Plastic Brains-What?

Objective: To learn about how our brain changes when we learn new things and that it is possible to teach an old dog new tricks!

Materials:

Bouncy balls
Crayons, paper and brain hat sheets
Upside down goggles and operation game

Introduction:

What is a plastic brain?
What is brain plasticity? Does it mean that our brains are made of plastic? Of course not. Plasticity, or neuroplasticity, describes how experiences reorganize neural pathways in the brain. Long lasting functional changes in the brain occur when we learn new things or memorize new information. These changes in neural connections are what we call neuroplasticity.
Our brains re-wire. Our brains re-map.

Activities:

color a brain hat to wear! Try coloring with both hands or the opposite hand.
- write with opposite hand
-bounce a bouncy ball with opposite hand
-use peripheral vision (hold an object to the side of the visitor's head and have them guess what it is without looking) or use colored paper and have them guess what color the paper is in the peripheral vision
-listen to a kids song and try to memorize the words
-also play any of the memory games

Go over how you learn and how memories are formed and physical changes in the brain (see info below)

-use the upside down goggles to change the way your brain receives information and see if your brain can adapt by doing every day things with the goggles on. Also, try playing the operation game while wearing the goggles!

Estimation games: flat images first then ask how many jellybeans are in the container not just what they see. or just watch video on the brain games NatGeo episode 7 website

ANYONE'S GUESS You don't have to split atoms to guess how many jelly beans are in this jar. Simply break the problem into steps.
1 Approximate the jar's radius (r) in beans. (Hint: Count the jar's width, then divide by two.)
2 Estimate its height (h) in beans.
3 Use these numbers to figure the jar's occupied volume: $V = \pi r2 \times h$. Round π off to three.
4 Gloat (Put your mouse over the jar photo and wait for the answer.)

Background:

Up until the 1960s, researchers believed that changes in the brain could only take place during childhood but that's not true! You can teach an old dog new tricks! Modern research has demonstrated that the brain continues to create new neural pathways and alter existing ones in order to adapt to new experiences, learn new information and create new memories.

According to the website Neuroscience for Kids, there are four key facts about neuroplasticity:

1. It can vary by age; while plasticity occurs throughout the lifetime, certain types of changes are more predominant during specific life ages.
2. It involves a variety of processes; plasticity is ongoing throughout life and involves brain cells other than neurons, including glial and vascular cells.
3. It can happen for two different reasons; as a result of learning, experience and memory formation, or as a result of damage to the brain.
4. Environment plays an essential role in the process, but genetics can also have an influence.

Read: https://faculty.washington.edu/chudler/plast.html
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2896818/

Watch:
http://braingames.nationalgeographic.com/episode/7/

Plasticity of Learning and Memory

So how does the brain change with learning? According to Durbach (2000), there appear to be at least two types of modifications that occur in the brain with learning:

- A change in the internal structure of the neurons, the most notable being in the area of synapses.
- An increase in the number of synapses between neurons.

Injury-induced Plasticity: Plasticity and Brain Repair

During brain repair following injury, plastic changes are geared towards maximizing function in spite of the damaged brain. In studies involving rats in which one area of the brain was damaged, brain cells surrounding the damaged area underwent changes in their function and shape that allowed them to take on the functions of the damaged cells. Although this phenomenon has not been widely studied in humans, data indicate that similar (though less effective) changes occur in human brains following injury.