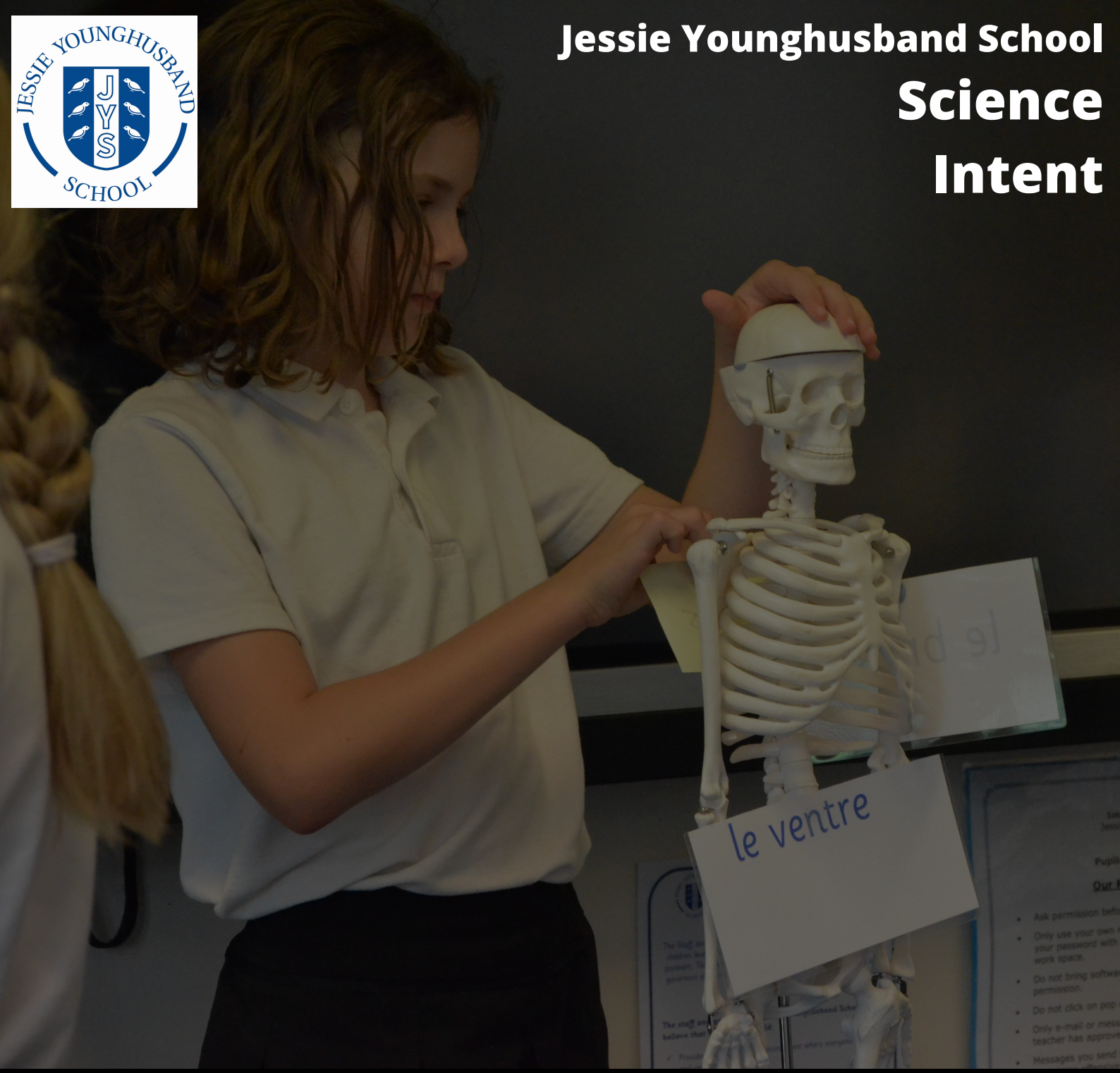
Jessie Younghusband School
Science Intent



At Jessie Younghusband School, we recognise the importance of science in every aspect of daily life. A high quality science education provides the foundations for understanding the world through the specific scientific disciplines. Science has changed our lives and it is vital that all pupils are taught essential aspects of the knowledge, methods, processes and uses of science.

Our science teaching aims to give all children an increased knowledge and understanding of our world, whilst developing specific skills associated with enquiry and thinking scientifically. We aim to develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence.

All children are encouraged to develop and use a range of skills including, making observations, using simple equipment and taking measurements, identifying and classifying, planning and investigating, as well as being encouraged to question the world around them and become independent learners. Our curriculum allows children to both reflect and build upon their prior knowledge which increases their enthusiasm for the topics, whilst embedding this procedural knowledge into the long-term memory. We place strong emphasis on the importance of practical investigative opportunities to enable our children to question and become enquiry based learners.

Specialist science vocabulary is taught and developed through all topics and this is reinforced using knowledge organisers. Children have access to key language and meanings in order to understand and readily apply this to their written, mathematical and verbal communication in science. Making a difference is an important element to our Science learning. We expose our children to interesting, diverse and relevant topics to which they can relate. At JYS, we encourage children to be inquisitive throughout their time at the school and beyond.

Science - Working Scientifically

YEAR 1

New vocab: properties, observe, test, magnifying glass, object, record, equipment

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

YEAR 2

New vocab: properties, observe, test, magnifying glass, object, record, equipment

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

YEAR 3

New vocab: prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

- To know that we can ask questions and answer them by setting up scientific enquiries.
- To know how to make relevant predictions that will be tested in a scientific enquiry.
- To 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.
- To know how to use a range of equipment to measure accurately (thermometers, data logger etc).
- To 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.
- To know how – with structured guidance - 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.

YEAR 4

New vocab: prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

- To know how to precis a scientific enquiry write-up into a brief oral discussion of what was found.
- To know that scientific enquiries can suggest relationships, but not prove whether a prediction is true.
- To 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.
- To 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).
- To know that they can draw conclusions from the findings of other scientists.
- To 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 5

New vocab: prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis, line graph, relationship, outlier

- To 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.
- To know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth).
- To know how to identify conditions that were imperfectly controlled and can explain how these might affect results.
- To know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device.

YEAR 6

New vocab: line graph, relationship, outlier

- To know how & when to repeat measurements, how to find an average of a set of measurements & how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement
- To know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.
- To know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary.
- To know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection).

JYS LEARNING PATHWAY - SCIENCE

Science - Plants

YEAR R (PRIOR LEARNING)

Vocab: plant, sense, life cycle

- To explore the natural world around them, making observations and drawing pictures of animals and plants.
- To understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

YEAR 1

Vocab: Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud Names of trees in the local area Names of garden and wild flowering plants in the local area

- To identify and name a variety of common wild and garden plants, including deciduous and evergreen trees, particularly those within our school grounds.
- To identify and describe the basic structure of a variety of common flowering plants, including trees.
- To ask questions about how and why different plants grow in our local area.

YEAR 2

Vocab: Light, shade, sun, warm, cool, water, grow, healthy, germination, seed, survival

- To observe and describe how seeds and bulbs grow into mature plants.
- To find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
- To describe the best conditions for the growth of plants and their germination.
- To set up different tests to see the effect water and light have on growth.

YEAR 3

Vocab: Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)

- To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers and understand that they all have jobs to do.
- To explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
- To discover how seeds are formed and how this feeds into a plants life cycle.
- To investigate the way in which water is transported within plants.
- To explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
- To be introduced to the idea that plants can make their own food.

KEY STAGE 3

- To learn about reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

JYS LEARNING PATHWAY - SCIENCE

Science - Living things and their habitats

YEAR R (PRIOR LEARNING)

Vocab: map, world, enviornment

- To explore the natural world around them, making observations and drawing pictures of animals and plants.
- To know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.

YEAR 2

Vocab: Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed , Names of local habitats e.g. pond, woodland etc. Names of micro-habitats e.g. under logs, in bushes etc.

- To explore and compare the differences between things that are living, dead, and things that have never been alive though sorting and classifying these things.
- To Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.
- To compare animals in familiar and unfamiliar habitats.
- To identify and name a variety of plants and animals in their habitats, (including microhabitats) focussing upon how livings things in our local are depend on each other.
- To describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

YEAR 4

Vocab: Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

- To recognise that living things can be grouped in a variety of ways.
- To explore the impact humans have upon habitats with a focus upon Chichester.
- To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
- To make and use simple keys to identify life in the school grounds (including pond).
- To recognise that environments can change and that this can sometimes pose dangers to living things.
- To investigate how the school habitats change over time.

YEAR 5

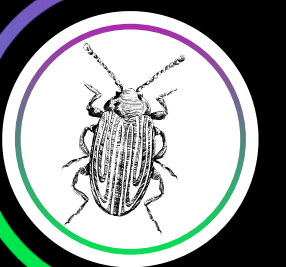
Vocab: Puberty – the vocabulary to describe body changes

- To describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- To describe the life process of reproduction in some plants and animals.
- To compare the life cycles and reproduction of differing plants / animals.

YEAR 6

Vocab: Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering

- To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- To give reasons for classifying plants and animals based on specific characteristics, particularly unfamiliar animals from a range of habitats.
- To find out about the work of Carl Linnaeus, a pioneer in classification.



KEY STAGE 3

- To learn about reproduction in humans, including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth.
- To learn about reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal.
- To learn about the differences between species.

Science - Animals including humans

YEAR R (PRIOR LEARNING)

Vocab: family, home, community

- To explore the natural world around them, making observations and drawing pictures of animals and plants.

YEAR 1

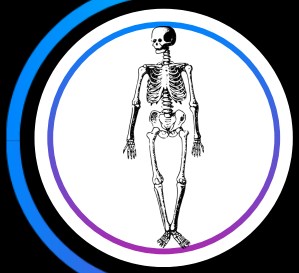
Vocab: Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, eyes, nose, ear and tongue

- To identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals with a focus upon the school grounds and what may be found in our area.
- To understand how to take care of animals in our habitat.
- To identify and name a variety of common animals that are carnivores, herbivores and omnivores.
- To describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).
- To identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense and to be able to use these in discussion.

YEAR 2

Vocab: Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types

- To notice that animals, including humans, have offspring which grow into adults.
- To find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
- To observe and measure how different animals grow and what they need to survive.



YEAR 3

Vocab: Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine

- To identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.
- To identify that humans and some other animals have skeletons and muscles for support, protection and movement, identifying and grouping animals with and without a skeleton.
- To research different food groups and design meals based on what they find out.

YEAR 4

Vocab: Classification, classification keys, environment, habitat, positive, negative, migrate, hibernate

- To describe the simple functions of the basic parts of the digestive system in humans.
- To identify the different types of teeth in humans and their simple functions.
- To compare the teeth of carnivores and herbivores explaining the differences.
- To construct & interpret a variety of food chains, identifying producers, predators & prey.
- To describe factors that may affect or disrupt a food chain and the consequences of this.

YEAR 5

Vocab: Puberty – the vocabulary to describe sexual characteristics

- To describe the changes as humans develop to old age.

YEAR 6

Vocab: Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

- To identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
- To build upon their prior knowledge and confidently describe the ways in which nutrients and water are transported within animals, including humans.

KEY STAGE 3

- To be aware of the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases., and also the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.
- To describe the structure and functions of the gas exchange system in humans, including adaptations to function, and the mechanism of breathing to move air in and out of the lungs.
- To describe the impact of exercise, asthma and smoking on the human gas exchange system.

JYS LEARNING PATHWAY - SCIENCE

Science - Forces

YEAR R (PRIOR LEARNING)

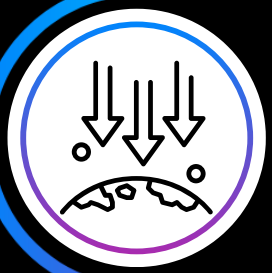
Vocab: push, pull, move, fall

- To understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

YEAR 3

Vocab: Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

- To compare how things move on different surfaces.
- To notice that some forces need contact between two objects, but magnetic forces can act at a distance.
- To observe how magnets attract or repel each other and attract some materials and not others.
- To compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.
- To describe magnets as having two poles.
- To predict whether two magnets will attract or repel each other, depending on which poles are facing.



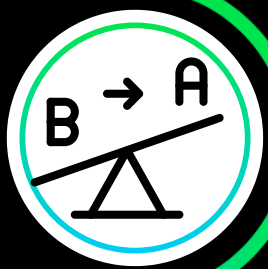
YEAR 5

Vocab: Force, push, pull, twist, contact force, non-contact force,gravity, resistance, friction, leverls, pulleys, gears, opposing

- To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
- To identify the effects of air resistance, water resistance and friction, that act between moving surfaces.
- To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

KEY STAGE 3

- To represent magnetic fields by plotting with compass, representation by field lines.
- To describe Earth's magnetism, compass and navigation.
- To explain forces as pushes or pulls, arising from the interaction between two objects.
- To be able to use force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.
- To describe movement as the turning effect of a force.
- To explain forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water.
- To know that forces can be measured in Newtons, measurements of stretch or compression as force is changed.



JYS LEARNING PATHWAY - SCIENCE

Science - Light and Sound

YEAR R (PRIOR LEARNING)

Vocab: see, hear, listen, eyes, ears

- To understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

YEAR 3

Vocab: Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous

- To recognise that they need light in order to see things and that dark is the absence of light.
- To notice that light is reflected from surfaces.
- To recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
- To recognise that shadows are formed when the light from a light source is blocked by an opaque object.
- To find patterns in the way that the size of shadows change.

YEAR 4

Vocab: Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

- To identify how sounds are made, associating some of them with something vibrating.
- To recognise that vibrations from sounds travel through a medium to the ear.
- To find patterns between the pitch of a sound and features of the object that produced it.
- To find patterns between the volume of a sound and the strength of the vibrations that produced it.
- To recognise that sounds get fainter as the distance from the sound source increases.

YEAR 5

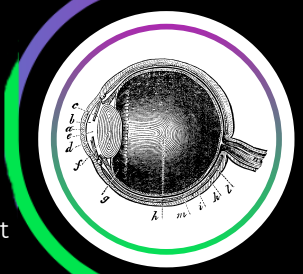
Vocab: property, light, hardness, solubility, transparency, conductivity (electrical and thermal), magnets

- To compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)

YEAR 6

Vocab: As for Year 3 - Light, plus straight lines, light rays

- To recognise that light appears to travel in straight lines.
- To use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
- To explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.



KEY STAGE 3

- To know the similarities and differences between light waves and waves in matter.
- To describe how light waves travel through a vacuum; speed of light and the transmission of light through materials
- To use a ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye.
- To know about colours and the different frequencies of light, white light and prisms
- To describe waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition.
- To describe frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound.
- To know that sound needs a medium to travel, the speed of sound in air, in water, in solids.

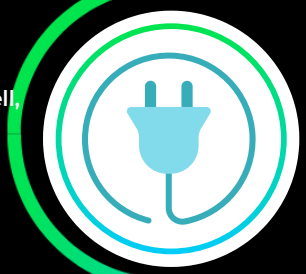
JYS LEARNING PATHWAY - SCIENCE

Science - Electricity

YEAR 4

Vocab: Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol.

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



YEAR 6

Vocab: Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

- To associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- To use recognised symbols when representing a simple circuit in a diagram.

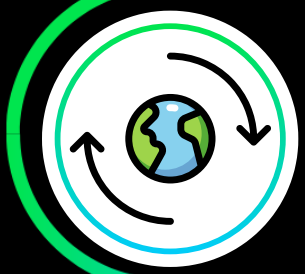
KEY STAGE 3

- To know that electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge.
- To calculate potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.
- To measure the differences in resistance between conducting and insulating components (quantitative).
- To understand what static electricity is.

JYS LEARNING PATHWAY - SCIENCE

Science - Seasonal changes, Rocks, Earth and space

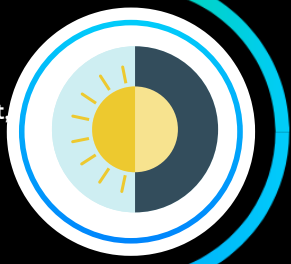
YEAR R (PRIOR LEARNING)



Vocab: Weather (sunny, rainy, windy, snowy etc.) Seasons (winter, summer, spring, autumn)

- To know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- To understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

YEAR 1



Vocab: Weather (sunny, rainy, windy, snowy etc.) Seasons (winter, summer, spring, autumn) Sun, sunrise, sunset, day length

- To observe changes across the four seasons.
- To observe and describe weather associated with the seasons and how day length varies.

YEAR 3

Vocab: Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil

- To compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
- To describe in simple terms how fossils are formed when things that have lived are trapped within rock.
- To recognise that soils are made from rocks and organic matter.

YEAR 5

Vocab: Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets

- To describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
- To describe the movement of the Moon relative to the Earth.
- To describe the Sun, Earth and Moon as approximately spherical bodies.
- To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

KEY STAGE 3

- To know that gravity is a force: weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only).
- To recognise our Sun as a star, other stars in our galaxy, other galaxies.
- To know more about the seasons and the Earth's tilt, day length at different times of year, in different hemispheres.
- To recognise a light year as a unit of astronomical distance (not time).

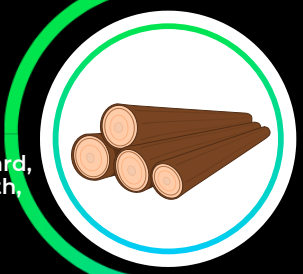
JYS LEARNING PATHWAY - SCIENCE

Science - Materials

YEAR R (PRIOR LEARNING)

Vocab: family, home, community

- To know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.



YEAR 1

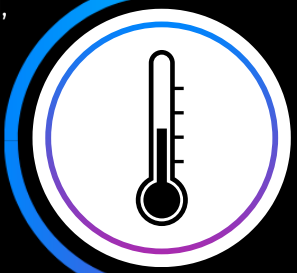
Vocab: Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through

- To distinguish between an object and the material from which it is made.
- To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.
- To describe the simple physical properties of a variety of everyday materials.
- To compare and group together a variety of everyday materials on the basis of their simple physical properties.

YEAR 2

Vocab: Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard
Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, non- reflective, flexible, rigid, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching

- To identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
- To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.



YEAR 4

Vocab: Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle

- To compare and group materials together, according to whether they are solids, liquids or gases.
- To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).
- To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- To recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity).

YEAR 5

Vocab: Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

- To compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.
- To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- To demonstrate that dissolving, mixing and changes of state are reversible changes.
- To explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

KEY STAGE 3

- To describe chemical reactions as the rearrangement of atoms, representing chemical reactions using formulae.
- To describe the terms combustion, thermal decomposition, oxidation and displacement reactions, and to define acids / alkalis .
- To explain the composition and structure of the Earth.