 Depth study ideas – Module 4

Investigating Science

Module 4 – Theories and Laws allows students to understand how theories and law are developed in science. Regarding depth studies, students have the opportunity to critically examine theories and laws in science, including their development, current and future research and analysis of scientific evidence.

Skills

The following are potential skill outcomes that would suit the potential for depth studies. The skills which are in bold are compulsory for depth studies which are to be assessed. Ideas are provided for the outcomes for teachers to set potential tasks and how students can engage with the outcomes and skill descriptors.

**INS11/12-1 develops and evaluates questions and hypotheses for scientific investigation**

* Students develop an inquiry question which is then investigated, reported and communicated in an authentic manner.
* Students develop an inquiry question based on an established theory or law and engage in research.

INS11/12-2 Designs and evaluates investigations in order to obtain primary and secondary data and information

* Students design a valid and reliable investigation which stems from an inquiry question.
* Students use an existing investigation which they critique and evaluate in order to determine new information.
* Students use an existing investigation to evaluate the primary data in comparison to established results.

INS11/12-3 Conducts investigations to collect valid and reliable primary and secondary data and information

* Students conduct an investigation which they have designed and continue to evaluate the validity and reliability.
* Students use an existing investigation which they critique and evaluate in order to determine new information.
* Students develop new methods of conducting investigations in order to collect valid and reliable data.

INS11/12-4 Selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media

* Students collect primary data through one or more valid and reliable investigations and report their findings.

INS11/12-5 analyses and evaluates primary and secondary data and information

* Students use statistical methods such as mode, median, mean and standard deviation to evaluate data and information.
* Students use mathematical analytical methods such as line of best fit, regression formula and correlation to evaluate data and information.

INS11/12-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes

* Students use problem solving frameworks to solve scientific problems.
* Students use the scientific method to evaluate scientific work.
* Students use critical thinking such as logical fallacies to evaluate scientific work.

**INS11/12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose**

* Students use authentic media to communicate their ideas, including:
  + Journal articles
  + Literature review or critical analysis
  + Scientific posters or infographics (information graphics)
  + 3-minute thesis
  + Short oral presentation

Potential areas for depth studies:

* Law of conservation of mass
* Law of conservation of energy
* Plate tectonic theory
* Germ theory
* Oxygen theory of combustion
* Heliocentrism
* Theory of evolution via natural selection
* Atomic theory
* Big Bang theory
* Avogadro’s law
* Newton’s laws of motion
* Law of superposition
* Mendel's laws
* Ohm’s law
* Theory of general and/or special relativity