

*Note: The Naked egg activity requires 24 hour prep time to show students finished product.

The Amazing Egg

Objective: To explain the parts of the egg and perform interesting egg experiments.

Materials:

- Eggs
- White Vinegar
- Bucket
- Big Spoon
- Straws (15 per group)
- Popsicle Sticks (10 per group)
- Masking tape
- Glass bottle with opening slightly smaller than width of egg
- Matches
- Tarp
- Spoons

10 minutes; Introduce parts of the egg. See diagram and definitions below.

15 minutes; Naked Eggs Activity (2 day project)

1. Place your eggs in the container so that they are not touching.
2. Add enough vinegar to cover the eggs. Notice that bubbles form on the eggs. Cover the container, put it in the refrigerator, and let the eggs sit in the vinegar for 24 hours.
3. Use your big spoon to scoop the eggs out of the vinegar. Be careful—since the eggshell has been dissolving, the egg membrane may be the only thing holding the egg together. The membrane is not as durable as the shell.
4. Carefully dump out the vinegar. Put the eggs back in the container and cover them with fresh vinegar. Leave the eggs in the refrigerator for another 24 hours.
5. Show finished product. This must be previously prepared by instructor.
6. Scoop the eggs out again and rinse them carefully. If any of the membranes have broken, letting the egg ooze out, throw those eggs away.
7. When you're done, you'll have an egg without a shell. It looks like an egg, but it's translucent—and the membrane flexes when you squeeze it. Very cool!

When you submerge an egg in vinegar, the shell dissolves. Vinegar contains acetic acid, which breaks apart the solid calcium carbonate crystals that make up the eggshell into their calcium and carbonate parts. The calcium ions (ions are atoms that are missing electrons) float free, while the carbonate goes to make carbon dioxide—the bubbles that you see.

10 minutes; Egg and Jar Experiment

1. Place a peeled, hard-boiled egg on top of the glass jar to show that it does not fit.
2. Light two matches.
3. Lift the egg and drop the burning matches into the bottle.

4. Immediately replace the egg onto the bottle. It might jump up and down a little but don't touch it, just watch and see what happens.

20-30 minutes; Egg Drop Activity

Use 1 egg, 15 straws, 10 popsicle sticks, and 1 meter of tape per group. With these materials, design a container that will stop an egg from breaking when it is dropped from 10 feet.

If time permits, egg and spoon races can be done.

Egg Definitions

- **Air Cell** - an empty space located at the large end of the egg; it is between the inner and outer shell membranes.
- **Chalaza** - a spiral, rope-like strand that anchors the yolk in the thick egg white. There are two chalazae anchoring each yolk; one on the top and one on the bottom. (The plural of chalaza is chalazae.)
- **Germinal Disc or Blastodisc** - a small, circular, white spot (2-3 mm across) on the surface of the yolk; it is where the sperm enters the egg. The nucleus of the egg is in the blastodisc.
- **Inner Shell Membrane** - the thin membrane located between the outer shell membrane and the albumin.
- **Outer Shell Membrane** - the thin membrane located just inside the shell.
- **Shell** - the hard, protective coating of the egg. It is semi-permeable; it lets gas exchange occur, but keeps other substances from entering the egg. The shell is made of calcium carbonate.
- **Thick Albumin** - the stringy part of the egg white (albumin) located nearest the yolk.
- **Thin Albumin** - the watery part of the egg white (albumin) located farthest from the yolk.
- **Vitelline (yolk) Membrane** - the membrane that surrounds the yolk.
- **Yolk** - the yellow, inner part of the egg where the embryo will form. The yolk contains the food that will nourish the embryo as it grows.

