

Inquiry Lesson 2
EDSE 690, Fall 2016
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Key Concept: Impulse-Momentum

Standards: Operationally define “impulse” as the area under a force vs. change in clock reading (time) curve and be able to determine the change in linear momentum of a system acted on by an external force. Predict the change in linear momentum of an object from the average force exerted on the object and time interval during which the force is exerted.

Objective: Students will apply their knowledge of impulse and momentum to construct a device that will allow an egg to survive a 5 meter drop.

Essential Question: How can impulse and momentum be applied when an object strikes the ground? How can we use that knowledge to reduce the force applied to an egg?

Engage: Explain to the students how we received a letter from NASA issuing a nation wide egg drop challenge (this is fake, but goes along nicely with the recent rocket launch project). Read the letter to the students and show videos of the Mars lands of Curiosity and opportunity. If time allows students can look up more information about Mars rovers and how they were landed on the surface. Be sure to explain the stipulations of the challenge and the materials that can be used.

Explore: Working individually, students will research designs for egg drops (students can work collaboratively, but each student must make their own project). Students must come up with a design to propose to the teacher with either a sketch or a verbal description; this must include an estimate of how many straws are required. Students will have about a day and a half for research and construction with the last half of the second day for dropping.

Teacher Support: Monitor students as they go, brainstorming ideas if they get stuck. Ask students about why they think their design will work, but don't offer advice unless it is asked for.

Explain: After dropping the eggs (film with high speed if available) the students will fill out discussion questions. Be sure to show at least a few of the students videos (both successes and failures) and look at why eggs survived or didn't. The students can work in groups to answer discussion questions, and if required a rehashed discussion on impulse-momentum could be helpful.

Teacher Support: If students are having trouble (and time allows) show them their video and talk through it with them. Use leading questions to get them to force-time ideas.

Extend: Have students discuss how their design would work on the moon or on Mars. What modifications would need to be made? Have students research the gravity and atmospheres of each place and compare them to Earth for their answers.