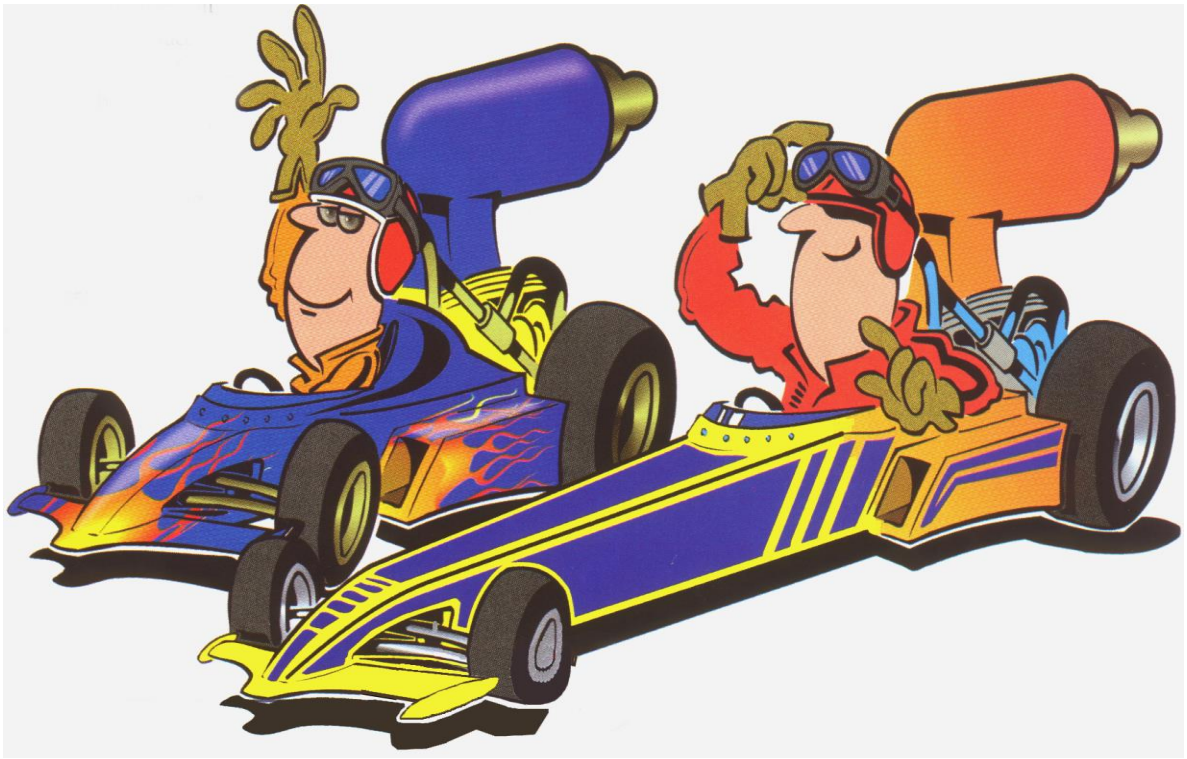
C02 Dragster Race

How Fast Can It Go!



Western Technical-Commercial School

Exploring Technologies, TIJ1O1	*School:*
Grade 9 juniors	*Course:*
Mr. Franzen	*Grade:*
michael.franzen@tel.tdsb.on.ca	*Teacher:*
www.mfranzen.ca	*E-Mail Address:*
C02 Dragster Project	*Web Address:*
	Project:

Name:

Date: Section #:

Table of Contents

Build That Dragster!

Dragster to Design, Build and Race

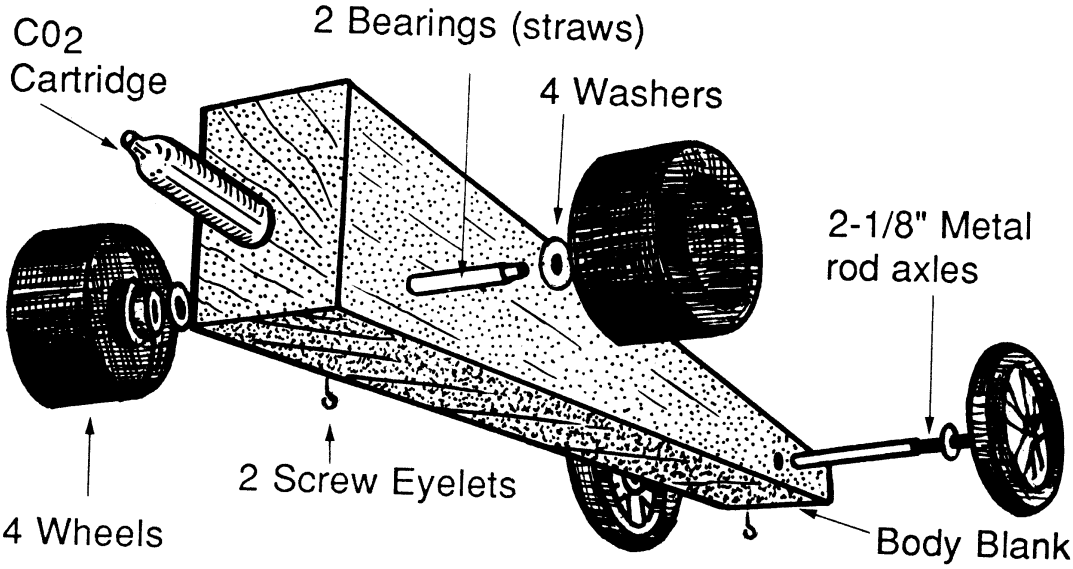
Situation:

A class of students who have been exploring different related technologies in a tech school will be finishing the course soon and looking for a final challenge to earn some heavy weighted marks by applying all that they have learned to a new project, maximize their learning, and showing off their capabilities.

The Challenge:

Using the design process, research, create 5 thumbnails, a final ortho/ISO, final full-scale drawing pattern, a prototype for testing, create your final wood design, finish with paint, add hardware, and test in a final qualified racing competition.
You will design a dragster with the given dragster rule limitations based on the Technology Students Association (TSA) Metric 500 Dragster Specifications. Marks are earned following the design process steps to design and build a competitive Co2 Dragster, completing a digital report, and racing your finished dragster to win the best time. The races will be based on the TSA Metric 500 Rules & Specs. Any competitors failing these specs will be disqualified to compete and not earn full marks. Senior peer mentor students will be leading, running, and judging the race, while the rest will be playing a supportive role/task during the competition races.

Resources:



Official dragster materials include: Styrofoam blank, a bass wood blank, molded front and rear wheels, 2 axles, 4 washers, 2 screw eyelets, and one straw are your immediate resources. Available tools and equipment in the shop will be used to design, build, and test your dragster. Competition timed raceway track will be used to race and time qualified competitors.

Tentative Due Dates:

Research _____ 5 Thumbnails _____ 1 Ortho/ISO Sketch _____ Final Top/Front _____

Prototype _____ Production _____ Finish _____ Race Day _____ Final Report _____

Project Guide

Step number 1 directly below (about your report) is to be done when time permits, with the next steps outlining what you need to do, along with checking with your teacher for feedback, to ensure you are on the right track.

1) ***G-Doc to PDF Report:*** Put together a report to include with proper title headers (TofC):

1.1. Graphic title page showing your face and your finished Co2 Dragster

1.2. Table of contents auto generated with page header titles with all pages showing a header with your logo, name, date, section, and footer with page number of total

1.3. Related topic research, plus screen captures of 2 partner's research

1.4. Five detailed isometric thumbnails and labels on landscape orientation

1.5. An orthographic sketch - 3 views: front, side, & top, in landscape orientation

1.6. Full size top and front Ortho view of final design on graph paper for template

1.7. Bill of materials, sizes and weight in the form of a (imported) spreadsheet

1.8. Page of pictures showing your finished Styrofoam prototype, rough cut out of wood, sanded down finished dragster, and finished painted dragster with all hardware

1.9. Page showing your SPICE steps details, 2-3 points per step

1.10. Test, tracking, and specs log sheet filled out with your best runs

1.11. Key terms filled out with NEW key terms or phrases you learned

1.12. Half page reflection on highlights, learning, challenges, and best accomplishments

1.13. Checklist of requirements with all steps checked off

1.14. Final self and peer SPICE evaluation completed

All above work in report to include title, name, date, and course section with digital media to also include your logo!

More on Your Research:

Here are some suggestions that may be useful to you when research needs to be done.
There are basically two types of research namely pure research and existing information search

Pure Research

<u>You are finding out things that have not been found before and therefore are not available in any books or periodicals.</u> This you do by experimentation and keeping careful notes on what you are doing. This is to make for continuity of your research on a day-to-day basis and also to prove that you actually did it and to validate your findings. Proof is usually your research notes and possibly actual products that you tested (e.g. An example of a new type of airfoil)

Existing Information Search

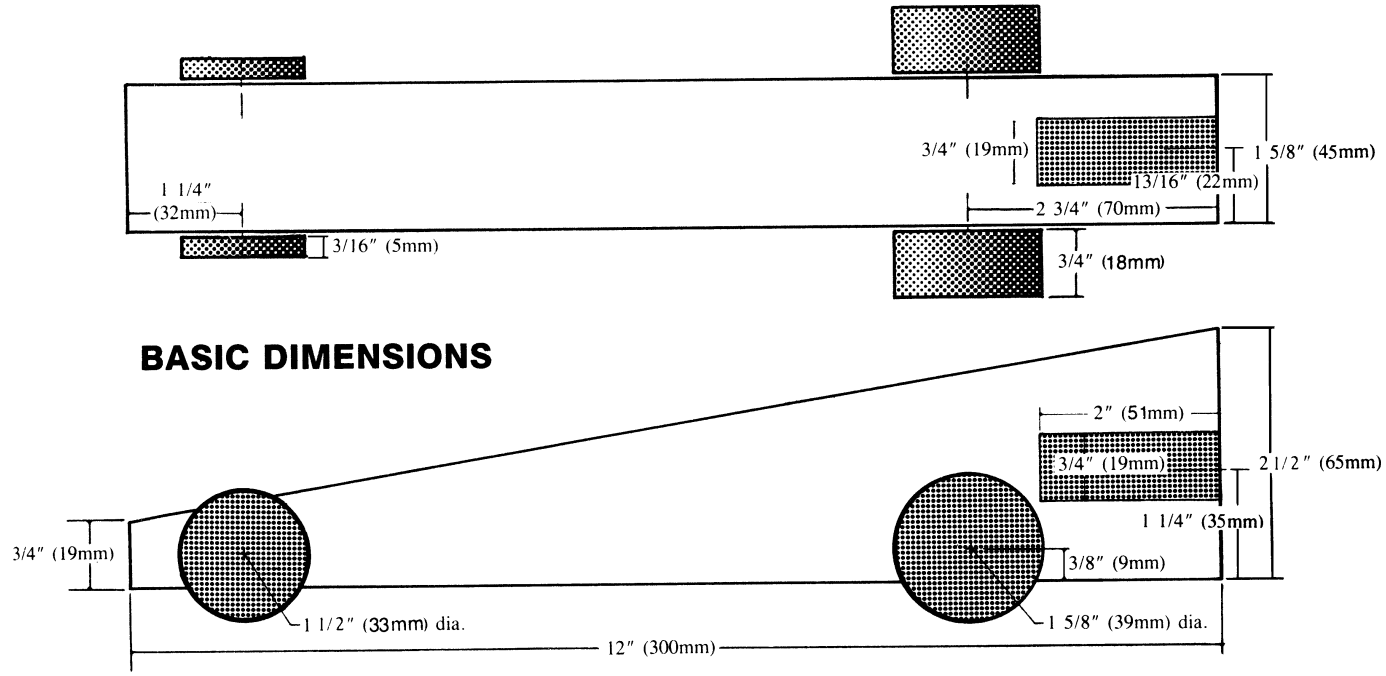
<u>This type of information, created others can usually be found in books, periodicals, newspapers etc</u>. You are allowed to use this information providing you recognize that this is not your own information. This you do by clearly indicating where you found this information. A reasonable way of doing this is in the following manner. State where you found it (Name of book, Magazine, etc. when it was published and by what organization, and who was the author of this particular article).

Possible Related Topics:

No two topics can be the same when each student signing up for your topic area to research. You will trade off with a minimum of two peers interested in your topic. Research must be a full page with about a little less than half a page of text, little less than half a page of illustration, and your resource links, with your header information and logo on top. Topics must be directed towards a specific area of the CO2 Dragster project that will help peers understand more of the technical side of this project. You will need this to put into your report, then screen capture yours to trade with two other peer researched pages.
Some main topic areas to focus in on may be:

1. Aerodynamics
2. Advanced painting
3. Wind tunnel testing
4. Advanced C02 advanced tips
5. Advanced Corel Draw techniques
6. Plastic injection moulds (wheels)
7. C02 Dragster operation
8. Competition race details
9. Low moving objects
10. Advanced wood working techniques
11. Rules to watch out for
12. Real dragsters
13. Maximizing dragster speed
14. Dragster body types
15. How to best use prototypes
16. Key to smooth running wheels
17. Best way to market your Dragster
18. Great dragster colour schemes
19. How to put a good report together
20. Research sources for the dragster
21. Dragster weight – lighter vs heavier
22. Physics of the co2 dragster
23. Common design and build mistakes
24. Crazy designs that might work & why

2. The Specs & Rules: *TSA Metric 500 Basic Dimensions and Specifications*



FACTORS	LIMITATIONS	
	MAXIMUM	MINIMUM
AXLES (diameter)	3mm	3mm
AXLES (length)	70mm	42mm
AXLES BEARING (diameter)	4.5mm	3.5mm
AXLE HOLE (diameter)	4.5mm	3.5mm
AXLE HOLE (position above body bottom)	9mm	3.5mm
AXLE HOLE (position from either end of body)	100mm	9mm
BRASS SPACER BEARING (diameter)	9mm	7mm
DRAGSTER BODY (length)	305mm	200mm
DRAGSTER BODY (height at rear with wheels)	75mm	56mm
DRAGSTER BODY (mass with wheels) *	170.10g	30g
DRAGSTER BODY (width at axles-front and back)	42mm	35mm
POWER PLANT DEPTH OF HOLE	51mm	51mm
POWER PLANT HOUSING THICKNESS (around entire housing)		3mm
POWER PLANT HOUSING (diameter)	20mm	19mm
POWER PLANT C/L (from body bottom)	35mm	31mm
SCREW EYE (eyelet inside diameter)	5mm	3mm
SCREW EYES (2) on C/L of bottom, distance apart	270mm	155mm
WHEELS, FRONT (diameter)	37mm	32mm
WHEELS, FRONT (width of greatest diameter)	5mm	2mm
WHEELS, REAR (diameter)	40mm	30mm
WHEELS, REAR (width of greatest diameter)	18mm	15mm
WHEELBASE	270mm	105mm

*Assembled without CO2 cartridge REVISED 08/1/86

2) Specifications: Study the following TSA Basic Dimensions and Specification Factors and Limitations carefully to have a clear understanding on limitations on dragster design and construction. The official TSA Metric Rules and Specs follow on the next two pages, which must be followed to qualify for the race competition. Dragster cannot be longer or wider than measurements shown.

Official TSA Metric 500 Rules & Specs Page 1 of 2

I. CONTEST PURPOSE
The Metric 500 Dragster Competition is planned to bring the best entries of each chapter together to compete for national honors.

II. ELIGIBILITY FOR ENTRY
A. Entries are limited to two (2) per chapter.
B. See "General Rules" for additional information.

III. LEVELS OF COMPETITION
Level I and Level II as described in General Rules.

IV. TIME LIMITATIONS
Contestants entry must be available at times specified in the conference program for timed runoffs.

V. SPECIFIC REGULATIONS
A. All entries must be turned in at the time designated. Each contestant will be responsible for obtaining time schedule at registration time.
B. A contestant may enter only one dragster that has been self-designed and constructed during the current AIASA year, and not previously entered in National AIASA Competitions.
C. All entries must be free of needed repair and/or maintenance at time of check-in.
D. CO_2 cartridges will be provided by AIASA.
E. Drawings
Every entry must be submitted with a metric drawing of the completed dragster. A two-view (top and side) drawing with metric dimensions shall be made either full scale on 11" x 17" or 12" x 18" paper or half scale on 8½" x 11" or 9" x 12" paper. A three view (top, side and end) drawing is acceptable, but will not change point allocations. Standard engineering procedures/practices should be followed. Drawings may be made using ink or graphite. Originals, blueprint copies will be accepted. Title block will only include "Entry Number _____," which will be assigned at registration time, and placed on entry prior to turn-in. *(See figure V.E.-1 for example of sheet layout).*

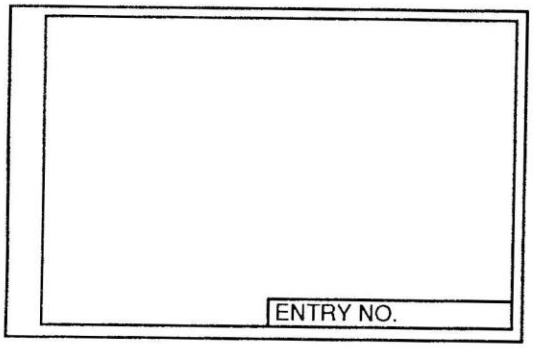


FIGURE V. E-1

F. Specifications - Body Blank and Dragster
1. Body Blank
a. Length - 305 mm
b. Front height - 20 mm
c. Rear height - 65 mm
d. Bottom to center line of power plant chamber - 33 mm
e. Body width - 42 mm
f. Power plant chamber - 20 mm diameter, 51 mm depth, and drilled parallel to bottom surface. A minimum of 3 mm thickness around entire power plant housing must be maintained on all dragsters for safety purposes. See Figure V. F1f-1

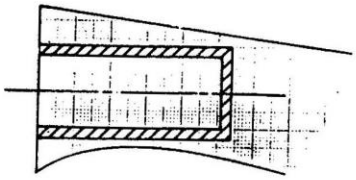


FIGURE V. F1f-1

g. The body of the model shall be one piece all-wood construction and no parts such as body strengtheners, fenders, plastic canopy, exhausts, or air foils may be glued or attached to or enclosed within the dragsters. Air foils, fenders and other appearance or designed and engineered in the original body blank. Bearings and lubricants may be used in construction.

2. Dragster	MIN	MAX
a. Axles (diameter)	3 mm	3 mm
b. Axles (length)	42 mm	70 mm
c. Axles bearing (diameter)	3.5 mm	4.5 mm
d. Axle hole (diameter)	3.5 mm	4.5 mm
e. Axle hole (position above body bottom)	3.5 mm	9 mm
f. Axle hole (position from either end of body)	9 mm	100 mm
g. Brass spacer bearing (diameter)	7 mm	9 mm
h. Dragster body (length)	200 mm	305 mm
i. Dragster body (height at rear **with** wheels)	56 mm	75 mm
j. Dragster body (mass with wheels)*	30 g	170.10 g
k. Dragster body (width at axles - front and back)	35 mm	42 mm
l. Power plant depth of hole	51 mm	51 mm
m. Power plant housing thickness (around entire housing)	3 mm	
n. Power plant housing (diameter)	19 mm	20 mm
o. Power plant C/L (from body bottom)	31 mm	35 mm
p. Screw eye (eyelet inside diameter)	3 mm	5 mm
q. Screw eyes (2) or C/L of bottom, distance apart	155 mm	270 mm
r. Wheels, front (diameter)	32 mm	37 mm
s. Wheels, front (width at greatest diameter)	2 mm	5 mm
t. Wheels, rear (diameter)	30 mm	40 mm
u. Wheels, rear (width at greatest diameter)	15 mm	18 mm
v. Wheelbase	105 mm	270 mm

*Assembled without CO_2 cartridge

G. Dragsters will be disqualified which fail to met the specifications listed in section F.
H. Wheels must be made entirely from plastic.
I. All contest entries will be judged according to the Metric 500 Rating Sheet, which includes criteria for drawing, design, race, speed, etc.
J. No repair or maintenance on entries will be allowed after entries have been registered. Any entry damaged during the race will be judged by the Contest Coordinator to determine whether or not the dragster will be allowed to race again. In the event that the dragster is damaged by conference personnel, the Contest Coordinator will make a ruling as to whether or not the dragster may be repaired by the student entering the dragster. This is the only reason a STUDENT would be allowed to touch his/her dragster after registration. Undamaged wheels which come off during the contest may be replaced as determined by the Contest Coordinator. Damaged wheels may not be replaced.

Official TSA Metric 500 Rules & Specs Page 2 of 2

VI. PROCEDURES
- A. Contestants will register with the Contest Coordinator at the time designated by the Competitive Events Coordinator. (See Conference Program.)
- B. Instructions and contest timelines provided at registration will be followed. It will be the responsibility of each contestant to obtain these for each conference.

VII. REQUIRED CONTEST PERSONNEL AND EQUIPMENT
- A. Contest Coordinator.
- B. Judges - three (3) or more per level.
- C. Two (2) persons assigned to check in and receive entries.
- D. Person assigned for security.
- E. Room - must be securable for equipment and entries. Size must accommodate an eighteen (18) meter track and equipment. Two (2) rooms optional - one per level.
- F. Tables and chairs for judges.
- G. Tables for entries (at least 6 - 2′ × 8′ tables).
- H. The length of the drag strip (track) shall be twenty (20) meters (65′ 7½″) from start gates to timer.
- I. CO_2 cartridges - two (2) per entry, plus spares are needed on site. Provided by AIASA at National Conference.

VIII. CRITERIA FOR JUDGING
- A. Contestants shall be ranked in numerical order on the basis of final score to be determined by each judge without consultation with each other. The winner will be that contestant whose total score is the highest. Other placings shall be determined in the same manner. In case of a tie, the judges shall consult each other to ascertain the winner.
- B. Ratings shall be based upon the following:
  1. Design - 6 points
     - a. Appearance - 3 points
     - b. Finish - 3 points
  2. Drawing - 20 points
     - a. Accuracy - 10 points (dragster will be compared to drawings and specifications)
     - b. Neatness - 2 points
     - c. Dimension - accuracy - 2 points
     - d. Point to point contact/dimension lines - 2 points
     - e. Line quality - 2 points
     - f. Irregular curves - 2 points
  3. Construction/craftsmanship - 14 points
  4. Race - 60 points

1st Place	60
2nd Place	56
3rd Place	52
4th Place	48
5th & 6th Place	45
7th & 8th Place	40
9 - 12	35
13 - 16	30
17 - 24	25
25 - 32	20
All others Run	10

- C. Contest Coordinator will provide a sealed packet to the competitive Events Coordinator containing the results.
- D. All judges' ratings and results are to remain confidential.

NOTE. *The top sixteen qualifiers for the double elimination bracket will be determined by the following TSA rules beginning in 1988.*

1. Points will be tallied for each dragster in the categories of design, drawing, and construction.

2. Points will be assigned for each dragster's rank in the qualifying round. See VIII B. 4 for points breakdown.

3. Points accumulated in 1 and 2 above will be added together to determine the sixteen entries with the most points.

4. The dragsters with the most accumulated points will advance to the double elimination bracket.

5. After the double elimination bracket races, final entry standings will be determined by adding together the points accumulated in the categories of design, drawing, construction and final ranking in the double elimination race.

★★NOTES REGARDING V. F2

Item 2a: Axles
Plastic axles such as delrin may be used in competition. However, design elements regarding impact, etc., should be considered when engineering the dragster.

Item 2f: Axle Hole
Axles may not be placed closer than 7 mm to either end.

Item 2h: Dragster Body (length)
Some student designers/engineers feel that shorter dragsters are faster. However, national contest results prove that length of the dragster is not generally the determining factor.

Item 2j: Dragster Body (mass with wheels)
Gross mass does not include the CO_2 cartridge.

Item 2k: Dragster Body (width at axles - front and back)
A dragster could be engineered to include a width of 42mm at the front axle and 35mm at the rear axle or vice versa or any distance between the specifications.

Item 2m: Power Plant Housing Thickness (around entire housing) Figure V. F1f-1

Item 2p: Screw Eyes
Eyelet shall be closed tightly to prevent the line from coming out of the screw eye. On very soft woods the designer/engineer may wish to reinforce the screw eye's hold in the wood with glue.

Items 2t and 2u: Rear Wheels
A dragster must have 4 wheels, two of which comply with item 2t specifications and two of which comply with item 2u specifications. The wheels may be placed in position(s) to create the effect of a 2, 3, or 4 wheel dragster.

Item 2u: Wheels, Rear (width at greatest diameter)
The specifications dictate that the wheel's surface contact is the point of measurement. See Figures VF2u-2.

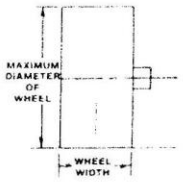


Figure VF2u-2

The wheel designs shown in VF21-3 will not be legal:

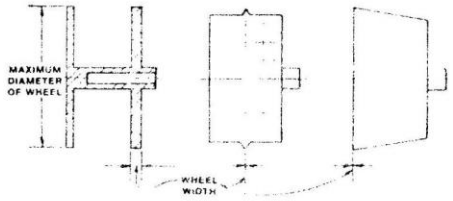
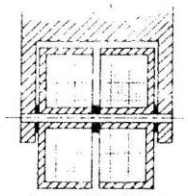


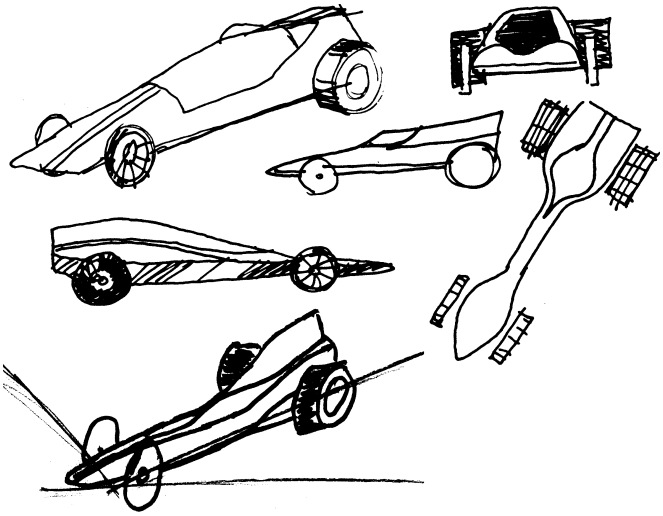
Figure VF21-3

COMMENT ON VF2a-v
Specifications now allow designs in which wheels may be located inside the car body. Example

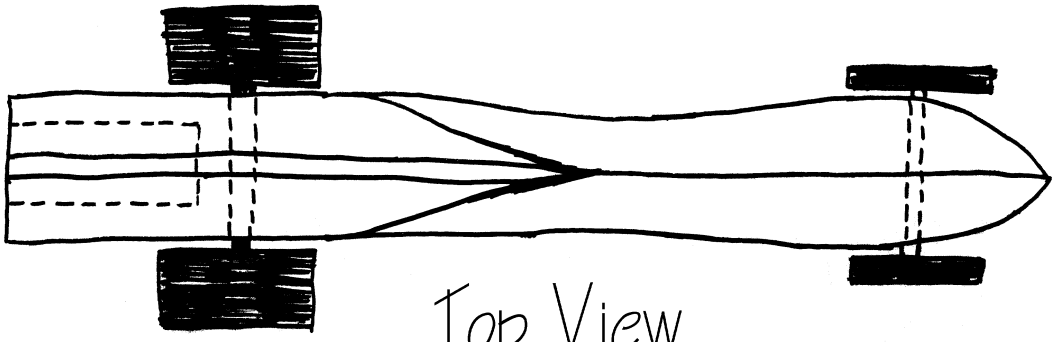


Section of Rear Wheels in front of CO_2 cartridge hole (minimum wheel width & diameter)

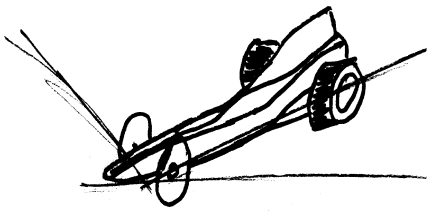
3) ***Thumbnail Sketches:*** a minimum of five detailed isometric thumbnails showing different dragster shapes, styles and sizes keeping in mind the dragster limitations set by TSA. Remember to layout your page with a header and 5 equal spaces showing each of your ideas.



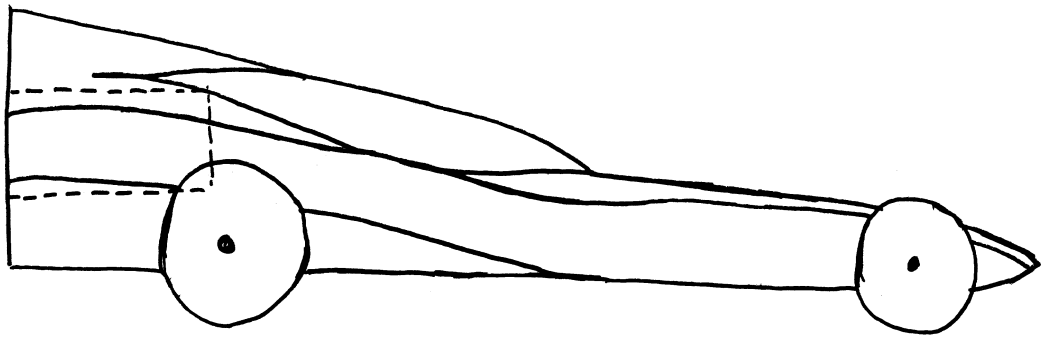
4) *Ortho Sketch:* one neat orthographic full-page, landscaped orientation drawing showing your chosen isometric thumbnail in the upper right corner. Remember these are just sketches, no ruler is allowed. Blank or graph paper may be used. Ortho views must be aligned and use hidden lines to show hidden features such as axels and CO2 hole opening.



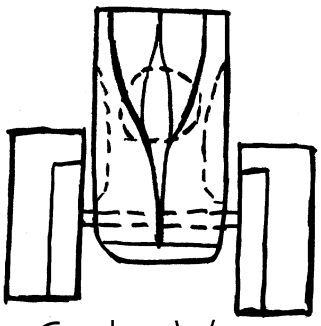
Top View



Thumbnail Idea

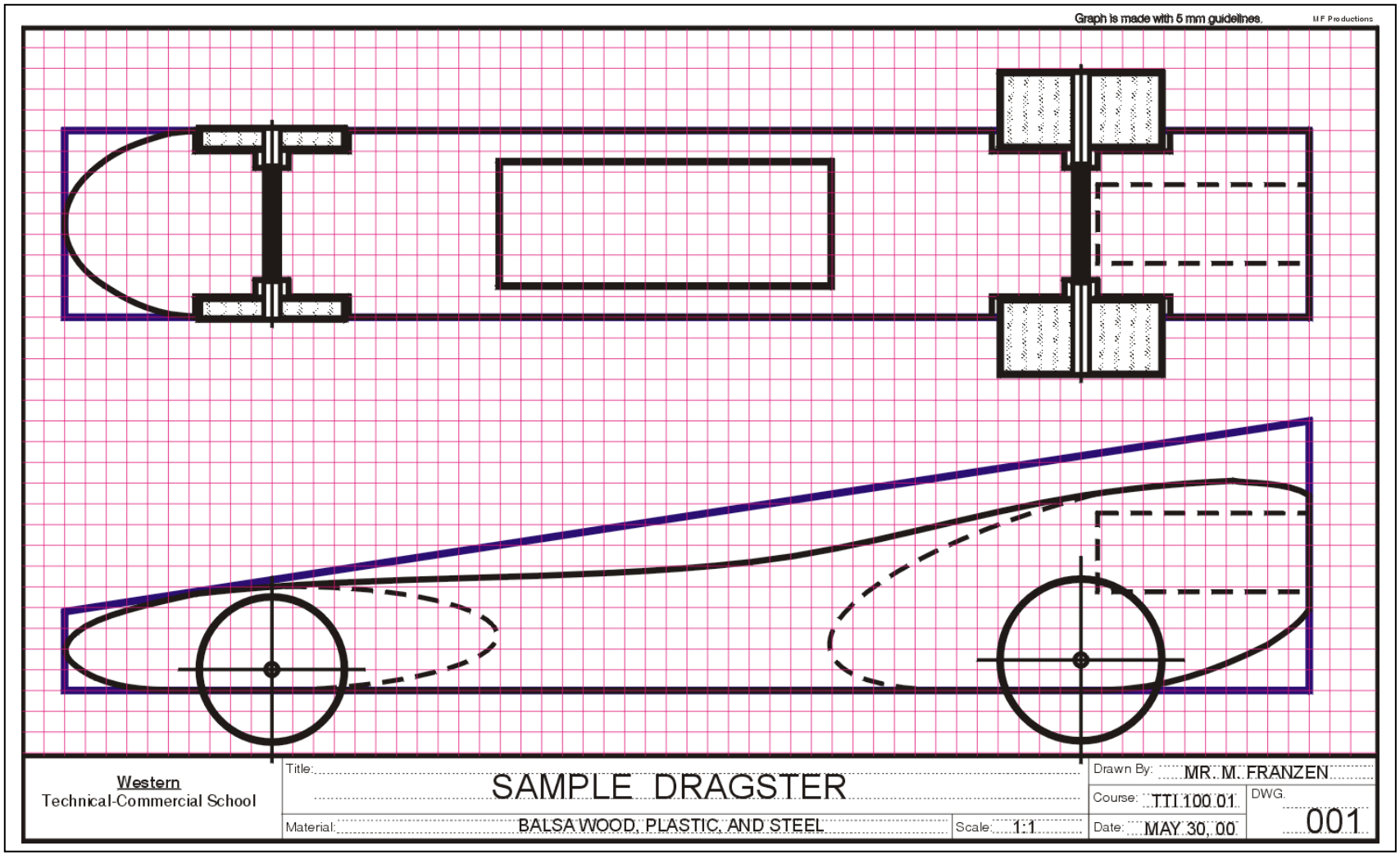


Front View

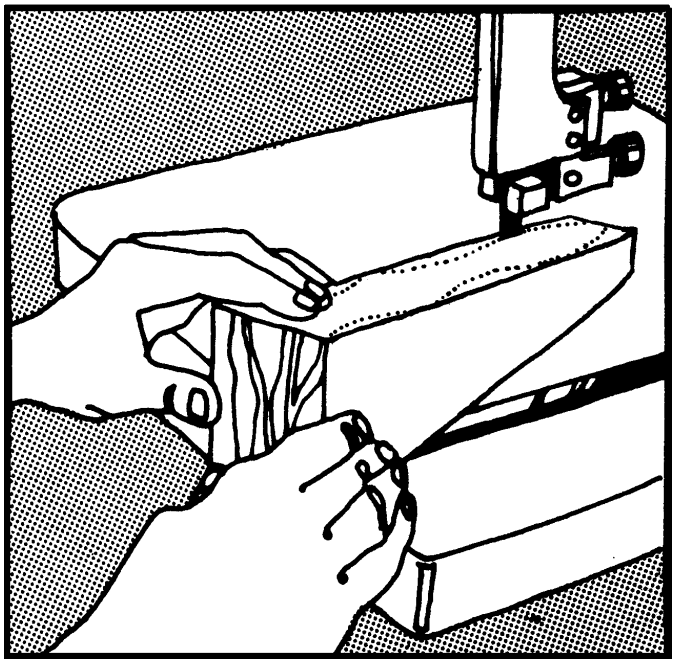


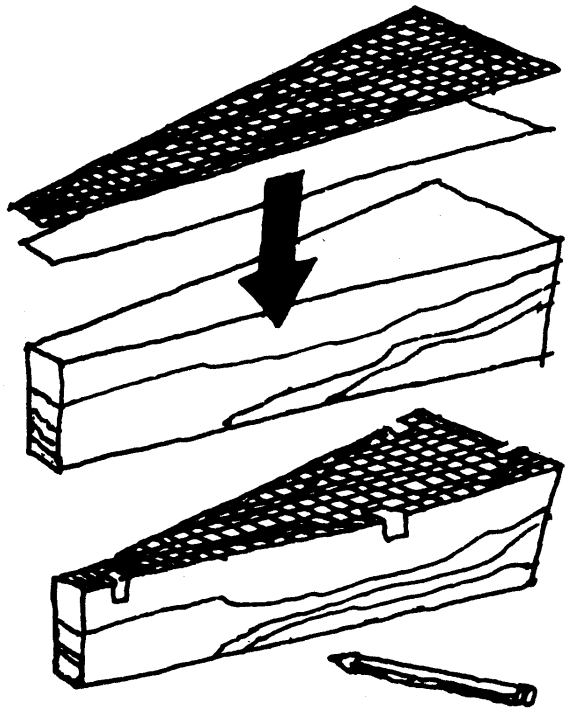
Side View

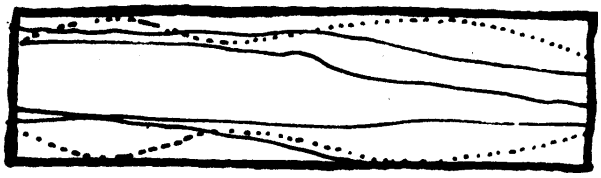
5) ***Finished Drawing:*** Make a top and front view ortho drawing showing your final "working" design. This will be used as a template for your prototype and possibly also for your final wood build. Be aware that you may want to make design changes as you further develop and test your prototype, as you rarely will have your final design the first time.



6) ***Styrofoam Prototype:*** Using your top and front view template you can then transfer your working design pattern to the Styrofoam blank to create a working prototype. This will help you visualize and test for possible improvements and modifications. You must have at least one Styrofoam prototype showing final shape and size with accommodating orthographic drawing showing top and front orthographic view, either on the computer or on graph paper.







a) <u>Points to Consider:</u>

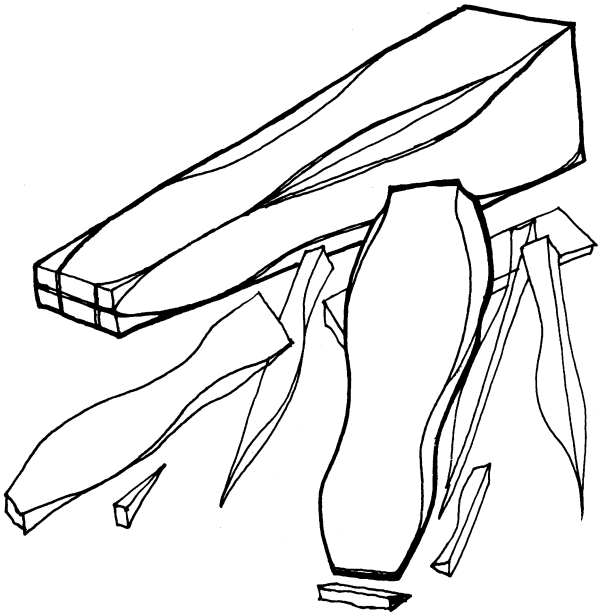
i) Double check that your front and rear axle are with-in the limitations set by TSA

ii) Check your C02 housing hole thickness in order to safely launch Dragster (3mm minimum).

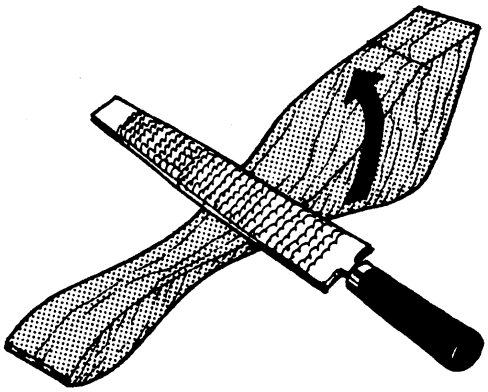
iii) **Drill your axle holes first** prior to cutting out vehicle in order to keep them straight – drill press will give you perfect perpendicular to length of dragster, as you start with a squared off/aligned block

iv) Transfer the pattern with the least number of curves, usually the front ortho view, onto the Styrofoam blank and cut out, then transfer the other ortho view pattern to finish, usually the top view to cut.

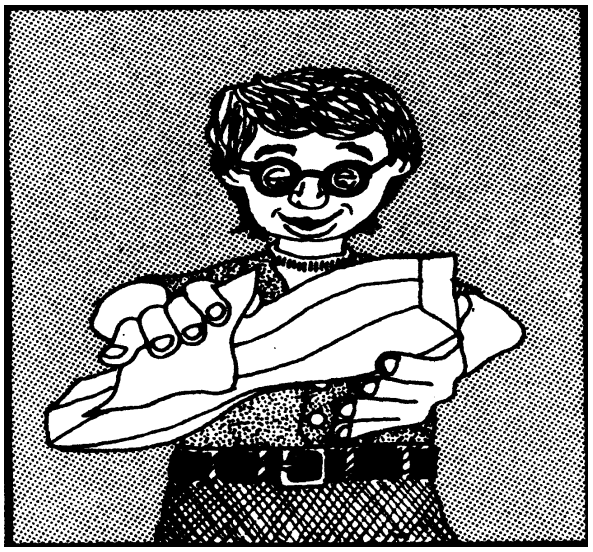
v) Finalize cutout roughed shape with the rasp, then finer file, then sandpaper 60 grit down to working finished design drawn earlier.



7) ***Wood Final Production:*** Once you have a prototype "working design" that you feel will work, take your latest top and front view orthographic template design and cut out your wooden dragster. Keep in mind the steps you followed to cut out the Styrofoam prototype. Remember measure twice, cut once! Sand down to a smooth finish to prepare for a final paint, stain/clear coat finish.



8) ***Finishing Vehicle:*** body with a primer and coloured paint, or natural with or without a stain including a minimum of two-three coats of clear coat (Varathane). Spray paint (done at home) may be used after the base colour coat has been put on. Advanced painting techniques may be done if time permits. Your 1" racing number and logo is to be either painted, print and stick/clear tape, or use-coloured markers on it, to identify your vehicle quickly and easily. Allow at least three days to complete painting process with night drying/next day sanding recommended (a great time to finish dragster report). A nice finish is to paint the spokes of wheels to compliment your colour scheme.



9) ***Testing Vehicle:*** to be done after the dragster is put together with its hardware and record test results in the Test and Data Tracking Log. Several tests can be done including the following:

a) **Weight Test:** Use digital scale get exact grams with all hardware installed

b) **Ramp Test**

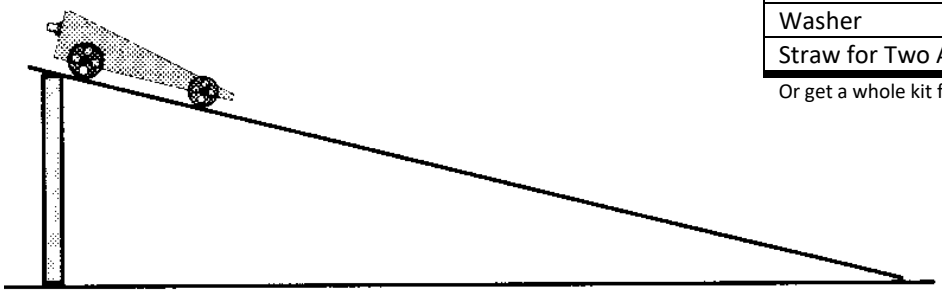
i) The degree of friction in the axles and bearings by recording distance traveled, a little "tweaking" may help to get better times, therefore faster dragster

ii) How straight the wheels are aligned and how far off centre at 1 meter from edge of ramp

iii) Time it takes to get to the 1-meter mark

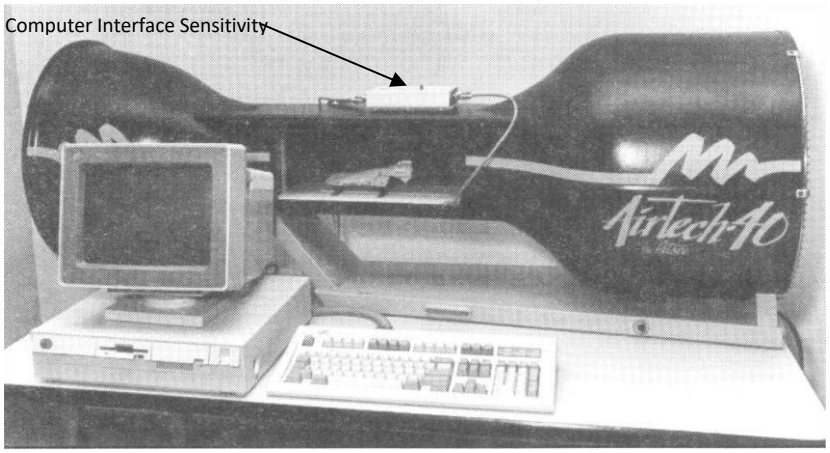
Dragster Kit Material and Cost Break-Down	
Material Description	**Cost in $**
Styrofoam Blanks	1.70
Basswood Blanks	7.00
C02 Cartridge	1.08
Front Wheel	0.47
Rear Wheel	0.56
Brass Washer	0.08
Screw Eye	0.24
Steel Axle	0.25
Washer	0.05
Straw for Two Axles	0.10

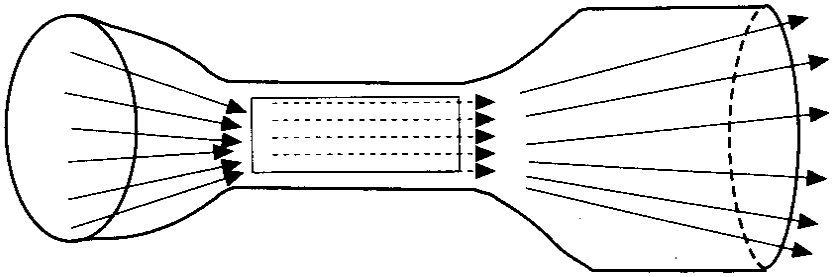
Or get a whole kit for $10.95 (no Styrofoam though)

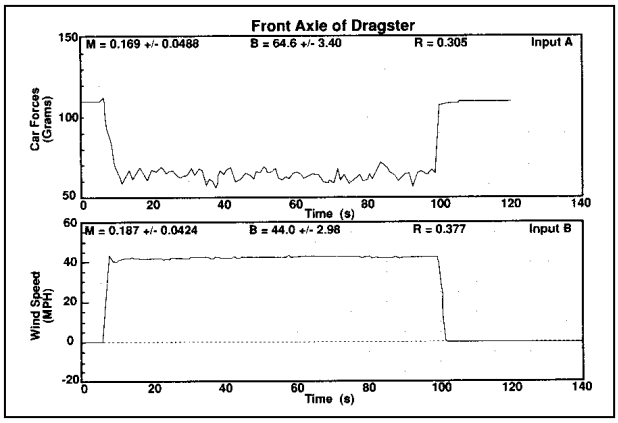


c) **Wind tunnel Test:** It is important to be familiar with the Airtech 40ic wind tunnel system before using. A manual is located beside unit so that you may follow instructions on proper use. Normally wind speed, drag, front axle and rear axle force will be already calibrated and ready to use. If wind speed measured is not around 40 miles per hour, the computer interface sensitivity adjustment has been tampered with. To get accurate readings it may be necessary to re-calibrate all of the elements. The moral of the story is DO NOT TOUCH THE COMPUTER INTERFACE SENSITIVITY DIAL The following four forces should be measured and recorded

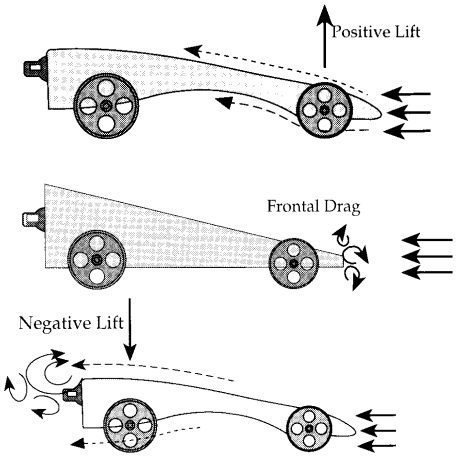
(1) Wind Speed
(2) Drag Force
(3) Front Axle Force
(4) Rear Axle Force







d) It is a good idea to get a real time graph showing the different elements that you want to observe, and then print up the graph.



10) ***The Race:*** Once this is complete you are ready to race your dragster. The race will start by racing each dragster individually. Each dragster will be given a rank according to speeds ranging from fastest to slowest times Test and Data Tracking Sheet must have a different peer marker than the final evaluation sheet.

If you are not sure of how a certain process is done, please ask for assistance!

***Remember to check with teacher after each step!**

Name:

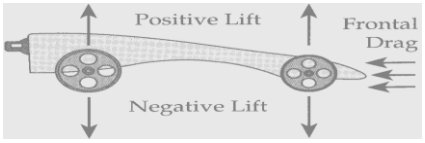
Date: Section #

Racing Terms that are Nice to Know (for your own info)

- A Bone: A Model A Ford
- Back Off: Reduce or slacken speed or power.
- Bad News: Dragster that performs well thus "bad news to the competition.
- Big Bangers: Cars with engines of large cylinder displacement.
- Big Wienle: Winning driver in drag races.
- Bite: Traction of tires on the racing strip.
- Blow: Failure of the engine.
- Boondocks: Off the course. "He headed for the boondocks."
- Boots: Tires.
- Bore: Diameter of an engine's cylinders.
- Broke: Washed out of a drag meet because of vehicle failure. Out of competition.
- Carry the Wheels: Doing a wheel stand (Wheelie).
- Christmas Tree: Drag strip starting light.
- Cornering: Good cornering is when the car holds the road firmly without swaying or leaning noticeably.
- Cutoff Point: The physical location on the track, before each corner, where the driver takes his foot off the throttle and puts it hard on the brakes; subject to the adjustment according to brake performance and intensity of competition.
- Deuce: A 1932 Ford. Still an ideal stock car for converting into a street dragster.
- Dicing: (British) Close, exciting and highly competitive driving. Drag or Dragging: A race to get to the fastest possible speed per hour over a quarter mile distance.
- D-Ring: The pull ring (or handle) for opening the safety chute at the end of the drag run.
- Drop the Hammer: To engage the clutch very rapidly at the start of the race.
- Elapsed Time: The total time it takes to drive the quarter mile. Given in seconds and fractions of seconds.
- Eliminated: Out of the meet; beaten.
- Flat Out: Full speed; straining to reach the maximum possible.
- Foul: To leave the starting line before getting the green light and so getting the red "foul" light.
- Four On the Floor: Stick shift for transmission with four forward gears.
- Full Bore: Full speed; wide-open throttle.
- Goodies: Fancy body ornaments on a customized car.
- Gran Turismo: (Italian) Closed two-seat coupe designed for rapid, comfortable touring with good performance and handling.
- Grease Monkey: Garage or auto shop employee who does unskilled work. Good appren-ticeship for a would-be mechanic.
- Hack: A hot rod.
- Hairpin: Acute corner on road racing circuit.
- Handier: Drag race driver.
- Hauler: Extremely fast car.
- Honker: Extremely fast car.
- Hot Dog: (1) Said to be main diet of drag fraternity; (2) to show off; a winning driver.
- Hot Shoe: A fast capable driver.
- Injected: Engine with fuel injection.
- Juice: Fuel specifically blended for race cars.
- Lunched an Engine: An engine completely destroyed or failing completely during a race.
- Match Race: Race in which winner must take two out of three drag runs (or three out of five).
- Mickey Mouse Circuit: Small, winding, race circuit.
- Moon: Hubcap. Nerf Bar: Bumper.
- Off the Line: Actual start of the race.
- Pace Car: Vehicle used to pace race cars at flying start.
- Pin striping: Painting narrow stripes at handles and other parts of car's body.
- Pipes: Fancy exhaust system.
- Roll bar: Bar firmly installed on racing vehicles to protect driver in case the car rolls over.
- Screamer: A hot rod.
- Shaving: Removing body trim preliminary to customizing
- Sleeper: Car with more horsepower and getaway than you would expect by just glancing at it.
- Slick: Oversized tire for better traction. Usually wide and flattened where it contacts the road surface.
- Stand on It: (1) To step all the way down on the throttle pedal. (2) To race aggressively.
- Stock Car: A drag racing class. Top: Top Eliminator.
- Zoomies: Exhaust headers on a dragster that sweeps upward, thus directing smoke and heat away from vehicle and driver.

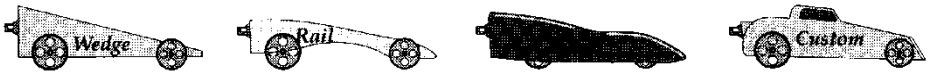
Name:

Date: Section #



Test and Data Tracking Log Sheet

Dragster Number_____ Peer Checker _____

Body Style (circle closest one) 

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

Rear Wheel type (Plastic injection, Standard, custom): _____

Below, fill in your actual specs recorded:

Design Phase →	Limitations		Initial Tests		Final Tests		
Measurements in mm, grams, or meters/sec	Max.	Min.	1st	2nd	3rd Self	1st 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					
AXLE HOLE (diameter)	4.5	3.5					
AXLE HOLE (position above body bottom)	9	3.5					
AXLE HOLE (position from either end of body)	100	9					
BRASS SPACER BEARING (diameter)	9	7					
DRAGSTER BODY (length)	305	200					
DRAGSTER BODY (height at rear with wheels)	75	56					
DRAGSTER BODY (mass with wheels) *	170.10g	30g					
DRAGSTER BODY (width at axles-front and back)	42	35					
POWER PLANT DEPTH OF HOLE	51	51					
POWER PLANT HOUSING THICKNESS (around entire housing)	---	3					
POWER PLANT HOUSING (diameter)	20	19					
POWER PLANT C/L (from body bottom)	35	31					
SCREW EYE (eyelet inside diameter)	5	3					
SCREW EYES (2) on C/L of bottom, distance apart	270	155					
WHEELS, FRONT (diameter)	37	32					
WHEELS, FRONT (width of greatest diameter)	5	2					
WHEELS, REAR (diameter)	40	30					
WHEELS, REAR (width of greatest diameter)	18	15					
WHEELBASE	270	105					

Name:

Date: Section #

Index of Key Terms and Phrases:

Find ten new key terms or phrases, their definition/explanation, and include the page number in the table below:

	New Key Terms or Phrases	**Definition/explanation**	**From Page #**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Name:

Date: Section #

Check List for G-Doc to PDF Project Report

Build your report using Google doc, then convert to PDF and combine this completed PDF (Highlighting, notes, etc.).
Prior to handing in Report, go through and double check instructions, review steps, and check off ✓ ☑ ☐ the following, if done:

↓ **Related Notes:**

1. ☐ Report title page with you and your Co2 dragster
2. ☐ Table of contents with all pages including header/logo and footer
3. ☐ * Researched pages – your original and 2 of your peer's screen captured JPG's
4. ☐ * Picture of your five isometric thumbnail ideas,
5. ☐ * Picture of your orthographic 3 view with isometric sketch
6. ☐ * Picture of your final full-scale front and top ortho view drawing
7. ☐ Table/sheet, showing of ALL your Parts/materials, Amount/number, & ~cost
8. ☐ Full page of pics showing your prototype, wood cut out, sanded, & finished steps
9. ☐ SPICE step breakdown with 2-3 points per step what you did
10. ☐ Reflection page of project highlights, learning, challenges, & accomplishments

---

11. ☐ This PDF doc with highlighting, notes and Key terms filled out
12. ☐ PDF Test and Data Tracking sheet filled in with **your** test and specs
13. ☐ PDF Check list showing items completed and checked off
14. ☐ PDF Final self and peer SPICE evaluation completed

*You are responsible to get the teachers initial with a plus #, OT, or minus # showing if they were completed Early, On-time, or Late based on due dates. These positive and negatives will directly affect your mark, so plan ahead.

Exploring Technologies

Name:

Western Technical-Commercial School

Date: Section #

Build a Dragster

SPICE/Project Evaluation Sheet

Project Due: _____

How great and fast was it? Peer Marker: _____

Note: Peer marker to be different than in Test and Tracking Data Sheet.

SPICE Process and Product Looking at your Dragster design, build quality, looks, race time, and report.	Total Marks	Self Mark	Peer Mark	Earned Marks
Situation: 1) Understanding the background and circumstances prior to project start	5			
Problem/Challenge: 1) Looking at what is to be done, filling in key terms, looking at requirements 2) Noting timelines, due dates, and resources available	5			
Ideas/Investigation: 1) Research, notes, diagrams, illustrations, etc. 2) Dragster isometric thumbnails 3) Bill of Material, supplies, amounts, sizes, and weight etc.	20			
Create/Construct: 1. Sketched final idea - ortho with isometric 2. Final full scaled top/front view pattern 3. Prototype build process and testing 4. Wood build process, quality, 5. Finish, race number & logo, installed hardware 6. Wood testing and specs	50			
Evaluation: 1. Final look, eye catching, aerodynamic, great colours, # & Logo 2. PDF Report completion, all process shown, including reflection 3. Qualified specs and race 4. Race car # in class races _____Best Legal time_____ 5. Test and Data Tracking Log Sheet - final race place _____ If you had to do this project again, what would you change or include: _____ _____ _____	20			
Final mark: Students: Total up your marks → (Based on % finished and completion of the problem requirements)	**100**			