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| **NAME:** | **CLASS PERIOD:** | **DATE:** |

**Foundations of Technology**

**Unit 1. Technological Inventions and Innovations**

**Learning Cycle 2. Inventions and Innovations: An Evolutionary Process**

**File 1.2.1. Constructed Response**

1. Define the Problem

Develop a problem statement that identifies the what, who, when, and how the problem should be addressed.

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1. Brainstorming

List/sketch possible solutions that might be used in your final design. Clearly identify and describe how each of these ideas relates to the problem statement.

1. Research and generating ideas

In the space below, document your research. Be sure to include proper citations at the end of your notes.

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| **Notes** |
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| **Citations/References** |
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1. Identifying criteria and specifying constraints

What are the criteria and constraints of the design problem?

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| **Criteria** | **Constraints** |
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1. Exploring possibilities

Reflect on your brainstormed ideas and research notes and describe the plusses and minuses of each design approach you have considered. Is there an alternative solution you did not consider?

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| **Brainstorming Idea** | **Plusses** | **Minuses** |
| **Idea 1** |  |  |
| **Idea 2** |  |  |
| **Idea 3** |  |  |

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| **Did alternative solutions arise as you initially evaluated your designs? Cite examples.** |
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1. Selecting an approach
   1. Enter the constraints and criteria of the project in the first column.
   2. Score your brainstorming ideas against each constraint or criterion and indicate how well the idea meets the criteria and constraints.

3 pts = easily meets, 2 pts = somewhat meets, 1 pt = does not meet

* 1. Total the columns and circle the highest score to indicate your best design idea.
  2. Write a short paragraph justifying your solution. Include trade-offs that were made in the selection.

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| **Constraint/**  **Criterion** | **Brainstorming Idea 1** | **Brainstorming Idea 2** | **Brainstorming Idea 3** | **Brainstorming Idea 4** | **Brainstorming Idea 5** |
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| **Total** |  |  |  |  |  |

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| **Justify the solution** |
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1. Developing a design proposal

Take your highest-scoring brainstorming ideas and create working drawings (sketches with dimensions so that you could build your project) of your complete device. Attach your working drawings to this sheet.

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| **Material to be Used** | **Qty** |
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1. Making a model or prototype

In the space below, document (using digital pictures) your construction of the model/prototype. Be sure to include a picture of the final model/prototype.

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| **Construction in Process** | **Construction in Process** |
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| **Construction in Process** | **Final Product** |
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1. Testing and evaluating the design, using specifications

As you create your solution, you will perform tests to make sure that the solution is meeting the needs of the given problem. If your solution does not work, you may need to repeat the previous steps of the Engineering Design Process until you find a functional design. In the space below, document the type of tests you conducted and the results.

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| **Test Performed** | **Test Results** |
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1. Refining the design

Based on your tests, what design refinements should be made to the prototype to ensure that it can satisfy all of the criteria and constraints of the design problem?

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| **Refinements** |
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1. Creating or making it

Modify your model/prototype to incorporate the design refinements you identified in Section 10. Document the construction of the model/prototype. Be sure to include sketches/pictures as appropriate.

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| **Construction in Process** | **Construction in Process** |
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| **Construction in Process** | **Final Product** |
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1. Communicating processes and results

Demonstrate the operation of your Nonverbal Communication to the class. As part of your demonstration, describe the steps involved in the development.