



Egg Crusher: Engineering Design



Time: 50 Minutes

Skill Level: Beginning (age 9-11), Intermediate (age 12-14)

Background

What is Science Inquiry?

Children are natural scientists. From a very early age they explore the world, ask questions and seek answers. This journey of exploration and discovery is Science Inquiry. Science Inquiry helps young people understand their environment, solve problems and gain knowledge about scientific ideas and processes. In this activity students will use the engineering cycle to design test the sturdiness of an egg shell under various stresses.

Science and Engineering Practices Youth Should Become Familiar With Are:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Obtaining, evaluating, and communicating information

FYI-

Engineering begins with a problem, need or desire that suggests an engineering problem needs to be solved. Engineering makes use of models to test possible solutions to problems. A simple engineering design cycle consists of six steps:

1. State the Problem
2. Generate Ideas
3. Select a Solution
4. Build the Item
5. Evaluate
6. Present Results

Help the students use these steps to address the engineering challenge of the Egg Crusher.

Watch the Video: <http://oregon.4h.oregonstate.edu/science-engineering-and-technology>

Materials List:

For the Instructor's Preparations

2 pieces of scrap plywood or ¼ inch thick boards at least 4" wide and 18" long
1 piece of lumber: 2x4 @ 4 inches or 2x6 @ 4 inches for the spine of the egg crusher
3 or 4 hinges to attach the top board to the spine of the egg crusher
Nails or screws to attach the spine to the bottom board of the egg crusher
1 piece of lumber for the egg crusher platform- see this in the video

For the Students:

A variety of chicken eggs, cooked, raw, brown, and/or white
Paper egg carton and/or bubble wrap or cushioning
Miscellaneous weights or a scale
Chart paper or poster board to record data
Towels to clean up the mess.

Preparations:

Construct the egg crusher as shown in the video.

Discuss...What do students know about chicken eggs. Some may have backyard hens. Use the information on the video to discuss chicken egg design. Use the FYI section information to explain the engineering cycle. Discuss what can be varied in the experiment: type of padding, amount of weight. Select a design challenge that the groups agrees upon for the first egg test.

Predict...Generate Ideas. Select a Solution.

Experience "What to Do"- What is the plan for the investigation?

After the discussion and prediction have one student record the agreed upon plan for the first investigation. Run the test. Evaluate the results. Continue to ask and answer questions.

Share ...Guide students to share questions about their Egg Crusher results and encourage them to think about ways to answer their questions. Recording data is an important part of sharing.

Reflect ...Analyze and interpret the data and results. Discuss among the group.

Help the students develop questions of their own. Some example questions are: Are brown eggs stronger than white eggs? Are hard boiled eggs stronger than raw eggs? Do fresh eggs change the results? In which direction should the egg be placed in the crusher to hold the most weight? Does air temperature make a difference?

Generalize ...to real world examples. Construct explanations.

Ask the students to identify other structures that have a shape similar to an egg. Where in nature or in the built environment would you find structures similar to the egg?

Apply ...outside the classroom or club meeting. What position do chickens place their eggs when they are in the nest? Could you use the shape of the egg to build a house? What would be some other benefits of an egg shaped house?

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