THE EGG DROP

ELEMENTARY SCHOOL LEVEL 3

According to Galileo's law of falling bodies, objects fall to the earth at a constant acceleration. It is the force of gravity that pulls these objects to the ground. In this exercise, students will engineer ideas to protect an egg that's being dropped from different heights. It's a study of force in motion as students will be minimizing the impact of collisions to protect their egg.

EDUCATIONAL STANDARDS:

NGSS CONNECTION:
2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for your intended purpose.*
2-PS1-3. Make observations to construct an evidence-based account of how an egg holder made of a small set of pieces can be disassembled and made into a new object.

COMMON CORE CONNECTION:
ELA/Literacy
RI.2.8 Describe how reasons support specific points the author makes in a text.

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on your topic to produce a report; record science observations).

W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

Mathematics
MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

DOK:
Level 3: Strategic Thinking
Level 4: Extended Thinking

MATERIALS NEEDED:

- ❑ Eggs
- ❑ Rubber bands
- ❑ Straws
- ❑ Small boxes
- ❑ Tape
- ❑ Cardboard rolls

DIRECTIONS:

1. Nestle the egg safely in a carriage of your creation.

2. Take your carriage and egg to a drop site where you can let the container fall safely from varying heights.

3. Have students stand shoulder to shoulder with their creations. Let them go!

Get your students thinking about momentum, force of impact, and the factors that can lessen the damage the impact creates. Students should ask which materials are more effective for saving their eggs? Which structures are most protective? Do they prefer a breakaway cage, or a foam-lined box? Why?

OBJECTIVE:

Students will be able to design a device to safely land an egg that is dropped from an elevation.

ESSENTIAL QUESTIONS:

- How might different materials be used to protect a dropped egg?
- What material properties are better for protecting the egg?
- How might we create a device to protect the egg?

FUN FACTS

A. **The Faberge "Winter Egg" is the most expensive egg which sold in 1994 for $5.6 million.**

B. **David Donoghue holds the record for longest egg drop without breaking. He threw an egg out of a helicopter onto a golf course in the UK from the height of 700 feet.**

C. **What came first: the chicken or the egg? One could argue the egg! Reptiles (including dinosaurs) were laying eggs long before chickens evolved.**

ENGAGE / EXPLORE:

1. Teacher begins by asking students what would happen if an egg was dropped on the floor
    a. After students discuss and answer teacher could drop an egg to see how easily it breaks.
2. Ask students “how can we create a protector for an egg in case it falls?”
    a. Allow students to start brainstorming ideas
3. Allow students to explore the materials
    a. Ask students to create an investigation about the properties of the materials
    b. Students organize them in a table based on observed qualities
        i. Hard
        ii. Soft
        iii. Stretchy, etc.
4. Evaluate
    a. Experimental design
    b. Observations
    c. Organization and collecting of data

EXPLAIN:

1. Have students make conclusions about which materials are better for the egg based on their observations.
    a. Use facilitating questions to guide and support student thinking
2. Students can now design their device.
    a. Draw pictures of the materials they will use
    b. Explain how their device will be assembled
    c. Reasoning for why their device will work
3. Evaluate
    a. Conclusion based on evidence
    b. Design based on a subset of small pieces

ELABORATE:

1. Students conduct an investigation to test their device without the egg
    a. Observe what happens to the device when it is dropped
    b. Will this protect the egg?
2. Students test the device with the egg
    a. Did it protect the egg?
    b. How would I modify it next time to better protect the egg.
3. Evaluate
    a. Evidence and support for their design
    b. Modifications based on observations to their design