

# “Think First”-Injury Prevention Program

## **OVERVIEW:**

In this activity, students will learn the structure and function of the brain and interact with someone who has had an injury to the central nervous system. Students will also explore some tests used to diagnose central nervous system injuries.

## **CONCEPTS:**

### **National Science foundation Standards:**

#### **Standard C: Life Science (Structure and Function in Living Systems)**

- Cells as the fundamental unit of life.
- Levels of organization in living systems for structure and function, e.g., cells, organs, tissues, organ systems, whole organisms, and ecosystems.
- Life functions in cells.
- Specialized cells, tissues, and organs and their functions.

### **Benchmark 6: The Human Organism**

#### **C: Basic Function**

- Organs and organ systems are composed of cells and help to provide all cells with basic needs.
- Interactions among the senses, nerves, and brain make possible the learning that enables human beings to cope with changes in their environment.

#### **D: Learning**

- Some animal species are limited to a repertoire of genetically determined behaviors; others have more complex brains and can learn a wide variety of behaviors. All behavior is affected by both inheritance and experience.

## **OBJECTIVES:**

Students will:

- Identify the parts of the brain and their function,
- Identify the causes of brain and spinal cord injuries,
- Recognize how to prevent brain and spinal cord injuries, and
- Identify the tests used to diagnose central nervous system injuries.

## **PROCEDURES:**

- Allow 1 hour to present background information and time for the guest speaker.
- Watch video: “On the Edge” by Think First (Activity Part A)
- Guest speaker: someone who has suffered a spinal cord trauma to talk about the experiences of being paralyzed (Activity Part A).
- Students complete the following tests: Ray Complex Figure, Trail Making, and Stroop (see Activity 3, 4, and 5).
- Follow up activities with discussion questions (see Activity, Part B). These questions can be used for assessment purposes.

## **MATERIALS:**

- Slides or diagram showing the parts of the brain
- Video: “On the Edge” by Think First (For additional information about the Think First program or for help locating a program in your community visit: <http://www.thinkfirst.org>).
- Guest speaker: someone who has suffered a spinal cord trauma
- Student Response Sheet
- Transparency: The Brain

## BACKGROUND:

The spinal cord attaches to the brain and runs the length of the spine. The skull and vertebrae protect the brain and spinal cord. Nerve endings that are present come from the spinal cord. Injuries to the spinal cord can be severe or bruising.

When thinking of diseases, it is very difficult to think of conditions like trauma as a disease. The truth of the matter is that trauma is a disease that occurs mainly due to high risk behavior.

Injuries to the central nervous system are permanent. Think about the brain and the role each part of the brain plays. Here is a quick review:

- **Frontal Lobe** – controls intellectual and muscular functions
- **Parietal Lobe** – controls sensations (sensory)
- **Temporal Lobe** – controls speech, hearing and memory
- **Occipital Lobe** – controls vision
- **Brain Stem** – *the most important!* It controls vital signs, blood pressure, pulse, respiration and it also relays information. Damage to the brain stem causes death.

The spinal cord attaches to the brain and runs the length of the spine. The skull and vertebrae protect the brain and spinal cord. Nerve endings that are present come from the spinal cord. Injuries to the spinal cord can be severe or bruising.

There are different results from injuries to the spinal cord, depending on the position of the injury;

- **Paraplegia** – injury to the spinal cord below the shoulders that causes paralysis to both lower extremities.
- **Quadriplegia** – injury to the cord in the neck area that causes paralysis of all four extremities (from the neck down)

What are some causes of trauma? Trauma is caused by car accidents, falls, violence, sports, and other events. A 50% of trauma incidents are caused by car collisions. The second highest cause of trauma is falls. A majority of traumatic injuries involve alcohol and/ or other drugs, because it affects your decision making abilities. The age group that is at high risk for trauma is 15-24 year olds.

Some precautions to take to help protect you from brain and spinal cord injuries include:

1. Always wear a seat belt
2. Water must be 12 ft. and more before diving
3. Do not dive into a lake or ocean head first
4. Football players should not tackle head first
5. Always wear a helmet
6. Avoid situations that may impair your decision making skills, like drugs, alcohol, smoking, and eat healthy

## 7. Avoid violent situations

In conclusion, look at the person seated next to you. In your mind, you would be thinking that such things can not happen to you, and that they happen to somebody else. Now look at that person again. If they are looking back at you, you are their 'somebody else'. Always live life knowing that at any minute, you could be somebody else's somebody else. Always think about your choices and make wise decisions, because ultimately, this is your life, protect it!

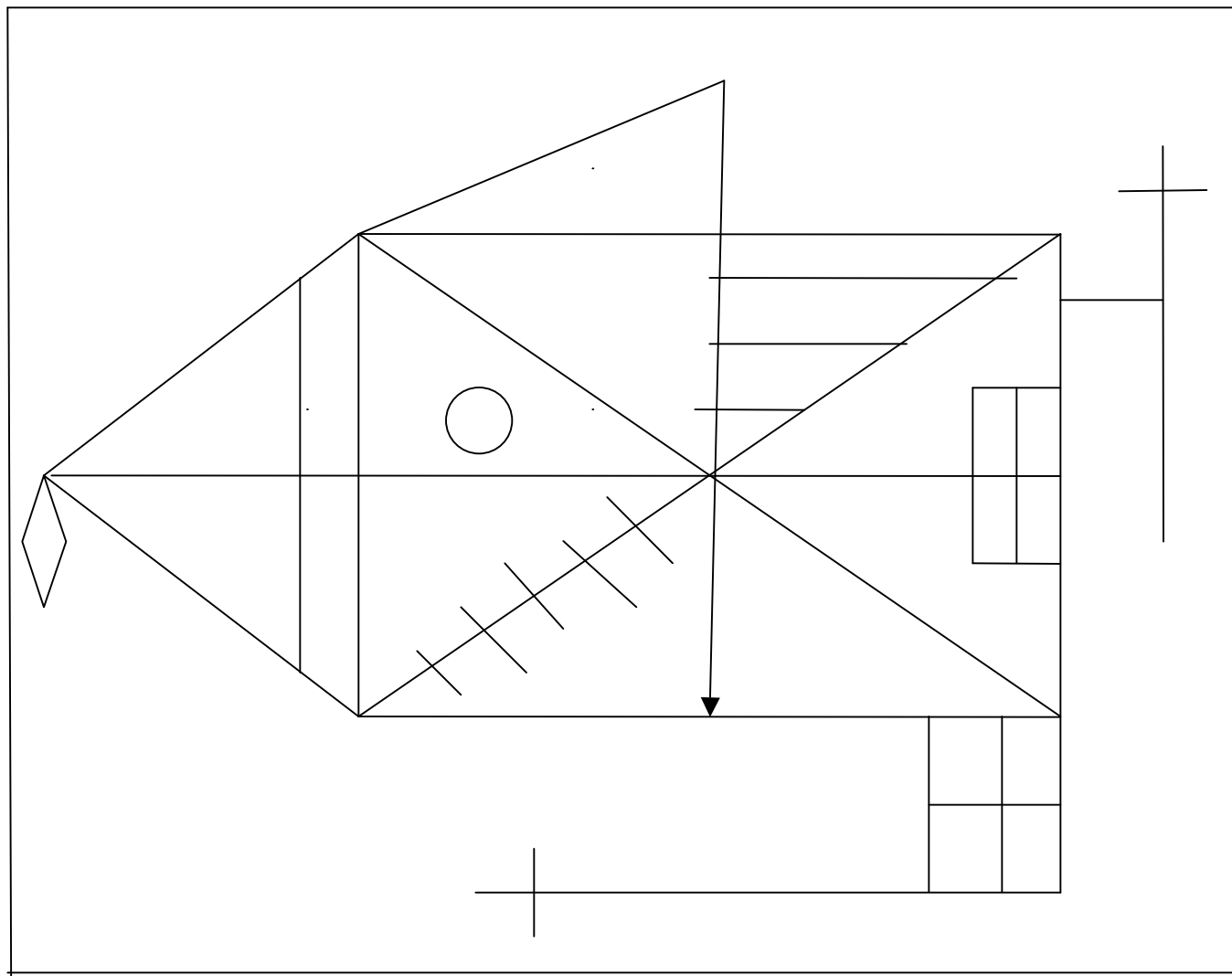
### **ACTIVITY:**

#### **Part A:**

**Activity 1:** Watch video: "On the Edge" by Think First

**Activity 2:** Guest speaker: Invite someone who has suffered a spinal cord trauma to talk about the experiences of being paralyzed.

**Activity 3: Ray Complex Figure Test**



Study this drawing for one minute.

Put drawing away and replicate it from memory on your own paper.

**Explanation of Ray Complex Figure Test:**

The ray complex figure is a test for visual-spatial memory. A patient with focal brain injury will have difficulty recreating the drawing. A patient may have recreated the left side of the image different from the right.

## Activity 4: Trail Making

### Materials:

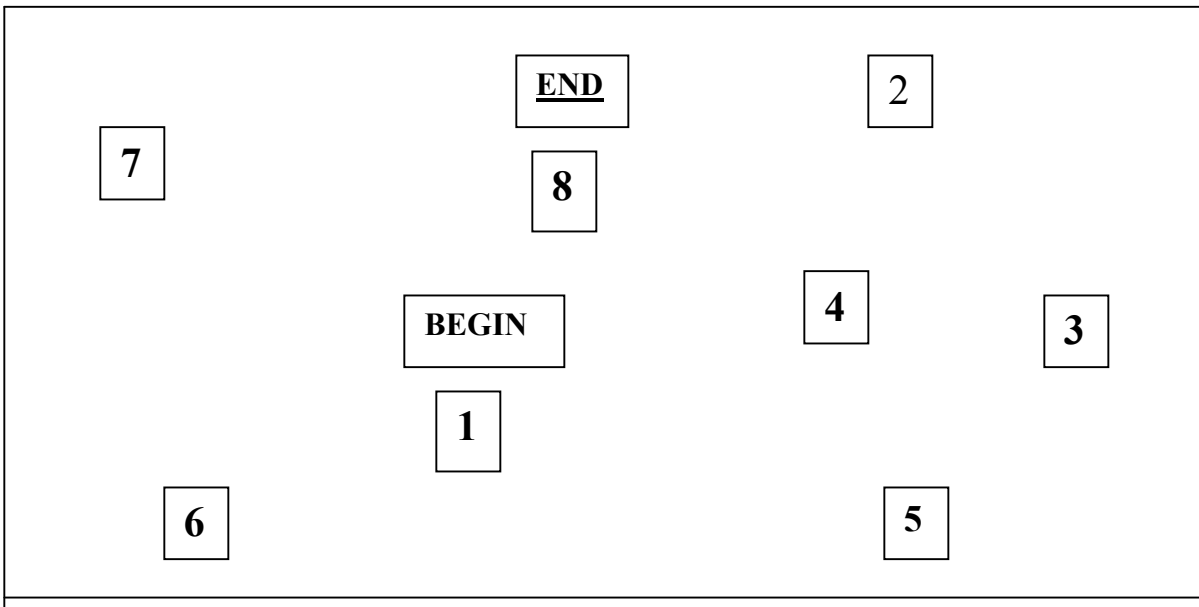
- Stopwatch

### Directions:

- Scores are calculated by adding the time it takes for the student to complete Part A with the time it takes to complete Part B. It is extremely important for the student to understand the directions fully before the pencil touches the paper and time begins. Follow the same instructions for Part C and Part D.
- Students work in pairs, one student takes the test the other student uses a stop watch and records the time.
- Students switch roles and repeat the activity.

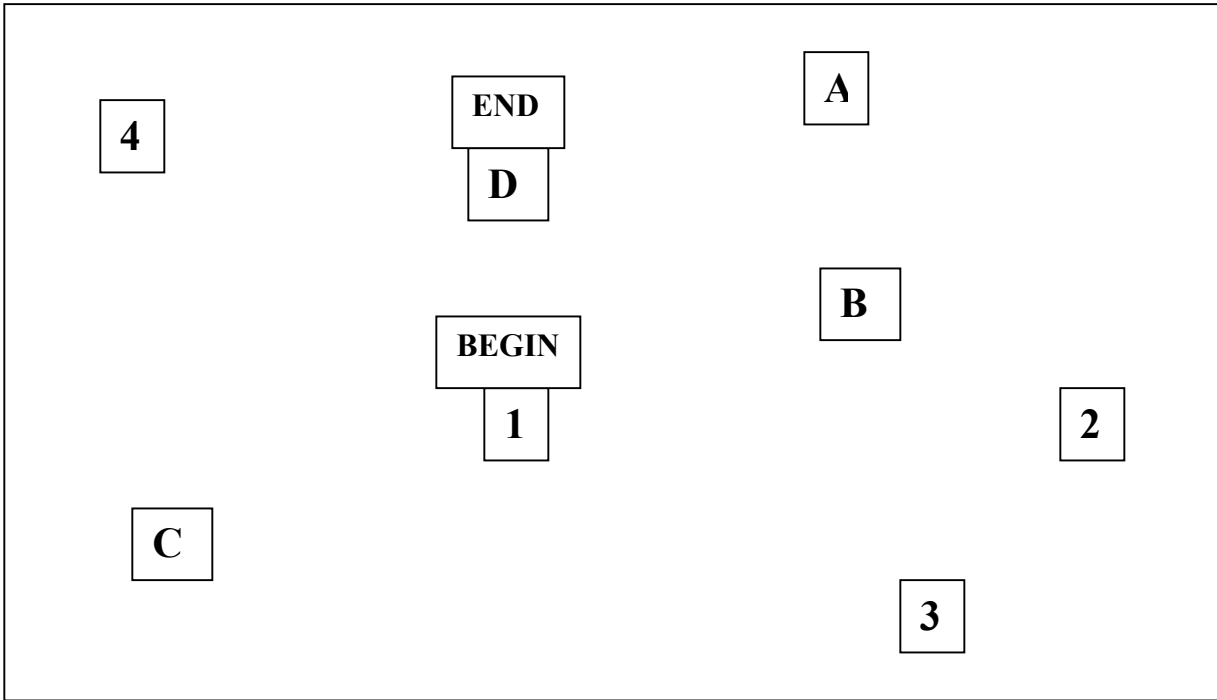
### Activity4-A

The object of the test is to connect the numbers in order, beginning with 1 and ending with 8, in as little time as possible.



## Activity 4-B

Part B is more complex than A because it is necessary to connect numbers and letters in an alternating pattern (1-A-2-B-3-C, etc.) in as little time as possible.

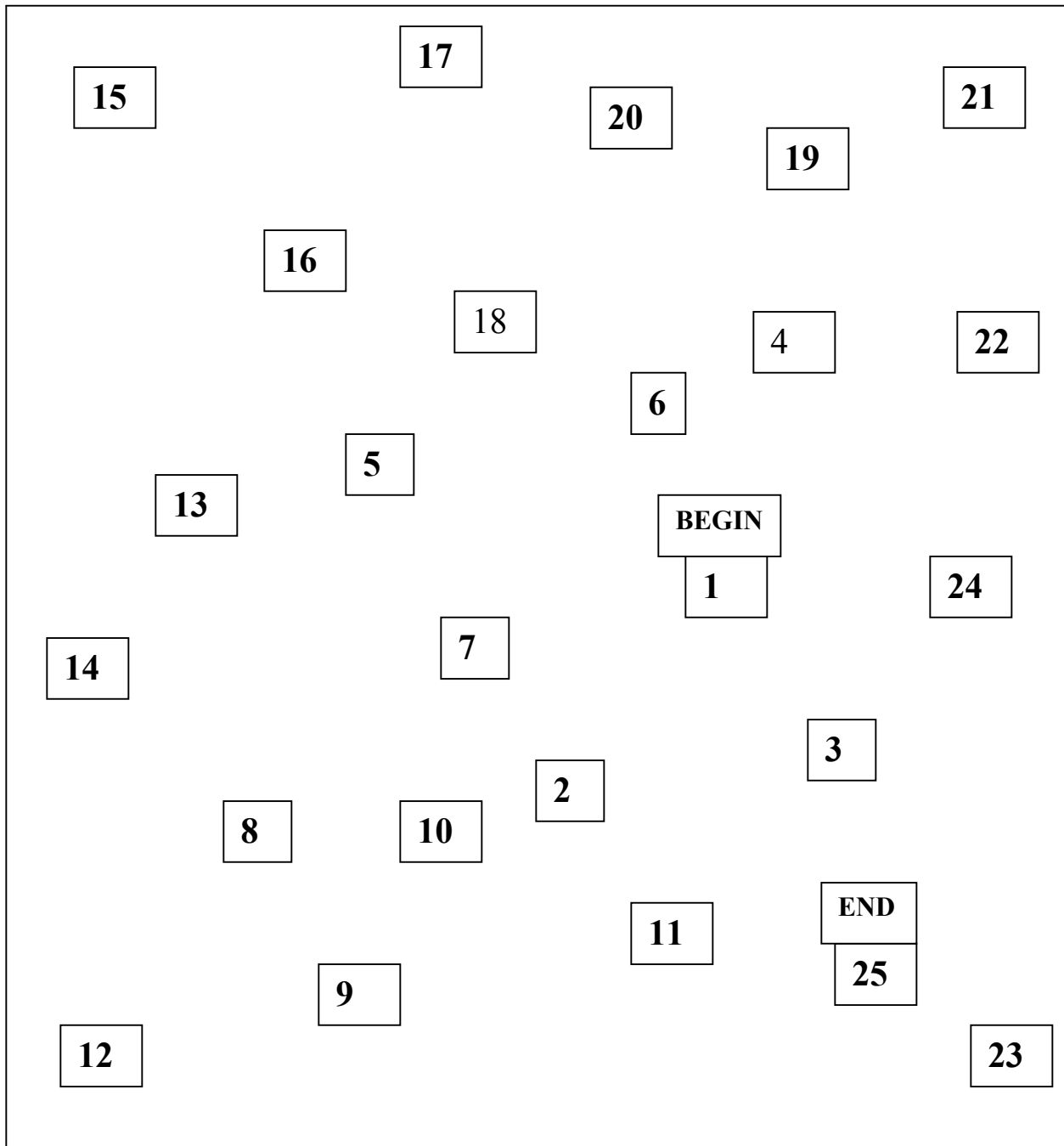


### **Explanation of Trail Making Test:**

It is a test of speed, so time and efficiency are important. The Trail Making Test, which looks at visual-conceptual and visual-motor tracking, is a frequently used neuropsychological test because sensitivity to brain damage. The Trail Making Test is a good predictor of brain impairment.

### Activity 4C

The object of the test is to connect the numbers in order, beginning with 1 and ending with 25, in as little time as possible.



### Activity 4D

Connect numbers and letters in an alternating pattern (1-A-2-B-3-C, etc.) in as little time as possible.

END												
13												10
	8	9			4		I			D		
			B									
			3									
			7			BEGIN						
						1				5		
			H									
12									C			
			G									
									A			J
	L			2								
					6							
			F							E		
	K											11

### Activity 5: Stroop Test

**Background:** This test was named after J. Ridley Stroop after his discovery in the late 1930's. When taking this test, pay attention to the color and not the word. You will need a timer to see how long it will take you to complete each test.

**Directions:**

- Students work in pairs, one student takes the test the other student uses a stop watch and records the time.
- Students switch roles and repeat the activity.

**Test 5A: What color do you see? (Observe both color and word)**

RED	BLUE	GREEN	PINK	YELLOW	
PURPLE	ORANGE	RED	GREEN	PINK	BLACK
YELLOW	BROWN	BLACK	PURPLE	ORANGE	
GREEN	RED	PINK	BLUE	BROWN	BLUE

**Test 5B: What color do you see? (Observe color, not the word)**

RED	BLUE	GREEN	PINK	YELLOW	
PURPLE	ORANGE	RED	GREEN	PINK	BLACK
YELLOW	BROWN	BLACK	PURPLE	ORANGE	GREEN
RED	PINK	BLUE	BROWN	BLUE	YELLOW

**Test 5C: What color do you see? (Observe the word, not the color)**

RED	BLUE	GREEN	PINK	YELLOW	
PURPLE	ORANGE	RED	GREEN	PINK	BLACK
YELLOW	BROWN	BLACK	PURPLE	ORANGE	GREEN
RED	PINK	BLUE	BROWN	BLUE	YELLOW

**Explanation of Stroop Test:**

The task takes advantage of our ability to read words more quickly than we can name colors. If a word is printed in a color different from the color it actually names, we will say the word more quickly than we can name the color in which it is displayed. The research on the Stroop effect emphasizes the interference that automatic processing of words has on the mentally effortless task of just naming the colors.

**Part B:**

**Ask the following questions and allow time for discussion.**

**Share:**

What do you think were the most important changes in the life of your guest speaker?  
Which tests for central nervous system injuries did you find easy to do? Hard to do?

**Process:**

Why is it difficult for people with central nervous system injury to perform daily tasks?

**Generalize:**

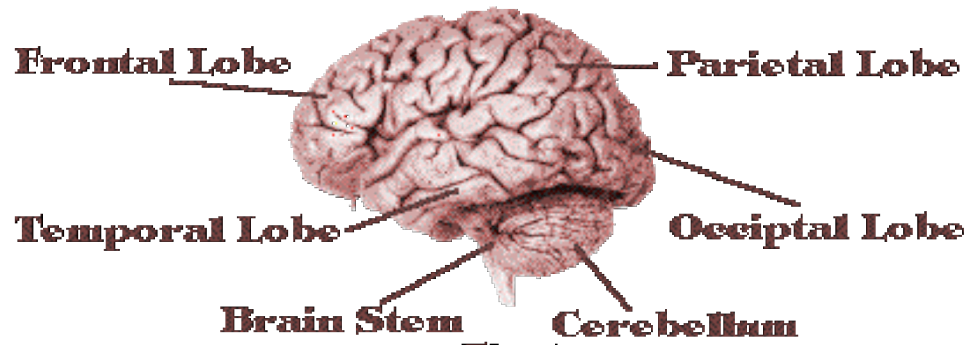
How do people with central nervous system injury adapt?

**Apply:**

What measures can you take if you as a young person are in danger when an adult is behind the wheel? Share some safety tips to protect your brain and spinal cord from injuries. Explain how these tips protect you.

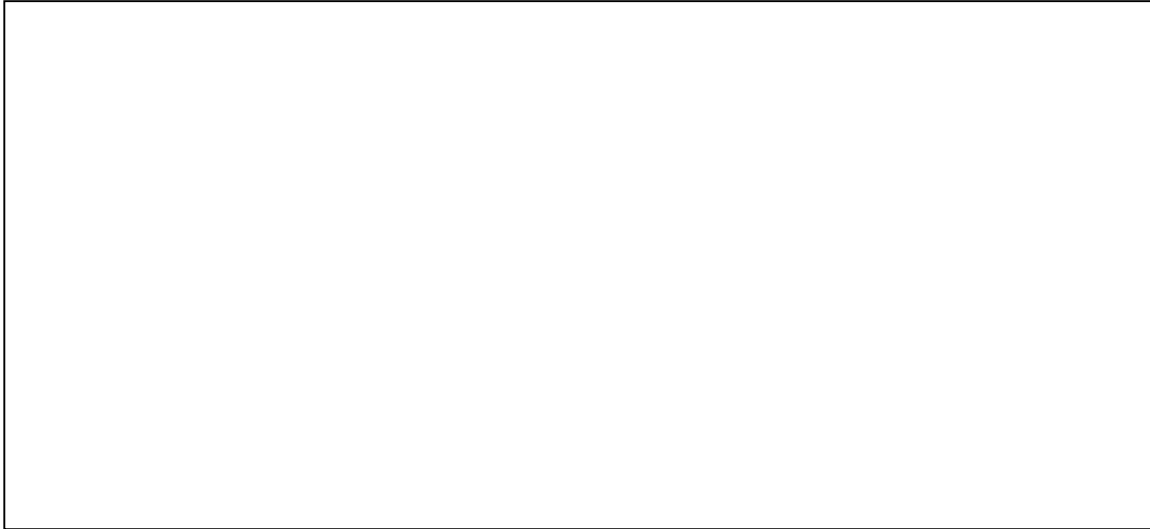
Transparency:

## Model of the Brain



# Student Response Sheet

## Activity 3: Ray Complex Figure Test



## Activity 4: Trail Making

Student	Part A (time)	Part B (time)	Combine A+B

## Activity 5: Stroop Test

Student	Test A (time)	Test B (time)	Test C (time)