**MOUSETRAP VEHICLE PROJECT**

* **Objective**: Create a mousetrap vehicle that travels the greatest distance.
* **Constraints**:
	+ You must use the mousetrap provided by your teacher.
	+ If you use Fischertechnik parts they may not be glued or cut.
	+ You may use wood and hot glue provided by your teacher or you may use any materials you decide you would like to bring to class.



* You will research mousetrap vehicles
* After choosing a design solution you are to outline step 1 and 2 of the design process in your engineer’s notebook.
* Once you are done with this step can share your ideas with your group members and choose 1 solution that might marry all the ideas (if need be).
* Sketch and annotate this solution in your notebook (step 3 below).
* Then you will get the go ahead to begin to build.
* Follow the design process steps below on what you should include in your notebooks.

Make sure that all of your information goes into your engineer’s notebook following the design process outline. Be sure to title each section.

**6 Step Design Process:**

* Step 1: **Define the Problem**: Here you state the objective of your project.
* Step 2: **Generate Concepts**: Here you describe your research idea.
* Step 3: **Develop a Solution**: Here you develop a design proposal and include annotated final design drawing. Explain THOROUGHLY how you will get your vehicle to move the greatest distance and label and describe the role of each part in the initial sketch of your vehicle.
* Step 4: **Construct and Test a Prototype**: Go ahead and build. BE SURE TO USE CAUTION WITH THE MOUSETRAPS!

**Building Steps:**

* Step 5: **Evaluate the Solution**: If something is not working, fix it! Be sure to explain what you changed in your notebooks!
* Step 6: **Present the Solution:** Here you will create a final drawing of your project with annotations on how it works. Also include a picture of your project.

Keep in mind when getting data:

* Be sure to mark your start and finish point and measure the distance in inches.
* After your final sketch and conclusion include the answers to the data analysis questions in complete sentences and/or showing all equations and mathematics necessary.

**Data Analysis**

1. Using a dial caliper measure the diameter of your tire on the rear axle. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inches.
2. Measure the diameter of the rear axle. inches.
3. Calculate the wheel to axle ratio. Show all your work, including equation and substitution with units.
4. Measure the greatest length of your vehicle. inches.
5. Determine the mass of your vehicle. grams.
6. Using a ruler, measure the distance your car travels 3 times in a row, and also note the time in seconds.
7. Find the average distance. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inches.
8. Find the average time. seconds.
9. Determine your vehicle’s average speed by dividing the average distance in part 7 by the average time in part 8. Show all your work including an equation, substitution with units and answer with units. inches/second.
10. Determine which simple machines are working in conjunction to create your mousetrap vehicle. Include labels on your final sketch of these simple machines. Write these labels in a different color.

**Rubric**:

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| --- | --- | --- | --- |
|  | **2** | **4** | **6** |
| **Step 1-2 in engineer’s notebook** | There is too much information missing from Step 1-2 | Step 1-2 is in the engineer’s notebook but it is unclear which step is which OR There is some information missing. | Step 1-2 is clearly outlined in the engineer’s notebook. |
| **Step 3 Design Proposal** | Your sketch is unclear and/or annotations unclear and hard to follow. | Your sketch is somewhat unclear and/or annotations unclear and hard to follow. | Your sketch is clear to understand and is correctly annotated and explained. |
| **Step 4-5 Building Steps****(ALL RUBRIC POINTS X2)** | Your design has many glitches and does not work properly or efficiently.**4 POINTS** | You created a design with some glitches that were not addressed.**8 POINTS** | You created a working design within the parameters given and all simple machines clearly work the way intended.**16 POINTS** |
| **Step 6: Communication** | Your final sketch and picture is lacking in annotations AND does not explain changes. | Your final sketch and picture is not thorough and could have been explained better.  | Your final sketch and picture has thorough explanations. |
| **Data Analysis** | Your calculations are messy and incomplete and not properly labeled. | You did not label equations and/or units OR What the calculations are for is not clearly labeled. | All calculations are clearly labeled and shows equations, substitutions with units and final answer with correct units. |
| **Conclusion steps 6-7 in data analysis** | Too much of your conclusion is incomplete. | Conclusion is somewhat incomplete. | Conclusion is complete and all questions are answered. |