Name(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class/Day: \_\_\_\_\_\_\_\_\_



**Identify - Define the Problem:** Describe clearly what your problem is:

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**Investigate -** What are the criteria and constraints for your project?

**CRITERIA:** In complete sentences, describe the standards, requirements, or specifications that your design must follow in order to be considered a solution. What does a successful solution look like?

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**CONSTRAINTS:** In complete sentences, describe some of the things that you cannot do. Doing these things would disqualify your design from being considered a solution. Possible constraints could include time, materials, skills, information, and/or budget.

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**Research:** You will need to make sure that you have an understanding of all of the parts of your problem before coming up with a solution.

You must start by writing down the important information you already know about your problem (could be vocabulary terms, a specific product, people or companies that would have helpful information on your problem, something you have learned in another class, etc).

|  |
| --- |
| **Important Information** |
|  |

You will then need to write at least 3 questions or things that you need to find more information on. You will then need to conduct research and record your references.

|  |
| --- |
| **Need More Information** |
| 1st Question: |
| What we found: |
| References |

|  |
| --- |
| 2nd Question: |
| What we found: |
| References |

|  |
| --- |
| 3rd Question: |
| What we found: |
| References |

**Imagine -** What are your ideas to solve the problem?

**For each idea create sketches to include two views, all materials labeled, how it works, and a positive and negative attribute to your idea. This could be done digitally as well.**

**Design 1**

|  |  |
| --- | --- |
| **View: \_\_\_\_\_\_\_\_\_** | **View: \_\_\_\_\_\_\_\_\_** |

**How it works:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Positive:**

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**Needs improvement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Design 2**

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| **View: \_\_\_\_\_\_\_\_\_** | **View: \_\_\_\_\_\_\_\_\_** |

**How it works:**

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**Positive:**

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**Needs improvement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Design 3**

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| **View: \_\_\_\_\_\_\_\_\_** | **View: \_\_\_\_\_\_\_\_\_** |

**How it works:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Positive:**

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**Needs improvement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Plan -** From your brainstorming ideas which seems to be the most possible to do and work?

When choosing your best solution make sure it solves the problem and follows the criteria and constraints for the project. These should be detailed sketches done with a ruler, the dimensions you plan on using (decide on Customary or Metric system) and label the lengths, includes labels on all of the parts (and the materials they are built with), and answer all of the questions.

**Final Design**

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| **View: \_\_\_\_\_\_\_\_\_** | **View: \_\_\_\_\_\_\_\_\_** |

**Explain why you feel this is the best solution (paragraph):**

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**Explain how your design will work(paragraph):**

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**Create** - Build It!

What materials will you need? How much of each supply will you need? Your list will need to be approved before you may grab any materials. If you need to bring supplies from home make sure to write down who is responsible for bring which item. Make sure you include anything that you will use for building (Ex: ruler, scissors)

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Do you only have the materials listed on your final design? Yes No

Who will be in charge of collecting and distributing materials? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Are there any items that need to be brought from home? Yes No

If Yes, have you planned out how the supplies will get here ASAP? YES (Only Option)

You will need to create a plan for the process of building your prototype.

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| **What is your game plan for constructing? Create a list that you group will be following as you build. (Things to include: Where will you start? How will you make sure you are following your design? How will you manage materials? What responsibilities will each group member have? How will you know when you are finished? What is your estimated build time?)** |
|  |

Use the template below to evaluate whether your group is ready to present or not. You will need to review it as a group and have another group review over your work as well before showing me. If any of the answers are no, you will need to go back and fix it.

Reviewer(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Reviewer Statements** | **Circle One** | |
| The problem has been clearly described and makes sense. **(Identify)** | Yes | No |
| The criteria and constrictions are clearly labeled and have been followed throughout the design process **(Investigate)** | Yes | No |
| The research has been completed. The group has included all information that they already know, created questions for information that they still need, and researched and recorded their responses and references. **(Investigate)** | Yes | No |
| Each group member created their own design idea (either on paper or digitally) to solve the problem. Each of the designs shows multiple views, has an explanation of how it works, and a positive comment and an improvement that could be made for each design. **(Imagine)** | Yes | No |
| The group has created their final design. The design is shown from multiple views, looks as if a ruler and/or other drawing tools were used, includes labeled dimensions (in Customary OR Metric units), and all materials and parts are labeled. **(Plan)** | Yes | No |
| The group has explained why they created this design and how it will work in complete sentences (3-5 at least). **(Plan)** | Yes | No |
| The group has listed all of the materials and tools they will need (with estimated amounts), determined if any supplies need to be brought from home (and who will bring them), and have decided who will be in charge of the materials. **(Create)** | Yes | No |
| The group has created a plan that is clear and easy to follow. The plan could be given to another group and they would be able to build the design just as it is described. **(Create)** | Yes | No |
| The group is ready to begin building and should see Mr. Lloyd. | Yes | No |

Additional Comments:

**Building:** Your group is now ready to begin building. The student that is in charge of the materials will need to make sure to fill out the table recording all materials that the group used. If it is a material you brought from home please place an \* next to it.

**Tips for Building a Successful Prototype**

* **Plan before you build.** It is better to plan out your ideas before acting upon them. This allows you to not waste materials or time.
* **Write everything down.** These projects take a long time to build so if you write everything on paper (data, future plans, procedures, modifications), you don’t have to try to remember things over a long period of time. You should have notes from each day of what was accomplished, what is working well, what is challenging, etc. You must include the dates for each entry. **This will be part of your final grade, so be specific.** You may type up a response each day if you prefer. You should put one person in the group in charge of this.
* **“Measure twice, cut once.”** When cutting any material, you must measure and mark what you will be cutting prior to cutting. Double check that your measurement is correct. You should put one person in the group in charge of this.
* **Manage your time well.** One main constraint for all engineers is time. You will not get an unlimited amount of time to build your design. Make sure your team is remaining on task and following your plan (Similar to a foreman). Your initial prototype should look as close to your design as possible. You should put one person in the group in charge of this.

Material Handler: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Data Recorder: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Foreman: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Test/Improve -** Determine if your design solves your problem.

Your group is now ready to begin testing your design. As you test remember that you are able to modify your design to make it better. You will need to make sure to modify only 1 thing at a time to determine if it was successful. Do not forget to record any and all data that you create.

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| --- | --- |
| **How will you test your design?** |  |
| **What do you predict will happen during testing?** |  |
| **How will you determine what modifications to make?** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trial** | **Observations** | **Modification Made** | **Did it help?** | **What next?** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
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**Communicate -** Share out the results of your project.

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| Were you completely satisfied with your end results? Explain why or why not. Did your solution solve the problem as stated in “define the problem”? Be specific as to what your design accomplished or did not accomplish. |
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| Look at your final design sketches and compare those to your final built product. Describe the differences between what you intended to build and what you actually built. Explain why these changes were made. |
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| Explain why the device you built worked or why it did not work. Think only about the design of the device. |
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| How does your group plan on presenting your findings? |
|  |