

Physical Sciences Program 2014 YEAR 9

AUSTRALIAN CURRICULUM CONTENT DESCRIPTIONS

Science Understanding

Energy transfer through different mediums can be explained using wave and particle models (ACSSU182)

- > 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

- Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community (ACSHE157)
- Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (ACSHE158)

Use and influence of science

- People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions (ACSHE160)
- Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities (ACSHE161)
- The values and needs of contemporary society can influence the focus of scientific research (ACSHE228)

Science Inquiry Skills

Questioning and predicting

• Formulate questions or hypotheses that can be investigated scientifically (ACSIS164)

Planning and conducting

- Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS165)
- Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (ACSIS166)

Processing and analysing data and information

• Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS169)

• Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170)

Evaluating

- Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (ACSIS171)
- Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems (ACSIS172)

Communicating

• Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (ACSIS174)

temperature	compression	tinnitus	total internal reflection
thermometer	rarefaction	regular reflection	cornea
conduction	sound wave	diffuse reflection	retina
conductor	transverse wave	angle of incidence	lens
insulator	longitudinal wave	plane mirror	accommodation
convection	echo	lateral inversion	total internal reflection
radiation	frequency	refraction	myopia
	wavelength	refractive index	hyperopia
	hertz	critical angle	electromagnetic spectrum
	ultrasound	total internal reflection	radio wave
	infrasound	convex	microwave
	cochlear	concave	infrared
	eustachian tube	real image	ultra violet
	decibel	virtual image	X rays
			dispersion
			primary colour
			secondary colour
			polarised light
			analogue

Vocabulary – These terms are important in conveying your understanding in the Physical Sciences

	Content description	week	Teaching plan	References Pearson Science 9	Homework& assessment
			HEAT	Chapter 4.1	
			On completing this section of work you should be able to	P 99-105	
SHT AND SOUND	 Describe how forms of energy such as heat are transferred Explain that the way energy is transferred depends upon the medium through which it travels Outline how heat is transferred in terms of conduction, convection and radiation and describe examples of each 	1	 Distinguish between the terms heat and temperature Use the particle model to explain heat transfer by conduction and convection Use simple diagrams to illustrate the particle model and heat transfer 	P99-100 Qu 1,2,5,12 p106 Science as a Human Endeavour Temperature Scales p101 P102-104 Qu 3,4,6,7,8 Act1-Comparing materials p108 Act 2 Testing Insulators- p 109 As a controlled investigation Science Inquiry Skills	HW book 4.1 Testing insulators
HEAT LI			 Describe radiation as heat transfer by invisible waves (infrared) that can travel through a vacuum Describe some examples of heat transfer by conduction, convection and radiation 	P105-106 Qu 9,13,14,16 Act3 Comparing heat radiation p110 Chapter review p143 Relevant Qu 1,2,6,7,8	HW book 4.2 Cool cars

			SOUND	Chapter 4.2	
			On completing this section of work you	P111-117	
			should be able to		
			Describe the difference between	P111-112 Qu 1,	
	Describe situations in which		a transverse and longitudinal	Act1-Making waves p122	
	energy is transferred in the	2/3	(particle model)		
	form of waves such as with		Use the terms compression and		
	Explain how your ears		transfer by sound waves		
	convert sound to electrical		Complete simple calculations for	P112-113 Qu 9,11	
ND	interprets as sound		the speed of sound		
no					
DS	 Discuss how changes in frequency and amplitude of 		Describe the properties of waves by referring to wavelength and	P114-116	
AN	a sound wave affect the		frequency	Act2-Good vibrations p 122	
ЭНТ	pitch and intensity heard by		Define the term Hertz		
	alisterier		Explain the pitch of a sound by reference to frequency and	Qu 2,4,10,12,14,15	
EAT			wavelength	Science as a Human	
王			 Define the term echo and reverberation 	Endeavour Describe the use of science	
			reverberation	understandings to protect	
				peoples hearing p118-119	
			 Label a simple diagram to show the structure of the ear 	P117	4.3 The ear
			Describe how the human ear	Qu 8,13,17	
			collects sound energy and	Chapter review questions p143	4.4 hearing
			impulses in nerves	Qu 3,4,9,12,16	lange

	Describe how light energy is transferred. Recall that light is a form of energy that travels as an electromagnetic wave. Identify that light rays obey the law of reflection and that this can be used to produce an image in a mirror. Explain how refraction occurs and	3/4	LIGHT On completing this section of work you should be able to • Describe light as an example of an electromagnetic wave and contrast it to sound waves • • Explain the terms transparent, translucent and opaque • Distinguish between transmission absorption and reflection	Chapter 4.3 P123-129 P123-124 Qu 12 Qu11	
HEAT LIGHT AND SOUND	produces		 Use a simple diagram to show regular and diffuse reflection Use a diagram to illustrate the laws of reflection and use the terms angle of incidence and reflection Describe the properties of images in plane mirrors and why they are virtual images Explain why refraction of light rays occurs and relate this to a materials refractive index Use a simple diagram to show how refraction can cause illusions involving depth Distinguish between refraction and total internal reflection 	P124p125 P126 Qu 1,9 Act1-law of reflection p132 Qu 2,4,16 P126-127 Qu 3,7,10,17 Act2-bending light p133 P128 Qu 6 P129 Qu 14 Chapter review Qu p14310,11,13,14,15,18	HW book 4.5 reflection in a plane mirror HW book 4.6 refraction experiment 4.7 refraction and total internal reflection

 Recall that wave motion is a transfer of energy without matter, and that waves can be transverse or longitudinal Describe the electromagnetic spectrum as consisting of differing energies that include gamma radiation, X-rays, ultra violet (UV), visible light, infrared radiation, microwaves and radio waves Compare the wave lengths and frequencies of the range of the electromagnetic radiation that makes up the electromagnetic spectrum Explain how the properties of electromagnetic radiation relates to its uses Describe how electromagnetic radiation is used in medicine, such as in the detection and treatment of cancer 		 On completing this section of work you should be able to Describe the difference between a transverse and longitudinal wave using simple diagram (particle model) Describe the properties of a wave by reference to wavelength, frequency and amplitude and label these on a diagram or sketch a diagram to show this Complete simple calculations using the wave equation v=fλ to find values for frequency or wavelength. Recall that electromagnetic radiation is a special type of wave that can travel through a vacuum Recall that electromagnetic waves vary in terms of frequency and wavelength and form a spectrum Describe the energy carried in electromagnetic waves as being determined by their frequency List the range of electromagnetic waves from lowest to highest energy 	P148-157 P148-149 Qu 1, Act1 Infrared radiation p160 Qu 13,18 Qu 16 Qu 2,3, P150-156 Qu 4,10 Act 2 UV protection p161 Qu Qu 15 Qu 5,8,9,11,12,17 Chapter review Qu 1,2,5,8,10,11	HW book 5.1 the wave equation HW book 5.3 Night vision HW book 5.4 radiation dose and Bert
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	Recall that the frequency of light waves indicates its colour in the		THE VISIBLE SPECTRUM On completing this section of work you should be able to • Recall that visible light is part of the electromagnetic spectrum	Chapter 5.2 P162-167 Qu13	
RADIATION	visible spectrum	6/7	 Recall that white light is made up of separate frequencies that can be shown by dispersion State the order of visible spectra light from lowest to highest frequencies Explain how the colour of an opaque object is determined Describe how colour filters interact with visible light Describe the link between the wave model of light and polarisation 	P162-163 Qu1,2,5,6 Act1-Combining colour p168 P163-165 Qu 3,4,9,10,11,12 Qu 7	HW book 5.5 Butterflies and mobiles
ELECTROMAGNETIC RA	Outline how communications methods are influenced by new mobile technologies that rely upon electromagnetic radiation Describe how technologies have been developed to meet the increasing needs of mobile communication		 polarisation COMMUNICATIONS AND REMOTE SENSING Describe the difference between analogue and digital signals Describe how optical fibres can be used to transmit digital information Describe examples of remote sensing 	Qu 7 Chapter 5.3 P170-174 Qu 1,2 Qu 13 Act 1- Using light p177 Qu 10 Science as a Human Endeavour – Remote sensing175p	HW book 5.6 Wifi

	Describe the structure of the atom in terms of the nucleus, protons, neutrons and electrons		SIMPLE CIRCUITS On completing this section of work you should be able to	Chapter 6.1 P183-186	
ELECTRICAL ENERGY		8	 Draw a simple diagram to show the structure of an atom and the charges on the particles State the charge law Explain the difference between static and current electricity Explain what are the necessary parts for an electric circuit Recognise the standard symbols for components of an electric circuit Construct simple circuit diagrams 	Act 1 Electroscopes p188 P184 Qu 4,10,11,13 Act2 How steady are you p189 P185 Qu 5,6 Qu 7 Qu 12,14	HW book Analogies

JERGY	Describe the factors that affect the transfer of energy through an electric circuit	9	MEASURING ELECTRICITY On completing this section of work you should be able to Define the term current (I) as the rate of flow of electric energy in a circuit and that it is measured in ampere Define the term voltage (V) as a measure of electric charge (potential difference) and that is measured in volts Recognise that batteries provide portable electric energy and these cells	Chapter 6.2 P190-195 P190 Qu6 P191 Act2 Dry cell voltages p198 P191-192 Qu 7,8,11 Act1 Lemon cells p197	HW book 6.2 Reading meters
ELECTRICAL ENE			 portable electric energy and these cells may be wet cells, dry cells or photovoltaic. Define the term resistance (R) as measure of how a material resists the flow of electricity and is measured in Ohms. Explain the three factors that resistance in a circuit depends Distinguish between conductors and insulators and provide examples 	Act1 Lemon cells p197 P193 Qu 1,2,3 Qu 3 P194 Qu 4,5,13	HW book 6.3 Ohms law 6.4 Plotting Ohm's law

Describe the factors that affect the transfer of energy through an electric circuit Describe specific safety precautions with electricity Evaluate claims relating to products such as electrical device Discuss the impacts of human activity from arrange of different perspectives Describe how scientific and technological advances have minimised pollution from industre Describe how choices related to the use of fuels are influenced be environmental consideration	10 e	 PRACTICAL CICUITS On completing this section of work you should be able to Distinguish between series and parallel circuits Distinguish between AC and DC (need to refer to page 212 of text) Describe the advantages and disadvantages of serial and parallel circuits Draw simple series and parallel circuits Describe the basic arrangement of circuits in houses Describe the basic arrangement of circuits in houses Describe safety features that can be built into circuits including Earth wires, Fuses, Circuit breakers and Safety switches ELECTROMAGNETS MOTORS AND GENERATORS Define the magnet, electromagnet, electromagnet, electromagnet, electromagnet, work Discuss how different methods for generating electrical energy have advantages and disadvantages in regards to cost and environmental impact MODULE TEST 	Chapter 6.3 P199-205 Act1 Series and parallel circuits P20 P199-200 Qu 1,8,9,12,13,14,15,16 P201 Qu 2,4 Act2 Fuses p207 P201-203 Qu 5,3,10,11 Research Task- Generating Electricity and alternatives to fossil fuels as the energy source	HW book 6.5 Predicting current and voltage HW book 6.6 Keeping safe HW book 6.8 Comparing methods of power generation
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ASSESSMENT DETAILS

Assessment type	Task Description	Week	Task Weighting %
Test1	Mid module test	5	
Test 2	End of module test	10	
Teacher directed tasks	Hw, Quizzes etc	1-10	10
Research Task	Electricity generation	10	