Government of Western Australia
School Curriculum and Standards Authority

SCIENCE IN PRACTICE

Unit GE001 – Local geology

Unit overview

Year 11

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

2023/39092v2

Contents

Unit GE001 – Local Geology

Unit description

Rocks and soils are important components of the natural environment and tell a story about how the environment has changed over time. In this unit, students identify the series of geological events that have led to the soil and rock formations that can be seen today in their local area.

In this unit, students develop their science understanding and skills in geology, soil science, chemistry and data handling though a variety of practical activities and field excursions. They also develop a greater understanding of the broader aspects of geology by exploring an issue of local relevance. Students are encouraged to use information and communication technology to gather and interpret data, and to communicate their findings in a variety of ways.

This unit integrates content from the Earth Science and Chemistry science disciplines.

Unit GE001 – Local Geology is a semester long unit equivalent to one course unit. The notional time for the unit is 55 class contact hours.

Unit content

Scientific method

- research a given topic and construct questions for investigation
- determine the appropriate methodology for investigations
- design scientific investigations, including the formulation of investigable questions and/or hypotheses, materials required, selection and/or modification of a procedure to be followed to collect valid and reliable data, and identification of safety and ethical considerations
- use equipment and techniques safely, competently and methodically to collect valid and reliable data, and use equipment with precision, accuracy and consistency
- represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing of quantitative data using appropriate mathematical relationships and units, and drawing of appropriate graphs
- analyse data to identify and describe trends, patterns and relationships, and recognise errors and limitations in data
- draw conclusions consistent with the evidence and relevant to the question being investigated, identify further evidence that may be required, and recognise limitations of conclusions
- evaluate the investigative procedure, including the relevance, accuracy, validity and reliability of data, and suggest improvements
- communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats

Workplace health and safety

- use and apply workplace health and safety documents, including safety data sheets (SDS), and other relevant documents, such as standard operating procedures (SOP), when performing activities
- use appropriate scientific and technological equipment safely to gather data and information
- conduct risk assessments to identify potential hazards and prevent potential incidents and injuries

Scientific literacy

- distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas
- use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with the evidence and relevant to the question under investigation
- identify examples of where the application of scientific knowledge may have beneficial and/or harmful and/or unintended consequences
- use scientific knowledge to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability

Science understanding

Rock cycle

- describe the geology of the local environment
- classify rocks as either igneous, metamorphic or sedimentary, using their characteristics and properties
- through the rock cycle, illustrate the formation processes of each rock type and their interrelationships

Rocks to soils

- explain the influence of rock types on surrounding soils
- illustrate the processes of weathering and erosion in soil formation

Soils

- describe the characteristics of soils, including colour, texture, particle shape and size
- investigate the properties of soils, including clay content, presence of lime, permeability and porosity
- identify the links between soil characteristics and surrounding geology
- explain the link between sediment formation environments and soil characteristics

Geoheritage

- identify evidence of paleoenvironments in the local area
- outline the importance of preserving geoheritage
- describe methods used to preserve and maintain geoheritage using local or broader Western Australian examples

Course Outline

The scientific method, workplace health and safety and scientific literacy content will be taught in each unit. The content from these areas aligns with the science understanding content of the unit and are integrated throughout the learning experiences.

Weeks	Teaching point
1	**Introduction to Geology** Changes to Western Australian geological sites (paleoenvironments) over time • describe the geology of the local environment • research a given topic and construct questions for investigation • communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats • distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas • use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with the evidence and relevant to the question under investigation
2–4	**Rock cycle** Rock cycle and the formation process of each rock type • through the rock cycle, illustrate the formation processes of each rock type and their interrelationships Characteristics of rock types • classify rocks as either igneous, metamorphic or sedimentary, using their characteristics and properties Identify rocks using physical samples • describe the geology of the local environment • classify rocks as either igneous, metamorphic or sedimentary, using their characteristics and properties • use equipment and techniques safely, competently and methodically to collect valid and reliable data, and use equipment with precision, accuracy and consistency • represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing of quantitative data using appropriate mathematical relationships and units, and drawing of appropriate graphs • analyse data to identify and describe trends, patterns and relationships, and recognise errors and limitations in data • draw conclusions consistent with the evidence and relevant to the question being investigated, identify further evidence that may be required, and recognise limitations of conclusions • evaluate the investigative procedure, including the relevance, accuracy, validity and reliability of data, and suggest improvements • communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats • use and apply workplace health and safety documents, including safety data sheets (SDS), and other relevant documents, such as standard operating procedures (SOP), when performing activities • use appropriate scientific and technological equipment safely to gather data and information

Weeks	Teaching point
	• conduct risk assessments to identify potential hazards and prevent potential incidents and injuries **Assessment task 1 – Practical assessment (10%)**
5–6	**Rocks to soils** Weathering, erosion and influence of rock types on soils • describe the geology of the local environment • classify rocks as either igneous, metamorphic or sedimentary, using their characteristics and properties • through the rock cycle, illustrate the formation processes of each rock type and their interrelationships • use equipment and techniques safely, competently and methodically to collect valid and reliable data, and use equipment with precision, accuracy and consistency • represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing of quantitative data using appropriate mathematical relationships and units, and drawing of appropriate graphs • analyse data to identify and describe trends, patterns and relationships, and recognise errors and limitations in data • draw conclusions consistent with the evidence and relevant to the question being investigated, identify further evidence that may be required, and recognise limitations of conclusions • evaluate the investigative procedure, including the relevance, accuracy, validity and reliability of data, and suggest improvements • communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats • use and apply workplace health and safety documents, including safety data sheets (SDS), and other relevant documents, such as standard operating procedures (SOP), when performing activities • use appropriate scientific and technological equipment safely to gather data and information • conduct risk assessments to identify potential hazards and prevent potential incidents and injuries
7–9	**Soils** Sediment formation and transport relating to grain size • illustrate the processes of weathering and erosion in soil formation Soil characteristics and properties, and links to surrounding geology • describe the characteristics of soils, including colour, texture, particle shape and size • investigate the properties of soils, including clay content, presence of lime, permeability and porosity • identify the links between soil characteristics and the surrounding geology • explain the link between sediment formation environments and soil characteristics • use equipment and techniques safely, competently and methodically to collect valid and reliable data, and use equipment with precision, accuracy and consistency • represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing of quantitative data using appropriate mathematical relationships and units, and drawing of appropriate graphs

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10–13	**Investigating local soil samples** **Assessment task 3 – Investigation (40%)** • explain the influence of rock types on surrounding soils • illustrate the processes of weathering and erosion in soil formation • describe the characteristics of soils, including colour, texture, particle shape and size • investigate the properties of soils, including clay content, presence of lime, permeability and porosity • identify the links between soil characteristics and the surrounding geology • explain the link between sediment formation environments and soil characteristics • research a given topic and construct questions for investigation • determine the appropriate methodology for investigations • design scientific investigations, including the formulation of investigable questions and/or hypotheses, materials required, selection and/or modification of a procedure to be followed to collect valid and reliable data, and identification of safety and ethical considerations • use equipment and techniques safely, competently and methodically to collect valid and reliable data, and use equipment with precision, accuracy and consistency • represent qualitative and quantitative data in meaningful and useful ways, including the construction of appropriately labelled tables, processing of quantitative data using appropriate mathematical relationships and units, and drawing of appropriate graphs • analyse data to identify and describe trends, patterns and relationships, and recognise errors and limitations in data • draw conclusions consistent with the evidence and relevant to the question being investigated, identify further evidence that may be required, and recognise limitations of conclusions • evaluate the investigative procedure, including the relevance, accuracy, validity and reliability of data, and suggest improvements

Weeks	Teaching point
	• communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats • use and apply workplace health and safety documents, including safety data sheets (SDS), and other relevant documents, such as standard operating procedures (SOP), when performing activities • use appropriate scientific and technological equipment safely to gather data and information • conduct risk assessments to identify potential hazards and prevent potential incidents and injuries **Paleoenvironments** • identify evidence of paleoenvironments in the local area • distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas • use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with the evidence and relevant to the question under investigation
14–15	**Geoheritage** • identify evidence of paleoenvironments in the local area • outline the importance of preserving geoheritage • describe methods used to preserve and maintain geoheritage using local or broader Western Australian examples • communicate information and ideas in a variety of ways using scientific conventions and terminology, including the selection and presentation of data and ideas to convey meaning to selected audiences in written, oral and multimedia formats • distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas • use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with the evidence and relevant to the question under investigation • identify examples of where the application of scientific knowledge may have beneficial and/or harmful and/or unintended consequences • use scientific knowledge to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability **Assessment task 4 – Project (30%)**

Assessment Outline

Assessment type	Assessment type weighting	Assessment task weighting	When	Assessment task
Investigation	40%	40%	Weeks 10–13	**Assessment task 3 – Investigating local soil samples** Students work in groups to plan and conduct the investigation and summarise their findings in a live or virtual poster presentation. Each student will prepare a written report to communicate their findings. Planning, working safety and group contributions will be monitored via student logbooks, responses to reflection questions, peer and self-assessments and teacher observations. Time: 12 hours
Project	30%	30%	Weeks 14–15	**Assessment task 4 – The importance of preserving Western Australia's geoheritage** Students will work individually to analyse and synthesise information from at least two different sources to illustrate a claim by explaining the relevant scientific concepts and describing the impact and/or influence on the society. Students will use their research to produce a persuasive news report (radio, television or online). Time: 5 hours
Practical assessment	10%	10%	Week 4	**Assessment task 1 – Using the properties of rocks for identification** Students will work individually to demonstrate their ability to perform accurate tests to safely collect meaningful data. Time: 50 minutes
Supervised written assessment	20%	20%	Week 9	**Assessment task 2 – The rock cycle and soils** Students will work individually to answer short and extended answer questions on the identified syllabus content. Time: 50 minutes
Total	**100%**	**100%**		