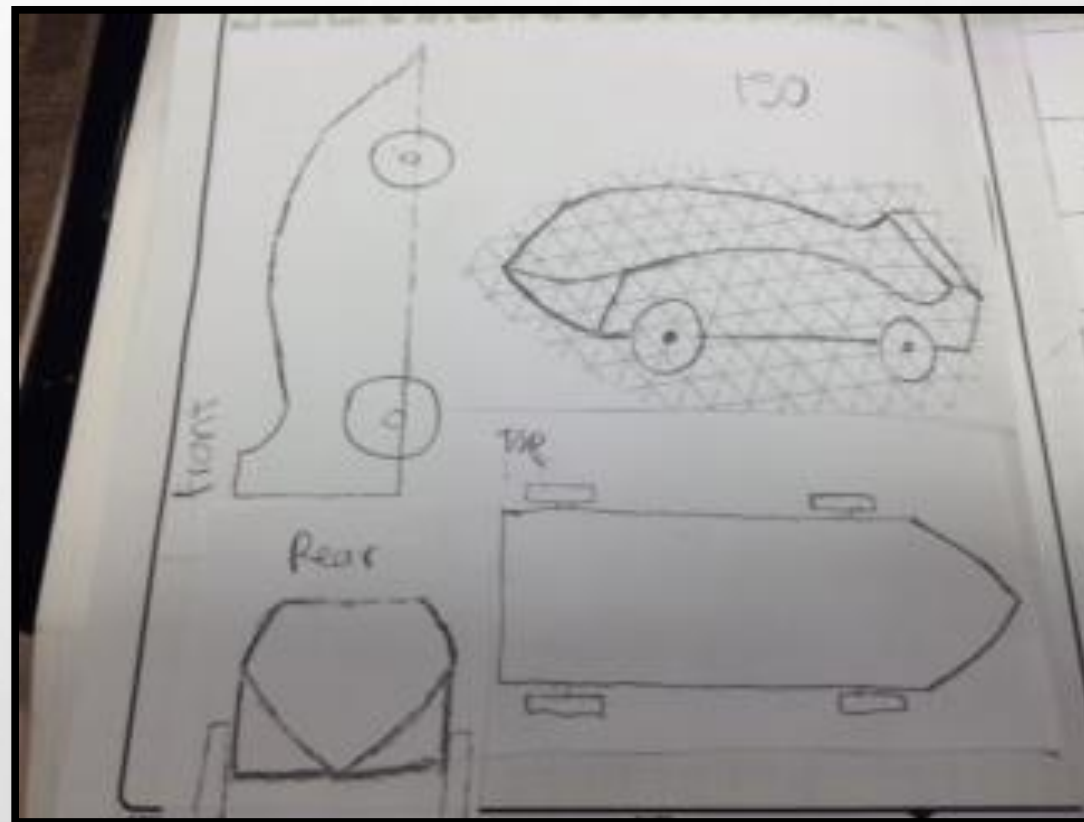


# **REVERSE ENGINEERING A PINE WOOD DERBY CAR**

**BY: CAMDEN BOGENRIEDER, ELI PARKER, CHASE ROSELAND**



# VISUAL ANALYSIS:



# VISUAL ANALYSIS:

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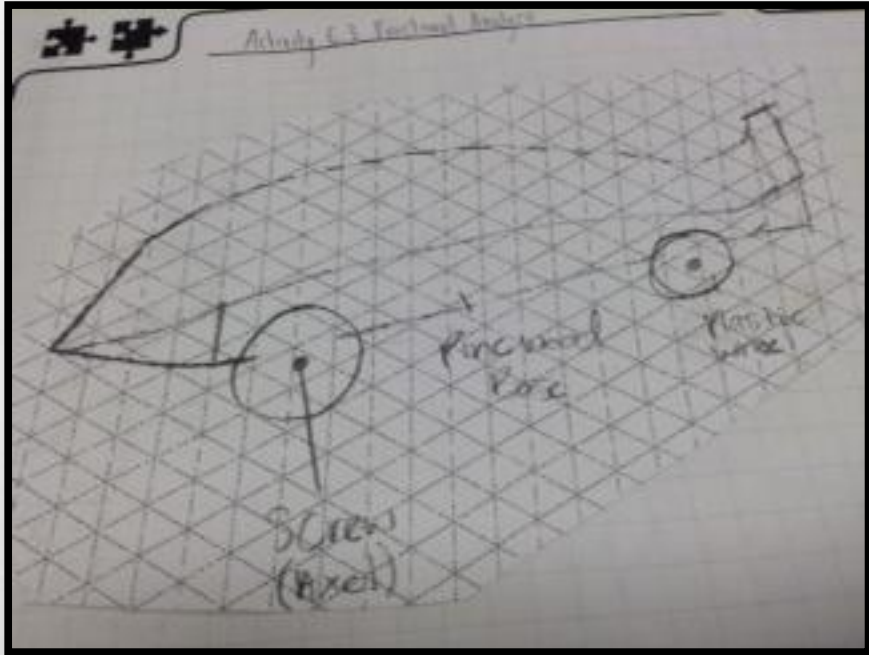
Activity 6.2a Visual Analysis AE

The light side of the wheel contrasts with the dark side of the thick wheel. Light is shown on the side of the car with the wheels. The wheel of the car is round. The economy of the car is simple. The texture is smooth. The wheel is round. The car has a rounded nose of geometric shapes and all the wheels are equal. Emphasis is placed toward the nose and spikes near the back of the car. The car contains horizontal, diagonal, and curved lines. The car's form is 3D. The color of car is brown, black, and tan.

ISO

| Area of Design | Elements of Design |             |            |               |            |           | Textural Information |
|----------------|--------------------|-------------|------------|---------------|------------|-----------|----------------------|
|                | Point              | Line        | Color      | Value         | Form       | Space     |                      |
| Color          | Light              | Dark        | Light      | Light         | Dark       | Light     |                      |
| Line           | Horizontal         | Vertical    | Diagonal   | Curved        | Angular    | Irregular |                      |
| Form           | Round              | Rectangular | Triangular | Quadrilateral | Pentagonal | Hexagonal |                      |
| Space          | Open               | Closed      | Open       | Closed        | Open       | Closed    |                      |
| Texture        | Smooth             | Textured    | Smooth     | Textured      | Smooth     | Textured  |                      |
| Value          | Light              | Dark        | Light      | Dark          | Light      | Dark      |                      |
| Form           | Round              | Rectangular | Triangular | Quadrilateral | Pentagonal | Hexagonal |                      |
| Space          | Open               | Closed      | Open       | Closed        | Open       | Closed    |                      |
| Texture        | Smooth             | Textured    | Smooth     | Textured      | Smooth     | Textured  |                      |
| Value          | Light              | Dark        | Light      | Dark          | Light      | Dark      |                      |

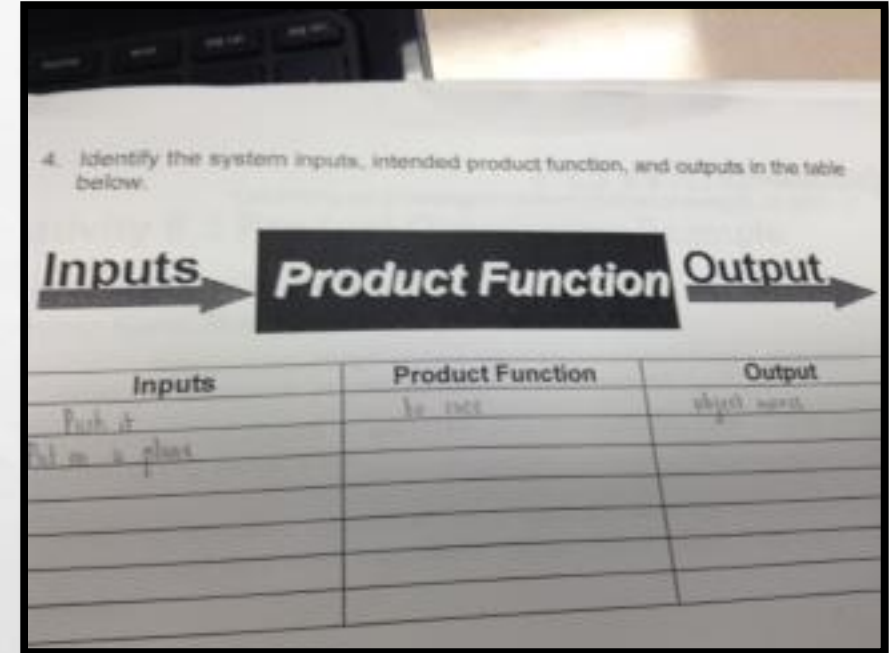
# FUNCTIONAL ANALYSIS:



**The main purpose/function of the Pine Wood Derby Car is to express creativity, race on a inclined plane, and to just have fun.**

# FUNCTIONAL ANALYSIS:

The object moves depending on the friction between the wheel and the surface that the object is rested on. The object's speed is determined on the angle of the inclined plane it is placed on and the total weight of the object. Without the incline plane it needs a push, pull, or another force in order to move it.



# STRUCTURAL ANALYSIS:

**Activity 6.4 Product Disassembly**

Product Name: Toy Wood Dolly, Ltd.  
 Date: 2/24/11  
 Time: 17:00

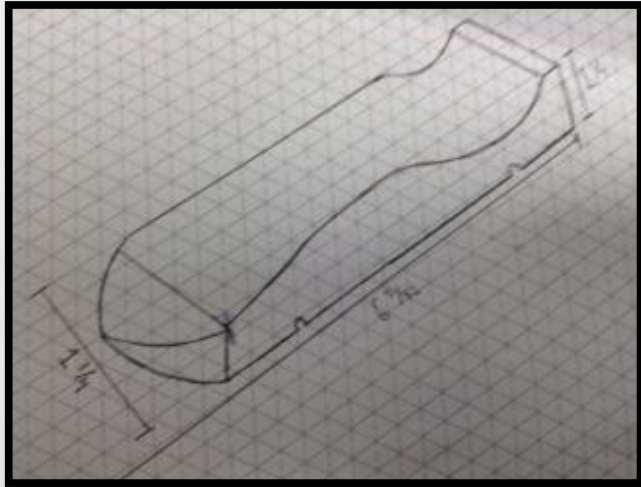
Group members:

| Part # | Part Name  | Qty | Dimensions            | Function                | Material | Density |
|--------|------------|-----|-----------------------|-------------------------|----------|---------|
| 1      | Wood Dolly | 1   | 6" x 1 1/4" x 1 1/4"  | Frame body              | Pin Wood | 47      |
| 2      | Wheel      | 4   | 1.85                  | Space for motion        | Plastic  |         |
| 3      | Screw      | 4   | 1.041<br>1/16<br>.095 | Holds wheel to our body | Steel    | 7.8     |
|        |            |     |                       |                         |          |         |
|        |            |     |                       |                         |          |         |

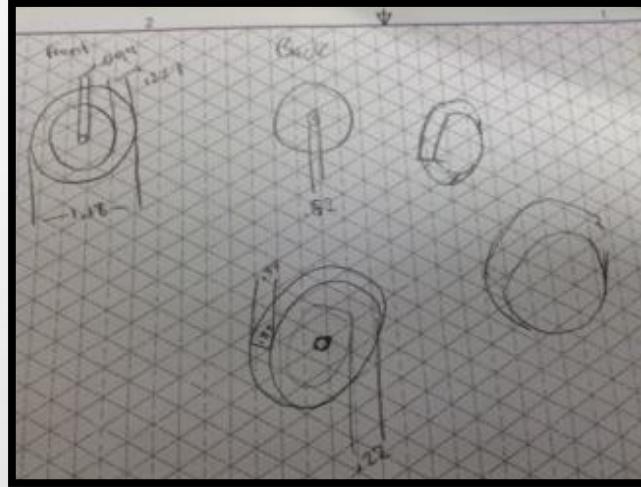
Group members: Chris Venturi  
London Papanicolaou  
Elie Pichel

| Qty | Mass or Weight | Texture and Finish | Interaction with Other Parts    | General Notes (i.e.: wear, stress indicators) |
|-----|----------------|--------------------|---------------------------------|---|
|     | 90 grams       | Smooth             | Sits on top of wheel and screws | Crack on back edge                            |
|     | 2 grams        | Mostly Smooth      | Space to give our motion        | not much wear                                 |
|     | 1 gram         | Smooth             | Holds wheel into our            | not much wear                                 |
|     |                |                    |                                 |   |
|     |                |                    |                                 |   |

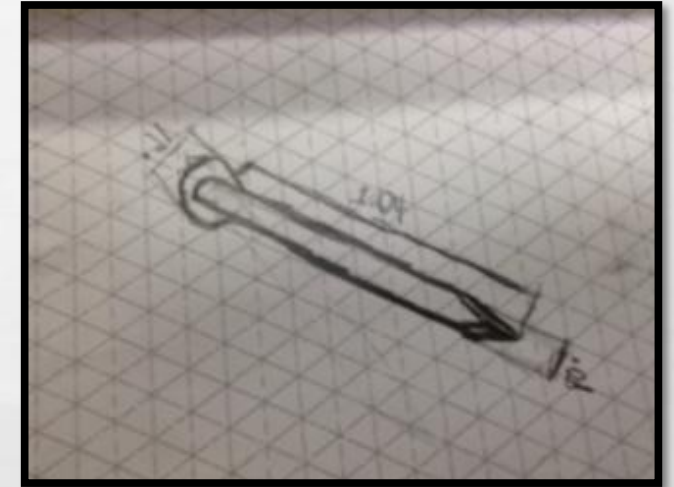
# STRUCTURAL ANALYSIS:



**Pine Wood Derby Car**



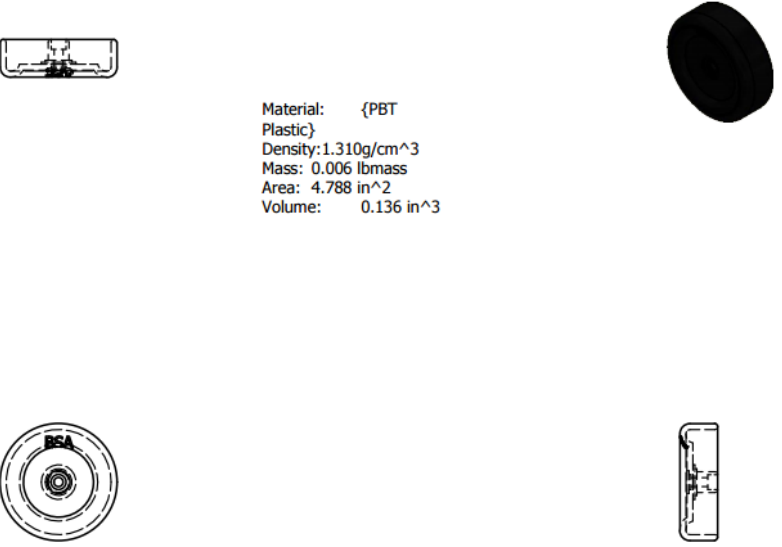
**Wheels**



**Screws/Axels**

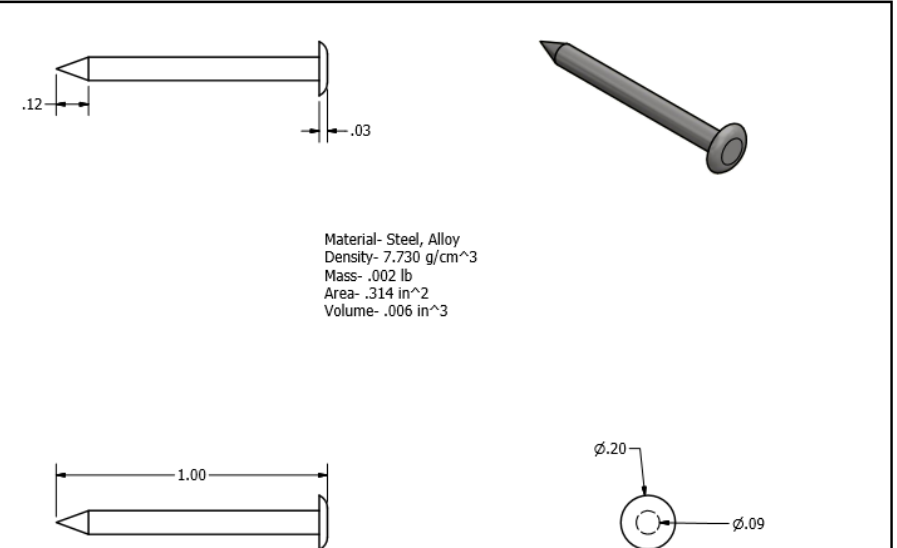
**Only notable damage/wear is a crack on the back right caused by making the track for the axels .**

# CAD MODELS:



Material: {PBT  
Plastic}  
Density: 1.310g/cm<sup>3</sup>  
Mass: 0.006 lbmass  
Area: 4.788 in<sup>2</sup>  
Volume: 0.136 in<sup>3</sup>

|   |           |                              |               |
|---|-----------|------------------------------|---------------|
| <b>Bethlehem Christian Academy</b><br>PLTW - Introduction to Engineering Design |           |                              |               |
| Designed by: cr cb ep   |           | Project Title: wheel drawing |               |
| 2/28/2017   | Sheet # 1 | File Name: chase wheel.ipt   | Engineering02 |



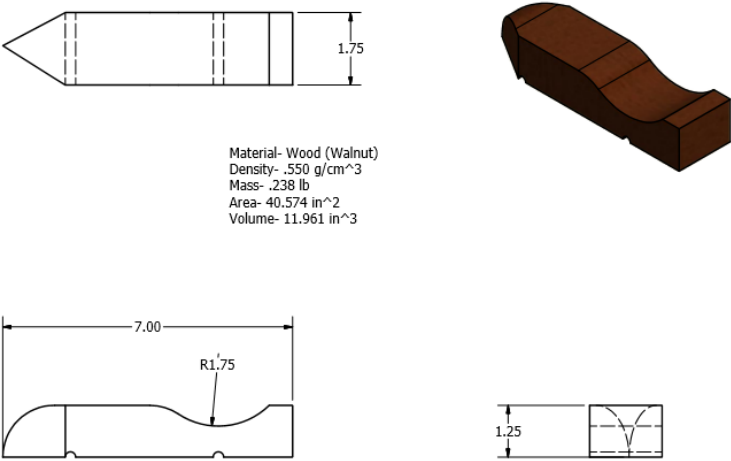
Material- Steel, Alloy  
Density- 7.730 g/cm<sup>3</sup>  
Mass- .002 lb  
Area- .314 in<sup>2</sup>  
Volume- .006 in<sup>3</sup>

Technical dimensions: .12, .03, 1.00,  $\phi .20$ ,  $\phi .09$

|   |           |                              |               |
|---|-----------|------------------------------|---------------|
| <b>Bethlehem Christian Academy</b><br>PLTW - Introduction to Engineering Design |           |                              |               |
| Designed by: EP CR CB   |           | Project Title: SCREW         |               |
| 2/28/2017   | Sheet # 1 | File Name: Elijah screws.ipt | Engineering05 |



# CAD MODELS:



Material- Wood (Walnut)  
Density- .550 g/cm<sup>3</sup>  
Mass- .238 lb  
Area- 40.574 in<sup>2</sup>  
Volume- 11.961 in<sup>3</sup>

|   |                                 |                |               |
|---|---------------------------------|----------------|---------------|
| <b>Bethlehem Christian Academy</b>        |                                 |                |               |
| PLTW - Introduction to Engineering Design |                                 |                |               |
| Designed by:                              | EP CB CR                        | Project Title: | Body          |
|   | 2/28/2017                       | Sheet #:       | 1             |
| File Name:                                | Pinewood Derby Car Block- CR CB |                | Engineering05 |
|   |                                 | EPfinal.ipt    |               |

# PRODUCT IMPROVEMENT:

Product Improvement could include adding some form of locomotion to the car besides using only a push, pull, or inclined plane for movement. The vehicle could also have the wheels secured to the body in a better manner.

