

Assessment Task Notification

RESPECT | RESPONSIBILITY | PERSONAL BEST



Faculty: Science	Course: Stage 6 - Year 11	Time allowed: 7 weeks
Teacher: Mesina	Email: frank.mesina@det.nsw.edu.au	
Task number: 2	Title: Depth Study	
Year: 11	Due date: 16 August 2023	Weighting: 40%

Syllabus outcomes assessed:

- PH11/12-1 Develops and evaluates questions and hypotheses for scientific investigations;
 PH11/12-2 Designs and evaluates investigations in order to obtain primary and secondary data and information;
 PH11/12-3 conducts investigations to collect valid and reliable primary and secondary data and information ;
 PH11/12-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media
 PH11/12-5 analyses and evaluates primary and secondary data and information
 PH11/12-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes
 PH11/12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose
 PH11-10 explains and analyses waves and the transfer of energy by sound and light

21st Century and employment related skills:

<input checked="" type="checkbox"/>	Communication	<input checked="" type="checkbox"/>	Use of technology
<input checked="" type="checkbox"/>	Critical Thinking	<input checked="" type="checkbox"/>	Self-reflection and refinement
<input type="checkbox"/>	Creativity	<input checked="" type="checkbox"/>	Problem Solving
<input type="checkbox"/>	Collaboration	<input type="checkbox"/>	Initiative and Enterprise
<input checked="" type="checkbox"/>	Planning and Organising	<input type="checkbox"/>	Cross-Cultural Understanding

Task description:

Depth studies provide opportunities for students to pursue their interests in physics, acquire a depth of understanding, and take responsibility for their own learning. Depth studies promote differentiation and engagement, and support all forms of assessment, including assessment for, as and of learning. Depth studies allow for the demonstration of a range of Working Scientifically skills.

Students will research and demonstrate their understanding of Topic 3 in the Year 11 Physics course by constructing an examination that tests each dot point of this topic. Students will also provide an answer key.

Assessment criteria:

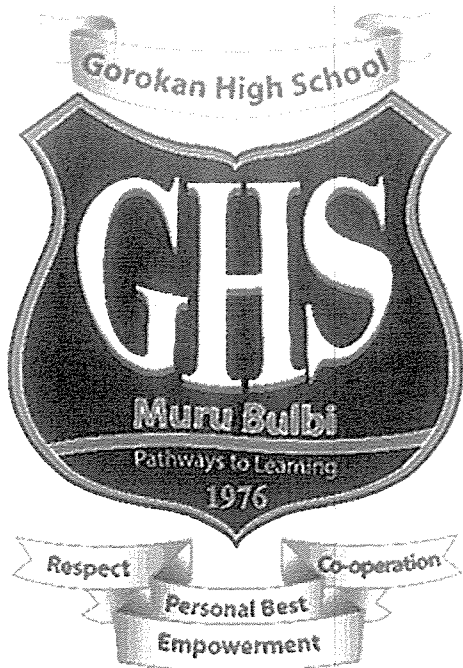
You will be assessed on your ability to: See attached criteria

Method of task submission:

Hand in to Library Wednesday 16 August 2023 (Wednesday, Term 3 Week 5)

Marking guidelines:

Grade	Descriptor	Mark
A		
B		
C		
D		
E		
N (Stages 5 and 6)		



2023
Year 11 Depth Study
Exam Creation:
Waves &
Thermodynamics

PHYSICS

General Instructions

- Board approved calculators may be used
- Write using black or blue pen
- Draw diagrams using pencil/black pen
- Computer presented document acceptable
- Write your student name at the top of every page that you submit.

Total Marks = 40%

Attempt all Questions

STUDENT
NAME_____

Year 11 Physics Depth Study Assessment Task 2023

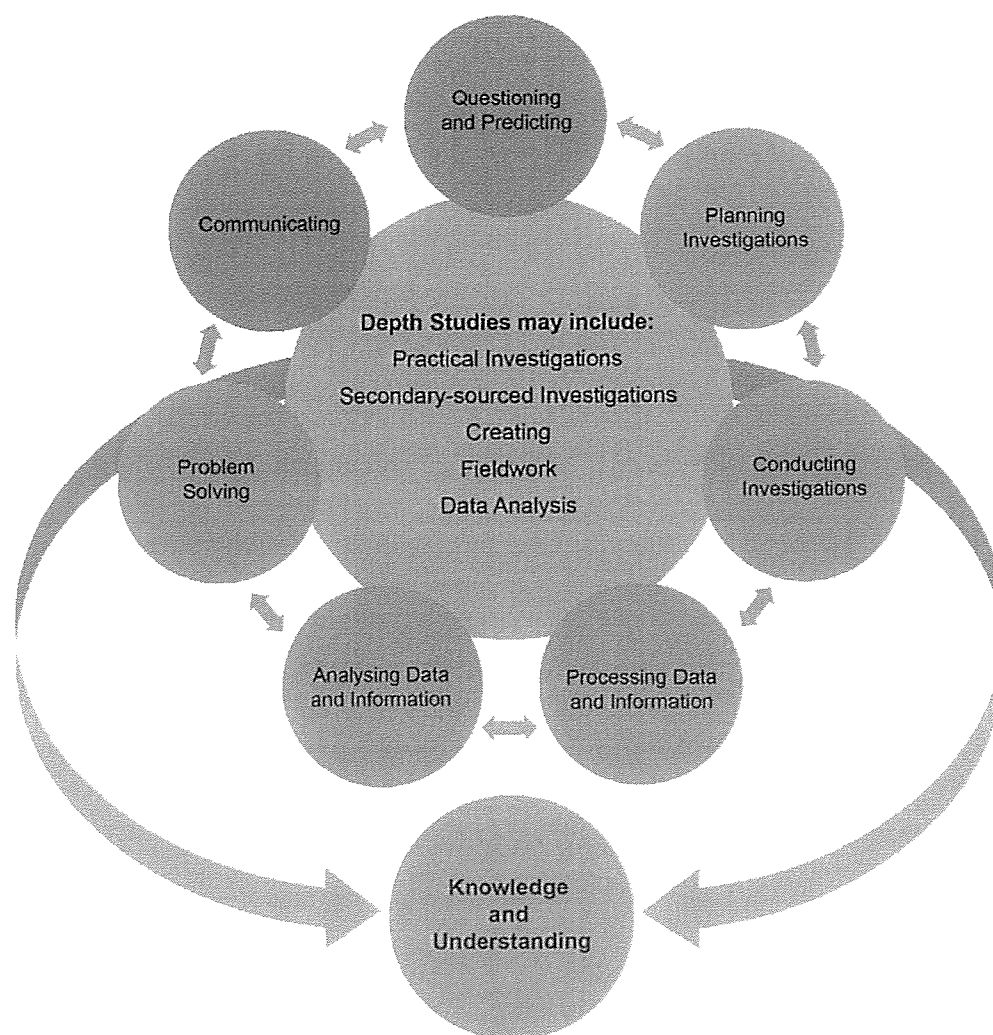
A depth study is any type of investigation/activity that a student completes individually or collaboratively that allows the further development of one or more concepts found within or inspired by the syllabus. It may be one investigation/activity or a series of investigations/activities.

Depth studies provide opportunities for students to pursue their interests in physics, acquire a depth of understanding and take responsibility for their own learning. Depth studies promote differentiation and engagement, and support all forms of assessment, including assessment for, as and of learning. Depth studies allow for the demonstration of a range of Working Scientifically skills.

The length of time for any individual study and the pedagogies employed are not prescribed. The time for the depth studies may be allocated to a single study or spread over the year and incorporate several studies depending on individual school and/or class requirements.

Requirements for Depth Studies

- A minimum of 15 hours of in-class time is allocated in both Year 11.
- At least one depth study must be included in Year 11.
- The two Working Scientifically outcomes of Questioning and Predicting and Communicating must be addressed in Year 11.



Assessment of Depth Studies must:

- address Questioning and Predicting, and Communicating skills outcomes
- address a minimum of two additional Working Scientifically skills outcomes
- include assessment of at least one Knowledge and Understanding outcome.

- A minimum of two additional Working Scientifically skills outcomes, and further development of at least one Knowledge and Understanding outcome, should be addressed in all depth studies.

Each of the seven Working Scientifically outcomes represents one of the interdependent dynamic processes that are central to the study of Science and the acquisition of scientific knowledge and skills. This course is structured to provide ongoing opportunities for students to implement these processes, particularly through the depth study provision. The following descriptions of the Working Scientifically outcomes provide further information about the skills students are expected to develop throughout the course.

Your Task:

1. You are to construct an exam that has multiple choice questions, short answer or problem solving questions based on the third topic “Waves & Thermodynamics”
2. You will have to provide an answer key for the exam you prepare.
3. There must be at least FOUR (4) problem solving/calculation questions. The rest can be multiple choice.
4. This Depth Study will not form part of your formal assessment, but must be completed as part of your course.

This task is due Wednesday Week 4 Term 3 (9 August 2023) to the Library by 8:15am.

Waves and Thermodynamics

Wave motion involves the transfer of energy without the transfer of matter. By exploring the behaviour of wave motion and examining the characteristics of wavelength, frequency, period, velocity and amplitude, students further their understanding of the properties of waves. They are then able to demonstrate how waves can be reflected, refracted, diffracted and superposed (interfered) and to develop an understanding that not all waves require a medium for their propagation. Students examine mechanical waves and electromagnetic waves, including their similarities and differences.

Students also examine energy and its transfer, in the form of heat, from one place to another. Thermodynamics is the study of the relationship between energy, work, temperature and matter. Understanding this relationship allows students to appreciate particle motion within objects. Students have the opportunity to examine how hot objects lose energy in three ways: first, by conduction, and, second, by convection – which both involve the motion of particles; and, third, the emission of electromagnetic radiation. An understanding of thermodynamics is a pathway to understanding related concepts in many fields involving Science, Technology, Engineering and Mathematics (STEM).

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This task is due Wednesday Week 4 Term 3 (9 August 2023) to the Library by 8:15am.


Your task requires you to make:

Waves

Two (2) questions based on the properties of all waves and wave motion.

- solve problems and/or make predictions by modelling and applying the following relationships to a variety of situations:  
 - $v = f\lambda$
 - $f = \frac{1}{T}$


To determine the one or more of the following wave characteristics:

- velocity
- frequency
- period
- wavelength
- displacement and amplitude (ACSPH069)  

Two (2) questions based on the properties of all waves (one (1) of these must be an "extended response" question where image is to be constructed via a mirror or lens)

- explain **one or more of** the behaviour of waves in a variety of situations/phenomena of:
 - reflection
 - refraction
 - diffraction
 - wave superposition (ACSPH071, ACSPH072)


Two (2) questions based on the properties of sound waves



- That analyse qualitatively and quantitatively the relationships of the wave nature of sound to explain: 
 - beats $f_{\text{beat}} = |f_2 - f_1|$
 - the Doppler effect $f' = f \frac{(v_{\text{wave}} + v_{\text{observer}})}{(v_{\text{wave}} - v_{\text{source}})}$

Two (2) questions based on the properties of ray model of light:

- Show quantitatively, using Snell's Law, the refraction and total internal reflection (by finding the critical angle) of light in different situations 

Two (2) questions based on the properties of ray model of light:

- explain the phenomenon of the dispersion of light 
- demonstrate the relationship between inverse square law, the intensity of light and the transfer of energy (ACSPH077)

These will solve problems or make quantitative predictions in a variety of situations by applying the following relationships to:  

- $n_x = \frac{c}{v_x}$ – for the refractive index of medium x , v_x is the speed of light in the medium
- $n_1 \sin \theta_1 = n_2 \sin \theta_2$ (Snell's Law)
- $\sin \theta_c = \frac{n_2}{n_1}$
- $I_1 r_1^2 = I_2 r_2^2$ – to compare the intensity of light at two points, r_1 and r_2

Thermodynamics



Two (2) questions based on the::

- relationship between the temperature of an object and the kinetic energy of the particles within it (ACSPH018)
- analyse the relationship between the change in temperature of an object and its specific heat capacity through the equation $Q = mc\Delta T$ (ACSPH020)

Two (2) questions based on:

- energy transfer by the process of one of:
 - conduction
 - convection
 - radiation (ACSPH016)
- predict quantitatively energy transfer from hot objects by the process of thermal conductivity ❄❄

Two (2) questions based on:

- analyse qualitatively and quantitatively the latent heat involved in a change of state
- apply the following relationships to solve problems and make quantitative predictions in a variety of situations:  
 - $Q = mc\Delta T$, where c is the specific heat capacity of a substance
 - $\frac{Q}{t} = \frac{kA\Delta T}{d}$ where k is the thermal conductivity of a material

PHYSICS – Year 11 ASSESSMENT TASK – Depth Study

Task 2

Outcome	Question	Assessment Criteria	Marks				
			1	2	3	4	5
PH11-10	1	Question tests $v = f\lambda$ (and gives a correct answer)	1	2			
PH11-10	2	Question tests $f = 1/T$ (and gives a correct answer)	1	2			
PH11-10	3	Question one behaviour of waves (and gives a correct answer)	1	2			
PH11-10	4	Question one behaviour of waves (and gives a correct answer)	1	2			
PH11-10	5	Question tests beats (and gives a correct answer)	1	2			
PH11-10	6	Question tests the Doppler effect (and gives a correct answer)	1	2			
PH11-10	7	Question tests using Snell's Law (and gives a correct answer)	1	2			
PH11-10	8	Question tests critical angle (and gives a correct answer)	1	2			
PH11-10	9	Question tests dispersion of light (and gives a correct answer)	1	2			
PH11-10	10	Question tests inverse square law (and gives a correct answer)	1	2			
PH11-10	11	Question tests temperature of an object and the kinetic energy (and gives a correct answer)	1	2			
PH11-10	12	Question tests change in temperature of an object and the specific heat capacity of object (and gives a correct answer)	1	2			
PH11-10	13	Question tests energy transfer by one or more process(es) (and gives a correct answer)	1	2			
PH11-10	14	Question tests energy transfer from hot objects by the process of thermal conductivity (and gives a correct answer)	1	2			
PH11-10	15	Question tests latent heat involved in a change of state (and gives a correct answer)	1	2			
PH11-10	16	Question solve problems where the temperature has changed in an object (and gives a correct answer)	1	2			
PH11/12-1		<i>Develops</i> and <i>evaluates</i> questions for scientific investigation	1	2	3	4	
PH11/12-2		<i>Designs</i> and <i>evaluates</i> questions in order to obtain primary and secondary data and information	1	2	3	4	
PH11/12-3		<i>Evaluates</i> investigations as valid and reliable primary and secondary data and information	1	2	3	4	
PH11/12-4		<i>Selects</i> and <i>processes</i> appropriate qualitative and quantitative data and information using a range of appropriate media	1	2	3	4	
PH11/12-5		<i>Analyses</i> and <i>evaluates</i> primary and secondary data and information	1	2	3	4	
PH11/12-6		<i>Solves</i> scientific problems using primary and secondary data, critical thinking skills and scientific processes	1	2	3	4	
PH11/12-7		<i>Communicates</i> scientific understanding using suitable language and terminology for a specific audience or purpose	1	2	3	4	
		1 = developing; 2= shows research; 3 = consistent; 4 = highly developed	Total: / 60				