



# **CO2 Car Design**

Engineering Technology

# Introduction

In this unit you will be challenged to design, build, and race your own CO<sub>2</sub> powered dragster. The car you will build is a fully functional, miniature, rocket-powered dragster. You won't believe how fast these little cars will go!!!!

*Some might go 65 feet in under 1 SECOND!!!*

You will actually have the opportunity to design your car for **SHOW**, **SPEED**, **AERODYNAMICS**, or all three! It's up to you to choose the style of car you want to make.

# The Physics of CO<sub>2</sub>

Does anyone know what a CO<sub>2</sub> cartridge is?

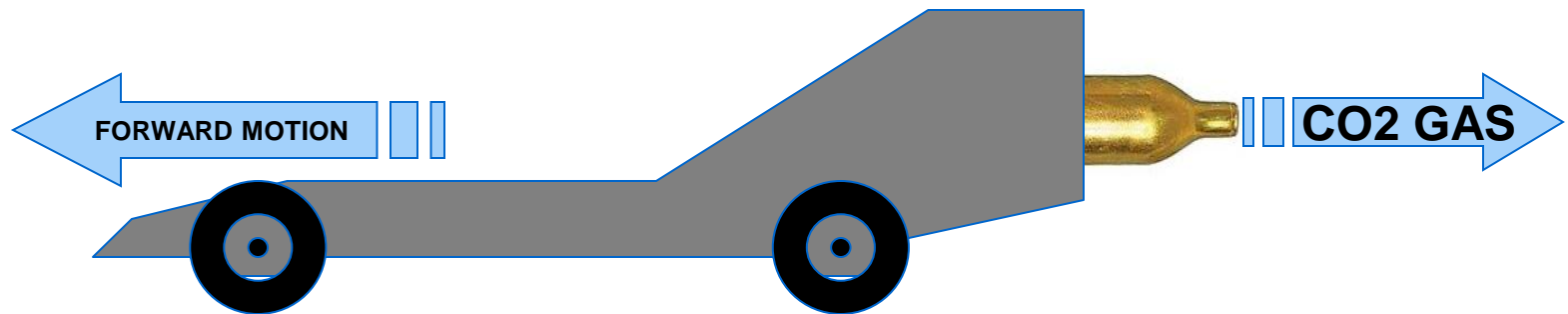


A CO<sub>2</sub> cartridge is simply a steel cylinder that is filled with compressed air.

# Newton's Law of Motion

## What is Newton's Third Law of Motion?

**For every action there is an equal and opposite reaction.**



When the end of the cartridge is punctured, the air rushes out the hole very quickly producing a jet-like propulsion. This force moves the race cars down the racetrack at amazing speeds.

# Uses of Co2 cartridges

What are CO2 cartridges actually used for?



Bike tire pumps



Whip Cream Maker

Life Jackets

Automatic Inflatable Life Jacket



Inflatable rafts



Paintball guns



# **Designing for SPEED**

Engineering Technology

# Designing for SPEED

If you choose to design your dragster for speed, you must keep a few simple design principles in mind.

The first is AERODYNAMICS!

## What is Aerodynamics?

The study of airflow over and around objects

***HINT:*** To make your dragster fast, it must be aerodynamic and have very little wind resistance. You should try to design your dragster so the air can travel over and around it with ease. Round edges will allow the air to travel over them much easier than square edges.



# Aerodynamics – continued

How does Aerodynamics effect real Race Cars?

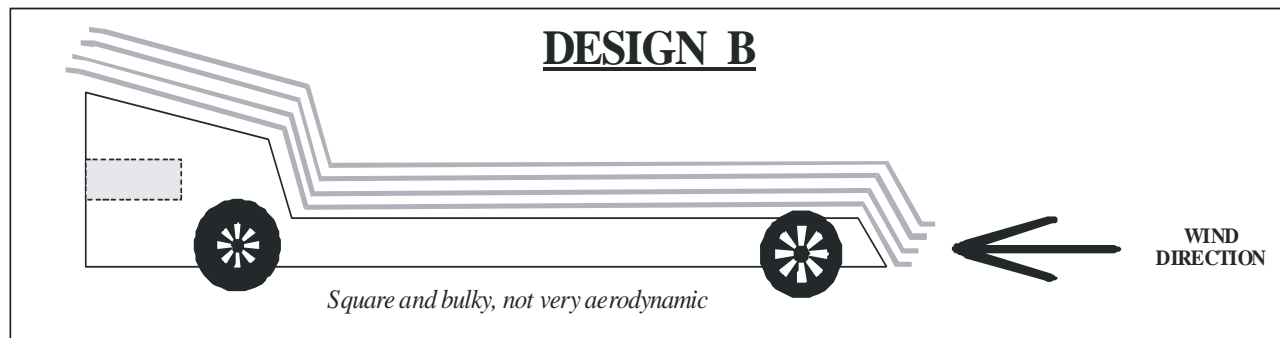
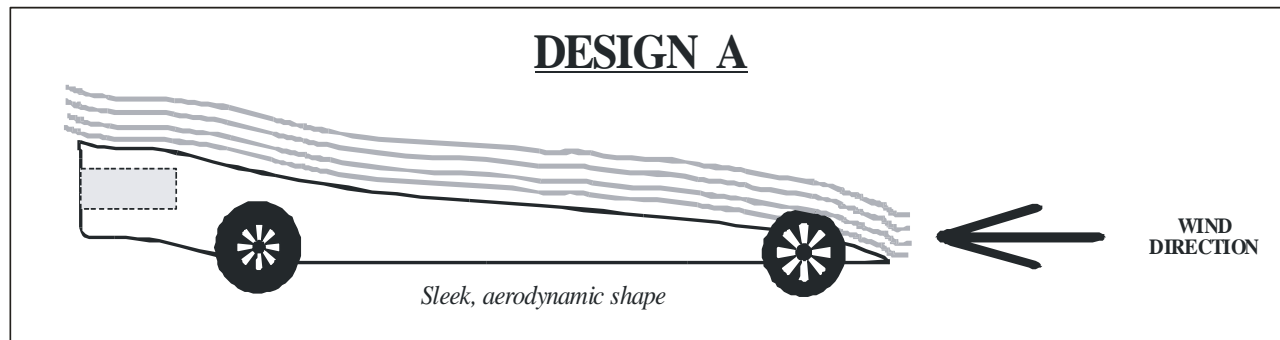
- Drag: how hard the engine will have to work
- Speed
- Lift: steering control
- Tire wear
- Fuel consumption
- Noise level



# SPEED Design Choices

Looking at the drawings below, which design is the most aerodynamic and should go the fastest?

If your answer is Design A, you are on your way to designing a fast and aerodynamic dragster.





# Weight

Engineering Technology

# Lighter is Better

The second design principle you should keep in mind is WEIGHT. The lighter you design your car, the faster your car should go.

*Remember, there will be some design limitations when it comes to the thickness of your car.*

Try to think of ways of making your car light and aerodynamic at the same time. Don't give up, the better you design - the better your car will turn out!

# **Designing for SHOW**

Engineering Technology

# SHOW Cars

If you choose to design your dragster for **SHOW**, there are three qualities in which the car will be judged; aesthetics, craftsmanship, and originality.

**Aesthetics** is the overall appearance of the car. (Is it visually appealing?)

**Craftsmanship** is the quality of work done to the car. (cutting, filing, sanding, paint and finish)

**Originality** is how creative you got in designing your car. (If the car looks just like the car used in demonstrations, than you probably did not get very creative!)



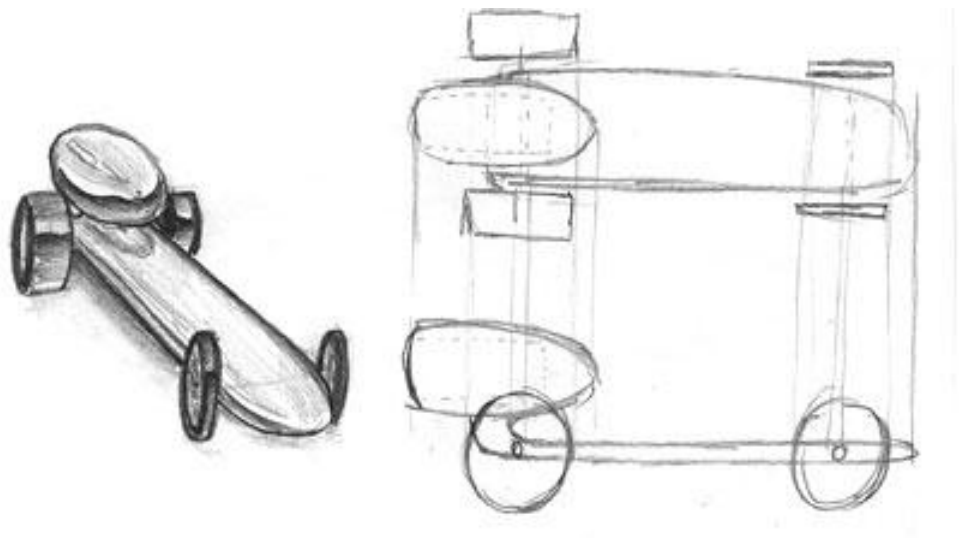
**Let's Start  
DESIGNING!!!**

Engineering Technology

# Thumbnail Drawings

The First step in designing your car is to make a bunch of Thumbnail Drawings on paper.

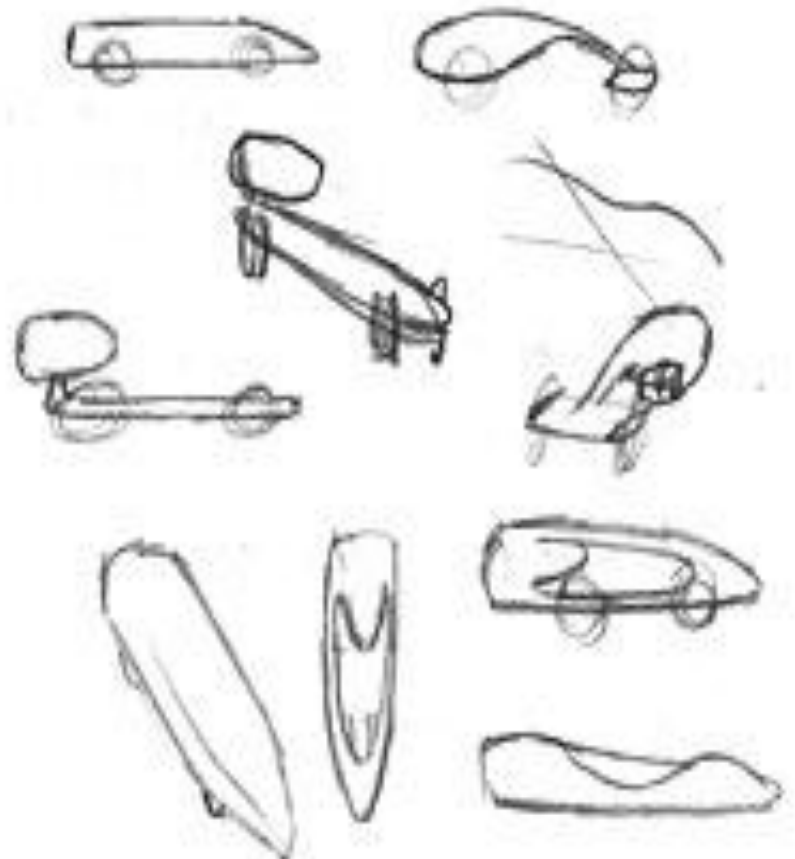
What are  
Thumbnail  
Drawings?





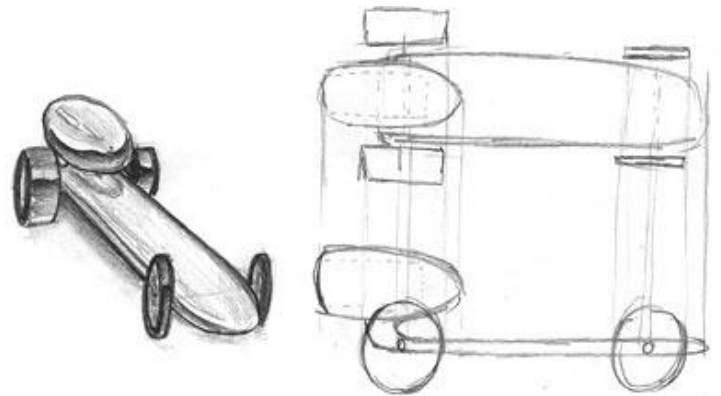
# Thumbnail Drawings

**Thumbnail** are small drawings that help you to see how your dragster might look. They may be of the whole car or parts of the car. They are not detailed drawings, just quick sketches to give you ideas.



# Thumbnail Drawings

A good idea for doing Thumbnail drawings is to make many side views and many top views and then mix and match them up later.



# **CO2 Car Examples**

Engineering Technology

# Examples



# Examples





# Examples



# Homework

Engineering Technology



# Design Assignment...

Use the space in your packets for your thumbnail drawings. You are required to come up with at least 10 different car designs. (*That's 10 side views and 10 top views*)

Each design should be different from the next. If you need more space use the back side of the sheet.

Each drawing is worth 10 points.

# Design Assignment...

Your drawings can be for Speed, Show or both. You can have all Speed designs or all Show designs or a combination of both.

You are required to come up with at least 10 different car designs.

*(That's 10 side views and 10 top views)*