## Stage 1 Biology

Investigation Folio Task 2:Science as a Human Endeavour

Topic 2: Infectious Diseases

**Introduction and Purpose of task:**

Despite the advances in medical treatments, infectious diseases worldwide are still the leading cause of death of children and adolescents, and one of the leading causes in adults. Three of the top ten causes of death, or sixteen percent of all deaths each year, are from infectious diseases. Most of these are attributable to preventable or treatable diseases such as diarrhoea, lower respiratory infections, HIV/AIDS, tuberculosis, and malaria. Most of the people who contract infectious diseases are from developing countries where access to the latest treatments or to medicines that prevent infection is limited, often due to cost and availability.

In this task you will have the opportunity to investigate an aspect of the role of science and scientists in the control of infectious disease, **influence** of innovative and new treatments available or are being **developed**, or the **ethical** and **social** implications of the control of disease. You will show the interaction of science and society.

You may choose to present your research findings as either an article in a scientific journal or as a report providing an expert’s point of view on any aspect related to infectious diseases. You will use and acknowledge a variety of relevant sources to find data and information to support your findings. Your research and article/report should have a *focus* on **at least one** of the key concepts of Science as a Human Endeavour listed below:

**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.

**Part A: Information Search and Planning**

Use the internet and/or other sources of information to do an initial search related to work that scientists are doing in order limit the spread of disease, innovative control measures, the ethical and social implications, or the wider effects of infectious disease on human health.

In a table or other graphic organiser, make a list of possible topics and related questions or contexts for your scientific communication based on this initial research.

Search for articles, data or other information that you could use to support your discussion related to your initial list of possible topics. Record the resources in a reference list use Harvard Referencing, for future reference. This will assist you in your selection of your final focus.

Choose the focus of your work. This may be one specific innovation or new technique to control the spread of disease.

Link the ideas in your chosen focus to **at least one** of the SHE key concepts. Use Appendix 1 as a guide.

Check with your teacher the focus you have chosen and how you have explored the connections to the key concept(s) of SHE chosen before you proceed.

Date Due: \_\_\_\_\_\_\_\_\_\_\_\_

Choose the format of your work: scientific article or expert report. You might like to formulate a question or statement that relates to your chosen focus and SHE key concept as the heading for your work.

Plan your article or report. This will be submitted to your teacher for feedback.

Date Due: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part B: Refinement of Information for your chosen focus**

Search for any further information that will enable you to provide a comprehensive and detailed report, with highly relevant biology as determined by your plan from Part A.

This will also assist you in being able to justify your conclusions.

Record the resources in a reference list. Use Harvard Referencing.

Part A and B are not included in the word count.

**Part C: Scientific Article or Expert Report**

Use the information and data gathered in Part A and B to prepare a scientific article or experts report on the aspect of infectious diseases you have chosen and the interaction it shows between biology and society.

Your report *must* include:

* An introduction, which links the focus aspect of your disease to the SHE key concept(s) chosen.
* Relevant biology concepts and background information ***(this should support your report but not be the focus)***.
* An explanation of the impact or significance of the focus to scientific research and current issues, future developments, or the ethical and social considerations of the focus chosen.
* A conclusion. You must include how the SHE key concept(s) has been addressed.
* In text referencing and Reference list using Harvard Referencing.

**Assessment Conditions:**

3 weeks to complete. Class time provided for research and support.

Students may submit one draft for feedback. This does not include the checkpoints and plan.

Word Count: maximum of 1000 words for Part C, if written, 6 minutes for an oral presentation, or equivalent for a multimodal product.

**Assessment Design Criteria**

Knowledge and Application: KA1, 3, 4

**Performance Standards**

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|  | Investigation, Analysis and Evaluation | Knowledge and Application |
| A | Critically deconstructs a problem and designs a logical, coherent, and detailed biological investigation.  Obtains, records, and represents data, using appropriate conventions and formats accurately and highly effectively.  Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.  Critically and logically evaluates procedures and their effect on data. | Demonstrates deep and broad knowledge and understanding of a range of biological concepts.  Applies biological concepts highly effectively in new and familiar contexts.  Critically explores and understands in depth the interaction between science and society.  Communicates knowledge and understanding of biology coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear biological investigation.  Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.  Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.  Logically evaluates procedures and their effect on data. | Demonstrates some depth and breadth of knowledge and understanding of a range of biological concepts.  Applies biological concepts mostly effectively in new and familiar contexts.  Logically explores and understands in some depth the interaction between science and society.  Communicates knowledge and understanding of biology mostly coherently, with effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear biological investigation.  Obtains, records, and represents data, using generally appropriate conventions and formats with some errors but generally accurately and effectively.  Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.  Evaluates procedures and some of their effect on data. | Demonstrates knowledge and understanding of a general range of biological concepts.  Applies biological concepts generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between science and society.  Communicates knowledge and understanding of biology generally effectively, using some appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a deconstruction and biological investigation.  Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and undertakes some basic interpretation to formulate a basic conclusion.  Attempts to evaluate procedures or suggest an effect on data. | Demonstrates some basic knowledge and partial understanding of biological concepts.  Applies some biological concepts in familiar contexts.  Partially explores and recognises aspects of the interaction between science and society.  Communicates basic biological information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a biological investigation.  Attempts to record and represent some data, with limited accuracy or effectiveness.  Attempts to describe results and/or interpret data to formulate a basic conclusion.  Acknowledges that procedures affect data. | Demonstrates limited recognition and awareness of biological concepts.  Attempts to apply biological concepts in familiar contexts.  Attempts to explore and identify an aspect of the interaction between science and society.  Attempts to communicate information about biology. |

**Appendix I: Possible exploration of SHE key concepts**

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| **Aspect of SHE** | **Possible exploration** |
| **Communication and Collaboration** | **This may include**   * **a discussion of the contribution of individuals, teams or organisations that are involved in the control of infectious disease outbreak** * **how communication between scientists, government agencies and members of the community help to define infectious disease control measures** * **the collaboration between scientists and other stakeholders required to control infectious disease** * **communication of disease outbreak and prevention from scientists to members of the wider community e.g. vaccination education etc.** |
| **Development** | **This may include**   * **development of new procedures to better control disease outbreaks** * **development of new medicines** * **better technologies, including IT, to better control disease outbreaks** * **improved modelling of disease outbreaks** |
| **Influence** | **This may include**   * **how one scientific discipline, or technology or mathematics may impact the development of models to understand disease outbreaks** * **discuss the responses by scientists to economic, social, environmental, ethical and cultural influences of disease outbreaks in different parts of the world** * **consider the ethical issues scientists need to consider around the control of disease outbreak** * **economic considerations and accessibility of faced by scientists in control measures including vaccines and other medicines** |
| **Application and Limitation** | **This may include**   * **how scientific knowledge can enable scientists to develop solutions for humans to have better lives** * **consider the economic and social impacts on scientific research** * **the application of scientific knowledge to other disease outbreaks** * **control of future outbreaks** * **unintended consequences of the use of different control measures in the control of disease outbreaks** |

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| **Note for teachers:** |
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| Parts A and B are not included in the 1000 word count. |
| Appendix 1 is provided as an additional support material for this task and should not be used as a checklist. Teachers should encourage students to widely explore the possible SHE key concepts involved. |
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| While the biology and science involved will be a part of the report it should not be the focus. The assessment focus should be on the student’s ability to explore and connect the interaction between science and society. |
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