


The Australian Curriculum

Subjects	Science
Year levels	Year 9

Year 9 Content Descriptions

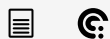
Science Understanding

Biological sciences

Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their [environment](#) ([ACSSU175 - Scootle](#) )

Elaborations

describing how the requirements for life (for example oxygen, nutrients, water and removal of waste) are provided through the coordinated function of body systems such as the respiratory, circulatory, digestive, nervous and excretory systems



explaining how body systems work together to maintain a functioning body using models, flow diagrams or simulations



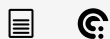
identifying responses using nervous and endocrine systems




investigating the response of the body to changes as a result of the presence of micro-organisms



investigating the effects on humans of exposure to electromagnetic radiations such as X-rays and microwaves

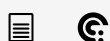


Ecosystems consist of communities of interdependent organisms and abiotic components of the [environment](#); [matter](#) and energy flow through these systems ([ACSSU176 - Scootle](#) )

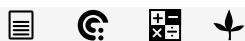


Elaborations

exploring interactions between organisms such as predator/prey, parasites, competitors, pollinators and disease



examining factors that affect population sizes such as seasonal changes, destruction of habitats, introduced species




considering how energy flows into and out of an ecosystem via the pathways of food webs, and how it must be replaced to maintain the sustainability of the system



investigating how ecosystems change as a result of events such as bushfires, drought and flooding

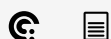


Chemical sciences

All matter is made of atoms that are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms ([ACSSU177 - Scootle](#) )

Elaborations

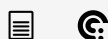
describing and modelling the structure of atoms in terms of the nucleus, protons, neutrons and electrons




comparing the mass and charge of protons, neutrons and electrons



describing in simple terms how alpha and beta particles and gamma radiation are released from unstable atoms



Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed ([ACSSU178 - Scootle](#) )

Elaborations

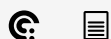
identifying reactants and products in chemical reactions



modelling chemical reactions in terms of rearrangement of atoms



describing observed reactions using word equations




considering the role of energy in chemical reactions



recognising that the conservation of mass in a chemical reaction can be demonstrated by simple chemical equations



Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer ([ACSSU179 - Scootle](#) )



Elaborations

investigating reactions of acids with metals, bases, and carbonates



investigating a range of different reactions to classify them as exothermic or endothermic



recognising the role of oxygen in combustion reactions and comparing combustion with other oxidation reactions




comparing respiration and photosynthesis and their role in biological processes



describing how the products of combustion reactions affect the environment



Earth and space sciences

The [theory](#) of plate tectonics explains global patterns of geological activity and continental movement ([ACSSU180 - Scootle](#) )



Elaborations

recognising the major plates on a world map



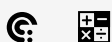
modelling sea-floor spreading



relating the occurrence of earthquakes and volcanic activity to constructive and destructive plate boundaries



considering the role of heat energy and convection currents in the movement of tectonic plates



relating the extreme age and stability of a large part of the Australian continent to its plate tectonic history



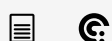
Physical sciences

Energy transfer through different mediums can be explained using wave and particle models

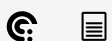
[\(ACSSU182 - Scootle\)](#)

Elaborations

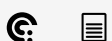
exploring how and why the movement of energy varies according to the medium through which it is transferred



discussing the wave and particle models and how they are useful for understanding aspects of phenomena



investigating the transfer of heat in terms of convection, conduction and radiation, and identifying situations in which each occurs



understanding the processes underlying convection and conduction in terms of the particle model



investigating factors that affect the transfer of energy through an electric circuit




exploring the properties of waves, and situations where energy is transferred in the form of waves, such as sound and light



Science as a Human Endeavour

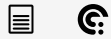
Nature and development of science

Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community ([ACSHE157 - Scootle](#) )

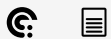


Elaborations

investigating the historical development of models of the structure of the atom



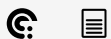
investigating how the theory of plate tectonics developed, based on evidence from sea-floor spreading and occurrence of earthquakes and volcanic activity



considering how ideas about disease transmission have changed from medieval time to the present as knowledge has developed




investigating the work of scientists such as Ernest Rutherford, Pierre Curie and Marie Curie on radioactivity and subatomic particles



investigating how models can be used to predict the changes in populations due to environmental changes, such as the impact of flooding or fire on rabbit or kangaroo populations



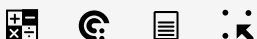
Advances in scientific understanding often rely on developments in [technology](#) and technological advances are often linked to scientific discoveries ([ACSHE158 - Scootle](#) )

Elaborations

considering how common properties of electromagnetic radiation relate to its uses, such as radar, medicine, mobile phone communications and microwave cooking

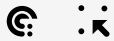


investigating technologies involved in the mapping of continental movement



considering how the development of imaging technologies have improved our understanding of the

functions and interactions of body systems

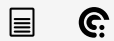


Use and influence of science

People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities ([ACSHE160 - Scootle](#))

Elaborations

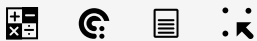
using knowledge of science to test claims made in advertising or expressed in the media



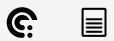
investigating how technologies using electromagnetic radiation are used in medicine, such as in the detection and treatment of cancer



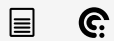
investigating the use of nanotechnology in medicine, such as the delivery of pharmaceuticals



describing how science is used in the media to explain a natural event or justify actions



evaluating claims relating to products such as electrical devices, fuels, indigestion tablets



considering the impact of technological advances developed in Australia, such as the cochlear implant and bionic eye



considering how communication methods are influenced by new mobile technologies that rely on electromagnetic radiation



considering the impacts of human activity on an ecosystem from a range of different perspectives



recognising aspects of science, engineering and technology within careers such as medicine, medical technology, telecommunications, biomechanical engineering, pharmacy and physiology



Values and needs of contemporary society can influence the focus of scientific [research \(ACSHE228 - Scootle !\[\]\(96cc62f861fdd6e50510c0224a756dff_img.jpg\)](#))



Elaborations

considering how technologies have been developed to meet the increasing needs for mobile communication



investigating how scientific and technological advances have been applied to minimising pollution from industry



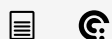
considering how choices related to the use of fuels are influenced by environmental considerations



investigating the work of Australian scientists such as Fiona Wood and Marie Stoner on artificial skin



considering safe sound levels for humans and implications in the workplace and leisure activities



investigating contemporary science issues related to living in a Pacific country located near plate boundaries, for example Japan, Indonesia, New Zealand



Science Inquiry Skills

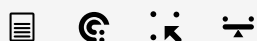
Questioning and predicting

Formulate questions or hypotheses that can be investigated scientifically ([ACSIS164 - Scootle !\[\]\(fd47dc3c71882b0b4a62715dd757d994_img.jpg\)](#))

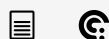


Elaborations

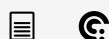
using internet research to identify problems that can be investigated



evaluating information from secondary sources as part of the research process



revising and refining research questions to target specific information and data collection or finding a solution to the specific problem identified



developing ideas from students own or others' investigations and experiences to investigate further



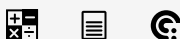
Planning and conducting

Plan, select and use appropriate [investigation](#) types, including field work and laboratory experimentation, to collect reliable [data](#); assess risk and address ethical issues associated with these methods ([AC SIS165 - Scootle](#) [↗](#))



Elaborations

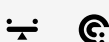
explaining the choice of variables to be controlled, changed and measured in an investigation



identifying the potential hazards of chemicals or biological materials used in experimental investigations



ensuring that any investigation involving or impacting on animals is justified, humane and considerate of each animal's needs



using modelling and simulations, including using digital technology to investigate situations and events




combining research using primary and secondary sources with students' own experimental investigation



considering how investigation methods and equipment may influence the reliability of collected data



Select and use appropriate equipment, including [digital technologies](#), to collect and record [data](#) systematically and accurately ([AC SIS166 - Scootle](#) )



Elaborations

using probes and data loggers to record information



applying specific skills for the use of scientific instruments



Processing and analysing data and information

[Analyse](#) patterns and trends in [data](#), including describing relationships between variables and identifying inconsistencies ([AC SIS169 - Scootle](#) )



Elaborations

using spreadsheets to present data in tables and graphical forms and to carry out mathematical analyses on data



describing sample properties (such as mean, median, range, large gaps visible on a graph) to predict characteristics of the larger population



designing and constructing appropriate graphs to represent data and analysing graphs for trends and patterns

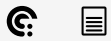


Use knowledge of scientific concepts to draw conclusions that are consistent with [evidence](#) ([AC SIS170 - Scootle](#) )

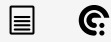


Elaborations

comparing conclusions with earlier predictions and reviewing scientific understanding where appropriate



suggesting more than one possible explanation of the data presented



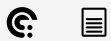
Evaluating

Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the **data** ([AC SIS171 - Scootle](#)

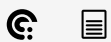


Elaborations

identifying gaps or weaknesses in conclusions (their own or those of others)



identifying alternative explanations that are also consistent with the evidence

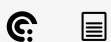


Critically **analyse** the **validity** of information in primary and secondary sources and **evaluate** the approaches used to solve problems ([AC SIS172 - Scootle](#)

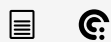


Elaborations

discussing what is meant by 'validity' and how we can evaluate the validity of information in secondary sources



researching the methods used by scientists in studies reported in the media



describing how scientific arguments are used to make decisions regarding personal and community issues



Communicating

Communicate scientific ideas and information for a particular purpose, including constructing **evidence-based** arguments and using appropriate **scientific language**, conventions and representations

(AC SIS174 - Scootle [↗](#))



Elaborations

presenting results and ideas using formal experimental reports, oral presentations, slide shows, poster presentations and contributing to group discussions



using secondary sources as well as students' own findings to help explain a scientific concept



using the internet to facilitate collaboration in joint projects and discussions

