St Mary MacKillop College, Canberra

Year 8 Science: Energy

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| Assessment Task | The Power of Wind | | |
| Relevant Conditions: | 2 classes per week will be allocated for completing testing and written work. | | |
| Teacher |  | Weighting | 30% |
| Distribution Date |  | Due Date(s) |  |
| **Year 8 Content descriptions:**  Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems ACSSU155  Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations ACSHE135  Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed ACSIS140  In fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task ACSIS141  Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate ACSIS144  Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate ACSIS148 | | | |
| **Sustainability cross-curriculum priority:**  OI.8 Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgments based on projected future economic, social and environmental impacts. | | | |
| **Year 8 Achievement Standard**  By the end of Year 8, students compare physical and chemical changes and use the particle model to explain and predict the properties and behaviours of substances. They identify different forms of energy and describe how energy transfers and transformations cause change in simple systems. They compare processes of rock formation, including the time scales involved. They analyse the relationship between structure and function at cell, organ and body system levels. Students examine the different science knowledge used in occupations. They explain how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems.  Students identify and construct questions and problems that they can investigate scientifically. They consider safety and ethics when planning investigations, including designing field or experimental methods. They identify variables to be changed, measured and controlled. Students construct representations of their data to reveal and analyse patterns and trends, and use these when justifying their conclusions. They explain how modifications to methods could improve the quality of their data and apply their own scientific knowledge and investigation findings to evaluate claims made by others. They use appropriate language and representations to communicate science ideas, methods and findings in a range of text types. | | | |
| **Energy - The Power of Wind**  **The Problem:**  It is 2034 and Canberra is facing a shortage of electricity. Coal supplies have been exhausted and there is not enough electricity available to power Canberran homes.  **Part of the Solution:**  The old coal fired power station in Bayswater, NSW has been disassembled and the turbine generators have been recovered. The hills around Canberra have been identified as suitable for wind turbines there is great opportunity to use the existing turbines to transform some of the available wind (kinetic) energy into electricity (electrical energy) to supply the struggling city.  **The Rest of the Solution:**  **Part A:**   1. Explore how people have harnessed the power of wind throughout history. For this section, you will need to focus on uses other than electricity generation. (100 words + 1 image) 2. Research and present an information report on an electricity generating wind turbine. You would at least need to name all of the parts, and what is required to make it work. It would also be relevant to include why turbines are placed in specific locations. (200 words + 3 images)   **Part B**  Your task is to design and construct a set of blades for an efficient wind turbine.   1. Research, design and construct a set of wind turbine blades. Each blade must meet these requirements:  * attach to a pencil (provided by you) with 2cm free at one end for it to be attached to our hub at school for testing. * be no more than 25cm in length * have no sharp metal edges or points * must not be a purchased turbine or propeller blade  1. Once your blades are complete, you will be able to measure the voltage (a measure of electrical energy) produced by the wind turbine using your blades. This will be completed in class and electric fans will be used to simulate wind. 2. Record all data and take a photo of your first set of blades. Redesign your blades and attempt to increase the amount of energy produced by the wind turbine. 3. Draw a Sankey diagram showing the transformation of energy from kinetic (the wind from the fan) to electric (power from the turbine), make sure that you also include any inefficiencies (waste) in your diagram. 4. You will be given several opportunities to measure the energy output of your blades in class. The more you improve your blade design, the better the efficiency of your blades and the more power you will generate.   Throughout your design and building, you will need to keep a working journal. The journal must include labelled sketches/photographs, efficiency results of your blades and text identifying and evaluating the improvements that you made to your blades over at least two successive attempts. (200 words + as many photographs, sketches and images as you require) | | | |
| **Extension (OPTIONAL)**   * Research and make a small generator using magnets and copper wire so that your wind turbine is operational as a standalone unit and does not require the hub and generator at school. * Select one renewable resource and defend its continued development to an audience of your choice taking into consideration its economic, social and environmental implications into the future. * Design a sustainable home with off-grid power – consider how the measures taken will also preserve and/or restore the quality and uniqueness of environments, immediately and into the future. | | | |
| ***Plagiarism***  *Plagiarism is the copying, paraphrasing or summarising of work, in any form, without acknowledgement of sources, and presenting this as your own work. Please refer to the Colleges Assessment Policy Year 7 – 10 available on Studywiz.* | | | |