

What's Included?

Unit Planning

- State & NGSS Standards document
- Unit Pacing Guide for 50 min classes
- Vocabulary terms for prefix/suffix work
- Differentiation ideas for honors students and virtual students ***Digital links for virtual learning found here**
- Honors assignment list

Notes

- PowerPoints
 - Nervous System PPT (53 slides)
 - Senses PPT (32 slides)
- Cornell Notes Pages
 - Fill-in-the-blank (14 pgs)
 - Editable versions of all Cornell notes
- Doodle Notes Pages
 - Nerve & Brain (10 pgs)
 - Senses (8 pgs)
 - Guide to Using Doodle Notes
 - Doodle Note Keys & Examples

Student Pages

- This folder contains duplicate copies of every student page. They are in order according to the pacing guide for QUICK PHOTOCOPYING if you are using the pacing guide as is.

Activities

- Vocab Matching Activity (6 pgs)
- Build a Neuron Modeling Activity (3 pgs)
- Sheep Brain Dissection Lab (5 pgs)
- Brain Crossword Puzzle (2 pgs)
- Science of Addiction Web-quest (1 pg)
- Sensory Stations Lab (18 pgs)
- Disease Slide Project (3 pgs)
- Answer keys or grading rubrics for all activities

Extensions

- Digging Deeper: Concussions
 - Cerebrospinal Homeostasis
 - Data Analysis: Tumors of the Central Nervous System*
 - Answer Keys for all Extensions
- *Honors Options

Review and Assessment

- Editable Task Card Review (24 cards) with answer sheet
- 4 diagrams- meninges & ventricles, brain, eye, ear
- Nervous Tissue & Brain Quiz through Google Forms
- Nervous System Test (paper)- both Honors and Regular versions with answer sheets

Unit Planning:

NGSS and State Standards Document

If your state isn't listed, contact me by email (support@suburbanscience.com) and I'll help you figure out which ones are covered!

Included Resources by Folder:

What's Included?

Nervous

Unit Planning

- State & NGSS Standards document
- Unit Pacing Guide for 50 min classes
- Vocabulary terms for prefix/suffix work
- Differentiation ideas for honors students and virtual students *Digital links for virtual learning found here
- Honors assignment list

Notes

<ul style="list-style-type: none"> PowerPoints <ul style="list-style-type: none"> Nervous System PPT (53 slides) Senses PPT (32 slides) 	<ul style="list-style-type: none"> Cornell Notes Pages <ul style="list-style-type: none"> Nervous Tissue & Impulses (4 pgs) Brain & Spinal Cord (4 pgs) Senses (6 pgs) 	<ul style="list-style-type: none"> Doodle Notes Pages <ul style="list-style-type: none"> Nerve & Brain Doodle Notes (10 pgs) Senses Doodle Notes (8 pgs) Guide to Using Doodle Notes Doodle Note Keys & Examples
---	---	--

Activities

- Vocab Matching Activity (6 pgs)
- Build a Neuron Modeling Activity (3 pgs)
- Sheep Brain Dissection Lab (5 pgs)
- Brain Crossword Puzzle (2 pgs)
- Science of Addiction Web-quest (1 pg)
- Sensory Stations Lab (18 pgs)
- Disease Slide Project (3 pgs)
- Answer Keys for All Activities

Extensions

- Digging Deeper: Concussions
- Cerebrospinal Homeostasis
- Data Analysis: Tumors of the Central Nervous System*
- Answer Keys for all extension pages

*Honors Option

Review and Assessment

- Editable Task Card Review (24 cards) with answer sheet
- 4 diagrams- meninges & ventricles, brain, eye, ear
- [Nervous Tissue & Brain Quiz through Google Forms](#) (Make a copy of this file to your Drive. Do NOT assign to students using this link.)
- Nervous System Test (paper)- both Honors and Regular versions with answer sheets

Student Pages

- This folder contains duplicate copies of every student page. They are in order according to the pacing guide for QUICK PHOTOCOPYING if you are using the pacing guide as is.

Supplementary Resources

- Draw a map of the brain on a swim cap. [Directions here.](#)
- Have students research the history of lobotomies and explain both how they benefited the medical profession and why they were eventually prohibited.
- Add a discussion of [anesthesia](#) while discussing action potentials
- [Case Study on Bell's Palsy](#) to coincide with facial nerves

Materials Needed

- General classroom use: colored pencils, scissors, markers, and crayons, index cards for prefixes and suffixes
- Build a Neuron Modeling Activity: clay or dough (or other craft supplies)
- Sheep Brain Dissection Lab: sheep brains, dissection trays & tools
- Science of Addiction Web-quest & Disease Slide Project: computers with internet access
- Sensory Lab: toothpicks, ruler, cold & warm water, essential oils, cotton swabs, stopwatch or clock with second hand, jellybeans, liquids (coffee, salt water, sugar water, diluted lemon juice), device with internet access, index cards

Not included:

Nervous System Unit Guide

Standards:

Topic:	State:	Standards:
OH	AP.1C.2	The senses of taste and smell occur primarily through taste buds and olfactory cells are the structure and afferent pathways of taste and smell. Processes include activation of chemoreceptors to the brain, where they are integrated.
CO	Standard VIII, Objectives 3-4	-Describe the anatomy of the nose and the regards to the sense of smell. -Discuss the anatomy of the tongue and the regards to the sense of taste.
IN	None	

Nervous System Unit Guide

Standards:

Topic:	State:	Standards:
OH	AP.1C.2	The special senses consist of sight, hearing, balance, smell, and taste. Each sense involves a network of feedback processes and consists of distinct structures.
CO	Standard VIII, Objective 1	Compare and contrast general and special senses.
IN	AP.7.1	Special senses, the prominent sensory receptor

Nervous System Unit Guide

Standards:

Choosing Standards:

Although many states use NGSS, there are some states that do not. I worked hard to find other state standards, but if yours are not addressed, please send me an email at support@suburbanscience.com and I can help you determine which of your state standards are covered in this unit. Thank you!

NGSS for the Unit:

- HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Topic:	State:	Standards:
OH	AP.1C.1	The nervous system consists of neurons and supporting cells that combine to form nerves, the spinal cord and the brain. The primary functions of the nervous system are sensation, integration and response. A comparison of the structures and functions of the central and peripheral nervous systems should be explored. The central nervous system is composed of the brain and spinal cord. The peripheral nervous system includes the remaining nervous tissue.
CO	Standard VII, Objectives 1-2	-Identify the major functions of the nervous system. -Compare and contrast the general organization of the nervous system.
IN	AP.6.1, AP.6.3	-Develop a model that illustrates the structural components and functional subdivisions of the nervous system. -Compare and contrast the actions, origins, and pathways of nerve fibers in the parasympathetic and sympathetic divisions of the autonomic nervous system and their associated neurotransmitters.
UT	Strand 7, Standards 1-2	-Restate the three broad functions of the nervous system. -Describe the general organization of the nervous system.
FL	SC.9.12.L.14.21	-Describe the anatomy, histology and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.

*Note: NGSS is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards were involved in the production of this product, and do not endorse it.

© Suburban Science

Unit Overview Page

plus

Supplementary Resource Ideas and Materials Lists

Editable Pacing Guides

	Day	Intro	Instruct	Assess	Homework
Diseases & Disorders	15	Anatomy of the Ear Diagram	<ul style="list-style-type: none"> Begin Research for Nervous System Disease Slide Activity Materials: devices with internet access	<ul style="list-style-type: none"> Monitor student progress and planning pages during research time 	All: Study for Test
	16	Review prefix/suffix flashcards and/or study for test	<ul style="list-style-type: none"> Finish Research for Nervous System Disease Slide Activity 	<ul style="list-style-type: none"> Monitor student progress and planning pages during work time 	All: Study for Test
Review	17	Study for test	<ul style="list-style-type: none"> Task Card 		
Assess	18	<ul style="list-style-type: none"> Last minute student questions? Study for test 	<ul style="list-style-type: none"> Take Unit 		

	Day	Intro	Instruct	Assess	Homework
Brain	7	Discuss/review homework	<ul style="list-style-type: none"> Sheep Brain Dissection Lab Materials: sheep brains for each group, dissection trays, dissection tools	<ul style="list-style-type: none"> Informal questioning during lab activity Lab answers can be graded for accuracy 	All: Brain Anatomy crossword puzzle
	8	Collect or check homework	<ul style="list-style-type: none"> The Science of Addiction Web Activity Materials: computers with internet access	<ul style="list-style-type: none"> Informal questioning during activity Check note page for accuracy and/or completion 	Study for Quiz

Nervous System Unit Pacing Guide					
	Day	Intro	Instruct	Assess	Homework
Functions & Divisions of Nervous System	1	Students add to prefix/suffix flashcards: <ul style="list-style-type: none"> neuro-, polar-, dendr-, auto- 	<ul style="list-style-type: none"> Nervous System PPT- Section 1 & Section 2 Cornell Notes (Nervous Sys Overview & Nervous Tissue) 	<ul style="list-style-type: none"> Cornell Notes summaries Informal discussion and questions 	
	2	Prefix/suffix flashcards: <ul style="list-style-type: none"> gli-, astro-, oligo- 	<ul style="list-style-type: none"> Nervous System PPT- Section 3 Cornell Notes (Nerve Protection & Support) Vocabulary Matching Activity 	<ul style="list-style-type: none"> Cornell Notes summaries Informal discussion and questions Informal assessment of student understanding during vocab activity 	
Neurons & Neuroglia	3	Review prefix/suffix flashcards	<ul style="list-style-type: none"> Build a Neuron Modeling Activity Materials: Clay (or other craft supplies)	<ul style="list-style-type: none"> Informal assessment of student understanding during modeling activity Brief grading rubric at bottom of activity 	
	4	Prefix/suffix flashcards: <ul style="list-style-type: none"> mening-, cereb-/enceph-, 	<ul style="list-style-type: none"> Nervous System PPT- Section 4 & Section 5 Cornell Notes (Nerve Impulses & Protecting the Brain) 	<ul style="list-style-type: none"> Cornell Notes summaries Informal discussion and questions 	All: Cerebrospinal Homeostasis
Brain	5	Discuss/review homework	<ul style="list-style-type: none"> Nervous System PPT- Section 6 & Section 7 Cornell Notes (Cerebrum & Diencephalon) 	<ul style="list-style-type: none"> Informal check of diagram accuracy Cornell Notes summaries Informal discussion and questions 	Honors: Data Analysis: Tumors of the CNS
	6	Honors: Discuss/review homework All: Prefix/suffix flashcards: <ul style="list-style-type: none"> -ellum, inter- 	<ul style="list-style-type: none"> Nervous System: Brain Diagram for Review Nervous System PPT- Section 8 Cornell Notes (Cerebellum & Spinal Cord) 	<ul style="list-style-type: none"> Informal check of diagram accuracy Cornell Notes summaries Informal discussion and questions 	All: Digging Deeper: Concussions

Using this Pacing Guide as is? You can

Using this Pacing Guide as is? You can

The daily topic coincide with the previous standards document.

Lesson planning is now quick and easy!

Coincide with State Standards document in Unit Planning Folder

*Bold items must be photocopied.



This icon is found on the top right corner of Honors pages for easy identification.

© Suburban Science

Differentiation Ideas for:

- Student Interest
- Student Ability
- Teaching Pace
- Teaching Environment (Virtual, in-class, or hybrid)

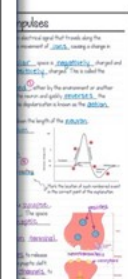
Differentiation

Differentiation is a key component to any unit. Here are some tips for differentiating based on student interest, ability and teaching environment.

Student Interest/Choice

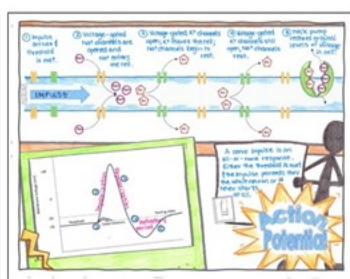
- Both Cornell notes and Doodle Notes™ are included in this unit. Although most of my students preferred the Doodle Notes™, they may not resonate with everyone. Some students may prefer the structure of the Cornell notes.
- **Slide Project**, students may have familiarity with another disorder of the nervous system. If they show a particular interest in another disorder that isn't covered in the unit, it may be helpful to let them pursue that.

Cornell Notes



OR

Doodle Notes



Differentiation

Teaching Environment

- Virtual or Hybrid students
 - Digital Options:
 - Links for PowerPoints
 - Digital Students pages using Google Slides™ for students to type on
 - Digital Doodle Notes™
- All found on the following page.
- For the Homeostasis in Cardiovascular and Respiratory Systems Lab, students can use family members and neighbors for test subjects.
- Digital drag-and-drop diagrams can be provided for students to self-check and turn it electronically. I have these available for every body system. Digital diagram quizzes are included, as well.
- Pacing


Honors Assignment List

Although there are no official education standards for what makes an "honors" class, honors assignments generally provide one of three options:

- Greater depth of knowledge
- Additional critical thinking
- More independent work

In this unit, you can find some additional assignments used to increase knowledge for honors students. These can certainly be used for extra credit, homework, or sub days if you have students who need it. Because answers to these assignments are often less straightforward, grading for completion and then discussing the answers to make sure they are correct is the goal.

Assignment	Type of work	Skills added
Data Analysis: Tumors of the Central Nervous System	Math extension	Interpretation

All honors assignments are designated by a  in the top right corner of the assignment page.

For additional skill-work in pathology or for students thinking outside the box, I also use my Anatomy case studies. There is one for each body system to allow students to integrate their knowledge of anatomy and physiology.

[Click here to see the Case Studies](#)


Digital Differentiation:

- [Nervous System PowerPoint](#)
- [Senses PowerPoint](#)
- [Student Pages for whole unit](#)
- [Doodle Notes for whole unit](#)
- [Nervous Tissue & Brain Quiz through Google Forms™](#)

Important: Please do NOT provide these links directly to students, as it can affect the files and will not provide you with the quiz reports. Make a copy of the files to your drive, then assign from your drive to students. Thank you!

To use these files for Google Classroom:

1. Make a copy of each file using the links above.
2. Rename the file in your own Google Drive.
3. Delete any pages you don't want to assign.
4. Make a new assignment in Google Classroom and add this file to the assignment. Then, choose "Make a copy for each student."



- [Sheep Brain Dissection Lab Video Demonstration](#) on YouTube

You CAN provide this link to students.

Every student page also comes in a **digital** version on Google Slides

Virtual, hybrid, or absent students can stay right on track!

Nervous Tissue

What are the types of nerve cells?

	Neurons	Neuroglia
Function	Conduct impulses around the body	"Nerve glue" Support, insulate & protect neurons
%	10%	90%

What is the structure of a neuron?

Neurons have different structures, but all have a main cell body with processes extending outward.

The cell body contains the nucleus, cytoplasm, & organelles.

Processes are divided into:

- Dendrites - bring impulses towards cell body
- Axons - send impulses away from cell body
 - End in axon terminals, which release neurotransmitters to pass the impulse to the next neuron.

What are the types of neurons?

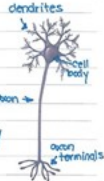
Neurons are classified by the number of processes extending from the cell body.

- Unipolar neurons - 1 process
- Bipolar neurons - 2 processes
- Multipolar neurons - many processes

Neurons can also be classified by their function.

- Afferent neurons - carry impulses toward the CNS
- Efferent neurons - carry impulses away from the CNS
- Interneurons - connect afferent & efferent neurons

Summary Neurons only make up 10% of the nervous system tissue, but they are the essential cells for carrying impulses around the body. The impulses pass through the processes and into the cell body. Neurons can be classified by the number of processes they have or by their function.



What is the structure of a neuron?

Neurons have different structures, but all have a main cell body with processes extending outward.

The cell body contains the nucleus, cytoplasm, & organelles.

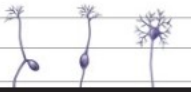
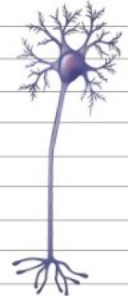
Processes are divided into:

-
-
- End in _____, which release _____ to pass the impulse to the next neuron.

What are the types of neurons?

Neurons are classified by the number of _____ extending from the cell body.

-
-



Can be used in Google Classroom, Microsoft OneDrive or many other platforms!

Greek and Latin Roots for Medical Terminology Practice

Anatomical Prefixes/Roots/Suffixes:

	Term	Definition
Nervous System	astro-	star
	audi-/oto-	hearing
	auto-	self
	-ellum	smaller
	cereb-/enceph-	brain
	dendr-	treelike
	gli-	glue
	inter-	between
	mening-	membrane
	neuro-	nerve
	oligo-	few
	opt-	vision
	photo-	light
	polar-	end

Using Prefixes/Suffixes in your Classroom:

Why study prefixes and suffixes at all?

The basis of scientific terminology comes from Latin & Greek. By teaching science students Latin & Greek prefixes, suffixes and root words, they can learn to dissect new scientific terms when they come across them in news articles or textbooks. This is a great way to train our students to be scientifically literate adults. Even if they don't remember all the facts they've memorized in this class, they can interpret scientific information from the media and from their own doctors.

How can you use them in class?

• How I do it:

- **Beginning of the year:** I ask students to bring in a stack of 300 3"x5" index cards. I always have a few extra on hand for students that forget or can't afford them, although they're fairly inexpensive.
- **Beginning of (almost) every class:** I write any prefixes and suffixes that are relevant to that day's topic on the board along with the definition. Students record the prefix/suffix on one side of an index card and the definition on the other. If there aren't any terms for that day, students can review the terms they already have written down.
- **On test day:** I add approximately two scientific words to the end of every unit test. These are words that relate to the unit but are not ones we have discussed in class. Students must use the prefixes/suffixes we've studied to interpret the meaning of the new term. For on-level or advanced classes, I recommend not letting students use their index cards on the test, but for low-level students, it may be beneficial to allow it.

Dendr-

Uses in your Classroom:

Helpful tips for using cards:

- Always have a master list of the terms you've given out or keep your own set of notecards. It may be helpful to have students write the date in the top corner of the card. This allows absent students to copy the terms they missed when they return.
- Starting class with these terms is a great way to give yourself a few more minutes to get organized. Students can always review their index cards or quiz each other if you need a few more minutes.
- Students will need some way to keep the cards organized- put them on a ring, rubber band them together, or keep them in a bag.
- Students add to these index card stacks throughout the year without removing terms. The course builds on itself, so it's always beneficial to review terms from previous units as well as the current unit. You may find that some terms are duplicated from one unit to another. No need to have students write the same term twice.
- For advanced students, you may want to have them look up the definition in a textbook rather than providing it to them.

Be sure to mention these prefixes and suffixes again as they come up in class. Using the terms in context is the best way for students to recognize and remember them.

Prep sub plans:

Students can type the terms into Quizlet or a similar site and quiz themselves.

Students can make up scientific terms (real or not) and have other students interpret the meaning of the term.

Use a blank bingo board (provided on the next page) and have students fill in the definitions for the current or past unit in any blank. The sub can call out a prefix or suffix and students mark off the definition until someone wins bingo.

*This is another important reason to have a master list or set of cards for all the terms students have already learned.

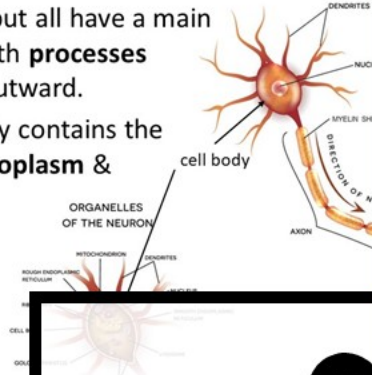
A great way to encourage scientific literacy and prepare students for higher level science courses.

2 Highly Visual PowerPoint Presentations

85 editable, fully-animated slides

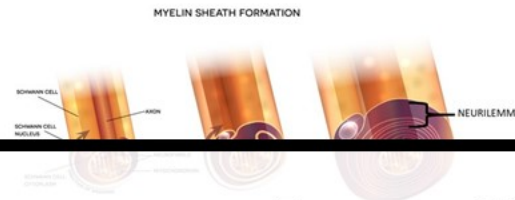
What is the structure of a neuron?

- Neurons have different structures, but all have a main **cell body** with **processes** extending outward.
- The cell body contains the **nucleus, cytoplasm & organelles**.



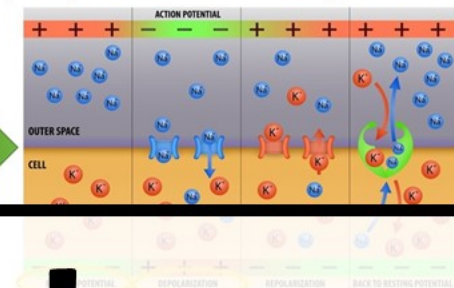
How is the myelin sheath created?

- Axons are wrapped in **myelin**, which is like a waxy insulation.
- To form the myelin, a **Schwann cell** (type of neuroglia) wraps itself around the **axon**, like a coil.
- The outer layers of the **Schwann cell** are called the **neurilemma**.



A neuron is **stimulated**, either by the environment or another neuron, **sodium** rushes into the cell and quickly **reverses** the charges (called **depolarization**). This depolarization is known as the **action potential**.

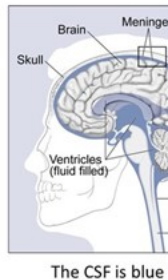
The action potential quickly **moves** down the length of the axon.



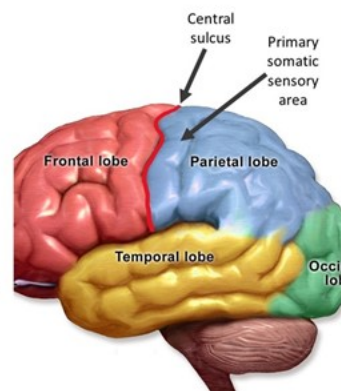
Sample Slides

Where is cerebrospinal fluid found & what is its function?

- Between the arachnoid layer and the pia mater is the **cerebrospinal fluid (CSF)**.
- The cerebrospinal fluid **protects** the brain by preventing it from contacting the **skull**.
- It also maintains the **blood-brain barrier**, which controls homeostasis for the brain and prevents **infection**.

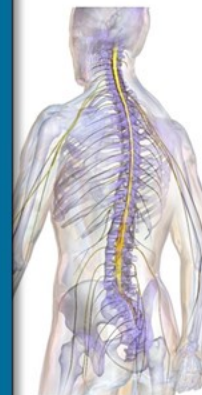


- The parietal lobe is separated from the frontal lobe by the **central sulcus**.
- The parietal lobe controls:
 - Sensations (pain, temperature, touch)
 - Visual-spatial processing
 - Body position



What is the structure and function of the spinal cord?

- The spinal cord extends from the **medulla oblongata** to the **lumbar vertebrae**.
- Like the brain, it is covered by **meninges** for protection.
- The spinal cord relays impulses between the **peripheral nervous system** and the brain through **31 pairs of spinal nerves**.



Two note-taking styles are included:

Cornell Notes

Protecting the Brain

What structures protect the central nervous system?

The brain and spinal cord make up the Central Nervous System (CNS). These structures are protected by 3 layers of connective tissue called the meninges.

- Dura mater - thick, tough layer
- Arachnoid membrane - thin, cobweb-like layer
- Pia mater - thin layer containing lots of blood vessels

Between the arachnoid layer and the pia mater is the cerebrospinal fluid (CSF).

The cerebrospinal fluid protects the brain by preventing it from contacting the skull. It also maintains the blood-brain barrier, which controls homeostasis for the brain and prevents infection.

The CSF is produced in spaces within the brain called ventricles.

There are 4 ventricles: 2 lateral (R & L), 3rd ventricle, 4th ventricle.

The lateral ventricles are connected to the third ventricle by the thin interventricular foramen (foramen of Monro).

Clusters of capillaries in the ventricles called choroid plexuses secrete CSF, it flows around the ventricles, then is absorbed by arachnoid granulations into the blood.

CSF is constantly being produced, circulated, and reabsorbed within these ventricles.

Identify the term that matches the number on the diagram.
(foramen of Monro, lateral ventricle, third ventricle, fourth ventricle, choroid plexus)

1. choroid plexus
2. lateral ventricle
3. foramen of Monro
4. third ventricle
5. fourth ventricle

Summary: The brain is protected by several layers of connective tissue called meninges. Between these layers is the cerebrospinal fluid, which is produced by choroid plexuses in one of four ventricles and circulates around the brain, providing cushioning and preventing infection.

Doodle Notes

Protecting the Brain

Cerebrospinal fluid

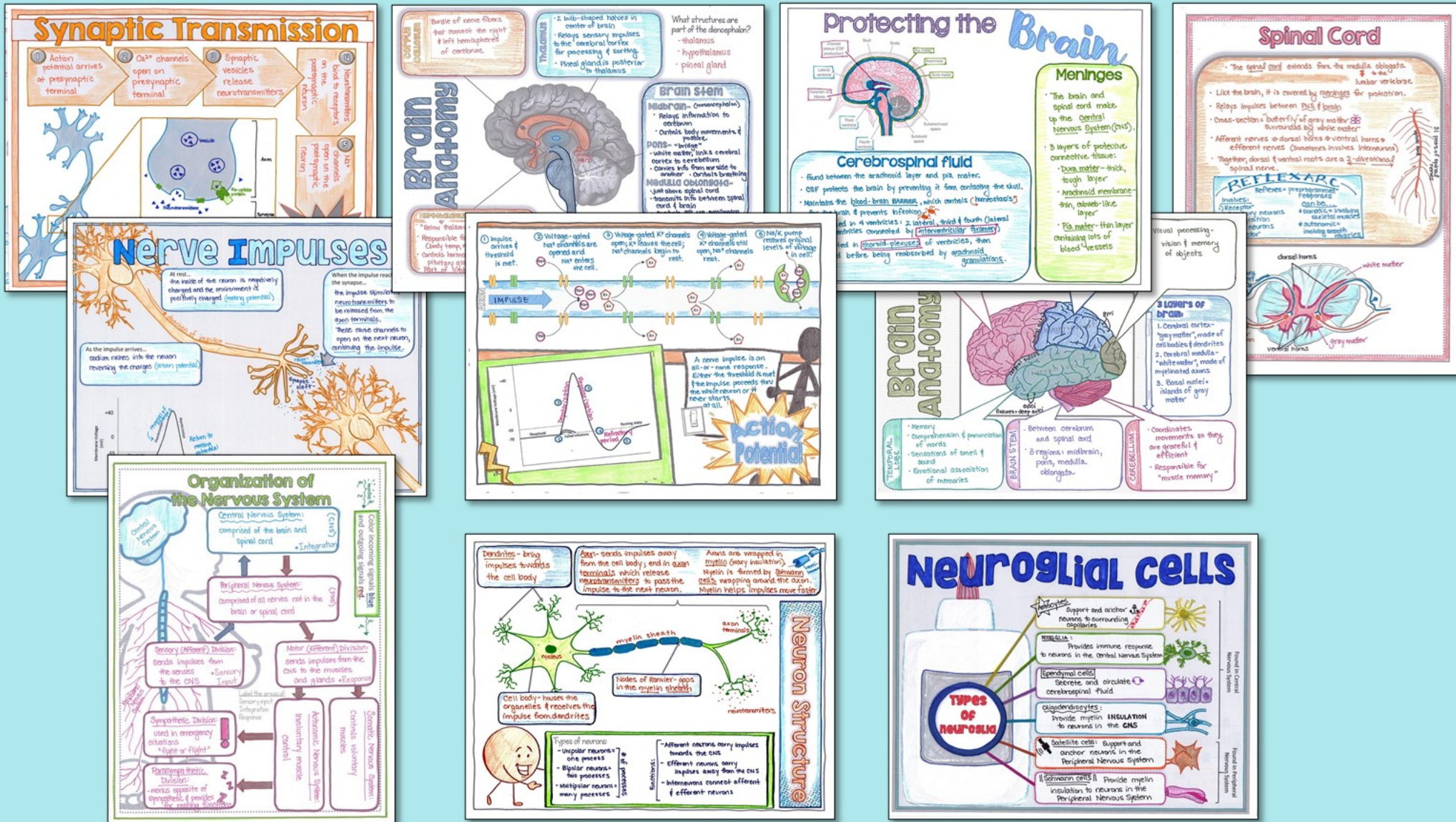
- Found between the arachnoid layer and pia mater.
- CSF protects the brain by preventing it from contacting the skull.
- Maintains the blood-brain barrier, which controls homeostasis for the brain & prevents infection.
- CSF produced in 4 ventricles: 2 lateral, third & fourth (lateral & third ventricles connected by interventricular foramen)
- CSF secreted in choroid plexuses of ventricles, then circulated before being reabsorbed by arachnoid granulations.

Meninges

- The brain and spinal cord make up the Central Nervous System (CNS).
- 3 layers of protective connective tissue:
 - Dura mater - thick, tough layer
 - Arachnoid membrane - thin, cobweb-like layer
 - Pia mater - thin layer containing lots of blood vessels

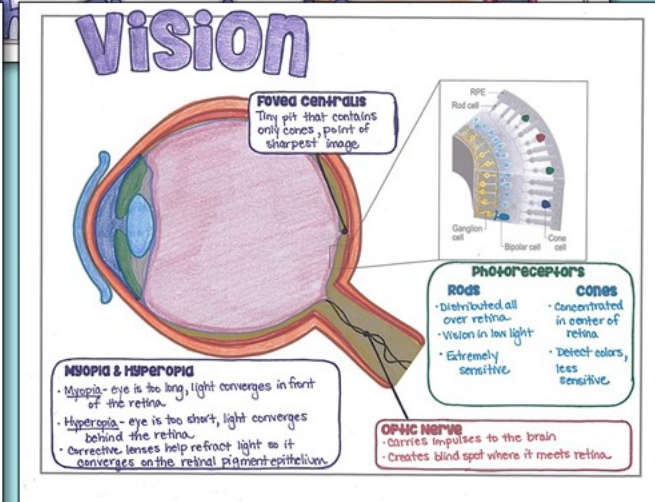
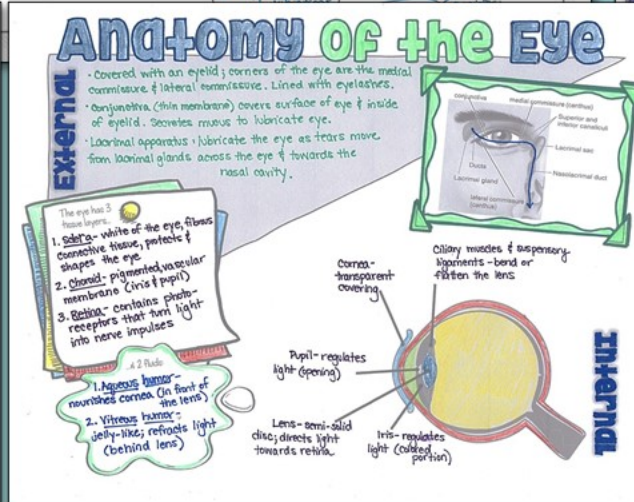
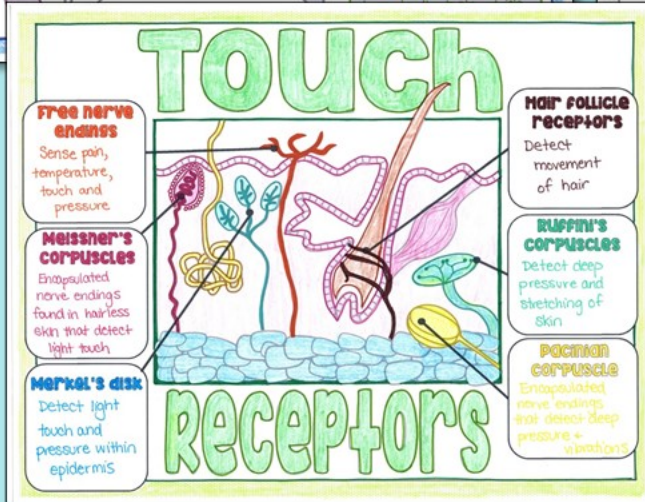
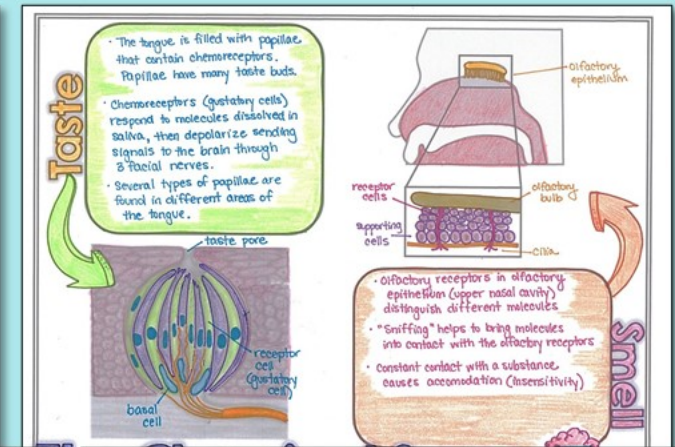
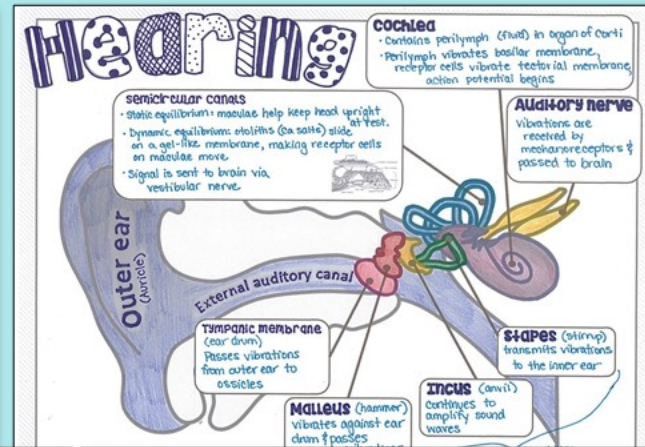
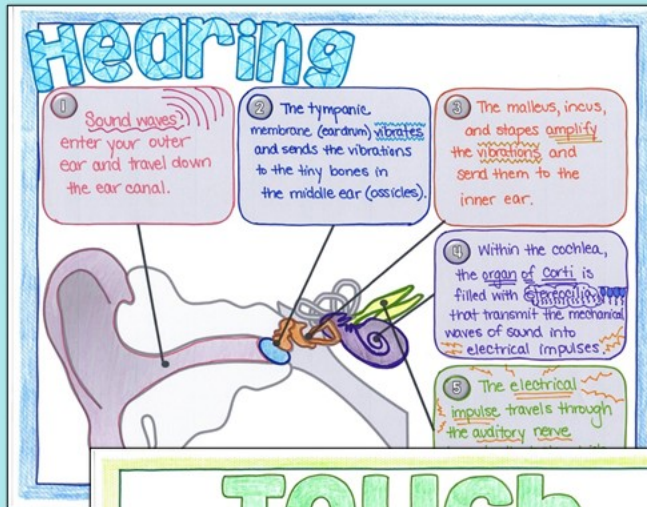
Both coincide perfectly with the presentation for error-proof notes!

10 pages of Nervous Tissue & Brain Doodle Notes



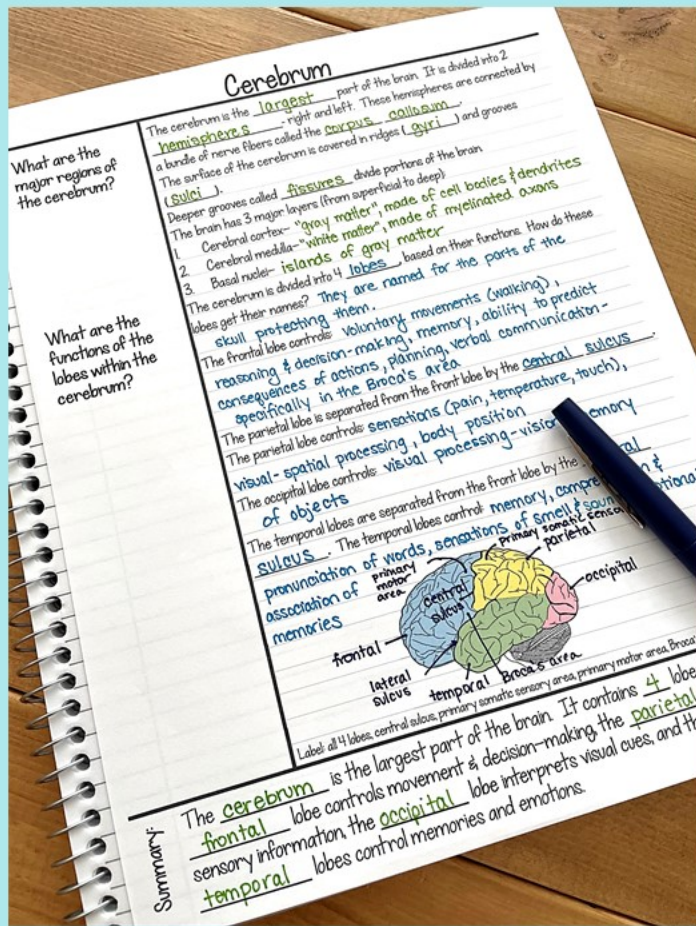
Doodle Notes™ increase student focus and memory-
and they're great fun!

6 pages of Senses Notes



A guide for using Doodle Notes in your classroom is included.

14 pages of Cornell Notes



Big
concept
questions

Content
summary for
each page

Cerebrum

What are the major regions of the cerebrum?

The cerebrum is the largest part of the brain. It is divided into 2 hemispheres - right and left. These hemispheres are connected by a bundle of nerve fibers called the corpus callosum. The surface of the cerebrum is covered in ridges (gyri) and grooves (sulci). Deeper grooves called fissures divide portions of the brain. The brain has 3 major layers (from superficial to deep):

1. Cerebral cortex- "gray matter", made of cell bodies & dendrites
2. Cerebral medulla- "white matter", made of myelinated axons
3. Basal nuclei- islands of gray matter

The cerebrum is divided into 4 lobes, based on their functions. How do these lobes get their names? They are named for the parts of the skull protecting them. The frontal lobe controls: voluntary movements (walking), reasoning & decision-making, memory, ability to predict consequences of actions, planning, verbal communication - specifically in the Broca's area. The parietal lobe is separated from the frontal lobe by the central sulcus. The parietal lobe controls: sensations (pain, temperature, touch), visual-spatial processing, body position. The occipital lobe controls: visual processing - vision & memory of objects. The temporal lobes are separated from the front lobe by the lateral sulcus. The temporal lobes control: memory, comprehension & pronunciation of words, sensations of smell & sound, emotional association of memories.

What are the functions of the lobes within the cerebrum?











The cerebrum is the largest part of the brain. It contains 4 lobes. The frontal lobe controls movement & decision-making, the parietal lobe controls sensory information, the occipital lobe interprets visual cues, and the temporal lobes control memories and emotions.

Each page is **editable**.
Add and delete text, questions, and summaries
to meet the needs of your students.

Includes 7 Activities

- Vocabulary Matching Activity
- Build a Neuron Model
- Disease Slide Project
- Sheep Brain Dissection
- Brain Crossword Puzzle
- Science of Addiction Web-quest
- Sensory Stations Lab

Vocabulary Matching Activity Sample Page

Central Nervous System 	Made of the brain & spinal cord	Peripheral Nervous System 	All nerves other than brain or spinal cord
Afferent nerves 	Send impulses towards the CNS	Efferent nerves 	Send impulses away from the CNS
Autonomic Nervous System 	Involuntary control of the body's internal organs	Somatic Nervous System 	Voluntary control of the body's muscles
Neuroglia 	Supportive framework for neurons	Astrocytes 	Neuroglia that wrap around capillaries
Microglia 	Neuroglia that fight infections in the CNS	Ependymal Cells 	Neuroglia that maintain cerebrospinal fluid

Build A Neuron

Directions:
The following structures must be present and labeled on your neuron: cell body, dendrites, axon, nodes of Ranvier, myelin sheath, synapses.
-On this page, list the function of each of those structures.

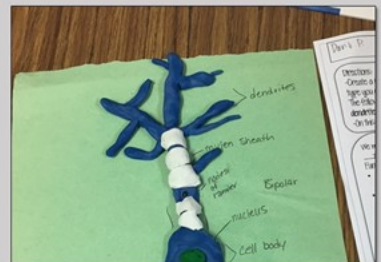
Functions of:

- Cell body
- Dendrites
- Axon
- Nodes of Ranvier
- Myelin sheath

Grading:

- ☐ A
- ☐ S
- ☐ A

Build a Neuron Model Sample Pages



This is an example of a bipolar neuron created by one of my students.

Disease Slide Project Sample Page

Nervous System Disease Slide Student Instructions

TASK: Make a Google slide to explain a disease or disorder of the nervous system to the rest of your class.

STARTING YOUR PROJECT:

1. Go to Google and create a new Google Slides presentation.
2. Don't change the size of the slide that automatically opens.
3. Add images and text.
4. Save your work. When you're finished, share the final project with your teacher.

REQUIREMENTS:

- A minimum of:
 - A slide title of the condition
 - 1 related image or chart
 - 1 related video
 - 1 related sound
 - 1 related text
 - Your name

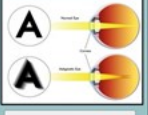
POSSIBLE CONDITIONS TO RESEARCH:

- ☐ Cataracts
- ☐ Color blindness
- ☐ Otitis media
- ☐ Tinnitus
- ☐ Meniere's disease
- ☐ ALS
- ☐ Alzheimer's
- ☐ Encephalitis
- ☐ Anencephaly
- ☐ Spina bifida
- ☐ Cerebral palsy
- ☐ Huntington's disease
- ☐ Epilepsy
- ☐ Guillain-Barre syndrome
- ☐ Parkinson's
- ☐ Cerebral Vascular Accident (stroke)

SAMPLE PROJECT:
This is an example of an "Astigmatism" project. It includes the above requirements as well as a first and video and extra explanation where appropriate. In order to keep the slide brief and informational, full sentences are not required.

Astigmatism

- Astigmatism is a condition in which the curve of the cornea and lens do not match. This prevents light rays from being correctly refracted to the retina.
- In a toric astigmatism, the lens is incorrectly curved. In a corneal astigmatism, the cornea is incorrectly curved.
- Symptoms: Blurred or distorted vision, eyestrain, headaches, difficulty with night vision, squinting.
- Treatment: Correct lenses (glasses or contact lenses), surgery to reshape the curve of the cornea.



Astigmatism may occur in combination with myopia or hyperopia.

Sheep Brain Dissection

Background Information:

The brain is the control center of the body and part of the **Central Nervous System**. Today you will be looking at the external and internal anatomy of a sheep's brain. Depending on the source of your specimens, they may be covered by **meninges**, which are layers of tissue responsible for protecting the brain.

The brain has a bumpy texture. The raised portions of the brain are called **gyri** (singular: gyrus) while the shallow grooves are called **sulci** (singular: sulcus). These grooves are often used to differentiate portions of the brain. A **fissure** is a deep sulcus.

Below the meninges is the top layer of the brain called the **cerebral cortex**. This is comprised of **grey matter**. Grey matter contains the cell bodies, while **white matter** is the inner layer. Look for the white matter underneath it.



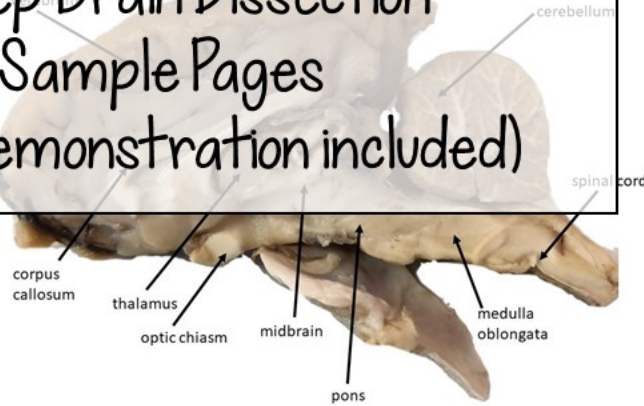
Internal Structures

Procedures:

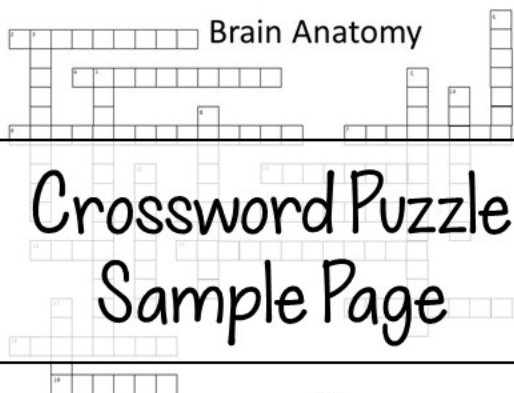
1. Use the external dissection guide to identify the external structures.
2. After finding the external structures, make a longitudinal incision in the brain to see the internal structures.
3. Set one half of the brain on a dissecting pan to see the external structures.
4. Use the diagrams provided to identify each structure a number of times.
5. Use a video demonstration to see the internal structures.

Sheep Brain Dissection Sample Pages

(Video demonstration included)



Brain Anatomy



Crossword Puzzle Sample Page

- Across:**
1. Lobe of the cerebrum involved in the visual memory of objects
 2. Lobe of the cerebrum that separates the cerebrum and cerebellum
 3. Lobe of the cerebrum involved in emotional and olfactory memories
 4. Lobe of the cerebrum found on the left of the longitudinal fissure
 5. Size of decussation; controls the vital functions of the body
 6. "Bridge"; controls breathing and passes messages between cerebrum and cerebellum
 7. Bulb-shaped structure that sorts and relays information from the PNS to cerebrum
 8. Lobe of the cerebrum found on the right of the longitudinal fissure
 9. Deep groove that separates left and right hemispheres of cerebrum
 10. Endocrine gland that secretes sexual and growth hormones
 11. Lobe of the cerebrum responsible for visual-spatial processing and body positioning
 12. A shallow groove on the brain

- Down:**
1. The half of the cerebrum found on the right of the longitudinal fissure
 2. The second largest portion of the brain; responsible for coordination of the body
 3. Bundle of neurons that connects the left and right hemispheres of the brain
 4. The lobe of the cerebrum responsible for decision-making and learning
 5. Long bundle of nerves that connects the brain and PNS
 6. Portion of the brain stem that controls visual and auditory reflexes
 7. Largest portion of the brain, divided into 4 lobes
 8. A raised portion or ridge on the brain

The Science of Addiction

Use these links to find the information below:

<https://bit.ly/28L07Y>
<https://bit.ly/2Z4xkE4>
<https://bit.ly/2WdybXf>
<https://bit.ly/2Zu2ev4>

What is the function of a reward pathway?

Effects on Nerve Pathway:

Results in Body:

Marijuana

Alcohol

Meth

Cocaine

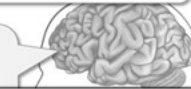
Ecstasy

Heroin

LSB

Why is a diminished prefrontal cortex advantageous during adolescence?

What are its disadvantages?



Sensory Lab

VISION: Part 1

What do rods detect?

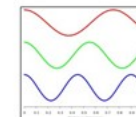
Vision Part 1

Purpose: to determine how the eye perceives color

Background Information:

There are 2 types of photoreceptor cells (those that receive light) within the retina of your eye. These 2 types of receptors are known as **rods** and **cones**.

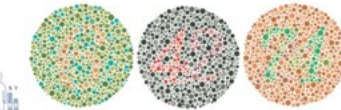
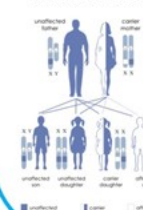
Watch the following animation to find out how these receptors help you see.



The three types of cones are each sensitive to a certain wavelength of light. L-cones detect long wavelengths, such as red. M-cones detect medium wavelengths, such as green. S-cones detect short wavelengths (blue). A sex-linked disorder called **dichromacy** (color blindness) occurs when one or more of these cones are defective or absent. L-cones and M-cones are located on the X-chromosome. X-linked traits occur more commonly in males (see the diagram below). Individuals with this disorder have a vision almost completely normal in their life. They may, however, be ineligible for some careers, such as military service or armed forces. Distinguishing traffic lights is always arranged in a specific pattern.

Test your L-cones and S-cones by using the images below. This is known as the **Ishihara test**. Individuals with dichromacy will have trouble distinguishing the numbers hidden in the circular patterns.

X-linked recessive inheritance



Answer the questions on your worksheet for Vision: Part 1.

do you have in your eyes? How do you see these three?

form of color-blindness in which affected detect blue wavelengths of light. Which is in this disorder?

uses a blind spot?

blind spot all the time?

glasses were convex, what does that mean? change her vision.

on looks blurry when you put on someone

Extension Pages

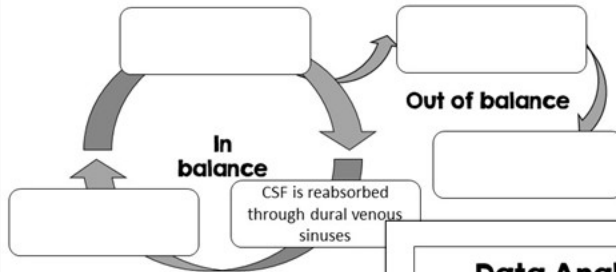
Cerebrospinal Homeostasis



CSF Balance

Cerebrospinal fluid is formed as choroid plexuses extract some components from blood and then circulate that fluid around the brain. As the CSF circulates through the ventricles and subarachnoid space, it absorbs wastes from the brain and cushions it from trauma. The CSF is finally reabsorbed through the dural venous sinuses via the arachnoid granulations before being returned to the blood.

If the arachnoid granulations are blocked by a tumor or inflamed due to injury, they are unable to reabsorb CSF at the necessary rate. This can cause a build up of CSF around the brain resulting in a condition known as hydrocephalus. Infants with hydrocephalus have enlarged heads, while adults with hydrocephalus can experience brain damage if the CSF is not removed.



Discussion Questions:

1. Fill in the following statements on the cycle above: CSF is block choroid plexuses of each ventricle, CSF builds up causing hydro ventricles and subarachnoid space
2. Consider the differences in the skull of an infant and an adult, hydrocephalus have an enlarged head while an adult would not
3. Explain how the buildup of CSF may cause brain damage.

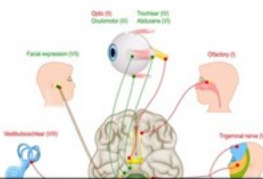
Digging Deeper: Concussions

Background:

Concussions are unfortunately all too common in sports today, but they can also occur from falls, bicycle accidents and car accidents. A concussion is a traumatic brain injury (TBI) that can be caused by a blow or bump to the head or simply by rapid body contact that jolts the brain, bouncing and twisting it in the skull. After a concussive event, the individual may act fairly normal, but the resulting brain tissue damage can continue for days, weeks or even months after the injury. Although concussions can cause immediate nerve damage, blood flow to the brain can also be affected. Particularly in children and adolescents, blood flow may continue to be abnormal for several weeks after the injury. Medical professionals are particularly concerned about concussions because of their wide-reaching effects and the variability in recovery times.



Cranial nerves



One of the biggest concerns for emergency physicians is the occurrence of Second Impact Syndrome (SIS). This condition arises when an individual experiences a second concussion before they have recovered from the first concussion. SIS is so rare that physicians can't even agree if it exists. In these rare situations, however, the patient experiences immediate cerebral swelling, brain herniation and death. Because of these grave consequences, physicians usually recommend that athletes with concussions rest and avoid high-impact activities for several weeks or months after a concussive event.

Discussion Questions:

Some of the common symptoms of concussion are listed below.

Which sensory nerves would these symptoms:

a. Unequal pupil dilation:

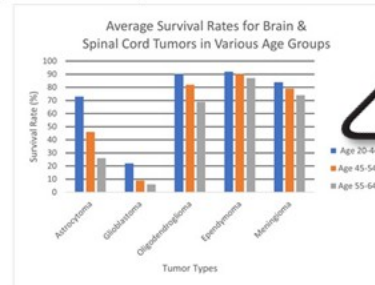
b. Nausea:

Individuals with concussions may have difficulty recognizing faces of family and friends immediately after the portion of the brain immediately involved in the process?

After being knocked over on the soccer field during the game, a player is unconscious. What do you think would she sit out? Provide a rationale for your opinion.

Data Analysis: Tumors of the Central Nervous System

Use the graph below to answer the questions that follow.

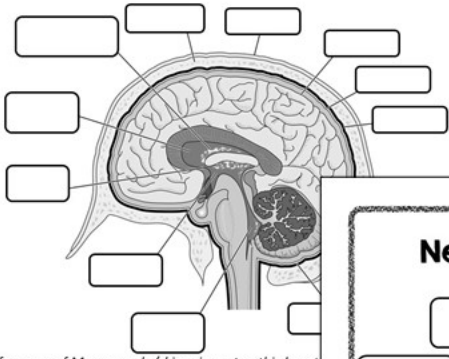


Greater depth of knowledge, scientific literacy, & critical thinking

Skills check!
Interpretation of graphs
(great for standardized test prep)

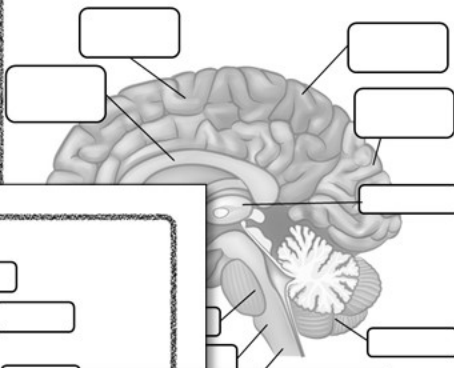
Anatomical Diagrams

Brain Meninges & Ventricles

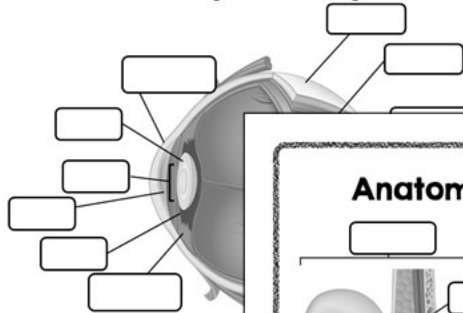


Word bank: foramen of Monro, scalp/skin, pia mater, third ventricle, subarachnoid space, skull, lateral ventricles, subdural space, arachnoid layer

Nervous System: Brain

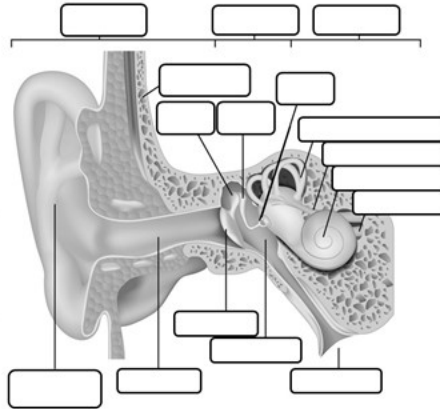


Anatomy of the Eye



Word bank: optic nerve, sclera, cornea, humor, iris, ciliary muscles, retina, lens

Anatomy of the Ear

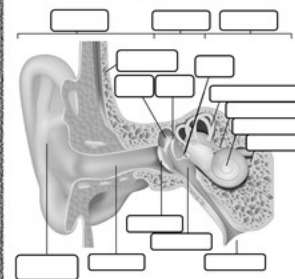


Word bank: ear canal, vestibular nerve, middle ear, auditory/eustachian tube, malleus, inner ear, temporal bone, stapes, outer ear, middle ear cavity, semicircular canals, pinna, cochlea, auditory nerve, incus, tympanic membrane

Each diagram comes in 4 versions:

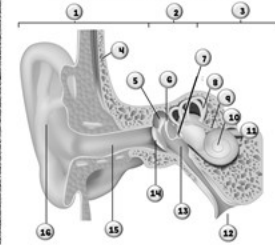
1. Fill-in the blank
2. Numbered quiz
3. Labeled black & white
4. Labeled color

Anatomy of the Ear



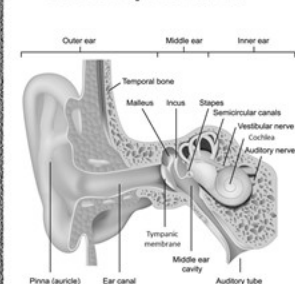
Word bank: ear canal, vestibular nerve, middle ear, auditory/eustachian tube, malleus, inner ear, temporal bone, stapes, outer ear, middle ear cavity, semicircular canals, pinna, cochlea, auditory nerve, incus, tympanic membrane

Anatomy of the Ear

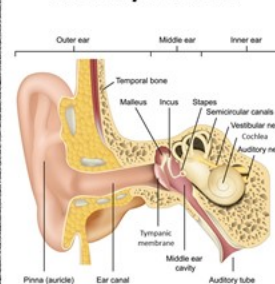


1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

Anatomy of the Ear



Anatomy of the Ear



24 Editable Task Cards for Review

1

How much of the nervous system is made of

2

What are the 3 types of neurons

3

List each type of neuroglial cell & its function.

4

What parts of your body are controlled by the somatic nervous system? The autonomic nervous system?

Sample Task Cards

21

Taste buds are found in structures called

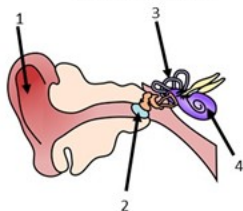
22

Name the sense that uses the following:

- Gustatory cells-
- Olfactory cells-
- Papillae-
- Maculae-

23

Identify the following structures:



24

Which nerve is used to carry information for

- hearing?
- vision?
- balance?
- smell?

Using Editable Task Cards

How to set-up:

1. Print the cards on cardstock or paper.
2. Cut the pages so that each card is separate. If you'd like to use them in future years, it may be worth laminating them to protect them from student writing and other damage.
3. Place each task card at a seat around the room.
4. Students will rotate to each seat until all cards are finished. Answers are recorded on their "Task Card Answer Sheet" or notebook paper.

*TIP: It is important to set a timer. Usually 1-2 minutes is appropriate. Without a timer, students will get backed up while rotating and chaos will ensue. ☺

Teacher Tips

Modifications:

- These task cards are editable so you can change the text on any card.
- There are additional cards at the end of the document for adding questions. Be sure to add the correct number, as well!
- Each card has an icon in the bottom right corner.

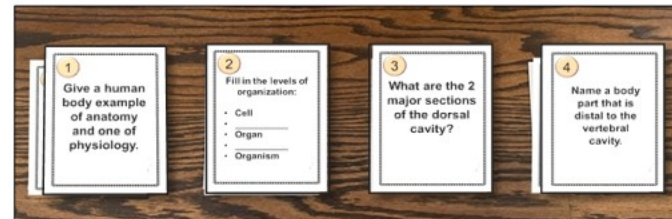


Questions about the CNS



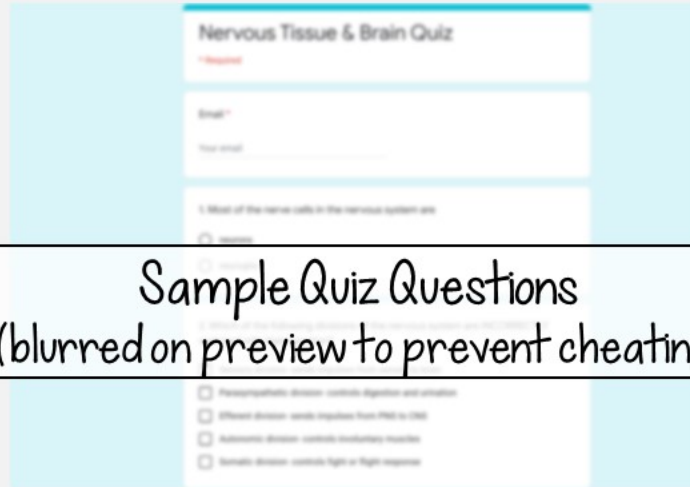
Questions about the senses

- If you'd prefer to divide the unit, you can use the blood task cards only, then use the heart & blood vessel questions later.
- If moving around your room isn't possible, you can have students pass the cards in one direction.
- Other options:
 - Students can use notes or not depending on the level of memorization you expect prior to reviewing.
 - Students can work in pairs, which adds confidence.



Assessments

Editable Online Quiz through Google Forms



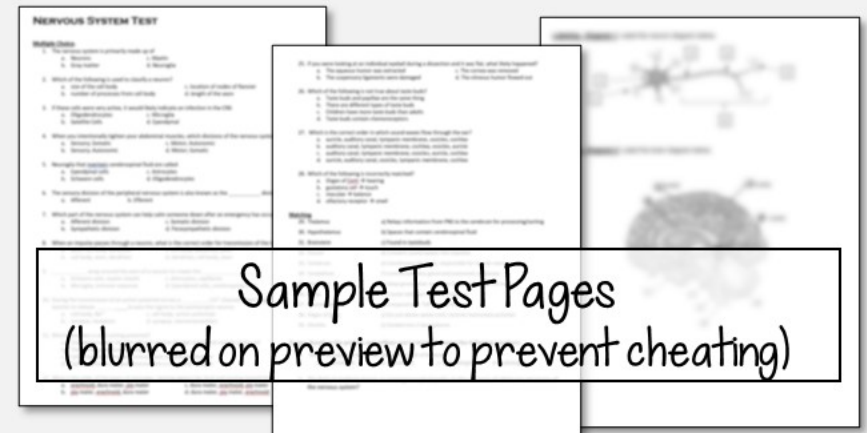
Sample Quiz Questions
(blurred on preview to prevent cheating)

- 9 multi-part questions
- Fully editable
- Answer key included for automatic grading

Editable Unit Test

- 28 multiple choice questions
- 11 matching questions
- 2 Greek/Latin term questions
- 4 labeled diagrams
- 8 free response questions

Two Versions: Honors & Regular



Sample Test Pages
(blurred on preview to prevent cheating)



Student answer
sheet & answer keys
included
(both fully editable)

I'd love to hear from you!

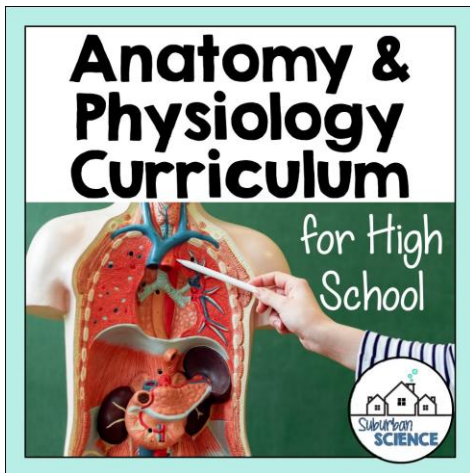
Like this resource?

You can **leave feedback** on your "My Purchases" section of TpT. Feedback also allows you to **earn credits** towards future purchases.

Didn't meet your needs?

Please email me (support@suburbanscience.com) so I can **respond directly** to your concerns. Your satisfaction is my goal.

This unit is part of my Full Anatomy & Physiology Curriculum.



The full course includes resources for every body system. If you **choose to purchase this full curriculum** after purchasing this unit, you can **receive a refund for the duplicate unit**. See the TpT return policy for details.

This resource is the copyright property of Suburban Science. It is provided as a **single user license for classroom or personal use only**. If you have questions about the use of this resource, please contact me at support@suburbanscience.com.

Want to earn credits for future purchases?

By leaving **feedback** for this purchase, you can **earn money for future purchases**. You'll earn 1 credit for every \$1 you spend on TpT.

Here's how...

1. Go to your "My Purchases" page.
2. Click the "Leave a Review" button.
3. Answer each question about your experience with this resource.

Then simply **redeem your credits** the next time you check out!

Want to connect?

I sincerely hope this resource will make your school year easier and more fun.

For more teaching tips and ideas, [subscribe](#) to my email list or [check out my blog](#).

You can also follow me on TpT or social media:



Sincerely,
Anne from Suburban Science

