**PLAN AND DESIGN LAB – INSULATION**

**Skill: PD**

**OBSERVATION/ PROBLEM:** Carlton became interested in insulation while his parents’ new house was being built. He wondered if the same concept of insulation for keeping houses at a constant temperature could be applied to his drinks in the summer. Carlton decided to determine which insulation was best for keeping a cold drink cold in the summer heat. Using four glasses from his kitchen, Carlton wrapped each jar with a different kind of insulation. The insulation types were Styrofoam, paper towel, aluminium foil and no insulation. He layered each type of insulation so that the layers were one cm thick around the glass. Each was attached to the glass by clear tape. Carlton cooled 1000ml of water to 15oC in an ice bath. He then added 250ml of the 15oC water to each glass. He placed the glasses outside in direct sunlight. After 30 minutes, he measured the temperature of the water in each glass. Carlton then emptied the water from the glasses, dried each glass and allowed the glasses to cool to room temperature in the kitchen. He then repeated his experiment five times for each type of insulation.

Plan and design an experiment to test a suitable hypothesis from this observation/ scenario.

**HYPOTHESIS: (*a statement about what you expect*)**

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**AIM:** (*Begin with “to determine/ to investigate/ to find out….”*)

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**APPARATUS and MATERIALS:** (List all the chemicals, apparatus and materials to be used)

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**DIAGRAM:** (*Drawing showing set up of apparatus – Add a TITLE below the drawing*)

**METHOD:**

*Write instructions for an experiment to be carried out.*

*Manipulated and responding variables clearly highlighted*

*A control used*

*Repetition in measuring. State what you are going to record and how.*

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**PRECAUTIONS/LIMITATIONS**

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**VARIABLES**

**CONSTANT** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**MANIPULATED** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**RESPONDING** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**EXPECTED RESULTS:** (*Decide on how to collect your results in an appropriate format)*

Table showing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**EXPLANATION OF EXPECTED RESULTS:** (State what results you expect if your hypothesis is correct or how you will interpret the results. Make a prediction.)

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**MARKSCHEME –PLAN AND DESIGN (PD)**

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| **Criteria** | **Marks** |
| 1. Hypothesis clearly stated | 1 |
| 1. Hypothesis testable | 1 |
| 1. Aim – related to hypothesis | 1 |
| 1. Materials and apparatus – appropriate | 1 |
| 1. Method – suitable | 1 |
| 1. Method – at least one manipulated variable only | 1 |
| 1. Controlled variables – described | 1 |
| 1. Expected results – reasonable | 1 |
| 1. Expected results – linked with method | 1 |
| 10. Assumptions, precautions, possible sources of errors | 1 |
| **TOTAL** | **10** |