

Science Department Long-term sequencing Year 7

Intent

As a team we have consistent high expectations based on an ambitious constructed curriculum, designed to build confidence through core substantive knowledge and disciplinary skills. The principles of science of learning and sequencing are weaved throughout with links to prior knowledge to ultimately support knowing and remembering more. We wish to develop enquiring minds of students that question the world around them. They should be able to interpret data and information from a range of sources using mathematical techniques and comprehension skills. They will be able to follow methods to get valid results and analyse the results to reach reasoned conclusions. We expect students to be able to manipulate a range of scientific apparatus and work safely to gather their results. They should be able to gather and record results with a suitable degree of accuracy and precision. When representing results we expect pupils to be able to present their information in an appropriate table or graph.

As a department we are driven by principles of Catholic faith which means we ensure equity of access through our curriculum planning/design and that students are not disadvantaged because of their socio-economic status or SEND/ additional need. To encapsulate an enjoyment of our subject through our teaching with the aim to inspire our pupils to continue their scientific education for future learning or employment. Our curriculum enables all pupils to do and be of their best and unlocks opportunity for further education.

HALF TERM 1:

STUDENTS MUST KNOW;

Transition into science (Substantive – Prior knowledge from KS2)

To know that there are kingdoms of classification which include plants, animals, bacteria, fungi and viruses

Recognise living things produce offspring that are different and that this is called 'variation'

To be able to name some key inherited and non-inherited characteristics

To know that cross breeding can lead to an organism with desirable characteristics of both parents

To know that organisms are made from cells containing a nucleus. The nucleus contains DNA (Links to cells first unit below)

To know that this DNA is found in the nucleus of sperm (50%) and egg (50%) To understand the behaviour of light

To understand how the number of batteries or components affect output in a circuit and interpret circuit diagrams

Introduction to science (Disciplinary)

Use key scientific skills and instructions on safety to:

- Light a Bunsen burner
- Boil water and take temperature readings
- Record results in appropriate results tables
- Recognise common hazards and hazard symbols in a lab
- Recognise and use basic scientific apparatus to make measurements

HALF TERM 2:

STUDENTS MUST KNOW: Substantive

Cells; Cells

Draw and label an animal and plant cell and describe the function of the organelles of the cell.

Identify some specialised cells and say how they are adapted for their function

Describe diffusion in and out of cells

Matter: Particles

State the three states of matter and construct particle diagrams for each of these.

Use particle diagrams to explain how diffusion occurs and how gas pressure is created.

Working scientifically (Disciplinary)

Describe how to use a microscope (**Cells RP**)

Calculate magnification (**Cells**)

Draw a scientific image such as a cell (**Cells**)

Model how diffusion happens in cells (Jelly baby/agar and dye) (**Cells, Diffusion**)

Use of a stopwatch and record data in a table (**Cells, Diffusion**)

Conduct a melting point practical using stearic acid. Draw and label a melting point curve. (**Particles RP**)

Carry out a practical on evaporation, carrying out experimental procedures carefully, and recording results accurately (**Particles RP**)

HALF TERM 3:

STUDENTS MUST KNOW:

Forces: Contact and Non-contact forces (Substantive)

Identify forces in a range of everyday scenarios.

Describe the relationship with the extension of springs.

Identify the forces of friction and drag and the direction in which they act on a moving object.

Body systems: Organisation (Substantive)

State what is meant by a tissue, organs, and an organ system

Explain how the adaptations of the parts of the gas exchange system help them perform their function

State what happens to the ribcage and diaphragm during inhaling and exhaling.

Working scientifically (Disciplinary)

Comparing data in tables for composition of inhaled and exhaled air.

(Body systems RP)

Gathering results on lung volume using upturned measuring cylinders (**Body systems**)

Use a Newton meter to measure forces (**Forces**)

Plot a graph of Force against extension and identify proportionalities from a graph – Hooke's Law (**Forces**)

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

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<p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>	<p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>	<p>Mid point knowledge check through each unit End of topic test at the end of every unit.</p>
<p>HALF TERM 4: STUDENTS MUST KNOW:</p> <p><u>Matter: Elements and compounds (Substantive)</u> State what an element is and explain why certain elements are used for given roles, in terms of the properties of the elements. Explain what chemical formulae show</p> <p><u>Waves: Sound</u> Identify and annotate features of transverse and longitudinal waves. Compare speed of sound and speed of light. Link loudness to amplitude and pitch to frequency.</p> <p><u>Working scientifically (Disciplinary)</u> Use observations and data obtained to form conclusions about given elements (Elements and compounds) Calculate the percentage of a given element within a compound such as Magnesium Oxide (Elements and compounds). Interpret models of transverse and longitudinal waves (Sound) Analyse sound waves using technology (Sound)</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>	<p>HALF TERM 5: STUDENTS MUST KNOW:</p> <p><u>Reproduction; Homeostasis (Substantive)</u> Explain the main changes that take place during puberty Describe the process of fertilisation. Describe the main stages in the menstrual cycle.</p> <p><u>Reactions: Common reactions and word equations</u> Describe in detail what happens to particles in a chemical reaction. Write word equations to represent chemical reactions. Identify common reactions such as thermal decomposition.</p> <p><u>Working scientifically (Disciplinary)</u> Plan a simple experiment, stating the variables, when given a hypothesis. (Bio RP length of sycamore seeds on dispersal) (Reproduction RP) Use of a stopwatch/Record data in a table. Dissect a plant and identify the reproductive organs (Reproduction) Record observations for common reactions such as thermal decomposition (Reactions RP)</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>	<p>HALF TERM 6: STUDENTS MUST KNOW:</p> <p><u>Body systems; Organisation</u> Review of core learning identifying gaps. Reteaching following assessment.</p> <p><u>Reactions: Energy changes and Conservation of mass</u> Explain conservation of mass in chemical reactions State simply what happens in endothermic and exothermic change.</p> <p><u>The Earth: Space</u> State the main components of our Solar System. Explain why seasonal changes happen. State and explain the phases of the Moon</p> <p>Review of core learning identifying gaps Reteaching following assessment Assess prior knowledge of previous topics and review key substantive/disciplinary knowledge i.e. discussing equipment/software used to observe the night sky.</p> <p><u>Working scientifically (Disciplinary)</u> Review of core learning identifying gaps Reteaching following assessment</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>
<p>Home learning set will consist of a combination of: Seneca and self quizzing using knowledge organisers.</p>		

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KS3 Science Long-term sequencing Year 8

HALF TERM 1:

STUDENTS MUST KNOW: Substantive

Reactions: Acids and alkalis

State and name common acids and alkalis and their link to concentration and hazard symbols.

Identifying colours for universal indicator in a range of pHs.

Describe neutralisation and construct word equations with named salts.

Waves: Light

Understand the difference between reflection and refraction.

Describe the structure of the eye.

Explain how white light is separated.

Review of core learning identifying gaps

Reteaching following assessment

Assess prior knowledge of previous topics and review key substantive/disciplinary knowledge i.e. use of pinhole cameras, dispersion of light via prisms, etc.

How science works (disciplinary)

Use of pinhole cameras, dispersion of light via prisms, ray boxes and light diagrams displaying refraction and reflection (**Light**)

Investigation of pH using a range of universal indicators. Categorising substances using experimental observations (**Acids and Alkalis RP**)

Design an investigation on which indigestion remedy is 'better' by identifying key variables (**Acids and alkalis**). Pupils will use key literacy skills to construct detailed methods.

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

Mid point knowledge check through each unit

End of topic test at the end of every unit..

HALF TERM 2:

STUDENTS MUST KNOW: Substantive

Ecosystems: Photosynthesis and Respiration, Bioenergetics

Describe the process of photosynthesis.

Explain how the structures of the leaf make it well adapted for photosynthesis.

Describe the differences between aerobic and anaerobic respiration.

Describe what food webs show and the interdependence of organisms. Explain the link between food chains and energy.

Matter: Separation techniques

Use particle models to represent mixtures and explain dissolving.

Explain how filtration, evaporation and distillation work.

Using solubility, explain how chromatography can be used in different scenarios.

How science works (disciplinary)

Conduct practicals on various separation techniques and draw conclusions on the separation techniques required for different mixtures (**Separation techniques RP**)

Analyse chromatograms to identify substances in mixtures

(**Separation techniques**)

Follow a method to safely investigate presence of starch in plant leaf

(**Ecosystems**)

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

Mid point knowledge check through each unit

End of topic test at the end of every unit.

HALF TERM 3:

STUDENTS MUST KNOW: Substantive

Electromagnets: Electricity and magnetism

State the two types of charge. Describe what current and p.d. is and what equipment is required to measure.

Draw the magnetic field lines around a bar magnet.

Adaptation: Inheritance (Substantive)

State some resources that plants and animals compete for.

State what is meant by the term adaptation.

Explain how characteristics are inherited through and coded for by genes.

How science works (disciplinary)

Represent variation within a species using the appropriate type of graph e.g discontinuous eye colour and continuous height.

(**Adaptation**)

Construct d.c. electric circuits. (**Electricity and magnetism**)

Use an ammeter and voltmeter to measure current and p.d., respectively. (**Electricity and Magnetism**)

Using plotting compass to draw field lines around a bar magnet.

Build an electromagnet to pick up steel paperclips. (**Electricity and Magnetism**)

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

Mid point knowledge check through each unit

End of topic test at the end of every unit.

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<p>HALF TERM 4: STUDENTS MUST KNOW: <u>Substantive</u></p> <p><u>Adaptation: Evolution</u> Describe the process of evolution via natural selection.</p> <p><u>Matter: Periodic table</u> Evaluate properties of elements in groups and periods and use patterns to predict properties of elements. Predict properties of elements in Group 1, 7 and 0, writing word equations for common reactions such as displacement</p> <p><u>Energy: Energy stores and transfers</u> Compare the energy values of food and fuels. State the principle of conservation of energy. State the major stores of energy and describe energy transfer in a number of scenarios. State the difference between thermal energy and temperature.</p> <p><u>Working scientifically (Disciplinary knowledge)</u> Analyse the risks in reacting Group 1 metals in water – demo. (Periodic table RP) Write word equations to represent displacement reactions and conduct group 7 displacement reactions (Periodic table) Deduce the energy content in food (Energy)</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>	<p>HALF TERM 5: STUDENTS MUST KNOW: <u>Substantive</u></p> <p><u>Energy: Power and work done</u> Define power and compare power consumption of appliances. Define work done and describe how this is link to transferring energy between stores.</p> <p><u>Health and lifestyle: Organisation</u> Describe the components of a healthy diet and explain the role of each nutrient in the body. Describe how to test foods for starch, lipids, sugar, and protein. Explain how each part of the digestive system works in sequence. Describe the effects of lifestyle on health such as smoking.</p> <p><u>How science works (Disciplinary)</u> Safely follow a procedure to investigate the different nutrients in foods. (Health and Lifestyle) Use a range of apparatus carefully and reach valid conclusion about which foods contain which nutrients from food tests (Health and Lifestyle RP)</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>	<p>HALF TERM 6: STUDENTS MUST KNOW: <u>Substantive</u></p> <p><u>Reactions: Metals and acids</u> Compare the reactions of different metals with dilute acids. Explain the reactivity of metals according to how they react with oxygen. State the products of the reaction between metals and water.</p> <p><u>How science works (Disciplinary)</u> Use the reactivity series to explain displacement reactions. (Metals and acids RP) Explain the test for hydrogen gas (Metals and acids) Compare the reactions of metals with oxygen and with water (Metals and acids)</p> <p><u>All topics:</u> Review of core learning identifying gaps Reteaching following assessment</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>
<p>Home learning set will consist of a combination of: Seneca and self quizzing using knowledge organisers.</p>		

Stuart Bathurst Catholic High School

Science Department

Long-term sequencing KS3 Y9

HALF TERM 1:

STUDENTS MUST KNOW: Substantive

Forces: Motion and pressure

State factors that affect gas pressure.

Apply ideas of pressure to a range of situations

Define speed and interpret distance-time graphs.

Draw distance-time graphs based upon descriptions

The Earth: Rock formation

State and name the layers of the earth and compare their components and properties.

Identify the formation and key features of sedimentary, igneous and metamorphic rocks.

How science works (disciplinary)

Estimate area of foot using graph paper (to subsequently calculate pressure generated via weight) **(Motion and pressure)**

Drawing distance-time graphs based upon description of a journey

(Motion and pressure RP)

Calculating gradients of straight lines in a distance-time graph **(Motion and pressure)**

Analysing and categorising rock samples **(Rock formation)**

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

Mid point knowledge check through each unit

End of topic test at the end of every unit.

HALF TERM 2:

STUDENTS MUST KNOW: Substantive

The Earth: Atmosphere

Explain changes in the level of carbon dioxide using the carbon cycle

Explain why global warming happens.

New technology in biology: Inheritance

Know alleles are on individual chromosomes.

Describe and evaluate the process of selective breeding.

Explain in terms of genetics the differences between sexual and asexual reproduction.

Explain the use of enzymes and explain what happens to an enzyme when it denatures and why this reduces reaction rate.

How science works (disciplinary)

Use a punnet square to show what happens during a genetic cross.

(New Technology in biology RP)

Conduct and experiment to investigate a variable on the effect of enzymes. **(New Technology in biology)**

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

Mid point knowledge check through each unit

End of topic test at the end of every unit..

HALF TERM 3:

STUDENTS MUST KNOW: Substantive

Matter: Detection in chemistry

Explain how to separate mixtures by filtration and evaporation.

State what is meant by neutralisation.

Explain how paper chromatography works.

How science works (disciplinary)

Conduct a range of practicals on acids and alkalis using litmus paper and universal indicator **(Detection in Chemistry).**

Conduct a chromatography practical **(Detection in Chemistry).**

HOW THIS WILL BE ASSESSED:

Low stakes quizzing, questioning, retrieval practice and recall

Mid point knowledge check through each unit

End of topic test at the end of every unit.

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<p>HALF TERM 4: STUDENTS MUST KNOW: Substantive</p> <p><u>Matter: Turning Points in chemistry</u> State what Dalton, Thompson, and Rutherford discovered about the atom. Explain how Mendeleev devised his Periodic Table and why he left gaps in it.</p> <p><u>How science works (Disciplinary)</u> Peer review by scientists (Turning points)</p> <p>Skills unit State three variables used in a scientific investigation; control, independent and dependent Create a simple method to test a scientific question that can be followed Calculate a mean from a set of results Using data suggest a valid conclusion Identify trends and patterns from sets of tabulated data Draw a bar chart with appropriate accurate plots, scales and labels on axis. Draw a line graph with appropriate accurate plot and scales and labels on axis Calculate the Gradient of a line from a graph Identify errors within an experiment and suggest reasoned improvements Round up or down using numerical data Write data to a reasonable amount of decimal places Write data to a reasonable amount of significant figures Identify common SI units for; speed, distance, time, power, forces, energy, mass, temperature etc., Convert between standard units e.g; mm, cm, m, km Calculate percentage increase or decrease and apply to given scenarios</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit..</p>	<p>HALF TERM 5: STUDENTS MUST KNOW: Key ideas in science <u>Biology – Cells (Substantive)</u> Draw and label cells and describe the function of the organelles of the cell. Identify some specialised cells and say how they are adapted for their function State what a stem cell is and describe their uses. Describe the process of mitosis</p> <p><u>Chemistry – Atomic structure</u> Identify key components of the current model of the atom and distinguish between atoms of various elements. Compare particle models for atoms, elements, compounds and molecules and evaluate methods of separation. Begin to construct balanced symbol equations for key reactions in Chemistry based on previous KS3 substantive knowledge</p> <p><u>Physics - Energy</u> State the principle of conservation of energy. Describe energy transfers between stores. Calculate efficiency of appliances, describing sources of unwanted energy transfer. Identify materials based upon low or high thermal conductivity.</p> <p><u>How science works (Disciplinary)</u> Describe how to use a microscope and draw cells (Cells) Calculate magnification and convert between units (Cells) Plan investigational methods to separate various mixtures of substances. Identify filtration, crystallisation, distillation and chromatography as methods of separation (Atomic Structure) Apply conservation of energy to a number of practical scenarios (winding up a toy car, a swinging pendulum, etc.) (Energy)</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit..</p>	<p>HALF TERM 6: STUDENTS MUST KNOW: <u>Biology – Cells (Substantive)</u> How substances move into and out of cells membranes by; Diffusion, Osmosis, and active transport Describe how the effectiveness of exchange of substances such as gases can be increased in organisms</p> <p><u>Chemistry – The Periodic table</u> Review the arrangement of elements in the current periodic table and the disciplinary knowledge behind organisation of elements. Identify key properties of group 1 elements and their reactions in water. Identify key properties of group 7 elements and their displacement reactions. Identify key properties of group 0 elements and why they are inert.</p> <p><u>Physics - Energy</u> Define renewable, non-renewable, and reliable energy resources. Discuss how a variety of renewable and non-renewable resources produce energy. Evaluate energy resources: advantages, disadvantages, and environmental impact.</p> <p><u>How science works (Disciplinary)</u> Calculate surface area to volume ratio and explain effects on a cell, intestine, alveoli and root hair. (Cells) Predict reactions of group 1 elements in water. (The Periodic table) Plan investigational methods to investigate displacement reactions in halogens. (The Periodic table)</p> <p>HOW THIS WILL BE ASSESSED: Low stakes quizzing, questioning, retrieval practice and recall Mid point knowledge check through each unit End of topic test at the end of every unit.</p>
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