**STAGE 2 PHYSICS**

**ASSESSMENT TYPE 1: Investigations Folio**

**Issues Investigation**

**Purpose**

This assessment provides you with the opportunity to demonstrate your ability to:

* identify and formulate questions, select, analyse and evaluate the evidence of physics from a range of sources
* present informed conclusions on contemporary physics applications
* communicate knowledge of concepts and information of physics
* demonstrate and apply knowledge and understanding of physics to an application.

**Description of assessment**

This individual task consists of four parts: Identifying and formulating a question to guide the Issues Investigation; Information Search and Analysis; Written Report; ICT Presentation.

***Part A: Formulating a Guiding Question (I1)***

Choose a topic to investigate which refers to some aspect of the course or of an issue that you are interested in. A guide to possible topics is provided but it is by no means exhaustive.

Based on your topic, you need to formulate a question that is relevant to you, society, or the environment, to guide your issues investigation. (For example, an issues investigation relating to the topic of ‘Ultrasound Imaging in Medicine’ may have the guiding question, “Should the use of ultrasound imaging of an unborn child be banned unless a definite medical need exists?”).

After gathering evidence and summarising the physics of ultrasound you can present a report involving the discussion of various views and present your own informed opinion.

**\* This guiding question must be submitted to the teacher in writing prior to commencing Part B below.**

***Part B: Information Search, Analysis and Evaluation***

Undertake an information search, analysis and evaluation on this topic.

1. Locate relevant Information

Find information in various types of publications such as: printed texts/encyclopaedia, scientific journals e.g. *New Scientist*, physics journals, newspaper articles, websites (e.g. NASA), online encyclopaedia.

Document at least three different sources related to your topic using a copy of the pro forma on page 4. The sources must include at least two different types of publications. You need to attach a hardcopy of the information source (i.e. photocopy or printout).

2. Analyse and Evaluate the Sources

Analyse and evaluate any source that is used by assessing its relevance, bias, and credibility.

To do this you can use a copy of the pro forma on page 4.

Your analysis and evaluation may be done in note form.

Submit your three evaluations in hardcopy.

 Alternatively you can present your analysis and evaluation as a 3 minute oral.

**\* Part B should have a word count of 500 words or less or an oral of 3 minutes or less**

***Part C: Written summary***

You may locate additional information relevant to your guiding question prior to writing the summary. Use what you have learnt from the Information Search and Analysis, and any other information that you have found since you completed part B above, to write a report on the information obtained. (Include a word count).

Reference your work correctly ‘in-text’ and include a reference list. The in-text reference and the reference list does not contribute to the word count.

Your report should address the guiding question that you developed in part A above.

**\* Part C should have a word count of approximately 1000 words or equivalent in multimodal**

***Checklist***

The list below shows elements that must be included in your issues investigation and suggests the most suitable part of the task to include each element:

* an introduction that identifies the issue or phenomenon that is to be investigated (parts A and C)
* background information on physics that is relevant to the issue or phenomenon (part C)
* identification and understanding of the significance of the issue or phenomenon (part C)
* an evaluation of the information covered (part B)
* a summary of results or findings, and conclusions formed (parts C)
* citations and a list of references (parts B and C)

**Assessment conditions**

Part A: *Formulating a Guiding Question* is to occur during Week10, Term 1 and a hardcopy of your question must be submitted by Friday 10th April.

Part B: *Information Search, Analysis and Evaluation*, this is to be completed during Week 1, Term 2 and submitted Friday 8th May.

Part C: *Written Summary* is completed after parts A and B and is due Week 4, Term 2, Friday 22 May.

 A draft of ideas is to be submitted before the end of Week 3.

The total word count for parts B and C is 1500 words, a maximum of 10 minutes for an oral presentation or the equivalent in ICT presentation time.

**Due Date: Friday 22 May (refer to assessment conditions) This is the suggested list from which you should choose a topic.**

**From this topic you will formulate a guiding question on an issue that is relevant to you, society, or the environment.**

|  |  |
| --- | --- |
| Use of magnets in cathode ray tube televisions | Electromagnets in industry |
| Comparison of cyclotrons and synchotrons | Electromagnets in Medicine |
| Comparison of FM and AM radio signals | Electromagnets in Sport |
| TV transmission to the foothills | Electromagnets in Research |
| Comparison of sonar with LADS | The effect of a ball’s surface texture on its flight  |
| Comparison of compact fluorescent lights with incandescent lights | Electromagnets in Electricity Production |
| Problems caused by interference of sound | The Van Allen Belts |
| Single beam tracking method for a CD or DVD | Digital recordings on CD and DVD |
| Magnetic resonance imaging | The production and transmission of radio or TV signals |
| Scanning electron microscope | Tweeters, woofers and subwoofers |
| Holograms | Phase contrast microscopes |
| Uranium-lead dating | Production and uses of technetium 99m |
| The use of lasers in communication | The use of lasers in medicine |
| Measuring and minimising radiation dose | The use of lasers in atmospheric physics and meteorology |
| Carbon dating  | Camera filters |
| Thin-film interference | Uses of Compton scattering |
| Orbiting telescopes | GPS |
| Inertial navigation systems | How aeroplanes turn |
| Industrial uses of corona discharges | Comparison of colour with black and white photocopying |
| Electrostatic loudspeakers | Linear accelerators |
| The production and transmission of radio or TV signals | Production of two light frequencies with a laser |
| Common applications of the photoelectric effect | The use of diffraction gratings in spectroscopy |
| X-ray crystallography | Some uses of X-rays in industry |
| The use of emission spectra in astrophysics | Similarities and differences between light and electron microscopes |
| The use of lasers in medicine | Fluorescence and phosphorescence |
| The use of lasers in atmospheric physics and meteorology | The use of lasers in communication |
| Radioactive dating | The use of radioisotopes in industry |
| Nuclear fusion as a future source of power | Thermoluminescence dating |

**STAGE 2 PHYSICS Information Search, Analysis and Evaluation pro forma**

**Student name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Topic:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
| Source type (e.g. internet, journal, newspaper article, book, video):I2 |
| Information source (correctly referenced):I2 |
| Key points:I2, AE1 |
| *relevance*the degree to which a source addresses the topic (e.g. relevant physics, correct physics)  | AE1 |
| *bias*refers to a prejudiced or partial viewpoint that would affect someone's interpretation of the topic or related issues | AE3 |
| *credibility*the trustworthiness (e.g. credentials, education, experience) of the source | AE3 |

Each analysis and evaluation should be attached to the source material and clearly marked.

|  |  |  |
| --- | --- | --- |
| ***Learning Requirements*** | ***Assessment Design Criteria*** | ***Capabilities*** |
| 1. identify and formulate questions, hypotheses, concepts, and purposes that guide investigations in physics2. design and conduct collaborative and individual investigations in physics using appropriate apparatus and safe working practices and by observing, recording, and interpreting the phenomena of physics3. represent, analyse, interpret, and evaluate investigations in physics through the use of technology and numeracy skills4. select, analyse, and critically evaluate the evidence of physics from different sources, and present informed conclusions or decisions on contemporary physics applications5. communicate knowledge and understanding of the concepts and information of physics using appropriate physics terms and conventions6. demonstrate and apply knowledge and understanding of physics to a range of applications and problems. | InvestigationThe specific features are as follows:I1 Design of physics investigations.I2 Selection and acknowledgment of information and data about physics and issues in physics from different sources.I3 Manipulation of apparatus and technological tools to implement safe and ethical investigation procedures.I4 The obtaining, recording, and display of findings of investigations using appropriate conventions and formats.Analysis and EvaluationThe specific features are as follows:AE1 Analysis and evaluation of connections between data, concepts, and issues in physics.AE2 Evaluation of procedures, with suggestions for improvement.AE3 Analysis and evaluation of data and other evidence to formulate conclusions and make relevant predictions.ApplicationThe specific features are as follows:A1 Application of physics concepts and evidence from investigations to solve problems in new and familiar contexts.A2 Use of appropriate physics terms, conventions, formulae, and equations.A3 Demonstration of skills in individual and collaborative work.Knowledge and UnderstandingThe specific features are as follows:KU1 Demonstration of knowledge and understanding of physics concepts.KU2 Use of knowledge of physics to understand and explain contemporary applications.KU3 Communication of knowledge and understanding of physics in different formats. | CommunicationCitizenshipPersonal DevelopmentWorkLearning |

Performance Standards for Stage 2 Physics

|  | Investigation | Analysis and Evaluation | Application | Knowledge and Understanding |
| --- | --- | --- | --- | --- |
| A | Designs logical, coherent, and detailed physics investigations.Critically and logically selects and consistently and appropriately acknowledges information about physics and issues in physics from a range of sources.Manipulates apparatus and technological tools carefully and highly effectively to implement well-organised safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using appropriate conventions and formats accurately and highly effectively. | Critically and logically analyses and evaluates connections between data, concepts, and issues in physics.Critically and logically evaluates procedures and suggests a range of appropriate improvements.Systematically and perceptively analyses and evaluates data and other evidence to formulate conclusions and make logical and highly relevant predictions. | Applies physics concepts and evidence from investigations to suggest solutions to complex problems in new and familiar contexts.Uses appropriate physics terms, conventions, formulae, and equations highly effectively.Demonstrates initiative in applying constructive and focused individual and collaborative work skills. | Consistently demonstrates a deep and broad knowledge and understanding of a range of physics concepts.Uses knowledge of physics perceptively and logically to understand and explain contemporary applications.Uses a variety of formats to communicate knowledge and understanding of physics coherently and highly effectively. |
| B | Designs well-considered and clear physics investigations.Logically selects and appropriately acknowledges information about physics and issues in physics from different sources.Manipulates apparatus and technological tools carefully and mostly effectively to implement organised safe and ethical work investigation procedures.Obtains, records, and displays findings of investigations using appropriate conventions and formats mostly accurately and effectively. | Clearly and logically analyses and evaluates connections between data, concepts, and issues in physics.Logically evaluates procedures and suggests some appropriate improvements. Uses mostly logical analysis and evaluation of data and other evidence to formulate conclusions and make consistent and relevant predictions. | Applies physics concepts and evidence from investigations to suggest solutions to problems in new and familiar contexts.Uses appropriate physics terms, conventions, formulae, and equations effectively.Applies mostly constructive and focused individual and collaborative work skills. | Demonstrates some depth and breadth of knowledge and understanding of a range of physics concepts. Uses knowledge of physics logically to understand and explain contemporary applications.Uses a variety of formats to communicate knowledge and understanding of physics coherently and effectively. |
| C | Designs considered and generally clear physics investigations.Selects with some focus, and mostly appropriately acknowledges, information about physics and issues in physics from different sources.Manipulates apparatus and technological tools generally carefully and effectively to implement safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using generally appropriate conventions and formats with some errors but generally accurately and effectively. | Analyses and evaluates connections between data, concepts, and issues in physics.Evaluates some procedures in physics and suggests some improvements that are generally appropriate. Analyses and evaluates data and other evidence to formulate conclusions and make simple and generally relevant predictions. | Applies physics concepts and evidence from investigations to suggest some solutions to basic problems in new or familiar contexts.Uses generally appropriate physics terms, conventions, formulae, and equations with some general effectiveness. Applies generally constructive individual and collaborative work skills. | Demonstrates knowledge and understanding of a general range of physics concepts. Uses knowledge of physics with some logic to understand and explain one or more contemporary applications.Uses different formats to communicate knowledge and understanding of physics with some general effectiveness. |
| D | Prepares the outline of one or more physics investigations.Selects and may partly acknowledge one or more sources of information about physics or an issue in physics.Uses apparatus and technological tools with inconsistent care and effectiveness and attempts to implement safe and ethical investigation procedures.Obtains, records, and displays findings of investigations using conventions and formats inconsistently, with occasional accuracy and effectiveness. | Describes basic connections between some data, concepts, and issues in physics.For some procedures, identifies improvements that may be made.Attempts to extract meaning from data and other observations and to formulate a conclusion or make a simple prediction that may be relevant. | Applies some evidence to describe some basic problems and identify one or more simple solutions, in familiar contexts.Attempts to use some physics terms, conventions, formulae, and equations that may be appropriate. Attempts individual work inconsistently, and contributes superficially to aspects of collaborative work. | Demonstrates some basic knowledge and partial understanding of physics concepts. Identifies and explains some physics information that is relevant to one or more contemporary applications.Communicates basic information to others using one or more formats. |
| E | Identifies a simple procedure for a physics investigation.Identifies a source of information about physics or an issue in physics.Attempts to use apparatus and technological tools with limited effectiveness or attention to safe or ethical investigation procedures.Attempts to record and display some descriptive information about an investigation, with limited accuracy or effectiveness. | Acknowledges that connections exist between data, concepts, and/or issues in physics.Acknowledges the need for improvements in one or more procedures.Attempts to organise some limited data or observations. | Identifies a basic problem and attempts to identify a solution in a familiar context.Uses some physics terms or formulae.Shows emerging skills in individual and collaborative work. | Demonstrates some limited recognition and awareness of physics concepts. Shows an emerging understanding that some physics information is relevant to contemporary applications.Attempts to communicate information about physics. |