



Science, Engineering,
Technology & Math

EGGS-ACTLY

Class Structure

INTRODUCTION

- Egg Kahoot!
- Structure of an Egg
- Egg Russian Roulette Intro

EGG STRUCTURE

- Walking on Eggs
- How Strong is an Eggshell (Stack with Books)
- Hardboiled Eggs
 - How To Make Them
 - Change Shapes

NAKED EGG

- Naked Egg Experiment (Creation with Vinegar)
- Naked Egg Experiment (Completion with Food Coloring)
 - Osmosis/Bouncing

EASTER

- Decorating Easter Eggs
- Easter Egg Hunt

EGG DROPS

- Humpty Dumpty Story
 - Build Our Own Humpty Dumpty Story (Egg Drop)
- Egg Drop (Glasses and Tray)

CASCARONES

- Egg Confetti

EGG FUN!

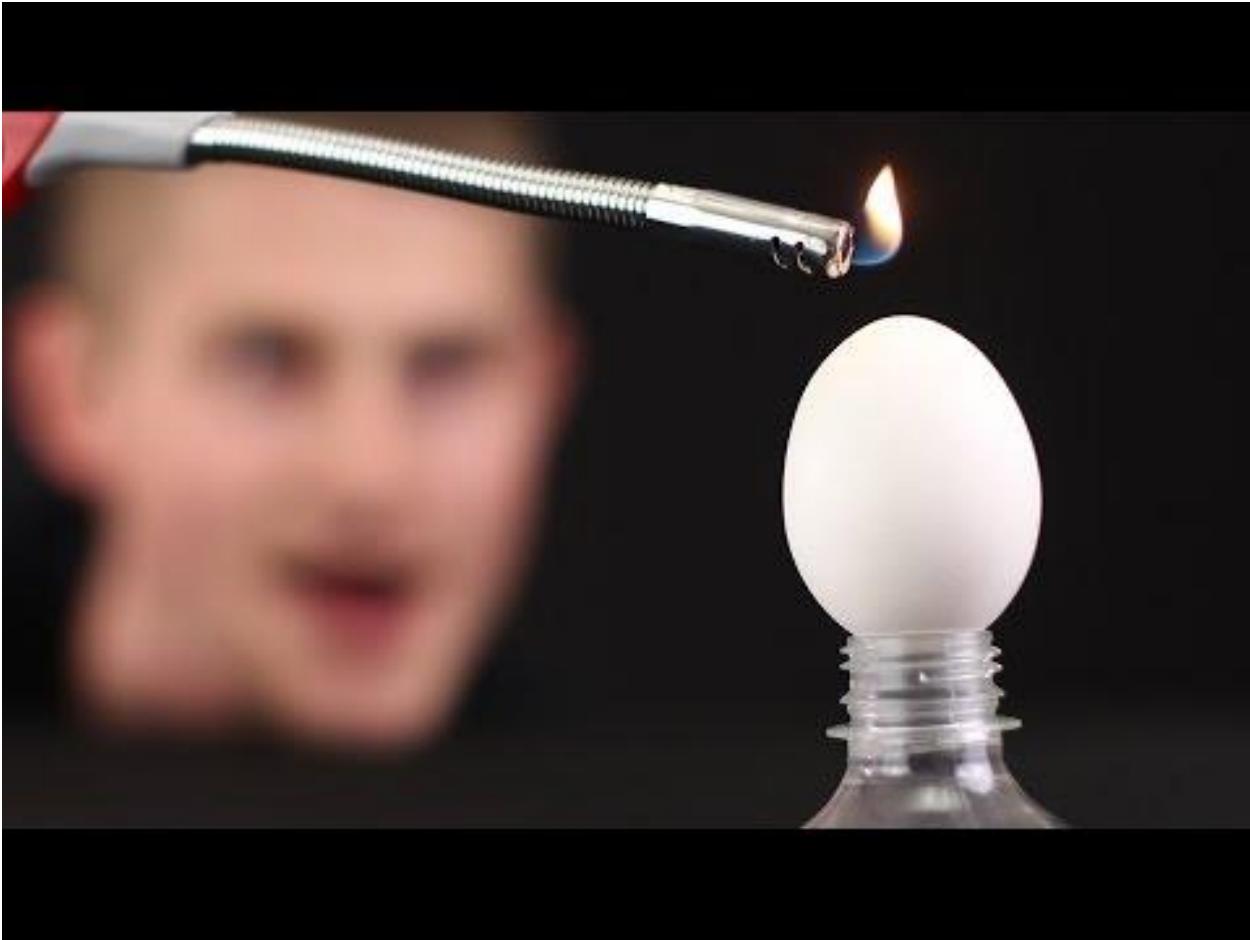
- FUN DAY!
 - Egg Races
 - Egg Bobbing
 - Egg Russian Roulette

EGG TOUR

Introduction

We only had one day in the first week, so I smashed all of these ideas together, and it went very well...

- Egg Kahoot! (To test their knowledge of the world of eggs)
 - https://create.kahoot.it/?_qa=1.239203971.1653822744.1455741718&deviceId=160182e3-7312-45e7-a34d-8913131a3d78#quiz/76b77a0d-c9d3-490a-8ead-8c8e1f10eb77
 - (^ the link for the Egg Kahoot that I created)
- Talk about structure of an egg
 - Why can a bird sit on her eggs without breaking them?
 - Experiment breaking the eggs (give everyone one egg and have them try to squish it longways and sideways with their bare hands...OUTSIDE!)
- Introduce rules and regulations for class/expectations/what is this class about?



10 *Awesome Tricks with Eggs*



IMPOSSIBLE EGG CRUSH

SICK!
science.

*Egg Crush Example
Video*

Egg Crush: Here's How You Do It

- Place an egg in the palm of your hand.
- Close your hand so that your fingers are completely wrapped around the egg.
- Squeeze the egg by applying even pressure all around the shell. If you're a little nervous about the outcome, try sealing the raw egg in a zipper-lock bag before putting the squeeze on it. You can also hold the egg over the sink if you're not in the super-brave category.
- Now hold the egg between your thumb and forefinger and squeeze the top and bottom of the egg. Are you covered in egg yolk? Why not?
- Hold the egg in the palm of your hand, again. Press only on one side of the shell. Do not squeeze the egg – just press on the side. Uh oh! Why do you think that happened?
- Instead of pressing on one side of the egg, put a ring a finger of your squeezing hand. Try to squeeze evenly around the entirety of the egg. What happens this time?

Egg Crush: Why Does it Work?

The egg's unique shape gives it tremendous strength, despite its fragility. Eggs are similar in shape to a 3-dimensional arch, one of the strongest architectural forms.

The egg is strongest at the top and the bottom (or at the highest point of the arch). That's why the egg doesn't break when you add pressure to both ends. The curved form of the shell also distributes pressure evenly all over the shell rather than concentrating it at any one point. By completely surrounding the egg with your hand, the pressure you apply by squeezing is distributed evenly all over the egg.

However, eggs do not stand up well to uneven forces which is why they crack easily on the side of a bowl (or why it cracked when you just pushed on one side or wore a ring). The uneven pressure of the ring against the shell will result in an amusing display of flying egg yolk for your audience members. This also explains how a hen can sit on an egg and not break it, but a tiny little chick can break through the eggshell – the weight of the hen is evenly distributed over the egg, while the pecking of the chick is an uneven force directed at just one spot on the egg.

Egg Structure- Strength

The eggshell is the sturdy protection of the fragile internal egg components. We don't usually pay much attention to the shell as it is the leftover waste after using an egg. For the function of the egg, however, the shell is vital. It gives physical strength due to its hard calcified structure, protects the egg from dirt and bacteria entering, prevents the egg from drying out, and serves as a calcium source for the developing chick.



<http://www.isonovatech.com/egg-structure-and-composition/>

Weight Lifting

Materials: 3 Raw eggs, Newspaper, A Stack of books, Knife, Paper towels or cleaning cloths

Before beginning the experiment predict how many books the eggs will support before breaking. Unfold the sheets of newspaper and lay several sheets flat on a table or countertop. Position two of the eggs in the middle of the newspaper so that they are a few inches apart. Now lay one of the books on top of the eggs. Keep placing books on top of the eggs until the eggs crack.

Now gently crack the remaining egg with the knife so that the egg is in two nearly-equal parts. Clean the yolk out of the shell halves. Spread clean newspaper on the tabletop. Lay the egg halves in the middle of the newspaper a few inches apart. Now lay a book on top of the eggs. Keep placing books on top of the eggs until the shells crack.

Did the eggshells support more weight than you had predicted? The curved shape of eggshells distributes the weight of the book over the entire egg so it is able to support more weight than a single point could.



Egg Structure- Strength

Materials: egg shells, paper holders (for the eggs), things to put on top of them!



Egg Structure- Walking On Eggshells

WALKING ON EGGS

Materials Needed: garbage bags, a few dozen eggs



Walking on Eggshells: Why Does it Work?

Plain and simple, the shape of the egg is the secret! The egg's unique shape gives it tremendous strength, despite its seeming fragility. Eggs are similar in shape to a three-dimensional arch, one of the strongest architectural forms. The egg is the strongest at the top and the bottom (or at the highest point of the arch). That's why the egg doesn't break when you add pressure to both ends. The curved form of the shell also distributes pressure evenly all over the shell rather than concentrating it at any one point. By completely surrounding the egg with your hand, the pressure you apply by squeezing is distributed evenly all over the egg. However, eggs do not stand up well to uneven forces, which is why they crack easily on the side of a bowl (or why it cracked when you just pushed on one side). This also explains how a hen can sit on an egg and not break it, but a tiny little chick can break through the eggshell. The weight of the hen is evenly distributed over the egg, while the pecking of the chick is an uneven force directed at just one spot on the egg.

If you guessed that the egg carton probably played a role in keeping the eggs from breaking, you're right. Joseph Coyle is credited as the inventor of the first container made specifically to keep eggs from breaking as they were transported from the local farm to the store. As the story goes, Coyle invented the egg carton in 1911 as a way to solve a dispute between a farmer and a hotel operator who blamed the farmer for delivering broken eggs. Coyle designed a container made out of thick paper with individual divots that supported each egg from the bottom while keeping the eggs separated from one another. As legend has it, the fully loaded egg carton can even be dropped, and if it lands just right, the eggs will survive the fall.

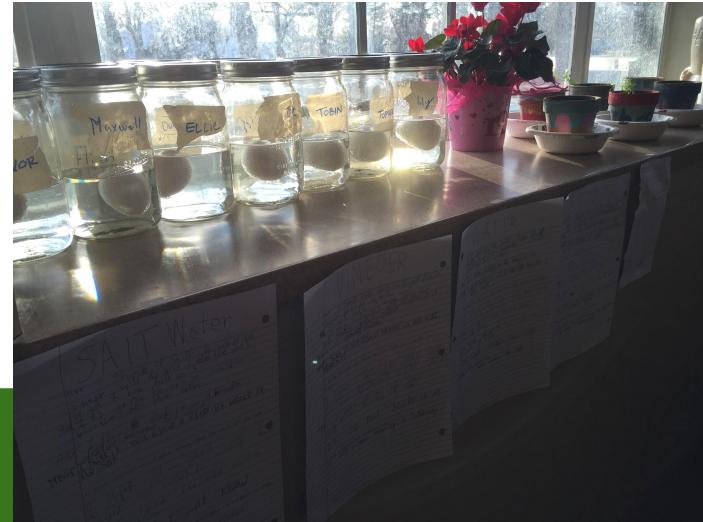
<http://www.stevespanglerscience.com/lab/experiments/walking-on-eggshells/>

Naked Egg (Part 1)

Materials Needed: large mason jars, vinegar, eggs, soda (any kind will work), salt, water

If eggshells are so strong, don't they have a weakness? Can anything eat away an eggshell?

Place the eggs in a large mason jar and pour in the vinegar (until it covers the egg). Make your predictions about each liquid (vinegar, soda, salt water, water) and its effect on the egg shell. We did ours on separate papers. The experiment will take 3 days to complete!



Soft Shell

Materials: Pin or Toothpicks, Egg, Cup, Soda (Any brand, but must be regular and not diet)

Gently use the pin to poke a hole in the top and the bottom of the egg without breaking the shell. Blow the insides of the egg out through one of the holes. If yolk won't come out, gently make the hole bigger.

Fill the cup with the sugary soda. Place the eggshell into the cup and leave it overnight. Have the kids predict what will happen to the shell. Check on the egg the following day. The shell will be soft. Expand on the experiment by asking what soda can do to other things like teeth.



Foldable Egg

Materials: Raw Egg, Vinegar, Cup, Spoon, Pin or Toothpick

Acetic acid in the vinegar breaks down the calcium carbonate in the eggshell, and the bubbles that form on the surface of the egg are CO₂. Eventually the hard shell of the egg disappears entirely and all that remains is the egg membrane. Because you have already blown out the contents of the egg, the membrane is just full of air. You can fold it up and the air will sneak out the tiny hole in the membrane that you used to blow the yolk out of the egg. The membrane will compress down into practically nothing. As you gently toss around and bounce the “folded egg” on your hand, the air will re-enter the membrane, expanding back into its original shape and volume.



Naked Egg (Part 2)

Materials Needed: toothbrushes, corn syrup, water, food coloring

Carefully take the eggs out of their mason jars after 3 days. The shell should be gone or close to it. Also very carefully, scrub the egg with a toothbrush to remove all of the remaining shell. After cleaning it off, replace the vinegar in the jar with corn syrup. The corn syrup will shrink the egg. This process should take a day to occur.

After shrinking the egg, replace the corn syrup with colored water and place the egg inside the jar. Leave them for a few days. At the end, you should have a bouncy, colorful egg!

Source:

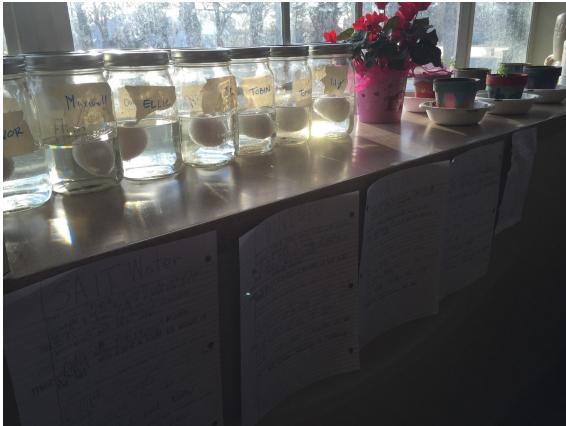
http://www.playdoughtoplato.com/cool-science-experiments/#_a5y_p=3482934



Naked Egg (Part 2)



Naked Egg (Part 2)



Naked Egg (Part 2)



Naked Egg: Why Does it Work?

Let's start with the bubbles you saw forming on the shell. The bubbles are carbon dioxide (CO_2). Vinegar is an acid called acetic acid (CH_3COOH), and white vinegar from the grocery store is usually about 4% acetic acid and 96% water. Eggshells are made up of calcium carbonate (CaCO_3). The acetic acid in the vinegar reacts with the calcium carbonate in the eggshell to make calcium acetate plus water and carbon dioxide bubbles that you see on the surface of the shell.

The egg looks translucent when you shine a flashlight through it because the hard outside shell is gone. The only part that remains is the thin membrane called a semipermeable membrane.

You might have noticed that the egg got a little bigger after soaking in the vinegar. Here's what happened... Some of the water in the vinegar solution (remember that household vinegar is 96% water) traveled through the egg's membrane in an effort to equalize the concentration of water on both sides of the membrane. This flow of water through a semipermeable membrane is called **osmosis**.

If you take your naked egg and place it in a glass filled with corn syrup, the egg will shrivel. Since corn syrup has a lower concentration of water than an egg does, the water in the egg moves through the membrane and into the corn syrup to equalize the water concentration levels on both sides.

Hard Boiling Eggs-The Science of It All

Materials: 1 ½ inch boxes (cardboard will do), rubber bands, hard boiled eggs

Objective #1: Teach how to hard boil an egg

Objective #2: Teach about what is happening to the egg while it is boiling

Objective #3: Change the shape of the egg

Source: <http://www.scientificamerican.com/article/shape-shifting-science-molding-hard-boiled-eggs/>

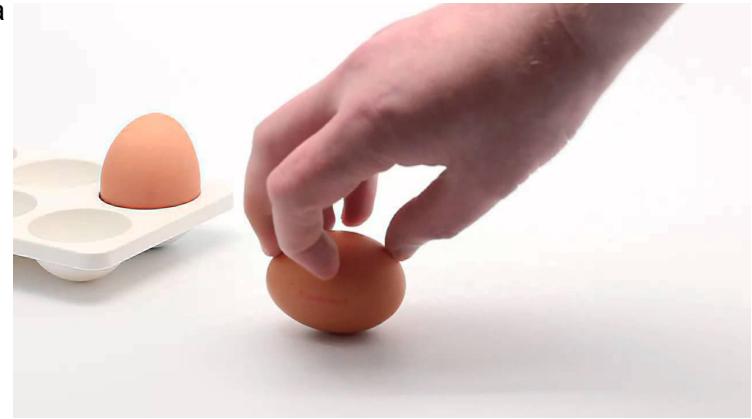
Check out the link...it's awesome!

Spinning Around

Materials: 1 hard-boiled egg, 1 raw egg

Ever wondered how you can tell the difference between a hard-boiled egg and a raw egg? Just spin them to figure it out. Place a hard-boiled egg and a raw egg on the table. Spin each of them and observe what happens. The boiled egg will spin faster. The raw egg will spin slowly. The reason for this has to do with the insides. The boiled egg is one solid piece. Therefore the whole egg spins in the same direction. The raw egg has liquid inside which moves separately from the shell. The movement of the inside of the raw egg keeps the whole egg from spinning quickly.

Observe what happens when you try to stop the spinning of the eggs. Spin the eggs and then put your finger on them to stop them. The boiled egg should stop immediately. The raw egg will keep spinning for a moment because the liquid inside the egg will keep moving.



Egg Etching

Materials Needed: vinegar, food coloring, tape, crayons, hardboiled eggs, plastic cups, newspaper/garbage bags

Let them design whatever they want with the crayons on the eggs before dipping them into the vinegar. You could also buy egg coloring kits and add vinegar for brighter colors.

<http://www.instructables.com/id/Egg-Etching/>



Natural Egg Dyes

Many common foods and spices make great dyes.

To make the dye, take 4 cups of chopped or mashed fruits and veggies, or 4 Tablespoons of spice, and boil them in 4 cups of water (use less if you're working with watery produce, such as spinach) and 2 Tablespoons of white vinegar. Let that simmer for 30 minutes. Then, strain out the bits of fruits or vegetables, and the remaining liquid is your dye.

Have fun trying other items you may have around: If it's brightly colored and stains your cutting board or fingers, chances are good it will stain eggshells nicely too.



Yellow onion skins = Yellow to dark orange

Turmeric or cumin = Bright yellow

Red beets = Pink to red

Red onion skins = Pale purple to red

Red cabbage = Blue (strange, but true)

Spinach = Green

Purple grape juice (use as is) = Lavender

Coffee (use as is) = Tan to brown

Chili powder = Orange

Raspberries or blackberries = Pink to purple

Yellow or green apple peels = Yellow-green

Egg Etching- Egg Hunt

Materials Needed: the hardboiled eggs from the past lesson!

I hid all of the eggs from the previous lesson all over a certain section of the park. They had to find the ones that they made from the day before. People with the earliest finishing time get a prize.

I also hid plastic eggs filled with candy for an extra prize.



Egg Drops

Materials needed: raw eggs, crayons, different soft materials (sand, packing peanuts, bubble wrap)

After showing the video, challenge the kids to create their own Humpty Dumpty story. They can decorate their own Humpty Dumpty egg and then drop him off of a wall! Place their choice of packing materials (in a plastic Ziploc) on the ground and drop the egg off!



Egg Drops

Materials needed: raw eggs, cardboard tubes, water filled glasses, tray

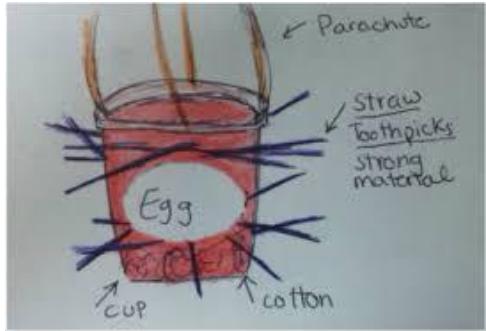
The goal is to get an egg to drop into a glass of water. Sound easy enough? Did I mention that the egg is perched high above the water on a cardboard tube and that a pie pan sits between the tube and the water? Still think it's easy? Sir Isaac Newton does. Once you try it, you'll be hooked!



Egg Drops

Materials Needed: whatever you want to give them to create their own egg drop!

There are a million ways to go with an egg drop, and it's really up to you. They love this activity! I suggest giving out prizes...it's really motivating.



Egg drop from different heights onto different materials

Drop Height(ft)		Result with different materials		
		grass	plastic bin	taravel
2	did not break	broke	did not break	did not break
5	did not break		did not break	bounced, hit top, broke
10	did not break		did not break	bounced, hit top, broke

inspirationlaboratories.com



<http://inspirationlaboratories.com/egg-drop-experiments/>

Cascarones

Materials Needed: eggs, confetti, fruity pebbles, tissue paper, glue, pin/toothpicks, scissors

Source: The website below is really what I used for this activity... I thought it gave an excellent description of what to do, and I don't have to recount it here!

<http://ohhappyday.com/2011/04/diy-party-confetti-egg-game/>



After we finished making our eggs, we played egg russian roulette with them!



EGG FUN!

I chose to finish the Egg session playing tons of fun egg games like...

- Egg/Spoon races
- Egg Russian Roulette (with raw eggs)
- Egg Tosses
- Another egg hunt

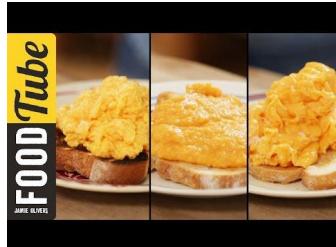
It was a fun way to end the session!

<https://www.babble.com/babble-voices/25-easter-party-ideas-for-kids/>



COOKING WITH EGGS

Scrambled Eggs 3 Ways



Omelets



Eggs Over Easy



Crepes



Poached Eggs 3 Ways



Fried Eggs



Frittata



Even More Ways to Cook Eggs!



Kids With Eggs



Egg Tour - Backyard Chickens

Backyard chickens are getting easier to find as there is a growing interest in urban farming and healthier eating. Ask around to see if you can find anyone with chickens that would be willing to host a group of eager kiddos to tour their coops.

Backup tours:

Wheeler Farm

IFA Stores

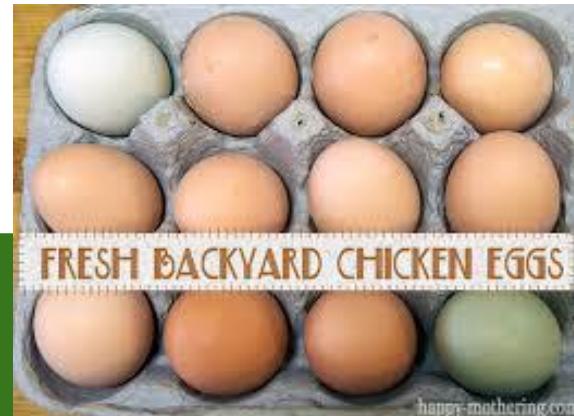
Wasatch Community Gardens



<https://www.ksl.com/?nid=148&sid=28941574>

<http://www.offthegridnews.com/how-to-2/7-tips-for-keeping-backyard-chicken-eggs-safe-to-eat/>

<http://modernfarmer.com/2014/07/raising-backyard-chickens-dummies/>



To Sink or Float

Materials: Salt, Tablespoon, 2 clear glasses, Warm water, 2 raw eggs

Place the two glasses of warm water on a table. Add about 10 heaping tablespoons of salt to one of the glasses and stir until the salt is dissolved in the water. Place an egg in each glass and observe what happens.

Expand on the experiment by mixing the two types of water. Remove the eggs from the glasses. Empty about half of the salt water. Then pour the plain water into the salt water cup up to the amount the glass had before. Place the egg in the cup. The egg will float in the middle of the cup.

Make the egg rise to the top again by removing the normal water. With the egg still in the glass, begin slowly removing the water a spoonful at a time. The egg will rise higher and higher as each spoonful is removed.

The egg floats in salt water because of density. Saltwater is denser than the egg thereby causing the egg to rise to the top. The egg is denser than normal water, though, which is why it sinks to the bottom when in the cup of normal water.



Suck It In

Materials: Glass bottle or jar with a narrow opening, Matches, Newspaper, Hard-boiled, peeled egg

In this experiment, the egg will be sucked into the bottle. First, sit the egg in the mouth of the bottle. The egg should sit in the opening without falling in. Now move the egg away and light the piece of newspaper and drop it into the bottle. Quickly place the egg over the opening of the bottle with the narrow part of the egg pointing down into the bottle.

As you watch, the egg will get sucked down into the bottle. Now try to get the egg back out of the bottle. It won't be able to go back through the opening without breaking apart.

The egg gets sucked into the bottle because the fire causes the air pressure inside the bottle to become less than the air outside. The air on the outside of the bottle is greater than the air in the bottle, so the egg gets sucked in. The egg won't come back out of the bottle easily because the pressures have stabilized and there is no force acting on the egg.



Egg Geodes

Materials: Pin, Egg, Cup, Alum Powder, Food Coloring, White Glue, Paint Brush

Your eggshell geode is formed through a process called sedimentation.

While a geological geode is a mass of minerals within a rock that can take thousands, even millions, of years to form, your Egg Geode only takes a couple of days. The heated alum solution contains suspended particles of alum powder in it and as the solution cools, these particles of alum begin falling to the bottom. When the alum particles settle on the bottom, they begin crystallizing. Coating the shell with alum powder beforehand gives the suspended alum particles a surface to which they can more readily attach themselves. The particles that settle onto the interior surface of the shell crystallize quickly but you will also see evidence of crystallization on other parts of the shell as well as on the bottom and sides of the bowl.





*Egg Crush Example
Video*

EGG-STRAS

https://www.buzzfeed.com/kasiagalazka/things-you-can-do-with-eggs-besides-coloring-them?utm_term=.ogWr1z3qB#.jlJ2pBwRQ

<http://www.stevespanglerscience.com/lab/experiments/amazing-egg/>

<https://www.exploratorium.edu/cooking/eggs/eggscience.html>

<http://tinkerlab.com/60-egg-activities-for-kids/>

<http://www.studentguide.org/all-things-eggs-activities-experiments-art-more/>

<https://owlcation.com/academia/Egg-tremelyFunandEasyEggExperiments>