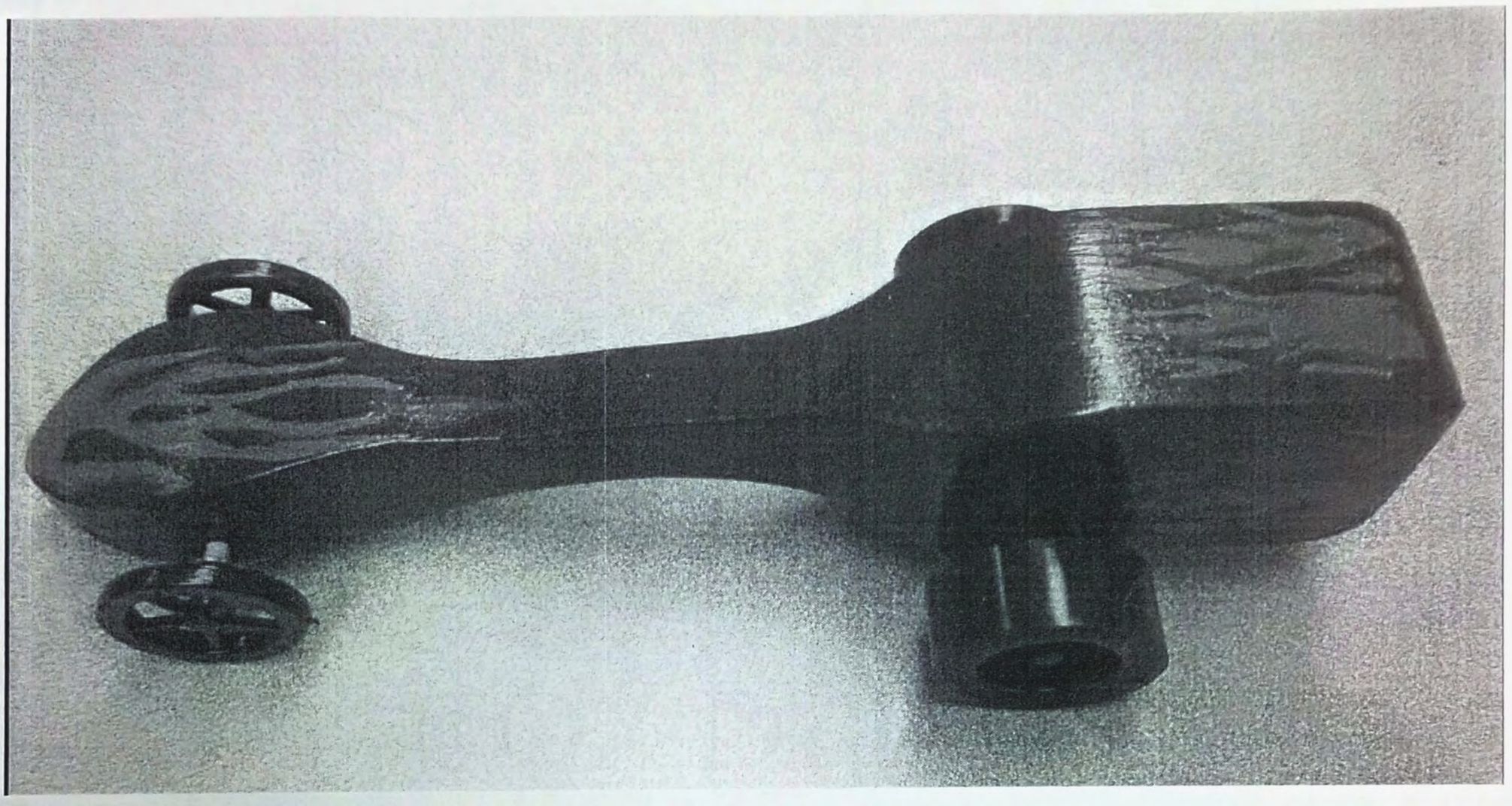
Exploring Technologies

Western Technical Commercial School

# MY CO2 DRAGSTER



Date: June 15, 2018

Name:

Course: Exploring technologies

Section: 05

Instructor: Mr. Franzen

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# NEW TERMS

**Exploring Technology**
Western Technical-Commercial School

| # | New Key Terms or Phrase | Definitions and/or Explanation | From Page # |
|---|---|---|---|
| 1 | Dragster | A race car meant to race a short distance | 2 |
| 2 | Washer | A flat ring made of metal | 3 |
| 3 | Bearings | cover over axels to create less friction around the wheels | 3 |
| 4 | Screw eyelets | Small screw with an enclose circular bend at the end | 3 |
| 5 | CO2 cartridge | A cartage that contains compressed carbon dioxide | 3 |
| 6 | Aerodynamics | A force produced as an object moved through the air | 5 |
| 7 | TSA | Technology Student Association | 6 |
| 8 | Positive lift | Force that pushes upwards on the car | 13 |
| 9 | Drag | A negative force meant to slow down (your car) | 13 |
| 10 | Wheel base | the distance between the centers of the front and rearwheels | 15 |

1 18/06/2018 P.Lauren

3 14/06/2018

# SPICE

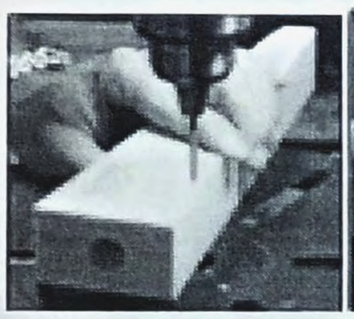
For our tech culminating project, grade 9's had to make a dragster car. They had to make the design of the car and had to build it using the machines in the shop. I was not there when we did the five dragster designs so I did them at home. I didn't have many good ideas so I went on the internet and got ideas. A lot of the ideas I liked but some of them I didn't so I mashed a few design parts together. Since I had done my report on dragster wood working I knew to drill the axel holes first before you cut out the body because it was harder to drill after you cut it and it could crack or break. I had cut out my dragsters prototype body which I liked and then I moved on to the wooden copy. After I finished the wood copy of my dragster I moved on to the painting of my dragster. Since I didn't have a design in mined I painted my dragster blue and then later after I got an idea I put it on my dragster. If you're not a hundred percent how to do a cut then ask for help, and take advice from other classmates because they may have a good point that can help you make your dragster better.

# RESEARCH



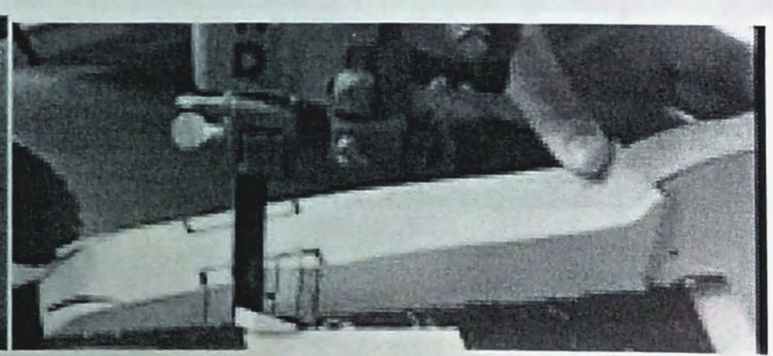
Advanced Woodworking Techniques

Drilling axles holes: Put your car on its side and drill an axle hole all the way through the wood using a drill press(make sure the axle hole is straight) then drill the other axle hole across from the first. After you finish drilling the axle holes, move on to shaping the body. Drill axle holes first other wise it is harder to drill the holes straight.




Cutting the body: Turn your wood on its side and use the large band saw. Roughly shape the first profile side of your car (doesn't need to be exact& don't forget to use relief cuts). Tape the scrap wood back on to your car (the tape will make your wood more study and not break or splinter) and cut the other profile of your car. Use the smaller band saw to do any edges you couldn't get on the larger band saw (use relief cuts where needed). When doing tight inner cuts use 3-5 relief cuts, and then cut the inner cut at a slant.





Sanding body: use rasps, files, sanding machines and/or an 80 grit sand paper and sand down the sides so they are smooth.

# Advanced Painting Techniques

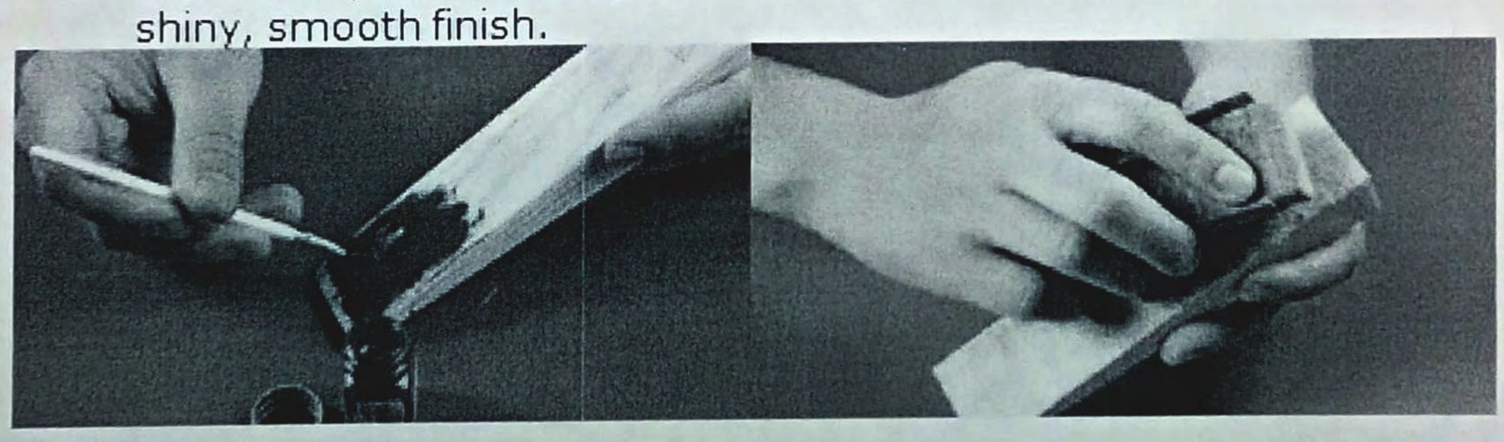
Co2 Dragster

J. EMMA

https://boyslife.org/hobbies-projects/projects/11508/paint-a-pinewood-derby-racer/ - techniques + prep for painting your car

https://paintedfurnitureideas.com/how-to-paint-without-brush-strokes/ - for a clean smooth paint

- Shorter bristles will show paint strokes more than longer bristles will
- Working in sections will help you finish areas while the paint is still wet. (Taking a paint brush over dried areas will result in the paint balling up and leaving streaks)
- Use bigger grit sandpaper to smooth wood to prepare for your painting, then use a very small grit sandpaper on the finished product to smooth down after paint
- Paint at least 3 coats of base color before adding designs overtop
- If available, add a clear gloss wax seal over the entire car to have a shiny, smooth finish.



# Maximizing Co2 Car Speed

## Info:

When designing a Co2 car it is crucial that you make it move fast as possible. A aerodynamic shape and light material used in construction are important aspects to be taken into account. The most common designs are "shell" and "rail" designs which are different ways of constructing dragsters. The main advantages rail design is they have less mass. However this can be a disadvantage since the rail design gives dragsters a fragile body. Shell dragsters have a design in which the body and wheels are covered by a protective shell. A shell reduces the aerodynamic drag of a dragster greatly. In a rail design the wheels and all the other parts of the dragster are exposed which greatly increases the drag. However it is possible to counteract this effect. It's also possible to reduce drag of Co2 cars by making the rear in a boat-tail form. The axles used in dragsters should be as short as possible.

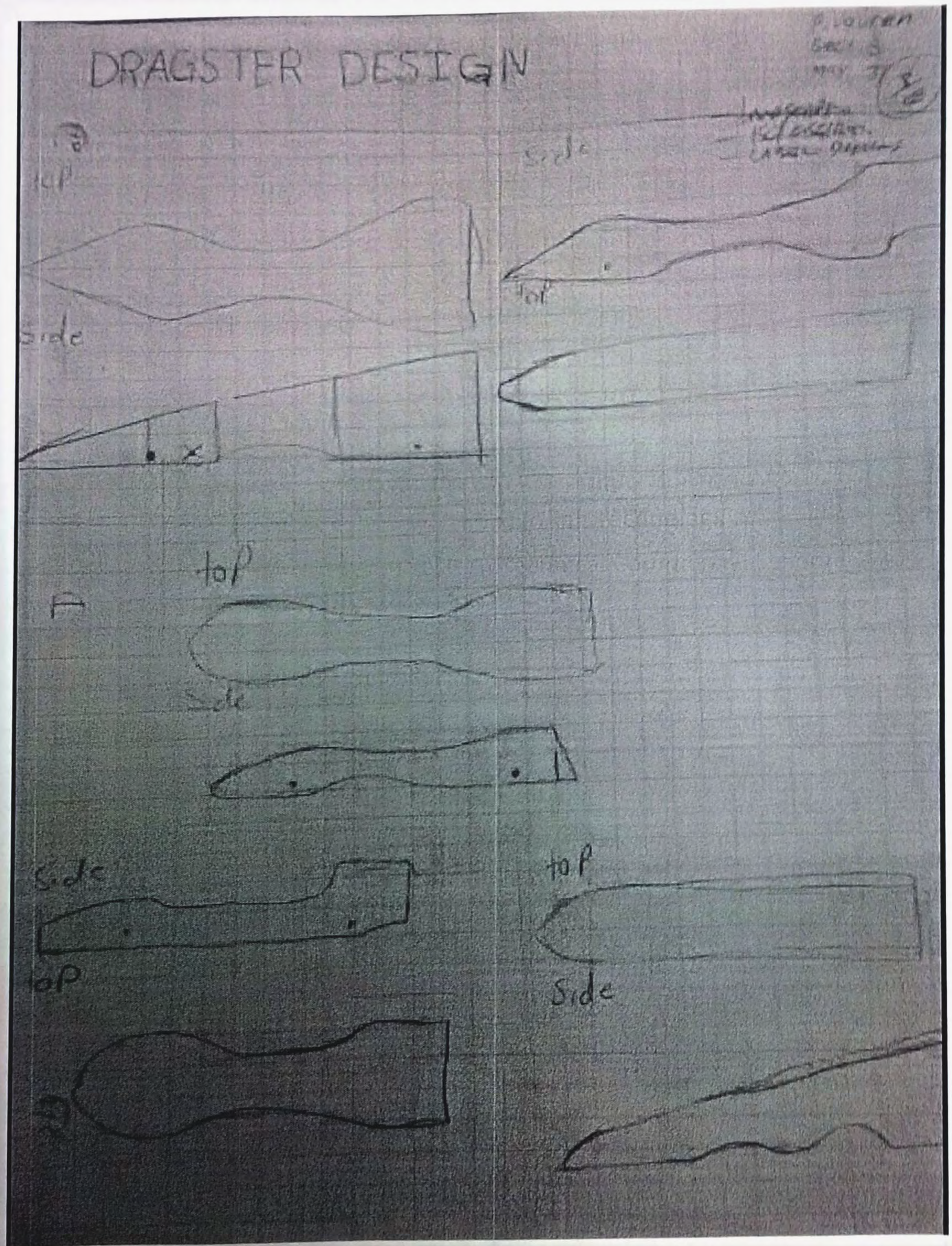
## Aerodynamics:

Aerodynamics is how air moves around an object. The rules of aerodynamics explain how airplanes are able to fly. Anything that passes through air has aerodynamics. Aerodynamics even acts on cars, since air flows around cars. As an object passes through the air, it is met with resistance as speeds increase there is more resistance. This air resistance will push against your Co2 car which prevents it from going at it's fastest speed which would be in a vacuum. You can't completely reduce drag, but you can help reduce the effect by making your car aerodynamic, but those are more difficult to create and require more planning.

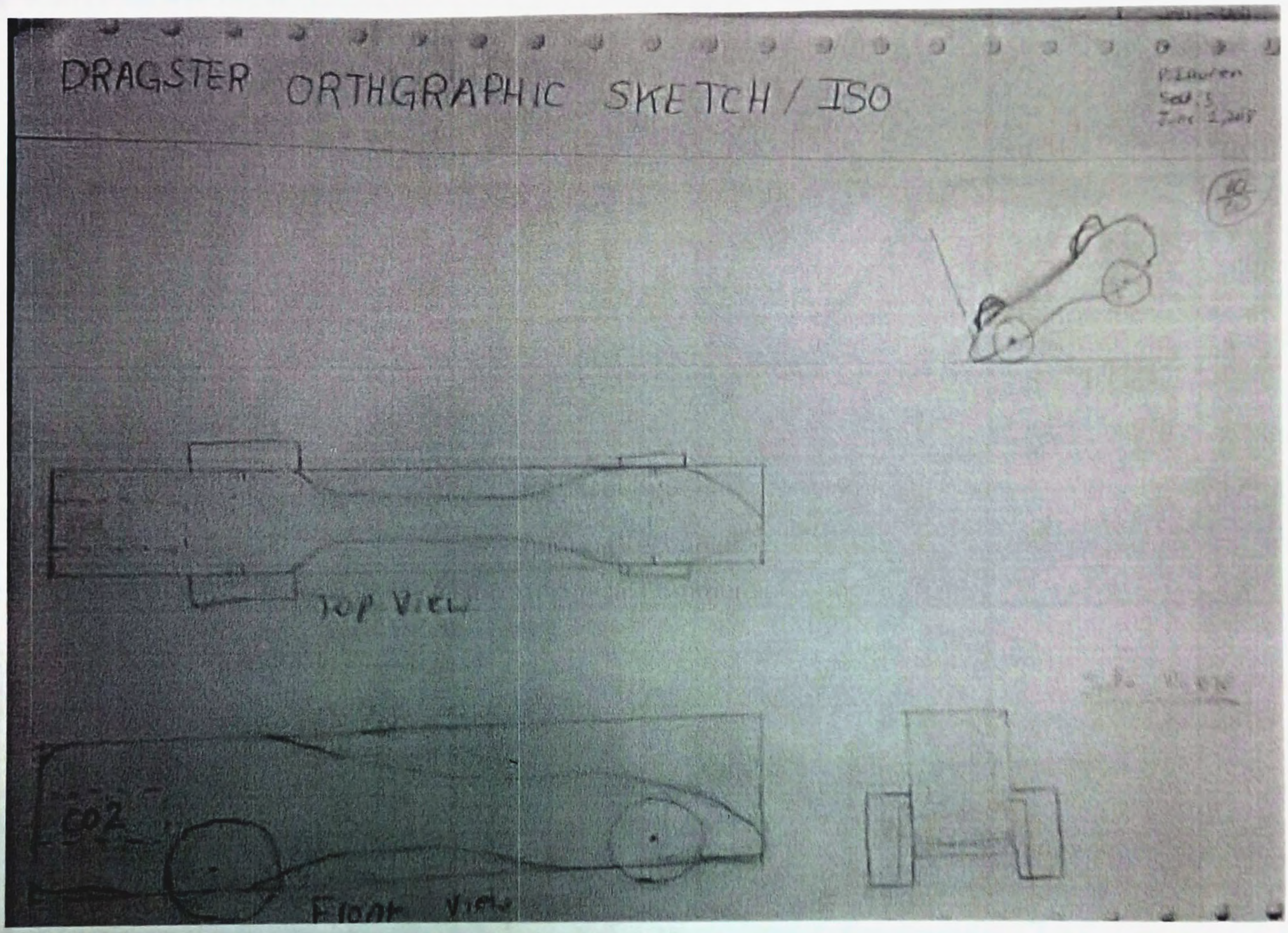
## Picture:

C. Nolan

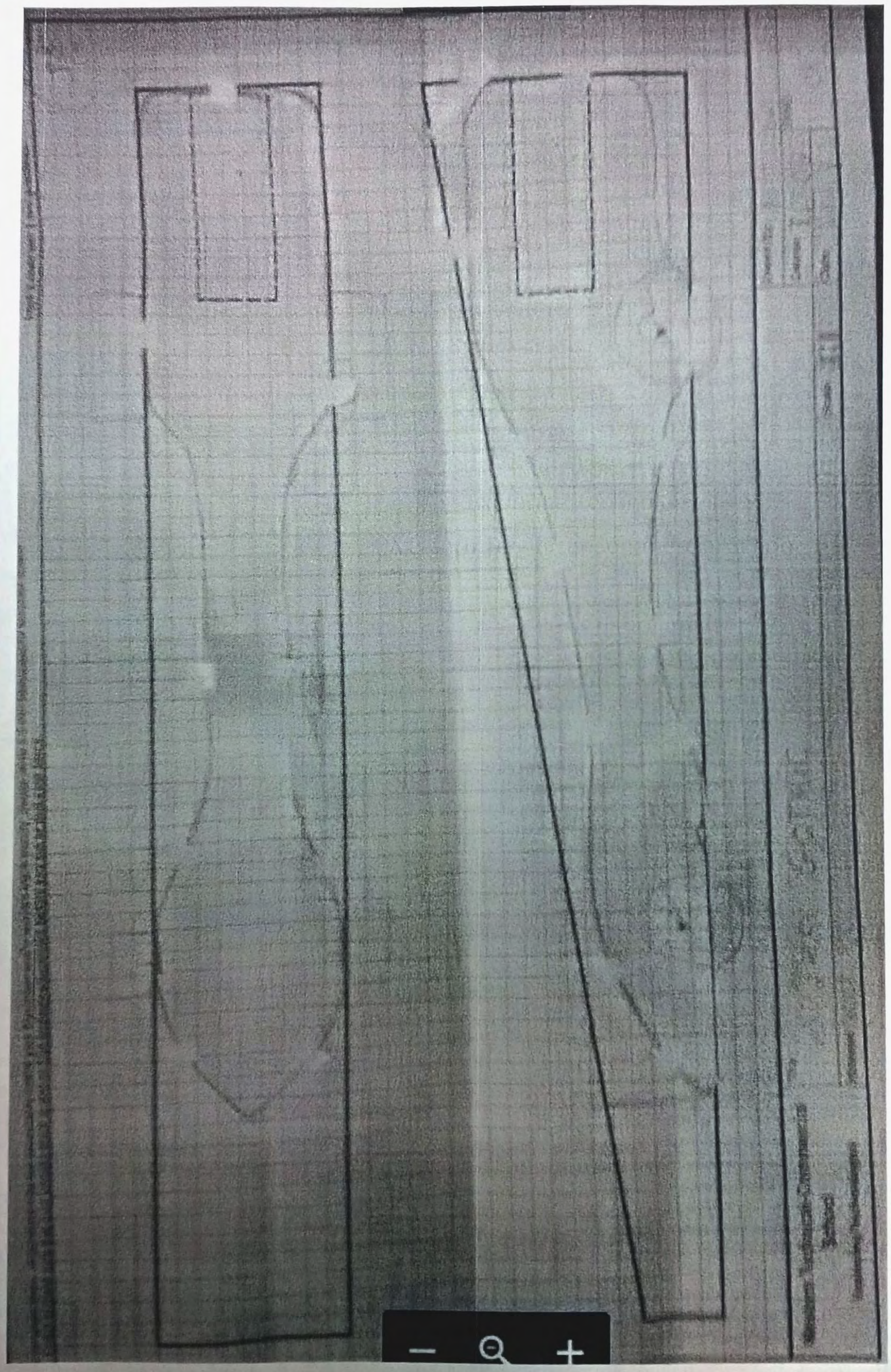
# 5 ISOMETRIC THUMBNAILS



# 1 DETAILED ORTHOGRAPHIC AND ISOGRAPHIC



# FINAL FULL SCALE



# MATERIAL, DETAILS AND COSTING SHEET

| Dragster Kit Material and Cost | |
|---|---|
| **Material Description** | **Cost $** |
| Styrofoam blanks | 1.00 |
| Basswood/balsa blanks | 5.95 |
| Front wheel | 0.50 |
| Back wheel | 0.66 |
| Brass washer | 0.08 |
| Screw eye | 0.13 |
| Steel axle | 0.21 |
| Straw for two axles | 0.10 |
| Co2 cartridge (8 grams) | 0.78 |
| Approx total | $ 9.41 |

# RECOURSE PAGE

https://en.wikipedia.org/wiki/Wheelbase

http://content.whiteboxlearning.com/application/dragster/l3/d1l0305.html

http://www.science-of-speed.com/STEM-Learning/Dragster-Glossary

Name:

Date: Section #:

# Test and Data Tracking Log Sheet

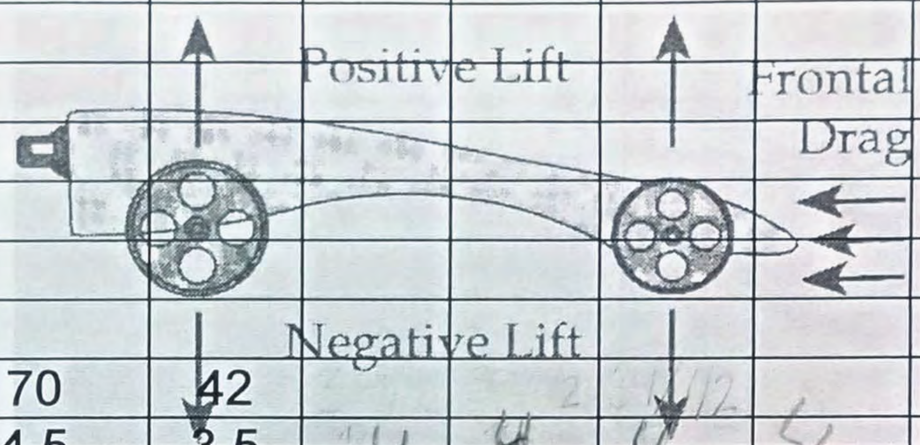
Dragster Number (section# & Att#) _____ Peer Checker N. Sebastian

Body Style (circle one) 


Front Wheel type (Plastic injection, Standard, or custom): Plastic

Rear Wheel type (Plastic injection, Standard, or custom): plastic

| Design Phase → | Limitations | | Initial Tests | | Final Tests | | |
|---|---|---|---|---|---|---|---|
| **Measurements in mm or grams or meters/sec** | Max. | Min. | 1st. | 2nd | Self | Peer | Teacher |
| Roll Test Distance | | | | | | | |
| Roll Test Off Centre to right or left | | | | | | | |
| Roll Test time for 1 meter | | | | | | | |
| Drag Force (g) | | | | | | | |
| Front Axle Force (g) | | | | | | | |
| Rear Axle Force (g) | | | | | | | |
| **Check Your Specifications** | | | | | | | |
| AXLES (length) | 70 | 42 | | | | | |
| AXLES BEARING (diameter) | 4.5 | 3.5 | 4 | 4 | 4 | 4 | |
| AXLE HOLE (diameter) | 4.5 | 3.5 | .5 | 5 | 5 | 5 | |
| AXLE HOLE (position above body bottom) | 9 | 3.5 | 5 | 5 | 5 | 5 | |
| AXLE HOLE (position from either end of body) | 100 | 9 | 63 | 63 | 63 | 63 | |
| BRASS SPACER BEARING (diameter) | 9 | 7 | 9 | 9 | 9 | 9 | |
| DRAGSTER BODY (length) | 305 | 200 | 240 | 240 | 240 | 252 | |
| DRAGSTER BODY (height at rear with wheels) | 75 | 56 | 61 | 61 | 61 | 59 | |
| DRAGSTER BODY (mass with wheels) | 170.10g | 30g | 108 | 144 | 144 | 144 | |
| DRAGSTER BODY (width at axles-front and back) | 42 | 35 | 35 | 35 | 35 | 35 | |
| POWER PLANT DEPTH OF HOLE | 51 | 51 | 51 | 51 | 51 | 51 | |
| POWER PLANT HOUSING THICKNESS (around entire housing) | | 3 | 3 | 3 | 3 | 3 | |
| POWER PLANT HOUSING (diameter) | 20 | 19 | 19 | 19 | 19 | 19 | |
| POWER PLANT C/L (from body bottom) | 35 | 31 | 32 | 32 | 32 | 32 | |
| SCREW EYE (eyelet inside diameter) | 5 | 3 | 5 | 5 | 5 | 5 | |
| SCREW EYES (2) on C/L of bottom, distance apart | 270 | 155 | 98 | 98 | 98 | 97 | |
| WHEELS, FRONT (diameter) | 37 | 32 | 33 | 33 | 33 | 35 | |
| WHEELS, FRONT (width of greatest diameter) | 5 | 2 | 4 | 4 | 4 | 2 | |
| WHEELS, REAR (diameter) | 40 | 30 | 40 | 40 | 40 | 40 | |
| WHEELS, REAR (width of greatest diameter) | 18 | 15 | 16 | 16 | 16 | 16 | |
| WHEELBASE (From font to rear axle - distance) | 270 | 105 | 147 | 147 | 147 | 147 | |




Time: start to finish = 0.855 s

# CONCLUSION

Making the dragster designs were hard because I didn't have any good ideas that I thought would work, so I went to the internet. When I was doing my Styrofoam prototype I thought it would snap in half because the material was weak but it was a lot sturdier than I thought. When I was using the large band saw I had to make sure I had full control over the Styrofoam because the blade would cut right through it easily. The sanders were also easy to use it just jolts a bit when I did the front point of my dragster. The wood good copy of the dragster was a bit harder to shape with the band saws but the sanders especially the spindle sander was very helpful when shaping the body. I found the stand for the dragster to be very helpful when painting because you can paint all of the sides at once and not have to wait for the paint to dry and do the other sides. I did a flame design at the back of my car near the CO2 cartridge all four sides and at the front. . I then put a clear coat after I finished painting.

# ✓ Check List for Project Module

Documentation and the steps you took to build the dragster is a big part of this project and very important to show. For this reason, there are two parts to hand in: the co2 dragster prototype and completed dragster design and build, and the web report showing your process. Before handing in work, check to make sure you have completed all of the required tasks:

**Related Notes/Explanations:** ↓

***Dragster Build (in project box)***

- ☑ Dragster prototype
- ☑ Finished Dragster
- ☑ All extra work and rough paperwork

***Report (Web or Paper in Order)***

- ☑ Title page with your Co2 Dragster image
- ☑ Table of contents
- ☑ New terms and their definition/explanations
- ☑ SPICE - summarizing project and your steps
- ☑ * Research – yours and 2 of your peers that you found helpful
- ☑ * 5 isometric thumbnail ideas
- ☑ * 1 detailed orthographic and isometric
- ☑ * Final full-scale front and top view drawing
- ☑ Material, details, and costing sheet using Excel
- ☑ Testing/information log tracking sheet filled out
- ☑ Resource page - where you found all of your resources
- ☑ Summary conclusion/reflection of project and learning
- ☑ This check list completed/checked off with explanations if needed
- ☑ Final self and peer evaluation done

*All due date components handed in will have the teachers initial along with a plus #, OT, or minus # showing if they were completed on time with dates on front. These positive and negatives will directly affect your mark.

# Exploring Technologies

Western Technical-Commercial School

Name: _____

Date: _____ Section #: _____

## Project Evaluation Sheet

How great was it?

Project Due: _____

Peer Marker: G. Isadore

Drag Start Build

| Activity Process and Product Steps | Total Marks | Self Mark | Peer Mark | Earned Marks |
|---|---|---|---|---|
| **Requirements Completed:**<br>1) Research paper<br>2) Sketch designs<br>3) With-in specs of TSA requirements/limitations<br>4) Spreadsheet showing materials, sizes, weight, and costs<br>5) Report, project box, logo, related information | 10 | 8 | 9 | 10 |
| **Research and Design Idea Generation:**<br>1) Research paper done, included 2 peer research papers. ✓<br>2) Dragster ISO thumbnails, ORTHO sketches, patterns, and prototypes ✓<br>3) Test and Data Tracking Log Sheet completed for better dragster<br>4) Spreadsheet- materials, sizes, weight, costs, etc. | 40 | 32 | 32 | 40 |
| **Your Final Design:**<br>1. Your final scaled orthographic drawing<br>2. Full scale top/front pattern | 10 | 10 | 10 | 10 |
| **Workmanship/Construction:**<br>1. Dragsters with-in TSA limits, well put together, and strong<br>2. Finish is smooth, colours look great, surface well done<br>3. Report well put together, in order, and complete | 20 | 15 | 17 | 20 |
| **Finished Product: Solution:**<br>1. Final product look, eye catching, aerodynamic and colourful<br>2. Portfolio completion, process all present including reflection<br>3. Position in class race ~~#~~ 1st Place out of 11 Best Legal Race time 1.066<br>4. Test and Data Tracking Log Sheet with final race place 1st Place<br>**If you had to do this project again**, what would you change or include:<br>I would clean up my flame design and make the base paint more blue ✓ | 20 | 17 | 17 | 20 |
| **Final mark:** Based on % finished, requirements, dragster design/build/finish & results | 100 | 82 | 85 | 100/100 |

Students: Total up your marks →

*Note Peer marker here **must be different** than the one in the Test and Tracking Data Sheet.

Teacher comments:

Well done! Excellent work & congrats on 1st Place in Competition!

1.075
÷ 3
1.066