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Assessment Due: Monday the 22nd of September, 2014



Ensuring Student Success Assessment & Reporting Package

"We plan. We develop. We deliver. We assess and evaluate the results of the assessment. We revise, deliver the revised material, and assess and evaluate again. Perfection is always just out of reach; but continually striving for perfection contributes to keeping both our instruction fresh and our interest in teaching piqued."

***E.S. Grassian***

Introduction

In order to make educated and consistent judgements which will improve future student education, an unending process of gathering, analysing and reflecting on evidence must take place. This process is what we refer to as ‘Assessment’ and it is a crucial part of every classroom. There are three main categories that assessment falls into and these are known as formative, summative and authentic. Formative assessment is a frequent part of the day to day running of a classroom and is a continuing process which permits teachers to regularly confirm or modify their direction or activities. Summative assessment takes place at the end of a unit or school term and helps teachers to determine what knowledge and skills students have gained and what achievement levels students have reached. Authentic assessment is the final form of assessment and involves the application of skills and knowledge over a period of time which allows students to fulfil set criteria which students are aware of and involved in.

This ‘Assessment and Reporting Package’ is based on a unit of work prepared by Kathryn Kavanagh for a grade 6 class that was adapted from The Australian National Curriculum (ACARA, 2013) and has been developed to provide teachers with the tools to scaffold student learning in the subject field of Biological Science. The unit, ‘Extreme Lives’ focuses on identifying how changes to the environment impacts the lives of organisms found in that environment and the way plants and animals have developed ways of surviving in the most extreme conditions. Students will investigate how different physical changes, such as water, sunlight and heat can affect the conditions of an environment and will be involved in researching the types of animals and plants found in extreme places on earth such as deserts and arctic environments. The final aspect that students will study is what impacts human activities have on the environment and what is being done to minimise these impacts. Students will be asked to brainstorm an appropriate solution to this issue and use what they have learned to make predictions about what the future might hold. The inquiry is sequenced so that the learners are engaging in both lower order and higher order thinking, and experience working independently, in groups and as a whole class (ACARA, 2013).

During the unit, a number of activities will provide teachers with the chance to carry out formative assessment tasks. This will allow teachers to monitor learner’s understanding of the information and their knowledge and skill level in relation to their peers. A series of focus questions will be used to scaffold student learning and provide opportunities for students to take part in both lower and higher order thinking while a number of guided questions will allow students to tackle small chunks of information, all the time working towards the end goal. The summative assessment task combines two of the DOL’s Dimension 4 Complex Reasoning processes - problem solving and invention. Students are to find a theoretical solution to a chosen human impact on the environment and invent a strategy/product that will improve or eliminate the problem. Students will acquire, utilise and improve problem solving and reasoning skills, while extending their knowledge and creativeness and capacity to work collaboratively (Marzano & Pickering, 1997).

This resource has been created in conjunction with The National Australian Curriculum to instil understandings and appreciation of how our choices influence not only our local environment but the entire global environment.

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| **Unit title: Extreme Lives** | **KLA(s): Science** | **Year level(s): Grade Six** | **Duration of unit: 1 Term** |
| **Key Questions &****Rationale for the Unit/context** |
| This unit of work runs for 1 term (10 weeks) and explores environmental changes throughout the world and seeks to answer the questions “How have animals adapted to their environments and how can we learn from them” and “What will happen to the Earth if we don’t do anything to limit the impact humans have on the environment?” It is important for students to know that every change which occurs within an environment impacts on the plants and animals living there. Students will learn that some plants and animals have developed amazing ways to survive changes in their environments and are able to thrive in the harshest places on Earth while others migrate seasonally so they are able to find food in order to survive and breed. By the end of year 6, The Australian Curriculum (ACARA, 2013) states that students should be able to describe and predict the effect of environmental changes on individual living things. Hands on investigations will allow students to explore how physical conditions impact the growth of plants while online simulations will allow them to see a number of other impacts that various environments endure. Students will be involved in developing questions that they will be able to investigate and take part in researching simple cause-and-effect relationships. They will use information technology, including a number of online platforms, to research, prepare and present information and assessment tasks to their peers and teachers. This unit overview prepares educators with the knowledge and resources to successfully instil knowledge while still permitting freedom to tailor lessons to the needs of their individual students (ACARA, 2013). |
| **Curriculum Content Descriptors** | **Elaborations** |
| The growth and survival of living things is affected by the physical conditions of their environment. (ACARA, 2013) | * Investigating how changing the physical conditions for plants impacts on their growth and survival such as salt water, use of fertilizers and soil types
* Observing the growth of fungi such as yeast and bread mould in different conditions
* Researching organisms that live in extreme environments such as Antarctica or a desert
* Considering the effects of physical conditions causing migration and hibernation

 (ACARA, 2013) |
| **Procedural Knowledge: What the learners will do****(specific for this unit & context)** | **Declarative Knowledge: What the learners will know****(specific for this unit & context)** |
| * Investigate the various impacts that different environments endure, man-made and natural.
* Discover how these changes impacts the plants and animals found in these environments.
* Research the various strategies that have been put in place to limit human impact on the environment
* Conduct experiments to discover how changing physical conditions of an environment impacts the growth of plants. (Mouldy Bread Experiment)
* Conduct experiments to discover how the quality of soil and water can impact the survival of plants and animals. (Salty Water Experiment.)
* Research the amazing animals which have been able to adapt and survive in the most extreme environments.
* Discuss how these adaptions could be used by humans to limit their impact on the environment or how they could help humans if our environment was to dramatically change.
* Explore the reason behind animal migration and discuss what physical conditions are causing these animals to migrate.
 | * That every environment on Earth has to endure physical changes whether man-made or natural.
* Physical changes within an environment impact the plants and animals living there
* Humans have taken some steps to help reduce their impact on the environment.
* That light, heat and moisture play an important role in the survival of plants and animals.
* That soil quality and availability of clean fresh water plays an important role in the survival of plants and animals.
* Animals are able to adapt and change according to their surroundings and some of these adaptions are remarkable.
* Studying the way animals and plants interact with their environments can help us reduce our impact on the Earth as well as helping us survive in extreme environments.
* That there are hundreds of animal species that migrate seasonally around the world for different reasons.
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# Year 6 – Biological Science: Extreme Lives

# Assessment Task: Presentation

**How can we minimise the impact we have on the environment?**

In pairs you are to research one impact that humans have on the environment and provide a solution by inventing a resource that could be used as a sustainable, cost effective alternative.

You need to research current environmental conservation approaches to guide your own invention of a suitable, sustainable, cost effective environmental conversation strategy. You must enhance your presentations through the use of digital resources (Weebly, Wiki, etc.), models, blue print plans etc.

Your presentation will be submitted to the United Nations Scientific Committee (UNSC) - your fellow students will make up the members of the committee. You are to convince the UNSC that your approach should be put in place. The summit members will hold a vote and decided on the most appropriate strategy.

Use information gathered in your research booklet and portfolio to form the basis of your strategy.

**Conditions:**

You must work in a pairs (or group of 3 in the case of uneven numbers) to produce a polished oral presentation. Each member must contribute to the presentation. Presentation must be 6 to 8 minutes in length and include the use of visual aids. Peer feedback will be done individually.

**Due Date/s: Draft Due in Week 8 Final Due in Week 9**

You will present a practise presentation in week 8 of the term to one other pair and your peers will provide feedback in the form of a PMI chart. You will be given 1 week to make any changes you need to your presentation. The final presentation will be made in week 9 of the term to the entire class.

**Criteria:**

You must demonstrate your understanding of the various ways humans impact the environment through your presentation. Have evidence that multiple strategies for investigation have been used, along with your analysis and evaluation of the data collected. The marker will be looking for evidence that you are able to use your problem solving and invention skills to produce a creative, sustainable, well justified, cost effective solution which could theoretically aid in reducing human impacts on the environment.

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| Assessment criteria – The Australian Curriculum – Biological Science: Science Knowledge and Understanding |
| **Year level:** Six **Unit Name:** Extreme Lives | **Student Name:** Peter Pumpkin Eater | **Marker:** Miss Muffet |
| **Task Description:** In pairs students are to provide a sustainable solution for human impacts on the environment. Students must invent and refine a resource that could be used as a sustainable, cost effective alternative. Students are to research existing environmental conservation procedures to guide their own invention. Students must enrich their presentations through the use of digital resources, models, blue print plans etc. This presentation must be planned for and presented to a United Nations summit – fellow students will make up the members of the summit. Students are to convince the UN summit members why their approach is the most appropriate. The summit members will hold a vote and decided on the most appropriate approach. Students are to use information gathered in their research book to form the basis of their strategy. |
| **Standards** | **Evidence in student work typically demonstrates a:** |
| **Assessable Elements** | **A** | **B** | **C** | **D** | **E** |
| **Task specific** | level of knowledge and understanding of concepts, facts and procedures, and application of processes |
| *Demonstrated knowledge and understanding of the different ways human activities impact the environment.* | Comprehensive knowledge and understanding of different ways human activities impact the environment. | Thorough knowledge and understanding of different ways human activities impact the environment. | Satisfactory knowledge and understanding of different ways human activities impact the environment. | Variable knowledge and understanding of different ways human activities impact the environment. | Rudimentary knowledge and understanding of different ways human activities impact the environment. |
| *Demonstrates use of investigation strategies to identify issues, development of focus questions and use of the inquiry process.* | Insightful identification of issues, development of focus questions and use of the inquiry process. | Effective identification of issues, development of focus questions and use of the inquiry process. | Competent identification of issues, development of focus questions and use of the inquiry process. | Variable identification of issues, development of focus questions and use of the inquiry process. | Minimal identification of issues, development of focus questions and use of the inquiry process. |
| *Demonstrates use of analysis and evaluation of evidence and information effectively used to support proposed environmental conservation approach.* | Discerning analysis and evaluation of evidence and information effectively used to support proposed environmental conversation approach. | Logical analysis and evaluation of evidence and information effectively used to support proposed environmental conversation approach. | Relevant analysis and evaluation of evidence and information effectively used to support proposed environmental conversation approach. | Narrow analysis and evaluation of evidence and information effectively used to support proposed environmental conversation approach. | Cursory analysis and evaluation of evidence and information effectively used to support proposed environmental conversation approach. |
| *Communicating effectively with presentation utilising appropriate technology/learning materials to help engage and inform the audience.* | Clear and accurate communication, with presentation utilising appropriate technology/learning materials to help engage and inform the audience. | Coherent and accurate communication, with presentation utilising appropriate technology/learning materials to help engage and inform the audience. | Sound communication, with presentation utilising some appropriate technology/learning materials to help engage and inform the audience. | Disjointed communication, with presentation utilising some technology/learning materials to help engage and inform the audience. | Unclear communication with presentation utilising minimal technology/learning materials to help engage and inform the audience. |
| *Creative, sustainable, justified, cost effective solution/ invention which could theoretically aid in reducing human impacts on the environment*  | Creative, sustainable, well justified, cost effective solution/invention which could theoretically aid in reducing human impacts on the environment | Creative, sustainable, justified, cost effective solution/invention which could theoretically aid in reducing human impacts on the environment | Appropriate solution/invention which could theoretically aid in reducing human impacts on the environment | Suitable solution/invention which could potentially aid in reducing human impacts on the environment. | Inappropriate solution/invention which would be unlikely able to aid in reducing human impacts on the environment. |
| *Effective engagement in reflection and feedback process* | Engages in peer evaluation and feedback processes in perceptive and tactful ways | Engages in peer evaluation and feedback processes in constructive ways | Engages in peer evaluation and feedback process in appropriate ways | Engages in feedback and evaluation process | Provided little or no feedback on learning |
| **Overall Grade:** **Comments:**  |

Assessment Justification

This assessment package uses student performance as the summative assessment task where students are to conduct their own research and present their ideas to their peers. Fosters and Master (1996) define performance based assessment tasks as ‘the assessment of students as they engage in real learning activities’. Through the use of this culminating authentic assessment task, students are able to demonstrate that they have built on their knowledge during this unit and are able to use this knowledge within a meaningful context. Brady & Kennedy (2012) suggest that authentic assessment should capture the quality of a student’s work while focusing on their daily performance so by encouraging students to go beyond just learning about the impacts humans have and asking them to think about the way they can use what they know to come up with solutions, this assessment task remains authentic. By using this method of assessment, the teacher is able to ensure students view the assessment as engaging and genuine which will help them link it with their everyday lives.

Problem Solving and Invention, from Dimension 4 of Marzano and Pickering’s Dimensions of Learning (1997), are promoted throughout this unit and this assessment task allows students to use their skills by allowing them the freedom to explore topics of their own choosing, which relate to the research questions and assignment. Psychologist Kathy Eugster (2009) suggests that it is essential for students to learn problem solving skills as it also improves their thinking abilities and ability to work through difficult situations. On top of this, research shows that students who are able to use problem solving strategies successfully are able to work better in a teams or group environments. It is also important for students to be able to generate original ideas and use what they know to take these ideas and turn them into something more. Jennifer Henderson (2008) state’s, in an article she wrote for the Association for Supervision and Curriculum Development, that ‘creativity, ingenuity, and innovation are the keys to success in the evolving global economy. To prepare young people for work and life in the 21st century, educators must cultivate students' creativity’. This assessment tasks addresses both the academic and creative sides of learning to ensure students are gaining the most from this unit and setting themselves up for success in the future.

This summative assessment task also makes use of the peer assessment technique wherein students are asked to assess the work of their peers in order to give feedback. A number of arguments have been made as to the benefits of peer assessment including promoting the idea that assessment is an ongoing and integral part of learning (Brady & Kennedy, 2012). Throughout the unit students are involved in activities which encourage higher order thinking and are provided with the ability to progress at their own pace and the opportunity to monitor their own learning. By incorporating peer assessment in the summative task, students are again given the chance to develop their critical thinking skills and take ownership of their work which in turn helps them to be more autonomous (Brady & Kennedy, 2012). It is however, important for teachers to remember that while peer-assessment has a long list of benefits, there are still limitations that need to be continuously moderated by the learning manager in order to ensure successful learning for all students.

While there is no doubt that this assessment task provides an excellent opportunity for students to demonstrate a number of skills including problem solving, invention, team work and public speaking, it is the responsibility of the learning manager to assess if it is suitable for their students. Modifications may need to be made in order to bring the assessment task in line with the abilities of the students. Some examples of differentiation for students are included further on in the package.

Key Learning Strategies

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| **Key learning experiences and teaching strategies** | **Checks for learning** |
| **Portfolio:** Each week students will look at a different animal which has developed amazing ways to survive in extreme conditions. Students will use their investigation skills to find out information about the animals. They will add this information to their portfolio. | Students will explore the environments these animals are found in, the physical changes that impact each animal, any human impact that affects the animals and how learning about their adaptations could help humans cope in the same environment. The teacher will use the portfolio to check that students understand what is classed as an ‘impact’ and that they are able to investigate and find information using a range of sources. |
| **Mouldy Bread Experiment:** Students will experiment with the physical conditions, including light and heat, which support mould growth on a piece of bread. They will work in groups with each group assigned a different set of physical conditions (Light but no water, no light, heat or water, heat but no water, etc.). They will monitor the growth of the mould for 3 weeks, placing their results on the class wall chart. (Appendix 1) | Students will explore the importance of physical conditions and how they impact the environment. They will look at why there is a lack of plants and animals in extreme environments such as the desert or arctic. Teachers will check that students have a firm understanding of how these physical conditions impact plant and animal survival. This experiment will also allow the teacher to check for student understanding of how to carry out a fair scientific test and how to write a scientific report. |
| **Mapping Migration Paths:** Students will look at the migration patterns of various species and map their migration routes. Animals will include short distance migratory animals such as zebra and buffalo in Africa and long distance migratory animals such as whales and geese. They will look at how the destruction of environments that serve as rest stops for migrating animals affects the survival of that species. | Students will research migratory animals to discover the reason behind their massive journeys. They will understand how physical changes in the environment trigger migrations and discuss how human impact on the environment has interfered with migratory patterns. The teacher will be able to assess student understanding of how changes in the environments impacts on animals that move from one place to another. This task also incorporates some elements of Geography and the teacher can assess students understanding of maps. |
| **Soil and Water Experiment:** Students will experiment with various soil and water types to find out how their quality affects the growth of plants. Students will work in groups with each group assigned a different soil type (sand, soil, gravel, no soil etc) and water type (fresh, salt, polluted etc). They will monitor the growth of the plants for 3 weeks then give a short 5 minute presentation detailing the results of their experiment. (Appendix 2) | Students will look at the impact that human farming has on the quality of soil and water had how this affects plants and animals living in these environments. Teachers will use this experiment to check that students understand the importance of quality soil and water in the survival of plants and animals. The teacher will use the presentation to check that students are able to speak in front of their peers and give a professional presentation.\*Online Interactive Activity: <http://www.sciencekids.co.nz/gamesactivities>/plantsgrow.html |

Formative Assessment Strategies

**Glogster Research Task**

Today's students find this new world of digital learning to be very motivating (Chen, 2010). Teachers are responsible for motivating students to learn and allowing students to use technology is a fantastic way to do so. Students will use the online platform “Glogster” to produce a poster with details about one impact that humans have on the environment and the plants and animals living there. An example could be the effects that run off from farming have on the Great Barrier Reef and the marine life that call it home. Students could also research how this issue affects humans. In the case of the Great Barrier Reef, if fish are no longer able to use the Reef for shelter, food and breeding, it will impact the fish stocks and in turn the amount of seafood available for humans to eat. The teacher will look at the chosen impact as well as the quality of information and relevance of images and links used by the student. The teacher will review each student’s poster and give them feedback in the form of a PMI chart. This will also give students an example of how they will complete their peer feedback for the Summative assessment task. The teacher will be able to use this task to gauge students understanding of the topic and make decisions about what skills students have developed and what they will still need to develop in order to successfully complete the summative assessment task. The International Reading Association recognises that using an online platform such as Glogster can strengthen literacy skills, specifically multimodal literacy skills, by providing students with opportunities to integrate video, images, text, and audio to present unified messages (IRA, 2014). Research recommends explicit teaching of multimodal literacy so that students understand how various modes can be used to develop dynamic multidimensional texts that effectively communicate messages to different audiences (Callow, 2008; Hassett & Curwood, 2009; Leu et al., 2004).

**Research Booklet**

At the start of this unit students will be given a ‘research booklet’ and put into pairs or small groups. They will be required to document their understandings and research in this workbook. As a group, students will tackle the 5 focus questions found in the booklet and using research skills, form their own opinions and draw conclusions about the topic. Stanford University (1999) suggest that small group work, used both in and out of class, can be an important supplement to lessons, helping students master concepts and apply them to situations calling for complex applications of critical thinking skills. This research booklet will become a part of the student’s portfolios along with their amazing animal information. Each week, the teacher will collect the group’s booklets and check what progress the students are making. This will allow the teacher to easily gauge the level of understanding of critical concepts and adjust their instruction to address any misconceptions or lack of understanding. The teacher will also be able to assess the student’s ability to conduct research in order to form their own opinions. Feedback will be given to the students in the form of comments made in their booklets as well as non-formal oral feedback given to the students. Independent research has been proven to be a fantastic teaching tool and when used correctly Langman (2012) suggests that it will help students build confidence in their own abilities as well as giving them more autonomy over what they are researching and what sources are used to do the research. He goes on to state that ‘with increasing independence students can then begin to follow the aspects of the subject that really interests them, building on their intrinsic motivation while also addressing specific areas of the curriculum (Langman, 2012).

**Practise Presentation & Peer Feedback**

It is a well-known fact that practise makes perfect and the University of Canberra (2014) suggests that giving the students the opportunity to practise their presentation in front of their peers will help them to polish their public speaking skills, build confidence and manage nervousness. As part of the summative assessment task, students are to present a practise presentation to at least one other group of their peers no less than one week before they present their final presentation. It is important for students to understand that practise is vital to presenting a polished presentation. Students will run through their presentation and their peers will evaluate the performance and provide feedback in the form of a PMI chart. Students giving feedback will be advised that they need to provide at least 2 points in each column of the chart, with the ‘P’ column being the positive aspects of the presentation, the ‘M’ column being things that the presenters might need to think about changing and the ‘I’ column being points that the audience finds interesting and informative. Feedback will be given to the students in the form of peer feedback with each group receiving their PMI charts from their peers. The teacher will also provide feedback to each group through an individual meeting to discuss the group’s progress. According to the University of Reading (n.d) [peer](http://www.reading.ac.uk/engageinassessment/peer-and-self-assessment/peer-assessment/eia-peer-assessment.aspx) [assessment](http://www.reading.ac.uk/engageinassessment/peer-and-self-assessment/self-assessment/eia-self-assessment.aspx), where students assess each other, can encourage students to take greater responsibility for their learning by encouraging engagement with assessment criteria and reflection of their own performance and that of their peers.

Modifications and Adjustments

This unit of work is adaptable when adjusting aspects to support student’s needs. For students who require a challenge this unit can be worked through independently making students accountable for their own learning. For students who require extra support this unit can become a guided journey facilitated and directed by the teacher, making this unit suitable for students of diverse skill levels. The focus animals could also be changed to make the subject area more relatable to the vast majority of students undertaking the unit of work. By doing this, students will find the content significant and more appealing, therefore providing authentic learning experiences and supporting learners from diverse backgrounds (Marzano & Pickering, 1997).

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| **Specific student needs and modifications** |
| **Specific students/groups** | **Adjustments, modifications and considerations** |
| **Gifted & Talented Students**These students will show a number of intellectual traits including exceptional reasoning ability and intellectual curiosity as well as a number of personality traits that may include (but are not limited to) intensity, perseverance and acute self-awareness. For a detailed list of characteristics visit: http://www.curriculumsupport.education.nsw.gov.au/policies/gats/assets/pdf/polsuppid.pdf | These students require tasks that will challenge them and keep them engaged in the lessons. For the Summative assessment task, have G&T student’s research statistics to back up their ideas and develop blue prints for their proposal. Discuss with the students what else they could use to enhance their presentation. For the experiments, put them in charge of their groups and ask them to present their groups data in the form of a table/chart/online document etc. |
| **ESL Students**These students will have a number of characteristics including being self-conscious, asking for a lot of help, or not asking for help at all and being withdrawn from their peers. They may also exhibit frustration and fatigue. ESL students come to the classroom at various levels of English learning experience. Some students may have had prior instruction on English while others none at all. Depending on the abilities of the ESL student, more or less dramatic modifications may need to be made. For a detailed list of ESL student characteristics, visit: http://www.learnalberta.ca/content/eslapb/documents/Characteristics\_of\_English\_Language\_Learners.pdf | For a student who has some command over English but would struggle in front of an audience, have them present their part of the presentation with a recording. If the student has little or no English speaking skills, have them use a Voki avatar to present their presentation. This way they are able to type what is to be said instead of stumbling through a speaking part. Another option is to have the student use power point and write on each slide what they would like to say and have the class take turns to read it out. Each of these modification tasks can be done with the assistance of a teacher or parent. |
| **At Risk Students**These students are often mistaken for ‘bad’ students because they exhibit disruptive behaviour and rebellious attitude however most times students identified at risk disengage from school work as they find it too hard and don’t know how to ask for help. At risk students are below the expected levels for their age and will have a history of absences and frequently ask to be sent to the nurse. They will have low self-esteem and will be quiet and withdrawn in the classroom. It is important that teachers are able to tell the difference between students with behavioural issues and those who need extra academic support. | At risk students need help to engage with the task they are being asked to do. For the summative assessment, set smaller goals instead of one large goal of the presentation. Get them to first decide on an issue and come up with an idea to solve the problem. Once they reach that point, set another goal such as writing a draft of what will be said in the presentation and so on until the final goal is reached. During classes, keep an eye on their behaviour. If they start to become distracted it could indicate they are having trouble with the work. Check if they need help as often as needed because at risk students don’t like to ask for it. |

Reporting framework

**Student’s Name:** Peter Pumpkin Eater **Class:** 6M **Term:** 1 **Year:** 2014

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| **Learning Area** | **Achievement** | **Comments** |
| **English** |  |  |
| **Mathematics** |  |  |
| **Science** | **B** | Peter has demonstrated a thorough understanding of Biological Science with a focus on how physical changes affect the environment. His portfolio and research booklet demonstrates that he is able to identify changes that impact the environment and the animals living there. Along with his group, Peter presented a polished oral presentation with few errors. Their solution to the problem posed was creative and well thought out however more research was needed to back up their theory. Peter consistently participates in science lessons and gave insightful and well thought out feedback to his peers. |
| **History****Geography** |  |  |
| **The Arts** |  |  |
| **Technology** |  |  |
| **Languages Other than English** |  |  |
| **Health and Physical Education** |  |  |
| Your child has also been assessed in the following: |
| **Studies of Society & Environment** |  |  |

**Signature:** Miss L Muffet

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**Appendices**

**Appendix 1 – Mouldy Bread**

This experiment uses 8 samples to test what conditions mould grows the best in.  Depending on the learning abilities of the students, you can use only 2 or 3 samples instead.

## What you need:

* Bread (4 slices)
* Water
* Sealable lunch bags
* At least 2 weeks of experiment time
* Magnifying glass
* [Moulds Printable Information Sheet](Moulds%20Printable%20Information%20Sheet): <http://www.kidzone.ws/science/is-mold.htm>

**Directions:**

AIR:  Take a piece of bread and slice it in half (it can be a few days old, but ensure it isn't too stale).  Seal one half in a sandwich bag and expose the other to air.

LIGHT:  Take another piece of bread and slice it in half.  Leave one half in the dark (a paper bag or cupboard) and the other half in strong light (sunlight works).

MOISTURE:  Take a third piece of bread and slice it in half.  Keep one half very dry and put about 1 tsp of water on the other half.  (Spritz the wet piece with a few drops of water each day).

TEMPERATURE:  Take a fourth piece of bread and put half of it someplace warm, in the dark (on top of the fridge in a paper bag) and the other half someplace cold in the dark (the refrigerator).

## Questions to Ask:

1. Where and how should bread be stored to keep it free from moulds?
2. What other foods do you think might grow moulds if left exposed?
3. What are some ways that people use to preserve their food?

**Possible Answers:**

1. Someplace sealed, in the refrigerator, in the light, someplace dry, someplace cool
2. Cheese, oranges, tomatoes, lemons, onions, used coffee grounds, potatoes (determining what foods mould the best can be an entirely different experiment)
3. Refrigerator, artificial preservatives, natural preservatives like vinegar and salt, Tupperware.

**Appendix 2 – Soil & Water**

This experiment uses 8 samples to test what conditions mould grows the best in.  Depending on the learning abilities of the students, you can use only 2 or 3 samples instead.

## What you need:

* Bean Plant Seeds
* Pots
* Different types of water. ie: fresh water, salty water, water with fuel in it (polluted water)
* Different types of soil. ie: Potting mix, sand, soil, dirt
* A dark place such as cupboard or box
* At least 2 weeks of experiment time

**Directions:**

CONTROL: The control seed will be planted in Potting Mix and will be watered with fresh water. It will be placed in a position that receives some sun but is not exposed to the sun all day.

LIGHT: Seeds will be planted in Potting Mix and watered with Fresh Water. One Pot will be placed in full sun and the other in a dark cupboard.

SALT WATER:  Seeds will be planted in Potting Mix and placed in the light. One pot will be watered with a 5% salt water solution, one with a 10% salt water solution and the other with a 20% salt water solution.

SOIL: Seeds will be planted in each of the following – Potting Mix, Sand, Gravel and paper. They will be put in the light and watered using fresh water.

POLLUTION: Seeds will be planted in Potting Mix and placed in the light. Each seed will be watered with the following mixes – Water containing fuel, Water containing Car Oil, Water containing pesticides.

TEMPERATURE: Seeds will be planted in Potting Mix and receive fresh water. One seed will be placed under a heat lamp and the other in the other will be placed under an air-conditioned or somewhere that is consistently colder than the room.

## Questions to Ask:

1. What are the best conditions for plants to grow in?
2. Apart from the elements tested, what else do you think impacts the growth of plants?
3. What are the worst conditions for plants to grow in?

**Possible Answers:**

1. A plant that is planted in healthy soil. Watered with fresh water. Gets some sun during the day but not too much.
2. Animals that eat the plants. Natural disasters like fires, floods and cyclones.
3. Seeds that get polluted water. Plants that don’t get any sunlight or too much. Plants that have no soil.