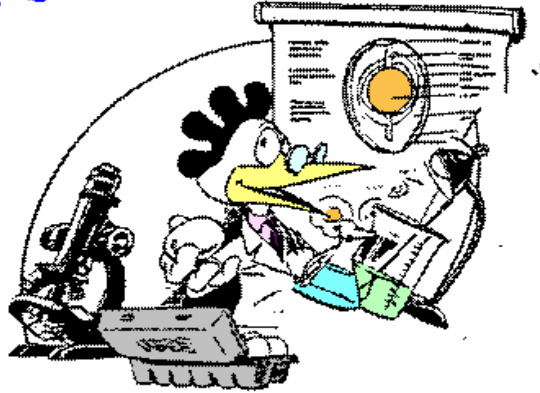


# "EGGPERIMENTS"



**"Eggsplore" science with these fascinating experiments featuring versatile, economical, nutritious, delicious eggs!**

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## **Eggs in a Bottle**

**Supplies:** 8 ounce glass baby bottle (or bottle with opening that is smaller than an egg)  
1 hard-cooked and peeled egg (slightly larger than the bottle opening)  
1 tablespoon of oil, butter or margarine  
1 match  
1 4x4 inch piece of paper

### **Steps:**

1. Smear the oil, butter, or margarine around the top edge of the bottle opening.
  2. Fold the paper accordion-style, light it, quickly plunge it into the bottle, and immediately place the egg over the opening.
  3. Watch the egg start dropping into the bottle and eventually plop to the bottom. The air and gases produced by the burning paper are heated by the flame and expand. Some of the gases work their way past the egg which is acting as a one-way valve. When the fire goes out, the gases contract, forming a vacuum and the egg plops into the bottle.
  4. If you want to get the egg out of the bottle, continue on by filling the bottle with water to rinse it out.
  5. Turn the bottle upside down over the sink or a bucket. Use your fingers to hold the egg away from the opening so that all the water and remaining burnt paper comes out of the bottle.
  6. When the water and paper is gone, let the egg fall back into the opening of the jar. Blow as hard as you can into the bottle. Your air flows past the egg. When you stop blowing, air pressure behind the egg forces the egg out of the bottle and into your hand.
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## **“EGGS”tra Strong**

**Supplies:** raw eggs  
plastic sandwich bag that can be sealed

### **Steps:**

1. Place an egg in a plastic bag and seal the bag.
  2. Have a student try crushing the egg, using their hands, by squeezing the small and large ends and then by squeezing the sides. (Remove rings from your hands because the rings may pierce the eggs.) It is nearly impossible to break an egg by squeezing it on the ends because the curvature of the egg distributes pressure evenly over the shell. The sides do not have the same curvature and are therefore not as strong.
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## **SUPER EGG!**

**Supplies:** 3 raw eggs  
1 empty 6 oz. frozen juice can  
1 empty 12 oz. frozen juice can  
variety of full food packages marked by weight such as 5 lbs. sugar, 2 lbs. rice  
or use books that have been weighted, or use small weights

### **Steps:**

1. Ask students how much weight they think an egg can hold. Record responses on the board along with the size and grade of the eggs (from the carton).
2. Put the small can, open end down, on a table. Place an egg on top of the can.
3. Line the inside of the large can with a paper towel (to prevent slippage and dripping) and cover the egg with the large can. (You may want to cut a small strip out of the side of the can, so you can continue to examine the egg for cracks.
4. Gently place your weights on top of the can – starting with the heaviest weights and adding smaller ones. Keep adding until you hear the egg crack. Everyone needs to be quiet to hear the sound. Take off your weights, add them up and record the results. Repeat these steps with the other two eggs. Because of the curvature of the egg shell, egg shells are stronger than you might think. If you have access to an ostrich egg, notice how thick and strong the egg is. Just think of how far it has to drop from the ostrich!

## **“EGGS”aminations**

**Supplies:** raw eggs flashlight  
hard-cooked eggs cardboard

### **Steps:**

1. Cut the cardboard to fit over the face of the flashlight. Make a round hole, about 1 ½ inches in diameter, in the center of the cardboard. Tape the cardboard to the flashlight.
2. Hold the raw egg over the hole on the flashlight. You should be able to see the yolk, white and air cell. This is called candling. Eggs are held up to a bright light to check the size of the air cell, if the yolk is centered and if the white is clear. The light also shows if there are any cracks or checks (very tiny cracks) in the egg shell. If any imperfections appear, the eggs are not sent on for packaging to consumers. This is how eggs get their grades—AA, A or B. Grade AA has the best exterior and interior qualities.
3. Now view the hard-cooked egg. Can you see anything? Why not? When the egg was cooked, the heat caused the egg protein to coagulate (turn from liquid to solid). This particularly happens in the egg white, so you can no longer see through it.
4. Mix up the raw and hard-cooked eggs, so you can't tell which one is which.
5. On a smooth surface, spin the eggs. Notice that some eggs spin while others wobble. The hard-cooked eggs spin, because they are solid. Because of the liquid in the raw eggs, they tend to wobble.

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## **Floating Eggs**

**Supplies:** raw eggs salt  
Drinking glasses large enough to hold egg and water spoon  
Tap water

### **Steps:**

1. Fill a glass with enough water to cover an egg.
2. Use the spoon to lower a raw egg into the water. Does the egg sink or rise to the top? Eggs have air cells. Eggs with smaller egg cells have higher grades. A large air cell is not an indication of freshness, hens can lay eggs with various sizes of air cells. If the air cell is large enough, the egg can float in the water. If the egg has sunk to the bottom of the glass, the egg is heavier than the water.
3. Add one teaspoon of salt to the water and stir carefully, so you don't break the egg. Continue to add more salt until the egg floats. Now the water is heavier than the egg.

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## **Kitchen “EGGS”periments**

You may want to assign five smaller groups to complete these experiments and report back to the entire class.

### **Suspension**

**Supplies:** oil  
water  
jar with tight fitting lid

### **Steps:**

1. Put a small amount of oil and water in a jar.
2. Shake vigorously. The heavier liquid sinks and the lighter liquid stays suspended on the top.

### **Emulsion**

**Supplies:** see recipe for ingredients spoon blender or mixer  
Saucepan hot plate or stove storage container

### **Steps:**

1. Make the following recipe for mayonnaise.

### *Cooked Mayonnaise*

*(makes 1 ½ cups)*

<i>2 egg yolks</i>	<i>2 tablespoons water</i>	<i>1 teaspoon dry mustard</i>	<i>dash pepper</i>
<i>2 tablespoons vinegar or lemon juice</i>	<i>1 teaspoon sugar</i>	<i>½ teaspoon salt</i>	<i>1 cup cooking oil</i>

*In small saucepan, stir together egg yolks, vinegar, water, sugar, mustard, salt and pepper until thoroughly blended. Cook over very low heat, stirring constantly, until mixture bubbles in 1 or 2 places. Remove from heat. Let stand 4 minutes. Pour into blender container or mixing bowl. Cover and blend or beat at high speed. While blending or beating, very slowly add oil. Blend or beat until thick and smooth. (If necessary, turn off blender and scrape down sides with rubber spatula.) Cover and chill if not using immediately. (From AEB)*

2. Did the oil separate? Why not? The egg yolks act as an emulsifier. An emulsifier stabilizes mixtures so they don't separate. The egg yolks keep the oil and the liquid (vinegar or lemon juice) evenly blended. Otherwise, the oil would sink to the bottom, because it is a suspension.

### **Coagulation**

Supplies: see recipe for ingredients hot plate or stove  
10 inch non-stick skillet pancake turner

Steps:

1. Make the following recipe for scrambled eggs.

### *Scrambled Eggs* *(makes 3 to 4 servings)*

<i>6 eggs</i>	<i>salt and pepper to taste</i>
<i>1/3 cup milk</i>	<i>1 teaspoon margarine or pan spray</i>

*Beat eggs, milk, salt and pepper. Heat margarine or pan spray in a 10 inch skillet over medium heat. Pour in eggs. With pancake turner, lift and fold eggs until no visible liquid remains.*

2. How did the eggs turn from liquid to a semi-solid? The heat causes the egg protein to coagulate.

### **Leavening**

Supplies: 4 eggs electric mixer  
1 large mixing bowl 2 plastic rulers labeled "whites" and "yolks"  
1 small mixing bowl

Steps:

1. Separate four eggs. Placing the whites in a large mixing bowl and the yolks in a small mixing bowl. Observe the total volume, texture and color of each. Measure the depth of the whites and the yolks by placing the plastic ruler straight down in the center of the bowl. Make sure you use the "whites" ruler only on the whites and the "yolks" ruler only on the yolks. If any fat from the yolks gets into the whites, the whites will not beat up as high. Record the measurements and observations.
2. Using an electric mixer and a large mixing bowl, beat the whites on a high speed until they are foamy. Observe the volume, texture and color changes. Measure the depth of the whites the same way as you did in step one. Record the measurements and observations. When the eggs are beaten, a foam of tiny air bubbles is formed. The foam lightens the mixture and increases its volume.
3. Continue beating the eggs until they form stiff (but not dry) peaks. Observe the volume, texture and color changes. Measure the depth of the whites the same as you did in steps one and two. Record the measurements and observations. Compare the results. Up to a point, the longer the egg whites are beaten the more they foam. If the egg whites are over beaten the air cells begin to break.
4. In a small mixing bowl, beat egg yolks on high speed for 3 to 5 minutes or until they're thick and lemon colored. Observe volume, texture and color changes. Measure the depth of the yolks the same way as you did in step one. Record the measurements and observations. Compare the results.

5. Make observations of an angel food cake made with egg whites only and a pound cake made with both egg whites and egg yolks. When egg white foam is heated, like in the angel food cake, the air bubbles expand and the protein coagulates around the air bubbles. The coagulated egg white protein traps the air bubbles and makes the product light and airy. When egg yolks are beaten into a foam, the air cells are surrounded by fat which does not become as light and airy. This is called leavening.

### **Coating or Glazing**

Supplies:      1 egg                              1 cookie sheet  
                  1 small bowl                      brush (or folded paper towel)  
                  1 tube biscuits                      stove or toaster oven  
                  1 jar sesame seeds                small bowl

### **Steps:**

1. Beat egg in a small bowl.
2. Brush half the tube biscuits with the beaten egg. Sprinkle sesame seeds on the top.
3. Sprinkle sesame seeds on the remaining biscuits that have not been brushed with eggs.
4. Bake the biscuits according to the directions on the package.
5. Compare the number of seeds that remain on each of the biscuits. Also look at the appearance and texture of the biscuits. The egg glazes the crust leaving a shine and making it crispier. Besides breads, pie crusts are often brushed with eggs.