The Nervous System
Don’t Be Nervous!

Objective: To learn the structure and function of the Nervous System

Opener: How does the nervous system help the body to maintain homeostasis?

The nervous system regulates other parts of the body by sensing and responding to conditions. For example, if your body drops in temperature, the brain will sense it and respond by causing an increase in body temperature - maintaining that stable internal environment.
Made up of the **brain**, **spinal cord**, and **nerves**
Neuron: cell that carries nerve impulse information

Three parts:

1. **Dendrites** (#1): delivers impulse to cell body
2. **Cell body** (#2): contains nucleus & organelles
3. **Axon** (#3): carries impulse away from cell body

Label the neuron on your sheet according to the numbers above
Nerve cells have a space between them called a **synapse**.

When a message reaches the end of a cell, a chemical moves across the synapse of the AXON to the DENDRITE of the next cell, delivering the chemical “message”
FUNCTION:

Receives & responds to information from inside and outside of body

- Regulates body functions through **stimulus & response**
- Maintains **homeostasis**
There are two parts to the Nervous System:

Central Nervous System (CNS):
- **Brain**: control center of the body
- **Spinal cord**: links **brain** with **body nerves**, controls **reflexes**. Protected by vertebrae

Peripheral Nervous System (PNS):
includes all nerves branching **from** CNS to body
So why is the brain so wrinkled?

Your brain is a really neat organ, storing all of your memories throughout your life, not to mention controlling everything you do! When you’re born, your brain is only half the size it is when you’re an adult. As it grows, it fills up your skull and runs out of growing room, creating the characteristic wrinkles you see as it folds in on itself. The purpose? To give you more surface area to THINK!
CNS and PNS work together to respond to stimuli in your surroundings through the five senses:

- Light
- Sound
- Heat
- Chemicals
- Pressure
1. **Vision**: light stimulates **rods** *(dim light)* and **cones** *(colors)* and sends impulse to brain.
2. **Hearing**: outer ear gathers sound **waves** that **vibrate** tiny bones & fluid which sends the impulse to brain
3. **Smell & Taste:** molecules in air stimulate nerve cells in the nasal passages (olfactory cells) & on the tongue (taste buds)
4. **Touch**: receptors found in organs & skin detect changes in **pressure**, **pain**, and **temperature**

What do you notice about the distribution of nerve receptors for each type of condition?
Catch Me if You Can!

Objective: To determine your reaction time by measuring how long you take to catch a falling ruler during times of concentration and distraction.

Hypothesis: Make a hypothesis about whether you think your reaction time will be faster under normal or distracted conditions.

What You Do:

1. Have your partner hold the ruler with the 0 centimeter mark level with your thumb and forefinger. Do not touch the ruler. Focus on catching the ruler as soon as your partner releases it.

2. When your partner releases the ruler, attempt to catch it as quickly as possible.

3. Observe and record the measurement where your thumb and forefinger have caught the ruler in the chart below.

4. Use the conversion chart to change centimeters to seconds and record this data in your table. Complete four trials.

5. Once complete with normal conditions, have your partner distract you by asking you multiplication problems as you try to catch the ruler. Complete four trials under distracted conditions following steps 2-4.
## Conversion Chart

<table>
<thead>
<tr>
<th>Distance ruler fell (cm)</th>
<th>time in Seconds (s)</th>
<th>Distance ruler fell (cm)</th>
<th>time in Seconds (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.06</td>
<td>18</td>
<td>0.19</td>
</tr>
<tr>
<td>4</td>
<td>0.09</td>
<td>20</td>
<td>0.20</td>
</tr>
<tr>
<td>6</td>
<td>0.11</td>
<td>22</td>
<td>0.21</td>
</tr>
<tr>
<td>8</td>
<td>0.13</td>
<td>24</td>
<td>0.22</td>
</tr>
<tr>
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<td>0.14</td>
<td>26</td>
<td>0.23</td>
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<tr>
<td>12</td>
<td>0.16</td>
<td>28</td>
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<td>30</td>
<td>0.25</td>
</tr>
<tr>
<td>16</td>
<td>0.18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
So what does the brain do?

Brain Scienstructable

What You Need to Know:
Use the notes about the brain to fill in your graphic organizer. For each part of the brain, you should identify the main functions. When finished, cut out each section of your scienstructable and glue it to the appropriate tab on the brain template.
**BRAIN HEMISPHERES:**

The brain is made of two **symmetrical** parts, the **right and left hemispheres**. Although they are equal in size, they carry out two very different jobs. The right side of the brain controls the left side of the body and performs tasks related to creativity and the arts. The left hemisphere controls the right side of the body and performs tasks related to logic like math and science. Both hemispheres are connected to each other by the **corpus callosum**, which allows the two sides to communicate with one another.
**BRAIN HEMISPHERES:**

**RIGHT HEMISPHERE FUNCTION:** Controls the right side of the body. Considered the academic and creative side of the brain – language, insight, science, music, writing, and imagination, creativity, and 3-d form understanding.
**Cerebellum:** Cauliflower shaped part of the brain located in the back under the pons.

**Function:** Performs everyday voluntary (movements you choose to carry out) tasks such as walking and writing. Helps us stay balanced and upright along with coordinating our muscles.

I’m balanced and coordinated! Yay!

How do you think a damaged cerebellum would affect the body?
For each part of the brain stem, identify parts 1-8 and the function of each

**Brain Stem:** comprised of the midbrain, pons, and medulla

1. **Thalamus:** It is involved in sensory perception, controlling sleep and awake states of consciousness. It also regulates movement.

2. **Optic Nerve:** transfer visual information from the retina in the eye to the vision centers of the brain.

3. **Optic Tract:** Part of the optic nerve found where the nerves of the left eye and right eye cross to create a complete picture.

4. **Pituitary:** This "master gland" regulates how your other glands operate. The pituitary gland secretes and stores hormones, which it uses to stimulate your other glands. Hormones regulate your body’s temperature, urine production, growth, and the production of sex hormones.
5. **Midbrain**: Regulates body movement, vision and hearing.

6. **Pons**: Links to the cerebellum to help with posture and movement. The Pons serves as a message station between several areas of the brain. It helps relay messages from the cortex and the cerebellum. Controls our sleeping states and dreams.

7. **Medulla Oblongata**: Maintains involuntary body functions necessary for life such as breathing, swallowing, blood pressure, and heart rate.

8. **Spinal Cord**: A long, thin bundle of nervous tissue that extends from the brain. Makes up part of the Central Nervous System. Transmits signals between the brain and the rest of the body. By itself, it can control numerous reflexes.