Science years 7 to 9 overviews

Click on the links below to jump to the topic summaries for years 7 to 9

	Year 7 Science		Year 8 Science		Year 9 Science	
	Teacher 1	Teacher 2	Teacher 1	Teacher 2	Teacher 1	Teacher 2
Sep	Investigation skills pt 1	Energy and Energy Transfers	Skills review	Cell biology	Energy	Ecology
Oct					Fundamental Chemistry	Energy Changes
Nov	Body systems	Investigation skills pt 2	Very tiny particles	Electricity		Cell Biology
Dec		The Periodic Table and Elements			Periodic Table	
Jan	Forces		Inheritance and Variation	Reactions		
Feb		Dynamic Earth			Nuclear Physics	Plant Biology
Mar			Waves			
Apr	Science Week theme (different each year)	Science Week theme (different each year)	Science Week theme (different each year)	Science Week theme (different each year)	Science Week theme (different each year)	Science Week theme (different each year)
May	Ecology	Dynamic Earth (continued)	Waves (continued and shared)	Waves (continued and shared)	Electricity	Metals
Jun						Human Digestive System
Jul			Space (shared)	Space (shared)	Resources (shared)	Resources (shared)
Aug						

Return to year overviews

Science Year 7

Investigation Skills

Key content

- Lab Safety
- Lab Equipment
- Types of Data and collecting data
- Variables
- Writing practical methods
- Results Tab;es
- Bar Graphs
- Scales
- Line Graphs
- Lines of Best fit

Previously studied

- KS2
  Performing simple experiments
  Observations
  Gathering and recording data – e.g. Results Tables
  Presenting data – e.g. bar graphs

Future links

- All KS4 content
- Specific attention to variables in exam questions (required practicals)

Assessment

- Paper Helicopters Required Practical
- Assessed Investigation
- End of Unit Test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Use of the word “amount” instead of being specific with units.
- The effect of changing a variable and measuring what happens

Key vocabulary

Hazard, apparatus, independent variable, dependent variable, control variable, method, observations, continuous data, categorical data, line of best fit, hypothesis

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology e.g, millimetre, centimetre
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 7

Energy and Energy Transfers

Key content

The unit covers what energy is and how it is considered to be in energy stores. Energy is transferred from one store to another

Energy
- The 8 energy stores
- The 4 energy transfer pathways
- Law of conservation of energy
- States of Matter

States of Matter and Particle Models
- Solids
- Liquid
- Gas

Transfer of energy through each state of matter
- Conduction (solids)
- Convection (fluids – liquids and gases)
- Radiation (in a vacuum and space)

Previously studied

KS2 states of matter

Future links

- Energy Calculations (KS4)
- Work done (KS4 Forces) that links Force and energy

Assessment

- Bouncy Ball Required Practical
- Changes of State Required Practical
- End of Unit Test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Not understood that energy is considered to be in stores and the energy just transfers between theses stores
- That energy can be created or destroyed.
- Distinction between the 8 energy stores and 4 energy transfer pathways

Key vocabulary

- Kinetic Energy, gravitational potential energy, elastic potential energy, thermal energy, chemical energy, nuclear energy, electrostatic energy, magnetic energy, energy transfer, solid, liquid, gas, thermal conduction, conduction, convection, radiation

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 7

Body Systems

Key content

Define cells, tissues, organs, organ systems.

Name the organs and describe the functions of each organ of the digestive system. Explain how villi are adapted for absorption in the small intestine

Name the parts and describe the job of each part, of the male and female reproductive system. Describe the journey the sperm makes to fertilise the egg.

Name the parts of the respiratory system, and what the function of each part is. Describe how alveoli are adapted for gas exchange. Practical: measuring lung volume

Describe how the circulatory system works, including blood and blood vessels.

Previously studied

KS2 – Names of common body parts; simple function of digestive and circulatory system.
processes.
Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood.
PSHE: puberty and adolescence

Future links

GCSE B1: Organisation: Human digestive system, circulatory system, respiratory system.

Exchanging substances

Assessment

Required practical: measuring lung volume
End of topic test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

Pregnancy occurs in woman's stomach

Respiration is same as breathing.

Key vocabulary

Cell	Tissue	Organ	Organ system	Enzyme	Substrate	Carbohydrates
Lipids	Proteins	Stomach	Small intestine	Large intestine	Breathing	
Gamete	Fertilisation	Ovulation				

Literacy skills development

Journey of a ham sandwich homework task

Support tables/strips for low literacy students

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 7

The Periodic Table and Elements

Key content

This provides the fundamental understanding of studying the periodic table which allows for deeper understanding through the chemistry specification.

Areas included:

- The principles of particles, metals and non-metals, reactivity of metals, physical properties of particles.
- History of the periodic table.
- Group 1 (alkali metals), group 7 (halogens), group 0
- Solubility, dissolving, removing insoluble products.

Previously studied

KS2 – everything is made of matter

KS2 – Solids, liquids, gases

Future links

- Students will revisit these concepts again, several times, to embed knowledge and understanding.
- Reactions and very tiny particles topics in year 8.
- Year 9: Fundamental concepts and The Periodic Table.
- Continued further throughout Chemistry in KS4 and 5.

Assessment

- Test 3 – Elements and the Periodic table. Alkali metal - ERT
- Required practical – reactivity of metals investigation
- HW – Choosing elements for a purpose, alkali metals, separating salt

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Table salt is the only salt.
- What is a metal and a non-metal?
- Non-metals are all gases

Key vocabulary

Soluble, insoluble, solution, solute, solvent, dissolve, separate, distil, alkali, halogen, element, periodic table

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 7

Forces

Key content

- What is a force?
- Friction
- Contact and non-Contact forces
- Types of force
  - Gravity
  - Magnetism
  - Friction
  - Upthrust
- Mass and weight
- Force Diagrams and resultant force
- Speed and calculations
- Distance time-graphs

Previously studied

KS2:
Contact and non-contact forces
Friction and resistance forces
Gravity

Future links

KS4:
Scalar and vector quantities
Newton's Laws of motion
Speed/acceleration (also done in maths)
Distance-time and velocity time graphs (also done in maths)

Assessment

- Friction Required Practical
- End of Unit Test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- The difference between mass and weight. Weight is a force and should be measured in N. General use is kg.
- Forces are acting when an object appears stationary. Only the resultant force is zero.
- Forces make an object move. They actually make an object accelerate /decelerate (this misconception occurs at KS4)

Key vocabulary

Newton, contact force, non-contact force, Resultant force, weight, mass, gravitational field strength, speed, distance, time

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 7

Dynamic Earth

Key content

- Structure of the Earth
- Composition and development of the atmosphere.
- The three rock types (Igneous, sedimentary, metamorphic)
- The rock cycle.
- The carbon cycle
- The green house effect vs. global warming
- Impacts of global warming

Previously studied

- Describe the sun, Earth and moon as approximately spherical bodies
- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties

Future links

- Photosynthesis in Y9 Topic 3 Plant Biology
- Carbon cycle in Y9 Topic 2 Ecology
- Y11 Unit 11 Atmosphere
- Y11 Unit 12 Hydrocarbons

Assessment

- Beautiful work – Summary task that's gets students combine and make link between all the areas of the topic to describe and explain why and how our Earth is Dynamic.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Global warming and the green house effect are the same thing.
- The green house effect is bad for the environment.
- Oxygen is the most common gas in the atmosphere.
- Carbon dioxide is one of the most common gases in the atmosphere.

Key vocabulary

Literacy skills development

- Being explicit with the meaning of key terms used in the topic e.g. composition.
- Etymology of metamorphic and igneous.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 7

Ecology

Key content

- This unit provides the fundamental understanding of studying cells which allows for deeper understanding through the Biology specification.

Areas included:

- Ecosystems
- Abiotic and Biotic factors.
- Food chains.
- Food webs.
- Predator – Prey relationships.
- Human impacts on Food webs.
- Sampling Methods.
- Animal adaptations.
- Plant adaptations
- Seed dispersal techniques.
- The need for Pollinators
- The Role of Zoos – Seed Banks.

Previously studied

- Food chains and habitats. The relationship between living things and their surroundings.

Future links

- Students will visit several topics again to embed knowledge and understanding:
- Communities. Abiotic & Biotic factors and Sampling methods.
- Students will use this to study Biodiversity, Land use, deforestation.

Assessment

- Sampling methods: How do we sample population size of different organisms
- Animal adaptations
- End of topic test.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Arrows show the transfer of energy and not who eats what.

Key vocabulary

Abiotic. Biotic. Producer. Primary & Secondary consumer. Tertiary consumer. Quadrat. Sampling.

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology e.g, biotic, biology, ecology
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Skills review

Key content

This unit builds on the Investigative Skills topic from year 7.

Areas included:

1. Equipment
2. Bunsen burners
3. Variables
4. Graphs
5. Means and Conclusions
6. A practical investigation into sweets or biscuits

Previously studied

- Y7 Investigative Skills
- Y7 all topics include reference to these key skills
- There is also crossover with Maths topics when carrying out graph work and analysis of results e.g. calculating means

Future links

KS4

There are required practicals in all GCSE topics, which require these skills to enable students to work safely and accurately, and to allow them to analyse their results effectively

Assessment

- Required practical choice of sweet or biscuit investigation (Marked task)

Common misconceptions (both pre-conceived and those likely to develop during teaching)

Using the term “amount” instead of “volume” or “mass”
Remember to discard anomalous results before calculating the mean from a set of data
Drawing smooth line/curve of best fit rather than joining the dots.

Key vocabulary

Hazard, Bunsen burner, independent variable, dependent variable, control variables continuous, discontinuous, line graph, bar graph, anomalous result, mean, conclusion

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology e.g, microscope, microscopy
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- Builds on year 7 skills unit promoting the independence and confidence in carrying out practical tasks essential for GCSE studies.
- Equips students with skills to analyse graphs, and draw valid conclusions which is applicable across all areas of science.

Return to year overviews

Science Year 8

Cell Biology

Key content

This unit provides the fundamental understanding of cells and the key processes that they undergo. This allows them to deepen their understanding in KS4.

Areas included:

- Animal, Plant and Bacteria cells, including the organelles in each and their roles.
- Respiration and Photosynthesis. This includes the equations for both, where they happen in the cell and which organisms undergo each reaction.
- Microscopes, including the parts, equation to work out actual size and how to convert from meter to millimetre and from millimetre to micrometre.

The assessed practical in this topic is based on writing a method for observing cells under a microscope.

Previously studied

- KS2 – Plants need sunlight to grow and use their leaves to capture sunlight.
- KS2 – Animals have a circulatory system and what is carried round in the blood which links to respiration.

Future links

- Year 9 – Animal, Plant and Bacteria cells along with Microscopes will be covered in Cell Biology. Photosynthesis will be covered in more detail in Plant Biology
- KS4 – Respiration will be covered in the circulatory topic.

Assessment

- Required practical where students will be tested on writing a method for the observation of cells under a microscope.
- An end of topic test on all of this topic.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- That plant cells have a cell wall **and** a cell membrane
- Plant cells still have mitochondria so still do respiration

Key vocabulary

- Organelle
- Cell
- Tissue
- Organ
- Organ system
- Microscope
- Resolution
- Cytoplasm
- Cell wall
- Chloroplast
- Mitochondria
- Ribosomes
- Nucleus
- Cell
- Vacuole
- Prokaryote
- Eukaryote

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology e.g, microscope, microscopy
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Very Tiny Particles

Key content

This provides the fundamental understanding of atoms, their reactions and how compounds are formed and named which allows for deeper understanding through the chemistry specification.

Areas included:

- Atoms
- Atomic structure
- History of the atom
- Compounds and mixtures
- Making compounds
- Structures
- Chemical formula
- Naming compounds

Previously studied

KS2 – everything is made of matter

Yr7 – elements and the periodic table

Future links

- Students will revisit these concepts again, several times, to embed knowledge and understanding.
  - Reactions topic in year 8.
  - Year 9: Fundamental concepts and The Periodic Table.
  - Continued further throughout Chemistry in KS4 and 5.

Assessment

Test 3 – Very tiny particles
Required practical – making compounds
HW – Converting units, particle model, substance dating

Common misconceptions (both pre-conceived and those likely to develop during teaching)

Application of the particle model, using scientific models to understand concepts. Unit conversion calculations

Difference between a compound and a mixture, chemical and physical changes.

Key vocabulary

Atom, model, particle, compound, mixture, formula, proton, neutron, electron

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Electricity

Key content

Areas included:

- Circuit components and their diagrams
- Definition and understanding of current, potential difference and resistance
- Electricity models that aid the comprehension of current, pd and resistance
- Series circuits and parallel circuits
- Static electricity

Practicals included:

- Measuring current through different elements to see if they are conductors or insulators
- Measuring potential difference
- Measuring current and pd to calculate resistance

Previously studied

- KS2 – pupils will have built circuits and lit bulbs, made buzzers ring. They may know metals are conductors and wires are made of copper.

Future links

- KS4 – series and parallel circuit rules for current, pd and resistance
  Factors affecting resistance (eg length of wire practical)

Assessment

- Required practicals
- Lesson exit tickets
- End of topic test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Electricity flows in the wires instead of current
- Conductors conduct heat (true but we are looking at electrical conductors which allow current to flow)
- Electrons move in the same direction as current

Key vocabulary

- Current (amps) – potential difference or voltage (volts) – resistance (ohms)
- Electrons – rate of flow – charge
- Conductors – insulators – static

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Inheritance and Variation

Key content

This unit provides the fundamental understanding of Variation between organisms and the inheritance of characteristics. This allows them to deepen their understanding in KS4.

Areas included:

- What variation can be caused by and how genetic variation is caused by DNA.
- The structure of DNA and it's discovery
- How differences in variation are vital for a species survival, how species can evolve over time or become extinct.

The assessed practical in this topic is based on graph drawing during the required practical looking at hand span

Previously studied

- KS2 – What inheritance and evolution is, and they have also covered what fossils are
- KS3 – That DNA is found inside of the nucleus of cells and that it controls the activity of the cell

Future links

- KS4 they will build on this content in the Variation in organisms module
- KS5 – They will look at Evolution and speciation in Topic 4 and will study the structure of DNA, transcription and Translation in Topic 2.

Assessment

- Required practical where students will be tested on their graph drawing skills when they draw a histogram during the required practical looking at the continuous variation of hand span across the class

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Evolution is the same as natural selection.
- Evolution has stopped in humans.

Key vocabulary

- Inherited characteristics
- Extinct
- Genetic Variation
- Adaptations
- Competition
- Environmental Variation
- Natural Selection
- Evolution

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Reactions

Key content

This unit provides the fundamental understanding of studying chemical reactions which allows for deeper understanding through the biology specification. Areas included:

7. Chemical v Physical reactions
8. Conservation of mass
9. Balancing equations
10. Combustion reactions
11. Fuels
12. Acids and alkalis
13. Neutralisation
14. Metals and acids
15. Metals and oxygen
16. Energy changes

Neutralisation required practical: skills covered:

Identified the correct equipment to use for the investigation; reading the scales; calculating means; writing conclusions; evaluating methods.

Previously studied

- Y7 Elements and the periodic table
- Y7 Reactivity of metals
- Y8 Atomic structure
- Y8 Compounds and mixtures
- Y8 Naming compounds.

Future links

KS4:

1) C1.1a atomic structure
2) C1.1b periodic table
3) C1.2a and C1.2b ionic and covalent bonding
4) C1.4b chemical reactions
5) C1.5 chemical changes

Assessment

- Required practical on neutralisation
- End of unit test on Reactions

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Change in mass of reactants when products are formed.
- Size of atoms

Key vocabulary

Proton neutron electron alkalis combustion neutralisation

Literacy skills development

- Modelling of key exam terminology e.g., compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Waves

Key content

Areas included:

- What waves are and the different types: transverse and longitudinal
- Properties of waves: speed, wavelength, amplitude, frequency…
- How waves behave: reflection, refraction, dispersion…
- Specific examples such as light (transverse) and sound (longitudinal) and their uses

Practicals included:

- Demoing/Using ropes and slinkies to model the different types of waves and energy transfer.
- Reflection of light using mirrors to calculate the angles of incidence and reflection.

Previously studied

KS2 – pupils will learn about sound and light but may not link this to the topic of waves.

- Sound – pitch, volume, how sound is made and heard.
- Light – how we detect it with our eyes, reflection and shadows.

Future links

KS4

- Calculations of speed, frequency, period…
- Describing methods to measure speed of a wave, frequency, etc
- Order of electromagnetic waves
- Uses and applications of EM waves

Assessment

- Required practical
- Assessed tasks
- End of topic test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Waves move matter
- Loudness and pitch are the same. Amplitude is the height from the trough to the peak.
- Sound can't travel through liquids or solids (or does so more slowly). Light can only be reflected off shiny surfaces

Key vocabulary

Transverse and longitudinal – perpendicular and parallel; Amplitude, wavelength, peak, trough, frequency, period, speed, distance; Reflect, refract, disperse; Matter and medium

Literacy skills development

- Modelling of key exam terminology eg, compare, explain, describe on lesson resources.
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology.
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- The bespoke KS3 curriculum has been designed to provide a spiral curriculum based on content learnt in KS1 and KS2. Skills lessons are incorporated into this topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.

Return to year overviews

Science Year 8

Space

Key content

- The solar system
- Weight and Gravity
- Gravity and Orbits
- Days and Years
- Seasons
- Life cycle of a Star
- Satellites and Space Exploration
- Evaluating our planet and potentials of inhabiting another planet (assessed piece of work)

Previously studied

- KS2 – Year 5 students develop their understanding of how our Earth is positioned in the solar system.
- Year 7 – forces which covered the concepts of contact and non-contact

Future links

- KS4 – Separate scientists will develop their understanding in Unit 8 of Physics.
- KS5 – Astrophysics module in AWQA

Assessment

- The main assessment for this topic is a scientific poster that students will spend 2-3 lessons on producing. This unit is positioned after the end of year exams.

Common misconceptions

- The earth is the centre of our universe (pre-conceived).
- Mars is hot (it is in fact very cold!)
- The sun is not a star (it is!)
- There is no gravity in space

Key vocabulary

- Astronomy
- Hemisphere
- Mass

Literacy skills development

- Keywords identified and broken down (etymology).
- Guided extended writing tasks
- Opportunities to read texts and interpret understanding (RLAC)

How this supports students

This topic follows the previous topics taught, developing pre-taught concepts around forces in a topic that most students find engaging. Real-life problems are explored providing the opportunity for all students to experience and discuss other planets and the problems that we currently face on Earth.

Return to year overviews

Science Year 9

Energy

Key content

This unit builds on previous understanding taught in year 7 based on where energy is stored and how it changes into different stores when actions occur.

Areas included:

- Energy stores and systems
- The 8 stores of energy and examples of each store
- Describing gravitational energy store transfer
- Describing kinetic energy store transfers
- Power including power calculations (Energy = power x time)
- Non-renewable energy sources (Coal, Oil, Gas, Nuclear and Biomass)
- Renewable energy sources (Wind, Tidal, Wave, Solar, Geothermal)

Previously studied

- Y7 – The 8 energy stores, energy transfers and the law of conservation of energy.

Future links

- KS5 – Energy transfer problems in A-level physics.

Assessment

Evaluation of energy sources

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Nuclear is non-renewable

Key vocabulary

Kinetic, gravitational potential, elastic potential, thermal, chemical, nuclear, electrostatic, coal, oil, gas, nuclear, biomass, wind, tidal, wave, solar, geothermal.

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology
- Comprehension tasks are embedded to promote the love of reading.

How this supports students

- Skills lessons incorporated into sequencing of topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.
- Multiple opportunities for independent practice following an I do, we do, you do model.

Return to year overviews

Science Year 9

Ecology

Key content

This unit provides the fundamental understanding of Earth as an ecosystem and the factors that affect population densities of organisms.

Areas included:

1. Communities and Habitats
2. The importance of adaptations to the survival of species.
3. Estimating population density.
4. Current issues surrounding species extinction.
5. Human impacts on the environment.
6. Nutrient cycling

There is one required practical that students complete in this topic.

1. Estimating population density using a transect and quadrat.

Previously studied

KS2 – Students develop their understanding of how organisms interact within an ecosystem by producing food webs and chains.

Y7 – Animal and plant adaptations to different environments including the need to conserve species. Students have also learnt how the atmosphere of the Earth has changed over time.

Future links

- KS5 – explaining how the actions of humans impact ecosystems overtime and how species are interdependent on each other.
- Climate crisis – understanding the human impacts on the climate crisis and how humans can prevent increased global warming.

Assessment

Adaptations extended writing assessed task

Accessing the impact of deforestation extended writing assessed task

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- The arrow in a food chain or web does not indicate which organisms eat other organisms. The arrows indicate the transfer of energy / biomass through organisms.
- Biotic factors are factors which have been living at some point which can affect the distribution of an organism.
- Abiotic factors have never been a-live (temperature, pH, water availability)

Key vocabulary

- Abiotic
- Adaptation
- Biotic
- Community
- Population
- Habitat
- Quadrat
- Transect
- Biomass
- Producer
- Consumer
- Eutrophication
- Respiration
- Extinction

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology
- Comprehension tasks are embedded to promote the love of reading

How this supports students

- Skills lessons incorporated into sequencing of topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.
- Multiple opportunities for independent practice following an I do, we do, you do model.

Return to year overviews

Science Year 9

Fundamental Chemistry

Key content

This unit provides a fundamental understanding of studying cells which allows for deeper understanding through the chemistry course.

Content taught in this topic includes

- Elements, Compounds and Mixtures
- Understanding Compounds
- Writing and interpreting equations
- Separating Mixtures
- Structure and Development of Atomic Structure

Previously studied

Y7: Students have studied the concept of mixtures and separating mixtures

Y8: Students have looked at atomic structure and making compounds

Future links

This topic underpins lots of concepts in KS5 chemistry that are not explicitly retaught due to time constraints.

Assessment

- 2 in-class assessed tasks to be marked by the teacher – Deducing formula of compounds; Mass of Atoms and Isotopes
- This topic is also assessed as 50% of an Assessment point assessment.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Students often believe that cells and atoms are comparable structures and not realise that cells are made up of atoms.
- Atoms can be seen through a microscope
- There is empty space between the energy levels in atoms

Key vocabulary

- Atom
- Compound
- Electron
- Element
- Mixture
- Neutron
- Products
- Crystallisation
- Filtration

Literacy skills development

- Explicit teaching of etymology of key words such as sub-atomic
- Opportunity to practise method writing for separating mixtures
- Development of Scientific literacy e.g CO_2 not CO^2

How this supports students

- Skills lessons incorporated into sequencing of topic to ensure core skills examined are revisited following spaced practice theory.
- Lessons follow a uniform structure to avoid split attention with consistency across other topics.
- Multiple opportunities for independent practice following an I do, we do, you do model.

Energy changes

Return to year overviews

Science Year 9

Cell Biology

Key content

This unit provides the fundamental understanding of studying cells which allows for deeper understanding through the biology specification.

Areas included:

1. Microscopy and magnification calculations including unit conversions and standard form.
2. Eukaryotic and Prokaryotic cell structure and function.
3. Stem cells and cell differentiation.
4. Cell division and the cell cycle.
5. Cellular transport processes (diffusion, osmosis and active transport).

There are two required practicals that students complete in this topic.

7. Using a microscope to look at cells and calculate magnification. Skills: writing a method, calculating magnification with unit conversions.
8. Investigating the effect of solute concentration of the rate of osmosis. Skills: writing a method, identifying variables, drawing a line graph, calculating percentage change, explaining results.

Previously studied

Y7 – Body systems: understanding the relationship between cell, tissue, organs and organ system.

Y8 – Cell Biology: students learnt the basic components of plant and animal cells and the function of key organelles such as nucleus, mitochondria, and chloroplasts.

Future links

- KS4 – specialised cells in the immune response and nervous system.
- KS5 – detailed ultrastructure of eukaryotic cells including the internal structures of mitochondria, chloroplasts and the different immune cells within our immune response.

Assessment

Magnification skills assessed task

Calculating SA:Vol ratio assessed task

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Osmosis is the movement of **water** NOT the movement of salt into a cell. Students often incorrectly identify that solutes move into/out of a cell (they are too big to pass through a membrane!)
- 1mm = 1000μm multiple the number of mm by 1000 to get the measurement in μm.

Key vocabulary

- Resolution
- Mitosis
- Concentration gradient
- Eukaryotic
- Prokaryotic
- Chromosomes
- Diploid
- Haploid
- Differentiation
- Specialisation
- Diffusion

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
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- Comprehension tasks are embedded to promote the love of reading

How this supports students

- Skills lessons incorporated into sequencing of topic to ensure core skills examined are revisited following spaced practice theory.
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Periodic Table

Return to year overviews

Science Year 9

Nuclear Physics

Key content

- The structure of an atom
- Mass number, atomic number and isotopes
- The three sources of radiation (alpha, beta and gamma)
- Nuclear equations
- The nature of radioactive decay in terms of half life
- Radioactive contamination
- Students will develop an understanding on how radiation can be measured using a Geiger counter.

Previously studied

- KS3 – Atomic structure, mass number, ion formation
- KS3 Maths – division by a factor of two.

Future links

KS5 – Nuclear physics

Assessment

- Extended response question on sources of radiation
- End of unit test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Although radiation can cause cell damage, there are many beneficial uses to using it.
- Light is a form of radiation.
- Isotopes are atoms with the same number of protons but different numbers of neutrons.

Key vocabulary

- Alpha
- Beta
- Gamma

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
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How this supports students

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Return to year overviews

Science Year 9

Plant biology

Key content

This unit provides the fundamental understanding of studying plant biology which allows for deeper understanding through the biology specification.

Areas included:

1) Plant tissues
2) Looking at stomata (microscopy lesson)
3) Photosynthesis and required practical into rate of photosynthesis in pondweed.
4) Plant uses of glucose
5) Limiting factors of photosynthesis
6) Transpiration and translocation

Required practical skills covered: Identified the correct equipment to use for the investigation; reading the scales; calculating means; calculating rates; writing conclusions; evaluating methods.

Previously studied

- Y7 ecosystems
- Y8 cells (including microscopy, plant cell structure, chloroplasts and photosynthesis)

Future links

KS4

- B1.2c Plants
- B2.6a reproduction

KS5

- SNAB Topic 4 plant cell structure
- SNAB Topic 5 photosynthesis

Assessment

- Required practical on photosynthesis
- End of unit test on Plant biology
- Assessed tasks

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Plants take in nutrients through their roots
- Plants breathe through their leaves
- Transpiration is the process of evaporation through leaves whereas the transpiration stream is the movement of water through the xylem vessels from roots to leaves.

Key vocabulary

Palisade cell spongy mesophyll upper epidermis palisade mesophyll stomata guard cells transpiration Translocation photosynthesis evaporation xylem phloem chloroplasts chlorophyll

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
- Teaching of explicit tier 3 vocabulary in lesson resources using etymology
- Comprehension tasks are embedded to promote the love of reading

How this supports students

- Spiral curriculum builds on prior knowledge.
- Visual representation of theory using practical investigations and demonstrations.

Return to year overviews

Science Year 9

Electricity

Key content

Areas included:

- Circuit diagrams
- Ohms law (V=IR) and resistance calculations
- Series circuit rules
- Parallel circuit rules
- Resistance in series and parallel
- Investigating resistance in a length of wire
- IV characteristics
- Uses of resistors

Practicals included:

- Resistance in series and parallel
- Investigating resistance in a length of wire
- IV characteristic of a wire, bulb and diode

Previously studied

- KS2 – pupils will have built circuits and lit bulbs, made buzzers ring.
- KS3 – circuit symbols and diagrams. Building circuits. Understanding of current, pd and resistance. Series and parallel circuits.

Future links

- KS5 – adding resistance in parallel, resistivity, electromotive force and power calculations. Electric fields

Assessment

- Resistance marked task
- Investigating resistance practical and marked task
- End of topic test

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Electricity flows in the wires instead of current
- Conductors conduct heat (true but we are looking at electrical conductors which allow current to flow)
- Electrons move in the same direction as current

Key vocabulary

- Current (amps) – potential difference or voltage (volts) – resistance (ohms)
- Electrons – rate of flow – charge
- IV characteristic

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
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How this supports students

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Return to year overviews

Science Year 9

Metals

Key content

- This unit extends on from previous bonding topic studied.

Content taught in this topic is

- Metallic Bonding
- Properties of metals and alloys
- Reactivity Series
- Extraction of metals
- Corrosion and its prevention

Previously studied

- Year 7 students came across the properties of metals and non-metals and also looked at Group 1 metals.

Future links

Elements of the metals topic is revisited again in the Resources topic in Year 10.

Assessment

- 1 marked task on reactivity series
- This topic will make up 50% of an assessment point.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Not all metals are magnetic, actually only three are magnetic Iron, nickel and cobalt.
- Not all metals are found as pure metal on Earth, most are found in rocks as metal oxides or metal carbonates which are called ores.

Key vocabulary

- Oxidation
- Reactivity Series
- Reduction

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
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How this supports students

- Skills lessons incorporated into sequencing of topic to ensure core skills examined are revisited following spaced practice theory.
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Return to year overviews

Science Year 9

Human Digestive System

Key content

- This unit provides the fundamental understanding of the principles of organisation of the digestive system.
- This includes the structure and function including adaptations of all the organs of the digestive system; including the Mouth, oesophagus, pancreas, gall bladder, small intestine and large intestine.
- This includes the structure and components of food polymers, such as Carbohydrates, Fats and Proteins.
- In relation to this, students must know all the food tests, including tests for starch – Iodine test, Protein – Biuret test, and Fat – emulsion test.
- Students must also know how complex food molecules are broken down by specific enzymes Starch – amylase. Protein – Protease and Fat – Lipase.
- Students must also know that enzymes work at a specific temperature and pH. This forms the basis of a required practical.

Previously studied

- The body breaks down the food that can contain complex substances . It takes place in a person's digestive tract or gut, a long tube that has muscly walls. This runs from the mouth all the way down to the anus.

Future links

- KS5 – Polymers of complex molecules such as starch, cellulose and proteins.
- Provides the fundamental understanding if wanting to pursue a career in healthcare (medicine, dentistry, dietetics etc.)

Assessment

- Required practical – the affect of pH on enzyme activity.
- Written Test – which forms part of group assessment.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Students believe that milk, eggs form part of a “dairy group”
- How the surface area of the small intestine is increased.

Key vocabulary

- Carbohydrates, Fats, Proteins, Minerals, Vitamins.
- Oesophagus, Stomach, Small & Large intestine. Enzymes. Amylase, Protease, Lipase

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
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How this supports students

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Return to year overviews

Science Year 9

Resources

Key content

- This unit provides students with an understanding of how lots of the materials used today have come from the Earth and how we can manage this resource sustainably.

Lessons include:

- Sustainable Development
- Providing water that is safe to drink
- Assessing environmental impact of products
- Extracting materials
- Reducing the use of raw materials

Previously studied

- Students in Year 7 have looked at the Earth and its resources

Future links

- Whilst there is no specific curriculum links this topic is important in developing students understanding amidst a global warming crisis.

Assessment

Extended writing assessed task on assessing environmental impacts.

End of unit assessment.

Common misconceptions (both pre-conceived and those likely to develop during teaching)

- Eco-Friendly means it's always good for the environment
- Water is a cheap resource

Key vocabulary

- Potable
- Alloy
- Extraction
- Manufacture
- Recycling
- Sustainable

Literacy skills development

- Modelling of key exam terminology (eg, compare, explain, describe) and extended writing (6 mark questions)
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How this supports students

- Skills lessons incorporated into sequencing of topic to ensure core skills examined are revisited following spaced practice theory.
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