



Curiosity Guide #309

Inertia

Accompanies Curious Crew, Season 3, Episode 9 (#309)

"Egg-citing" Safety Restraints

Stem Challenge

Description

Design and test a system that will protect a raw egg being transported to market.

Materials for the crash test

- Plastic drop cloth
- Wooden plank, preferably with low guide-rail sides
- Chair or table
- Cement block
- Toy dump truck that is big enough to hold an egg within a restraint system

Materials per designer or design team

- 1 raw egg
- Marker
- String
- Rubber bands
- Cotton balls
- Tape
- Toothpicks
- Styrofoam cups
- Bubble wrap
- Pipe cleaners
- Pompons

- Craft sticks
- Mesh or netting material
- Item cost sheet

Procedure 1: Prepare the crash site

- 1) Place the plastic drop cloth on the ground.
- 2) Run the wooden plank from a chair or table to the floor.
- 3) Place the cement block on the floor, in line with the wooden plank.
This block will serve as the crash obstacle.

Procedure 2: Design and build a prototype.

- 1) Draft a plan to make a safety restraint system to protect the egg riding in the back of the truck. The egg must survive the crash test.
- 2) Build a prototype that fits the following objectives:
 - The system and the egg must fit into the back of the truck.
 - The system must protect the egg.
 - The system must be cost-effective.
 - The egg must be easily removable from the system and the truck.
- 3) Keep track of the cost of each prototype on the item cost sheet.
- 4) Draw a face on your egg passenger. Put your egg into the prototype.

Procedure 3: Test the system

- 1) Place your egg and its safety system into the toy dump truck.
- 2) Test your prototype by rolling the truck down the plank and crashing the truck into the block.
- 3) Did your egg survive?

My Results

Explanation

You will discover that is a good example of Newton's First Law of Motion, the Law of Inertia, which says that an object that is still or at rest will stay at rest. An object in motion will keep moving unless another force acts on it.

At the beginning of the crash test, both the truck and passenger egg are at rest. When the truck begins to roll down the plank, the egg is also in motion. However, when the truck suddenly crashes, the egg continues to move forward. Without a proper restraint system, the egg will get smashed. Effective restraint systems will apply a force to help slow the passenger's forward motion and reduce injuries.

More to consider: The Crew had a lot to think about to design a safety restraint for their eggs, and they were each successful! But did you know that insurance and car companies use full-sized dummies in crashes to make sure that human passengers can survive a car accident? It's true! Thanks to those experiments, engineers continue to make cars safer when dealing with the effects of inertia during a crash. That would make Dan, Dan, the Driver Man so happy!

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