Year 11 Physics

Depth Study Assessment Task 2023

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| **TOPIC**: Depth Study – Module 3 Waves and Thermodynamics | **MARKS:** / 35 |
| **SUBMISSION REQUIREMENTS:**  All components of the assessment will be submitted on Friday 16th June 2023 (Term 2, Week 8). The educational manual, logbook and instrument video recording should be submitted via CANVAS by 23:59. The instrument should be submitted to E01 before 8:40am.  The instrument recording will be verified in class during week 9. | **WEIGHTING:**  30 % |
| **OUTCOMES TO BE ASSESSED:**  **PH12-1** **Develops** and evaluates questions and hypotheses for scientific investigation.  **PH12-2 Designs** and evaluates investigations in order to obtain primary and secondary data and information.  **PH12-3** Conducts **investigations** to collect valid and reliable primary and secondary data and information.  **PH12-6 Solves** scientific problems using primary and secondary data, critical thinking skills and scientific processes.  **PH12-7 Communicates** scientific understanding using suitable language and terminology for a specific audience or purpose.  **PH12-10 Explains** and analyses waves and the transfer of energy by sound, light and thermodynamic principles. | |
| **DIRECTIONAL VERBS:**  **Communicate** – to convey knowledge or information; can occur through different methods, such as written, oral or visual  **Design** – to make plans for something  **Develop** – tothink of and produce  **Explain** – Relate cause and effect; make the relationships between things evident; provide why and/or how  **Investigate** – to observe or study by close examination and systematic inquiry  **Solve** - to find an answer to, explanation for, or means of effectively dealing with a problem | |
| **TASK DESCRIPTION:**  **STEM project: Using musical instruments to teach Physics**  Students will conduct an **investigation** by researching, **designing** and constructing a functional stringed instrument that can play at least 3 notes of the chromatic scale. Students will then produce an educational manual to **communicate** to 15-year-old students how to construct the instrument and to understand the Physics behind it. Students will be required to keep a logbook documenting their thinking and processing of data throughout the project. | |
| **ASSESSMENT CRITERIA:**  Module 3 – Waves and Thermodynamics  ***Inquiry question****: What are the properties of all waves and wave motion?*  ***Inquiry question****: How do waves behave?*  ***Inquiry question:*** *What evidence suggests that sound is a mechanical wave?*  Context  In recent years, STEM (Science, Technology, Engineering and Mathematics) has had increased focused in schools as the skills covered by these areas have been identified as key for the development of future technologies and employment. An important part of STEM teaching is integrating hands-on activities and problem solving with scientific and mathematical principles.  Camden High School is looking to produce a unit of work to teach Year 9-10 students about Physics by making a simple instrument out of recyclable materials that can play some musical notes. As part of this, a manual would help these students understand the concepts of resonance and standing waves, by explaining how the instrument produces musical notes.  This depth study will take place over approximately 7 periods of class time and consist of 3 parts, which each have submitted components.   1. Part A – Instrument (10 marks)   Students will conduct an **investigation** by researching, **designing** and constructing a functional stringed instrument that can play at least 3 notes of the chromatic scale.   * The instrument will be handed in on or before the due date. * A video recording of the 3 notes being played on the instrument should be uploaded with the submission to CANVAS. * The recording will be verified by demonstration in class to your teacher during week 9 (after the task is submitted), where you will have 2 minutes to demonstrate your instrument. The notes will be measured using an electronic tuner. Ideally, your instrument should be able to play a recognisable tune. * The instrument   + Must be made from recycled materials that are easily available, not pre-fabricated components   + Must be able to be assembled by Year 9-10 students using resources available at school.  1. Part B – Education Manual (15 marks)   Students will then produce an educational manual to **communicate** to 15-year-old students how to construct the instrument and to understand the Physics behind it.   * You can assume that students understand basic maths (measurement, ratios etc.) and basic concepts of waves (what waves are, speed, wavelength), but should be in plain, rather than technical, language. * The manual should not be more that 4 pages, including diagrams.  1. Part C – Logbook (10 marks)   Students will be required to keep a logbook documenting their thinking and processing of data throughout the project. Regular dated entries will be expected. It should include:   * Evidence of your thinking (brainstorming, visible thinking routines, question development) * Evidence of research using secondary data, including processing of data (summaries, highlighting, annotations) * All raw data from first-hand investigations * Evidence of challenges faced when constructing instrument and modifications made * An annotated bibliography, using APA referencing style, of all the sources that you used throughout the process. | |

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| **ASSESSMENT MARKING CRITERIA: PART A - INSTRUMENT** | | |
| ***Part A - Outcomes PH11-3, PH11-6*** | | |
|  | **Mark** | **Grade** |
| Student conducts a comprehensive **investigation** to construct a highly functional instrument.  *The instrument successfully plays 3 or more chromatic scale notes as measured by a digital tuner, and the notes that are produced can play a tune. The tones played are consistent over time. The instrument has a solid and careful construction, is made of over 80% recycled materials and is very easy to play/use. The instrument has a unique design and demonstrates creativity or innovation.* | 9-10 | A |
| Student conducts a thorough **investigation** to construct a functional instrument.  *The instrument successfully plays 3 chromatic scale notes as measured by a digital tuner. The instrument has a solid construction, is made of over 60% recycled materials and is easy to play/use. The instrument design imitates known instrument design with a unique design feature.* | 7-8 | B |
| Student conducts a sound **investigation** to construct a functional instrument.  *The instrument successfully plays 3 chromatic scale notes. The instrument has a good construction, is made of over 50% recycled materials. The instrument design clearly imitates known instrument design.* | 5-6 | C |
| Student conducts a basic **investigation** to construct an instrument.  *The instrument plays 3 audible tones. The instrument is made of some recycled materials, and has some construction issues. The instrument design is simple.* | 3-4 | D |
| Student conducts a limited **investigation** to construct an instrument.  *The instrument makes a noise. It may be poorly constructed or includes pre-constructed components.* | 1-2 | E |

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| **ASSESSMENT MARKING CRITERIA: PART B – EDUCATIONAL MANUAL** | | |
| ***Part B - Outcomes PH11-7, PH11-10*** | | |
|  | **Mark** | **Grade** |
| Student produces a comprehensive educational manual to **communicate** instrument construction and explanation of relevant Physics concepts.  *The manual provides clear and complete instructions in the construction of the instrument, including fully labelled diagrams. Correct terminology and technical language is used throughout, and addresses the target audience appropriately. The manual includes a comprehensive* ***explanation*** *of the Physics of how the instrument works in relation to mathematical equations, resonance, standing waves, frequency and tension.* | 13-15 | A |
| Student produces a thorough educational manual to **communicate** instrument construction and explanation of relevant Physics concepts.  *The manual provides thorough instructions in the construction of the instrument, including labelled diagrams. Correct terminology and technical language is used throughout. The manual includes a thorough* ***explanation*** *of the Physics of how the instrument works in relation to mathematical equations, resonance, standing waves, frequency and tension. Some components may be incomplete or lacking detail.* | 10-12 | B |
| Student produces a sound educational manual to **communicate** instrument construction and explanation of relevant Physics concepts.  *The manual provides sound instructions in the construction of the instrument, including diagrams. Correct terminology and technical language is mostly used. The manual includes a sound* ***explanation*** *of the Physics of how the instrument works in relation to mathematical equations, resonance, standing waves, frequency and tension. Some components are incomplete or lacking detail.* | 7-9 | C |
| Student produces a basic educational manual to **communicate** instrument construction and explanation of relevant Physics concepts.  *The manual provides instructions in the construction of the instrument, but some steps may be missing or unclear. It may include diagrams. Some appropriate technical language and terminology has been used. The manual includes a basic* ***description*** *of the Physics principles related to how the instrument works.* | 4-6 | D |
| Student produces a limited educational manual to **communicate** instrument construction and explanation of relevant Physics concepts.  *The manual provides basic and incomplete instructions in the construction of the instrument. Some Physics terminology has been used, but may be inappropriate. Relevant Physics principles have been* ***identified****.* | 1-3 | E |

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| **ASSESSMENT MARKING CRITERIA: PART C – LOGBOOK AND BIBLIOGRAPHY** | | |
| ***Outcomes PH11-1, PH11-2*** | | |
|  | **Mark** | **Grade** |
| Student produces an extensive log book which shows consistent and relevant entries relating to the project.  *There is evidence of extensive research conducted, including processing and assessment of the information gathered. There is evidence of significant* ***development*** *of ideas, questions and understanding, including detailed evidence of modifications made and evaluation of progress. There are records of trials of prototypes, including pictures with logical sequence. An annotated bibliography is included, using APA referencing style, with a comprehensive list of sources (8+)* | 9-10 | A |
| Student produces a thorough log book which shows consistent and relevant entries relating to the project.  *There is evidence of thorough research conducted, including some processing and assessment of the information gathered. There is some evidence of* ***development*** *of ideas, questions and understanding, including evidence of modifications made and evaluation of progress. There are records of trials of prototypes, including pictures. A bibliography is included, using APA referencing style, with a list of sources (6+)* | 7-8 | B |
| Student produces a sound log book which shows consistent and relevant entries relating to the project.  *There is evidence of sound research conducted, including some simple processing and assessment of the information gathered. There is some evidence of* ***development*** *of ideas and/or questions and understanding. There are records of trials of prototypes. A bibliography is included, using APA referencing style, with a list of sources (5+)* | 5-6 | C |
| Student produces a basic log book which shows relevant entries relating to the project.  *There is evidence of some research conducted. There is some evidence of* ***development*** *of ideas and/or questions and/or understanding. There are some records of trials of prototypes. A bibliography is included of sources used (5+)* | 3-4 | D |
| Student produces a limited log book which contains few entries relating to the project.  *There is minimal evidence of research conducted or* ***development*** *of ideas. There are some records of trials. Some sources are listed.* | 1-2 | E |