

ENGINEERING DESIGN WORK SAMPLE

Name: _____ Date: _____

Partner: _____ Partner: _____ Partner: _____

STEP 1: IDENTIFY & DEFINE A PROBLEM TO BE SOLVED

Based on observations and scientific principles, formulate a statement of a practical problem that can be addressed through the process of engineering design.

- What is the problem you want to solve?

- What scientific concepts do you need to consider while solving this problem? List at least 2 concepts and explain why they relate.

- **Criteria and Constraints**
 1. **Criteria (requirements):** These are the factors that can be measured to show the design worked. Examples include: evidence of durability and function.
 2. **Constraints (limitations):** Limits on what you can do. Examples include: materials, appearance, environmental impact, and time to build.

What are three criteria and three constraints for this project?

Criteria:

- 1.
- 2.
- 3.

Constraints:

- 1.
- 2.
- 3.

STEP 2: BRAINSTORM

Generate possible solutions then evaluate those solutions with the rubric using the criteria and constraints.

In the boxes below, sketch three designs and identify the materials required. (At this point, you should not have actually built any of these three designs.)

POSSIBLE DESIGN #1	Design sketch	Materials needed
---------------------------	---------------	------------------

POSSIBLE DESIGN #2	Design sketch	Materials needed
---------------------------	---------------	------------------

POSSIBLE DESIGN #3	Design sketch	Materials needed
---------------------------	---------------	------------------

Name: _____

Date: _____

ENGINEERING DESIGN EVALUATION RUBRIC

Problem to be solved:	Optional: Rank the criteria and constraints	DESIGN 1	DESIGN 2	DESIGN 3
Evaluate each design against each criteria and constraint 0: Does not meet 1: Meets a little bit 2: Meets at least halfway 3: Completely meets				
CRITERIA 1				
CRITERIA 2				
CRITERIA 3				
CONSTRAINT 1				
CONSTRAINT 2				
CONSTRAINT 3				
<p>After scoring each design against the criteria and constraints, total the scores. The highest score is the best engineering design solution.</p>				

STEP 3: DESIGN

Finalize your design from the evaluation rubric.

After analyzing your designs do you want to make any changes? Select one design you are going to test. This will be your **prototype**.

Prototype Design	Design sketch	Materials needed

- Why did you choose to start with this design as your prototype?

STEP 4: BUILD

Construct the prototype to test.

- Explain any changes you made from your original design and why you made them.

STEP 5: TEST SOLUTION AND RECORD DATA

Test solution by collecting and displaying data to facilitate the analysis of test results.

- How will you test your prototype? How will you use the criteria for the project to decide what to test?
- Show the results of your tests.

STEP 5 CONTINUED: EVALUATE RESULTS

Analyze test result to evaluate the success of the proposed solution in terms of criteria, constraints, and other factors.

- Use the data you collected and explain how well your prototype solved the problem. Be sure to use the criteria and constraints in your explanation.

- Now that you have tested your design do you see any additional problems that you had not thought of when you started?

- Do you need to change your design? What do you think you need to change and how will those changes make the design even better?

STEP 6: REDESIGN

Use the evaluation of your engineering design process to redesign a new prototype. Go back to **STEP 4** and **BUILD** it.

STEP 7: SHARE SOLUTION

Summarize your engineering design process and share your results with the scientific community.