

TEACHER GUIDE

4th–6th Grade

Includes Student
Worksheets

Science



Weekly Lesson Schedule



Supply List



Activities



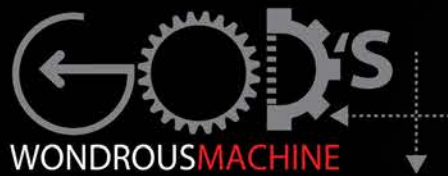
Answer Key



Tests

ELEMENTARY ANATOMY: NERVOUS, RESPIRATORY, & CIRCULATORY SYSTEMS

Lainna Callentine, M.Ed., M.D.



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Elementary Anatomy: Nervous, Respiratory, & Circulatory Systems



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Using This Teacher Guide

Features: The suggested weekly schedule enclosed has easy-to-manage lessons that guide the reading, worksheets, and all assessments. The pages of this guide are perforated and three-hole punched so materials are easy to tear out, hand out, grade, and store. Teachers are encouraged to adjust the schedule and materials needed in order to best work within their unique educational program.

Lesson Scheduling: Students are instructed to read the pages in their book and then complete the corresponding section provided by the teacher. Assessments that may include worksheets, activities, quizzes, and tests are given at regular intervals with space to record each grade. Space is provided on the weekly schedule for assignment dates, and flexibility in scheduling is encouraged. Teachers may adapt the scheduled days per each unique student situation. As the student completes each assignment, this can be marked with an “X” in the box.



Approximately 30 to 45 minutes per lesson, four days a week



Includes answer keys for worksheets and tests.



Worksheets for each section. Additional teaching material available as a download. <http://www.masterbooks.com/free-downloads>



Tests are included to help reinforce learning and provide assessment opportunities.



Designed for grades 4 to 6 in a one-year science course

Course Objectives: Students completing this course will

- ✓ Investigate the main areas and structures of the brain and what important role each plays in making the body function
- ✓ Evaluate awesome examples of God’s creativity in both the design and precision of human anatomy
- ✓ Review a timeline of important discoveries and innovators, as well as key anatomical terms and concepts
- ✓ Explore the human body’s respiratory system, focused on structures, function, diseases, and God’s efficient and effective designs
- ✓ Learn about the mechanics of the circulatory system, how it transports nutrients, blood, chemicals, and more to cells within the body
- ✓ Identify important innovations that help professionals understand the mechanisms of our lungs, sinus cavities, and diaphragm
- ✓ Demonstrate vital facts about why you sleep, what foods can superpower your brains functions, and how it controls the wondrous machine known as your body!

Course Description

This series delights in sharing the truth to children of how they are wonderfully made! Beyond the basics of how and why the body works as it does, it is important to share how the amazing and deliberate design of their bodies enables it to function as it should, just as God meant for it to. Utilizing three books from pediatrician and instructor Dr. Lainna Callentine, students will learn about the complex circulatory system, the electrifying nervous system, and the breathtaking respiratory system, with features that include instructional guidance on the eight areas of intelligence to help students of all learning styles. This includes designated levels and pacing suggestions, and it should be noted that all activities can be used at any level.

You will find activities geared to the particular level of your student. Levels 1, 2, and 3 charts outline activities that pertain to the particular types of intelligences. Each of the activities and worksheets in this guide have been identified by the various learning styles. Many of these activities can be designated in multiple categories. Remember this is just a guide. The activities can be designated in other ways.

Note: Keep your worksheets in a folder to have them ready for your review.

Optional Science Lab

Hands-on science kits are available with each unit. *These lab kits are optional, and are not an integral part of completing the course.* They are in no way mandatory to enjoy the “God’s Wondrous Machine” series. The kits include dissection specimens and materials to do several of the activities and are available from:

[www. Sciexperience.com](http://www.Sciexperience.com)



Dr. Lainna Callentine, MEd, MD, is a physician, instructor, writer, speaker, and creator at Sciexperience, as well as volunteering her services at a clinic that serves the uninsured in the Chicago suburbs. She affirms the clinic’s motto from Galatians 5:13, “serving one another in love” and left formal medicine in the ER to homeschool her three children and pursue her passion in teaching.

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester–First Quarter					
Week 1	Day 1	Read pages 7–9 • <i>Electrifying Nervous System</i> • (ENS)			
	Day 2	Read pages 10–11 • (ENS) • Complete Activity 1 pages 25–32; Practice sounding out the words and reviewing the vocabulary flash cards			
	Day 3	Read pages 12–13 • (ENS)			
	Day 4	Read pages 14–19 • Complete Worksheet 1 pages 33–34			
	Day 5				
Week 2	Day 6	Complete Activity 2 page 35			
	Day 7	Complete Activity 3 page 36			
	Day 8	Complete Worksheets 2, 3, or 4 pages 37–42			
	Day 9	Complete Activity 4 page 43			
	Day 10				
Week 3	Day 11	Read pages 20–21 • (ENS) • Complete Worksheet 5 page 44			
	Day 12	Complete Activity 5 page 45			
	Day 13	Read 22–23 • (ENS) • Complete Worksheet 6 pages 47–48			
	Day 14	Complete Worksheet 7 and Activity 6 page 49–57			
	Day 15				
Week 4	Day 16	Review pages 22–23 • (ENS) and Vocabulary Cards Complete Activity 7 or 8 pages 59–60			
	Day 17	Read pages 24–27 • (ENS) • Complete Worksheet 8 page 61			
	Day 18	Complete Worksheets 9, 10, or 11 pages 62–66			
	Day 19	Complete Activities 9, 10, 11, or 12 pages 67–70			
	Day 20				
Week 5	Day 21	Read pages 28–30 • (ENS) Complete Worksheets 12, 13, or 14 page 71–74			
	Day 22	Complete Activity 13 or 14 pages 75–76			
	Day 23	Read pages 31–33 • (ENS) Complete Worksheet 15 or 16 pages 77–79			
	Day 24	Complete Activity 15 or 16 pages 80–81			
	Day 25				
Week 6	Day 26	Complete Activity 17 page 82			
	Day 27	Read pages 34–37 • (ENS) • Complete Worksheet 17 page 83			
	Day 28	Complete Activity 18, 19, or 20 pages 84–86			
	Day 29	Review word flash cards from this section.			
	Day 30				

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 31	Read pages 38–41 • (ENS) • Complete Worksheet 18 pages 87–88			
	Day 32	Complete Activity 21 page 89			
	Day 33	Complete Activity 22 page 90			
	Day 34	Read pages 42–43 • (ENS) Complete Activity 23 or 24 pages 91–92			
	Day 35				
Week 8	Day 36	Read page 44 • Complete Activity 25 pages 93–94			
	Day 37	Complete Worksheet 19 page 95			
	Day 38	Review Vocabulary Words (all levels) and flashcards			
	Day 39	Read pages 45–47 • (ENS) • Complete Worksheet 20 page 97			
	Day 40				
Week 9	Day 41	Complete Activity 26, 27, or 28 pages 98–102			
	Day 42	Complete Activity 29 page 103			
	Day 43	Read pages 48–51 • (ENS) • Complete Worksheet 21 page 104			
	Day 44	Complete Activity 30 or 31 pages 105–106			
	Day 45				
First Semester–Second Quarter					
Week 1	Day 46	Complete Activity 32 or 33 pages 107–108			
	Day 47	Read pages 52–53 • (ENS) Complete Worksheet 22 pages 109–110			
	Day 48	Complete Activity 34 or 35 pages 111–112			
	Day 49	Read pages 54–56 • (ENS) Complete Worksheet 23 pages 113–114			
	Day 50				
Week 2	Day 51	Read pages 57–59 • (ENS) • Complete Activity 36 pages 115–116			
	Day 52	Complete Activity 37 page 117			
	Day 53	Complete Activity 38 page 118			
	Day 54	Read pages 60–61 • (ENS) • Complete Worksheet 24 page 119			
	Day 55				
Week 3	Day 56	Complete Activity 39 page 120			
	Day 57	Read pages 62–66 • (ENS) • Complete Worksheet 25 page 121			
	Day 58	Read pages 67–69 • (ENS) • Complete Worksheet 26 page 122			
	Day 59	Complete Activity 40 page 123			
	Day 60				
Week 4	Day 61	Complete Activity 41 page 124			
	Day 62	Complete Activity 42 page 125			
	Day 63	Complete Activity 43 page 126			
	Day 64	Review all Vocabulary Words Complete Activity 44 pages 127–128			
	Day 65				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 66	Review diagrams on pages 26, 36, 37, 42, 45, and 57 of ENS			
	Day 67	Complete Activity 45 pages 129–130			
	Day 68	Review worksheets and study for Unit Test			
	Day 69	Study day for <i>The Electrifying Nervous System</i> Unit Test; review activities and vocabulary words			
	Day 70				
Week 6	Day 71	Unit Test: <i>The Electrifying Nervous System</i> pages 373-376			
	Day 72	Read pages 7-12 • <i>Breathtaking Respiratory System</i> • (BRS) Complete Activity 46 pages 143-150; Cut out flash cards			
	Day 73	Complete Activity 47 page 151; practice sounding out the words and reviewing the vocabulary flash cards			
	Day 74	Read pages 13-15 • (BRS) • Complete Worksheet 27 page 152			
	Day 75				
Week 7	Day 76	Read pages 16-19 • (BRS) • Complete Activity 48 pages 153-154			
	Day 77	Complete Worksheet 28 pages 155–161			
	Day 78	Read pages 20-21 • (BRS) Complete Worksheets 29 and 30 pages 163–165			
	Day 79	Complete Activity 49 page 166			
	Day 80				
Week 8	Day 81	Read pages 22-23 • (BRS) • Complete Worksheet 31 page 167			
	Day 82	Complete Worksheet 32 and Activity 50 pages 168–169			
	Day 83	Read pages 24-25 • (BRS) • Complete Worksheet 33 page 170			
	Day 84	Read pages 26-27 • (BRS) • Complete Worksheet 34 page 171			
	Day 85				
Week 9	Day 86	Read pages 28-29 • (BRS) • Complete Worksheet 35 page 172			
	Day 87	Read pages 30-31 • (BRS) • Complete Worksheet 36 page 173–174			
	Day 88	Complete Activity 51 page 175			
	Day 89	Read pages 32-33 • (BRS) Complete Worksheets 37 and 38 pages 177–180			
	Day 90				
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
Second Semester–Third Quarter					
Week 1	Day 91	Read pages 34–35 • (BRS) • Complete Activity 52 page 181			
	Day 92	Read pages 36–37 • (BRS) • Complete Worksheet 39 page 182			
	Day 93	Read pages 38–39 • (BRS) Complete Activity 53 or 54 pages 183–184			
	Day 94	Read pages 40–41 • (BRS) • Complete Worksheet 40 page 185			
	Day 95				
Week 2	Day 96	Complete Activity 55 or 56 pages 187–189			
	Day 97	Complete Activity 57 page 190			
	Day 98	Read pages 42–43 • (BRS) Complete Activity 58 page 191–192			
	Day 99	Read pages 44–45 • (BRS) • Complete Worksheet 41 page 193			
	Day 100				
Week 3	Day 101	Read pages 46–47 • (BRS) • Complete Worksheet 42 page 194			
	Day 102	Read pages 48–49 • (BRS) Complete Activity 59 and Worksheet 43 pages 195–196			
	Day 103	Complete Activity 60 page 197–198			
	Day 104	Read pages 50–51 • (BRS) Complete Worksheet 44 pages 199–200			
	Day 105				
Week 4	Day 106	Read pages 52–53 • (BRS) • Complete Worksheet 45 page 201			
	Day 107	Complete Activity 61 pages 203–204			
	Day 108	Complete Activity 62 page 205			
	Day 109	Read pages 54–55 • (BRS) • Complete Worksheet 46 page 206			
	Day 110				
Week 5	Day 111	Complete Activity 63 or 64 pages 207–210			
	Day 112	Read pages 56–57 • (BRS) • Complete Worksheet 47 page 211			
	Day 113	Complete Activity 65 page 212			
	Day 114	Complete Activity 66 pages 213–214			
	Day 115				
Week 6	Day 116	Review all Vocabulary Cards; read definitions first and try to remember the words.			
	Day 117	Read pages 58–59 • (BRS) Complete Worksheet 48 pages 215–216			
	Day 118	Complete activity 67 page 217			
	Day 119	Review all completed worksheets			
	Day 120				
Week 7	Day 121	Read pages 60–61 • (BRS) • Complete Worksheet 49 page 218			
	Day 122	Complete Activity 68 page 219			
	Day 123	Complete Activity 69 page 220			
	Day 124	Read pages 62–63 • (BRS) Complete Activity 70 pages 221–224			
	Day 125				

Date	Day	Assignment	Due Date	✓	Grade
Week 8	Day 126	Complete Activity 71 page 225–226			
	Day 127	Read pages 64–65 • (BRS) Complete Worksheet 50 page 227–228			
	Day 128	Read pages 66–67 • (BRS) • Complete Worksheet 51 page 229			
	Day 129	Complete Activity 72 page 230			
	Day 130				
Week 9	Day 131	Read pages 68–69 • (BRS) • Complete Activity 73 page 231			
	Day 132	Read pages 70–71 • (BRS) • Complete Activity 74 page 232			
	Day 133	Read pages 72–73 • (BRS) Complete Worksheet 52 page 233–234			
	Day 134	Read pages 74–75 • (BRS) • Complete Worksheet 53 page 235			
	Day 135				
Second Semester–Fourth Quarter					
Week 1	Day 136	Review diagrams carefully on pages 22, 24, 26, 27, 29, 30, 33, 39, 52, and 59 • (BRS)			
	Day 137	Study day for Unit Test: <i>The Breathtaking Respiratory System</i> ; review coursework and vocabulary words			
	Day 138	Unit Test: <i>The Breathtaking Respiratory System</i> pages 377–380			
	Day 139	Read pages 7–9 • <i>The Complex Circulatory System</i> • (CCS) Complete Activity 75 pages 249–258			
	Day 140				
Week 2	Day 141	Read pages 10–11 • (CCS) Complete Activity 76 pages 259–260			
	Day 142	Read pages 12–13 • (CCS) Complete Worksheet 54, 55, or 56 pages 261–264			
	Day 143	Read pages 14–16 • (CCS) Complete Worksheet 57 page 265			
	Day 144	Read pages 17–19 • (CCS) Complete Worksheet 58 page 266			
	Day 145				
Week 3	Day 146	Read pages 20–23 • (CCS) Complete Activity 77 pages 267–279			
	Day 147	Read pages 24–25 • (CCS) Complete Activity 78 or Worksheet 59 pages 281–282			
	Day 148	Read pages 26–28 • (CCS) • Complete Activity 79 and Worksheet 60, 61, or 62 pages 283–287			
	Day 149	Read pages 29–31 • (CCS) • Complete Activity 80 or 81 and Worksheet 63 pages 288–290			
	Day 150				
Week 4	Day 151	Read pages 32–33 • (CCS) • Complete Activity 82 or 83 and Worksheet 64 pages 291–293			
	Day 152	Read pages 34–35 • (CCS) • Complete Activity 84, 85 or 86 and Worksheet 65, 66, or 67 pages 294–300			
	Day 153	Read pages 36–37 • (CCS) • Complete Activity 87 and Worksheet 68, 69, 70, or 71 pages 301–312			
	Day 154	Read pages 38–39 • (CCS) Complete Activity 88 or Worksheet 72 pages 313–315			
	Day 155				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 156	Read pages 40–41 • (CCS) Complete Worksheet 73 or 74 pages 316–317			
	Day 157	Read pages 42–43 • (CCS) Complete Worksheet 75, 76, or 77 pages 318–320			
	Day 158	Read pages 44–45 • (CCS) • Complete Activity 89 and Worksheet 78, 79, or 80 pages 321–324			
	Day 159	Read pages 46–47 • (CCS) Complete Activity 90 and Worksheet 81 or 82 pages 325–328			
	Day 160				
Week 6	Day 161	Read pages 48–49 • (CCS) Complete Activity 91, 92, 93, or 94 pages 329–343			
	Day 162	Read pages 50–53 • (CCS) Complete Worksheet 83 or 84 pages 344–345			
	Day 163	Read pages 54–55 • (CCS) • Complete Worksheet 85 or 86 and Activity 95 or 96 pages 346–352			
	Day 164	Read pages 56–57 • (CCS) Complete Worksheet 87 or Activity 97 pages 353–358			
	Day 165				
Week 7	Day 166	Read pages 58–59 • (CCS) Complete Worksheet 88 or Activity 98 pages 359–362			
	Day 167	Read pages 60–62 • (CCS) Complete Worksheets 89 and 90 page 363–364			
	Day 168	Read page 63 • (CCS) Complete Worksheet 91 page 365			
	Day 169	Read pages 64–65 • (CCS) Complete Worksheet 92 or 93 pages 366–368			
	Day 170				
Week 8	Day 171	Read pages 66–69 • (CCS) Complete Worksheet 94 page 369			
	Day 172	Read pages 70–73 • (CCS)			
	Day 173	Study day for <i>The Complex Circulatory System</i> Unit Test; review coursework and vocabulary words			
	Day 174	Unit Test: <i>The Complex Circulatory System</i> pages 381–383			
	Day 175				
Week 9	Day 176	Review <i>The Electrifying Nervous System</i> vocabulary words and Unit Test			
	Day 177	Review <i>The Breathtaking Respiratory System</i> vocabulary words and Unit Test			
	Day 178	Review <i>The Complex Circulatory System</i> vocabulary words and Unit Test			
	Day 179	Final Exam: <i>The Electrifying Nervous System, The Breathtaking Respiratory System, and The Complex Circulatory System</i> pages 385–388			
	Day 180				
		Final Grade			

Eight Areas of Intelligence

Let's face it. We all learn in different ways. I may be naturally talented in playing basketball. Any sport that I pick up I achieve good success . . . however, I can't carry a musical tune. In fact, I believe people would pay me *not* to sing. We all have different talents with which God has blessed us. Some things come easier than other things. As a former classroom teacher, coach, pediatrician, and homeschool mother, I have witnessed the many talents and ways that my students, players, patients, and children are gifted.

We all are gifted. God places those gifts in each of us. Although I was able to meet with a moderate amount of educational success in my formative years, it has been thwarted by many challenges. My teachers did not appreciate my particular learning style. I was not a traditional learner. Just reading a book and doing worksheets never seemed to help me gain a firm grasp on my studies. I learned best by movement, experiencing, and visualizing my lessons. I see the world in pictures. My constant doodling in class was at times not embraced by my instructors. In fact, it was viewed as a distraction and inattentiveness. This is how I learn. All through medical school, I had the "best" illustrated notes. Even to this day, during Sunday morning sermons I take artistic renditions of the pastor's message. It is through my illustrations that I understand and process what is being said to me.

How effectively we process new information determines how successfully we are able to recall that same knowledge later. The layout of this series capitalizes on hands-on activities, experiments, worksheets, and fascinating stories connecting the student to information engaging the many learning styles of children. Educational trends today focus on linguistic and mathematical abilities almost exclusively. The theory of multiple intelligences was constructed by a developmental psychologist named Dr. Howard Gardner. He is a prolific author in educational theory. His most noted work, *Frames of Mind: The Theory of Multiple Intelligences*, suggested that there are at least eight different types of human intelligence or ways of understanding the world around us. In his book, he discusses how most individuals rely on one or two dominant intelligences. In our quest to acquire knowledge to understand our Heavenly Father and the world that lies around us, it is important to strengthen all of our levels of intelligence.

The eight areas of intelligence are the following:



INTRAPERSONAL



VERBAL-LINGUISTIC



VISUAL-SPATIAL



MUSICAL



BODY-KINESTHETIC











INTERPERSONAL



LOGICAL-MATH



NATURALIST

<p>INTRAPERSONAL </p> <p>These are the people who are introspective. They tend to understand themselves well. They analyze their thoughts and feelings. They enjoy individual activities. They are “self wise.”</p>	<p>VERBAL-LINGUISTIC </p> <p>These are the people who love to color the world through their words. They think in words. They learn best by writing, reading, and speaking. They are “word wise.”</p>	<p>VISUAL-SPATIAL </p> <p>These are the people who think in shapes, colors, and images. They can see the spatial relations in things and know that things will fit just by playing with them in their minds. They are “picture wise.”</p>
<p>MUSICAL </p> <p>These are the people who can pick up a tune naturally. They hear it once and instantly “get it.” They are aware of rhythms and learn best with activities that involve music. They are “music wise.”</p>	<p>LEVEL</p>	<p>BODY-KINESTHETIC </p> <p>These people have good physical awareness. They can bound on the playground from apparatus to apparatus like a billy goat scaling the side of a mountain. They are the ones who need to move, and they benefit best through hands-on discovery. They are “body wise.”</p>
<p>INTERPERSONAL </p> <p>These people enjoy working in groups and playing on teams. They enjoy their experiences best with others. They are the “people wise.”</p>	<p>LOGICAL-MATH </p> <p>These people are rational intellectuals. They can see the abstract. They work best with numbers of patterns. They are “logic wise.”</p>	<p>NATURALIST </p> <p>These people are acutely aware of the many patterns in nature. They learn best when activities involve animals, plants, and the outdoors. They are “nature wise.”</p>

It can be very rewarding to capture your student’s interest based on his or her particular learning style and then stretch him or her to develop skills in the other intelligences. God calls us at times to step out of our comfort zone. The more we follow Him and allow that discomfort to occur . . . the more He can use us.

Division of the Teacher's Guide

This teacher guide is set up in three sections. Each contains material that corresponds with a specific book in the God's Wondrous Machine series. You will note three symbols on the sections of material that follow:



The Electrifying Nervous System

The brain symbol is a designation found on items pertaining to the nervous system.



The Breathtaking Respiratory System

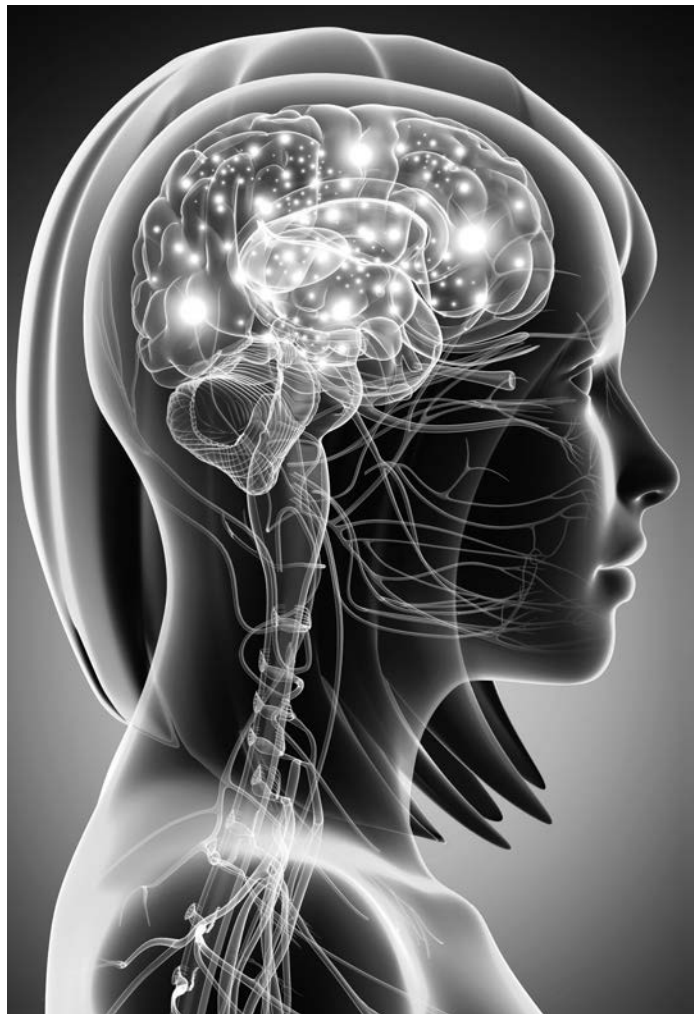
The respiratory symbol is a designation found on items pertaining to the respiratory system.



The Complex Circulatory System

The circulatory symbol is a designation found on items pertaining to the circulatory system.

If all the symbols are on a page (such as the reports and rubric section in the back), then the sheets can be used with any of the different units of material.



The Electrifying Nervous System

Educator Aids

NERVOUS SYSTEM OBJECTIVES


Successful completion of this module will enable the student to:

- Name the major regions of the brain and describe their functions.
- Identify the gray and white matter's location and of what it consists.
- Locate the cerebral hemispheres.
- Name the three divisions of the diencephalon.
- Explain how the brain is located, supported, and protected in the cranial vault.
- Explain the blood-brain barrier.
- Locate the sensory, motor, and association areas of the cerebral cortex and discuss their functions.
- Identify the important structures within the regions of the brain and explain their prospective functions.
- Identify the gross anatomical features of the spinal cord.
- Explain what are dermatomes.
- Distinguish between the role of the parasympathetic and sympathetic divisions of the autonomic nervous system.



ACTIVITY/WORKSHEET OVERVIEW

Activity (ACT) / Worksheets (WS)	Description	Multiple Intelligence Type								Ability Level		
										1	2	3
ACT1	Nervous System Flash Cards		✓			✓				✓	✓	✓
ACT2	Back in Time	✓									✓	✓
ACT3	How Did it Happen?	✓									✓	✓
ACT4	Supercilious							✓				✓
ACT5	Techy		✓								✓	✓
ACT6	Timeline Shuffle				✓	✓					✓	✓
ACT7	Neuron Connections				✓					✓	✓	✓
ACT8	You've Gotta Nerve			✓	✓						✓	✓
ACT9	Jingle, Jangle						✓				✓	✓
ACT10	Brain Transplant	✓										✓
ACT11	Head Injuries	✓								✓	✓	✓
ACT12	Blood-brain Barrier				✓							✓
ACT13	Write It Out			✓	✓						✓	✓
ACT14	Act It Out			✓	✓	✓					✓	✓
ACT15	Little Man in the Brain				✓	✓					✓	✓
ACT16	Broca / Wernicke							✓				✓
ACT17	Penelope's Lost Puppy	✓	✓									
ACT18	Drug Effects		✓									✓
ACT19	Brainiac			✓	✓					✓	✓	✓
ACT20	Training Your Cerebellum					✓				✓	✓	✓
ACT21	Brain Disorders			✓								✓
ACT22	Dough Brain Model			✓	✓					✓	✓	✓
ACT23	Egghead				✓	✓				✓	✓	✓
ACT24	Holes in the Head		✓									✓
ACT25	A Bird on a Wire			✓								✓
ACT26	Stem Cells		✓	✓								✓
ACT27	Spinal Cord					✓					✓	✓
ACT28	Spinal Column			✓							✓	✓
ACT29	If You Couldn't				✓	✓						
ACT30	Reflexes					✓				✓	✓	✓
ACT31	It is all in the Timing					✓					✓	✓
ACT32	Light as a Feather					✓				✓	✓	✓

Activity (ACT) / Worksheets (WS)	Description	Multiple Intelligence Type								Ability Level		
										1	2	3
		Intrapersonal	Verbal-Linguistic	Logical-Math	Visual-Spatial	Body-Kinesthetic	Musical-Rhythmic	Interpersonal	Naturalist			
ACT33	The Scary Stuff Challenge	✓	✓		✓							
ACT34	Memory				✓					✓	✓	✓
ACT35	Take a Picture				✓					✓	✓	✓
ACT36	Fun with Limericks							✓			✓	✓
ACT37	Sleep	✓								✓	✓	
ACT38	Sleep Simulator	✓										
ACT39	Lame Brains			✓						✓	✓	✓
ACT40	Salad on the Side			✓						✓	✓	✓
ACT41	Shrunken Apple Head				✓	✓					✓	✓
ACT42	I am Wonderfully Made Part 1				✓	✓						
ACT43	I am Wonderfully Made Part 2				✓	✓						
ACT44	Brain Salad			✓	✓						✓	✓
ACT45	Brain Lab					✓					✓	✓
WS1	Just the Facts	✓								✓	✓	✓
WS2	Biblical References #1	✓						✓				✓
WS3	Biblical References #2		✓							✓	✓	✓
WS4	The Word of God		✓								✓	✓
WS5	Looking Inside the Brain		✓									
WS6	Back to Basics		✓									✓
WS7	Basics of the Nervous System				✓					✓	✓	✓
WS8	Word Scramble: Major Regions	✓								✓	✓	✓
WS9	Anatomy of the Central Nervous System				✓					✓	✓	✓
WS10	Cerebrum		✓								✓	✓
WS11	Type of Brain							✓				✓
WS12	Regions of the Brain				✓					✓	✓	✓
WS13	Action and Control		✓								✓	✓
WS14	Frontal Lobe		✓								✓	✓
WS15	Life of Dr. Penfield		✓									✓
WS16	Homunculus				✓						✓	✓
WS17	Brain and Growth	✓	✓	✓								✓
WS18	Fearfully and Wonderfully Made		✓	✓							✓	✓
WS19	Blood Brain Barrier Maze	✓								✓	✓	✓
WS20	The Backbone		✓							✓	✓	✓
WS21	All Circuits Firing		✓									✓
WS22	The Hypothalamus					✓				✓	✓	✓
WS23	A Personal Sleep Study					✓				✓	✓	✓
WS24	Brain food					✓				✓	✓	✓
WS25	Cross Over		✓									✓
WS26	Do You Know?	✓						✓		✓	✓	✓



KIT COMPONENTS FOR THE NERVOUS SYSTEM

As noted, dissection and associated kits are an optional portion of this curriculum. Dissection kits are available at additional cost through the following sources:

www.Sciexperience.com

The kits provide a hands-on experience for the student, but it may not be appropriate for some young learners. It is up to the course instructor to determine whether or not the dissection activities are considered essential or optional as well as age-appropriate for their students.

You've Gotta Lotta Nerve! The Nervous System Charged Up

Description
Sheep Brain Specimen with Cranial Nerves
Cow Spinal Cord Section
Probe and Seeker
Art Fabric Markers
Baseball Cap
Brain Dissection Guide
Art of Illusion Prints
Styrofoam Dissection Trays
Reaction "Knobby" Ball
Nitrile Gloves (small, medium and large)
Plastic knife
Plastic Eye tub
Percussion Hammer
Teacher's Guide

Activities that will be described in the instructions in the kit:

- Brain Dissection
- Cow Spinal Cord Dissection
- Reflexes
- Thinking Cap
- Reflex/Timing Cerebellum — Reaction Ball
- Optical Illusions — the Eye-Brain Connection
- Neuron
- Reaction Tester
- Memory
- Hole in the Hand



SUPPLY LIST FOR THE ACTIVITIES

Activity 1: Nervous System Flash Cards

- Scissors
- Tape or glue stick

Activity 6: Timeline Shuffle

- Scissors
- Tape or glue stick

Activity 7: Neuron Connection

- Paper
- Colored pencils, crayons, or markers (10)

OR

- Scrap piece of wood
- Nails (10)
- Red yarn
- Hammer
- Scissors

Activity 8: You've Gotta Nerve

Possible list of materials for each activity:

- Modeling clay, cardboard
- 1 cup of flour, ½ cup of salt, 2 tsp Cream of tartar, salad oil, food coloring
- Pipe cleaners (5 colors)

Activity 12: Blood-Brain Barrier

- 6 test tubes with stoppers
- Safety goggles
- Test tube rack
- Marking pen
- Water
- Masking tape
- Clear cooking oil
- Sesame or motor oil
- Red & Blue food coloring
- Alcohol
- 3 droppers
- Paper towels
- Funnel (optional)

Activity 19: Brainiac

- White swim cap
- Permanent markers of various colors

Activity 22: Dough Brain

- Gray-colored paint (water-soluble)
- Newspaper
- Masking tape
- Paint brush
- School or wood glue
- Soft white bread

Activity 23: Egghead

- Permanent markers (waterproof)
- Plastic container with a lid
- Water
- Raw eggs (2)

Activity 27: Spinal Cord

- Cow spinal cord specimen
- Dissection kit (scalpel, forceps, probe)
- Tray
- Gloves
- Human body atlas (age-appropriate)
- Magnifying glass

Activity 28: Spinal Column

- 5 -6 empty thread spools
- Yarn (any color)
- Hole punch
- Masking tape
- Foam disks cut to size of the spools or cardboard disks
- Drinking straw

Activity 30: Reflexes — Reaction Tester

- Ruler

Activity 31: It is All in the Timing

- Reflex hammer

Activity 32: Memory

- 10 random small household objects
- Towel

Activity 35: Take a Picture

- Illustrated book or magazine

Activity 39: Lame Brain

Ingredients:

- 3½ cups flaked coconut
- 2 cups confectioners' sugar
- ¼ cup butter, softened
- ¼ cup light cream
- 1 teaspoon almond extract
- ¾ cup grenadine syrup

Materials:

- Mixing bowl
- Cookie sheet
- Spatula
- Table spoon
- Wax paper

Activity 40: Side Salad

Ingredients:

- 1 – 16-ounce jar of pasta sauce
- 1 packet of unflavored gelatin
- 1/2 cup of crushed ice
- Water
- Spaghetti
- Gray cake-decorating dye
- Cooking spray

Materials:

- Large pot
- Small bowl
- Aluminum foil
- Small sauce pan
- Measuring cup
- Spoon
- Colander
- Plastic wrap
- Large plate

Activity 41: Shrunken Apple Head

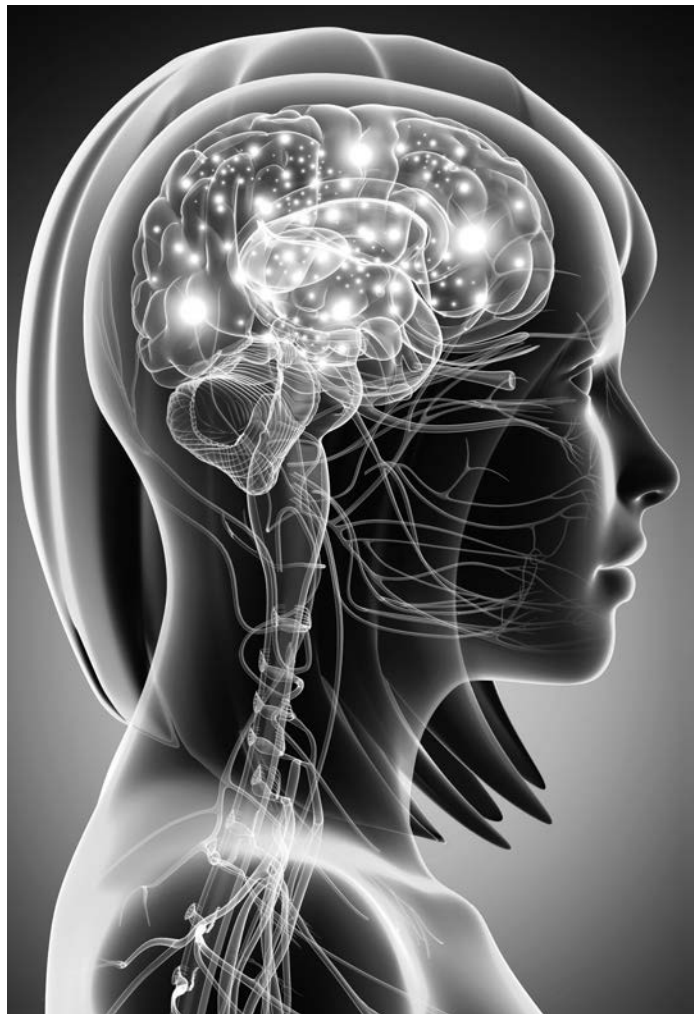
- Apple
- Vegetable peeler
- Long, sharp pencil
- Butter knife
- Push pins or thumbtacks
- Grains of uncooked rice
- Mug or cup
- Newspaper

Activity 44: Brain Salad

- Aluminum foil
- Colander
- Cooking spray
- Gray cake decorating dye
- Ice, crushed, ½ cup
- Large plate
- Measuring cup
- Pasta sauce, 1 jar
- Plastic wrap
- Six ounces of spaghetti
- Small bowl (the size of your head)
- Spoon
- Unflavored gelatin, 1 packet
- Water
- Large pots (2)

Activity 45: Brain Lab

- Kitchen knife
- Dissection kit
- Preserved sheep brain with cranial nerves attached
- Dissection tray
- Disposable gloves



The Electrifying Nervous System

Activities and Worksheets

<p>Located on the left hemisphere; the area that houses the motor speech region, which provides the ability to form spoken words.</p>	<p>"Tree of life" located in the middle section of the cerebellum; helps to coordinate movement</p>
<p>A group of disorders that affects the brain and nervous system functions that can affect movement, learning, hearing, vision, and speech. There are different types of cerebral palsy; in one type, an individual may experience spasticity, which means his or her movements are jerky and difficult to coordinate.</p>	<p>A type of brain cell that supplies nutrients to the neuron</p>
<p>The two halves of the brain, right and left</p>	<p>Self-controlling part of the nervous system that does not require conscious thought to operate</p>
<p>Tentacle-like structures that extend from the cell body of the neuron and reach out to other neurons.</p>	<p>The part of the neuron through which electrical impulses travel away from the body of the nerve cell to other nerve cells. It is wrapped in a white fatty substance called the myelin sheath.</p>
<p>Areas or zones of the skin where sensation arises from a particular spinal nerve root.</p>	<p>A special barrier that lies between the brain and the rest of the body. Small blood vessels and cells packed close together act as a filter that blocks unwanted materials from entering the brain.</p>

Cerebellum	Fissures
Cerebral Spinal Fluid (CSF)	Frontal Lobe
Cerebrum	Gray Matter
Corpus Callosum	Gyrus
Diencephalon	Homunculus
Ependymal Cells	Hypothalamus

<p>A groove or deep fold in the cerebral cortex.</p>	<p>The region of the brain located behind the brain stem. The arbor vitae resides here.</p>
<p>The front (anterior) part of the brain involved in reasoning and personality.</p>	<p>A clear fluid that bathes the brain and spinal cord and transports nutrients, chemical messengers, and waste products.</p>
<p>The thin outer rim on the surface of the brain where memory storage, processing, and conscious and subconscious regulation of skeletal movement occur.</p>	<p>The main part of brain composed of the two hemispheres.</p>
<p>A rounded convolution (folded or ridged part) on the surface of the brain.</p>	<p>The arched white matter found in the center of the cerebrum that connects the two hemispheres of the brain.</p>
<p>"Very small man," a visual representation of the connection between different body parts and the areas in the brain hemisphere that control them.</p>	<p>A structure in the middle of the brain that connects to the brainstem; also the location of the thalamus and the hypothalamus.</p>
<p>The part of the brain that regulates body temperature, sleep, and puberty.</p>	<p>The cells that make up the lining of the ventricles of the brain and of the spinal cord that help in producing spinal fluid.</p>

Medulla Oblongata	Occipital Lobe
Meninges	Oligodendoglia
Mescenphalon	Parietal Lobe
Microglia	Pituitary Gland
Neuroglia	Pons
Neurons	Pyrogen

<p>The back or posterior part of the brain that houses the visual processing center.</p>	<p>Located in the lower half of the brainstem, connecting to the pons, it regulates the vital functions of breathing, swallowing, and heart rate.</p>
<p>The “protector” cells of the nervous system that support, protect, and insulate the axons by helping to form the myelin sheaths.</p>	<p>The tough fibrous membranes that cover the brain and spinal cord.</p>
<p>Located between the frontal and occipital lobes of the brain; serves as the primary sensory cortex. Enables conscious perception of touch, pressure, vibration, pain, taste, and temperature. Memory storage, processing, and conscious and subconscious regulation of skeletal movement also originate in this area.</p>	<p>The midbrain located below the cerebral cortex near the center of the brain. The key in sorting through the visual and auditory data received by the brain.</p>
<p>A pea-sized structure at the base of the skull that secretes hormones. It is the “master gland” of the body by overseeing key functions, such as growth during childhood and the onset of puberty, by controlling male and female hormones.</p>	<p>The “garbage collector” cells of the brain that kill unwanted organisms and remove waste products produced by the neurons.</p>
<p>Latin for “bridge.” Located anterior to (in front of) the cerebellum, it serves as a bridge between the cerebellum and the thalamus, acts as a relay station for sensory information between the structures.</p>	<p>General term for the glia cells of the brain that support nerves. Glia comes from the Greek word meaning “glue.”</p>
<p>A substance released from the brain that tells the hypothalamus to increase the body’s temperature, causing a fever.</p>	<p>An electrical conducting cell of the nervous system.</p>

Shingles	Ventricles
Temporal Lobe	Wernicke's Area
Thalamus	White Matter

<p>Spaces in the middle part of the brain that produce and are filled with cerebrospinal fluid.</p>	<p>A painful, blistering skin rash caused by the chicken pox virus. Pain, tingling, or burning occurs along a dermatome.</p>
<p>The region of the brain that interprets what one hears and makes sense of spoken communication.</p>	<p>The side (lateral) region of the brain in which the auditory perception, and language comprehension are located.</p>
<p>Regions of the brain that lie at a deeper depth in brain; the area where neurological nerve tracts are housed.</p>	<p>Buried under the cerebral cortex, it serves like a communications center; relays and processes sensory information to various destinations in the brain.</p>



Just the Facts

Match the word with its related meaning:

- | | | |
|---------------|-------|---|
| A. Anatomy | _____ | Abnormal health consequences of disease |
| B. Physiology | _____ | Microscopic cell structure |
| C. Histology | _____ | Name and location of parts of the body |
| D. Pathology | _____ | How the body functions |

Quick questions:

1. How much does your brain weigh?
2. At what rate can your brain and nervous system send out signals to the body?
3. What basic function does your brain serve to do?
4. The Edwin Smith Surgical Papyrus was written by what ancient culture?
5. Who is also known as “The Father of Medicine”?
6. Who believed the brain was just a place to cool blood from the heart?



Back in Time

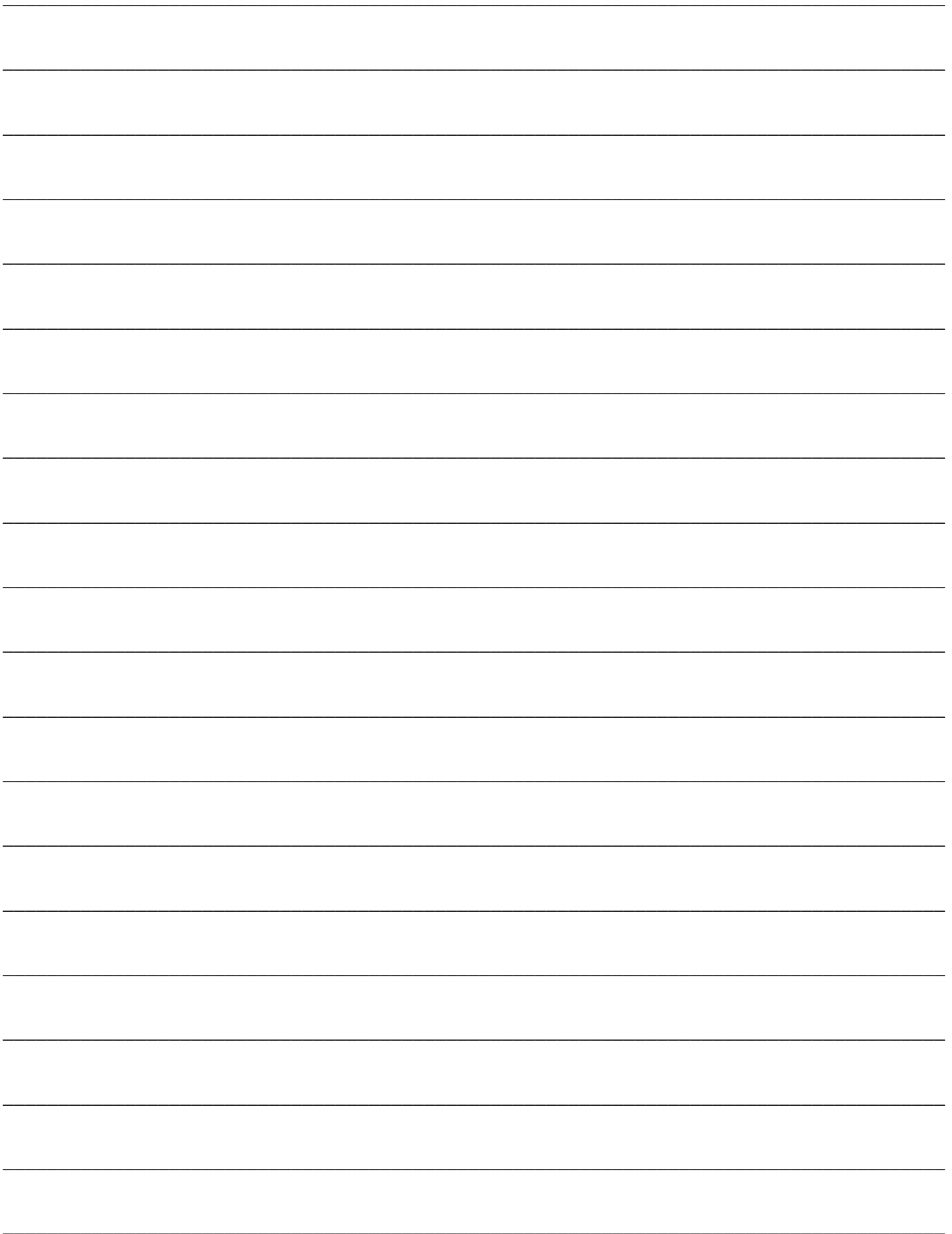
Choose one of the people from the historical timeline. Write a short story of how this discovery may have been made — and you can be as creative as you like. For example, imagine a situation that Hippocrates would have felt the need to develop the Hippocratic Oath. Or why the Edwin Smith Surgical Papyrus was written. Or what a day in an early apothecary may have been like.



How Did It Happen? Short Story Challenge

Imagine you are the assistant of one of the people listed on the timeline of brain-related discoveries or innovations. In 750 words or less, create a possible scenario that might have led to the discovery.

For example, you are Dr. Alice Hamilton's nurse and she is looking over a stack of patient records. When she realizes that the patients all have the same symptoms, she then tries to discover other things they have in common. (Hint! What kind of jobs do they have?)





Supercilious

Here is an intellectual play on words. There is a ridge above the eye sockets in the skull called the *superciliary ridge*. What does it mean when someone describes a person as acting in a *supercilious* way? How are these two terms — superciliary ridge and supercilious — related? *Hint*: You will need a dictionary!





Looking Inside the Brain

Modern technology has afforded us the ability to look into a person's brain. It provides useful diagnostic information to treat disease.



Fill in the blanks below on the following modalities.

1. CT scans or _____ are used for diagnosing _____, _____, and _____.
2. EEG or _____ is a way of recording _____ of the _____.
3. MRI or _____, are _____ that use powerful magnetic _____ and radio _____ to form images of the body.
4. PET scan or _____ uses _____ . It reveals which areas of the brain are _____.



Techy

MRI (Magnetic Resonance Imaging), CAT (Computerized Tomography), and PET (Positron Emission Tomography) scans have become valuable tools for peering into the body. Physicians use these tools to diagnose problems inside the brain without performing surgery. Write a report describing the difference between these diagnostic tools and describe how they relate to the brain and the nervous system.





Back to the Basics

Fill in the blanks with the following words:

neuron dendrites axon myelin sheath neuroglia

The _____ are tentacle-like structures that extend from the cell body and reach out to the other cells.

A long tail-like extension of the cell body is called a(n) _____ and it is surrounded by a white fatty segmented covering called a(n) _____.

Electrical impulses are transmitted through the _____.

_____ literally means “neuron glue.”

Match the neuroglia with its function.

_____ Microglia

1. “The grocer” — supplies nutrients to the neuron

_____ Astroglia

2. “The lining” — cells that line the small cavities of the brain and produce cerebral spinal fluid (CSF)

_____ Oligodendroglia

3. “The garbage collector” — these are the phagocytic cells that digest microorganism invaders and waste products from the neurons

_____ Ependymal cells

4. “The protector” — cells that support and insulate the axons by helping to form the myelin sheaths that protect the neuron

Name the parts of a neuron.

1.

2.

3.

Draw and label a picture of a neuron.

