**STAGE 2 PHYSICS**

**Assessment Type 1: Investigations Folio**

**Science as a Human Endeavour: Great Inventions in Physics**

The development of many inventions and techniques have been based on our understanding of physics concepts or resulted in the development of new scientific theories. There has always been a link between these inventions and techniques and society. Your task is to investigate **one** contemporary example from the list below and prepare a report or presentation on the topic. Your report or presentation should **explain the physics concepts** involved, showing how it relates to at **least one key concept of science as a human endeavour, listed below.**

Electromagnetic devices:

Electrical transformers: cars, phone chargers, SA’s power supply, arc-welders, induction stoves, induction coils in traffic sensors, electric cars, photocopiers, maglev trains, rollercoasters, railguns, radio, television, microwave ovens, mobile phones, defibrillators, generators.

Medical Diagnostic Devices/Techniques:

MRIs, X-Rays, Ultrasound, CAT Scans, PET scans, cyclotrons, Radiotherapy, Endoscopy, fluoroscopy.

Devices and Techniques using LASERS:

Industry (e.g. welding, engraving), medicine, eye surgery, tattoo removal, Blu-ray players, telecommunication.

Uses of Radionuclides:

Burglar alarms, medicine, industry, food production, nuclear power, nuclear waste, nuclear subs, nuclear weapons.

*Science as a Human Endeavour in the study of physics encompasses:*

**Communication and Collaboration**

* Science is a global enterprise that relies on clear communication, international conventions, and review and verification of results.
* Collaboration between scientists, governments and other agencies is often required in scientific research and enterprise.

**Development**

* Development of complex scientific models and/or theories often requires a wide range of evidence from many sources and across disciplines.
* New technologies improve the efficiency of scientific procedures and data collection and analysis; this can reveal new evidence that may modify or replace models, theories, and processes.

**Influence**

* Advances in scientific understanding in one field can influence and be influenced by other areas of science, technology, engineering, and mathematics.
* The acceptance and use of scientific knowledge can be influenced by social, economic, cultural, and ethical considerations.

**Application and Limitation**

* Scientific knowledge, understanding, and inquiry can enable scientists to develop solutions, make discoveries, design action for sustainability, evaluate economic, social, and environmental impacts, offer valid explanations, and make reliable predictions.
* The use of scientific knowledge may have beneficial or unexpected consequences; this requires monitoring, assessment, and evaluation of risk, and provides opportunities for innovation.
* Science informs public debate and is in turn influenced by public debate; at times, there may be complex, unanticipated variables or insufficient data that may limit possible conclusions.

**In this task you will:**

* Access information from different sources and prepare a reference list
* Select relevant information about your investigation (invention/technique) to show that you understand both the relevant physics in the invention and its link to science as a human endeavour
* Analyse your findings to determine the lasting impacts of the invention on society.

**Your completed report should include the following:**

* an introduction to identify the focus of the investigation and the key concept(s) of science as a human endeavour that it links to
* relevant physics concepts or background
* an explanation of how the focus of the investigation illustrates the interaction between science and society, including a discussion of the potential impact of the focus of the investigation, e.g. further development, effect on quality of life, environmental implications, economic impact, or intrinsic interest
* some appropriate diagrams to improve the effectiveness of your communication.
* a conclusion
* citations and referencing.

**Assessment Conditions:**

This is an **individual** Investigation and you should submit one **draft** of your **introduction** by the end of the second week. (Due date: \_\_\_\_\_\_\_\_\_)

Your completed report should be submitted **electronically** within **4 weeks** in **any format** (eg: a screencast, a video, an animation, a Web Page, a magazine article or report using MS Word, etc ).

The maximum word count for the report is **1500 words.**

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|  | | **A** | **B** | **C** | **D** | **E** |
| **Knowledge** **and Application** | **1** | Demonstrates a deep and broad knowledge and understanding of a range of physics concepts. | Demonstrates some depth and breadth of knowledge and understanding of a range of physics concepts. | Demonstrates knowledge and understanding of a general range of physics concepts. | Demonstrates some basic knowledge and partial understanding of physics concepts. | Demonstrates limited recognition and awareness of physics concepts. |
| **3** | Critically explores and understands in depth the interaction between science and society. | Logically explores and understands in some depth the interaction between science and society. | Explores and understands aspects of the interaction between science and society. | Partially explores and recognises aspects of the interaction between science and society. | Attempts to explore and identify an aspect of the interaction between science and society. |
| **4** | Communicates knowledge and understanding of physics coherently, with highly effective use of appropriate terms, conventions, and representations. | Communicates knowledge and understanding of physics mostly coherently, with effective use of appropriate terms, conventions, and representations. | Communicates knowledge and understanding of physics generally effectively, using some appropriate terms, conventions, and representations. | Communicates basic physics information, using some appropriate terms, conventions, and/or representations. | Attempts to communicate information about physics. |