

Amazing Egg!



Lesson Overview

Students increase their interest in science through discrepant events. Students investigate how pushes and pulls can cause changes in an object's motion.

Suggested Grade Levels: K~8

Standards for Lesson

Content Standard A: Science as Inquiry

Content Standard B: Physical Science

VA SOL:

K.1 b, g, j; K.2 a; K.4 e; 1.1 a, f, g; 1.2 a, c; 2.1 a, b, d;

3.1 a, c; 4.1 a, b; 4.2 a, b, c, d; 5.1 f, g, h

6.1 e, f, g; 6.2 a, e; LS.1 b, e, f, g; PS.1 g, k; PS.6 a, b; PS.10 b

Time Needed

1 day

Materials for Lesson

- Egg
- Toilet paper tube
- Pie pan or plastic plate
- Container of water

Content Background

Information for teacher:

From the earliest grades, students must experience science in a form that engages them and increases their curiosity so that they are intrigued to raise questions and to generate ideas and explanations for their observations. These inquiry experiences will provide opportunities to develop and enrich students' understanding of the nature of science. At this early level, students will develop concepts and vocabulary from such experiences while also developing inquiry skills. As students focus on the process of scientific investigation, they increase their abilities to ask questions, explore the world around them, make predictions, test their predictions, make observations, and construct reasonable explanations for their questions.

Students soon discover that their predictions are not always correct and that sometimes the unexpected happens. At times, they think one thing will happen, but the opposite actually occurs. In science, these are called *discrepant* events. Discrepant events get students thinking as they wrestle with their understanding and start thinking WHY? Such events and responses are a great way to increase students' curiosity about the world around them and to get them hooked on science. It is also a wonderful way to clear up misconceptions or to introduce a new concept.

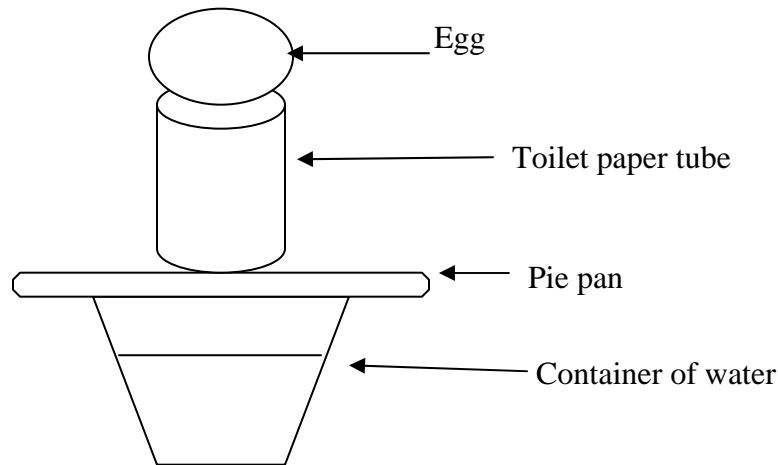
Amazing Egg is based on Newton's Laws of Motion. The first law states, "**Every object in a state of rest or uniform motion in a straight line tends to remain in that state of motion unless an external force is applied to it.**" This is also known as the law of inertia. Objects keep doing whatever they're doing (rest or motion) until something else exerts a force on it. Anytime there's a change in an object's motion, a push or hit from something else caused that change. For this demonstration, remember that an object at rest will remain at rest unless acted upon by some force. In the setup, the pie plate remains at rest until a force (your push) acts upon it. The egg remains at rest until a force (gravity) acts upon it. Gravity pulls the egg down in a straight line; hence, the egg falls into the container. The plate and tube eventually stop moving due to a force (gravity and friction).



Engage

To prepare, setup the demonstration as pictured below. Fill the cup about three-quarters full with water and center the pie plate on top of the glass. Place the cardboard tube on the plate,

positioning it directly over the water. Carefully set the egg (or practice ball) on top of the cardboard tube as shown.



Discuss the Amazing Egg setup using terms such as shapes, relative size, and position (over/under, in/out, above/below). Students should make drawings and write a description about the set-up in their science notebook.

THINK-PAIR-SHARE: Ask students to observe the setup carefully and to think about what they think will happen if you smack the edge of the pie plate horizontally and why. Give 15 seconds think time. Have student record their predictions in their science notebook. Tell students to pair with their shoulder partner. Have students share with their teammates (group of 4) in **SINGLE ROUND ROBIN** followed by random whole class “share” asking students, “How do you know this will happen? Or why do you think that will happen?”

Explore

Tell students to make observations when you hit the plate. Remind students that observations are made using the senses. Have student **RALLY ROBIN** with their shoulder partner a list of the senses (10 seconds). Stress that observations are only something we can see, hear, smell, feel, and/or taste. An “*I think*” statement is NOT an observation.

Allow students to watch the setup for 30 seconds. Ask them if they notice anything happening or if it starts moving all by itself.

With your writing hand, smack the edge of the pie plate horizontally and make sure that you follow through as in tennis or throwing a ball. Make sure that you use a solid hit so that the plate and tube go flying.

Repeat demonstration if desired.

Explain

Have students share their observations beginning each sentence with “I saw...,” “I heard...,” etc. **SINGLE ROUND ROBIN**

Have students draw a picture of what they observed and to think or write a question about their observations. Ask them: What do you still wonder about what happened? Ask students to share their picture and questions with shoulder partner **RALLY ROBIN**

While students are drawing/writing, quietly assess student responses and select 5-6 students (SAGES) who seem to grasp the scientific principle.

CIRCLE THE SAGE: Have the SAGES spread out around the room. Tell remaining students to gather around the SAGE with no two members of the same team going to the same sage. Have the sages explain why the egg fell into the cup instead of flying across the room. What makes the plate stop moving? Students return to their seats and discuss what the sages said. If there is disagreement, the team stands. Discuss with whole class to clarify any misconceptions.

Elaborate

Design an experiment to test how the one change in the set-up might affect how the egg falls. Ask students what might be changed in the setup (manipulated variable). If you're brave, try 2 toilet paper tubes with 2 eggs making sure that the cups are directly beneath the tube/egg. Ask students what would happen if you used more than one egg. Have them formulate a hypothesis based on cause and effect. The effect would be the responding variable.

Evaluate

Show another discrepant event and have students respond. Fill a plastic zip lock bag with water and stick a sharpened pencil through it. Ask: What happened? Why? Have students draw and write to tell what happens. Have them ask a question based on what they observe.

Newton's First Law: Place a ball on the floor. Tell students to observe it for several minutes. Does it move? (It should not move. If it rolls, ask them to explain what force is acting on it – air flow, gravity if floor isn't level, etc.) Push the ball. Ask students to explain why it moved.

Extension:

Students often want to demonstrate what they learn to their parents. This should be encouraged. Allow students to center an index card over the top of a glass and place a coin directly over the glass in the middle of the index card. Using just one finger, flick the card from the side. If the card is flicked correctly, the card will fly to the side and the coin will fall into the glass.