**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Science Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period Science: \_\_\_\_\_\_\_\_\_\_\_\_**

**Math Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period Math: \_\_\_\_\_\_\_\_\_\_\_\_**

**International Baccalaureate- Middle Years Programme- Year 3**

**Are you a Scientist? Prove it!! Bridge Building**

How do we use science to gather and analyze data to influence the safe development of bridges?

***By the end of this unit, I will be able to****:*

* Collect data from an experiment
* Create clear, understandable graphs
* Follow safety procedures
* Work well in groups
* Use materials appropriately and wisely

**IB Learner Profile Focus: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Why do you think this is important in this unit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Activities in Science**

|  |  |  |
| --- | --- | --- |
| **Activity** | **Description** | **IB Criterion** |
| **Build-A-Lab** | Students will design a lab using a question, hypothesis and good scientific reasoning. They will manipulate variables accordingly and describe how data will be collected in an inquiry fashion. | Criterion B- Inquiring and Designing |
| **Photo “Graph”** | Students will collect, present and analyze data from an experiment | Criterion C- Processing and Evaluating |
| **“Bridging” Math and Science** | Students will build bridges showing integration of both Math and Science disciplinary knowledge | Interdisciplinary Criterion B-  Synthesizing |
| **“Bridging” Math and Science** | Students will use appropriate strategies to communicate in Math and Science vocabulary and document their sources correctly | Interdisciplinary Criterion C-  Communicating |
| **“Bridging” Math and Science** | Students will reflect on their disciplinary and interdisciplinary understanding | Interdisciplinary Criterion D- Reflecting |

**Approaches to Learning**

*How do I learn best? How do I know? How do I communicate my understanding?*

*Students will be developing the following approaches to learning:*

* Communication skills
* Research skills
* Thinking skills
* Social skills

**Reflection: How did I do?**

|  |  |
| --- | --- |
| **Activity** | **Rubric Score** |
| **Build-A-Lab-Criterion B** |  |
| **Photo “Graph”- Criterion C** |  |
| **“Bridging” Math and Science- Criterion B** |  |
| **“Bridging” Math and Science- Criterion C** |  |
| **“Bridging” Math and Science- Criterion D** |  |

**Unit Reflection**

In IB, it is very important to reflect on what we have learned. In this section, we are going to record our rubric score and reflect on what we have learned. ***A good reflection has three parts: what did you learn? What were you surprised by? What would you do differently next time?***

**What did I learn about the relationship between Math and Science? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**What were you surprised by? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**What would you do differently next time? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Are you a Scientist? Prove it! “Bridge” Building**

***Build-a-Lab***

Science Criterion B-Inquiring and Designing

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name: |  | Period: |  | Date: |  |

You will be assessed on the following criteria:

Criterion B- Inquiring and Designing: (max 8) Your Level:

***Students should be able to:***

* Describe a problem or question to be tested by a scientific investigation
* Outline a testable hypothesis and explain it using scientific reasoning
* Describe how to manipulate variables, and describe how data will be collected
* Design scientific investigations

To obtain the highest level for each of the following criteria you will need to do the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criterion B- Inquiring and Designing** | **Level** | **Descriptors** | **Task Specific Clarifications** | **Shaker Grade** |
| 0 | The student does not reach a standard identified by any of the descriptors below. | The student doesn’t recognize the scientific method and how to implement it to investigate the problem or question. The student doesn’t use scientific equipment appropriately or safely. Variables are unclear or absent and are not consistent with the investigation. | 50% |
| 1-2 | The student is able to:   * State a problem or question to be tested by a scientific investigation, with limited success * State a testable hypothesis * State the variables * Design a method, with limited success | The student is able to:   * State a problem/question that is inappropriate for the investigation and/or is not clear * State a hypothesis which may or may not answer the problem/question of the investigation * Incorporate variables are stated but not intentionally declared. * Write procedures that are written but not explicit, lab safety not employed, doesn’t work well in a group, with redirection more than 3 x’s | 60-69% |
| 3-4 | The student is able to:   * State a problem or question to be tested by a scientific investigation * Outline a testable hypothesis using scientific reasoning * Outline how to manipulate the variables, and state how relevant data will be collected * Design a safe method in which he or she selects materials and equipment | The student is able to:   * State a problem/question that is appropriate for the investigation but isn’t clear * State a hypothesis which answers the problem/question of the investigation * Incorporate variables that are outlined and state how data will be collected * Design procedures that are safe and materials and equipment used are selected, works well in a group part time, needs to be redirected 2x’s | 70-79% |
| 5-6 | The student is able to:   * Outline a problem or question to be tested by a scientific investigation * Outline and explain a testable hypothesis using scientific reasoning * Outline how to manipulate the variables, and outline how sufficient, relevant data will be collected * Design a complete and safe method in which he or she selects appropriate materials and equipment | The student is able to:   * Outline an appropriate problem/question to be tested in their designed investigation * Outline and explain a testable hypothesis using scientific reasoning * Outline how to manipulate variables and outline how sufficient, relevant data will be collected * Design a completed and safe method to employ the investigation selecting and using appropriate materials and equipment, works well in a group, must be redirected 1x | 80-89% |
| 7-8 | The student is able to:   * Describe a problem or question to be tested by a scientific investigation * Outline and explain a testable hypothesis using correct scientific reasoning * Describe how to manipulate the variables, and describe how sufficient, relevant data will be collected * Design a logical, complete and safe method in which her or she selects appropriate materials and equipment | The student is able to:   * Describe a problem or question to be tested by a scientific investigation * Outline and explain a testable hypothesis that uses correct scientific reasoning, the data supports the hypothesis * Describe how to manipulate variable and describes how sufficient, relevant claims can be made by the investigation * Design a logical, complete and safe method in which they select appropriate materials and equipment and are always safe in the lab, works well in a group and never needs to be redirected | 90-100% |

**Are you a Scientist? Prove it! “Bridge” Building**

***Photo “graph”- Every Picture Tells a Story***

Science Criterion C-Processing and Evaluating

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name: |  | Period: |  | Date: |  |

You will be assessed on the following criteria:

Criterion C- Processing and Evaluating: (max 8) Your Level:

***Students should be able to:***

* Present collected and transformed data
* Interpret data and describe results using scientific reasoning
* Discuss the validity of a hypothesis based on the outcome of the scientific investigation
* Discuss the validity of the method
* Describe improvements or extensions to the method

To obtain the highest level for each of the following criteria you will need to do the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criterion C- Processing and Evaluating** | **Level** | **Descriptors** | **Task Specific Clarifications** | **Shaker Grade** |
| 0 | The student does not reach a standard indentified by any of the descriptors below. | The student doesn’t use data to inform an investigations conclusion. The hypothesis and method of this investigation are not valid and do not line up with the question/problem. The procedures do not delineate how to reach an appropriate conclusion to the problem | 50% |
| 1-2 | The student is able to:   * Collect and present data in numerical and/or visual forms * Accurately interpret data * State the validity of a hypothesis with limited reference to a scientific investigation * State the validity of the method with limited reference to a scientific investigation * State limited improvement or extensions to the method | The student is able to:   * Collect and present data in a graph but graph is missing one or more of the following: title, label of axes and unit of measure * Interpret data correctly * Propose a hypothesis but it isn’t necessarily connected to the investigation, variables and procedures * State a procedure for their investigation but it doesn’t fit the investigation * State claims/conclusions about the investigation but they don’t necessarily match the investigation | 60-69% |
| 3-4 | The student is able to:   * Correctly collect and present data in numerical and/or visual forms * Accurately interpret data and describe results * State the validity of a hypothesis based on the outcome of a scientific investigation * State the validity of the method based on the outcome of a scientific investigation * State improvements or extensions to the method that would benefit the scientific investigation | The student is able to:   * Correctly collect and present data in a graph with a correct title, label of axes and unit of measure * Accurately interpret the data and describe results * State a valid hypothesis that fits the investigation * State a valid procedure that fits the investigation * State improvements or extensions of their investigation | 70-79% |
| 5-6 | The student is able to:   * Correctly collect, organize and present data in numerical and/or visual forms * Accurately interpret data and describe results using scientific reasoning * Outline the validity of a hypothesis based on the outcome of a scientific investigation * Outline the validity of the method based on the outcome of a scientific investigation * Outline improvements or extensions to the method that would benefit the scientific investigation | The student is able to:   * Correctly collect, organize and present data in a graph with most of the elements * Accurately interpret data and describe results using valid scientific reasoning * Outline the validity of a hypothesis based on the outcome of the investigation * Outline the validity of the procedures based on the outcome of the investigation * Outline improvements or extensions of their investigation | 80-89% |
| 7-8 | The student is able to:   * Correctly collect, organize, transform and present data in a numerical and/or visual form * Accurately interpret data and describe results using correct scientific reasoning * Discuss the validity of a hypothesis based on the outcome of a scientific investigation * Describe improvements or extensions to the method that would benefit the scientific investigation | The student is able to:   * Correctly collect, organize, transform and present data in a graph will all the elements * Accurately interpret and describe results using correct reasoning * Discuss the validity of a hypothesis based on the outcome of the investigation * Describe improvements or extensions of the procedures that would benefit the investigation further | 90-100% |

**Are you a Scientist? Prove it! “Bridge” Building**

***When Math and Science Coincide***

Interdisciplinary Criterion B-Synthesizing

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name: |  | Period: |  | Date: |  |

You will be assessed on the following criteria:

Interdisciplinary Criterion B- Synthesizing: (max 8)

Your Level:

***Students should be able to:***

* Synthesize disciplinary knowledge to demonstrate interdisciplinary understanding.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criterion B- Synthesizing** | **Level** | **Descriptors** | **Task Specific Clarifications** | **Shaker Grade** |
| 0 | The student does not reach a standard identified by any of the descriptors below. | The student doesn’t recognize the contribution of each discipline in relation to each other. Ultimately the student can apply science and math knowledge to real life concepts. | 50% |
| 1-2 | The student:   * Suggests few or superficial connections between disciplines | The student:   * Demonstrates very little scientific knowledge and how it correlates with math | 60-69% |
| 3-4 | The student:   * Describes basic connections between disciplines | The student:   * Describes basic scientific knowledge and how it correlates with math | 70-79% |
| 5-6 | The student:   * Synthesizes disciplinary knowledge to demonstrate interdisciplinary understanding | The student is able to:   * Demonstrates a good understanding of scientific knowledge and how it correlates with math | 80-89% |
| 7-8 | The student:   * Synthesizes disciplinary knowledge to demonstrate consistent and thorough interdisciplinary understanding. | The student is able to:   * Demonstrates deep scientific knowledge and how it correlates with math and science. | 90-100% |

**Are you a Scientist? Prove it! “Bridge” Building**

***When Math and Science Coincide***

Interdisciplinary Criterion C-Communicating

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name: |  | Period: |  | Date: |  |

You will be assessed on the following criteria:

Interdisciplinary Criterion C- Communicating: (max 8)

Your Level:

***Students should be able to:***

* Use appropriate strategies to communicate interdisciplinary understanding effectively
* Document sources using recognized conventions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criterion C- Communicating** | **Level** | **Descriptors** | **Task Specific Clarifications** | **Shaker Grade** |
| 0 | The student does not reach a standard identified by any of the descriptors below. | The student doesn’t recognize the contribution of each discipline in relation to each other. Ultimately the student can apply science and math knowledge to real life concepts. | 50% |
| 1-2 | The student:   * Communicates interdisciplinary understanding with little structure, clarity or coherence. * Document sources using recognized conventions. | The student:   * Communicates very little understanding of correlation between science and math with limited clarity and coherence * Identifies sources but does not list all sources and/or does not use proper (MLA) format and/or is missing source. | 60-69% |
| 3-4 | The student:   * Communicates interdisciplinary understanding with some clarity and coherence * Lists sources. | The student:   * Communicates understanding of correlation between science and math with some clarity and coherence * Identifies sources but does not use proper (MLA) format. | 70-79% |
| 5-6 | The student:   * Communicates interdisciplinary understanding that is generally organized, clear and coherent, beginning to use selected forms or media effectively. * Documents relevant sources using a recognized convention. | The student is able to:   * Uses appropriate forms or media to clearly communicate a good understanding of the correlation between science and math. * Documents teacher-chosen sources but does not accurately cite (MLA) or list all sources. | 80-89% |
| 7-8 | The student:   * Communicates interdisciplinary understanding that is consistently well-structured, clear, and coherent, using selected forms or media effectively. * Consistently documents well-chosen sources using a recognized convention. | The student is able to:   * Communicates a clear understanding of both math and science concepts through their data tables and graphs, which have correct labels and spacing on both axes, titles, and units. * Consistently documents and lists teacher-chosen sources appropriately using MLA format. | 90-100% |

**Are you a Scientist? Prove it! “Bridge” Building**

***When Math and Science Coincide***

Interdisciplinary Criterion D-Reflecting

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name: |  | Period: |  | Date: |  |

You will be assessed on the following criteria:

Interdisciplinary Criterion D- Reflecting: (max 8)

Your Level:

***Students should be able to:***

* Reflect on the development of their own interdisciplinary understanding
* Evaluate the benefits and limitations of disciplinary and interdisciplinary knowledge and ways of knowing in specific situations.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criterion D- Reflecting** | **Level** | **Descriptors** | **Task Specific Clarifications** | **Shaker Grade** |
| 0 | The student does not reach a standard identified by any of the descriptors below. | The student doesn’t recognize the contribution of each discipline in relation to each other. Ultimately the student can apply science and math knowledge to real life concepts. | 50% |
| 1-2 | The student:   * Reflects on himself/herself as a disciplinary and interdisciplinary learner in a limited way * Outlines the contribution of selected discipline in a limited way | The student:   * Vague reflection on his/her science and math learning * Does not communicate pros and cons of linking math and science knowledge in bridge building explicitly | 60-69% |
| 3-4 | The student:   * Reflects on himself/herself as a disciplinary and interdisciplinary learner * States some limitations or benefits of disciplinary and interdisciplinary knowledge in specific situations. | The student:   * Reflects on his / her science and math learning * Communicates some pros and cons of linking math and science knowledge in bridge building | 70-79% |
| 5-6 | The student:   * Consistently reflects on himself/herself as a disciplinary and interdisciplinary learner * Describes some benefits and limitations of disciplinary and interdisciplinary   knowledge in specific situations. | The student is able to:   * Routinely reflects on math and science learning. * Is able to communicate some of the pros and cons of linking math and science knowledge in bridge building. | 80-89% |
| 7-8 | The student:   * Consistently reflects with sophistication on himself/herself as a disciplinary and interdisciplinary learner. * Explains the limitations and benefits of disciplinary and interdisciplinary knowledge in specific situations. | The student is able to:   * Genuinely reflects on the relationship between math and science learning. * Communicates pros and cons of linking math and science knowledge in bridge building. | 90-100% |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name: |  | Period: |  | Date: |  |

**Are you a Scientist? Prove it!! Bridge Building**

**Inquiry Skill(s):** **Problem** (the thing you want to know)

**Research** (information about the problem. What do you already know?)

**Hypothesis** (an educated guess that can be tested)

**Experiment** (Design or conduct an experiment to test the hypothesis)

**Observations** (Data collected during an experiment)

**Conclusion** (Determine if the hypothesis is supported by the data)

**Communicate** (Present your results to others)

**Background information:**

A team of engineers have inquired about if the strength of a beam of a bridge is related to its thickness. They also want to know how length and strength of a bridge are related.

***Investigation One:***

Within your lab group, do some research on beam bridge design focusing on length and strength. Record your findings below.

**Investigate:**

What are the requirements for an 8 on the IB rubrics for the “Are you a Scientist? Prove it! ”Bridging Math and Science”? (Use Build-a-Lab rubric)

What kind of bridge is the simplest and most common type? How does it work? What kind of materials is it made from?

What are some advantages/disadvantages of using this type of bridge?

List your websites and other sources used to find your information in MLA Format: (refer to handout attached to this lab)

Based on your investigations on page 7 complete STEP 1 below:

**Step 1 – Problem/Question**

What question does your team have and want to solve about the bridge’s length and strength? Once your team has developed a ***testable*** question see me for approval.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 2 – Research (See page 7 and refer to the questions you answered about beam bridges).**

**Step 3 - Hypothesis**

This is a possible answer to the team question. Your hypothesis must be an If, then, statement and include the word ***because*** which is the explanation as to why you believe your hypothesis to be correct.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 4 - Experiment**

How will the hypothesis be tested? This includes the materials and step by step procedures detailing how the experiment will be conducted.

**Plan: In the section below make a work flow plan for your group. This must include each partner’s role in your investigation and contribution. A timeline must be developed of when each person is going to complete their part.**

**Partner 1:** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Role: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contribution and timeline of contribution (dates): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Partner 2:** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Role: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contribution and timeline of contribution (dates): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Partner 3:** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Role: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contribution and timeline of contribution (dates): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Partner 4:** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Role: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contribution and timeline of contribution (dates): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Materials**:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Procedures**:

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If more space is needed, please attach a regular sheet of note book paper to this packet.

**Approval of materials and procedures are required before conducting your experiment. \_\_\_\_\_\_\_\_\_\_\_**

**Teacher initials**

**Variables**

What is the independent variable in your experiment?

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What is the dependent variable(s) in your experiment?

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What are the constants in your experiment?

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**Step 5 – Observations (Collect Data)**

What observations will you make? What data will you collect? Now create a data table (graph/chart) on which to collect data.

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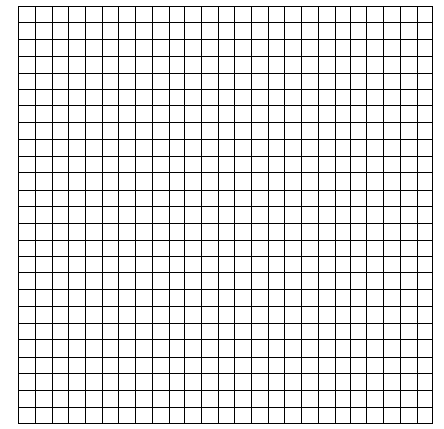
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| Trial | Thickness | Breaking Weight |
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| 3 | 5 |  |
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**Remember that your graph must have a title, the axes must be labeled and units in (SI) must be used in the axes as well!**



**Step 6 – Draw a Conclusion**

Summarize, using words and numbers, what you learned in this experiment. Does the evidence, your data, support the original hypothesis? Why or why not?

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**Step – 7 Communicate Results**

Based on your results write a catchy newspaper headline that communicates these findings to students here at SMS.

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***Investigation Two:***

**Step 1 – Problem/Question**

What question does your team have and want to solve about the bridge’s length and strength? Once your team has developed a ***testable*** question see me for approval.

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**Step 2 – Research (See page 1 and refer to the questions you answered about beam bridges).**

**Step 3 - Hypothesis**

This is a possible answer to the team question. Your hypothesis must be an If, then, statement and include the word ***because*** which is the explanation as to why you believe your hypothesis to be correct.

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**Step 4 - Experiment**

How will the hypothesis be tested? This includes the materials and step by step procedures detailing how the experiment will be conducted.

**Materials**:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Procedures**:

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If more space is needed, please attach a regular sheet of note book paper to this packet.

**Approval of materials and procedures are required before conducting your experiment. \_\_\_\_\_\_\_\_\_\_\_\_**

**Teacher initials**

**Variables**

What is the independent variable in your experiment?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the dependent variable(s) in your experiment?

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What are the constants in your experiment?

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**Step 5 – Observations (Collect Data)**

What observations will you make? What data will you collect? Now create a data table (graph/chart) on which to collect data.

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|  |  |  |
| --- | --- | --- |
| Trial | Length | Breaking Weight |
| 1 | 10cm |  |
| 2 |  |  |
| 3 |  |  |
|  |  | Avg |

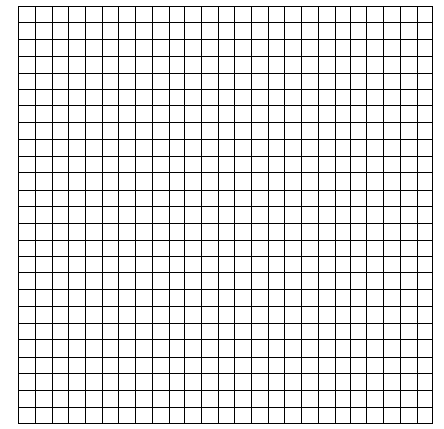
|  |  |  |
| --- | --- | --- |
| Trial | Length | Breaking Weight |
| 1 | 15cm |  |
| 2 |  |  |
| 3 |  |  |
|  |  | Avg |

|  |  |  |
| --- | --- | --- |
| Trial | Length | Breaking Weight |
| 1 | 20cm |  |
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| 3 |  |  |
|  |  | Avg |

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| Trial | Length | Breaking Weight |
| 1 | 22cm |  |
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| 3 |  |  |
|  |  | Avg |

|  |  |  |
| --- | --- | --- |
| Trial | Length | Breaking Weight |
| 1 | 28cm |  |
| 2 |  |  |
| 3 |  |  |
|  |  | Avg |

**Remember that your graph must have a title, the axes must be labeled and units in (SI) must be used in the axes as well!**



**Step 6 – Draw a Conclusion**

Summarize, using words and numbers, what you learned in this experiment. Does the evidence, your data, support the original hypothesis? Why or why not?

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**Step – 7 Communicate Results**

Based on your results write a catchy newspaper headline that communicates these findings to students here at SMS.

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**Reflection journal**

**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_**

**What did I do today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**What did I learn today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_**

**What did I do today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**What did I learn today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**What do I need to have clarified during the next class? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_**

**What did I do today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**What did I learn today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**What did I do today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_**

**What did I do today? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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