

# The Central Nervous System: Functional Anatomy of the Brain & Spinal Cord

## Overview of the Brain

1. Write the four main regions of the brain as labeled in the image to the right. Use the key words below.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

### Key Words

Spinal cord

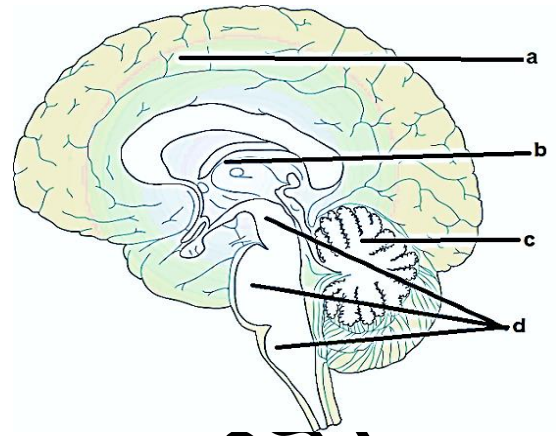
Cerebrum

Diencephalon

Cervical Plexus

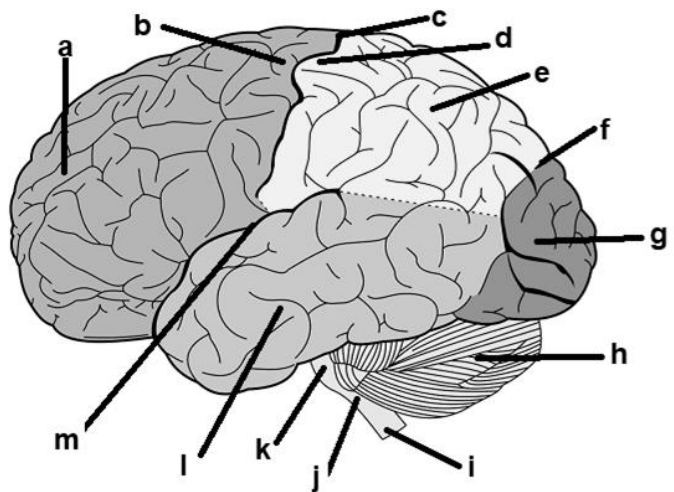
Brain Stem

Cerebellum



2. Use the keywords below to identify each structure in the image to the right.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_
- g. \_\_\_\_\_
- h. \_\_\_\_\_
- i. \_\_\_\_\_
- j. \_\_\_\_\_
- k. \_\_\_\_\_
- l. \_\_\_\_\_
- m. \_\_\_\_\_



### Key Words: (may be used once, some will not be used)

motor homunculus

medulla oblongata

temporal lobe

cerebellum

post-central gyrus

spinal cord

pons

visual area

parieto-occipital sulcus

frontal lobe

parietal lobe

motor speech area

pre-central gyrus

central sulcus

fornix

lateral sulcus

projection fibers

occipital lobe

basil nuclei

sensory homunculus

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Use the key terms below to answer questions 3-6.

3. Cerebral hemispheres have three basic regions. The:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

4. Ridges formed from folded cerebral tissue are called \_\_\_\_\_.

5. Shallow groves in the surface of the brain are called \_\_\_\_\_.

6. Deep groves in the surface of the brain are termed \_\_\_\_\_.

<b>Key Words</b>	Sulcus Gyri	Cerebral cortex (gray matter) Cerebral white matter	basil nuclei cerebellum	fissure pre-central gyrus
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**Cerebral Cortex:** Match each description below to the appropriate term or key terms.

7. \_\_\_\_\_ General term for nerve fiber tracts that connect the two hemispheres of the brain.
8. \_\_\_\_\_ Speech, memory, logical and emotional responses, consciousness, interpretation of sensation, voluntary movements take place in this area.
9. \_\_\_\_\_ General term for nerve fiber tracts that connect areas within one hemisphere.
10. \_\_\_\_\_ Area of the cerebral cortex responsible for processing impulses traveling from the body's sensory receptors (except for special sense).
11. \_\_\_\_\_ Area of the cerebral cortex responsible for voluntary skeletal muscle movements.
12. \_\_\_\_\_ Spatial map which shows how much of the cerebrum is devoted to various sensory functions.
13. \_\_\_\_\_ General term for nerve fiber tracts that connect the cerebrum with the brain stem.
14. \_\_\_\_\_ Help regulate voluntary motor activities by modifying instructions (particularly starting or stopping movements) sent to the skeletal muscles.
15. \_\_\_\_\_ Spatial map which shows how much cerebral brain tissue is devoted to various motor functions.
16. \_\_\_\_\_ Neuron pathway formed by neuron axons of the precentral gyrus; descends to the spinal cord.
17. \_\_\_\_\_ Area of the brain involved in intellectual reasoning and socially acceptable behaviors.
18. \_\_\_\_\_ Large commissure connecting the left and right cerebral hemispheres.
19. \_\_\_\_\_ Part of brain that recognizes patterns, faces, and inputs to understand a whole situation.
20. \_\_\_\_\_ Area of the brain involved in motor speech. (Usually found in one hemisphere only.)
21. \_\_\_\_\_ Area of the brain at the junction of the temporal, parietal, and occipital lobes enabling speech.
22. \_\_\_\_\_ Composed of deep nerve fiber tracts carrying impulses to, from, or within the cerebral cortex.

## Key Words

- |                                 |                               |  |
|---------------------------------|-------------------------------|--|
| a. cerebral cortex              | h. corpus callosum            | o. primary motor area                    |
| b. Broca's area                 | i. association fibers         | p. pyramidal tract (corticospinal tract) |
| c. cerebral white matter        | j. parietal lobe              | q. motor homunculus                      |
| d. commissures                  | k. posterior association area | r. projection fibers                     |
| e. basal nuclei                 | l. central sulcus             |  |
| f. primary somatic sensory area | m. speech area                |  |
| g. anterior association area    | n. sensory homunculus         |  |

# The Central Nervous System: Functional Anatomy of the Brain & Spinal Cord

## Diencephalon

Identify the structure that performs each set of functions below.

23. \_\_\_\_ Forms the roof of the third ventricle; Houses the pineal body (an endocrine gland); Includes the choroid plexus; forms cerebrospinal fluid
24. \_\_\_\_ Makes up the floor of the diencephalon; Important autonomic nervous system center; Regulates body temperature, water balance, and metabolism; Houses the limbic center for emotions; Regulates the nearby pituitary gland; Houses mammillary bodies for olfaction (smell)
25. \_\_\_\_ Encloses the third ventricle; Relay station for sensory impulses passing upward to the cerebral cortex; Transfers impulses to the correct part of the cortex for localization and interpretation

**Key Terms:** (use only once, some will not be used)

- a. Thalamus
- b. Hypothalamus
- c. Epithalamus
- d. Subthalamus

## Brain Stem

Identify the structure that performs each set of functions below.

26. \_\_\_\_ The rounded structure protruding just below the midbrain; Mostly composed of fiber tracts; Includes nuclei involved in the control of breathing
27. \_\_\_\_ The most inferior part of the brain stem that merges into the spinal cord; Includes important fiber tracts; Contains important centers that control: Heart rate, blood pressure, breathing, swallowing, vomiting
28. \_\_\_\_ Extends from the mammillary bodies to the pons inferiorly; Cerebral aqueduct (tiny canal) connects the third and fourth ventricles; Two bulging fiber tracts (cerebral peduncles) that convey ascending and descending impulses; Four rounded protrusions (corpora quadrigemina) acting as visual and auditory reflex centers
29. \_\_\_\_ Diffuse mass of gray matter along the brain stem involved in motor control of visceral organs; plays a role in awake/sleep cycles and consciousness; Filters incoming sensory information

- a. Reticular Formation
- b. Medulla Oblongata
- c. Basal nuclei
- d. Midbrain
- e. Pons

# The Central Nervous System: Functional Anatomy of the Brain & Spinal Cord

## Protection of the Central Nervous System

From the key terms listed, identify the meningeal layer or structure described below.

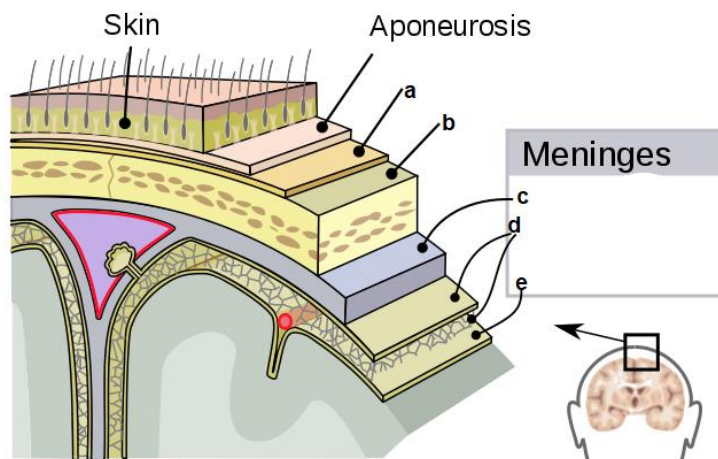
- 30. \_\_\_\_\_ Outermost covering of the brain that is composed of tough fibrous connective tissue; "tough mother"
- 31. \_\_\_\_\_ Delicate innermost covering of the brain
- 32. \_\_\_\_\_ Specialized projections that protrude through the dura mater
- 33. \_\_\_\_\_ Cobweb-like meningeal layer
- 34. \_\_\_\_\_ Forms the periosteum of the skull

### Key Terms

- a. Arachnoid mater
- b. Periosteal dura mater
- c. Dura mater
- d. Pia mater
- e. Arachnoid granulations

Match each term with the appropriate letter in the image below.

- 35. \_\_\_\_\_ Pia Mater
- 36. \_\_\_\_\_ Dura mater
- 37. \_\_\_\_\_ Arachnoid mater
- 38. \_\_\_\_\_ Skull
- 39. \_\_\_\_\_ Periosteum of skull



**Brain Dysfunctions:** Match each description below with the correct disease or condition.

- 40. \_\_\_\_\_ Brain disease in which dopamine-deprived basal nuclei are unable to regulate motor control resulting in persistent tremors at rest
- 41. \_\_\_\_\_ Bleeding from a ruptured brain vessel
- 42. \_\_\_\_\_ Loss of the ability to speak due to damage to Broca's area
- 43. \_\_\_\_\_ Blood clot, blocked artery, or ruptured blood vessel in the brain
- 44. \_\_\_\_\_ Degenerative brain disease that results in memory loss (particularly of recent events).

### Key Words

- a. Intracranial hemorrhage
- b. Alzheimer's Disease
- c. Parkinson's Disease
- d. Cerebrovascular accident
- e. Motor aphasia