



# Elementary Anatomy: Nervous, Respiratory, & Circulatory Systems



**MASTERBOOKS®**  
— CURRICULUM —

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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><b>INTRAPERSONAL</b> </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><b>VERBAL-LINGUISTIC</b> </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><b>VISUAL-SPATIAL</b> </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><b>MUSICAL</b> </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><b>LEVEL</b></p>   | <p><b>BODY-KINESTHETIC</b> </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><b>INTERPERSONAL</b> </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><b>LOGICAL-MATH</b> </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><b>NATURALIST</b> </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<br>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)<br>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)<br>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  |          |   |       |

| <b>Date</b>                          | <b>Day</b> | <b>Assignment</b>   | <b>Due Date</b> | <b>✓</b> | <b>Grade</b> |
|--------------------------------------|------------|---|-----------------|----------|--------------|
| 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                                   |                 |          |              |
| <b>First Semester–Second Quarter</b> |            |   |                 |          |              |
| Week 1                               | Day 46     | Complete Activity 32 or 33 pages 103–104                        |                 |          |              |
|                                      | Day 47     | Read pages 54–55 • (GWM)<br>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                              |                 |          |              |

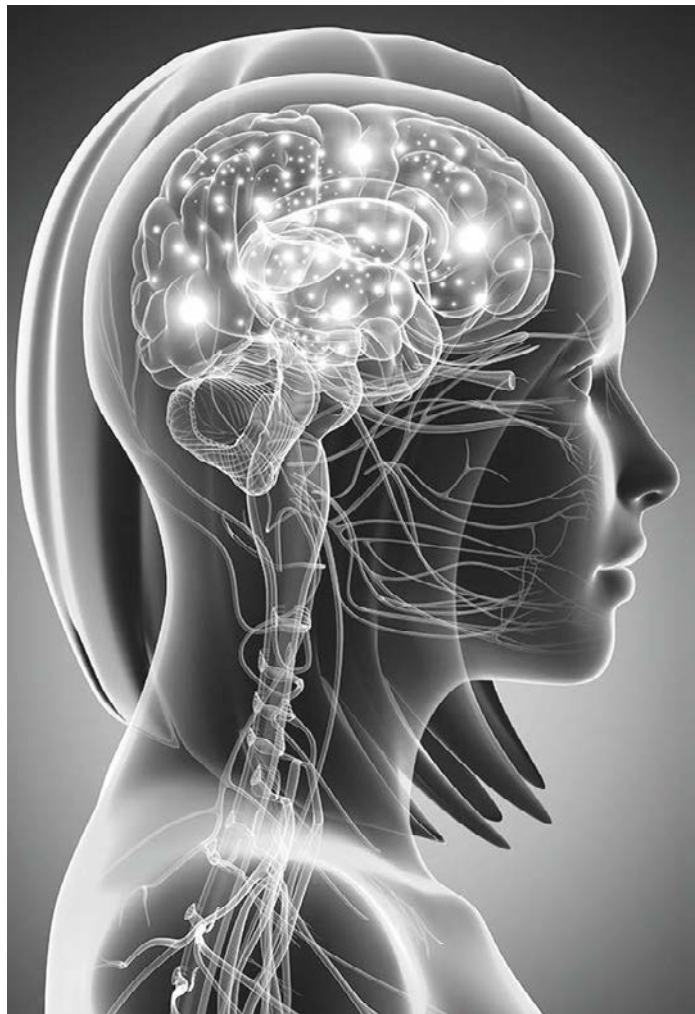
| <b>Date</b> | <b>Day</b> | <b>Assignment</b>   | <b>Due Date</b> | <b>✓</b> | <b>Grade</b> |
|-------------|------------|---|-----------------|----------|--------------|
| Week 5      | Day 66     | Review diagrams on pages 28, 38, 39, 44, 47, and 59 • (GWM)   |                 |          |              |
|             | 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     | <b>Unit Test: <i>The Electrifying Nervous System</i> pages 361-364</b>                                  |                 |          |              |
| 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)<br>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)<br>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)<br>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)<br>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)<br>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;<br>read definitions first and try to remember the words. |          |   |       |
|                               | Day 117 | Read pages 126–127 • (BRS)<br>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)<br>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)<br>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 | <b>Unit Test: <i>The Breathtaking Respiratory System</i></b> 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)<br>Complete Activity 76 pages 247–248   |          |   |       |
|                                | Day 142 | Read pages 150–151 • (GWM)<br>Complete Worksheet 54 or 55 pages 249–250                                      |          |   |       |
|                                | Day 143 | Read pages 152–154 • (GWM) •<br>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)<br>Complete Activity 77 pages 255–267   |          |   |       |
|                                | Day 147 | Read pages 162–163 • (GWM)<br>Complete Activity 78 or Worksheet 59 pages 269–270                             |          |   |       |
|                                | Day 148 | Read pages 164–166 • (GWM) • Complete Activity 79 and<br>Worksheet 60, 61, or 62 pages 271–275               |          |   |       |
|                                | Day 149 | Read pages 167–169 • (GWM) •<br>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 | <b>Unit Test: <i>The Complex Circulatory System</i></b> 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 | <b>Final Exam: <i>God's Wondrous Machine</i></b> pages 373–376  |          |   |       |
|        | Day 180 | Final study day for any makeup work   |          |   |       |
|        |         | Final Grade   |          |   |       |



*The Electrifying Nervous System*

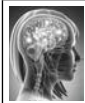
Educator Aids  
for Use with  
*Elementary Anatomy: Nervous,  
Respiratory, and Circulatory Systems*

# 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

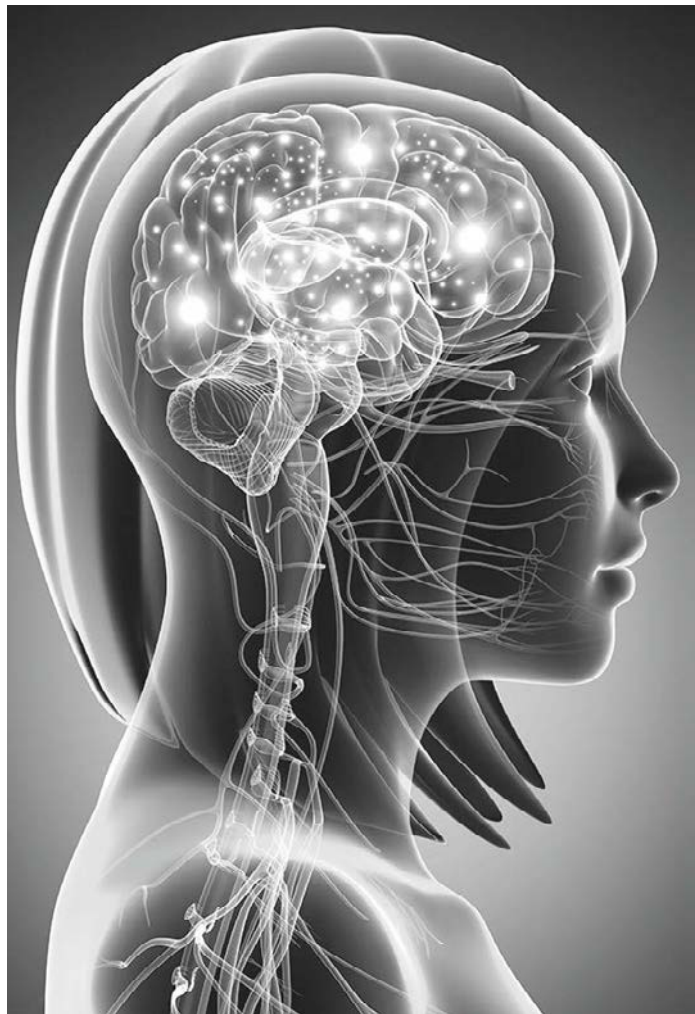
### Activity 44: Brain Salad

- 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?

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2. At what rate can your brain and nervous system send out signals to the body?

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3. What basic function does your brain serve to do?

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4. The Edwin Smith Surgical Papyrus was written by what ancient culture?

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5. Who is also known as “The Father of Medicine”?

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6. Who believed the brain was just a place to cool blood from the heart?

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

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8. Who is the “Father of Anatomy”?

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9. What was the study known as phrenology?

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

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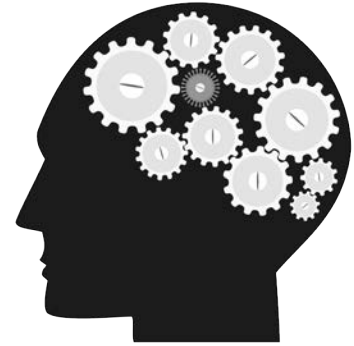






## Looking Inside the Brain

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

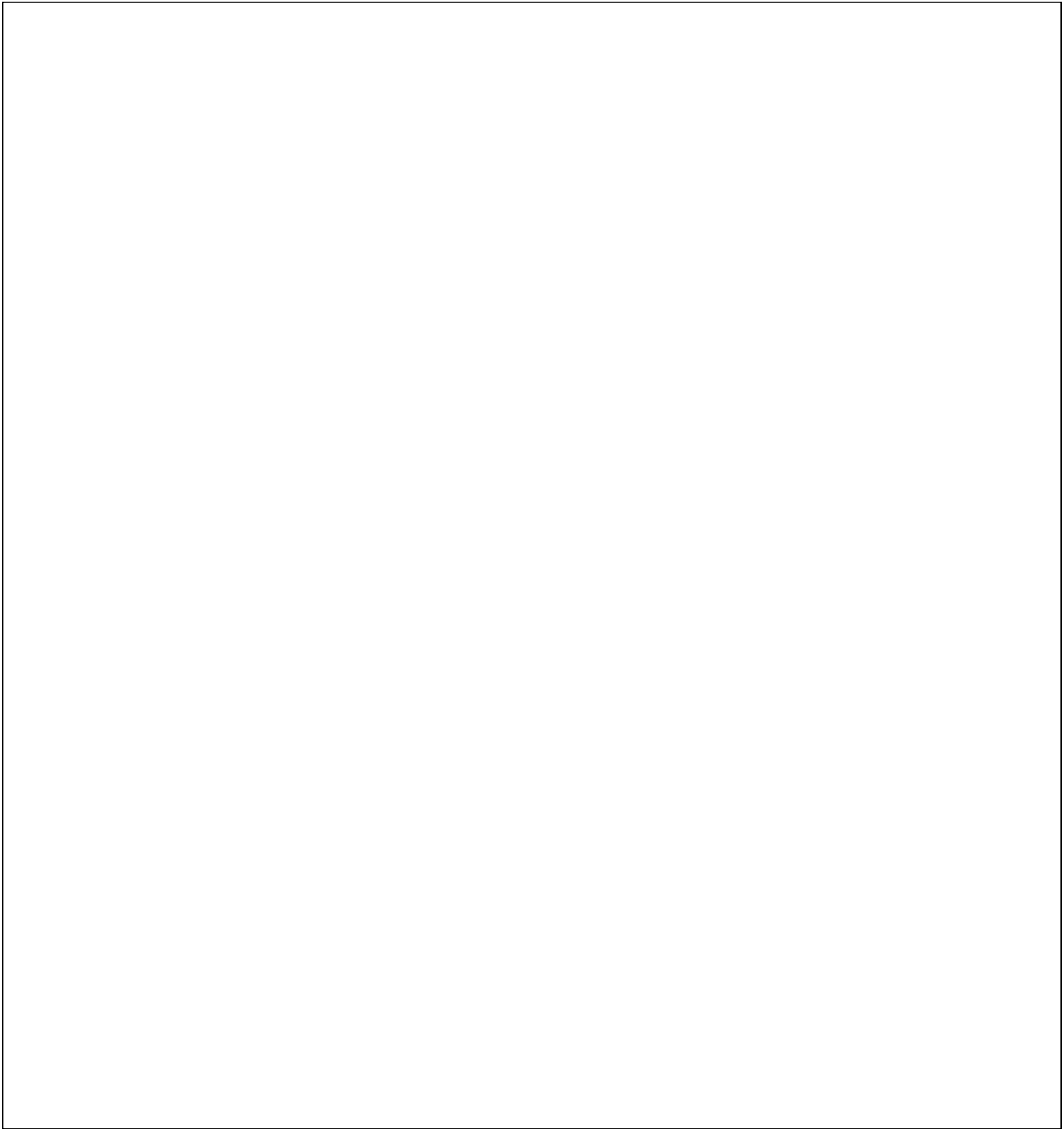
Name the parts of a neuron.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Draw and label a picture of a neuron.



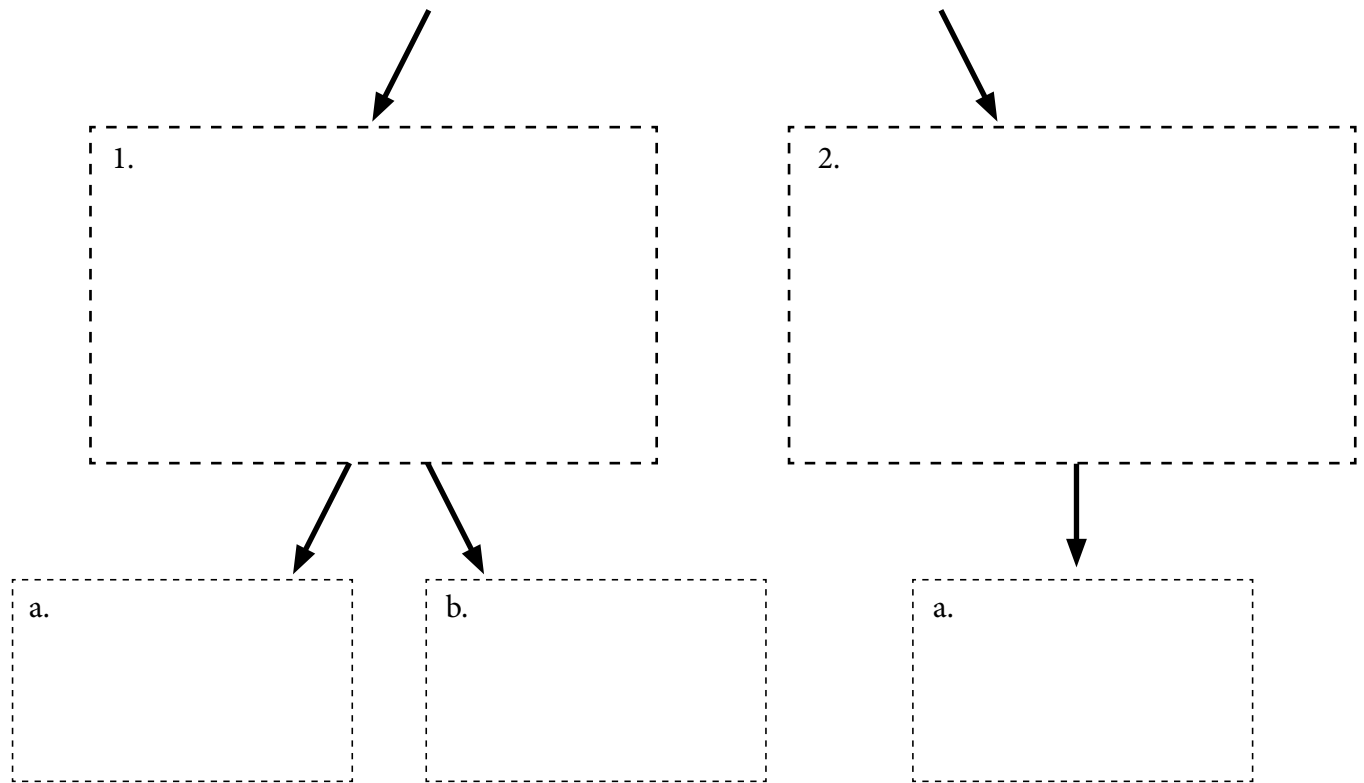


# The Basics of the Nervous System

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.

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

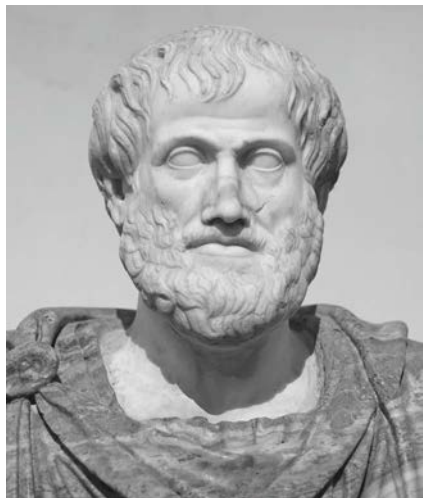
1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

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# Timeline Shuffle

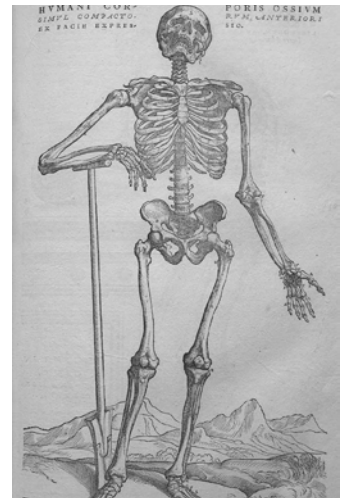
Cut out the following images and paste them in the appropriate spot on the timeline (pages 55-57).



Aristotle



Christ



Andreas Vesalius's *De humani corporis fabrica*



Dr. Alice Hamilton



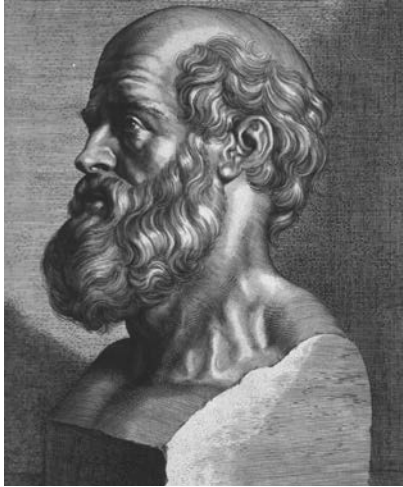
Edwin Smith Papyrus



Dr. Paul Broca

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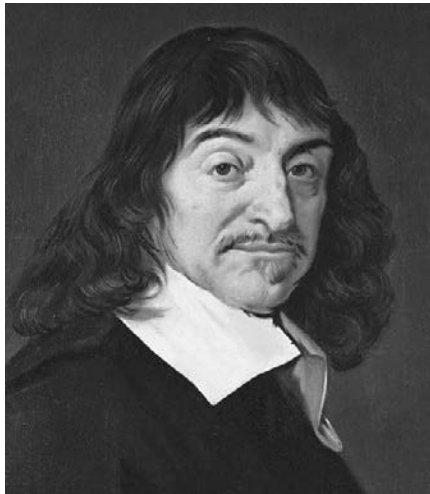
Hippocrates



Dr. Raymond Damadian



Dr. Wilder Penfield



Rene Descartes



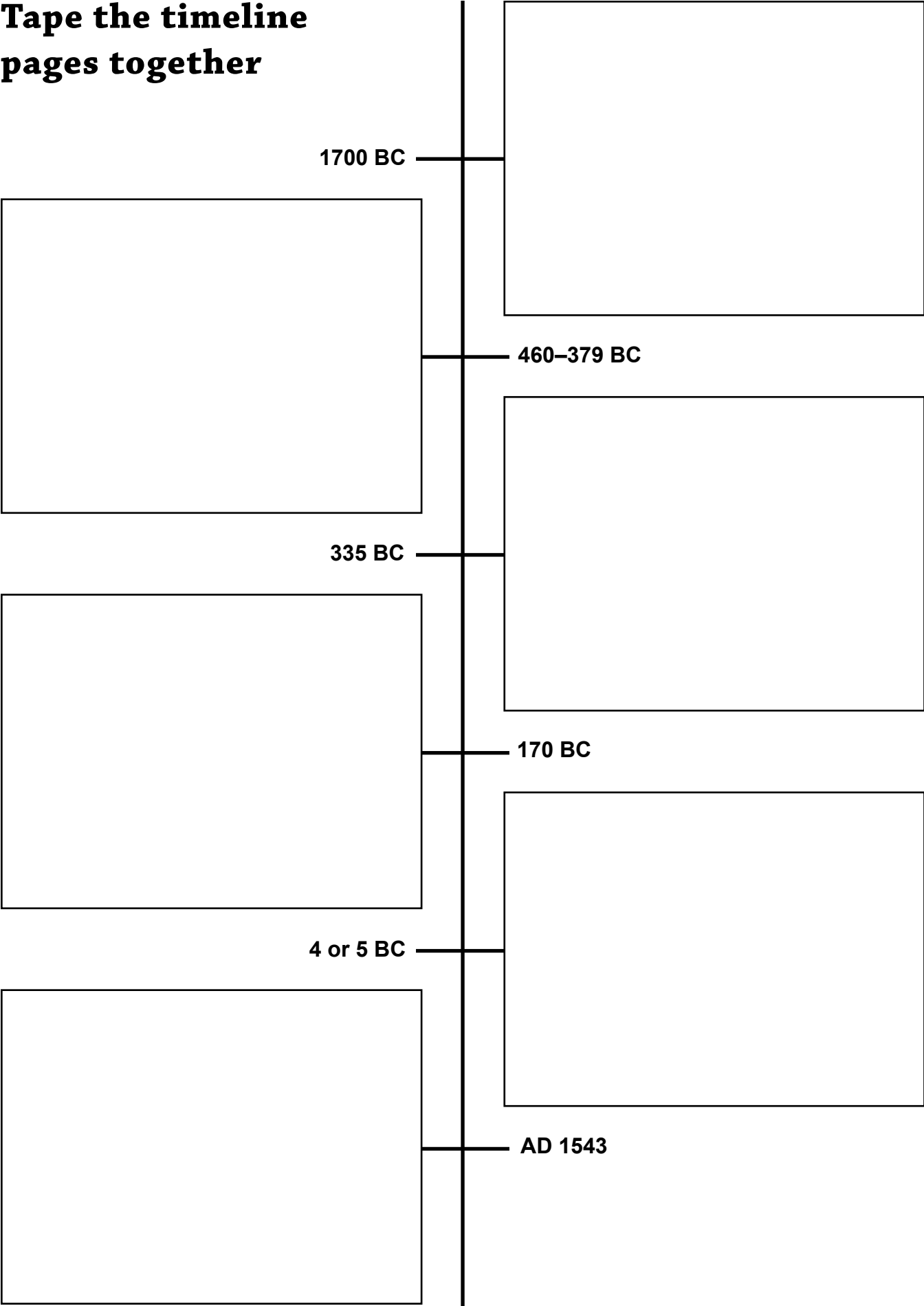
Galen



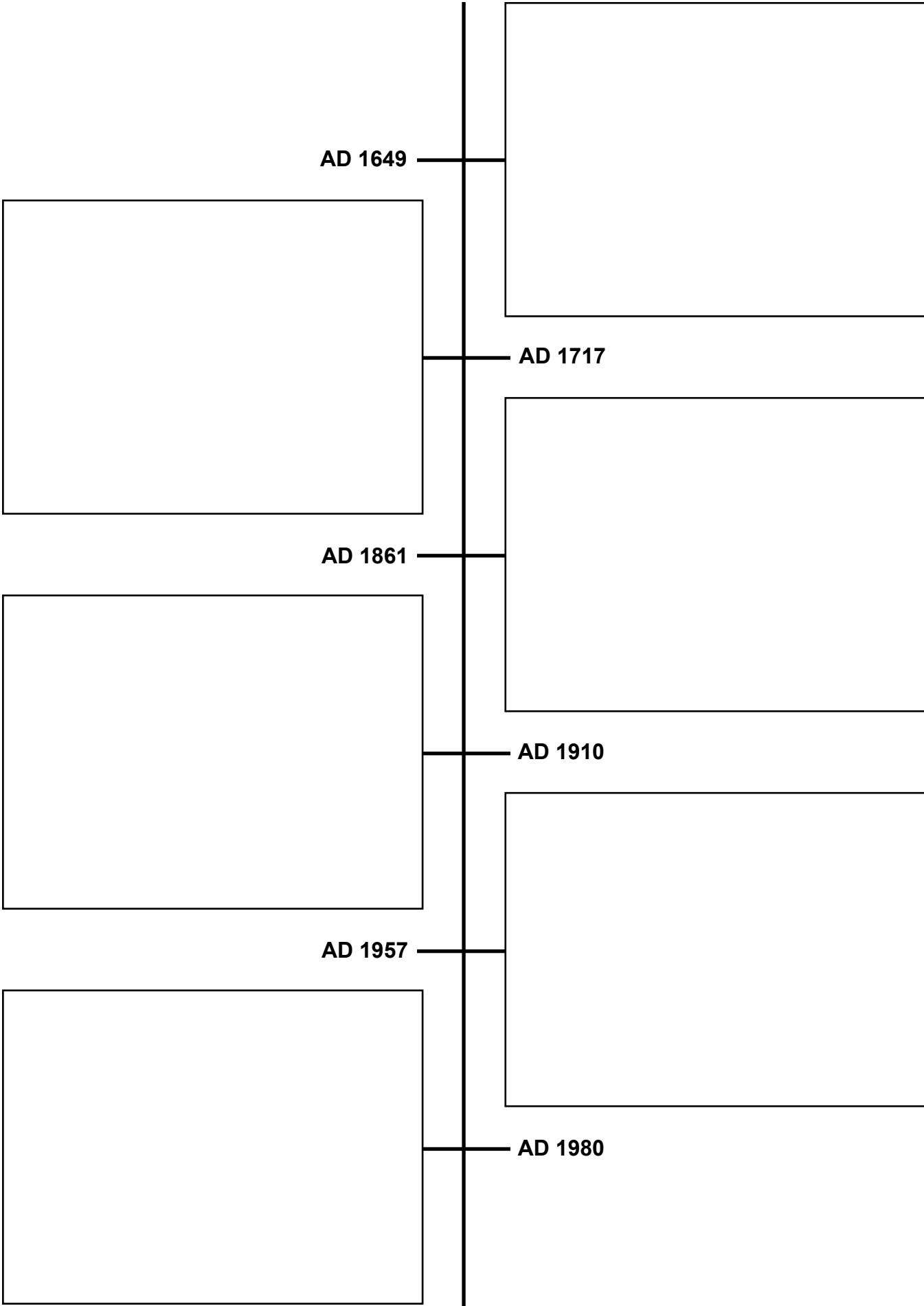
Anthony Van Leeuwenhoek

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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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