Steps of the Design Process

1. Identify the problem.
2. Identify criteria and constraints.
4. Select a design.
5. Build a model or prototype.
6. Test the model and evaluate.
7. Refine the design.
8. Share the solution.
Step 1: Identify the Problem

- State the problem clearly.

Step 2: Identify Criteria and Constraints

- Identify the conditions that must be met to solve the problem.

- Identify anything that might limit a solution, such as cost, availability of materials, safety.

- Be specific.
Step 3: Brainstorm Possible Solutions

- Consider what others have done to solve this problem and include prior research.

- Generate new ideas for solutions.

Step 4: Select a Design

- Choose two or three of the best ideas from the brainstormed list.

- Make a detailed sketch of each design.

- Label each sketch with dimensions and include the materials needed to build a model.

- Select one design to construct.

- Justify your choice by listing the reasons you selected this design.
Step 5: Build a Model or Prototype

- Write a detailed procedure for building the model or prototype.

- List the materials actually used to construct the model.

- Follow your procedure and build the model.
Step 6: Test the Model and Evaluate

Test

- Write a hypothesis about your design's performance during testing.

- Use an “If . . . then . . .” format. For example, “If the redesigned model has increased in size (change in the independent variable), then it will fall at a faster speed, (change seen in the dependent variable).

- Decide on a test for the model and try it out.

- Record the results of your tests.

Evaluate

- List the strengths of your design.

- List the weaknesses of your design.

- Discuss what changes, or compromises, in your design (if any) had to be made due to constraints.

- Decide if your design solved the problem identified in Step 1.
Step 7: Refine the Design

- Based on the results of your tests, make improvements on your design.

- Identify the changes that you would make.

- Give reasons for the changes.

Step 8: Share the Design

- Organize your findings. For example, you could make a poster, digital collage, PowerPoint presentation, or short video documentary.

- Present your findings to your teammates for feedback.

- Compare your design to those of your teammates.

- If you were to build this model again, what would you do differently and why?
## Design Challenge Evaluation Rubric

### Rubric Category

#### Brainstorm to Identify the Problem and Constraints
- The problem is identified and explained in detail.
- All criteria and constraints are listed and clarified.
- Possible solutions are listed from the brainstorming session.
- The work others have done to solve the problem is included.

#### Generate Ideas, Possibilities, and Design Choice
- Two or three ideas are selected from brainstormed list.
- Detailed sketches are created for the selected ideas.
- Sketches are labeled with dimensions and materials for each component.
- One design is selected to construct with reasons for the choice.

#### Build the Model or Prototype
- Detailed list of materials is included.
- Detailed procedures are included and followed.
- Materials are handled and stored appropriately.
- Safety rules are followed.

#### Test the Model and Evaluate
- Hypothesis following an “if..., then...” format is developed for the design.
- Strengths of the design are listed.
- Weaknesses of the design or compromises of the design are listed.
- Results are accurately recorded.
- Data tables are complete and well organized.
- The chosen design effectively addresses the identified problem.

#### Refine the Design
- Modifications to improve the design are based on test results.
- Modifications to the design are documented.
- Additional trials are conducted.
- Reflections show great insight and understanding of process and goals of project.

#### Share the Design
- Presentation is well-organized.
- Presentation covers all areas of the design process.
- Presentation is clearly communicated (verbally or visually) with appropriate data, sketches, graphs or pictures.
- Presentation includes contributions from all team members.

### Score

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<thead>
<tr>
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### Group Members:

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### TOTAL (out of 24 pts possible)

4 (Excellent) = All criteria (procedures, steps, and details) are met or followed with rare mistakes.
3 (Good) = Most criteria are met with only a few mistakes.
2 (Fair) = Many criteria are not met and/or there are many mistakes.
1 (Poor) = Most criteria are not met.
0 (No effort) = No effort to meet criteria.