

TEACHER GUIDE

4th–6th Grade

Includes Student
Worksheets

Science



Weekly Lesson Schedule



Supply List



Activities



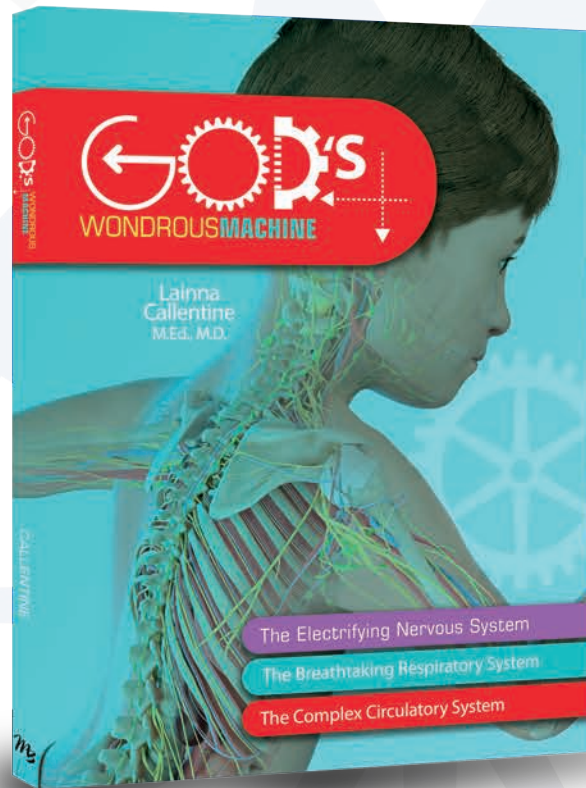
Answer Key



Tests

ELEMENTARY ANATOMY

Nervous, Respiratory,
& Circulatory Systems



MASTERBOOKS®
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Elementary Anatomy: Nervous, Respiratory, & Circulatory Systems



MASTERBOOKS®
— CURRICULUM —

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First printing: April 2016

Eighth printing: October 2022

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Master Books®, P.O. Box 726, Green Forest, AR 72638

Master Books® is a division of the New Leaf Publishing Group, Inc.

ISBN: 978-1-68344-319-3

ISBN: 978-1-61458-824-5 (digital)

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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. **There is a supply list for the activities in this teacher guide at the front of each unit study.**

God's Wondrous Machine! Go on an amazing journey through your body's nervous, respiratory, and circulatory systems! Students will learn how their brains control the different parts of their body, how the cycle of a breath works, what route their blood takes through their body, and much more. Providing a variety of worksheets that appeal to different learning styles and skill levels, this course is instructional and exciting for any student.



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



Includes answer keys for worksheets and tests



Worksheets for each section



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 brain's 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 *God's Wondrous Machine* by 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.

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. If you would like to know which multiple intelligence type a particular activity sheet or worksheet was designed for, you can check in the appendices for the Activity/Worksheet Overview charts.

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

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

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.

<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 “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>

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester–First Quarter					
Week 1	Day 1	Read pages 10–11 • <i>God's Wondrous Machine</i> • (GWM)			
	Day 2	Read pages 12–13 • (GWM) • Complete Activity 1 pages 21–28; Practice sounding out the words and reviewing the vocabulary flash cards			
	Day 3	Read pages 14–17 • (GWM)			
	Day 4	Read pages 18–21 •			
	Day 5	Complete Worksheet 1 pages 29–30			
Week 2	Day 6	Complete Activity 2 page 31			
	Day 7	Complete Activity 3 page 32			
	Day 8	Complete Worksheet 2 or 3 pages 33–36			
	Day 9	Complete Worksheet 4 pages 37–38			
	Day 10	Complete Activity 4 page 39			
Week 3	Day 11	Read pages 22–23 • (GWM) • Complete Worksheet 5 page 40			
	Day 12	Complete Activity 5 page 41			
	Day 13	Read 24–25 • (GWM) • Complete Worksheet 6 pages 43–44			
	Day 14	Complete Worksheet 7 page 45			
	Day 15	Complete Activity 6 pages 47–53			
Week 4	Day 16	Review vocabulary flash cards Complete Activity 7 or 8 pages 55–56			
	Day 17	Read pages 26–29 • (GWM) • Complete Worksheet 8 page 57			
	Day 18	Complete Worksheet 9, 10, or 11 pages 58–62			
	Day 19	Complete Activity 9 or 10 pages 63–64			
	Day 20	Complete Activity 11 or 12 pages 65–66			
Week 5	Day 21	Read pages 30–32 • (GWM) Complete Worksheet 12, 13, or 14 pages 67–70			
	Day 22	Complete Activity 13 or 14 pages 71–72			
	Day 23	Read pages 33–35 • (GWM) Complete Worksheet 15 or 16 pages 73–75			
	Day 24	Complete Activity 15 page 76			
	Day 25	Complete Activity 16 page 77			
Week 6	Day 26	Complete Activity 17 page 78			
	Day 27	Read pages 36–39 • (GWM) • Complete Worksheet 17 page 79			
	Day 28	Complete Activity 18 or 19 pages 80–81			
	Day 29	Complete Activity 20 page 82			
	Day 30	Review vocabulary flash cards			

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 31	Read pages 40–43 • (GWM) • Complete Worksheet 18 pages 83–84			
	Day 32	Complete Activity 21 page 85			
	Day 33	Complete Activity 22 page 86			
	Day 34	Read pages 44–45 • (GWM) • Complete Activity 23 page 87			
	Day 35	Complete Activity 24 page 88			
Week 8	Day 36	Read page 46 • Complete Activity 25 pages 89-90			
	Day 37	Complete Worksheet 19 page 91			
	Day 38	Review Vocabulary Words (all levels)			
	Day 39	Read pages 47–49 • (GWM)			
	Day 40	Complete Worksheet 20 page 93			
Week 9	Day 41	Complete Activity 26, 27, or 28 pages 94-98			
	Day 42	Complete Activity 29 page 99			
	Day 43	Read pages 50-53 • (GWM) • Complete Worksheet 21 page 100			
	Day 44	Complete Activity 30 page 101			
	Day 45	Complete Activity 31 page 102			
First Semester–Second Quarter					
Week 1	Day 46	Complete Activity 32 or 33 pages 103–104			
	Day 47	Read pages 54–55 • (GWM) Complete Worksheet 22 pages 105–106			
	Day 48	Complete Activity 34 or 35 pages 107–108			
	Day 49	Read pages 56–58 • (GWM)			
	Day 50	Complete Worksheet 23 pages 109–110			
Week 2	Day 51	Read pages 59–61 • (GWM) • Complete Activity 36 pages 111–112			
	Day 52	Complete Activity 37 page 113			
	Day 53	Complete Activity 38 page 114			
	Day 54	Read pages 62–63 • (GWM)			
	Day 55	Complete Worksheet 24 page 115			
Week 3	Day 56	Complete Activity 39 page 116			
	Day 57	Read pages 64–68 • (GWM) • Complete Worksheet 25 page 117			
	Day 58	Read pages 69–71 • (GWM)			
	Day 59	Complete Worksheet 26 page 118			
	Day 60	Complete Activity 40 page 119			
Week 4	Day 61	Complete Activity 41 page 120			
	Day 62	Complete Activity 42 page 121			
	Day 63	Complete Activity 43 page 122			
	Day 64	Read pages 72–73 • (GWM) • Review all Vocabulary Words			
	Day 65	Complete Activity 44 pages 123–124			

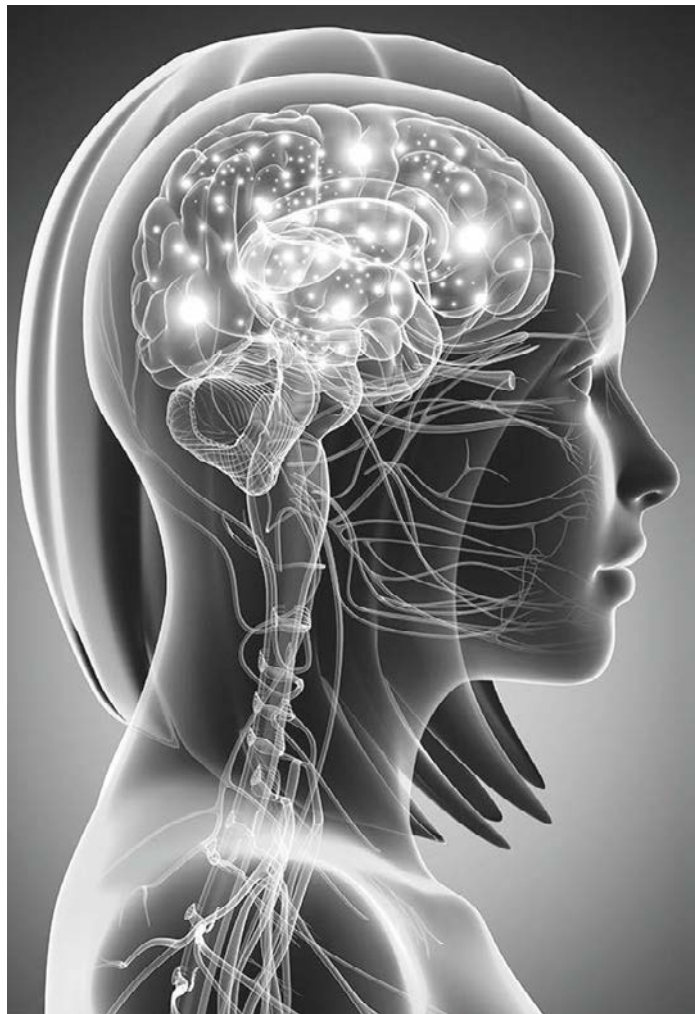
Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 66	Review diagrams on pages 28, 38, 39, 44, 47, and 59 • (GWM)			
	Day 67	Complete Activity 45 pages 125–126			
	Day 68	Review worksheets and study for Unit Test			
	Day 69	Study day for <i>The Electrifying Nervous System</i> Unit Test; review activities and vocabulary words			
	Day 70	Unit Test: <i>The Electrifying Nervous System</i> pages 361-364			
Week 6	Day 71	Read pages 76–80 • (GWM)			
	Day 72	Complete Activity 46 pages 135–142; Cut out flash cards			
	Day 73	Complete Activity 47 page 143; practice sounding out the words and reviewing the vocabulary flash cards			
	Day 74	Read pages 81–83 • (GWM)			
	Day 75	Complete Worksheet 27 page 144			
Week 7	Day 76	Read pages 84–87 • (GWM) • Complete Activity 48 pages 145–146			
	Day 77	Complete Worksheet 28 pages 147–153			
	Day 78	Read pages 88–89 • (GWM) Complete Worksheet 29 pages 155–156			
	Day 79	Complete Worksheet 30 page 157			
	Day 80	Complete Activity 49 page 158			
Week 8	Day 81	Read pages 90–91 • (GWM) • Complete Worksheet 31 page 159			
	Day 82	Complete Worksheet 32 and Activity 50 page 161			
	Day 83	Read pages 92–93 • (GWM) • Complete Worksheet 33 page 162			
	Day 84	Read pages 94–95 • (GWM)			
	Day 85	Complete Worksheet 34 page 163			
Week 9	Day 86	Read pages 96–97 • (GWM) • Complete Worksheet 35 page 164			
	Day 87	Read pages 98–99 • (GWM) • Complete Worksheet 36 pages 165–166			
	Day 88	Complete Activity 51 page 167			
	Day 89	Read pages 100–101 • (GWM) Complete Worksheet 37 pages 169–170			
	Day 90	Complete Worksheet 38 pages 171–172			
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
Second Semester–Third Quarter					
Week 1	Day 91	Read pages 102–103 • (BRS) • Complete Activity 52 page 173			
	Day 92	Read pages 104–105 • (BRS) • Complete Worksheet 39 page 174			
	Day 93	Read pages 106–107 • (BRS) Complete Activity 53 or 54 pages 175–176			
	Day 94	Read pages 108–109 • (BRS)			
	Day 95	Complete Worksheet 40 page 177			
Week 2	Day 96	Complete Activity 55 or 56 pages 179–181			
	Day 97	Complete Activity 57 page 182			
	Day 98	Read pages 110–111 • (BRS) Complete Activity 58 pages 183–184			
	Day 99	Read pages 112–113 • (BRS)			
	Day 100	Complete Worksheet 41 page 185			
Week 3	Day 101	Read pages 114–115 • (BRS) • Complete Worksheet 42 page 186			
	Day 102	Read pages 116–117 • (BRS) Complete Activity 59 and Worksheet 43 pages 187–188			
	Day 103	Complete Activity 60 pages 189–190			
	Day 104	Read pages 118–119 • (BRS)			
	Day 105	Complete Worksheet 44 pages 191–192			
Week 4	Day 106	Read pages 120–121 • (BRS) • Complete Worksheet 45 page 193			
	Day 107	Complete Activity 61 pages 195–196			
	Day 108	Complete Activity 62 page 197			
	Day 109	Read pages 122–123 • (BRS)			
	Day 110	Complete Worksheet 46 page 198			
Week 5	Day 111	Complete Activity 63 or 64 pages 199–202			
	Day 112	Read pages 124–125 • (BRS)			
	Day 113	Complete Worksheet 47 page 203			
	Day 114	Complete Activity 65 page 204			
	Day 115	Complete Activity 66 pages 205–206			
Week 6	Day 116	Review all Vocabulary Cards; read definitions first and try to remember the words.			
	Day 117	Read pages 126–127 • (BRS) Complete Worksheet 48 pages 207–208			
	Day 118	Complete activity 67 page 209			
	Day 119	Review Worksheets 1–24			
	Day 120	Review Worksheets 25–48			

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 121	Read pages 128–129 • (BRS) • Complete Worksheet 49 page 210			
	Day 122	Complete Activity 68 page 211			
	Day 123	Complete Activity 69 page 212			
	Day 124	Read pages 130–131 • (BRS)			
	Day 125	Complete Activity 70 pages 213–216			
Week 8	Day 126	Complete Activity 71 pages 217–218			
	Day 127	Read pages 132–133 • (BRS) Complete Worksheet 50 pages 219–220			
	Day 128	Read pages 134–135 • (BRS)			
	Day 129	Complete Worksheet 51 page 221			
	Day 130	Complete Activity 72 page 222			
Week 9	Day 131	Read pages 136–137 • (BRS) • Complete Activity 73 page 223			
	Day 132	Read pages 138–139 • (BRS) • Complete Activity 74 page 224			
	Day 133	Read pages 140–141 • (BRS) Complete Worksheet 52 pages 225–226			
	Day 134	Read pages 142–143 • (BRS)			
	Day 135	Complete Worksheet 53 page 227			
Second Semester–Fourth Quarter					
Week 1	Day 136	Review diagrams carefully on pages 90, 92, 94, 95, 97, 98, 101, 107, 120, and 127 • (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 365–368			
	Day 139	Read pages 146–147 • (GWM)			
	Day 140	Complete Activity 75 pages 237–246			
Week 2	Day 141	Read pages 148–149 • (GWM) Complete Activity 76 pages 247–248			
	Day 142	Read pages 150–151 • (GWM) Complete Worksheet 54 or 55 pages 249–250			
	Day 143	Read pages 152–154 • (GWM) • Complete Worksheet 56 pages 251–252			
	Day 144	Read pages 155–157 • (GWM) • Complete Worksheet 57 page 253			
	Day 145	Complete Worksheet 58 page 254			
Week 3	Day 146	Read pages 158–161 • (GWM) Complete Activity 77 pages 255–267			
	Day 147	Read pages 162–163 • (GWM) Complete Activity 78 or Worksheet 59 pages 269–270			
	Day 148	Read pages 164–166 • (GWM) • Complete Activity 79 and Worksheet 60, 61, or 62 pages 271–275			
	Day 149	Read pages 167–169 • (GWM) • Complete Activity 80 or 81 pages 276–277			
	Day 150	Complete Worksheet 63 pages 278			

Date	Day	Assignment	Due Date	✓	Grade
Week 4	Day 151	Read pages 170–171 • (GWM) • Complete Activity 82 or 83 and Worksheet 64 pages 279–281			
	Day 152	Read pages 172–173 • (GWM) • Complete Activity 84, 85 or 86 and Worksheet 65, 66, or 67 pages 282–288			
	Day 153	Read pages 174–175 • (GWM) • Complete Activity 87 and Worksheet 68, 69, 70, or 71 pages 289–300			
	Day 154	Read pages 176–177 • (GWM) • Complete Activity 88 pages 301–302			
	Day 155	Complete Worksheet 72 pages 303			
Week 5	Day 156	Read pages 178–179 • (GWM) Complete Worksheet 73 or 74 pages 304–305			
	Day 157	Read pages 180–181 • (GWM) Complete Worksheet 75, 76, or 77 pages 306–308			
	Day 158	Read pages 182–183 • (GWM) • Complete Activity 89 and Worksheet 78, 79, or 80 pages 309–312			
	Day 159	Read pages 184–185 • (GWM) • Complete Activity 90 page 313			
	Day 160	Complete Worksheet 81 or 82 pages 314–316			
Week 6	Day 161	Read pages 186–187 • (GWM) Complete Activity 91, 92, 93, or 94 pages 317–331			
	Day 162	Read pages 188–191 • (GWM) Complete Worksheet 83 or 84 pages 332–333			
	Day 163	Read pages 192–193 • (GWM) • Complete Worksheet 85 or 86 and Activity 95 or 96 pages 334–340			
	Day 164	Read pages 194–195 • (GWM) Complete Worksheet 87 pages 341–342			
	Day 165	Complete Activity 97 pages 343–346			
Week 7	Day 166	Read pages 196–197 • (GWM) Complete Worksheet 88 or Activity 98 pages 347–350			
	Day 167	Read pages 198–200 • (GWM) Complete Worksheets 89 and 90 pages 351–352			
	Day 168	Read page 201 • (GWM) • Complete Worksheet 91 page 353			
	Day 169	Read pages 202–203 • (GWM) Complete Worksheet 92 pages 354–355			
	Day 170	Complete Worksheet 93 page 356			
Week 8	Day 171	Read pages 204–207 • (GWM) • Complete Worksheet 94 page 357			
	Day 172	Read pages 208–211 • (GWM)			
	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 369–371			
	Day 175	Study day to finish any assignments			
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>God's Wondrous Machine</i> pages 373–376			
	Day 180	Final study day for any makeup work			
		Final Grade			



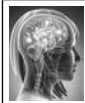
The Electrifying Nervous System

Educator Aids
for Use with
*Elementary Anatomy: Nervous,
Respiratory, and Circulatory Systems*

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 dermatomes are.
- Distinguish between the role of the parasympathetic and sympathetic divisions of the autonomic nervous system.



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)
- 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 25: 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

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

*Please be careful with items that can stain surfaces or clothing.

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 41: Shrunken Apple Head

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

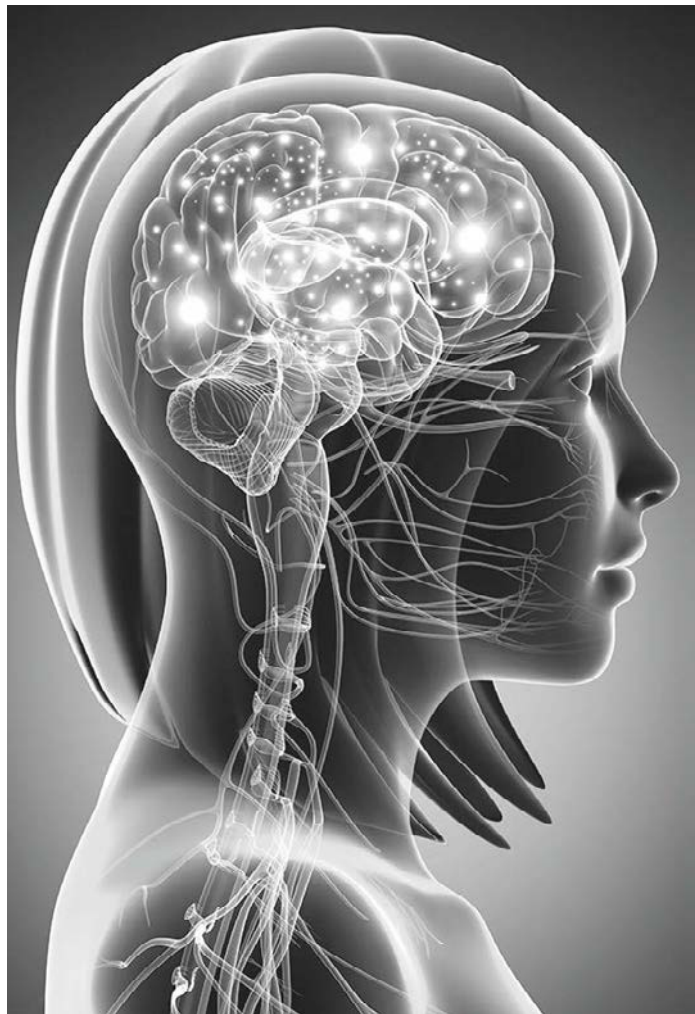
Activity 44: Brain Salad

- 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
for Use with
*Elementary Anatomy: Nervous,
Respiratory, and Circulatory Systems*

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The Electrifying Nervous System Flash Cards

Carefully cut the vocabulary cards along the dashed lines. Cards are used in multiple activities, so please store in an envelope or secure with a rubber band.

Arbor Vitae	Broca's Area
Astroglia	Cerebral Palsy
Autonomic Nervous System	Cerebral Hemispheres
Axon	Dendrites
Blood-Brain Barrier (BBB)	Dermatomes

<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 the 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?

7. What does the Latin word *plumbum* mean?

8. Who is the “Father of Anatomy”?

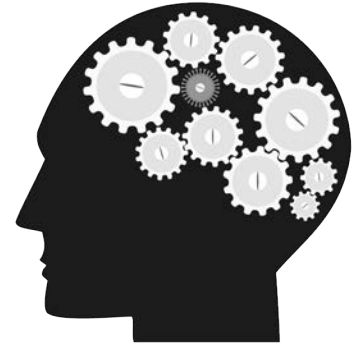
9. What was the study known as phrenology?

10. When was the first documented and successful removal of a brain tumor done?



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 _____.

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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

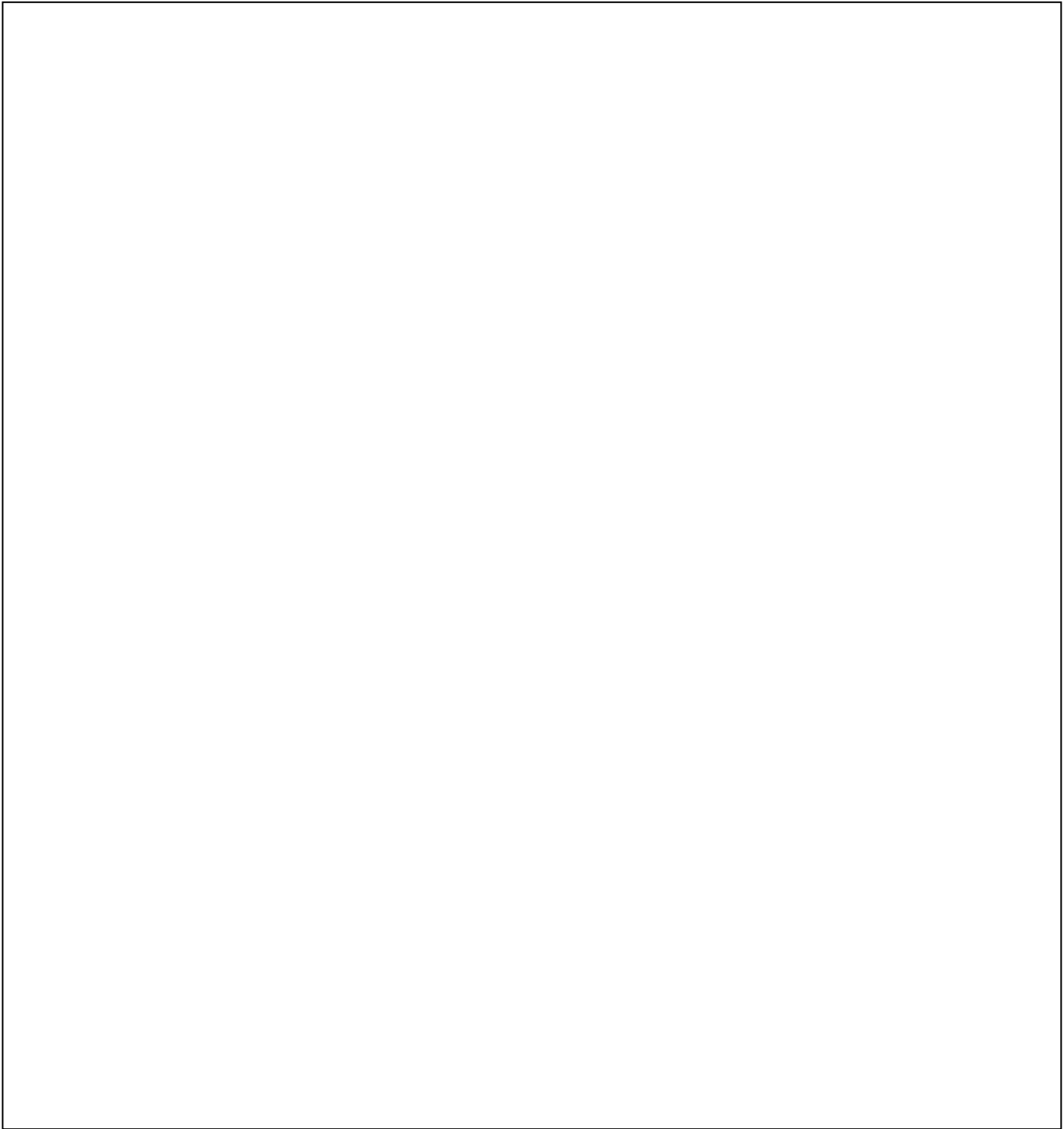
Name the parts of a neuron.

1. _____

2. _____

3. _____

Draw and label a picture of a neuron.



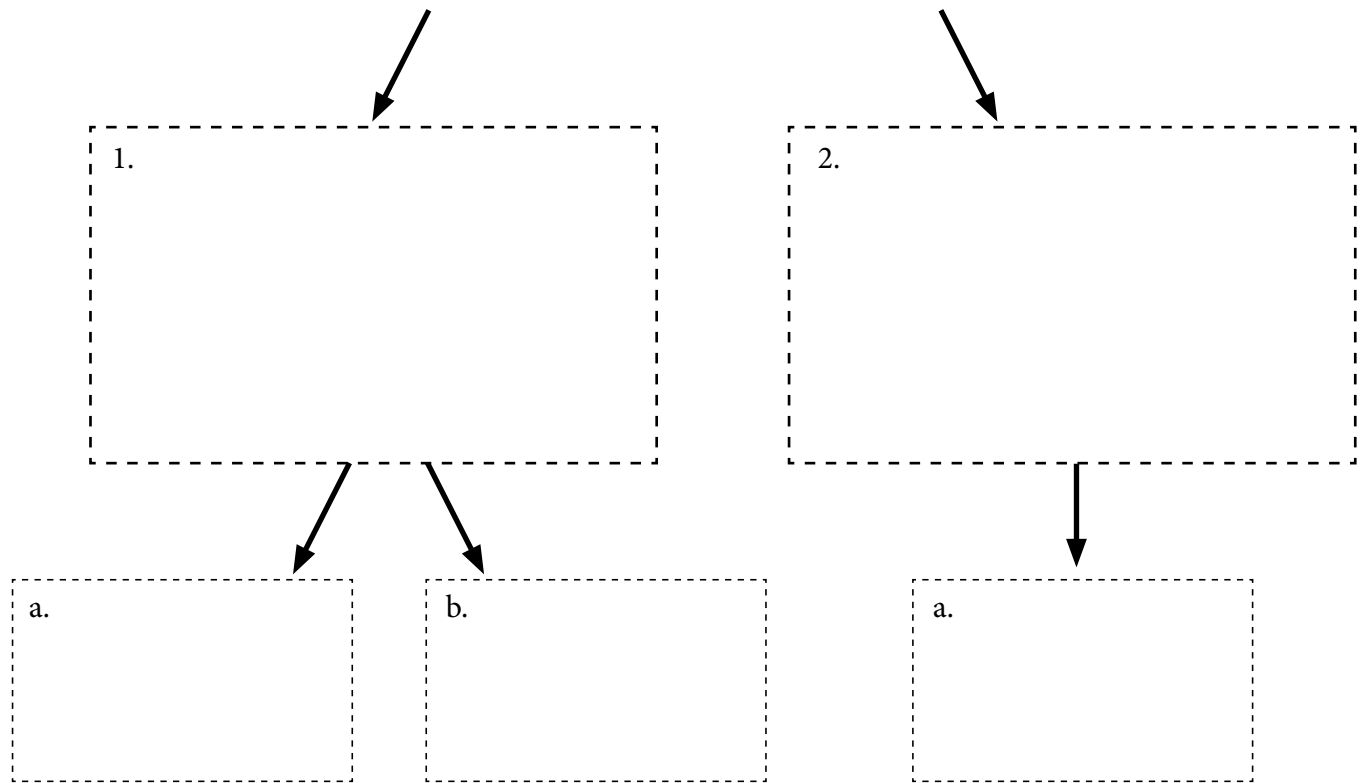


The Basics of the Nervous System

Fill in the associated boxes.

The Nervous System

Can be divided into 2 parts



What are the four types of neurological cells?
Name the cells and draw a cartoon in each box depicting their functions.

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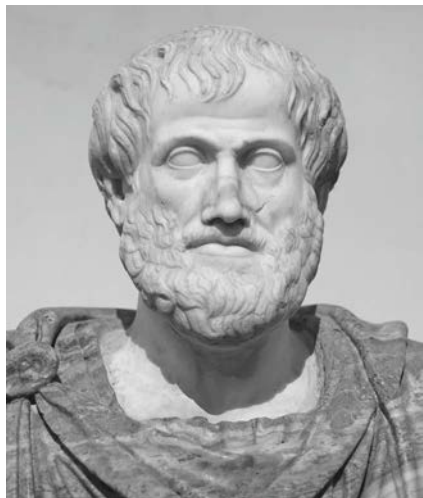
1. _____
2. _____
3. _____
4. _____

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Timeline Shuffle

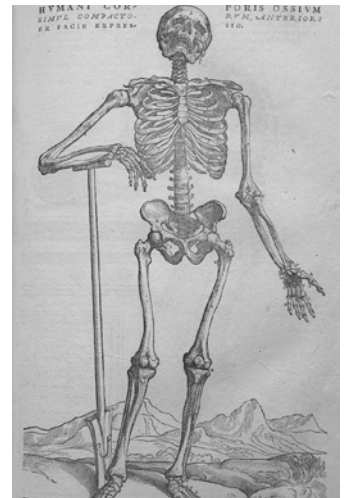
Cut out the following images and paste them in the appropriate spot on the timeline (pages 55-57).



Aristotle



Christ



Andreas Vesalius's *De humani corporis fabrica*



Dr. Alice Hamilton

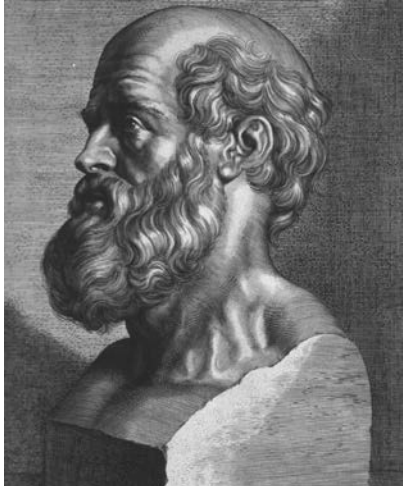


Edwin Smith Papyrus

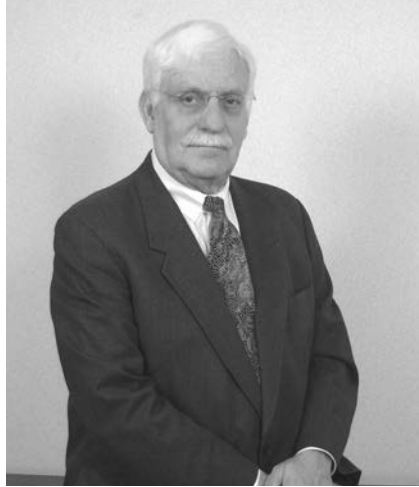


Dr. Paul Broca

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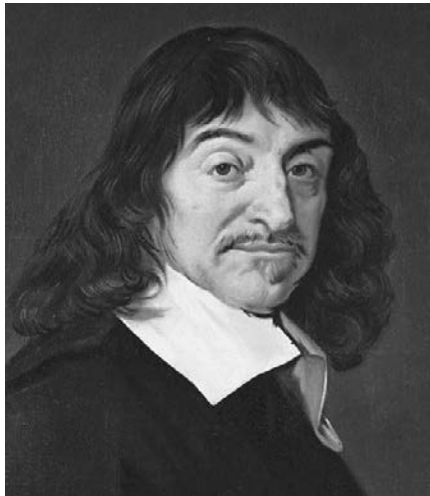
Hippocrates



Dr. Raymond Damadian



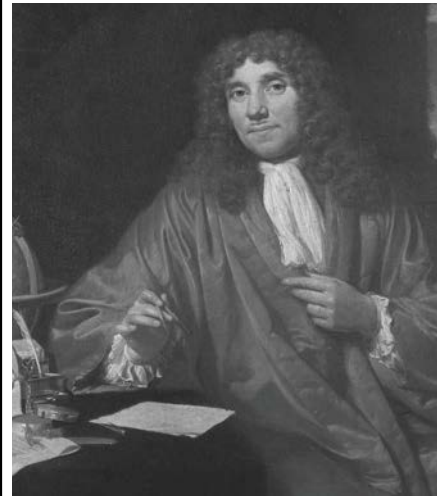
Dr. Wilder Penfield



Rene Descartes



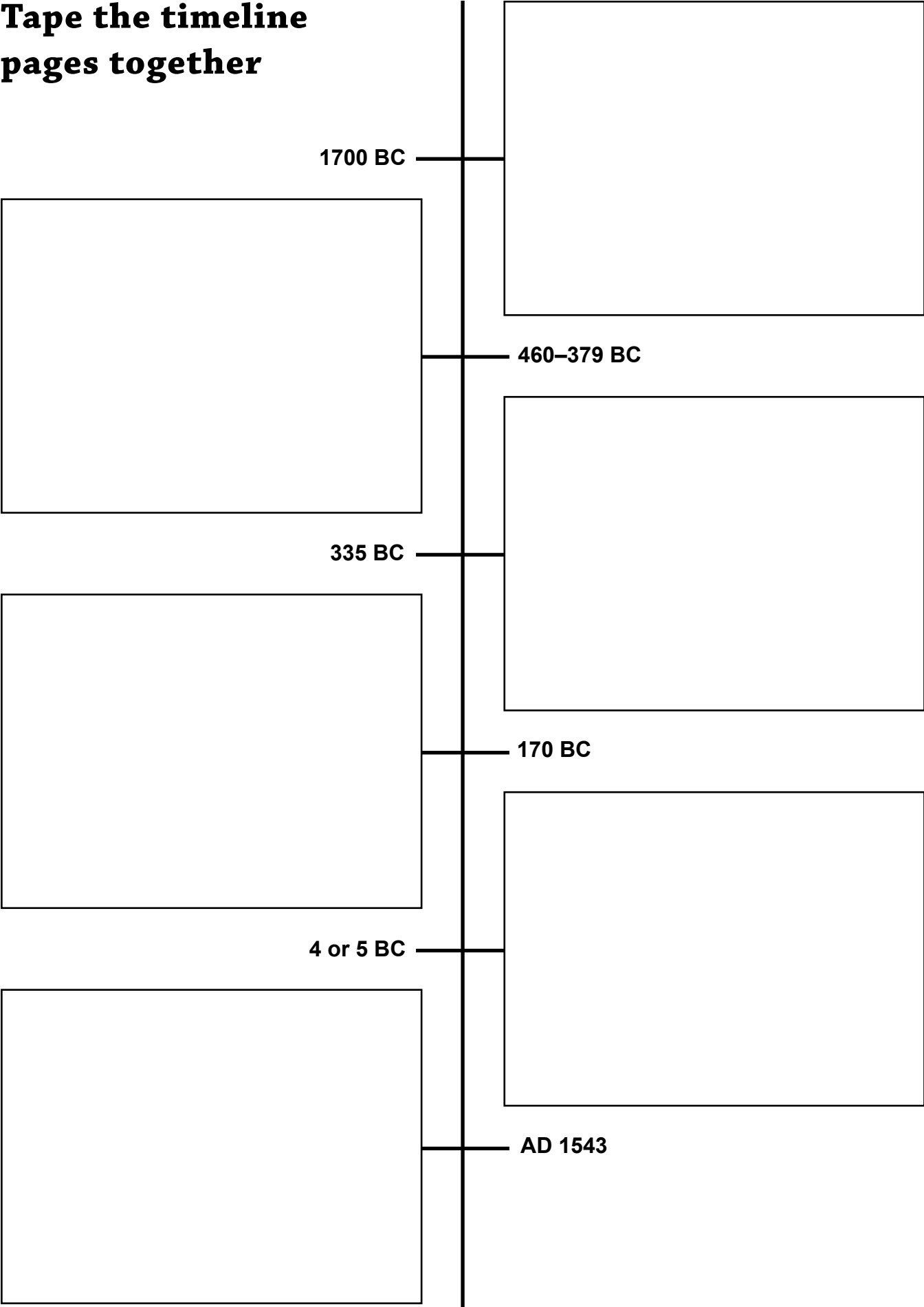
Galen



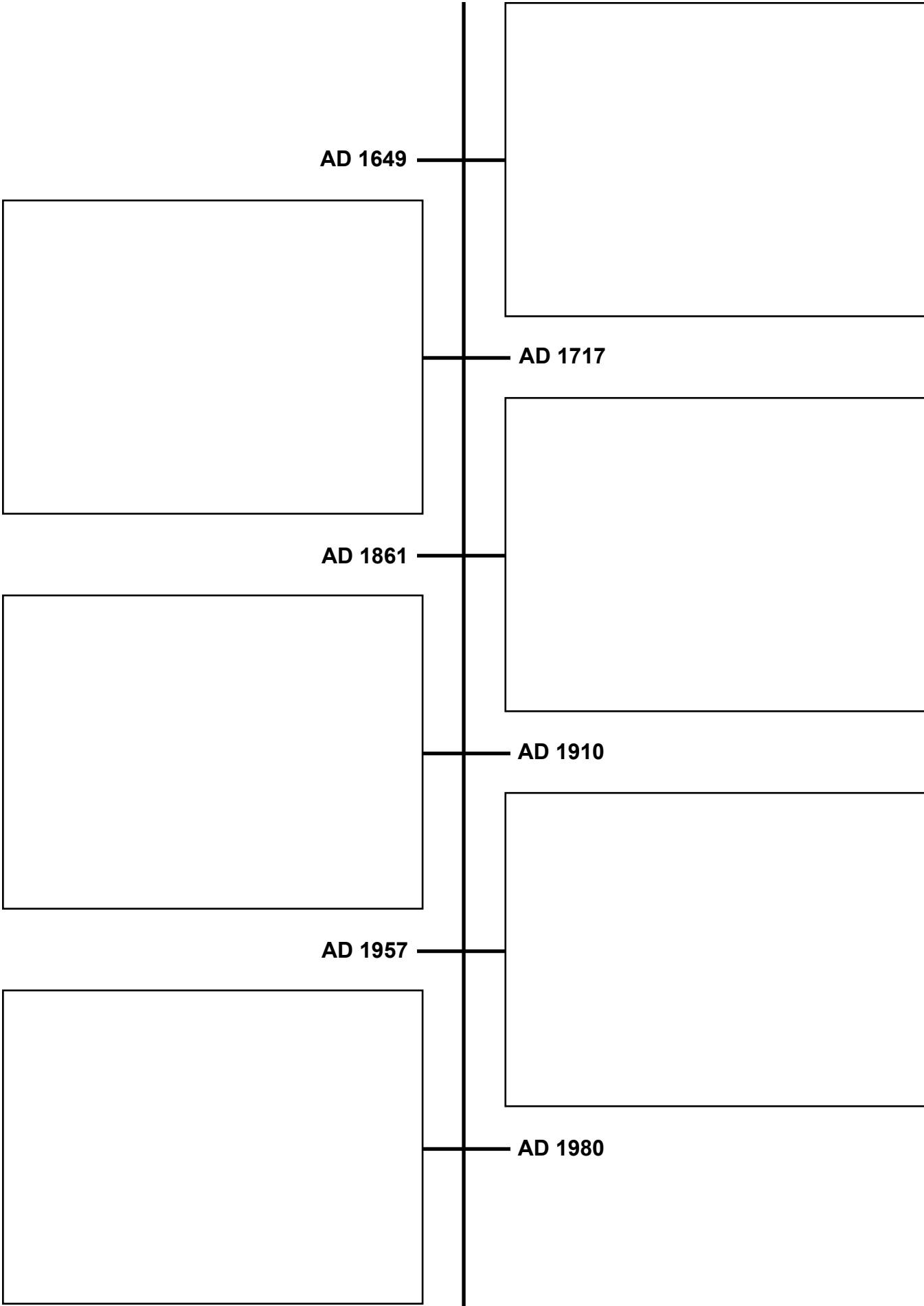
Anthony Van Leeuwenhoek

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**Tape the timeline
pages together**



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AD 1649

AD 1717

AD 1861

AD 1910

AD 1957

AD 1980

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