Regions of the Brain

Hindbrain:

• medulla
• pons
• reticular formation
• cerebellum
The Hindbrain

- **Brainstem:** lower base which connects the spinal cord to the brain; is the oldest part of the brain responsible for automatic survival functions.

  **Medulla:** controls heartbeat and breathing
The Hindbrain

- **Cerebellum**: responsible for balance and movement; referred to as the “little brain” attached to the rear of the brainstem.

- **Pons**: connects the lower and mid brain regions; regulates brain during sleep and dreaming.

- **Reticular Formation**: plays a role in controlling arousal.
Regions of the Brain

**Midbrain**: contains clusters of nerve cells.
Regions of the Brain

- **Forebrain**: is the most important part of the brain consisting of the thalamus, limbic system, hypothalamus, and cerebral cortex which contains the lobes of the brain.
The Forebrain

- **Thalamus:** referred to as the “sensory switchboard,” or “the relay station.” All auditory (hearing), visual, taste, and touch signals pass through it where it relays it to the appropriate part of the brain.
The Forebrain

- **The Limbic System**: system plays a major role in controlling emotion and drives (sex, hunger, etc.)
The Limbic System

• **Hippocampus**: structure involved in the formation of memories.

• **Hypothalamus**: involved in a variety of drives, such as hunger, thirst, and sex. Pleasure or reward center. Controls the pituitary gland.

• **Pituitary Gland**: controlled by the hypothalamus; it regulates growth and other glands in the endocrine system. It is often referred to as the “master gland.”

• **Amygdala**: neural clusters linked to emotions like aggression and fear.
The Limbic System

Match the picture with the part of the limbic system that is related to it.

- hypothalamus
- hippocampus
- pituitary gland
The Limbic System’s “Reward Center”
The Cerebral Cortex

The Cerebral Cortex: is the brain’s ultimate control and information processing center; contains all the interconnected neural cells that cover cerebral hemispheres. Contains lobes.
The Lobes

**Frontal Lobe:** involved in speaking and muscle movements along with making plans and judgments. Includes the **motor cortex:** controls voluntary movements.

**Parietal Lobe:** includes the **somatosensory cortex** which allows you to register and process body sensations (sense of touch).
Frontal Lobe and Phineus Gage

- How did Gage’s accident affect him?

[Phineas Gage Movie](#)
The Lobes

- **Occipital Lobe:** includes the visual areas involved in seeing.

- **Temporal Lobe:** includes the auditory areas which are involved in hearing.
We Only Use 10% of Our Brains…JUST KIDDING!!!

- **Association Areas:** areas of cerebral cortex not involved in motor or sensory processes. Makes up largest portion of cortex which is involved in higher mental functions such as learning, memory, thinking, and speaking.
Cerebral Cortex and Language

- **Aphasia**: impairment of language, usually caused by damage to the left hemisphere of the brain either in Broca's or Wernicke's area:

**Broca’s Area**: an area of the left frontal lobe that directs the muscle movements involved in speech.

**Wernicke’s Area**: an area of the left temporal lobe involved in language comprehension.
The Body’s Other Communication Network (Slower)

- **The Endocrine System**: the body’s “slow” chemical communication system; secretes hormones into bloodstream. It takes longer for hormones to work, but they affect your behavior longer than nerve impulses.
Endocrine System Components

- **Hormones:** cousins of neurotransmitters; chemical messengers, mostly those manufactured by the endocrine glands, that are produced in one tissue and affect another.

- **Adrenal Glands:** endocrine glands above the kidneys that secrete the hormones epinephrine (adrenaline) and norepinephrine (noradrenaline), which help to arouse the body in times of stress.
Brain Reorganization

- **Plasticity**: the brain’s capacity for modification as evident in brain reorganization following damage (especially in children) and in experiments on the effects of experience on brain development.
The Divided Brain

- **Corpus Callosum**: large bundle of neural fibers that allows the two sides of the brain to communicate. Carries messages between the two hemispheres.

- Cutting it leads to **split brains**.
Specialization of the Cerebral Hemispheres

Left Hemisphere
- Spontaneous speaking and writing
- Responses to complex commands
- Word recognition
- Memory for words and numbers
- Sequences of movements
- Feelings of anxiety
- Positive emotion

Right Hemisphere
- Repetitive but not spontaneous speaking
- Responses to simple commands
- Facial recognition
- Memory for shapes and music
- Spatial interpretation
- Emotional responsiveness
- Negative emotion