Impulse-Momentum Due:

Objective: Build a device that can protect an egg as it is launched into a brick wall.



Apparatus:

- 1. Normal, white shelled, chicken egg*
- 2. Pop bottle accelerator*
- 3. Air Compressor*
- 4. Plastic Bag*
- 5. Brick Wall
- 6. Pop Bottle (2 Liter SODA bottle)
- 7. Any packaging materials you choose
- 8. Any glue, cement, bonding agents, duct tape, packaging materials, etc. needed for the project

*These items will be supplied by the teacher

Procedure:

- 1. Design and build a device that can be attached to the end of a 2 Liter soda bottle.
- 2. Determine mass of device.
- 3. Place egg in plastic bag.
- 4. Place egg in device.
- 5. Launch device at the wall.
- 6. Determine the outcome of Egg.



Rules:

- 1. Your apparatus must be no longer than 1 meter, and no wider than 0.25 meter, (from mouth of bottle to end of protection).
- 2. Your device cannot have a mass of over 400 grams.
- 3. You must be able to place your egg inside of your device and be ready for launch within 5 minutes on the day of the launch.
- 4. You must be able to remove your egg from the device within 1 minute after the launch.
- THERE WILL BE NO LATE PROJECTS! All individuals that fail to bring a device to school on the day of the launch will be required to write a 3 page <u>research</u> paper explaining the physics behind automobile safety features.

Scoring:

I. Launch (50 Points) - All of the devices with surviving eggs will be sorted by mass (complete apparatus and pop bottle – no egg). The one deemed "best" will be the least massive.

50 points - did not crack or break and mass is within the lightest 1/3 of survivors.
48 points - did not crack or break and mass is within the middle 1/3 of survivors.
46 points - did not crack or break and mass is within the heaviest 1/3 of survivors.
45 points - cracked shell but did not leak any liquids from shell.
40 points - destroyed egg but there were no leaks from device.
35 points - destroyed the egg and made a mess.

II. Presentation (50 Points) – See Rubric.

The presentation will be the analysis of the success or failure of the project. Many key discussion points will be required within the lab.

- 1. The presentation must include a visual aspect. This must include either a poster board, or PowerPoint (or Google Docs) presentation, and the actual project itself (Do not throw it away!)
- 2. All members have to participate in the presentation.
- 3. All presentations should last at least 3 minutes, but no longer than 4 minutes. Use this time to explain impulse and momentum. Convince the audience that you understand the concepts and that you used them to design and build your project.
- 4. The presentation should discuss why the egg survived or did not survive using proper terms from the unit. For example, momentum, impulse, time, force, etc. **The audience should know why the project was constructed based on the concepts of momentum and impulse**. Questions will be asked by the class and the instructor from this section if further explanation is needed. Questions will count as part of your time, but do not count on anyone asking them. Only legitimate questions will count and the instructor will determine their legitimacy.
- 5. Part of the presentation grade will be an individual grade based on the level of work performed during the one (1) work day provided.

Point Value	Categories
6	Description of Design
6	Evidence that Impulse/Momentum concept was used within the design
6	Proper use of physics terminology within the design of the project
2	Statement of result
6	Proper use of physics terminology within the explanation of success or failure
6	Spoke for 3 minutes
6	Everyone in group participated
6	Everyone worked on work day provided
6	Presentation quality - Look, grammar, etc.
50	