MoLab Mondays!

Egghead Science

MoLab is excited to have the opportunity to stay in touch with our MoFamilies and continue to provide on-the-go, dynamic, hands-on, and inquiry-based science experiences through a mobile laboratory that promotes discovery. Our weekly activities will engage your little investigators with hands-on learning that proves anyone can think like a scientist.

It's Easter week, so for our third MoLab Mondays! we are going to share a fun engineering activity that explores force. The only materials that you will really need should be easy to find: an egg, and recycled supplies! It's a new take on the open-ended egg drop challenge.

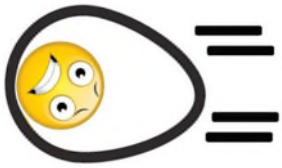
Tools & Materials:

- Raw Egg
- Tape
- Scissors
- Tape measure
- Sharpies (optional)
- Pencils and paper
- Access to the outdoors
- Any combination of various household materials
    - Aluminum foil
    - Masking tape
    - String
    - Straws
    - Bubble wrap
    - Packing peanuts
    - Cardboard
    - Newspaper
    - Any other inspirational recycled materials

Engineering Your Egghead

- Lay out the various materials available for the activity.
- Pass out one raw egg per student. If you have sharpies and want to decorate your egg, go for it. It's always fun to give it a name and a face.
- Introduce the engineering challenge to your student. "Today's challenge is to construct protective device, or gear, to protect a raw egg in order to survive an egg toss of 25 ft."
- Ask your students to think about the potential forces their egghead will encounter.
- Ask your students to form a hypothesis on which materials will best protect their egghead.
- Using their pencils and paper, they should sketch their design.
- Set a time limit for your students to construct their protective gear. Typically, 20 minutes is a good amount of time.

- Go outside and use the tape measure to determine the distance goal of 25 ft.
- Put your protective gear to the test in a classic egg toss. You will need two people to test the survivability of each egg. Start close together and toss. Move back 5 ft and toss again. Repeat until you reach 25 feet apart. You can repeat rounds and have fun until your egghead has had at least one fall.
    - Alternatively, you could drop your egghead from a height if you have access to a stair well or a tall ladder. Warning: adults should drop the egghead if using a ladder and interior experiments could get messy.
- Open each egghead's protective gear and evaluate which egg survived.



Make Observations and Ask Questions

1. If your egg survived the test, why?
2. Revisit their hypothesis, was it correct?
3. Which materials and design seems to protect your egghead the best?
4. What forces did the egghead encounter during the test?
5. Did one of the egghead players throw faster? What difference does that make?
6. How would you change your design if you were to conduct the experiment again?

What's Going On?

Conducting an egghead challenge is a great opportunity to explore force. Simply put, a force is either a push or a pull. There are several types of forces that we can consider in this experiment.

Gravity is the force that pulls objects toward each other. On Earth, objects are pulled towards the center of our planet, which causes them to fall downward. If your partner dropped the egghead, it was gravity that was responsible for pulling it to the ground.

Drag is another force to consider. Drag is also called air resistance. Wave your hand through the air. What do you feel? As your hand pushed down on the air molecules, they push back. Drag is when forces are acting in the opposite direction of the motion of an object.

Another force that affected our egghead was impact. Impact is the high force applied over a short period of time when two or more objects collide. The impact force depends on the relative velocity (or speed) of the two objects to one another.

Dig a Little Deeper

If you would like to take your discovery experience a little further, the experiment is a great opportunity to explore Newton's Laws of Motion.

Newton's First Law states that: An object at rest tends to remain at rest unless an object in motion tends to continue moving in a straight-line at constant speed, unless an outside force acts upon it. While the egghead was in your hand (an object at rest) it has potential energy. When you throw the egghead (a push from an outside force), the energy is transformed to kinetic energy. The forces of gravity, drag, and impact all work to slow it down. Gravity will pull it to the earth and cause deacceleration. Drag will slow the forward motion by creating friction (between the air and the egghead). Depending on the design of each egghead's protective gear, some will have more or less drag. Impact happens when the egghead is caught or hit the ground. The size and amount of impact will depend on the speed the egghead was traveling.

Newtown's Second Law is: Force = Mass times acceleration. The egghead will accelerate based on the force behind the push as it is being thrown (or by gravity in a classic egg drop) and the mass of the egghead.

Newton's Third Law states that: For every action, there is an equal and opposite reaction. When the egghead hits your hand, or the ground, it will exert an impact force. The ground will, in turn, exert the same force on the egghead.

Extension Activity

Ask your students to compare the anatomy of our brain to that of an egg. How is the shell of the egg like our skull? How are the shell membranes similar to the membranes surrounding our brains? Students can apply what they learned about outside forces and Newton's Laws to the physics of sports science. Ask students to brainstorm how these concepts relate to their favorite sports and what types of extra protective gear athletes use.

Happy Experimenting from MoLab, Inc!

https://sciencing.com/the-science-behind-the-egg-drop-experiment-12750680.html