Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Egg Cart Challenge

**Introduction:** The purpose of the egg car project is to put Newton’s second law into action. On the line below, write Newton’s second law of motion.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Thus, the more mass your car has, the more \_\_\_\_\_\_\_\_\_\_\_ it will have. Your group will be given a budget of twenty dollars. With that budget, your goal is to create a car that will protect an uncooked egg down an incline of 1.5 meters.

|  |  |
| --- | --- |
| **Material** | **Price** |
| Popsicle Stick | $1.00 |
| Rubber Band | $1.00 |
| Straw | $1.00 |
| Balloon | $3.00 |
| String | $1.00/ 30cm |
| Washer | $1 |
| Tape | $1.00/ 30 cm |
| Paper | $2/sheet |

You must stay within budget!

The egg is free! Compliments of your teacher!

Picture of my soon-to-be-egg car

|  |  |  |  |
| --- | --- | --- | --- |
| **Material** | **Price** | **Quantity** | **Total Price** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Total Price: Total Price:

Total Price:

Egg car

1.5

M

E

T

E

R

S

ramp

|  |  |  |  |
| --- | --- | --- | --- |
| Egg Car Structure | 10 – Car is constructed and can travel down ramp.  | 5 – Car is constructed and cannot travel down ramp.  | 0 – Car is not constructed.  |
| Egg Survival | 20 – From 1.5 meters, the egg has no fractures.  | 10 – From 1.5 meters, the egg has a fracture but still maintains shape. No liquids from inside the egg are visible.  | 0 – From 1.5 meters, the egg is broken and the liquids from inside the egg are visible.  |

Rubric

Score: \_\_\_\_\_\_\_\_\_/30

Questions

1. Draw a picture of your first design below.
2. What changes did you make and why?
3. How did you use what you learned about Newton’s second law of motion when making this egg car?
4. Measure the mass of your egg car including the egg. Write it below.
5. How much force would be required to stop the egg car in freefall? (Acc. = 9.8m/s2)
6. Is more or less force required to stop the egg car on the ramp? Why?

**Teacher Page:**

This lesson plan spans three sixty minute periods in the classroom. This lesson plan is meant to be a kinesthetic lab after students have been introduced to Newton’s second law.

*Day One*: First, I introduce the challenge. I show students all of the supplies and how much they cost. I tell students that they can work individually or they can work with up to two other people. If they choose to work with other people, every single person must hand in their paper completed. Before the students can get their supplies, they must have a *detailed* picture of their design and their “order form” complete. Then, as I am handing them their supplies, I highlight it on their order form. They can also do a return later if they supply looks like it is in great condition. I do not give them their egg today. Today, students will be brainstorming and creating their project!

*Day Two:* Today, I will introduce the value of trials. I might ask, “What if a car company designed and built cars and sold them without ever testing them out?” Students will obviously reply, “They would never know if there was something wrong or unsafe with the car”. I tell the students that the majority of the day they will be working on the cars, and I do not want to rush anyone’s hard work. But, if you and your group feel ready to test your car, then you can get a plastic egg. (I have easter eggs that the students can use for today.) I also ask them, “How would this be different than the real egg you are going to use tomorrow?” Students will obviously reply, “The real egg is heavier.” I will tell them to think about things that you can put into the plastic egg to make it more realistic to a real egg.

*Day Three:* Today, students will have half of a work day and half of a test day. I will have the ramp out again, and students can test their eggs. When they are finished testing, I will have a real egg ready to give them so they can place it in their car exactly how they want. When thirty minutes of class is left, students will then begin testing their egg cars! Make sure that you have plastic on the ground as this obviously could get messy!

Supplies Needed:

* Supplies on student price list
* Eggs
* Plastic eggs
* Ramp (I used a leftover board at Menards for $2.)
* Tarp ( I also got a blue tarp from Big R for $1.
* Pennies possibly (could be used as weight for the plastic eggs).