# Sample Unit Year 11– Investigating Science (Module 2)

***Sample for implementation for Year 11 from 2018***

| **Unit Title** | **Module 2:** Cause and Effect – Inferences and Generalisations | **Duration** | 30 hours (8 hours dedicated to depth studies.) | |
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| **Content Focus**  Scientific inquiry follows on from humans making inferences and generalisations from commonly held understandings. Such inferences and generalisations have led to a wide range of investigations being performed throughout history, culminating in breakthroughs in scientific understanding.  Many hypotheses, when found to be correct, have generated further inquiry and created the need to develop new technologies for further observation. Students consider primary and secondary-sourced data and its influence on scientific investigations. In this module, students engage in gathering primary and secondary-sourced data to assist them in conducting and reporting on investigations, and to understand further the central roles of scientific questioning and collaboration in the pursuit of scientific truth.  Throughout this unit students will address the identified syllabus content areas in the context of mining and its influence on the Australian environment. Students will explore links between inferences and generalisations and attitudes and ideas surrounding mining.  **Working Scientifically**  In this module, students focus on designing and evaluating investigations, drawing inferences, making generalisations, and developing and testing hypotheses through the collection and processing of data. Students should be provided with opportunities to engage with all Working Scientifically skills throughout the course. | | | | |
| **Outcomes**  A student:   * develops and evaluates questions and hypotheses for scientific investigation INS11/12-1 * designs and evaluates investigations in order to obtain primary and secondary data and information INS11/12-2 * selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media INS11/12-4 * examines the use of inferences and generalisations in scientific investigations INS11-9 | | | | |
| **Key Considerations**   * Equipment for a range of investigations including, but not limited to: growth of plants; reactions of calcium carbonate; battery ‘life’ under different conditions; water quality in a local pond/stream. * Access to Aboriginal Education consultant, Aboriginal cultural educator or appropriate knowledge holder able to discuss the practices of Aboriginal and/or Torres Strait Islander Peoples relating to observations and inferences and biases of European settlers on Aboriginal People’s ecological understanding and practices. * Access to secondary sources and data which relate, but are not limited to: soil salinity; chemical reactions in cave formation; energy storage; water monitoring methods; animal migration; movement of comets; snow crystals; properties of elements; germ theory; the work of Becquerel and Curie; phlogiston theory; atmospheric pollution; origin of life on earth; existence of feynmanium; expanding Universe and Hubble’s constant. | | | | **Assessment (Depth Study)**  ***Testing Assumptions – Laboratory Report*** |
| **Depth Study – Testing Assumptions – Laboratory Report**  Students propose an inquiry question, construct a hypothesis and conduct an investigation that tests a common assumption associated with mining. Students will be required to produce a report on their findings and then complete a reflection under examination conditions.  This will be completed as a component of the Year 11 Depth Study requirements. 8 hours of class time is to be provided to complete the task including the reflection.  At least one hour per week will be allocated to students developing, researching, planning for, conducting and reporting the findings of the investigation.  **Outcomes:** INS11/12-1; INS11/12-2; INS11/12-4; INS11/12-7, INS11-9 | | | |  |

| **Unit Title** | **Module 2:** Cause and Effect – Inferences and Generalisations | **Duration** | 30 hours (8 hours dedicated to depth studies.) |
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| **Working Scientifically skills**  **Conducting investigations – INS11/12-3**  **A student conducts investigations to collect valid and reliable primary and secondary data and information**  Students:   * employ and evaluate safe work practices and manage risks (ACSCH031) * use appropriate technologies to ensure and evaluate accuracy * select and extract information from a wide range of reliable secondary sources and acknowledge them using an accepted referencing style.   **Processing Data and Information – INS11/12-4**  **A student selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media**  Students:   * select qualitative and quantitative data and information and represent them using a range of formats, digital technologies and appropriate media (ACSCH004, ACSCH007, ACSCH064, ACSCH101) * apply quantitative processes where appropriate * evaluate and improve the quality of data.   **Analysing Data and Information – INS11/12-5**  **A student analyses and evaluates primary and secondary data and information**  Students:   * derive trends, patterns and relationships in data and information * assess error, uncertainty and limitations in data (ACSCH004, ACSCH005, ACSCH033, ACSCH099) * assess the relevance, accuracy, validity and reliability of primary and secondary data and suggest improvements to investigations (ACSCH005)   **Problem Solving – INS11/12-6**  **A student solves scientific problems using primary and secondary data, critical thinking skills and scientific processes**  Students:   * use modelling (including mathematical examples) to explain phenomena, make predictions and solve problems using evidence from primary and secondary sources (ACSCH006, ACSCH010) * use scientific evidence and critical thinking skills to solve problems   **Communicating – INS11/12-7**  **A student communicates scientific understanding using suitable language and terminology for a specific audience or purpose**  Students:   * select and use suitable forms of digital, visual, written and/or oral forms of communication * select and apply appropriate scientific notations, nomenclature and scientific language to communicate in a variety of contexts (ACSCH008, ACSCH036, ACSCH067, ACSCH102) * construct evidence-based arguments and engage in peer feedback to evaluate an argument or conclusion (ACSCH034, ACSCH036) | | | |

| **Topic: Observations and Inferences** | |
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| **Inquiry question:** *What inferences can be drawn from observations?* | |
| **Content** | **Teaching, learning, working scientifically activities and assessment** |
| * investigate the practices of Aboriginal and Torres Strait Islander Peoples that relate to observations and inferences, including but not limited to: Aboriginal and Torres Strait Islander histories and cultures icon   + leaching of toxins in bush tucker   + locating sources of freshwater within bodies of salt water | * Students use a Venn Diagram to compare and contrast the terms inference and observation * Students research the practices of Aboriginal and/or Torres Strait Islander Peoples that relate to observations and inferences including: * the method of leaching of toxins in bush tucker * locating sources of freshwater within bodies of salt water   Queensland Museum 2011 *Bush Foods fact Sheet* [www.qm.qld.gov.au/~/media/Documents/Learning.../fact-sheet-bush-foods.pdf](http://www.qm.qld.gov.au/~/media/Documents/Learning.../fact-sheet-bush-foods.pdf) **Leaching toxins in bush tucker**   * Students research the main toxins in the Australian cycad (***Burrawang****)* [origin of name: Darug language], known as ***Macrozamia*** seeds, and two effects on humans. * Students design an investigation, using a locally available starch rich vegetable or fruit, to simulate the leaching of ‘toxins from cycad fruit’. Students should have a clear understanding of: * the variables and their possible effects * be able to name and identify the leached chemical * solubility, solution equilibria and leaching.   **Resources**  Royal Botanic Gardens 2012   |  |  | | --- | --- | | |  | | --- | | The Cycad Pages GENUS  Macrozamia | |   <http://plantnet.rbgsyd.nsw.gov.au/PlantNet/cycad/mackey.html>  Monroe 2013 Australia: The Land Where Time Began: [A biography of the Australian continent](http://austhrutime.com/venerable.htm)  <http://austhrutime.com/food_preparation_poison.htm>  ididjaustralia 2010 Indigenous preparation of Djitama (bush yam), bush tucker, Ramingining  <https://www.youtube.com/watch?v=2wgeBcWXMo0>  Note: Students are not expected to collect and use cycad fruit in this investigation. They should not taste or eat these fruit. A class risk assessment for possible allergens in the samples used should be conducted |
|  | **Finding freshwater within Saltwater bodies**   * Students identify that salt water is, or may be: * visible in the environment for example, oceans, salt lakes or * invisible for example, underground * Students investigate Aboriginal People’s knowledge and understanding of how animals and plants source fresh water in high salt and other areas. For some plants and animals it is about effective salt excretion methods, for other plants and animals it is about finding and/or storing water * Students research the properties of particular plants, or other indicators, that Aboriginal and/or Torres Strait Islander Peoples could use to assist in locating sources of fresh water in salt water environments. For example: * the presence of Pigface [or refer to local Aboriginal language name] as an indicator of underground sources of fresh water in coastal salt environments   **Resources**  Catchment Management Authority Local Land Services Western Region 2014 *Through our Eyes – Finding water in an arid environment with Badger Bates* [Baarkindji]  <https://www.youtube.com/watch?v=-EAmaHkf4vY> BBC 2008 *Finding Water in the Desert - Ray Mears World of Survival* [Pitjantjatjara] <https://www.youtube.com/watch?v=s5G9nQTLB0U>  Australian National Botanic Gardens and Centre for Australian National Biodiversity Research 2012 *Carpobrotus glaucescens Pigface, or Angular Pigface*  <https://www.anbg.gov.au/gnp/interns-2005/carpobrotus-glaucescens.html>  Alternatively, knowledge about indicators of freshwater sources may be held by some coastal Aboriginal communities and provided if this is appropriate.  Support student research by inviting an Aboriginal Education consultant, Aboriginal cultural educator or appropriate knowledge holder to come and show or discuss these practices with students.  **Assessment for learning:** Students prepare a response to the following question: *Describe how Aboriginal and Torres Strait Islander Peoples have used observations and inferences to utilise the natural resources available to them.*  Feedback is provided to students. |
| * conduct a collaborative practical investigation and collect a range of qualitative and quantitative primary data from **one** of the following: Critical and creative thinking icon Information and communication technology capability iconNumeracy icon * growth of plants * reactions of calcium carbonate * the ‘life’ of different batteries under different circumstances * water quality of a pond or local stream | * Students research the mining industry’s use of water. As a class create a spider diagram which outlines the use of water in mining and then the following impact on the environment. The graphic organiser can be displayed in the room. * Students collaboratively perform a pond or stream study to gather qualitative and quantitative data on the quality of water in the system (see the following site as a guide: <http://www.sustainingriverlife.org.au/Riversandwater/31Whatwaterqualitytellsusaboutriverhealth.aspx> ) * Obtain water samples from a water source and test for the following parameters including but are not limited to:   + dissolved oxygen   + turbidity   + total solids   + pH   + temperature   + nitrates   + phosphates * Students report on their findings and include tabulation of qualitative and quantitative data in their results. |
| * make inferences and conclusions derived from the primary data collected in this collaborative practical investigation | * Students construct a Venn Diagram to compare the terms inference and conclusion. Discuss the terms in relation to the experiment conducted above. * From the data obtained from the testing of the water sample, students make an inference on the quality of the water. Students use this inference to draw conclusions about the impact of mining on water quality.   **Depth Study:** (2 hours)  Students extend the issue of water quality to the degree of plant growth – working individually or collaboratively, students conduct secondary research to determine how the results of the water quality would impact on plant growth. Students are to develop a hypothesis that will later be refined and tested. |

| **Topic: Using Secondary-sourced Data** | |
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| **Inquiry question:** *How is secondary-sourced data used in practical investigations?* | |
| **Content** | **Teaching, learning, working scientifically activities and assessment** |
| * collect qualitative and quantitative secondary-sourced data to validate the inferences and conclusions drawn from the practical investigation carried out above, based on **one or more** of the following: Critical and creative thinking icon Information and communication technology capability iconNumeracy icon * the effect of soil salinity on plant growth * chemical reactions in cave formation * energy storage * methods of water monitoring | * Students analyse secondary information about water monitoring methods to justify the conclusions drawn from the investigation above. The sources of secondary information must have quantitative and qualitative values. * Useful sources of information include environmental agencies and environmental protection authorities.   Due to the extensive nature of mining this information can be contextualised. Some examples include:  <http://www.environment.nsw.gov.au/water/waterqual.htm>  <http://www.waternsw.com.au/water-quality/catchment/mining>  <http://www.water.nsw.gov.au/water-management/water-quality>  <http://d3n8a8pro7vhmx.cloudfront.net/caha/legacy_url/53/Climate-and-Health-Alliance_Report_Layout_PRINTv2.pdf?1439938112>   * Students make links between their investigation and the water quality data from the secondary sources. |
| * Discuss how secondary-sourced data adds to the inferences and conclusions drawn from primary data | * Students construct a table to contrast the information from their investigation and the secondary sources. * Discuss the importance of referring to water monitoring guidelines in making inferences from the primary data that is being analysed. Students record the points of discussion. * If possible have a representative from the Department of Primary Industries to speak with students about water monitoring methods used in the catchment area. Refer to: <http://www.water.nsw.gov.au> |
| * Evaluate the usefulness considering secondary-sourced research before undertaking an investigation to collect primary data, in order to: Critical and creative thinking icon * make inferences * develop inquiry questions * construct suitable hypotheses * plan suitable investigations * avoid unnecessary investigation | * In light of the research conducted previously students investigate the following question: ‘Does the mining industry’s use of water affect the agricultural industry?’ * Students describe and record how secondary sources are useful in generating: * inferences * more specific inquiry questions * a suitable hypothesis * a suitable investigation plan * evidence to avoid unnecessary investigation * Students are challenged through a ‘What if?’ discussion regarding the use of secondary sources when planning investigations, for example: * What if secondary sources were not used? * What would the possible inferences be? * What possible inquiry questions could be proposed? * What hypotheses could have been developed? * What investigations could be designed which would lead to necessary investigations?   **Depth study (2 hours)**  Working collaboratively or individual, students design and perform an experiment to test the effect of water quality on plant growth for a variety of plants that constitute cropping varieties for an area. Link the investigation to issues associated with mining and agriculture. |

| **Topic: Observing Patterns** | |
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| **Inquiry question:** *How does humans’ ability to recognise patterns affect the way they interpret data?* | |
| **Content** | **Teaching, learning, working scientifically activities and assessment** |
| * describe patterns that have been observed over time throughout the Universe and in nature using, for example: * animal migration * movement of comets * formation and shape of snow crystals * elements exhibiting certain properties | * Revise the concepts of magnetism and gravity with students as these are concepts used in mineral exploration. * Students investigate the patterns mineralogists use to identify possible sources of viable minerals. They include information about geophysical observation of deposition patterns, magnetic pattern and gravitational patterns. This shows how different elements exhibited certain properties in nature. [Exploring for Gold](http://www.scootle.edu.au/ec/viewing/L5923/index.html) illustrates these processes   <http://www.scootle.edu.au/ec/viewing/L5923/index.html>   * Students research how ancient communities used patterns to source metals which gave rise to the various metal ages. |
| * interpret data in order to propose a hypothesis based on an irregular pattern observed over time in the Universe and in nature using, for example: Critical and creative thinking iconhttps://lh5.googleusercontent.com/BMZkaZTyd7SEXkkc_CcgwiBXerETEUrPzFGAZAcWIGC0XQhqI_l_64A0db-oTz9IwKSFEQuxjIklP0qVv_NytfCJ_LdKF7n0x4ar8QYV_fwPNJXxQVuPJB76LXPIXqtbhQvpUIcuNumeracy icon * the Aurora Australis * fractals in nature * the behaviour of unstable isotopes | * Review the concept of isotopes and radioactive decay with students. Introduce the concept of decay equations. * Students complete a number of decay equations and analyse decay equations to identify the pattern that exists for alpha, beat and gamma decay. * Show students a [half-life](file://C:\Users\blanch\Documents\Offline%20Records%20(TS)\Science%20Stage%206%20Syllabus%20Support%20Materials%20-%20Investigating%20Science%20-%202017(2)\Assessment%20for%20Learning:%20students%20are%20provided%20with%20information%20of%20the%20half-life%20of%20a%20number%20of%20elements%20and%20independently%20graph%20this%20information.) graph. Students are challenged to develop a definition of half-life based on the information from the graph. Introduce the half-life equation. Students use the graph to make a prediction of half-life and then check this using the equation.   <http://www.scootle.edu.au/ec/viewing/L8032/index.html>  **Assessment for Learning:** students are provided with information of the half-life of a number of elements and independently graph this information. |
| * examine the human tendency to observe patterns and misinterpret information, for example: * pareidolia * optical illusions | * Provide students with a range of optical illusions. Think-pair-share what students are seeing: students record their own observations, share this with a partner and then discuss this with the class. * Discuss the human tendency to observe pattern and misinterpret information. Students record the points of discussion. <https://www.youtube.com/watch?v=x63ZYsk761U> * Students evaluate the importance of multiple perspectives when observing patterns. |
| * discuss how the tendency to recognise patterns, even when they may not exist, can lead to misinterpretation of data | * Students evaluate the importance of multiple perspectives when observing patterns. * Students research scientific studies which have flawed causation links. For example: * rubella vaccination and autism <http://www.upworthy.com/16-years-ago-a-doctor-published-a-study-it-was-completely-made-up-and-it-made-us-all-sicker> * consumption of aspirin and reduction in heart disease * Students compare the terms causation and correlation and relate these to the scientific studies which they have research. * As a class discuss how humans have a tendency to recognise patterns when these may not exist and this can lead to misinterpretation of data. Students record the points of discussion. |
| * discuss the role and significance of outliers in data | * Provide students with an experiment and an accompanying data set which has a clear outlier. Students are to graph the data and identify the outlier. Ask students to suggest how the outlier could have resulted and what this could mean for the design of the experiment. * Discuss the significance of the outlier in experimental data and the scientific method. |

| **Topic: Developing Inquiry Questions** | |
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| **Inquiry question:** *How can hypotheses and assumptions be tested?* | |
| **Content** | **Teaching, learning, working scientifically activities and assessment** |
| * gather secondary-sourced data describing historical instances of long-standing assumptions that have been updated by scientific investigation, including but not limited to: Critical and creative thinking icon * spontaneous generation and the investigations that led to the proposal of the germ theory * radioactivity: including the work of Henri Becquerel and Marie Curie * phlogiston theory * human influences on atmospheric pollution | * Students (in groups) present information about the following historical assumptions that have been updated by scientific investigation: * spontaneous generation and the investigations that led to the proposal of the germ theory * radioactivity: including the work of Henri Becquerel and Marie Curie * phlogiston theory * human influences on atmospheric pollution * steady state theory of the Universe * discovery of the electron which challenged the Dalton model of the atom including Thompson’s experiment and Rutherford’s gold foil experiment. * The following information must be included in the presentation: * *description* of *previous understanding of the concept* * *evidence this understanding was based on* * *description of the new understanding* * *how the new understanding was developed (description of experiment or analysis of data)* * *the technologies that needed to be developed that allowed for the advancement of scientific understanding* * Students present their findings using a digital platform of their choice eg: Prezi, pencast, podcast, iMovie. Each group provides feedback on the presentations: before your presentation I knew …; during your presentation I learnt …; after your presentation I would like to know more about … * Students, through the development of their presentation, are able to identify that science is an ever changing body of knowledge and describe examples which illustrate this.   **Assessment for Learning:** Present students with information about an issue associated with mining, eg environmental impacts of fracking. Students identify and record current understanding on the issue and prepare a response to the following question: *Describe the role of science in furthering understanding of this issue.* |
| * propose an inquiry question, construct a hypothesis and conduct an investigation that tests a common assumption, for example: * washing with antibacterial soap kills more germs than washing with normal soap * the Sun rises in the East and sets in the West * what goes up must come down * use appropriate representations to analyse the dataCritical and creative thinking icon Information and communication technology capability iconhttps://lh5.googleusercontent.com/BMZkaZTyd7SEXkkc_CcgwiBXerETEUrPzFGAZAcWIGC0XQhqI_l_64A0db-oTz9IwKSFEQuxjIklP0qVv_NytfCJ_LdKF7n0x4ar8QYV_fwPNJXxQVuPJB76LXPIXqtbhQvpUIcuNumeracy icon | * Brainstorm what the term assumption means and ask them to identify some common assumptions. Students record this discussion as a spider diagram. * Students suggest how each assumption could be tested and add their responses on the spider diagram.   **Depth Study** **(4 hours)**  Students are to propose an inquiry question that expands on the ideas presented, construct a hypothesis, and conduct an investigation that tests an assumption. Students report their findings in a scientific report and submit this for feedback showing appropriate representations of data in their analysis. |

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| **Topic: Generalisations in Science** | |
| **Inquiry question:** *What generalisations and assumptions are made from observed data?* | |
| **Content** | **Teaching, learning, working scientifically activities and assessment** |
| * make generalisations to describe any trends found in the data  Information and communication technology capability iconNumeracy icon * draw conclusion based on generalisations  Information and communication technology capability iconNumeracy icon | * Students research and define a scientific generalisation, eg a generalisation that describes how some aspect of the world behaves under stated circumstances and explain why generalisations are important in science. * Students refer to their previous investigation and identify what generalisations they made to develop their conclusion. |

| **Topic: Peer Review** | |
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| **Inquiry question:** *What role do peers play in scientific investigation?* | |
| **Content** | **Teaching, learning, working scientifically activities and assessment** |
| * assess the input that collaborative teams and alternative perspectives have had on the development of hypotheses and research questions that have contributed to the development of, for example: * particle accelerators * periodic table * study of bioastronomy * geological uniformitarianism | * Provide students with information regarding Australia’s involvement in international collaboration in research. For example: * Australia-China Joint Research Centre for In-Line Chemical and Mineral Sensing for Sustainable Mineral Processing * Square Kilometre Array * FII AMIRA P260G Flotation Project * Australia’s involvement with UNESCO in developing the Indian Ocean Tsunami Early Systems * Gemini Observatory   **Resources**  <http://www.science.gov.au/international/CollaborativeOpportunities/ACSRF/jointResearch/Pages/JRC-for-In-Line-Chemical-and-Mineral-Sensing-for-Sustainable-Mineral-Processing.aspx>  <http://www.ga.gov.au/ausgeonews/ausgeonews200912/tws.jsp>   * Students describe the goals of the research project and identify the involvement of each country. Students discuss and record the benefits for each country. Students write a headline from the perspective of each country about the collaboration. * Students use IDEA (Identify; Describe; Explain; Assess) and answer the following: ‘Assess the input of Australia and another country in the development of scientific understanding’. Students discuss their understanding of the verb ‘assess’ with students to ensure they are familiar with the requirement of their response. |
| * assess the scientific community's current understanding of scientific mysteries and outline why this understanding remains incomplete, including but not limited to: Critical and creative thinking icon Information and communication technology capability icon * origins of life on the Earth * the idea that feynmanium is the last chemical on the periodic table that could exist * the expanding Universe and Hubble constant | * Students describe the goals of the research project and identify the involvement of each country. Students discuss and record the benefits for each country. Students write a headline from the perspective of each country about the collaboration. * Introduce the idea of a scientific mystery by reading an article from the media covering a current or topical ‘mystery’. For example, the [Higgs Boson](https://www.newscientist.com/round-up/instant-expert-higgs-boson/) (New Scientist: *Instant Expert 35: Higgs Boson, 6 Sep 2013* ) or end theories of the end of the Universe (New Scientist: [*Your explosive guide to the end of the universe*](https://www.newscientist.com/article/mg23030760-200-the-end-your-explosive-guide-to-the-ultimate-fate-of-the-cosmos/)*, 1 June 2016*).   **Resources**  <https://www.newscientist.com/round-up/instant-expert-higgs-boson/>  <https://www.newscientist.com/article/mg23030760-200-the-end-your-explosive-guide-to-the-ultimate-fate-of-the-cosmos/>   * Discuss how missing evidence makes these concepts a mystery. Also discuss the hypotheses scientists develop based on evidence which would support these ideas. * Brainstorm and list other scientific mysteries. Students use their own ideas, including: * origins of life on Earth * that feynamium is the last chemical on the periodic table that could exist * the expanding Universe and Hubble constant * Complete a table with the following headings: * description of mystery * missing evidence which makes this a mystery * hypotheses which have been developed |
| * evaluate biases that may have affected the scientific thinking of European settlers about Aboriginal and Torres Strait Islander peoples’ ecological understanding and knowledge of Country and Place in relation to agricultural practices and the biological and natural resources of Australia. Aboriginal and Torres Strait Islander histories and cultures icon | * Students discuss the concept of bias and develop a definition of the term. * Students compare a range of scientific and other texts that explain a range of perceptions of Aboriginal Peoples’ ecological understanding and knowledge of Country (including skyways and waterways), for example: * scientific reporting in the early 1800’s by Samuel Morton’s * excerpts of settlers’ accounts * communication by contemporary scientists * reporting of the Sydney Aboriginal Language terms ‘bu\_do\_e\_nong’ and ‘cal gal le on’ (ie Magellanic cloud) in ‘The notebooks of William Dawes’.   **Resources**  Morton’s 1839 *Crania Americana - 21.The Australian Family* pp93 -94 <https://archive.org/details/Craniaamericana00Mort>  University of Cambridge 2014Skulls in print: scientific racism in the transatlantic world<http://www.cam.ac.uk/research/news/skulls-in-print-scientific-racism-in-the-transatlantic-world>  Bruce Pascoe 2014 (pp11-18) of *Dark Emu Black Seeds agriculture or accident?* (Introduction, pp11-18)  Ray Norris 2014 ***Aboriginal people – how to misunderstand their science*** <http://theconversation.com/aboriginal-people-how-to-misunderstand-their-science-23835>  The notebooks of William Dawes on the Aboriginal Language of Sydney Book C, Page 16  <http://www.williamdawes.org/ms/msview.php?image-id=book-c-page-16>  <http://www.williamdawes.org/index.html>   * Students take part in a [Socratic Circle](http://www.acsa.edu.au/pages/images/Creating%20significant%20learning%20experiences%20through%20PBL%20Socratic%20Seminar%20Protocol.pdf): with the initial open ended question: ‘What biases may European settlers have had that affected their scientific thinking about Aboriginal and Torres Strait Islander Peoples’ understanding ecosystems?*’* As students present their ideas encourage the discussion to address knowledge of Country and Place and resources. |

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| **Resources, Reflection and Evaluation**  Teacher sign off………………………………… Date commenced……………………… Date completed…………………………….  Program evaluation and recommended amendments  ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..  Recommended additional text/resources   1. ……………………………………………………………………………………………………………………………………………………………… 2. ……………………………………………………………………………………………………………………………………………………………… 3. ………………………………………………………………………………………………………………………………………………………………. |