

## Design Brief

# Wind Powered Land Vehicles

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Friday, October 9<sup>th</sup>, 2009 



## Wind Powered Land Vehicle

### Background Context:

Wind has allowed the earliest explorers to travel by ship. Sails of massive sizes would be drawn out to catch ~~this~~ wind and propel a ship. Wind, although unpredictable and constantly varying, is a clean source of energy and fun to use. Today ~~we~~ are so fossil fuel dependent ~~and we know that~~ fossil fuels are not a renewable source of energy.

Now let's pretend we are in the year 2030. The vehicles we know and use today no longer exist. Natural resources are on the brink of extinction/depletion. The United Nations has declared that the remaining uses for our depleting resources are limited to agricultural and health related purposes. The only useable form of energy left is wind.

### Problem:

Using the materials provided, design and create a small-scale, working model of a wind-powered vehicle suitable for travel on land.

### Constraints:

- Working in groups of two
- Can **ONLY** use materials provided in class
- Must be constructed in the class time provided
- Projects cannot be taken home until after race-day
- Projects must be wind-driven
- Wind will be produced by the classroom fan, which will be placed on the floor

### Materials:

1	file folder	4	axle/wheel assemblies	4	paper cups
1	24" string	6	split -pins	8	wood BBQ skewers
5	elastic bands	4	gears	1	egg carton
4	straws	3	2' linear strips of balsa wood (1/4" square)	5	pipe cleaners

*All materials do not need to be consumed. Tape and hot glue will be available for joining purposes.*

### Design Considerations:

There are many factors to think of when designing an efficient vehicle.

- Will your design employ 2, 3, 4 or more wheels?
- Will you harvest wind through a sail, turbine and gear box, or something else unique?
- If you do go with a sail, will your vehicle be too top heavy?
- How can you design your vehicle to attain top speed and distance?
- How can you best meet all these considerations while still maintaining an appealing vehicle appearance?

**Construction Sequence:**

## 1. Research

## Resources:

- Use the information provided in our notes, hand-outs, and exercises to base your design.
- The internet and library are also excellent resources.
- Come ask me for help if you are having difficulty finding information.

## 2. Make ideation sketches (at least eight sketches to hand in)

## 3. Design vehicle

## 4. Critique design

## 5. Construct vehicle

## 6. Test vehicle (and modify if necessary)

**Management Issues:**

## Week 1:

- Pick your partner
- Research and create ideation sketches
- Have your sketches approved before continuing
- Begin design process and critique with other classmates

## Week 2:

- Complete design process
- Begin construction
- Complete construction and start testing

## Week 3:

- Complete testing and modifications
- Present a 2 minute explanation of your vehicle design
- Race the vehicles (Friday Oct 23 immediately after presentations)
- Take vehicles home. If both team members want to keep the vehicle, a coin will be flipped

**Related studies:**

- Engineering
- Physics
- Mathematics
- Drafting



**Self Evaluation:****Self Evaluation:**

Student _____	Rate	Student _____	Rate
Contribution to design	1 2 3 4 5	Contribution to design	1 2 3 4 5
Group work	1 2 3 4 5	Group work	1 2 3 4 5
Overall participation	1 2 3 4 5	Overall participation	1 2 3 4 5

Did you enjoy the project?	Did you enjoy the project?
Were you happy working with your partner?	Were you happy working with your partner?
How could you improve on this project?	How could you improve on this project?
Additional Comments:	Additional Comments:

**Assessment:**

Student Names: \_\_\_\_\_

Research		Presentation		Race Day	
Proof of research	/5	Clarity	/5	Vehicle appearance and construction	/10
Ideation sketches	/5	Projection	/5	Vehicle speed <sup>1</sup>	/10
Design	/5	Content	/5	Total distance travelled <sup>2</sup>	/10

**Total Marks /60****Notes:**

1. Vehicle speed is calculated in the first 2 meters of travel from the start line. The fastest vehicle will receive 10 out of 10 and the slowest vehicle will receive 5 out of 10. All other speeds will fall between 5 and 10 marks.
2. The team with the furthest distance travelled will receive 10 out of 10. The team with the shortest distance travelled will receive 5/10. Teams with distances between the furthest and shortest will receive a mark between 5 and 10.