Nervous System Lab

Pre –Lab (Homework)
You have been entrusted with the care and feeding of the most extraordinary and complex creation in the universe. Home to your mind and personality, your brain houses your cherished memories and future hopes. It orchestrates the symphony of consciousness that gives you purpose and passion, motion and emotion. Go to http://www.alz.org/alzheimers_disease_4719.asp sponsored by the Alzheimer's Association and take a tour of the brain. Click on "Start the Tour".

1. Three pounds, three parts: What is the texture of the brain?

   _____

2. Name the general function of each main brain part:
   Cerebrum

   _____
   Cerebellum

   _____
   Brain Stem

   _____
3. Supply Lines: What % of energy and oxygen will the brain use when you are thinking hard?

   _____
4. The Cortex: "Thinking Wrinkles": Read the script.
5. Left Brain/Right Brain: Where is the language area of the brain?

   _____
6. The Neuron Forest: How does Alzheimer's affect neurons?

   _____
7. Cell Signaling: What is the function of a neurotransmitter?

   _____
8. Signal Coding: What lobe of the brain lights up on a PET scan when you:
   Read words? _____
   Hear words? _____
   Think about words? _____

Continue to Click through the modules to see how Alzheimer's affects the brain.

Classroom Activities

Neuroanatomy & Function Activities

A. **Cerebellum** Function: balance and coordination
   1) Knee Flexion
      a. Stand straight; hold onto table with one hand
      b. Slowly bend knee as far as possible, so foot lifts up behind you; hold this position
      c. Now, use one fingertip to hold onto the table

d. Next, no hands
e. Finally, with your eyes closed if you are steady
Why do you think closing your eyes makes this more difficult?

_____
_____

2) Hip Extension
a. Stand 12-18 inches from table
b. Bend at hips; hold onto table
c. Slowly lift one leg backwards (like an ice skater); hold this position
d. Now hold onto the table with one fingertip, then no hands, Finally with eyes closed!

B. **Parietal Lobe** (part of the cerebral cortex) Function = Sensory processes (touch); attention and language
1) Cutaneous (Skin) Sensations
a. Have your partner rest comfortably with his/her eyes closed and both forearms resting on the table. One arm should have the hand up, the other with hand facing down. Hair or clothing from the back of the neck should be pinned back so the surface of the neck is exposed. Do not allow your partner to open his/her eyes at any time during this part of the lab!
b. Perform the tests with the caliper or pin pricks in a **random order.**
c. Touch your partner in the following areas and measure the distance between the points when your partner indicates he/she can feel only one stimulus instead of two.

Location Two-Point Distance (mm)
Mid-Foream
Tip of Pointer Finger
Tip of Little Finger
Palm of Hand
Back of Hand
Back of Neck
Cheeks
Forehead

Which areas of the skin are most sensitive to the two-point discrimination test?

_____

Which areas of the skin are least sensitive to the test?

_____

C. **Temporal Lobe** (part of the cerebral cortex) Function: auditory perception and speech
1) Tongue Twisters

- Six sick slick slim sycamore saplings.
- Sam's shop stocks short spotted socks.
- A box of biscuits, a batch of mixed biscuits.
- Lesser leather never weathered wetter weather better.
- Red lorry, yellow lorry, red lorry, yellow lorry.
- Fat frogs flying past fast.
- Six thick thistle sticks. Six thick thistles stick.
- We surely shall see the sun shine soon.
- Toy boat. Toy boat. Toy boat.
- Ed had edited it.
- What time does the wristwatch strap shop shut?
- Are our oars oak?

Which tongue twister was the most difficult?

_____

Why?

_____

D. **Occipital Lobe** Function: Vision

Two eyes are better than one, especially when it comes to depth perception. Depth perception is the ability to judge objects that are nearer or farther than others. To demonstrate the difference of using one eye versus two to judge depth complete the following:

1. Depth Perception
    a) Hold the ends of a pencil/pen in each hand, hold them horizontally facing each other at arms length from your body.
    b) Now, close one eye and try to touch the ends of the pencils together
    c) Now try with two eyes: it should be much easier.
2. Why do you need two eyes?
    a) With your arms fully extended, hold a plastic drinking straw in one hand and a pipe cleaner in the other.
    b. With both eyes open, try to insert the pipe cleaner into the straw.
    c. Now close your right eye. Try to insert the pipe cleaner into the straw.
    d. Repeat step c, but this time close your left eye instead.

    How does closing one eye affect the ability to judge distances?

    _____
    _____

E. **Frontal Lobe** Function: Decision making, problem solving and planning

If you were asked to design a test to stimulate the frontal lobe, what would you do?

_____

_____

F. **Brain Stem** Function: Vital center (respiration, regulation of heart rhythms…) Why didn't we test this in lab?

_____

_____

Cranial Nerve Activities

You have 12 pairs of Cranial Nerves; view your cranial nerve diagram to see the location of each cranial nerve.

A. **Olfactory Nerve (1)**: This nerve carries smell messages from the nose to the brain.

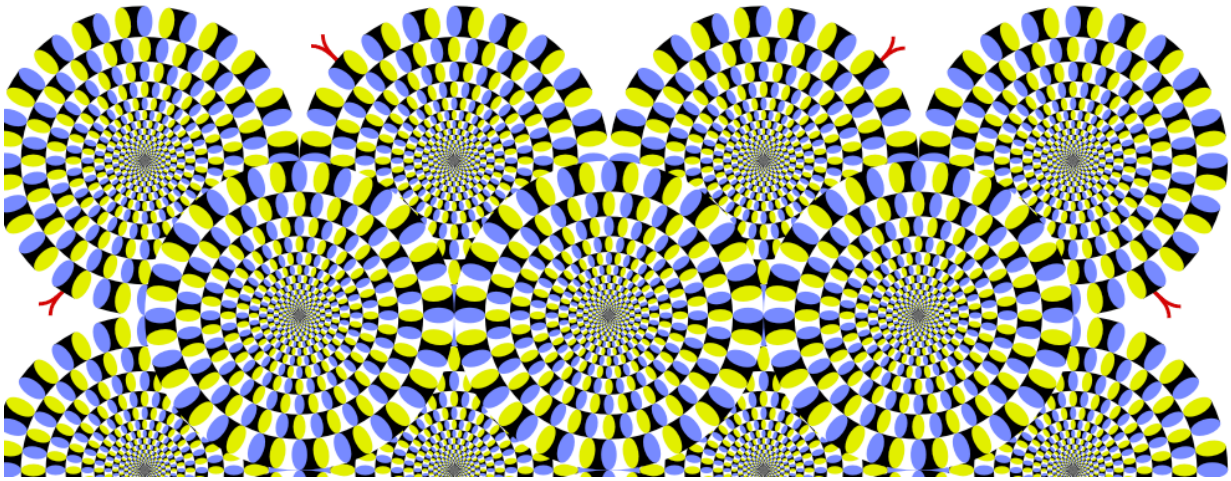
Test: With your eyes closed, smell the items on the table one at a time. Can you identify the item? Was the odor strong, pleasant, or neutral? Which nostril did you use to identify the item?

Sample	Identity of Item	Strong	Pleasant	Neutral	Nostril Used
A					
B					
C					
D					
E					

Which specific lobe of the brain does the olfactory nerve (1) send information to?

_____

B. **Optic Nerve (II)**: This nerve (or brain tract) carries sight messages from the retina of the eye to the brain.



Test: Is this picture moving?_____

What specific lobe(s) does optic nerve (II) send information to?

_____

C. **Oculomotor Nerve (III), Trochlear Nerve (IV), Abducens Nerve (VI)**: These nerves carry movement messages from the brain to the muscles controlling eyeball movement.

Test: Have your partner follow your finger with his/her eyes.
If you were to damage any of these three nerves, what activities would you have difficulty performing?

_____

_____

D. **Trigeminal Nerve (V)**: This nerve carries sensory information from the face to the brain, and movement (motor) messages from the brain to the muscles in the face.

Test: To test the sensory part of this nerve, lightly touch various parts of your face with your finger. To test the motor part of this nerve, close your jaws as if you were biting down on a piece of gum.
Which lobe(s) does trigeminal nerve (V) send information to?

_____

E. **Facial Nerve (VII)**: This nerve carries messages from the brain to the muscles controlling facial expression.

Test: To test the motor part of this nerve, make a funny face. To test the sensory part of this nerve, shake some sugar into your hand and taste it with the tip of your tongue. Now, put some gymnema extract on the tip of your tongue and try

some sugar again. Can you still taste the sweetness of the sugar?

_____

If you were to damage you facial nerve (VII), what activities would you have a difficult time doing?

_____

F. **Vestibulocochlear Nerve (VIII)**: Carries sound and movement (vestibular) messages from the inner ear to the brain.

Test: Shake each of the film canisters on the table. Can you identify the item? Which ear did you use to hear?

Sample	Identity of Item	Ear Used to Identify Item
A		
B		
C		
D		

Which specific lobe(s) does vestibulocochlear nerve (VIII) send information to?

_____

G. **Glossopharyngeal Nerve (IX) and Vagus Nerve (X)**: The Glossopharyngeal nerve carries messages to and from the tongue and pharynx. The vagus nerve also carries movement messages from the brain to the muscles of the pharynx and larynx. In addition, the vagus nerve carries messages that regulate heart rate, breathing, digestive activity, and blood pressure both to and from the brain.

Clinical Application: Inflammation of the glossopharyngeal nerve results in loss of sour and bitter tastes, and impaired swallowing. A complete destruction of the vagus nerve is fatal.

Test: Swallow.
Which lobe(s) do these nerves send information to?

_____

H. **Spinal Accessory Nerve (XI)**: This nerve carries movement messages from the brain and brain stem to movement muscles in the larynx, pharynx, shoulders, head and neck.

   Test: Move your head from side to side. Shrug your shoulders.

I. **Hypoglossal Nerve (XII)**: This nerve carries movement messages from the brain to the tongue.

   Test: Stick out your tongue and move it side to side.

   If you were to damage the hypoglossal nerve (XII), what activities would you have a difficult time doing?

   _____