**Teaching and Learning Program for the Elements**

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| **T:\Office\Graham Moore\jpeg sentral logo.jpg** | **Teaching and Learning Program** | | | | | | | | | | | | | | | | | |
| **Title/Type of Unit: Forces**  **Program Risk Level: Medium** | | | | | | | | | | | | **Duration: 10 weeks**  **By** | | | | | |
| **Syllabus Outcomes**  **Stage 4** | *A student:*  SC4-10PW  describes the action of unbalanced forces in everyday situations  SC4-11PW  discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations  SC4-1VA  appreciates the importance of science in their lives and the role of scientific inquiry in increasing understanding of the world around them  SC4-6WS  follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | | | | | | | | | | | | | | | | | |
| **Connectedness**  **Why does this learning matter?** | **Students learn to:**  a. identify changes that take place when particular forces are acting  b. predict the effect of unbalanced forces acting in everyday situations  c. describe some examples of technological developments that have contributed to finding solutions to reduce the impact of forces in everyday life, eg car safety equipment and footwear design  d. analyse some everyday common situations where friction operates to oppose motion and produce heat  e. investigate factors that influence the size and effect of frictional forces | | | | | | | | **Students learn about:** | | | | | | | | | |
| **Background and Key Ideas** | **Background**  In this unit student will be building their understandings of forces. They will use their prior understandings of forces and develop these concepts by incorporating Stage 4 understandings. This unit will incorporate highly engaging practical activities through a variety of simple experiments and demonstrations. As a result of this practical aspect students will begin to understand elements forces through student regulated experiments.  **Key Ideas**   * What is a force? * Isaac Newton’s Laws of Motion * Gravity * Friction * Magnetism | | | | | | | | | | | | | | | | | |
| **Literacy Continuum** | Reading Texts | Comprehension | | | Vocabulary Knowledge | | Aspects of Writing | | | Aspects of Speaking | | | | Phonics | Phonemic Awareness | | | Concepts About Print |
| Clusters: 10-14  Activities linked to program to increase learning:   * Understanding the elements of a scientific experiment (Aim, Method, Hypothesis, Results, Discussion and Conclusion. * Formulating a scientific experiment, * Student worksheets. * Watching, discussing scientific concepts. | | | | | | | | | | | | | | | | | |
| **Numeracy Continuum** | Counting Sequences | | Counting as Problem Solving | | | Pattern and Number Structure | | Place Value | | | | Multiplication and Division | | | | Fraction Units | | Length, Area and Volume |
| Elements: 7  Activities linked to program to increase learning:   * Multiplying mass and weight on different planets. * Measuring distance, area. * Formulating speed, velocity and acceleration. | | | | | | | | | | | | | | | | | |
| **Quality Teaching** | | | | | | | | | | | | | | | | | | |
| **Intellectual Quality** | | | | **Quality Learning Environment** | | | | | | | **Significance** | | | | | | | |
| * IQ1 Deep Knowledge * IQ2 Deep Understanding * IQ3 Problematic Knowledge * IQ4 Higher-order Thinking * IQ5 Metalanguage * IQ6 Substantive Communication | | | | * QLE1 Explicit Quality Criteria * QE2 Engagement * QE3 High Expectations * QE4 Social Support * QE5 Students’ Self-regulation * QE6 Student Direction | | | | | | | * S1 Background Knowledge * S2 Cultural Knowledge * S3 Knowledge Integration * S4 Inclusively * S5 Connectedness * S6 Narrative | | | | | | | |
| **Teaching and Learning Lesson Overview** | | | | | | | | | | | | | | | | | | |
| **The Elements of Learning & Achievement**    F:\Mock ups\Square elements\Numeracy.jpg    E:\Final V1\Final sq NO border\Sq Technology no bdr.jpg | **Week1: Introduction: Identifying what is a force, what is a scientific experiment?**   * A force in its simplistic is a push, pull and twist.   **Week 2: Writing a Scientific Experiment**   * Identify the requirements of writing a scientific experiment.   + Aim, Equipment, Method, Hypothesis, Results, Conclusion   **Activity:** *Students copy down the descriptions of an Aim, Equipment, Method, Results and Conclusion. Then complete an investigation of different forces.*  **Week 3: Isaac Newton Laws of Motion Overview,**  Who is Isaac Newtown?   * What are his 3 laws of motion? * What other things did he invent?   **Newton’s 1st Law**  An object in motion tends to stay in motion, and an object at rest tends to stay at rest, unless acted upon by and outside force*.*  Identify that in order for something to move forces must be unbalanced.  **Activity:** *Teacher and students pariticipate in an Egg Drop that demonstrates Newton’s 1st Law of Motion.*  **Week 4: Dependant and independent Variables & Rocket Experiment**  A **dependent variable** is what you measure in the experiment and what is affected during the experiment. An **independent variable** is the **variable** you have control over, what you can choose and manipulate.  **Activity:** *Experiment: Rocket Experiment*   * + *What would be the aim?*   + *What equipment is needed?*   + *How will we measure the results*   *As the students perform the experiment, challenge them to identify the independent, dependent, and controlled*  *variables, as well as whether there is a control setup for the experiment. (Hint: As the amount of gas in the balloon*  *changes, does the distance the rocket travels change?)*  **Week 5: Newton’s 2nd Law, Video**  Force equals mass times acceleration (F=ma). **Newton’s second law of motion** explains that the more **matter** an object has, the more **momentum** it has.  **Activity:** *Moving Marbles is an experiment that tests the acceleration of different ball with different matter. Students are to investigate an record their results, discussing as a class how their results were different to one another.*  **Week 6: Newton’s 3rd Law of Motion**  For every action, there is an equal and opposite reaction. **Newton’s third law of motion** explains that forces work in pairs. For every action (force) on an object there is an equal reaction (force) in the opposite direction.  **Activity: S***tudent to help teacher set up a launch rocket in a wide spaced area. They should be able to actively discuss where Newtons Laws of Motion are at play.*  **Week 7: What is gravity? Mass vs. weight what’s the difference and what is gravity’s role?**   * What is gravity? * How does it affect earth? * Does it affect other planets? * How much gravity do other planets have?   **Activity:** *Experiment : Parachute experiment*  *Students are to use the worksheet to create a paper parachute. They should observe why the parachute comes back down to earth, the balance of forces, how does the parachute combat gravity and finally is there any other forces at play.*  **Week 8: Magnets**  Magnetism is an invisible force. It pulls metal objects which are magnetic towards a magnet. All magnets have two poles – a South pole and a North pole.  **Activity:** *Magnet Mayhem.*  *Students provided with a set of magnets and complete the activities on the Magnet Mayhem worksheet. They are to record their observations in their exercise books.*  **Week 9: Friction:**  Identifying different surfaces levels of friction and how they are positive and negative aspect to levels of friction in everyday life.   * Friction is a force that acts when two objects rub together. * When the two objects appear to be smooth, there is less friction. * When the two objects are rough, there is a greater amount of friction.   **Activity:** *Toy Car Experiment*  *Students are to use a toy car (or another similar object) investigating and measuring the distance it travels on different surfaces. Students should investigate the following:*   * *How will this help us to understand friction?* * *How could we carry out our experiment?* * *What equipment might we use?* * *How could we ensure a fair test?* * *What variables could we change?* * *How could we measure our results?* | | | | | | | | | | | | | | | | **Aboriginal 8 Ways of Learning**  *The following ways of learning are incorporated throughout the program through pedagogical practices*  2_maps.jpg  Learning Maps  7_deconstruct.jpg  Deconstruct/ Reconstruct  6_non-linear.jpg  Non-Linear    Land Links    Story Sharing    Non-Verbal | |
| **Special Needs Adjustments** | | | | | | | **School to Work** | | | | | | | | | | | |
| * Extra support given to students when required. * Differentiate the work according to students * Variety of different learning activities to cater for all learners * Students’ work adjusted to meet their personal learning plans goals and outcomes. | | | | | | | * Students develop their comprehension skills to allow them to identify and interpret texts. * Students develop their analytical skills. * Students develop skills to make informed choices. * Students develop a responsibility of conducting self-regulated tasks. | | | | | | | | | | | |
| **Assessments** | | | | | | | | | | | | | | | | | | |
| Formative:  Student response to questioning, student participation in class discussion and science experiments, student written work  Summative:  Student progress will be assessed through a student regulated science experiment. They will need to regulate their own experiment by implementing the scientific procedure learnt throughout the term. Emphasis will be on how did they record and analyse their results. | | | | | | | | | | | | | | | | | | |
| Roles and Responsibilities | | | | | | | | | | | | | | | | | | |
| Teacher | | | | SLSO | | | | | | | Student | | | | | | | |
| * Lesson Planning * Student Support * Behaviour Support * Class Instruction * Resource Preparation * Safety Supervision | | | | * Teacher Support * Student Support, both individually and in small groups * Behaviour Support (under teacher supervision) * Resource Preparation | | | | | | | * Participation in all activities * Acting in a safe and responsible manner in all experiments * To develop both academic and social skills | | | | | | | |

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| **Teacher Evaluation**  **Comments / Variations** | |
| Guiding Questions  **What worked well?**  The practical aspects of the unit were highly engaging for students. This aspect place theory into practice and enabled students to participate in self-regulated demonstrations and modified experiments.  **What needed to be changed?**  Although there was a high level of engagement in the unit of study there needs to be modifications to the scientific concepts in the unit. Improvement towards student learning would mean that more time should be spent on learning the concepts with a number of demonstration and experiments, rather than focusing on only one. This will transpire in to students retaining more knowledge of the content taught throughout the unit.  **What do I think the students gained from this lesson?**  Students gained an understanding of the expectations of writing a scientific experiment, concepts of forces, how forces affect everyday lives, planning and conducting self-regulated experiments.  **How well did this unit match the Elements of Learning and Achievement?**  Students engaging in this unit will become more aware of the world and how science has the ability to change the way we live. Understanding forces and the impact they can have on us, whether it is good or bad, can influence our decision making processes and awareness of the world around us (ie. Impacts of speed in driving).  **What did I learn?**  The unit has taught me that using practical aspects to engage students takes careful planning, completing demonstrations prior to its teaching is essential and there has to be good communication with your SLSO in order for the required equipment to be ready and prepared. Furthermore, student behaviour can impact the successes of the practical aspects of this unit. Students must be in the right mindset to self-regulate themselves within the practical task and retain the theoretical concepts to them.  **How will I use this experience to extend my practice in the future?**  Complex theories and scientific concepts are more engaging for students when taught in a practical learning environment. However, the practical nature of this experiment means that the whole unit has to be well planned in regards to the availability of resources at school and also suppliers. | |
| **Date Commenced**: 27/1/16 | **Date Finished**: 8/4/16 |
| **Teachers Signature**: | **Assistant Principals Signature**: |