



Curriculum Map

Subject: Science Year Level: 7

Great teaching will no longer mean masterful delivery of the year level curriculum, but extending the skills and knowledge and understandings of every student in every class, regardless of their starting point.

Peter Goss and Jordana Hunter: Targeted Teaching: How better use of data can improve student learning, p.5

BROAD CURRICULUM CONTENT

In Levels 7 and 8, the curriculum focus is on explaining phenomena involving science and its applications. Students explain the role of classification in ordering and organising information about living and non-living things. They classify the diversity of life on Earth into major taxonomic groups and consider how the classification of renewable and non-renewable resources depends on the timescale considered. Students classify different forms of energy, and describe the role of energy in causing change in systems, including the role of heat and kinetic energy in the rock cycle. They use and develop models including food chains, food webs and the water cycle to represent and analyse the flow of energy and matter through ecosystems and explore the impact of changing components within these systems. Students investigate relationships in the Earth-Sun-Moon system and use models to predict and explain astronomical phenomena. They explain changes in an object's motion by considering the interaction between multiple forces. Students link form and function at a cellular level and explore the organisation and interconnectedness of body systems. Similarly, they explore changes in matter at a particle level, and distinguish between chemical and physical change. Students make accurate measurements and control variables in experiments to analyse relationships between system components and explore and explain these relationships using appropriate representations. They make predictions and propose explanations, drawing on evidence to support their views.

BIG IDEAS

- Patterns, order and organisation
- Form and function
- Stability and change
- Scale and measurement
- Matter and energy

ENDURING UNDERSTANDINGS

- Science provides an empirical way of answering interesting and important questions about the biological, physical and technological world. The knowledge it produces has proved to be a reliable basis for action in our personal, social and economic lives.
- Science is a dynamic, collaborative and creative human endeavour arising from our desire to make sense of our world through exploring the unknown, investigating universal mysteries, making predictions and solving problems.
- Science knowledge is contestable and is revised, refined and extended as new evidence arises.
- Science helps us to make informed decisions about local, national and global issues
- Learning in Science helps us to develop critical and creative thinking skills and challenge ourselves to identify questions and draw evidence-based conclusions using scientific methods.
- The ability to think and act in scientific ways helps build the broader suite of capabilities, such as confident, self-motivated and active members of society.

TERM 3

TOPIC

Human Impact on Ecosystems

TIMEFRAME

10 weeks (7 weeks content, +2 weeks assessment, + 1 week feedback)

ESSENTIAL QUESTIONS

- What does it mean to be a healthy Ecosystem?
- What can make an Ecosystem unhealthy?
- What are the best ways to monitor the health of an Ecosystem?
- How do Scientists plan an investigation of the health of an Ecosystem?

- How can we collect and use evidence (data) to support our explanations?
- How do we know our data is accurate?
- How do Scientists communicate their findings?

STANDARDS ADDRESSED

Science

By the end of Level 8, students explain how evidence has led to an improved understanding of a scientific idea. They discuss how science knowledge can be applied to generate solutions to contemporary problems and explain how these solutions may impact on society. They investigate different forms of energy and explain how energy transfers and transformations cause change in simple systems. They use examples to illustrate how light forms images. They use a wave model to explain the properties of sound. They use the particle model to predict, compare and explain the physical and chemical properties and behaviours of substances. They describe and apply techniques to separate pure substances from mixtures. They provide evidence for observed chemical changes in terms of colour change, heat change, gas production and precipitate formation. They analyse the relationship between structure and function at cell, organ and body system levels. They identify and classify living things. They explain how living organisms can be classified into major taxonomic groups based on observable similarities and differences. They predict the effect of environmental changes on feeding relationships between organisms in a food web. They distinguish between different types of simple machines and predict, represent and analyse the effects of unbalanced forces, including Earth's gravity, on motion. They compare processes of rock formation, including the time scales involved, and analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They model how the relative positions of Earth, the Sun and the Moon affect phenomena on Earth.

Students identify and construct questions and problems that they can investigate scientifically and make predictions based on scientific knowledge. They plan experiments, identifying variables to be changed, measured and controlled. They consider accuracy and ethics when planning investigations, including designing field or experimental methods. Students summarise data from different sources and construct representations of their data to reveal and analyse patterns and relationships, and use these when justifying their conclusions. They explain how modifications to methods could improve the quality of their data and apply their scientific knowledge and investigation findings to evaluate claims made by others. They use appropriate scientific language, representations and simple word equations to communicate science ideas, methods and findings.

Mathematics

Number and Algebra

Students solve problems involving the order, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving all four operations with fractions, decimals, percentages and their equivalences, and express fractions in their simplest form. Students compare the cost of items to make financial decisions, with and without the use of digital technology. They make simple estimates to judge the reasonableness of results. Students use variables to represent arbitrary numbers and connect the laws and properties of number to algebra and substitute numbers into algebraic expressions. They assign ordered pairs to given points on the Cartesian plane and interpret and analyse graphs of relations from real data. Students develop simple linear models for situations, make predictions based on these models, solve related equations and check their solutions.

Measurement and Geometry

Students use formulas for the area and perimeter of rectangles. They classify triangles and quadrilaterals and represent transformations of these shapes on the Cartesian plane, with and without the use of digital technology. Students name the types of angles formed by transversals crossing parallel lines and solve simple numerical problems involving these lines and angles. They describe different views of three-dimensional objects, and use models, sketches and digital technology to represent these views. Students calculate volumes of rectangular prisms.

Statistics and Probability

Students identify issues involving the collection of discrete and continuous data from primary and secondary sources. They construct stem-and-leaf plots and dot-plots. Students identify or calculate mean, mode, median and range for data sets, using digital technology for larger data sets. They describe the relationship between the median and mean

in data displays. Students determine the sample space for simple experiments with equally likely outcomes, and assign probabilities outcomes.

KEY SKILLS

- ☐ Explain how evidence has led to an improved understanding of a scientific idea.
- ☐ discuss how science knowledge can be applied to generate solutions to contemporary problems
- ☐ explain how these solutions may impact on society
- ☐ identify and classify living things
- ☐ explain how living organisms can be classified into major taxonomic groups based on observable similarities and differences
- ☐ predict the effect of environmental changes on feeding relationships between organisms in a food web
- ☐ analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems
- ☐ identify and construct questions and problems that they can investigate scientifically
- ☐ make predictions based on scientific knowledge
- ☐ plan experiments, identifying variables to be changed, measured and controlled
- ☐ summarise data from different sources
- ☐ construct representations of their data to reveal and analyse patterns and relationships
- ☐ use data representations, patterns and relationships when justifying their conclusions
- ☐ explain how modifications to methods could improve the quality of their data
- ☐ apply scientific knowledge and investigation findings to evaluate claims made by others
- ☐ use appropriate scientific language, representations and simple word equations to communicate science ideas, methods and findings

DEEP UNDERSTANDINGS

Science

Science as a Human Endeavour

- ☐ Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across the disciplines and practice of science (VCSSU089) (End of Level 8)
- ☐ Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (VCSSU090) (End of Level 8)
- ☐ Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people's lives (VCSSU073) (End of Level 6)
- ☐ Science knowledge helps people to understand the effects of their actions (VCSSU056) (End of Level 4)
- ☐ People use science in their daily lives (VCSSU041) (End of Level 2)

Classification and adaptations

- ☐ There are differences within and between groups of organisms; classification helps organise this diversity(VCSSU091) (Level 7/8)
- ☐ Living things have structural features and adaptations that help them to survive in their environment (Level 5/6)
- ☐ Living things can be grouped on the basis of observable features and can be distinguished from non-living things (VCSSU057) (Level 3/4)
- ☐ Living things have a variety of external features and live in different places where their basic needs, including food, water and shelter, are met(VCSSU042) (Level F/2)

Ecosystems

- ☐ Interactions between organisms can be described in terms of food chains and food webs and can be affected by human activity (VCSSU093) (Level 7/8)
- ☐ The growth and survival of living things are affected by the physical conditions of their environment(VCSSU075) (Level 5/6)
- ☐ Different living things have different life cycles and depend on each other and the environment to survive(VCSSU058) (Level 3/4)
- ☐ Living things grow, change and have offspring similar to themselves (VCSSU043) (Level F/2)

Science Inquiry

QUESTIONING AND PREDICTING

- ☐ Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge (End of Level 8)

- ☐ With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be based on previous experiences or general rules (End of Level 6)
- ☐ With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge (End of Level 4)
- ☐ Respond to and pose questions, and make predictions about familiar objects and events (End of Level 2)

PLANNING AND CONDUCTING

Planning

- ☐ Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (End of Level 8)
- ☐ With guidance, plan appropriate investigation types to answer questions or solve problems and use equipment, technologies and materials safely, identifying potential risks (End of Level 6)
- ☐ Suggest ways to plan and conduct investigations to find answers to questions including consideration of the elements of fair tests (End of Level 4)
- ☐ Participate in guided investigations, including making observations using the senses, to explore and answer questions (End of Level 2)

Conducting

- ☐ In fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task (End of Level 8)
- ☐ Decide which variables should be changed, measured and controlled in fair tests and accurately observe, measure and record data (End of Level 6)
- ☐ Safely use appropriate materials, tools, equipment and technologies (End of Level 4)

RECORDING AND PROCESSING

- ☐ Construct and use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships (End of Level 8)
- ☐ Construct and use a range of representations, including tables and graphs, to record, represent and describe observations, patterns or relationships in data (End of Level 6)
- ☐ Use formal measurements in the collection and recording of observations (End of Level 4)
- ☐ Use a range of methods including tables and column graphs to represent data and to identify patterns and trends (End of Level 4)
- ☐ Use informal measurements in the collection and recording of observations (End of Level 2)
- ☐ Use a range of methods, including drawings and provided tables, to sort information (End of Level 2)

ANALYSING AND EVALUATING

Analysing

- ☐ Use scientific knowledge and findings from investigations to identify relationships, evaluate claims and draw conclusions (End of Level 8)
- ☐ Compare data with predictions and use as evidence in developing explanations (End of Level 6)
- ☐ Compare results with predictions, suggesting possible reasons for findings (End of Level 4)
- ☐ Compare observations and predictions with those of others (End of Level 2)

Evaluating

- ☐ Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method (End of Level 8)
- ☐ Suggest improvements to the methods used to investigate a question or solve a problem (End of Level 6)
- ☐ Reflect on an investigation, including whether a test was fair or not (End of Level 4)

COMMUNICATING

- ☐ Communicate ideas, findings and solutions to problems including identifying impacts and limitations of conclusions and using appropriate scientific language and representations (End of Level 8)
- ☐ Communicate ideas and processes using evidence to develop explanations of events and phenomena and to identify simple cause-and-effect relationships (End of Level 6)
- ☐ Represent and communicate observations, ideas and findings to show patterns and relationships using formal and informal scientific language (End of Level 4)
- ☐ Represent and communicate observations and ideas about changes in objects and events in a variety of ways (End of Level 2)

Mathematics

Number and Algebra

- ☐ Solve problems involving the order, addition and subtraction of integers (End of Level 7)
- ☐ Solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts (End of Level 6)
- ☐ Solve simple problems involving the four operations using a range of strategies including digital technology. Estimate to check the reasonableness of answers and approximate answers by rounding. (End of Level 5)
- ☐ Choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context (End of Level 4)
- ☐ Recognise the connection between addition and subtraction, and solve problems using efficient strategies for multiplication with and without the use of digital technology (End of Level 3)
- ☐ perform simple addition and subtraction calculations, using a range of strategies (End of Level 2)

Statistics and Probability

- ☐ Identify issues involving the collection of discrete and continuous data from primary and secondary sources. Construct stem-and-leaf plots and dot-plots. Identify or calculate mean, mode, median and range for data sets, using digital technology for larger data sets. Describe the relationship between the median and mean in data displays. (End of Level 7)
- ☐ Interpret and compare a variety of data displays, including displays for two categorical variables. Analyse and evaluate data from secondary sources (End of Level 6)
- ☐ Pose questions to gather data and construct various displays appropriate for the data, with and without the use of digital technology. Compare and interpret different data sets. (End of Level 5)
- ☐ Describe different methods for data collection and representation, and evaluate their effectiveness. Construct data displays from given or collected data, with and without the use of digital technology. (End of Level 4)
- ☐ Carry out simple data investigations for categorical variables. Interpret and compare data displays. (End of Level 3)
- ☐ Collect data from relevant questions to create lists, tables and picture graphs with and without the use of digital technology. Interpret data in context (End of Level 2)

KEY KNOWLEDGE

- ☐ The disciplines of Science are interconnected and can scientific skills and knowledge can be used to solve contemporary problems
- ☐ The systems and skills of identifying and classifying living things into major taxonomic groups based on observable similarities and differences
- ☐ Changes in environmental factors, abiotic and biotic, that can affect feeding relationships between organisms in a food web
- ☐ Sustainable use of resources depends on the way they are formed and cycle through Earth systems
- ☐ Questions and problems can be constructed so that they can investigate scientifically
- ☐ Predictions based on scientific knowledge can be made when the variables are identified
- ☐ How to plan experiments, identifying variables to be changed, measured and controlled
- ☐ summarise data from different sources – Field Investigation
- ☐ How to construct representations of their data to reveal and analyse patterns and relationships – Tables and Graphs using digital and non-digital tools
- ☐ Repeated results with the calculation of mean, median or mode can help improve the quality of the data collected
- ☐ Conclusions need to be justified using data representations, patterns and relationships
- ☐ Modifications to methods that could improve the quality of their data
- ☐ How to apply scientific knowledge and investigation findings to evaluate claims made by others
- ☐ Appropriate scientific language, representations and simple word equations to communicate science ideas, methods and findings

CAPABILITIES and DISPOSITIONS

Critical and Creative Thinking

Questions and Possibilities

- Consider how to approach and use questions that have different elements, including factual, temporal and conceptual elements ([VCCCTQ032](#)) (End of Level 8)
- Examine how different kinds of questions can be used to identify and clarify information, ideas and possibilities ([VCCCTQ021](#)) (End of Level 6)
- Construct and use open and closed questions for different purposes ([VCCCTQ010](#)) (End of Level 4)
- Identify, describe and use different kinds of question stems to gather information and ideas ([VCCCTQ001](#)) (End of Level 2)

- Suspend judgements temporarily and consider how preconceptions may limit ideas and alternatives(VCCCTQ033) (End of Level 8)
- Experiment with alternative ideas and actions by setting preconceptions to one side (VCCCTQ022) (End of Level 6)
- Explore reactions to a given situation or problem and consider the effect of pre-established preferences(VCCCTQ011) (End of Level 4)
- Consider personal reactions to situations or problems and how these reactions may influence thinking(VCCCTQ002) (End of Level 2)
- Synthesise information from multiple sources and use lateral thinking techniques to draw parallels between known and new solutions and ideas when creating original proposals and artefacts (VCCCTQ034) (End of Level 8)
- Identify and form links and patterns from multiple information sources to generate non-routine ideas and possibilities (VCCCTQ023) (End of Level 6)
- Investigate different techniques to sort facts and extend known ideas to generate novel and imaginative ideas (VCCCTQ012) (End of Level 4)
- Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities (VCCCTQ003) (End of Level 2)

Reasoning

- Examine common reasoning errors including circular arguments and cause and effect fallacies(VCCCTR035) (End of Level 8)
- Investigate common reasoning errors including contradiction and inconsistency, and the influence of context (VCCCTR024) (End of Level 6)
- Examine and use the structure of a basic argument, with an aim, reasons and conclusion to present a point of view (VCCCTR013) (End of Level 4)
- Examine words that show reasons and words that show conclusions (VCCCTR004) (End of Level 2)
- Investigate the difference between a description, an explanation and a correlation and scepticism about cause and effect (VCCCTR036) (End of Level 8)
- Consider the importance of giving reasons and evidence and how the strength of these can be evaluated (VCCCTR025) (End of Level 6)
- Distinguish between main and peripheral ideas in own and others information and points of view(VCCCTR014) (End of Level 4)
- Compare and contrast information and ideas in own and others reasoning (VCCCTR005) (Level 2)
- Investigate when counter examples might be used in expressing a point of view (VCCCTR037) (End of Level 8)
- Consider when analogies might be used in expressing a point of view and how they should be expressed and evaluated (VCCCTR026) (End of Level 6)
- Investigate why and when the consequences of a point of view should be considered (VCCCTR015) (End of Level 4)
- Consider how reasons and examples are used to support a point of view and illustrate meaning(VCCCTR006) (End of Level 2)
- Consider how to settle matters of fact and matters of value and the degree of confidence in the conclusions (VCCCTR038) (End of Level 8)
- Examine the difference between valid and sound arguments and between inductive and deductive reasoning, and their degrees of certainty(VCCCTR027) (End of Level 6)
- Identify and use 'If, then...' and 'what if...' reasoning(VCCCTR016) (End of Level 4)
- Examine how to select appropriate criteria and how criteria are used in clarifying and challenging arguments and ideas (VCCCTR039) (End of Level 8)
- Explore what a criterion is, different kinds of criteria, and how to select appropriate criteria for the purposes of filtering information and ideas (VCCCTR028) (End of Level 6)
- Explore distinctions when organising and sorting information and ideas from a range of sources(VCCCTR017) (End of Level 4)

Metacognition

- Consider a range of strategies to represent ideas and explain and justify thinking processes to others (VCCCTM040) (End of Level 8)
- Investigate thinking processes using visual models and language strategies (VCCCTM029) (End of Level 6)
- Consider concrete and pictorial models to facilitate thinking, including a range of visualisation strategies (VCCCTM018) (End of Level 4)
- Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and self (VCCCTM007) (End of Level 2)
- Examine a range of learning strategies and how to select strategies that best meet the requirements of a task (VCCCTM041) (End of Level 8)
- Examine learning strategies, including constructing analogies, visualising ideas, summarising and paraphrasing information and reflect on the application of these strategies in different situations (VCCCTM030) (End of Level 6)
- Examine an increased range of learning strategies, including visualisation, note-taking, peer instruction and incubation, and reflect on how these can be applied to different tasks to reach a goal (VCCCTM019) (End of Level 4)
- Explore some learning strategies, including planning, repetition, rewording, memorisation and use of mnemonics (VCCCTM008) (End of Level 2)
- Consider how problems can be segmented into discrete stages, new knowledge synthesised during problem-solving and criteria used to assess emerging ideas and proposals (VCCCTM042) (End of Level 8)
- Investigate how ideas and problems can be disaggregated into smaller elements or ideas, how criteria can be used to identify gaps in existing knowledge, and assess and test ideas and proposals (VCCCTM031) (End of Level 6)
- Investigate a range of problem-solving strategies, including brainstorming, identifying, comparing and selecting options, and developing and testing hypotheses (VCCCTM020) (End of Level 4)
- Investigate ways to problem-solve, using egocentric and experiential language (VCCCTM009) (End of Level 2)

ASSESSMENT

Formative: (Details are in the learning sequence)

Principles:

- Students work with and learn from other students
- Students give feedback to their peers and receive feedback from their peers
- Students give feedback to their teacher and receive accurate, timely and relevant feedback from their teacher
- Students reflect using the metalanguage of the subject (and the specific topic)

Summative assessment:

Students will write a Field Investigation Report on the health of the Heatherton Road Wetlands

Exit 1 –

Design, Plan and Conduct an Investigation on the health of the Freshwater Ecosystem.

Record and Process data related to this investigation

Exit 2 –

Analyse relationships between the abiotic and biotic factors in the ecosystem to determine possible outcomes for the health of the Ecosystem

Exit 3 –

Evaluate and explain the health of the Ecosystem using the data collected to support your verdict.

Propose changes to human behaviours that can maintain or change the health of the Ecosystem.