

# BIONIC KIDS

## WEEK 1: The BRAIN

EVER WONDER . . . HOW MUCH YOUR BRAIN WEIGHS?

### What we learned this week:

- ◆ What the parts of the brain are and how the brain controls the body.
- ◆ How we can protect our brain.
- ◆ That the brain is divided into left and right sides and how we can tell which side of the brain is dominant.
- ◆ How to exercise your brain in keep your brain healthy.

### Today's Experiments

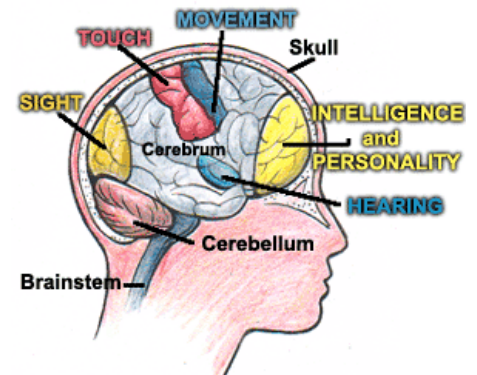
1. Explore the Fragile Brain.
2. Experiment with Safety Helmets.
3. Experiment with Right Brain/Left Brain.
4. Experiment with Brain Teasers.

### Did You Know?

- ◆ The human brain is an amazing thing! It looks and feels like a sponge and weighs only three pounds, but it is in charge of your whole body. It controls your breathing, heart rate, muscle coordination, and is also the center for your thoughts and imagination. Your brain has many different parts working together, including:

- **Cerebrum:** This is the biggest part of the brain and makes up about 85% of the brain's weight. It has grooves and folds in a pattern that differs for each person. Parts of the cerebrum help you see, hear, speak, think, have feelings, move your body and more. The cerebrum has two sides: the left side controls the right side of your body, and the right side controls the left! So, if you are right handed, you are left brain dominant. And vice-versa. The left side also controls logic, while the right side controls creativity.

- **Cerebellum:** This is at the back of the brain and is a lot smaller than the cerebrum. This is where your brain controls your balance, movement and coordination.



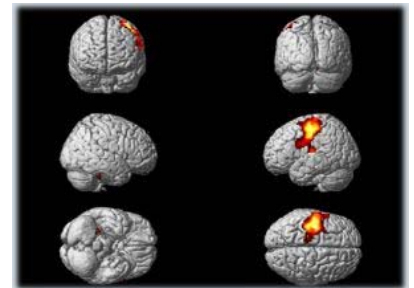
- **Brain stem:** This is found beneath the cerebrum and in front of the cerebellum. The brain stem connects the brain to the spinal cord that runs all the way down your back. This is where the brain controls the important functions that keep you alive. It controls things like breathing, digestion and blood flow.

- **Hypothalamus:** This is your body's thermostat. If you get too hot, the hypothalamus will cause your body to sweat to cool you down. If you get too cold, the hypothalamus will cause you to shiver and warm yourself up.

- ◆ Ever wonder how your brain helps you learn? You were born with billions of nerve cells called neurons. As an infant, most of these neurons were not yet connected together. As you learn more and more each day, the brain connects these neurons in pathways that make you able to do things more easily. Remember when you were first learning to rollerblade or ride a bike? You had to really concentrate on staying balanced and going straight. With practice, your brain created certain pathways that allow you to rollerblade or ride a bike without even thinking about it. Brainteasers, along with doing puzzles, reading, playing music and making art are all great ways to exercise your brain!
- ◆ The brain is suspended in a fluid called the cerebro-spinal fluid, surrounded by three tough layers called the meninges, and encased in bone. Even then, it still needs protection sometimes!

## Science in Your World

There is a new method of lie detection available that uses MRI (magnetic resonance imaging) instead of the widely used polygraph technology. The polygraph test measures heartbeat, blood pressure and respiration rates to indicate whether or not someone is lying. But this new lie detector technology, called fMRI (functional magnetic resonance imaging), “films” the brain to see how it responds when someone lies. In the fMRI, different parts of the brain appear to light up as they are being used. When someone is lying, their brain is much more active, because the person has to come up with the lie and then make sure that they don’t sweat, blush, or look nervous. Therefore, under the fMRI, their brain appears to “light up” in many different places. When someone is telling the truth, however, just a small part of the brain, where that truth is stored, will “light up.” This would be an excellent tool for forensic scientists, who could use this when they question suspects to solve crimes.



## Curiosity @ Home

Grow a brain! This is kind of a silly toy, but once the brain is fully hydrated, it will be about the same size and weight as your real brain! Also, try out the brainteasers we did in class on your friends or parents. Can they solve them? Here are the directions:

**Brainteaser 1.** Arrange 8 toothpicks into a large square where each side is 2 toothpicks long. Add 4 toothpicks in the center to divide the square into 4 smaller squares. Now, can you remove 2 toothpicks so that you are left with 2 complete squares?

(Answer: Remove any 2 adjacent toothpicks of the 4 inside. You will have 2 squares left: one large square and one small.)

**Brainteaser 2.** Arrange 6 toothpicks side by side in a row, about an inch apart. Make sure that the toothpicks are vertical. Can you add 5 more toothpicks and end up with 9?

(Answer: By putting one toothpick at an angle between the first and second toothpicks it makes an N. Do this again between the 4<sup>th</sup> and 5<sup>th</sup> toothpicks for another N. Then, add 3 toothpicks to the last one to make an E. This spells out NINE! )

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