Through Space and Time

Balloon Rockets

Design and Materials Technology (**DTM4260)**

Task 3

By Carla Rae

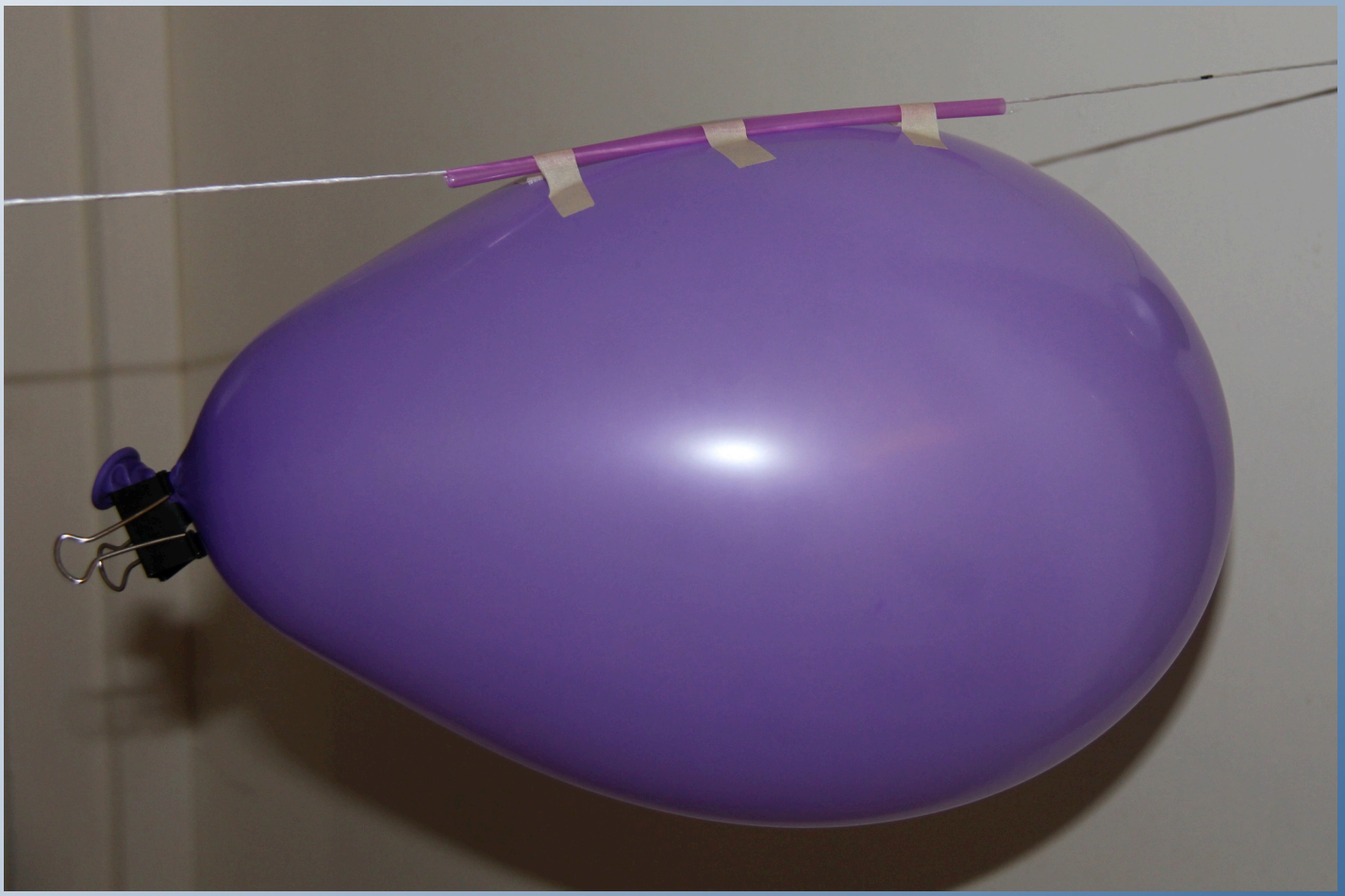
Band Level: Year 5 and Year 6
Australian Curriculum: Technologies (draft)
Strand: Design and Technologies knowledge and understanding
Content Descriptor: Explain how forces or electrical energy can be used to control movement, sound or light in a product or system and consider how material properties and construction processes influence the design and construction of structures.
Cross curricular links: Literacy, science

This unit of work involves students looking at the evolution of space travel, from the history of first experience outside the Earth's atmosphere to Sir Richard Branson's dream of Virgin Galactic and commercial passenger travel into space. Students will apply the knowledge acquired to construct and launch a space craft.

At the conclusion of these learning experiences students will be able to:

- Facilitate research to plan and collaboratively design a space craft.
- Critically analyse the materials required and designs constructed to assemble a space craft from recyclable materials.
- Explain the theory behind the motion of force specifically looking into Newton's 'third law of motion'.
- Safely launch the rocket ship and use mathematical concepts to calculate the height

The third sequential lesson involves students working in groups of mixed abilities to investigate propulsion theories by conducting a 'Balloon Rocket' experiment.



Lesson plan page one

Learning Area: Design and Technologies knowledge and understanding **Learning Experience Focus:** Explaining and critically analysing processes and theories used to propel a balloon along a string line (6.4)	**Date:** 12 May 2014	**Time:** **2.00 – 3.05**	**Year Level:** **6**
Content Descriptor: • 6.4 Explain how forces or electrical energy can be used to control movement, sound or light in a product or system and consider how material properties and construction processes influence the design and construction of structures			
Specific Learning Goals: *At the conclusion of this learning experience each student should be able to:* • Conduct an experiment to test Newton's third law of motion. • Work in collaborative learning groups. • Explain a propulsion theory by using evidence collected from the rocket experiment. • Apply the information to critically analyse and improve group design.			
Assessment: What will you monitor? Do students follow recommended method to test theory? Can student work collaboratively to complete the experiment? Are members of the group able to make comparisons or suggestions to improve blueprint?		**Recording: How** will you monitor? **Formative** – Self/group reflections (students) Student work samples (experiment and suggestions for improvement) Observation checklist	
Students' Prior Knowledge: This is the third of five lessons involving students investigating and planning a blueprint to construct a spacecraft. Students have worked both individually and collectively to gather information about materials, aerodynamics and possible methods to launch the product. Students are familiar conducting science investigations evaluating information collated. Students are competent in administering 'probability and statistic' methods to calculate median of measured information.			
Time:	**Teaching and Learning Strategies:**	**Focus Questions:**	**Preparation and Resources:**
Introduction: **2.00 – 2.01**	*Students seated at desks, teacher uses C2S lesson*		
2.01 – 2.05	Teacher asks focus questions to elicit thinking about what propels spacecraft into the air.	From your research on this topic, what have you learnt about a spacecraft's take	

Lesson plan page two

		off? How do you plan to launch your product?	
2.05 – 2.07	Teacher divides students into collaborative learning groups. The outcomes of the lesson are explained as well as background information on Newton's third law of motion and the method to conduct the experiment. *(This theory can be demonstrated by the combustion of a fuel powered spacecraft built up at the rear thrusting down onto the ground. As a result of the combusted fuel, the craft is lifted in the opposite direction in equal power).*		
2.07 – 2.37	**Body:** Teacher uses questions to remind students of the rules when conducting an experiment. Students collect the materials required and apply the following method to conduct the experiment: 1. Identify where the experiment will be conducted. Make sure there are no objects that will intercept or inhibit the balloon rocket. You will need an area that has enough room (5-10 metres) for the balloon rocket to travel. 2. Attach one end of the string to a fixed object such as door handle; make sure it is tied tightly. 3. Thread the string through the straw. 4. Attach the other end of the string to the other fixed object. Tie it tightly so the string will remain tight and secure. 5. Mark the string determining the point of launch by the balloon rocket (this is to identify the exact same starting point for the following trials). 6. Using the ball pump, inflate the balloon with 10 full pumps of air (a second person may be needed to hold the balloon in place).	What do we need to remember when we are working in groups to conduct an experiment?	Electronic copy of 'Balloon Rocket experiment' IWB 40x Balloons (preferably long balloons) 6 x Straw 6x 8-10m in length of fine strin 6x Bulldog clip 6x Permanent marker 6x Sticky tape 6x Measuring tape 6x Ball pump Exercise books to record results Observation checklist

Lesson plan page three

	7. Use the clip to capture the air molecules in the balloon (be careful not to release any air from the balloon). 8. With 3 pieces of sticky tape, secure the straw along the side of the balloon. 9. Hold the balloon where the string was marked for launching. 10. Release the clip from the balloon and observe the reaction. 11. Using the measuring tape, record the distance travelled by the balloon (a second person maybe required to help measure the exact distance). 12. Record results in exercise book. 13. To calculate the average, repeat the balloon rocket experiment a total of five times. 14. Once all the trials have been completed calculate the average distance by adding all five results from the 10 pumps of air together and divide by five. 15. Tidy up work area.		
2.37 – 2.50	When all five trials are completed and the average is calculated, students construct a summary of the activity and conclude the events using scientific terminology relating to propulsion.		
2.50 – 2.52	Teacher uses focus questions to check for understanding of concept.	Did this theory prove Newton's third law of motion? What happened to the balloon when it was released?	
2.52 – 3.00	**Conclusion:** The blueprints are distributed to each group to make any valid adjustments or add how the product will be launched. This is to ensure construction starts during the next consecutive lesson. Two students from each group are then selected to gather relevant materials from the collection table. These are named and kept in a		Group blueprints Collection of materials (Prior to this unit of work commencing, a note was sent home for students to bring any

Lesson plan page four

3.00 – 3.05	secure part of the classroom. This is also done so other required materials can be sourced from home or the teacher (within reason). The teacher collects student work (to ensure plans are safe and appropriate) while students tidy and prepare for the end of the day.		clean recyclable goods for an 'up coming project').
	Learning and Teaching Adjustments The EA can work with particular groups who may be off task or who are struggling to complete the experiment. However due to the dynamics of the groups, students should be able to work together to complete required activities. If students finish early, they can continue on with the following tasks and receive 'first pick' from the recyclable materials.		


Balloon Rocket Result