimenting and Investigating • Find out how muscles work using balloons • Carry out an investigation about exercise **Research** • Find out about names of joints • Find names of parts of skeleton	**Observation over time** • Observe how water travels up the stem **Research** • Research different types of seed dispersal		**Research** • Research how fossils and different types of rocks are formed **Grouping and Classifying** • Identify different rocks and the group they belong to	**Fair testing** • Compare materials based on the amount of friction they generate **Grouping and Classifying** • Group magnetic and non-magnetic materials	**Fair testing** • Compare materials based on reflectiveness **Observation over time** • Shadow length throughout the day **Grouping and Classifying** • Group materials based on their opacity and transparency **Pattern Seeking** • Object size compared to shadow

Long-term overview for SCIENCE

YEAR 3

Biology: Human Body

- This follows on from the two previous human body units in Y1 and Y2. It also prepares pupils for the Y4 unit on the digestive system

Why do humans have skeletons and muscles?

What are the names of the body parts associated with the skeleton?

What are the muscles and how do they work?

What are joints and how do they work?

Why is it important to have a balanced diet and why exercise is important?

Science Knowledge	Working Scientifically
• Know about the importance of a nutritious, balanced diet • Know how nutrients, water and oxygen are transported within animals and humans • Know about the skeletal and muscular system of a human	**Experimenting and Investigating** • Find out how muscles work using balloons • Carry out an investigation about exercise **Research** • Find out about names of joints • Find names of parts of skeleton

Knowledge Organiser

Years 3

Subject: Science **Main Learning: Human Body – Skeletons and muscles**

Key knowledge
Know that humans have skeletons and muscles for support, protection and movement
Know the names of the body parts associated with skeleton and muscles
Know that the body parts have special functions
Know what the function of muscles are
Know what joints are and how they work
Compare the diets of different groups of animals, including humans

Vocabulary	
skeleton	Is made of bone and grows as we grow. Our skull protects our brain and our ribs protect our heart and lungs
muscles	These are attached to bones by tendons and help them to move
joint	Allow the body to make movements. The body has many bones and are connected through the joints
cartilage	Is a connective tissue found in many areas of the body including joints between bones e.g. the elbows
tendon	Muscles are attached to the bone by tendons and work in pairs to allow for smooth movement.
spine	Also known as your backbone, it is a strong, flexible column of ring-like bones that runs from your skull to your pelvis.

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 3

Biology: Plants

- This follows on from the two previous plants units in Y1 and Y2. This one is much more demanding and requires quite a bit of igniting prior learning.

What part do different parts of plants play in helping them grow healthily?

What are the functions of different parts of the flowering plant?

What are key factors that are important for a plant's growth?

How is water transported within a plant?

What do we mean by pollination?

What types of pollination are there?

Science Knowledge	Working Scientifically
• Know the function of different parts of flowing plants and trees • Know what pollination is • Know about seed dispersal	**Observation over time** • Observe how water travels up the stem **Research** • Research different types of seed dispersal

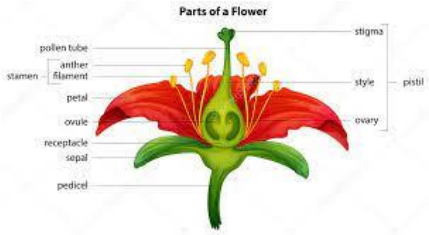
Knowledge Organiser

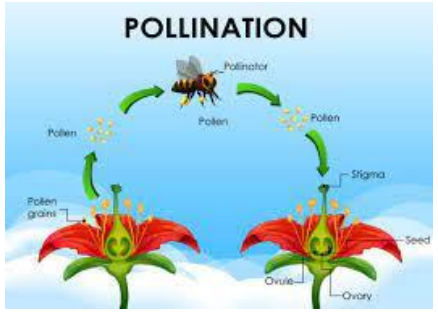
Years 3

Subject: Science **Main Learning: Plants**

Key knowledge
Understand what a plant needs to flourish and find out about its life cycle
Know the function of the different parts of the flowering plant
Know that light, air, water, nutrients from soil are all important for plant growth
Find out how water is transported within a plant
Know the part that flowers play in the life cycle of a flowering plant
Know about pollination, seed formation and seed dispersal

Vocabulary	
pollination	This is the act of transferring pollen grains from the male anther of a flower to the female stigma
seed dispersal	Is the movement or transport of seeds away from the parent plant
seed formation	A seed is a small baby plant enclosed in a covering called the seed coat, usually with some stored food
nutrients	Are the food the plant wants. Most of the plant's nutrients comes from the soil
stigma	This is usually sticky and receives pollen
anther	The stamen has a pollen producing structure at the end which is called the anther





Prior Knowledge –

Long-term overview for SCIENCE

YEAR 3

Chemistry

- This the first and only full unit on rocks and soil. However, pupils will have focused on dinosaurs and fossils at some stage even if it is in EYFS

What are the main types of rocks on our Earth?

How are fossils are formed?

What is soil?

What is the difference between igneous, sedimentary and metamorphic rocks?

Why are some crystals extremely rare and valuable?

Science Knowledge	Working Scientifically
• Compare and group rocks based on their appearance and physical properties, giving reasons • Know how soil is made and how fossils are formed • Know about and explain the difference between sedimentary, metamorphic and igneous rock	**Research** • Research how fossils and different types of rocks are formed **Grouping and Classifying** • Identify different rocks and the group they belong to

Knowledge Organiser

Years 3

Subject: Science **Main Learning: Rocks**

Key knowledge
Know that the Earth is made up of different types of rocks
Know how fossils are formed
Know what soil is
Know the difference between igneous, sedimentary and metamorphic rocks
Group together different rocks according to different attributes
Know that some crystals are extremely rare and valuable

Vocabulary	
sedimentary	Are formed when sand, mud and pebbles get laid down in layers. Over time, these layers are squashed under more and more layers
metamorphic	When a rock experiences heat and pressure, it becomes a metamorphic rock
igneous	Is formed when magma cools and solidifies. It may do this above or below the Earth's surface
crystals	These are a special kind of solid material where the molecules fit together in a repeating pattern
fossil	A fossil is the preserved remains or traces of a dead organism
soil	Consists of a mix of organic material (decayed plants and animals) and broken bits of rocks and minerals

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 3

Physics

- This the first full unit on forces. However, pupils will have met some forces work in KS1 and EYFS. Focus here on friction and air and water resistance

What do we mean by a ‘force’?

What is friction?

What is a magnet?

How do pulleys work?

Science Knowledge	Working Scientifically
• Know about and describe how objects move on different surfaces • Know how a simple pulley works and used to lift an object • Know how some forces require contact and some do not, giving examples • Know about and explain how magnets attract and repel Predict whether magnets will attract or repel and give a reason	**Fair testing** • Compare materials based on the amount of friction they generate **Grouping and Classifying** • Group magnetic and non-magnetic materials

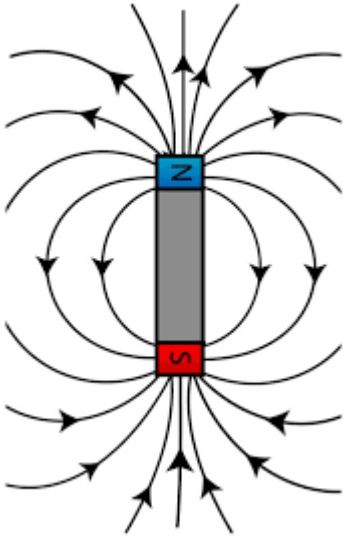
Knowledge Organiser

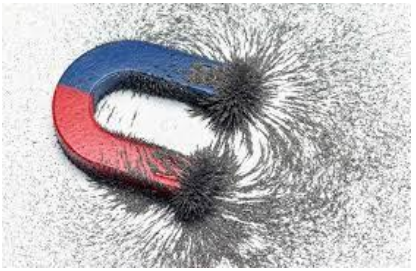
Years 3

Subject: Science **Main Learning: Forces and magnets**

Key knowledge
Know what we mean by a 'force'
Know how different surfaces speed thing up or slows things down
Know what a pulley is and how it works
Know how magnets work

Vocabulary	
repel	Two (magnetic) poles which are the same will repel each other
attract	Two (magnetic) poles which are not the same will attract each other
Pole	There are two Poles on Earth a South Pole and North Pole
pulley	A collection of one or more wheels over which you loop a rope to make it easier to lift things
magnet	A material or object that creates a magnetic force
magnetism	Magnetism is a force that can be felt by metals such as iron, steel, nickel and cobalt.





SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 3

Physics
- This the first full unit on light and dark although pupils will have met elements of it in YR and Y1.
- Picked up again in the unit in Y6.

Why do we have light and dark and what is its impact on our everyday life?

What is dark (in relation to absence of light)?

Why do we need light?

What happens to light when it hits a shiny object?

How is a shadow formed and why does it change shape?

Why is dangerous to look directly into the sun?

Substantive Knowledge	Disciplinary Knowledge
• Know that dark is the absence of light • Know that light is needed in order to see and is reflected from a surface • Know and demonstrate how a shadow is formed and explain how a shadow changes shape • Know about the danger of direct sunlight and describe how to keep protected	**Fair testing** • Compare materials based on reflectiveness **Observation over time** • Shadow length throughout the day **Grouping and Classifying** • Group materials based on their opacity and transparency **Pattern Seeking** • Object size compared to shadow

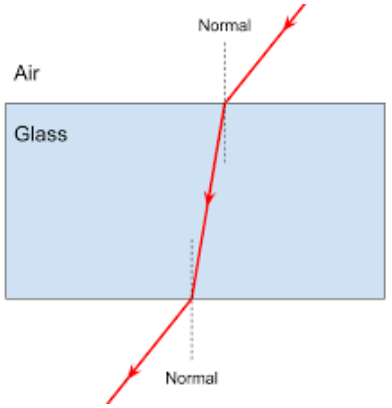
Knowledge Organiser

Years 3

Subject: Science **Main Learning: Light and Dark**

Key knowledge
Know why we have light and dark and its impact on our everyday life
Know what dark is (in relation to absence of light)
Know that we need light so we can see things
Know that light can be reflected
Know how a shadow is formed and why they change shape
Know the dangers of looking directly at the Sun

Vocabulary	
reflection	Occurs when a ray of light hits a surface and bounces off
shadows	Is formed when an object blocks out the light. The object must be opaque or translucent to make a shadow
opaque	Opaque objects do not allow light to pass through them, in most cases creating a shadow
refraction	It is the change of direction of a light ray as it passes through different surfaces, for example, from air to water
convex	These are lenses, also called positive lenses. Are lenses that curve outward from the edges to the centre
concave	This is a lens where the centre of the lens is thinner than the edges



Prior Knowledge –

Barton Hill Academy

Science Progression 2023-24

Year 4

Substantive (Science) Knowledge: Year 4

Biology

Animals, including humans

- *Digestive system*
- *Teeth*
- *Food chains*

- Identify and name the parts of the human digestive system
- Know the functions of the organs in the human digestive system
- Identify and know the different types of human teeth
- Know the functions of different human teeth
- Use and construct food chains to identify producers, predators and prey

All living things and their habitats

- *Grouping living things*
- *Classification keys*
- *Adaptation of living things*

- Use classification keys to group, identify and name living things
- Know how changes to an environment could endanger living things
- Group materials based on their state of matter (solid, liquid or gas)

Chemistry

States of Matter

- *Compare and group materials*
- *Solids, liquids and gases*
- *Changing state*
- *Water cycle*

- Know the temperature at which materials change state
- Know about and explore how some materials can change state
- Know the part played by evaporation and condensation in the water cycle

Physics

Electricity

- *Uses of electricity*
- *Simple circuits and switches*
- *Conductors and insulators*

- Identify and name appliances that require electricity to function
- Construct a series circuit
- Identify and name the components in a series circuit (including cells, wires, bulbs, switches and buzzers)
- Predict and test whether a lamp will light within a circuit
- Know the function of a switch
- Know the difference between a conductor and an insulator; giving examples of each

Sound

- *How sounds are made*
- *Sound vibrations*
- *Pitch and Volume*

- Know how sound is made, associating some of them with vibrating
- Know how sound travels from a source to our ears
- Know the correlation between pitch and the object producing a sound
- Know the correlation between the volume of a sound and the strength of the vibrations that produced it
- Know what happens to a sound as it travels away from its source

Working Scientifically

Animals, including humans

Research
- Research the different body parts involved in digestion

Grouping and classifying
- Classify plants/ animals into either producer, consumer or predator

Investigation
- Recreating a digestive system in class

All living things and their habitats

Research
- Research the effect of climate change on animals around the world

Grouping
- Classify plants/ animals into either producer, consumer or predator

States of Matter

Observation over time
- Measure temperature changes in water over time

Research
- Research the water cycle and how it works

Grouping
- Identify solids, liquids or gases

Electricity

Fair testing
- Determine which materials are electrical conductors or insulators
- Predict and test whether a lamp will light within a circuit

Grouping and classifying
- Classify/ group materials into electrical conductors or insulators

Sound

Fair testing
- The affect of distance from the source on volume

Pattern seeking
- Compare how length and width of tubes affect pitch

Long-term overview for SCIENCE

YEAR 4

Biology: Human Body

- This continues the human body theme and focuses on the food we eat before moving on in Y5 to changes as we grow and then to The circulatory system in Y6.

What happens to the food we eat?

What are the parts of the digestive system called?

What is the function of each organ within the digestive system?

What are the names and function of the different types of teeth in humans?

How can the digestive system be recreated in a classroom?

What are food chains and how we use them to identify producers, predators and prey

Science Knowledge	Working Scientifically
• Identify and name the parts of the human digestive system • Know the functions of the organs in the human digestive system • Identify and know the different types of human teeth • Know the functions of different human teeth • Use and construct food chains to identify producers, predators and prey	**Research** • Research the different body parts involved in digestion **Grouping and classifying** • Classify plants/ animals into either producer, consumer or predator **Investigation** • Recreating a digestive system in class

Knowledge Organiser

Years 4

Subject: Science **Main Learning: Digestive system**

Key knowledge
Know exactly what happens to the food we eat
Know and name the parts of the digestive system
Know about the function of each organ of the digestive system
Know and identify the different types of teeth in humans
Know the function of different human teeth
Construct and use food chains to identify producers, predators and prey

Vocabulary	
oesophagus	This is like a stretchy tube that moves food from the back of the throat to the stomach
pancreas	This produces juices called enzymes which help the body digest food
organ	The skin is the biggest organ of your body. Other organs include your brain, lungs, heart, liver, stomach, intestines, pancreas, and kidneys, all called internal organs
intestine	The small intestine absorbs nutrients and minerals from food. The large intestine absorbs water from the remaining indigestible food
molars	These are teeth that are used for chewing and grinding our food
canine	These are teeth used for ripping and tearing our food. We have two located at the top of our mouth and two at the bottom

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 4

Biology: Living things

- This follows on from the classifying that happened in Y1 and also to a certain extent the habitats learning in Y2

How are living things grouped?

How do we use classification keys to group living things?

How can we identify and group trees?

How can we group plants and animals?

How can environments change for good?

Science Knowledge	Working Scientifically
• Use classification keys to group, identify and name living things • Know how changes to an environment could endanger living things • Group materials based on their state of matter (solid, liquid or gas)	**Research** • Research the effect of climate change on animals around the world **Grouping** • Classify plants/ animals into either producer, consumer or predator

Knowledge Organiser

Years 4

Subject: Science **Main Learning: Living things and their habitats**

Key knowledge
Know that living things can be grouped in a variety of ways
Explore and use classification keys to group living things
Know that plants can be grouped into flowering and non flowering plants
Know that animals can be grouped into amphibians, reptiles, birds, mammals and fish
Recognise that environments can change for good
Recognise that some changes to the environment can be a danger to living things

Vocabulary	
flowering plants	These plants produce seeds, fruits, and flowers. Most deciduous trees belong to this group
invertebrates	These do not have skeletons or backbones
insects	Small and often winged animals that are arthropods having six jointed legs and a body formed of a head, thorax, and abdomen
deforestation	The act of cutting down huge numbers of trees, such as is happening in many rainforests
pollution	Pollution happens when the environment is contaminated, or dirtied, by waste, chemicals, and other harmful substances
industrial waste	This is material which is created when making products – if they are disposed of carefully, it can be a danger to the environment

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 4

Chemistry

- To a certain extent this unit links back to the materials learning in Y1 and Y2.
- However, it is an important link to the Y5 unit on reversible and irreversible changes

How do some solids, liquids and gases change state?

How can we classify solids, liquids and gases?

What do we mean by freezing and melting?

How can you separate sand, salt and water?

What is a water cycle?

What is meant by the terms: condensation, and evaporation?

Science Knowledge	Working Scientifically
• Know the temperature at which materials change state • Know about and explore how some materials can change state • Know the part played by evaporation and condensation in the water cycle	**Observation over time** • Measure temperature changes in water over time **Research** • Research the water cycle and how it works **Grouping** • Identify solids, liquids or gases

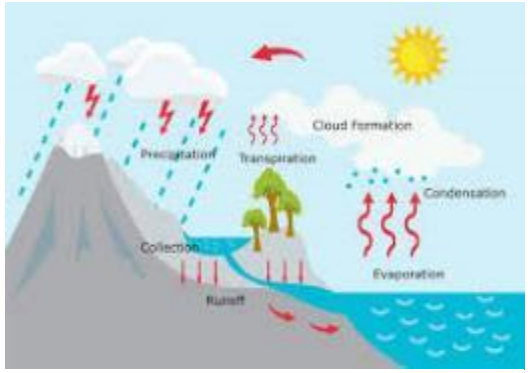
Knowledge Organiser

Years 4

Subject: Science **Main Learning: States of Matter**

Key knowledge
Know that some solids, liquids and gases change states
Know that certain materials can change state
Know what the temperature of water is when it boils or freezes
Know which materials, other than water, changes state
Explain the differences between solids, liquids and gases
Know what is meant by the terms: condensation, and evaporation

Vocabulary	
evaporation	when a liquid changes to a gas
condensation	when a gas changes into a liquid
melting	when a solid becomes a liquid
solidifying	when a liquid becomes a solid
precipitation	rain, snow, sleet and hail
degrees - Celsius	the most common unit of temperature



Ice

Water

Steam

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 4

What is electricity and why it so important in our lives?

- How does electricity work?
- How can we construct a simple series electrical circuit?
- What is renewable energy and is it better than fossil fuels?
- How important is electricity at home?
- What are conductors and what are insulators?

Substantive Knowledge	Working Scientifically (Disciplinary)
• Identify and name appliances that require electricity to function • Construct a series circuit • Identify and name the components in a series circuit (including cells, wires, bulbs, switches and buzzers) • Predict and test whether a lamp will light within a circuit • Know the function of a switch • Know the difference between a conductor and an insulator; giving examples of each	**Fair testing** • Determine which materials are electrical conductors or insulators • Predict and test whether a lamp will light within a circuit **Grouping and classifying** • Classify/ group materials into electrical conductors or insulators

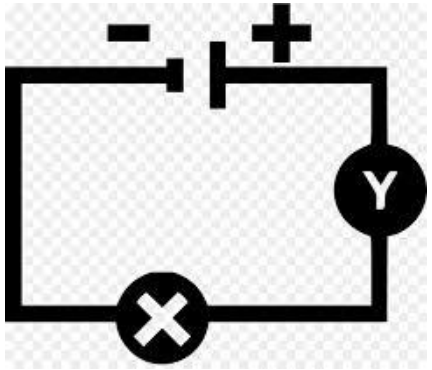
Knowledge Organiser

Years 4

Subject: Science **Main Learning: Electricity**

Key knowledge
Know what electricity is and why it so important in our lives
Know about common appliances that run on electricity
Know how to construct a simple series electrical circuit
Identify and name the basic parts of the circuit, including cells, wires, bulbs, switches and buzzers
Know that a switch opens and closes a circuit
Know about some common conductors and insulators

Vocabulary	
circuit	Is a completed path through which an electrical current flows
conductor	Is an object or type of material that allows the flow of an electrical current in one or more directions
insulator	Is a material whose internal electric charges do not flow freely
battery	Is a device that stores chemical energy and makes it available in an electrical form
cells	An electrical cell is a device that is used to generate electricity
appliance	Is a device that uses electricity to perform a function



SCIENCE

Prior Knowledge –

Knowledge Organiser

Year 4

Subject: Science **Main Learning: Sound**

Key knowledge
Know how we get to hear things and how sound is created
Know how sound is made and what happens as sound travels away from its source
Know how sound travels from the source to the ears
Know to associate sound with vibration
Know the correlation between pitch and the object producing a sound
Know the correlation between the volume of a sound and the strength of the vibrations that produced it

Vocabulary	
pitch	A high sound has a high pitch and a low sound has a low pitch
volume	Is the perception of loudness from the intensity of a sound wave. The higher the intensity of a sound, the louder it is perceived in our ears
vibrating	Sound is caused by the vibration of a medium (usually air) and it travels in waves
frequency	This is measured as the number of wave cycles that occur in one second
vibrating	Sound is caused by the vibration of a medium (usually air) and it travels in waves
hammer	The ear has little bones called ossicles that help you hear. They are called the hammer (malleus), anvil (incus), and stirrup (stapes). They amplify the sound or make it louder

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 4

Physics
- This is the only full unit on sound in the primary science curriculum. However, there are links to music at different levels.

How is sound created and how does it travel?

How do our ears work?

What happens to sound as it travels away from its source?

What do we mean by 'pitch' and 'vibration' in relation to sound?

How do telephones work?

Science Knowledge	Working Scientifically
• Know how sound is made, associating some of them with vibrating • Know how sound travels from a source to our ears • Know the correlation between pitch and the object producing a sound • Know the correlation between the volume of a sound and the strength of the vibrations that produced it • Know what happens to a sound as it travels away from its source	**Fair testing** • The affect of distance from the source on volume **Pattern seeking** • Compare how length and width of tubes affect pitch

Barton Hill Academy

Science Progression 2023-24

Year 5

Substantive Knowledge: Year 5

Biology

All living things and their habitats

- *Life cycles – plants and animals*
- *Reproductive processes*
- *Famous naturalists*

- Know the life cycle of different living things e.g. mammal, amphibian, insect and bird
- Know the differences between different life cycles
- Know the process of reproduction in plants
- Know the process of reproduction in animals

Animals, including humans

- *Changes as humans develop from birth to old age*

- Create a timeline to indicate stages of growth in humans

Chemistry

Properties and changes in materials

- *Compare properties of everyday materials*
- *Soluble/ dissolving*
- *Reversible and irreversible substances*

- Compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets
- Know and explain how a material dissolves to form a solution
- Know and show how to recover a substance from a solution
- Know and demonstrate how some materials can be separated (e.g. through filtering, sieving and evaporating)
- Know and demonstrate that some changes are reversible and some are not
- Know how some changes result in the formation of a new material and that this is usually irreversible

Physics

Forces

- *Gravity*
- *Friction*
- *Forces and motion of mechanical devices*

- Know what gravity is and its impact on our lives
- Identify and know the effect of air and water resistance
- Identify and know the effect of friction
- Explain how levers, pulleys and gears allow a smaller force to have a greater effect

Earth and Space

- *Movement of the Earth and the planets*
- *Movement of the Moon*
- *Night and day*

- Know about and explain the movement of the Earth and other planets relative to the Sun
- Know about and explain the movement of the Moon relative to the Earth
- Know and demonstrate how night and day are created
- Describe the Sun, Earth and Moon (using the term spherical)

Working Scientifically

All living things and their habitats / Animals, including humans

Research
- Research changes in humans at different stages in our lives
- Research the life cycle of different animal groups

Grouping
- Classify/ group and animal based on its group and species

Pattern seeking
- Compare height with physical task e.g., distance a ball is thrown

Properties and changes in materials

Fair testing
- Factors that affect the speed a solute dissolves in water, e.g., temperature

Observation over time
- Observe over time the separation of a solute and solvent via evaporation

Grouping
- Classify/ group materials as either soluble or insoluble

Forces

Fair testing
- Shape of an object and the time it takes to travel through water

Pattern seeking
- Surface material on a ramp and note the distance/ speed it travels

Earth and Space

Research
- Research the planets in our solar system, including length of orbit

Pattern seeking
- Dimensions associated with the Sun, Earth and Moon

Long-term overview for SCIENCE

YEAR 5

Biology: Animals, including Humans

- This links to life cycles of animals in previous units..
- However, it is also linked to the human body strand in Year 1.

What do we know about the life cycles of humans and various animals?

What happens to us as we get older?

What do the terms puberty, gestation and reproduction mean?

What is the early life cycle of a human being?

What is the process of reproduction in plants?

What is the process of reproduction in animals?

Science Knowledge	Working Scientifically
• Know the life cycle of different living things e.g. mammal, amphibian, insect and bird • Know the differences between different life cycles • Know the process of reproduction in plants • Know the process of reproduction in animals • Create a timeline to indicate stages of growth in humans	**Research** • Research changes in humans at different stages in our lives • Research the life cycle of different animal groups **Grouping** • Classify/ group and animal based on its group and species **Pattern seeking** • Compare height with physical task e.g., distance a ball is thrown

Knowledge Organiser

Years 5

Subject: Science **Main Learning: Life cycle, including humans**

Key knowledge
Know about the life cycles of humans and various animals
Know about the life cycle of a human being
Know what the terms puberty, gestation and reproduction mean
Know the life cycle of different living things, e.g. mammal, amphibian, insect and bird
Know about the process of reproduction in plants
Know about the process of reproduction in animals

Vocabulary	
puberty	Is the name for the time when your body begins to develop and change as you move from childhood to adulthood
gestation	Is the time between conception and birth, during which the embryo is developing in the uterus
reproduction	Is the way different plants and animals make new plants and animals. The reproduction system differs in plants and animals
embryo	Fertilisation happens when an egg cell meets with a sperm cell and joins with it. The fertilised egg divides to form a ball of cells called an embryo
obese	Obesity is the condition of being much too heavy for one's height so that one's health is affected
teenager	The age between thirteen and nineteen

SCIENCE

Prior Knowledge –

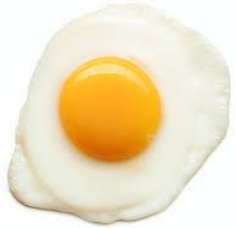
Knowledge Organiser

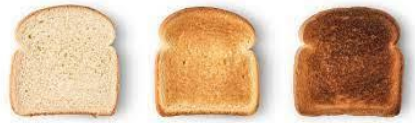
Years 5

Subject: Science **Main Learning: Reversible and irreversible changes**

Key knowledge
Know about materials that can or cannot be changed back to their original form once an action has been taken
Know what a reversible change means
Know what an irreversible change means
Give examples of reversible and irreversible changes
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

Vocabulary	
dissolve	To become broken up or absorbed by something or to disappear into something else
solubility	Is a chemical property referring to the ability for a given substance to dissolve in a solvent
filtering	To pass a substance through a device which is designed to remove certain particles contained within
melting	A physical process that results in the transition of a substance from a solid to a liquid
separating	Separate, part, and divide mean to break into parts or to keep apart
thermal	Something that is thermal is hot, retains heat, or has a warming effect





SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 5

Chemistry
- This links to the Y4 unit of learning on states of matter.

Which materials can or cannot be changed back to their original form?

What does reversible and irreversible changes mean?

How can you set up an investigation to find which materials can and cannot be changed back to their original state?

How can mixtures be separated, including through filtering, sieving and evaporating?

How has the science related to reversible and irreversible changes helped with crime work?

Science Knowledge	Working Scientifically
• Compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets • Know and explain how a material dissolves to form a solution • Know and show how to recover a substance from a solution • Know and demonstrate how some materials can be separated (e.g. through filtering, sieving and evaporating) • Know and demonstrate that some changes are reversible and some are not • Know how some changes result in the formation of a new material and that this is usually irreversible	**Fair testing** • Factors that affect the speed a solute dissolves in water, e.g., temperature **Observation over time** • Observe over time the separation of a solute and solvent via evaporation **Grouping** • Classify/ group materials as either soluble or insoluble

Long-term overview for SCIENCE

YEAR 5

Physics

- This is a unit that has some links to the Y3 unit on forces.
- It also has links to DT mechanisms aspect.

What is a force and how does it impact on the way things move?

What is gravity and what is its impact on our lives?

What are pulleys and why are they important in our everyday life?

What is air resistance, what is the effect of air resistance?

What is friction and what effect does it have?

How do gears allow a smaller force to have a greater effect?

Science Knowledge	Working Scientifically
• Know what gravity is and its impact on our lives • Identify and know the effect of air and water resistance • Identify and know the effect of friction • Explain how levers, pulleys and gears allow a smaller force to have a greater effect	**Fair testing** • Shape of an object and the time it takes to travel through water **Pattern seeking** • Surface material on a ramp and note the distance/ speed it travels

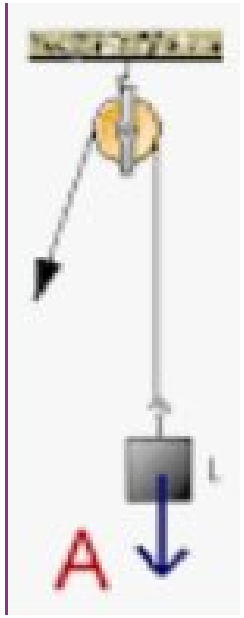
Knowledge Organiser

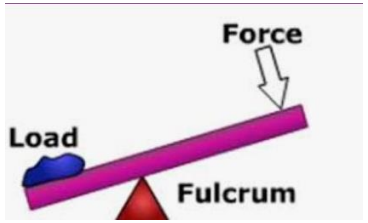
Years 5

Subject: Science **Main Learning: Forces**

Key knowledge
Know what a force is and how it impacts on the way things move
Know what gravity is and its impact on our lives
Identify and know the effect of air resistance
Identify and know the effect of water resistance
Identify and know the effect of friction
Explain how levers, pulleys and gears allow a smaller force to have a greater effect

Vocabulary	
friction	A force between two surfaces that are sliding, or trying to slide, across each other
gravity	A force which tries to pull two objects towards each other
air resistance	A type of friction between air and another material. For example, when an aeroplane flies through the air
water resistance	If you go swimming, there is friction between your skin and the water particles
levers	A long rigid body with a fulcrum along its length
pulleys	A simple machine and comprises of a wheel on a fixed axle, with a groove along the edges to guide a rope or cable





Prior Knowledge –

Long-term overview for SCIENCE

YEAR 5

Physics
- This is a stand alone unit although there are some links to the Y3 unit on light and dark.

What do we know about the Sun, Earth, Moon and the Planets?

How can you explain the movement of the Earth and other planets relative to the Sun?

How can you explain the movement of the Moon relative to the Earth?

How can you demonstrate how night and day are created?

What do we know about the dimensions associated with the Sun, Earth and Moon?

What information do you know about the planets?

Science Knowledge	Working Scientifically
• Know about and explain the movement of the Earth and other planets relative to the Sun • Know about and explain the movement of the Moon relative to the Earth • Know and demonstrate how night and day are created • Describe the Sun, Earth and Moon (using the term spherical)	**Research** • Research the planets in our solar system, including length of orbit **Pattern seeking** • Dimensions associated with the Sun, Earth and Moon

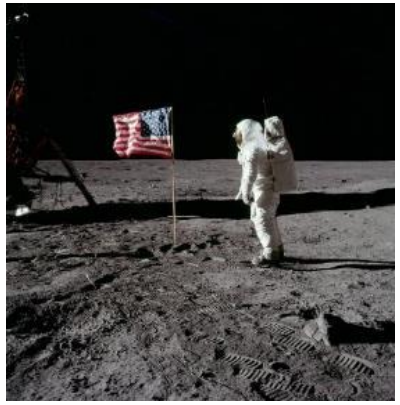
Knowledge Organiser

Years 5

Subject: Science **Main Learning: Earth and Space**

Key knowledge
Know about the Sun, Earth, moon and the plants
Know about and explain the movement of the Earth and other planets relative to the Sun
Know about and explain the movement of the Moon relative to the Earth
Know and demonstrate how night and day are created
Describe the Sun, Earth and Moon (using the term spherical)
Know information about the planets

Vocabulary	
solar system	Is made of the eight planets that orbit our sun; it is also made of asteroids, moons, comets and lots more
planet	There are 8 planets in our solar system, they are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune
spherical	Something spherical is like a sphere in being round, or more or less round, in three dimensions
crescent moon	It is a slither of the moon that is lit up and can be seen and is less than half the moon
gibbous moon	A gibbous moon occurs when the moon is three-quarters lit up
eclipse	This occurs when an astronomical object is temporarily obscured. A lunar eclipse happens when the Earth moves between the Sun and the Moon and blocking the Sun's rays from striking the Moon



SCIENCE

Prior Knowledge –

Barton Hill Academy

Science Progression 2023-24

Year 6

Substantive Knowledge: Year 6

Biology

Animals, including humans

- *The circulatory system*
- *Water transportation*
- *Impact of exercise on body*

- Identify and name the main parts of the human circulatory system
- Know the function of the heart, blood vessels and blood
- Know the impact of diet, exercise, drugs and lifestyle on health
- Know the ways in which nutrients and water are transported in animals, including humans

All living things and their habitats

- *Classification of living things and the reasons for it*

- Classify living things into broad groups according to observable characteristics and based on similarities and differences
- Know how living things have been classified
- Give reasons for classifying plants and animals in a specific way

Evolution and Inheritance

- *Identical and non identical off-spring*
- *Fossil evidence and evolution*
- *Adaptation and evolution*

- Know how the Earth and living things have changed over time
- Know how fossils can be used to find out about the past
- Know about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents)
- Know how animals and plants are adapted to suit their environment
- Link adaptation over time to evolution
- Know about evolution and can explain what it is

Physics

Electricity

- *Electrical components*
- *Simple circuits*
- *Fuses and voltage*

- Compare and give reasons for why components work and do not work in a circuit
- Draw circuit diagrams using correct symbols
- Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer

Light

- *How light travels*
- *Reflection*
- *Ray models of light*

- Know how light travels
- Know and demonstrate how we see objects
- Know why shadows have the same shape as the object that casts them
- Know how simple optical instruments work e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

Working Scientifically

Animals, including humans

Fair testing
- Impact of exercise on the heart rate

Research
- Research how drugs affect the body

Pattern seeking
- Compare resting heart rate of different people

All living things and their habitats

Observation over time
- Conditions needed for bread to go mouldy

Research
- Research the different types of micro-organisms

Pattern seeking
- Compare resting heart rate of different people

Evolution and Inheritance

Research
- Research Charles Darwin and his work

Pattern seeking
- Compare sculls/ body parts of animals as they have evolved

Electricity

Fair testing
- Effect of increasing voltage on the brightness of a bulb

Pattern seeking
- Compare brightness of bulb in series and parallel circuits

Light

Grouping and Classifying
- Group materials based on transparency

Pattern seeking
- Compare distance from light source and shadow

Experimenting and investigating
- Experiment to find out that light travels in straight lines

Long-term overview for SCIENCE

YEAR 6

Biology: Human Body

- There are links to the Y1 to Y5 human body strands.
- Many pupils find it useful to consider the link to Y4 digestive system.

How does the heart work and why is it so important?

What part does the heart play in the human circulatory system?

What is the circulatory system and how does it work?

What is the impact of diet, exercise, drugs and lifestyle on health?

What is the relationship between your heartbeat and exercise?

Who was William Harvey and what was his contribution to science?

Science Knowledge	Working Scientifically
• Identify and name the main parts of the human circulatory system • Know the function of the heart, blood vessels and blood • Know the impact of diet, exercise, drugs and lifestyle on health • Know the ways in which nutrients and water are transported in animals, including humans	**Fair testing** • Impact of exercise on the heart rate **Research** • Research how drugs affect the body **Pattern seeking** • Compare resting heart rate of different people

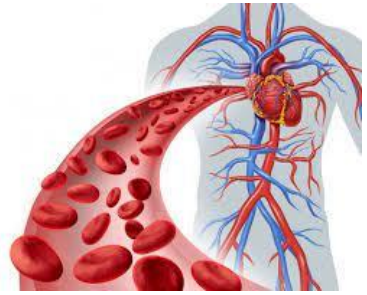
Knowledge Organiser

Years 6

Subject: Science **Main Learning: Circulatory system**

Key knowledge
Know about the function of the heart and the importance of blood in keeping us alive
Identify and name the main parts of the human circulatory system
Know the function of the heart, blood vessels and blood
Know the impact of diet, exercise, drugs and lifestyle on health
Know the ways in which nutrients and water are transported in animals, including humans
Know who William Harvey was

Vocabulary	
atriums	The two uppermost chambers of the heart. Blood is pushed from the atriums to the ventricles
cardiovascular	The blood circulatory system (cardiovascular system) delivers nutrients and oxygen to all cells in the body
capillaries	Are very thin blood vessels. They bring nutrients and oxygen to tissues and remove waste products
pulse	Your heart has to push so much blood through your body that you can feel a little thump in your arteries each time the heart beats
ventricles	The two lower chambers in the heart
blood vessels	A series of tubes inside your body. They move blood to and from your heart



Prior Knowledge –

Long-term overview for SCIENCE

YEAR 6

Biology: Classifying
- There are links to the Y1 and Y4 units on animals including humans.
- In Y1 the classification of animals and in Y4 grouping animals.

How are living things grouped and classified?

What do we know about the five kingdoms: animals, plants, monera, protista and fungi?

What can you find out about the special attributes that some animals and plants have to help them survive?

What do we know about vertebrate and invertebrate animals?

Who was Carl Linnaeus?

Science Knowledge	Working Scientifically
• Classify living things into broad groups according to observable characteristics and based on similarities and differences • Know how living things have been classified • Give reasons for classifying plants and animals in a specific way	**Observation over time** • Conditions needed for bread to go mouldy **Research** • Research the different types of micro-organisms **Pattern seeking** • Compare resting heart rate of different people

Knowledge Organiser

Year 6

Subject: Science **Main Learning: Classification of all living things, including micro-organisms**

Key knowledge
Understand how all living things are grouped and classified
Be able to classify living things into broad groups according to observable characteristics and based on similarities and differences
Know how living things have been classified
Give reasons for classifying plants and animals based on specific characteristics
Know about vertebrate and invertebrate animals
Know who Carl Linnaeus is

Vocabulary	
vertebrates	An animal that has a backbone
invertebrates	An animal that does not have a backbone and 97% of creatures belong to this group
species	This is the grouping together of similar types of plants, animals and other organisms that can reproduce with each other
fungi	A classification or group of living organisms. This means they are not animals, plants, or bacteria
bacteria	Are tiny little organisms that are everywhere around us
algae	A single or multi-cellular organism that has no roots, stems or leaves and is often found in water

SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 6

Biology:
This is a stand-alone unit. However, there are links to some areas such as Y3 fossils and to a certain extent the Y5 changes as we grow.

How have living things on Earth changed over time?

Know that living things have changed over time

Know the part fossils play in helping us understand more about living things that inhabited our Earth millions of years ago

Know that living things produce off-spring of the same kind

Know that off-spring vary and are not normally identical to their parents

Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Science Knowledge	Working Scientifically
• Know how the Earth and living things have changed over time • Know how fossils can be used to find out about the past • Know about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents) • Know how animals and plants are adapted to suit their environment • Link adaptation over time to evolution • Know about evolution and can explain what it is	**Research** • Research Charles Darwin and his work **Pattern seeking** • Compare sculls/ body parts of animals as they have evolved

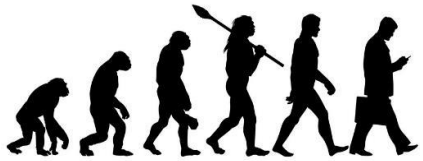
Knowledge Organiser

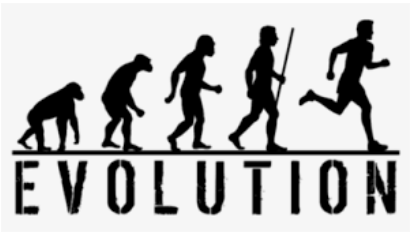
Years 6

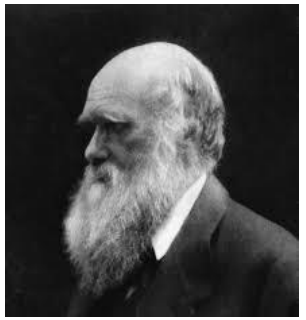
Subject: Science **Main Learning: Evolution and inheritance**

Key knowledge
Know how living things on Earth have changed over time
Know that living things have changed over time
Know the part fossils play in helping us understand more about living things that inhabited our Earth millions of years ago
Know that living things produce off-spring of the same kind
Know that off-spring vary and are not normally identical to their parents
Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Vocabulary	
off-spring	When living things reproduce they pass on characteristics to their offspring. All living things produce offspring of the same kind, but normally offspring are not identical to their parents
adaptation	Is the process by which animals, plants and other living things have changed so that they better suit their habitat
evolution	Is the theory that all the kinds of living things that exist today developed from earlier types
inheritance	When living things reproduce they pass on characteristics to their offspring. This is known as inheritance
palaeontologist	A palaeontologist is someone studying the life of past geological periods, as known from fossil remains
genotype	A genotype refers to a particular gene or set of genes carried by an individual







SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 6

Physics
- This is a unit that has direct links to the Y4 unit on electricity. This one is more focused on its power.

How does electricity work and how does its power vary?

How does electrical energy vary?

What do we mean by electrical particles?

Which symbols are used to represent different parts of a simple circuit?

How can we construct simple series circuits?

How can we make use of our knowledge of circuits to create a simple game?

Science Knowledge	Working Scientifically
• Compare and give reasons for why components work and do not work in a circuit • Draw circuit diagrams using correct symbols • Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer	**Fair testing** • Effect of increasing voltage on the brightness of a bulb **Pattern seeking** • Compare brightness of bulb in series and parallel circuits

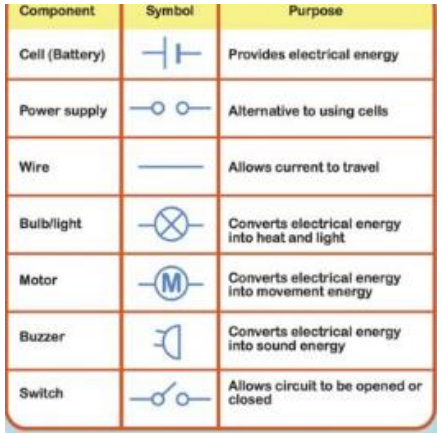
Knowledge Organiser

Years 6

Subject: Science **Main Learning: Electricity**

Key knowledge
Understand how electricity works and how its power can vary
Know that the brightness of a bulb is associated with the voltage
Compare and give reasons for variations in how components function
Use recognised symbols when representing a simple circuit in a diagram
Construct simple series circuits
Be able to answer questions about what happens when they try different components, for example; switches, bulbs, buzzers and motors

Vocabulary	
series circuits	Is a circuit that has more than one resistor, but only one path through which the electricity (electrons) flows
cells	Is a device that is used to generate electricity, or one that is used to make chemical reactions possible by applying electricity
generator	A machine that converts energy into electricity
turbine	A machine that creates continuous power in which a wheel, or something similar, moves round and round by fast moving water, steam, gas or air
fuses	These are safety devices. They are strips of wire that melts and breaks an electric circuit if it goes over a safe level
socket	A safe device to plug your electrical items into at home. Almost every room at home will have at least one socket



SCIENCE

Prior Knowledge –

Long-term overview for SCIENCE

YEAR 6

Biology: Light

- There are links to the Y3 unit on light and dark. There are also links with the human body strand when it comes to look at the working of the eye.

How do our eyes help us see?

How does light travel?

How do we know that light travels in straight lines?

How do our eyes work?

What do we mean by concave and convex mirrors?

Why do shadows have the same shape as the objects that cast them?

Science Knowledge	Working Scientifically
• Know how light travels • Know and demonstrate how we see objects • Know why shadows have the same shape as the object that casts them • Know how simple optical instruments work e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.	**Grouping and Classifying** • Group materials based on transparency **Pattern seeking** • Compare distance from light source and shadow **Experimenting and investigating** • Experiment to find out that light travels in straight lines

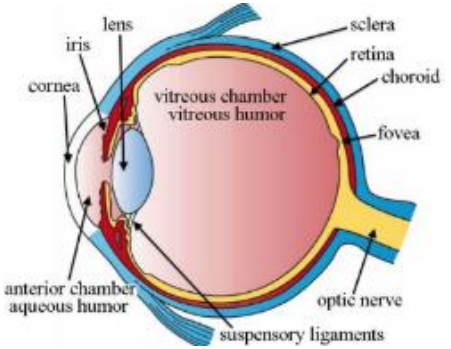
Knowledge Organiser

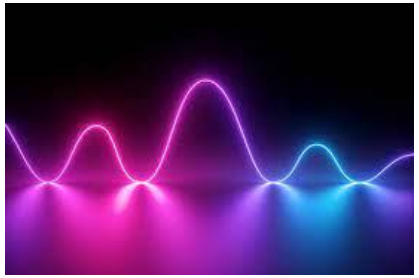
Years 6

Subject: Science **Main Learning: Light**

Key knowledge
Know how our eyes help us to see.
Know that light travels in straight lines
Understand that because light travels in straight lines objects are seen because they give out or reflect light into the eye
Know how our eyes work
Know what we mean by concave and convex mirrors
Know why shadows cast the same shape as the object that cast them

Vocabulary	
retina	This is at the back of your eye and it has light-sensitive cells called rods and cones
cornea	This is thin, clear covering over our eye. It's important because it helps you see by focusing light as it enters the eye
iris	By opening and closing the pupil, the iris controls the amount of light that enters the eye
pupil	Can be compared with the shutter of a camera. It is surrounded by the iris which is the coloured part of the eye
lens	Is a curved piece of glass or plastic designed to refract light in a specific way
light wave	One of the characteristics of light is that it behaves like a wave. Light can be defined by its wavelength and frequency. The frequency is how fast the waves vibrate up and down





Prior Knowledge –

Science Assessment overview: Key Stage 1

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 1:How are animals classified?			
Name two carnivores, two omnivores and two herbivores	4 points		
Name two reptiles, two mammals and two amphibians	4 points		
Name two birds we see in the UK	2 points		
Name two types of fish we have in UK rivers	2 points		
Year 1:What are our seen body parts called and what do we mean by the five senses?			
Name our five senses	5 points		
Name three parts of our bodies that are above the belly button	2 points		
Year 1:How do the seasons change?			
Name the four seasons of the year	4 points		
Name two features of the Spring and two features of the Autumn	2 points		
Name the season the month of August is in	2 points		

Science Assessment overview: Key Stage 1

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 1:What are the names of the different parts of plants?			
Point to and name the following on the diagram of a plant: stem, root, leaf and petal	2 points		
Point to and name the following on the diagram of a tree: branch, root, trunk and flower	2 points		
Know what the role of a root is in keeping a plant or tree healthy	2 points		
Name two wild flowers we could see in the woods	2 points		
Year 1: What are the materials that are around us called?			
Name a material that we wear to keep us warm	2 points		
Name three materials we see on houses	2 points		
Name a material that keeps us from getting wet	2 points		
Name a material that you can see through	2 points		
Name a material that is difficult to break	2 points		

Science Assessment overview: Key Stage 1

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 2: Why do animals choose the habitats they have?			
Name two animals that live underground	2 points		
Name two animals that can be seen in trees	2 points		
Name three animals that started life as an egg	3 points		
Name two woodland animals	2 points		
Know what do we mean by the term predator	2 points		
Year 2: Why is it important to keep our bodies healthy?			
Know what we mean by a balanced diet	2 points		
Know what the word hygiene means	2 points		
Know why it is important to exercise	2 points		
Name three stages of growth after baby	2 points		
Know why we breath very heavily at times	2 points		

Science Assessment overview: Key Stage 1

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 2: What do plants and trees need to grow healthily?			
Name three things that plants need to grow healthily	3 points		
Name three different types of trees	3 points		
Name one way we can tell how old a tree is	2 points		
Year 2: What are the properties of different materials?			
Name a materials can be squashed	2 points		
Know which material we would use if we wanted to see through something	2 points		
Name a material that can be bent	2 points		
Know why plastic can be good and bad	2 points		
Name two types of materials you would use to build a car	2 points		

Science Assessment overview: Lower Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 3: Why do humans have skeletons and muscles?			
Name two bones you will find on your leg	2 points		
Name two different joints found in our bodies	2 points		
Know what nutrients are and why they are important to our bodies	2 points		
Explain how our muscles work	2 points		
Know the name of the main bone found in our heads	2 points		
Year 3: What part do different parts of plants play in helping them grow healthily?			
Explain how water is transported in a plant	2 points		
Explain what pollination is	2 points		
What part do insects play in pollinating a plant	2 points		
How does the wind play a part in pollination	2 points		
Know why flowers are important to a plant	2 points		

Science Assessment overview: Lower Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 3: What are the main types of rocks on our Earth?			
Explain what soil is	2 points		
Know what a fossil is	2 points		
Name two igneous rocks	2 points		
Name two sedimentary rocks	2 points		
Name two crystals	2 points		
Year 3: What do we mean by a force?			
Know what friction is	2 points		
Know why a pulley helps to make a weight lighter to lift	2 points		
Know what a magnet is	2 points		
Know what we mean by poles in respect of magnets	2 points		
Know what the word repel means	2 points		

Science Assessment overview: Lower Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 3: Why do we have light and dark and what is its impact on our everyday life?			
Know why light is important	2 points		
Know that light reflects off a shiny surface	2 points		
Know how a shadow is formed	2 points		
Know why they should not look directly at the sun	2 points		

Science Assessment overview: Lower Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 4: What happens to the food we eat?			
Name four parts of the digestive system	4 points		Kirsteen Andrew
Name three different teeth in our mouth	3 points		
Know the part the mouth plays in the digestive system	2 points		
Know the part the stomach plays in the digestive system	2 points		
Know what we mean by food chain	2 points		
Year 4: How do some solids, liquids and gases change state?			
Name two solids	2 points		
Name two liquids	2 points		
Name two gases	2 points		
Know what the freezing point of water is	2 points		
Know the difference between condensation and evaporation	2 points		

Science Assessment overview: Lower Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 4: What is electricity and why it so important in our lives?			
Know how to set up a simple electrical circuit	4 points		
Explain what renewable energy is	2 points		
Name four ways we use electricity at home	4 points		
Name two conductors of electricity	2 points		
Name two insulators of electricity	2 points		
Year 4: How is sound created and how does it travel?			
Name four parts of the ear?	4 points		
Know that sound gets quieter the further it is from the source	2 points		
Know what pitch is	2 points		
Know what vibration is	2 points		
Know what volume is	2 points		

Science Assessment overview: Lower Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 4: How are living things grouped?			
Know how to group plants	2 points		
Know how to group animals	2 points		
Know how environments can change for good	2 points		
Know how changes to the environment can endanger living things	2 points		

Science Assessment overview: Upper Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 5: What do we know about the life cycles of humans and various animals?			
Know what happens to our bodies as we get older	4 points		
Know what we mean by the term puberty	2 points		
Understand how plants reproduce	2 points		
Understand how animals reproduce	2 points		
Know how an embryo changes during pregnancy	2 points		
Year 5: Which materials can or cannot be changed back to their original form?			
Name two materials that are irreversible when changed	2 points		
Name two materials that are reversible when changed	2 points		
Understand the difference between transparent, translucent and opaque	3 points		
Name something that can be separated through filtering, sieving or evaporating	2 points		

Science Assessment overview: Upper Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 5: What is a force and how does it impact on the way things move?			
Know what gravity is and can explain it	2 points		
Know what air resistance is	2 points		
Know what water resistance is	2 points		
Explains what friction is	2 points		
Understands how gears work	2 points		
Year 5: What do we know about the Sun, Earth, Moon and the Planets?			
Explains the relationship between the Sun and the Earth	2 points		
Explains the relationship between the moon and the Earth	2 points		
Explains how night and day are created	2 points		
Name the eight planets in order, starting from the Sun	4 points		

Science Assessment overview: Upper Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 6: How does the heart work and why is it so important?			
Name the four chambers of the heart	4 points		
Explain at least one function of the blood as its moves around the body	2 points		
Explain what pulse is	2 points		
Explain what happens to the pulse rate when we exercise	2 points		
Explain who William Harvey was	2 points		
Year 6: How are living things grouped and classified?			
Name the five kingdoms	5 points		
Name four vertebrate animals	2 points		
Name four invertebrate animals	2 points		
Explain who Carl Linnaeus was	2 points		

Science Assessment overview: Upper Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 6: How have living things on Earth changed over time?			
Explain how off-spring are often identical to their parents	2 points		
Explain how fossils have helped us understand more about evolution	2 points		
Explain how animals have adapted to suit the environment	2 points		
Explain who Charles Darwin was	2 points		
Year 6: How does electricity work and how does its power vary?			
Explain how electrical energy can vary	3 points		
Know what electrical particles are	2 points		
Know which symbols represent different part of an electrical circuit	3 points		
Know how to construct a simple series circuit	2 points		
Know that the brightness of a bulb depends on the voltage of a battery	2 points		

Science Assessment overview: Upper Key Stage 2

Key Knowledge	Weight given to question	Green or Amber according to outcomes	Red (name children needing support for this question)
Year 6: How do our eyes help us see?			
Explain how light travels	2 points		
Explain what a concave mirror is	2 points		
Explain what a convex mirror is	2 points		
Explain why a shadow is the same shape as the object that casts them	2 points		
Name three parts of the eye	3 points		