**EASTERN GOLDFIELDS COLLEGE**

**GENERAL 11 INTEGRATED SCIENCE**

**Task 14 - Water Rocket Design Investigation**



**NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ WEIGHTING: 10%**

Important Information for Students:

1. There are THREE sections in this task – Designing, Testing and Analysing.
2. Plan your experiment and rocket design on the **separate** A3 sheet provided.

Curriculum Points:

* the Laws of Motion can assist in predicting the motion of objects
* forces can be exerted by one object on another by direct contact or from a distance
* energy has different forms: kinetic, potential and heat, which can cause change
* construct questions for investigation; propose hypotheses; and predict possible outcomes
* plan, select and use appropriate investigation methods, to collect reliable data; assess risk and address ethical issues associated with these methods
* conduct investigations safely, competently and methodically for the collection of valid and reliable data
* represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error and use evidence to make and justify conclusions
* communicate scientific ideas and information for a particular purpose, using appropriate scientific language, conventions and representations

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| Sections | **Marks Allocation** | **Score** |
| Planning and design | 264 |  |
| Building and testing | 9 |  |
| Analysis of results | 16 |  |
| **TOTAL** | 49 |  |

**Introduction**

At its simplest, a water rocket is an upside down fizzy drink bottle, which has had a nose cone and some fins added. The bottle has some water which will provide the thrust to push the rocket along. The actual fuel of the rocket is provided by compressed air which is inserted into the bottle by a bike pump.

**PLANNING AND DESIGNING 24 MARKS**

1. Name three features that impact the launch distance of rockets, and explain how they impact the launch distance. *(3 marks)*

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Decide which feature you think is the most important in making the rocket fly the best. This is the feature you are going to change and then test to find the optimum design for a water bottle rocket.

1. State the:
   1. independent variable *(1 mark)*

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* 1. dependent variable *(1 mark)*

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1. Create a hypothesis for your experiment*(2 marks)*

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1. State three controlled variables, and explain why they must be controlled.*(4 marks)*

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1. The design of your rockets.
   1. You need to design two rockets which will be exactly the same except for the one feature you’ve decided to change. Draw a sketch of your two designs on the A3 sheet of paper; include the measurements and design features that are unique to your rocket *(5 marks)*
   2. Next to each feature of your rocket design – the features that are the same between your two rockets - include why you have chosen that particular weight/shape (refer to Newton’s laws and other scientific concepts)  *(5 marks)*
2. Write a step by step method of how you are going to measure the launch distance of your rockets and record your data. *(3 marks)*

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**BUILD AND TEST YOUR ROCKET 9 MARKS**

1. You must now build the rocket(s) that you have designed. You will be marked on whether your rocket(s) match your design and the effort put into their assembly. *(2 marks)*
2. Rocket launches and data collection. *(2 marks)*

1. In the space below create a table for your results.  *(5 marks)*

**ANALYSIS 16 MARKS**

1. Describe the trend shown by your results. *(2 marks)*

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1. Explain your results using your scientific knowledge of rocket design. In other words – explain why the rockets flew the way they did.  *(3 marks)*

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1. Use Newton’s first law of motion to explain why the rocket did not continue to rise into the sky.

*(2 marks)*

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1. Using Newton’s Third Law of motion, explain why the rocket took off from the ground. *(2 marks)*

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1. Describe two limitations in your experiment, and explain how they could be altered to improve the reliability of your data. *(4 marks)*

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1. Write a scientific conclusion for this experiment. *(3 marks)*

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The End ☺