

Student Examples of StemDesignSheet_PBL For a Balloon Car Project

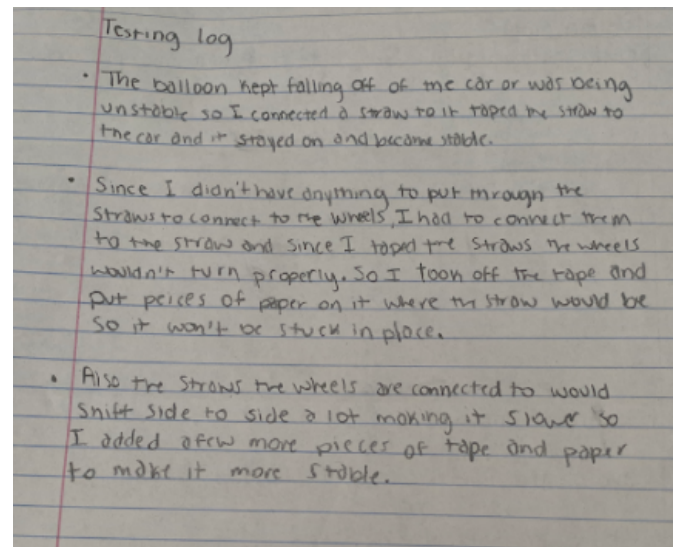
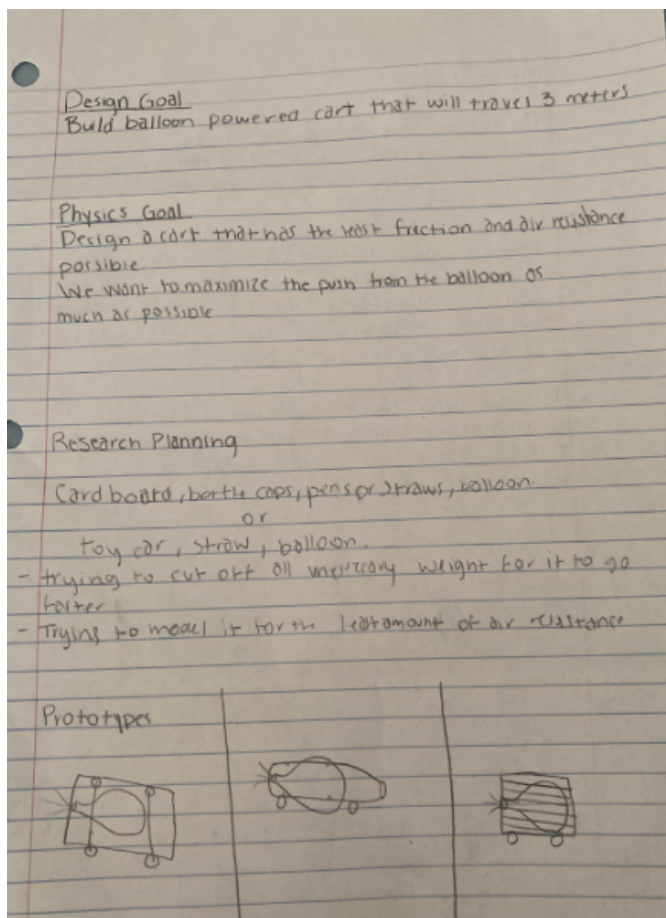
Students created a balloon car as an end cap on the mechanics portion of the class.

Context: Honors Physics (10-12), Online and In Person.

Note: Since these examples were from a hybrid instructional setting, students did their worksheet on their own paper (rather than a printed version of the template in this drive).

BALLOON CAR

Sample 1:



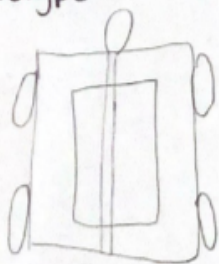
Sample 2:

Design Goal - Build a balloon powered car that will travel 3 meters.

Physics Goal - Design a car that has the least friction and air resistance possible, we want to maximize the push from the balloon as much as possible.

Research/Planning - I will make an outline with card board and leave an empty space in the middle, for less mass and use caps or toy tires with no grip so it can roll through the floor.

Prototype 1



prototype 2



prototype 3



testing log

- I had to add weight to make the car go straight.
- I add more straws to make the air escape faster and make the car go faster.
- I added tops on top of my car to help the balloon not hit the wheels.
- Add rubbers bands at the end of my wheels to keep them steady.

Car Mass m
 54.9 | 66.7 g
 Furthest Distance Traveled m
 10.75

Log #	Trail 1	Trail 2	Trail 3	Ave
Time for 3 meters	3.45	1.85	1.99	2.43
Total Distance traveled	4.30	7.45	6.50	6.08
Maxio Time for 3 meters				
Total Distance traveled				

Sample 3

Design Goal

Build a balloon-powered car that will travel 3 meters

Physics Goal

Design a cart that has the least friction and air resistance possible
We want to maximize the push from the balloon as much as possible

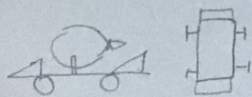
Research / Planning

For the design of the car I intend to make something that is as aerodynamic as possible. Also, the weight of the car shouldn't be either too heavy or too light for the best speed.

I will cut my wheels out of cardboard and will also use cardboard for the base of my car.

Prototypes

#1



Only went about 2 feet. Car didn't travel straight.

#2



1.5m
The flaps on the side helped



3.3 Meters
Better wheels
Front more aerodynamic
Less loops in the back.

Analysis

Design #1

Spin-out After
2 feet (less than 1m)
Wheels weren't good?

Design #2

Spin-out After
1.5m. Flaps on
side might have
helped but wheels should
be fixed.

Design #3

3.3 meters
Car Crashed
Balloon Positioning?
Better wheels for sure
worked. Permed
back T-11 for less drag.
Front designed for better
Aerodynamics.