

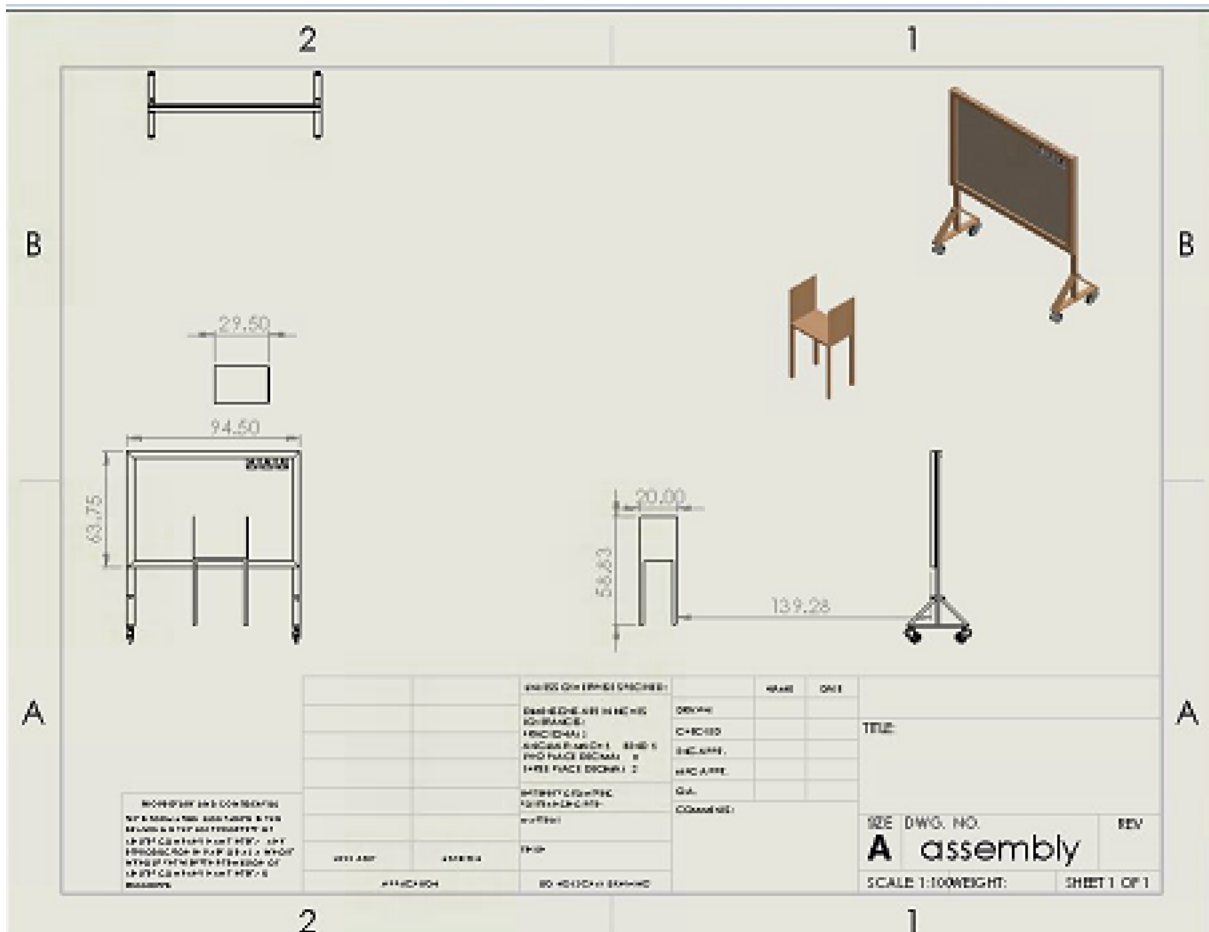
Team 2-A  
 Wonder Factory – Words  
 ME 486C  
 August 2, 2018

### Final Product Testing Proof

**Table 1: Engineering Requirements and Customer Requirements**

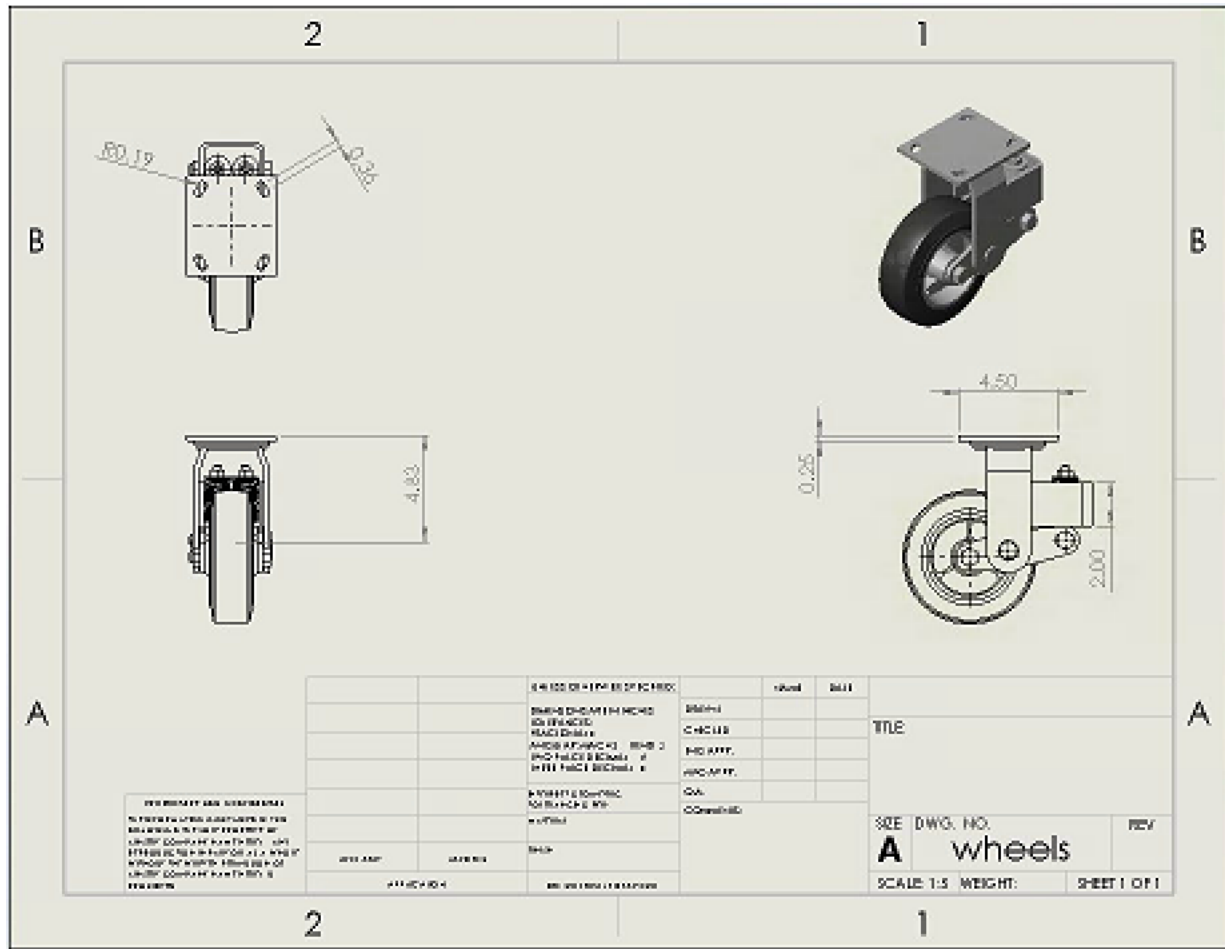
| Engineering Requirements | Target Value | Percentage Error |
|--------------------------|--------------|------------------|
| Size                     | 6X6 feet     | 25%              |
| Weight                   | 100 lb       | 10%              |
| Safe (No Sharp Edges)    | -            |                  |
| Number of Words          | 10 words     | 10%              |
| Range                    | 1-1.5 meters | 30%              |

Requirement #1- Size:



Since the width is well within the percentage error. The Engineering Requirement for the size have been met.

Requirement #2- Weight:



For the weight of the project, we had wheels of 90 lb. attached to it so it could withstand the required weight of 100 lb.

Requirement #3- Safe:

There were no sharp edges used in this project where we focused on using materials that were harmless and we mostly used Velcro material and plywood in this project.



Requirement #4- Number of Words:

The alphabets on the board are 3 rows and 6 columns. So, it makes sense that we can gather 10 words from those alphabets.



Requirement #5-Range:

The distance that we calculated to be the safest for kids was 1.445 meters. And from that distance, they can hit their targets using the catapult that we designed.

Assume  $v_0 = 1\text{m}$ ,  $\theta = 45^\circ$

horizontal component:

$$v_{0x} = v_0 \sin \theta \Rightarrow 1 \sin 45^\circ = 0.85\text{m/s}$$

$$\Delta t = \left[ \frac{2(v_{0y})}{g} \right] \quad , g = 9.81$$

time:

$$\Delta t = \frac{2(0.85)}{9.81} \Rightarrow \Delta t = 1.7\text{s}$$

Complete Distance:

$$\Delta dx = v_{0x} \times \Delta t = (0.85)(1.7) = 1.445\text{m}$$