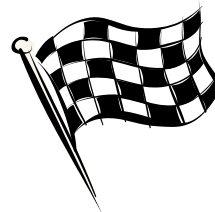
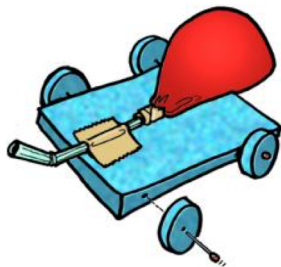


Balloon Powered Race Cars



I. Objectives:

- to create a balloon powered race car to go the distance of at least 3 meters
- to be able to graph your speed (included in brochure)
- to be able to apply Newton's 3 laws of motion to your project

II. Materials:

What I will provide:

- Two 12" balloons. I will only provide you with 2 balloons. Any additional balloons = 10 ¢
- Straws. I will provide you with 2 straws. This may be used to hold your axle to your car. The skewers go into the straws and move freely. **Do not glue skewers to straws!!**
- Axles. These are skewers -they are the straight sticks that will connect to the wheels.

What you will provide:

- Wheels - your wheels must be made of something that **wasn't originally made as a wheel**; **round and light** items - such as bottle caps, light plastic lids (like from yogurt world), CD's, ping pong balls - be creative! You must have **at least three wheels!**
- The body of the car - make this **as light as possible**. Reuse Styrofoam and do the Earth a favor! Small **empty thin boxes**, or anything flat, too. **Check your recycling!**
- You need two LARGE straws - the bigger the diameter the better! These will be the straws **attached to your balloons**. **Attach the balloons with thin rubber bands**. The air from the balloon will go through these balloons. (The faster the air coming out - the faster the balloon will move.)

III. Rules:

- The car must be powered by no more than 2 balloons. (It will be 10¢ to replace a balloon.) **You may not bring in your own bigger balloon.**
- You can build the car out of anything. Do not use wood for wheels - Newton's 2nd Law.
- The wheels can **NOT** be wheels from a toy car. They must be made out of something that was not originally meant to be used as wheels.
- The car may not leave the ground and must be entirely assembled in class.
- The car must be capable of traveling at least 3 meters.
- You will work with a partner that **can only be from this class**.

HELPFUL HINTS:

1. Make sure your wheels and axle roll smoothly **BEFORE** you attach your axle and wheels to the body of your car. First use masking tape to attach the axles to the body - to test, before you permanently glue them on the body of your car.
2. When the balloons are blown up, make sure they don't drag on the ground or contact your wheels. This is most important. Balloons will create drag.

3. Once it can roll 3 m, STOP blowing up your balloons - start measuring and drawing. Elasticity will be lost when you keep blowing up your balloon.

IV. BENCHMARK DATES:

Due Date and points value:

- a. Due Date: _____
 - i. You must bring in your materials on _____
 - ii. You will work in class on this assignment on _____
 - iii. This project is worth _____

There will be an award for the FARTHEST, AND BEST LOOKING, AND FASTEST

Google Slides In this order:

SLIDES (there is not a defined number of slides, use what you need to address the following)

Slide 1: Name of Car, Designer(s) of Car. Add picture of your car on this slide

Slide 2: Materials used- list all materials include a picture of these before you start building.

Slide 3: Modifications- List the modifications you made to create a better car as you built it and the reason why. Include picture of modified material(s)

Slide 4: Picture or drawing of your car with following measurements in a data table:
Car Height, Car Width, Car Length, Wheel Width, Mass (metric units).

Slide 5: Data Table

Race	Distance (m)	Time (s)	Speed (m/s)	Mass	Momentum
#1					
#2					
#3					

Slide 6:

Create SPREADSHEET

A COLUMN: trials; (1, 2, 3) ONLY NUMBERS

B COLUMN: speed; (ex: 4.2, 6.1, 5.3) no units on spreadsheet

INSERT CHART

click "Switch rows/columns"

click on "use column A as headers"

choose "COLUMN CHART"

Then go to "Customize" tab:

title chart (Balloon Car Speed), choose a dark color if you like.

Click "AXIS" "Horizontal" and Label horizontal axis: "speed (m/s)"

Click "AXIS" again and select "left vertical axis title" and title is "trials"

Copy and Paste the Graph into Slide #6. Slide should fill entire slide

Slide 7: Conclusion: Paragraph form

- a. Describe how the Newton's 1st law applies to the balloon car.
- b. Describe how the Newton's 2nd law applies to the balloon car.
- c. Describe how the Newton's 3rd law applies to the balloon car.

Overall appearance: Presentation is professional and easy to follow

Total Points _____

Race Day _____