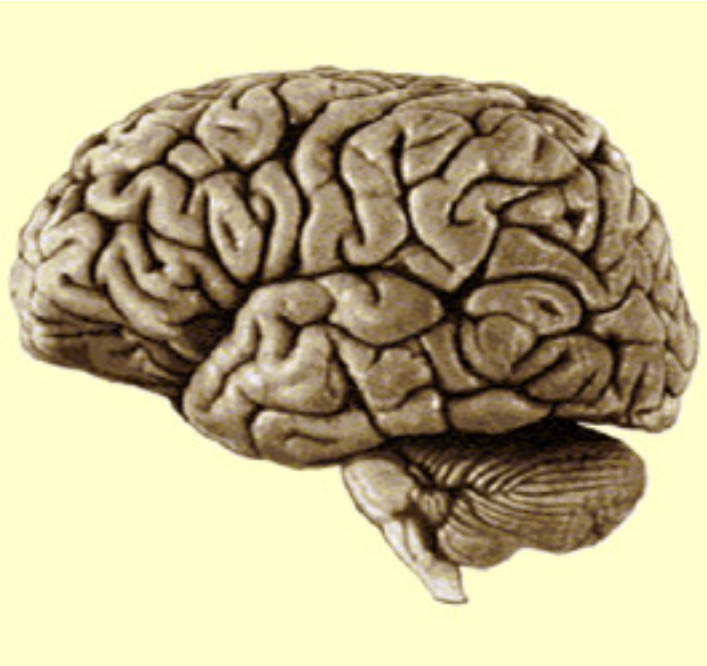
Brain Zoo Student Guide **Student Name:** _____

Parts of the Brain



Match the terms to the picture.

1. Cerebrum
2. Cerebellum
3. Brain Stem

Activity 1: At each station is a different kind of brain and a task. You will have 2-3 minutes to perform the task before moving in rotation to the next station. Record the task on the line below; write your response on the poster paper. If you have time, you may record your response below but time is very limited so don't worry about filling in information below as you move through the stations. You will have time to record your responses as well as other students' responses at the end of the task.

STATION 1 TASK: _____

_____

My Response:
Other Ideas:

STATION 2 TASK: _____

_____

My Response:
Other Ideas:

STATION 3 TASK: _____

My Response:
Other Ideas:

STATION 4 TASK: _____

My Response:
Other Ideas:

STATION 5 TASK: _____

My Response:
Other Ideas:

STATION 6 TASK: _____

My Response:
Other Ideas:

STATION 7 TASK: _____

COMPARE

My Response:
Other Ideas:

CONTRAST

My Response:
Other Ideas:

Activity 2: In Activity 2 you will rotate through the stations again; this time try to figure out what kind of brain it is. Use your observations of brain structure to make inferences and record your ideas in the Evidence Box. It is not expected that you will figure out all of the brains yet, so keep track of questions or points of confusion – you will get to "buy" hints later. Don't fill in the Claim & Reasoning portion below until after you've had a chance to get hints – unless you are very confident.

Station 1 Need-to-Know List:

_____

_____

Evidence Box:

Station 1 Claim: _____

Reasoning: _____

Station 2 Need-to-Know List:

_____

_____

Evidence Box:

Station 2 Claim: _____

Reasoning: _____

Station 3 Need-to-Know List:

_____

_____

Evidence Box:

Station 3 Claim: _____

Reasoning: _____

Station 4 Need-to-Know List:

_____

_____

Evidence Box:

Station 4 Claim: _____

Reasoning: _____

Brain Zoo Student Guide **Student Name:** _____

Station 5 Need-to-Know List:

_____

_____

Evidence Box:

Station 6 Need-to-Know List:

_____

_____

Evidence Box:

Station 5 Claim: _____

Reasoning: _____

Station 6 Claim: _____

Reasoning: _____

Station 7 Need-to-Know List:

_____

Evidence Box:

Station 7 Claim: _____

Reasoning: _____

Comparative Brain Anatomy: An Introduction to Structure and Function Relationships (to be read during the activity)

Much can be learned from comparing brain anatomy. Observing a real brain is incredibly interesting. There is simply no substitute for viewing nature's work first hand. Pictures and videos are great tools but a real specimen evokes wonder, curiosity, and a desire to understand. These "wonderstandings" never fail to reveal the unexpected along with the anticipated, and help remind us of our connection to the natural world. What can be learned about the needs and behaviors of an animal by observing external brain anatomy?

A major concept throughout science is that form follows function. Another way of saying this is the structure of something is important to how it works. This is true of human-made objects as well as things in nature. A wheel is round because that shape facilitates rolling which is necessary to drive a car. Your fingers and toes have different shapes because they perform different tasks to meet the needs of your body. You don't often need to hold a fork with your foot so toes don't need the same range of motion that your thumb and other fingers do to grasp items. This same principle can be applied to less obvious things including your brain.

Humans have a brain that is structurally similar to the brain of a whale because they are both mammals, and all living things must be able to respond to stimuli to meet their needs for food, safety, and maintenance of homeostasis. At the same time, there are obvious differences because we live in different environments and have different needs. The reverse is also true -- the structure, function, and behavior of other animal brains can be used to understand the human brain and its evolution.

Scientists commonly use what is known about one object to help them understand an unfamiliar phenomenon or living thing. As an example, anthropologists use known skeletons, called a *reference collection*, to help them identify bones they find in the field. The same process can be used to understand anatomy. Scientists can use what we know about the human brain to understand the brains of other organisms and identify evolutionary relationships among those organisms.

Animal brains are structured similarly. We can use the known functions of a region in a sheep's brain to suggest possible functions in that same region of a human brain. The brain's most obvious external structures are the brain stem, cerebellum, and cerebrum.

The **brain stem** is responsible for involuntary, necessary functions like breathing and heart rate.

The **cerebellum**, on the dorsal side of the brain, is responsible for coordination and balance.

The **cerebrum** processes, integrates, and coordinates sensory and motor functions, emotions, thinking, and decision-making. The cerebrum is divided into **four lobes**:

- The **frontal lobe** is the site of reasoning and contains a region responsible for voluntary movement.
- The **parietal lobe** is responsible for sensory processing and integration.
- The **temporal lobe**, located on the lateral sides of the brain near the ears, is involved in hearing and object identification.
- The **occipital lobe** is responsible for processing visual information.

Described above are the general functions of the four lobes; this is an introductory overview. In reality, each lobe is far more complex.