



**9/10 Tech Ed UNIT PLAN  
CO2 DRAGSTER**

## **CO2 Dragster Unit**

### **Overview**

The Co2 dragster unit is an introduction for grade 9/10 students to many new and different concepts and challenges. The goal of the unit is to allow students apply concepts from physics with real world application. Furthermore, the students will also learn new skills and techniques involved in the construction of the project.

The unit will comprise of four main areas; theory of physics involved with dragster, design of vehicle, construction of vehicle, and racing of vehicle. Students will work with a partner for the unit.

Concepts from math and physics will be employed during the dragster unit. They include measurement, multiplication and division, use of formulas, graphing and estimation. This activity allows students to use academic concepts in a "real world" situation.

The design process is a major component of the Co2 dragster unit. The design process will help the students understand the relationship between friction, drag and weight. Moreover, consideration of the materials used for construction of the vehicle will allow student to reflect on the sustainability and environmental impact of their use throughout the design process. The students will conduct their own research and analyze the information to select the best design for their own vehicle. The student will be required to create a booklet containing the applied science of the design along with a portfolio of sketches and drawings showing the development of the dragster's final form. The design of this vehicle is not a linear process, it is expected that many revisions to the design will occur. Thus, each student's dragster will have a different form that is based upon their design envelope.

CO2 dragsters must be built to certain specifications to avoid interference with the propulsion system, wheel placement, launch system, guidance system, as well as the prevention of failure or destruction during testing. During the construction the students will learn to use many tools, machines, safety equipment, and identify the potential safety hazards associated with them.

Finally the testing of the dragsters, the vehicle are propelled down a track by compressed Carbon Dioxide gas. The CO2 cartridge is punctured so the gas can rapidly leave the canister causing the dragster to move. The dragster is guided down the track by fishing line or wire. Track length is approximately 40 feet. The process of testing the dragsters will allow the students to compare and analyze the different designs for success and needed improvements. It is intended that a dialog between students will help further the design of the dragsters and improve results on the drag strip.

## CO2 Dragster Unit

### IRP Guidelines

The ☑ indicates that the CO2 Dragster Unit meets that proscribed learning outcome set out in the IRP

### Grade 9 - Energy and Power

#### PRESCRIBED LEARNING OUTCOMES

*It is expected that students will:*

- ☑ Explain how systems convert [potential energy](#) to [kinetic energy](#), and assess their environmental and social implications
- ☑ Construct devices that convert and transmit various forms of energy
- ☑ Describe alternative sources of energy
- ☑ Incorporate selected devices in the design of energy transmission and conversion systems

### Grade 9 – Production

#### PRESCRIBED LEARNING OUTCOMES

*It is expected that students will:*

- ☑ Use a [design process](#) to modify products to improve their appearance, usefulness, and function
- ☑ Select and safely use hand and power tools in the manufacture of products
- ☑ Demonstrate safe work habits when using tools, equipment, and technical processes, and encourage the same in others

## CO2 Dragster Unit

### Student Objectives

At the completion of this activity the students will be able to:

- ☑ Demonstrate an understanding for the design process
- ☑ Explain the role of trouble shooting, research and experimentation with regards to design
- ☑ Explain the reasoning behind their design
- ☑ Explain how the CO2 Dragster converts [potential energy](#) to [kinetic energy](#)
- ☑ Build a co2 car according to specifications
- ☑ Explain the correlation between weight and speed
- ☑ Explain the importance of wheel Alignment
- ☑ Explain the impact of "drag" and how it relates to efficiency and speed
- ☑ Safely use the hand and power tools involved in building the co2 car
- ☑ Demonstrate safe work habits when using tools, equipment, and technical processes, and encourage the same in others
- ☑ Calculate speed in MPH and KPH
- ☑ Demonstrate an understanding of Newton's Law
- ☑ Accurately use measuring tools to determine weight and distance traveled
- ☑ Identify how this information related to improving the efficiency and speed of automobiles
- ☑ Describe alternative sources of energy

## **Introduction:**

An important consideration in designing a vehicle is **aerodynamics**. Aerodynamics is the effect of airflow and the forces involved when an object moves through the air or when air moves past an object. Aerodynamics has taken on new importance since the need for more fuel-efficient vehicles. A poorly designed vehicle uses more fuel. The flow of air moving around a vehicle is called **streamline**. A body with an overall rounded or square shape will cause air to break away from the streamline into swirls of air. This uneven or turbulent air movement that will slow the vehicle down is called **drag**. Vehicles have less resistance if they are rounded

in the front and tapered off to a point in the rear (**teardrop shape**). In this activity, you will design, construct, and test an aerodynamically sound vehicle. The car you will be building is like a miniature rocket powered dragster. As you build your dragster, take your time. It will have a better chance of looking good and going fast if you build it with patience and care. One major mistake can ruin the whole dragster and disqualify you from racing. Take pride in your work and try to make the best dragster in the class.

## **Problem:**

You are an automotive design engineer in the research and development department of the ACDS Automotive Company. You have been assigned the task of designing the new, fuel efficient, aerodynamically sound, stylish, and futuristic automobile for the company. You will be in charge of the designing, constructing, and testing of the new vehicle. All cars in the company will be compared for excellence in design, craftsmanship, aerodynamics, and the fastest racing time.

## **Research:**

You will be given class time to use the Internet to search for information about CO2 dragsters. You must show documentation of your research, along with the web addresses used.

## **Design Criteria:**

The dragster needs to travel down the track while being propelled by a CO2 cartridge. It must be held and launched by the teacher using an eye hook to position the dragster and the launching apparatus to puncture the CO2 cartridge. The dragster can be any shape as long as it is carved from the given blanks and meets the weight requirements. The design should reflect the research that has been done in regards to aerodynamics and mechanical function.

**Materials/Supplies:**

- 1/4" graph paper
- masking tape
- sandpaper
- soda straw
- 2 axles
- 4 washers
- 5/8" x 2-3/4" x 12" basswood block
- 2 rear wheels
- 2 front wheels
- 5/8" x 2-3/4" x 12" Styrofoam block
- 2 1/8" screw eyes
- CO<sub>2</sub> cartridges

**Tools/Equipment:**

- scissors
- wood rasp/file
- band saw/scroll saw
- disc sander
- drill press

**Reference:**

**[http://en.wikipedia.org/wiki/CO2\\_dragster](http://en.wikipedia.org/wiki/CO2_dragster)**

**[http://closure.trainingo2.net/mobiletopic.php?s=CO2\\_dragster](http://closure.trainingo2.net/mobiletopic.php?s=CO2_dragster)**

### Production Procedure:

1. Develop several thumbnail sketches. You should not just rely on one design at this point. **Develop at least forty (40) different designs.** Be creative. Don't be afraid to experiment with some far out designs. **Thumbnails are little, not much detail, quick sketches to give you ideas.**
2. Look over the thumbnails and choose the **best three (3) ideas.** Sketch these ideas a little larger, with more detail, and from several angles or views.
3. Using AutoSketch, neatly draw your dragster exact size and detail using the 1/4" template located in your student folder. **(Remember to <SAVE AS> the document in your student folder when you first begin and <SAVE> the document often while you work.)** This final drawing will be used as the pattern to cut out your dragster. Be sure to show the location of the axle holes.
4. Take your thumbnails, rough sketch, and final drawing to the teacher to have them approved. **(Teacher Signature: \_\_\_\_\_ )**

### Comments:

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5. Carefully cut out the top and side views of your car from the graph paper.
6. Tape the templates on your wooden block and trace around them with a pencil. Be sure to locate and mark the axle holes and engine housing. (Note: Tape the top view template to the bottom of the wooden block.
7. Drill the axle holes (3/16") on the drill press being very careful to keep them straight and parallel to each other. They should be 1/4" from the bottom of the car.
8. Cut the side view first using the band saw. Then, cut the top view, which you traced, on the bottom of the block. Be *very* careful not to cut into the engine housing.

9. Shape the body using a wood rasp, file, Dremel Tool, and sandpaper.
10. Finish smoothing the car using finer and finer grit sandpaper.
11. Take your car home and apply spray paint and/or decals (**optional**).
12. Cut two pieces of soda straw 1-5/8" long for bearings. Insert one straw through the front axle hole and the other through the rear axle hole.
13. Insert axles through the straws.
14. Place washers on each end of the axles.
15. Carefully place the wheels on the axles. Be careful not to break the wheels. If the wheel does not stay on place a drop of hot-melt glue in the wheel before placing it on the axle.
16. Install the screw eyes about 3/4" to 1-1/2" from each end of the body. They screw into the bottom of the car. Be sure that they are centered down the middle of the vehicle.
17. Take the completed CO2 car to your teacher for evaluation.

**Comments:**

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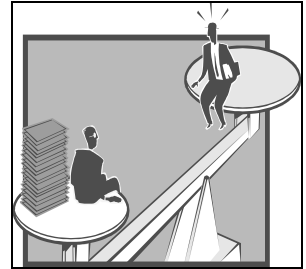
# CO2 Dragster Unit

## Design Testing

### Weight:

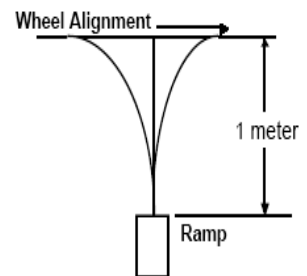
The heavier a dragster is, the slower it will travel. The weight of the dragster will be the most important factor in determining how well it will perform in the real race. Use the scale near the wind tunnel to record the weight of your car to the nearest gram.

WEIGHT: \_\_\_\_\_ grams



### Wheel Alignment:

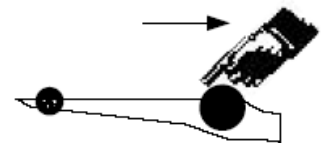
If the wheel alignment of a dragster causes it to veer sideways, it will create friction between the tires and the track and friction between the string and the "screw eye". Friction will cause the dragster to slow. We can measure the wheel alignment of dragsters by rolling them down a short ramp, and measuring how far it veers to the side on a one meter run.



WHEEL ALIGNMENT: #1: \_\_\_\_ #2: \_\_\_\_ #3: \_\_\_\_ Average: \_\_\_\_mm

### Wheel spin:

If the wheels on a dragster are wobbly or if they stick, it will slow the dragster down. To measure the wheel spin of a dragster, turn it over and spin each wheel in turn with your finger. Time how long each wheel spins using a stop watch.

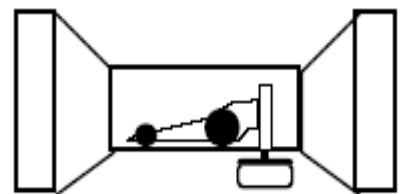


Back Wheels #1: \_\_\_\_ #2: \_\_\_\_ #3: \_\_\_\_ average \_\_\_\_

Front Wheels #1: \_\_\_\_ #2: \_\_\_\_ #3: \_\_\_\_ average \_\_\_\_

### Wind Tunnel:

If the air gets "caught" on your car as it travels by, your car will be slowed down. This force is called "drag" and is measured in grams. The lower your drag, the less your dragster will be slowed down by the wind as it travels down the track. Test your dragster in the wind tunnel 2 times and record the results below



DRAG #1: \_\_\_\_\_ grams DRAG #2: \_\_\_\_\_ grams

## **CO2 Dragster Unit**

### **Determining Kilometers Per Hour (KPH)**

When given the race time of a car in seconds and the distance traveled, follow the steps below to figure out a dragster's KPH.

- |                                                                                                                                 |                          |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Write down your Elapsed Time (ET) in seconds                                                                                 | Time in Seconds_____     |
| 2. Write down your reaction time in seconds                                                                                     | Time in Seconds_____     |
| 3. Subtract Reaction time from ET.                                                                                              | Time in Seconds_____     |
| 4. Divide the length of the track (_____ meters)<br>By your race time (this is how many<br>Meters per second your car traveled. | Meters per Second_____   |
| 5. Multiply that number (Meters per second) times<br>60 to get the Meters per minute.                                           | Meters per minute_____   |
| 6. Multiply that number (Meters per minute) times<br>60 to get Meters per hour.                                                 | Meters per hour_____     |
| 7. Divide that number (Meters per hour ) by<br>1000 (the number of Meters in a Kilometer<br>to get Kilometers per Hour (KPH)    | Kilometers per Hour_____ |

## CO2 Dragster Unit

### Race Rules & Safety

With our dragsters finally complete, the time has come to race them. It is a known fact that these drag cars will travel in the area of 120km/h and therefore safety is a serious issue. To ensure a safe race there is a set of strict rules that everyone must abide by.

#### Rules

1. No walks across the track. The only person who is allowed to cross over the track is the student who is racing on the far side. If you are caught crossing the track for any other reason you will receive one warning. If you cross the track again you will be disqualified from all future races.
2. CO2 Cartridges will only be given out by the teacher, and only when a student is in the staging area.
3. Students are responsible for figuring out who they race, when they race, and who their next opponent is. You will also be responsible for recording your race times.
4. There will be no booing during race day. Cheering is allowed; however making another student feel bad will not be tolerated.
5. Students must be in one of the student area's at all times. You are not permitted to be anywhere else.

#### Student Area's

##### The Pit

This is an area where you can make adjustments to your car prior to your race. Adjustments include, repairing broken wheels, loose eye hooks, and other small tweak. No major changes may occur. This area is for tuning your car, not redesigning it.

##### On-Deck

This is the area where the next 2 people in line to race will prepare their cars. They will receive their CO2 cartridges at this time. You will not be allowed to make any adjustments at this time.

##### Spectator Area

This is the area where you may watch the race. It is advised that you sit near the finish gates as this is the best place to watch the race from. You must be aware that cars do come off track, and although it is exciting, the cars are traveling at very high speeds and serious danger exists. You cannot make adjustments to your car in this year.

##### The "other side"

This is the area that is out of bounds. It is across the track. It is extremely dangerous to have people cross the track, and this is why the only person allowed to cross the track is the person racing on that side. If you are racing on the other side, you must **obtain permission before crossing the track.**

## CO2 Dragster Unit

### Assessment

**Name:** \_\_\_\_\_ **Student #** \_\_\_\_\_ **Block** \_\_\_\_\_

**Design, 25 points**      **Your total:** \_\_\_\_\_      **No**      **Maybe**      **Yes**

Evidence of research:      1      3      5

Design includes sketches:      3      6      10

Design meets criteria specified:      3      6      10

**Overall Car, 25 points**      **Your total:** \_\_\_\_\_      **No**      **Maybe**      **Yes**

The engineering principle of Mass has been considered:      2      3      5

The engineering principle of Friction has been considered:      2      3      5

Design involves advanced ideas, construction, or detail:      1      3      5

Design is thoughtful, not block-like:      3      6      10

**Body, 25 points**      **Your total:** \_\_\_\_\_      **No**      **Maybe**      **Yes**

Body meets design envelope:      3      7      10

Body is free of structurally weak areas:      4      5      8

Body shape is free of flaws:      4      6      7

**Finish, 25 points**      **Your total:** \_\_\_\_\_      **No**      **Maybe**      **Yes**

Preparation for painting was done properly:      6      7      10

Overall finish is defect free:      6      9      10

Special details (multi-colour, decals, painting hubs) included:      3      4      5

**Craftsmanship and Quality, 25 points** **Your total:** \_\_\_\_\_      **No**      **Maybe**      **Yes**

Finished project maintains original design:      6      8      10

Attention to detail is evident:      6      8      10

Project was completed in a timely manner:      3      4      5

**Average Race Time, 25 points**      **Your total:** \_\_\_\_\_

**<1.05 seconds - 25**      **1.21-1.30**      -      **20**

**1.06 – 1.10 - 24**      **1.31-1.35**      -      **18**

**1.11-1.15 - 23**      **1.36-1.40**      -      **16**

**1.16-1.20 - 22**      **1.41-14.0**      -      **14**

**OVERALL SCORE: Possible 150** \_\_\_\_\_

## CO2 Dragster Unit

### Questions

1. What 2 things can you do to fix a dragster that travels off alignment?
2. What 3 things can you do to improve wheel spin?
3. What 2 things can you do to reduce drag?
4. Give several examples of how mathematics was used during the design, construction or testing of your vehicle.

**Newton's 1st Law:** *A body that is in motion continues in motion with the same velocity (at speed and in a straight line), and a body at rest continues at rest unless an unbalanced force acts upon it.*

**Newton's 3rd Law:** *For every action there is an equal and opposite reaction which has the same force but is opposite in direction.*

5. Explain how each of the above 2 Laws of Physics is important to your CO2 dragster
6. Define potential energy:
7. Define kinetic energy:
8. What causes your car to decelerate?
9. What happens to kinetic energy when your car stops at the end of the track?
10. If there were no air or no gravity, what would happen to the car once it was started?

## **Lesson Plans & Class Schedule**

**Date:** October 8, 2007

**Grade:** 9/10

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**Teacher Name:**

**Subject:** Technology

**1. Topic-**

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Design Envelope:  
CO2 powered drag cars.

**2. Content-**

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This lesson is based on the design aspect while utilizing research, development and experimentation.

**3. Goals: Aims/Outcomes-**

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- 1.The students will learn how to use the internet for specific research.
- 2.The students will begin to learn CAD programs.
- 3.The students will identify and understand the benefits of pre-planning and basic design.

**4. Objectives-**

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- 1.The students will develop an understanding of the role of troubleshooting.
- 2.The students will learn to problem solve using research, development and experimentation.
- 3.The students will design build and test a CO2 powered drag car.

**5. Materials and Aids-**

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The students can utilize the internet for research. They will also be shown videos in class and given design briefs.

**6. Procedures/Methods-**

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**A. Introduction-**

Students will be given the opportunity to:

- 1.Research vehicle design.
- 2.Create a design based on specific criteria.
- 3.Check your design against previously successful designs.

**B. Development-**

Students will research:

- 1.Aerodynamics
- 2.Friction coefficients

### **C. Practice-**

The students will work with a CAD program and internet research to further develop their skills and the specific project.

### **D. Independent Practice-**

The students are expected to:

- 1.Demonstrate they have done research.
- 2.Submit a CAD drawing.
- 3.Complete a quiz.

### **E. Accommodations (Differentiated Instruction)-**

Accommodations will be given to students that need it.

### **F. Checking for understanding-**

Teacher checkpoints include:

- 1.Internet research assignment.
- 2.Submitted CAD drawing.
- 3.Quiz

### **G. Closure-**

By the end of this lesson, the students will understand the benefits of research and development in the area of design.

## **7. Evaluation-**

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See CO2 Drag Car Rubric.

## **8. Teacher Reflection-**

**Date:** October 8, 2007

**Grade:** 9/10

**Teacher Name:**

**Subject:** Technology

**1. Topic-**

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CO2 Drag Cars:  
Rough Cuts

**2. Content-**

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This lesson is based on making rough cuts from the rough stock.

**3. Goals: Aims/Outcomes-**

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- 1.The students will learn how to use the shop tools correctly and safely.
- 2.The students will understand the process involved with breaking out stock for initial production.
- 3.The students will produce a rough shape for their project.

**4. Objectives-**

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- 1.The students will break out rough stock.
- 2.The students will develop safe and productive skills within the shop environment.
- 3.The students will experience efficient use of materials.

**5. Materials and Aids-**

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At this stage of the project, the majority of the time will be spent with the shop tools.

**6. Procedures/Methods-**

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**A. Introduction-**

Students will be given the opportunity to:

- 1.Break out rough stock.
- 2.Use different shop tools.
- 3.Begin construction on their CO2 drag cars.

**B. Development-**

Students will develop their skill in the shop setting.

### **C. Practice-**

The students will gain experience with the shop tools.

### **D. Independent Practice-**

The students are expected to:

- 1.Demonstrate safe work habits.
- 2.Cut the rough shape of their project.
- 3.Safety Quiz.

### **E. Accommodations (Differentiated Instruction)-**

Accommodations will be given to students that need it.

### **F. Checking for understanding-**

Teacher checkpoints include:

- 1.Inspection of rough cuts.
- 2.Safety quiz.

### **G. Closure-**

By the end of this lesson, the students will understand and demonstrate the safe use of shop equipment.

## **7. Evaluation-**

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See CO2 Drag Car Rubric.

## **8. Teacher Reflection-**

# CO2 Dragster Unit

## Rough Outline

Class 1:

- Introduction to CO2
- Dragsters vs. SSC's
- Newton's Third Law
- Partial Video, Extreme Machines: SSC

### Notes:

The purpose of this introduction is to get students to base their thinking on "fast" rather than "dragster" in their design. The video gives students a good idea of what they will be designing, only at a smaller scale. It also effectively demonstrates technology's impact on our society both culturally, politically, and historically.

Class 2:

- Internet research
- Thumbnails Sketches

### Notes:

Using the internet to research the project gives students information technology skills and provides examples for them to draw inspiration from. This also helps to emphasize the core concepts of technology students will learn. I emphasize that the students don't "think" too much at this stage. The emphasis is on creativity rather than how to build the car at this point. I will restate this every time a student asks me a question about how big the car has to be, etc.

Class 3:

- Engineering Principles in CO2

### Notes:

Here emphasis is on how engineering is like a balancing act. Everything has both advantages and disadvantages that affect each other. This factor's into both design and engineering design heavily.

Class 4:

- Video:  
Extreme Machines: Indy Car Engineering

### Notes:

The purpose of showing this video is to expose students to the design principals discussed in Day 3. The video demonstrates the core concepts of technology and the relationships among technologies and connections between technology and other fields of study.

Class 5:

- Design Envelope
- Rough Sketches

**Notes:**

The design envelope is a great way to develop an understanding of the role of troubleshooting, research and development, and experimentation in problem solving. Through application of a design envelope students develop the abilities to apply the design process and to assess the impact of products and systems. There will be lots of questions on the design envelope. I usually explain what each requirement means, then continually refer students to the design envelope handout. If this is not done, students will expect the teacher to tell them exactly how to design their car, asking for checks at every step. As this is part of the learning experience, I try not to do this unless a student is genuinely struggling.

Class 6:

- Finish Roughs
- Begin Working Drawings

**Notes:**

This can be a high mischief time, as students will finish their drawings at different times and want to go visit to see what each other's cars look like. I usually allow this to a point, as long as it's done quietly and respectfully.

Class 7-8

- Working Drawings

**Notes:**

Emphasis here is on making the most accurate drawings possible. Yet plans are also technical works of art, so I also emphasize good line quality and neatness.

Class 9

- Engineering Test #1
- Materials selection

**Notes:**

I pass around the heaviest block I have, then the lightest. Next I ask students to pick their block one at a time from presorted piles blocks divided by weight. Once students pick their block, there is no exchanging it. I do allow student to student trading if both parties agree.

Class 10 -11

- Rough Cutting

**Notes:**

Bandsaw day. This can bog down if there is only one bandsaw available. I usually sit next to one saw and help students with little experience using the machines. More experienced students can use a second bandsaw without me looking over their shoulder. Some students will need little help. Others will require some hand-over-hand help.

### Class 12-13

-Shaping and sanding

#### **Notes:**

Balsa wood can be very dusty. I recommend having student wear something to protect good clothes. Rasps, files and sandpaper will do the job easily. Emphasis here is on craftsmanship.

### Class 14

-Finish sanding

-Priming

#### **Notes:**

Emphasis here is on proper preparation for priming. Students normally will want to prime before the car is ready, forgetting to sand the back of the car or the details.

### Class 15-16

-Spray Painting

#### **Notes:**

This can be a mess. I have an area in my lab devoted to spray paint with adequate ventilation. I only allow two students to paint at a time at a time. This can also be a high mischief day, so a close eye is needed.

### Class 17

-Axle bearing assembly

-Axle cutting

#### **Notes:**

Emphasis here is on getting it right. I only give students one replacement for anything. If they cut their axle wrong, they use their replacement and are docked points. If they cut it wrong again they are out and suffer a severe grade penalty. Following directions is a learned skill that I emphasize through this type of activity.

### Class 18

-Eye-hook assembly

-Wheel assembly

#### **Notes:**

I recommend checking student's work on this step. If the eye-hook isn't opened correctly, they tend to come off the track. This is dangerous and usually destroys the car.

## Class 19

- Finishing Details
- Testing

### **Notes:**

This can be a high mischief day, so a close eye is needed. Emphasis on this day is on getting the wheels to spin with as little wobble as possible. Gentle bending and testing can achieve this.

## Class 20

- Time Trials

### **Notes:**

I give each student one to two time trial races (depending on class size), and use their fastest time to determine qualification and position for an 8-car double elimination class tournament. Emphasis on this day is on correct race procedure and proper set up of the cars.

## Class 21

- Begin double elimination

### **Notes:**

In a double elimination tournament of 8 cars, I am usually able to get through about half the tournament in one day. I find this helps to build student's interest as the second day is usually between the faster cars for the top places.

## Class 22

- Finish Double elimination

### **Notes:**

Generally on the second class period I take my time and build up each race before it is run. The students really get into this and the tension and excitement really mount. After the races are over we discuss what worked and what didn't, and share average times.

# Co2 Dragster Final Test

Technology 9/10 Period \_\_\_\_\_

Date \_\_\_\_\_

Name Gavin Pearce  
Chris LeFluffy

## Section 1: True/false

Indicate whether the statement is **true or false** for the following statements.

1. If the wheels on a dragster are wobbly or if they stick, it will slow the dragster down.

\_\_\_\_\_

2. The lower your drag, the less your dragster will be slowed down by the wind as it travels down the track.

\_\_\_\_\_

## Section 2: Multiple Choice

Circle the best answer **and** mark the corresponding letter in the space provided

1. The dragster is powered by what form of energy.  
A. Diesel  
B. Gasoline  
C. Electricity  
D. Co2

Answer\_\_\_\_\_

2. The material we will be using for the car body is:  
A. maple  
B. Cherry  
C. Pine  
D. Steel

Answer\_\_\_\_\_

3. Rough cut are to be done on the:  
A. Lathe  
B. Table Saw  
C. Planer  
D. Band Saw

Answer\_\_\_\_\_

4. The wheels are held on with:

- A. Hot Glue
- B. An Axle
- C. Contact Cement
- D. Jorgensen Clamp

Answer\_\_\_\_\_

5. The Cylinder will be placed
- A. Under the Car
  - B. At the Back of the Car
  - C. On Top of the Car
  - D. Both A and C

Answer\_\_\_\_\_

6. The Wind Tunnel is used to show us:
- A. Weather Patterns
  - B. Aerodynamics
  - C. Wind Speed
  - D. How to Convert Energy

Answer\_\_\_\_\_

### **Section 3: Matching Questions**

Draw a line to link the best answer to the word on the left.

- |             |                                        |
|-------------|----------------------------------------|
| 1. CO2      | Used as Wheels                         |
| 2. Band Saw | Holds the Racer in Place Before Launch |
| 3. Washers  | Used for Rough Cutting                 |
| 4. Eye Hook | Powers the Racer                       |

**Section 4: Completion**

Read through the following text and select from the list of words below it to fill in the blanks...

CO2 dragsters are miniature racing cars powered by a carbon dioxide cartridge. They are \_\_\_\_\_ used for \_\_\_\_\_ purposes in \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_. A set of two hooks (eyelets) linked to a string at the bottom of the car prevent the vehicle from losing control during launch. In a race, a laser scanner records the speed of the car at the end of its run. Often, the dragster is carved out of balsa wood because of its light \_\_\_\_\_.

CO2 cars are model \_\_\_\_\_ and built by \_\_\_\_\_ that are designed \_\_\_\_\_ to race against one another. Wooden dragsters are made from \_\_\_\_\_ or balsa wood are designed, \_\_\_\_\_, and shaped with plastic wheels. Students start with a wedge of wood, much like a \_\_\_\_\_ in \_\_\_\_\_. Power tools are commonly used to shape the body into the design \_\_\_\_\_ to the student. Axles and wheels get the car moving down the drag strip.

according aerodynamically appearance basswood constructed demonstrating  
designed doorstop dragsters frequently mechanical pedagogic principles  
producer qualities students

**Section 5: Paragraph Response**

Respond to the following question in a brief and succinct response of one or two paragraphs.

How does Newton's 1<sup>st</sup> and 3<sup>rd</sup> Laws of Physics affect the Co2 Dragster?

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Answer: **Newton’s 1st Law:** *A body that is in motion continues in motion with the same velocity (at speed and in a straight line), and a body at rest continues at rest unless an unbalanced force acts upon it.*

**Newton’s 3rd Law:** *For every action there is an equal and opposite reaction which has the same force but is opposite in direction.*

# Co2 Dragster PreTest # 1

Technology 9/10 Period \_\_\_\_\_

Date \_\_\_\_\_

Name Gavin Pearce  
Chris LeFlufy

List five things that affect the performance of a vehicle?

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Co2 Dragster PreTest # 2

Technology 9/10 Period \_\_\_\_\_

Date \_\_\_\_\_

Name Gavin and Chris

List five safety items and there uses for the wood shop?

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Co2 Dragster PreTest # 3

Technology 9/10 Period \_\_\_\_\_

Date\_\_\_\_\_

Name Gavin Pearce  
Chris LeFlufy

List five things that you learned about the design process of the CO2 Dragster?

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_