**Subject area**: Science **Teacher**: Mr. Groth and Ms. Bauder

**Year**: 3 **Title**: Experimental Design

**Criterion**: B: Inquiring and designing

**Objectives**:  i. describe a problem or research question to be tested by a scientific investigation

ii. outline a testable hypothesis and explain it using scientific reasoning

iii. Describe how to manipulate variables, and describe how data will be collected

iv. design scientific investigations

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| **Achievement level** | **IB Level descriptor** | **Task specific descriptor** |
| 0 | The student does not reach a standard described by any of the descriptors below | Limited to no evidence |
| 1-2 | 1. State a problem or question to be tested by a scientific investigation 2. State a testable hypothesis 3. State the variables 4. Design a method with limited success | Testable question presented – not original (i.e., taken from outside source such as science buddies); Hypothesis present with if and then included; Independent and Dependent Variable identified; Procedure exists but no safety procedures explicitly stated in lab |
| 3-4 | 1. State a problem or question to be tested by a scientific investigation 2. Outline a testable hypothesis 3. Outline how to manipulate the variables, and state how relevant data will be collected 4. Design a safe method in which he or she selects materials and equipment | Testable question present – not original; Hypothesis present with if, then and because evident; Procedure includes variables and data collection method; Materials and procedure include safety – materials are not all inclusive or contain extemporaneous materials |
| 5-6 | 1. Outline a problem or question to be tested by a scientific investigation 2. Outline and explain a testable hypothesis using scientific reasoning 3. Outline how to manipulate the variables and outline how sufficient, relevant data will be collected 4. Design a complete and safe method in which he or she selects appropriate materials and equipment | Developed testable question based on previously presented (not original but student expands to have ownership of testable question); Hypothesis includes an if, then and because format and the because portion reflects on scientific reasoning; All variables identified; Procedure includes data collection with a minimum of 3 trials included; Necessary materials only are included with safety accounted for; Materials are included but missing details (explicit amounts or details still needed) |
| 7-8 | 1. Design a problem or question to be tested by a scientific investigation 2. Outline and explain a testable hypothesis using correct scientific reasoning 3. Describe how to manipulate the variables and describe how sufficient, relevant data will be collected 4. Design a logical, complete and safe method in which he or she selects appropriate materials and equipment | Testable question developed originally by student; Hypothesis includes if, then and because format with the because portion of hypothesis containing correct scientific reasoning; All variables identified; Contains explanation of variable manipulation and procedure in detail with a minimum of 3 trials; The procedure is clear and concise with correct materials presented in correct amounts |