

KIRWAN STATE HIGH SCHOOL: JUNIOR SECONDARY SCIENCE PROGRAM

YEAR 9 COURSE OVERVIEW

Term 3 (10 Weeks): Physical Science: Energy Transfers See Unit: (C2C) for extra details and resources			
Year 9 Australian Curriculum Achievement Standard: Science Understanding: By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function; respond to external changes with reference to interdependencies, energy transfers, and flows of matter.			
Science as a Human Endeavour: They describe social and technological factors that have influenced scientific developments and predict how future applications of science and may affect people's lives.			
Science Inquiry Skills: Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.			
Assessment Overview:			
Formative assessment: Week 5 Day 3		Summative assessment: Week 9 Day 2 or 3	
Guaranteed Vocabulary:	Design Question Three Strategy	Design Question Four Strategy	21st Century Skill:
Energy, Energy transfer, Electricity, Current, Voltage, Resistance, Ohm, Ampere, Conductor, Insulator, Heat, Temperature, Particle model, Convection, Conduction, Radiation, Medium, Wave, Continental drift, Plate tectonic, echo sounding, mid ocean ridge and trench, subduction,			Use of ICT's Collaboration Recording and representing data
Guaranteed Skills/Language Features:	Reading Comprehension Skill and Strategy	CCEs and Key Terms:	ICT to Enhance Learning:
Factorial Explanation Multiple Choice Short Response	Magnet summary Concept Maps	<ul style="list-style-type: none"> • Interpreting the meaning of pictures/ illustrations • Compiling results in a tabular form: Devising appropriate headings and presenting information using rows and/or columns • Translating from one form to another: Graphing • Analysing: Dissecting to ascertain and examine constituent parts and/or their relationships 	Java Applets: PheT

Learning Goals:

Strands and Sub-Strands	Australian Curriculum Content Descriptors	Kirwan High Goals
Science Understanding	<p>Energy transfer through different mediums can be explained using wave and particle models (ACSSU182)</p> <p>Elaborations:</p> <ol style="list-style-type: none"> investigating the transfer of heat in terms of convection, conduction and radiation, and identifying situations in which each occurs investigating factors that affect the transfer of energy through an electric circuit <p><i>QCCA Standard elaboration: description of models of energy transfer which can be applied to provide explanation of phenomena</i></p> <p>The theory of plate tectonics explains global patterns of geological activity and continental movement (ACSSU180)</p> <p>Elaborations:</p> <ol style="list-style-type: none"> considering the role of heat energy and convection currents in the movement of tectonic plates <p><i>QCAA standard elaboration: explanation of global features and events in terms of geological processes and timescale</i></p>	<p><i>Review of Year 8 physics:</i></p> <ul style="list-style-type: none"> Describe forms of kinetic and potential energy. Describe and represent the transformation of energy from one form into another (focus on chemical → electrical → heat/light; electrical → kinetic) Describe static electricity Describe current electricity; including <i>amperes</i> (A) Describe how an electric circuit works Describe voltage; including <i>volts</i> (V) Describe the relationship between current, voltage and circuits. Define and represent insulators and conductors of electricity and heat Define and describe resistance; including <i>ohms</i> ($R=V/I$) Define energy transfer Describe the three models of heat transfer: conduction, convection and radiation. Describe and represent conduction using particle model <p><i>Review of Year 8 earth science:</i></p> <ul style="list-style-type: none"> Describe the layers of the Earth Describe geological timescale Apply the model of heat transfer in the form of convection currents to explain the movement of tectonic plates
Science as a Human Endeavour	<p>Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community (ACSHE157)</p> <p>Advances in scientific understanding often rely on developments in and technological advances are often linked to scientific discoveries (ACSHE158)</p> <p>Elaboration:</p> <ol style="list-style-type: none"> investigating how the theory of plate tectonics developed, <p><i>QCAA standard elaboration: description of social and technological factors that have influenced scientific developments</i></p>	<ul style="list-style-type: none"> Explain how echo sounding and temperature sensing technology aided in Wegner's Continental Drift hypothesis developing into Theory of Plate tectonics.

<p>Science Inquiry Skills</p>	<p>Analyse patterns and trends in data , including describing relationships between variables and identifying inconsistencies (AC SIS169)</p> <p>Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (AC SIS170)</p> <p><i>QCAA standard elaboration: analysis of trends in data to:</i></p> <ul style="list-style-type: none"> • identify relationships between variables • reveal inconsistencies in results <p>Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the evidence (AC SIS171)</p> <p><i>QCAA standard elaboration: evaluation of others' methods and explanations from a scientific perspective</i></p> <p>Communicate scientific ideas and information for a particular purpose, including constructing evidence based arguments and using appropriate science language , conventions and representations (AC SIS174)</p>	<ul style="list-style-type: none"> • Identify relationships between current, volts and resistance by analysing given data • Evaluate of given conclusions by Identifying inconsistencies in given data about heat transfers • Construct tables, line graphs and graphical representations from given data
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Possible Habit of Mind:				
<p>Exploring Meaning of the HOM By the end of this unit students will be able to:</p> <p>Think Flexibly</p>	<p>Expanding Capacity for using the HOM By the end of this unit students will be able to:</p> <p>Understand how many solutions may relate to a single problem.</p>	<p>Increasing Alertness for the HOM By the end of this unit students will be able to:</p> <p>Actively seek out multiple solutions for a given problem by considering different perspectives.</p>	<p>Extending Values of the HOM By the end of this unit students will be able to:</p>	<p>Building Commitment towards the HOM By the end of this unit students will be able to:</p>

General Capabilities: This unit provides opportunities for students to engage in following capabilities:		
<p>Literacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Comprehending texts through listening, reading and viewing <input checked="" type="checkbox"/> Composing texts through speaking, writing and creating <input type="checkbox"/> Text knowledge <input type="checkbox"/> Grammar knowledge <input type="checkbox"/> Word knowledge <input type="checkbox"/> Visual knowledge <p>Numeracy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Estimating and calculating with whole numbers <input checked="" type="checkbox"/> Recognising and using patterns and relationships <input checked="" type="checkbox"/> Using fractions, decimals, percentages, ratios and rates 	<p>ICT</p> <ul style="list-style-type: none"> <input type="checkbox"/> Applying social and ethical protocols and practices when using ICT <input checked="" type="checkbox"/> Investigating with ICT <input type="checkbox"/> Creating with ICT <input checked="" type="checkbox"/> Communicating with ICT <input type="checkbox"/> Managing and operating ICT <p>Critical and creative thinking</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Inquiring - identifying, exploring and organising information and ideas <input checked="" type="checkbox"/> Generating ideas, possibilities and actions 	<p>Personal and social capability</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Self-awareness <input checked="" type="checkbox"/> Self-management <input checked="" type="checkbox"/> Social awareness <input checked="" type="checkbox"/> Social management <p>Ethical understanding</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Understanding ethical concepts and issues <input type="checkbox"/> Reasoning in decision making and actions <input type="checkbox"/> Exploring values, rights and responsibilities <p>Intercultural understanding</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recognising culture and developing respect

<input type="checkbox"/> Using spatial reasoning	<input type="checkbox"/> Reflecting on thinking and processes	<input type="checkbox"/> <input checked="" type="checkbox"/> Interacting and empathising with others
<input type="checkbox"/> <input checked="" type="checkbox"/> Interpreting statistical information	<input type="checkbox"/> Analysing, synthesising and evaluating reasoning and procedures	<input type="checkbox"/> Reflecting on intercultural experiences and taking responsibility
<input type="checkbox"/> <input checked="" type="checkbox"/> Using measurement		

Cross Curriculum Priorities:

<input type="checkbox"/> Aboriginal and Torres Strait Islander histories and cultures	<input type="checkbox"/> Asia and Australia's engagement with Asia	<input type="checkbox"/> <input checked="" type="checkbox"/> Sustainability
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Differentiation [for small groups or individuals]:

- Review the available data for you class to understand areas of strength and areas needing support in your students.
- Increase scaffolding to support low literacy classes and students.
- Use formative tasks to give frequent feedback and maintain your understanding of student progress.
- Include opportunities for students to demonstrate deep understanding of complex concepts.
- Monitor the effectiveness of your teaching strategies and change strategies as required. Combine strategies to create macro strategies where appropriate.

Week	Lesson 1	Lesson 2	Lesson 3
1	LEARNING SEQUENCE 1: Revising Year 8 physics <ul style="list-style-type: none"> • Describe forms of kinetic and potential energy. • Describe and represent the transformation of energy from one form into another (focus on chemical → electrical → heat/light; electrical → kinetic) 		
2	LEARNING SEQUENCE 2: Electricity <ul style="list-style-type: none"> • Define energy transfer • Describe static electricity • Describe current electricity; including <i>amperes</i> (A) • Describe how an electric circuit works • Describe voltage; including <i>volts</i> (V) • Describe the relationship between current, voltage and circuits. • Define and represent insulators and conductors of electricity • Define and describe resistance; including <i>ohms</i> ($R=V/I$) • Identify relationships between current, volts and resistance by analysing given data • Construct tables, line graphs and graphical representations from given data 		
3	LEARNING SEQUENCE 2 CONTINUED		
4	LEARNING SEQUENCE 2 CONTINUED		LEARNING SEQUENCE 3 HEAT ENERGY AND TRANSFERS <ul style="list-style-type: none"> • Define energy transfer • Describe the three models of heat transfer: conduction, convection and radiation. • Describe and represent conduction using particle model • Define and represent insulators and conductors of heat

			<ul style="list-style-type: none"> Evaluate of given conclusions by Identifying inconsistencies in given data about heat transfers Construct tables, line graphs and graphical representations from given data
5	LEARNING SEQUENCE 3: HEAT ENERGY AND TRANSFERS		Formative assessment
6	LEARNING SEQUENCE 3: HEAT ENERGY AND TRANSFERS		
7	LEARNING SEQUENCE 4: PLATE TECTONICS <ul style="list-style-type: none"> <i>Describe the layers of the Earth</i> Describe geological timescale Apply the model of heat transfer in the form of convection currents to explain the movement of tectonic plates Explain how echo sounding and temperature sensing technology aided in Wegner's Continental Drift hypothesis developing into Theory of Plate tectonics. 		
8	LEARNING SEQUENCE 4 : PLATE TECTONICS	Revision	
9	Revision	Summative part 1 Exam IA4 types	Summative part 2 stimulus response
10	Independent research project	Independent research project	Independent research project