

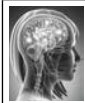
The Electrifying Nervous System

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

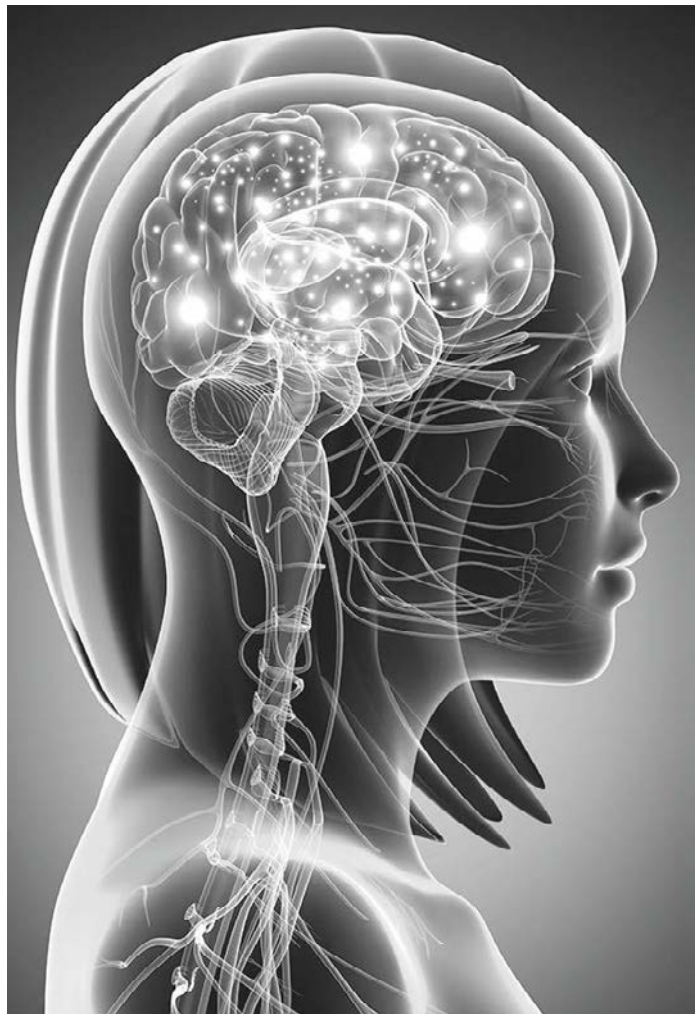
Activity 44: Brain Salad

- 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?

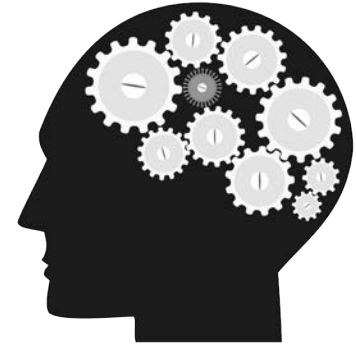
8. Who is the “Father of Anatomy”?

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

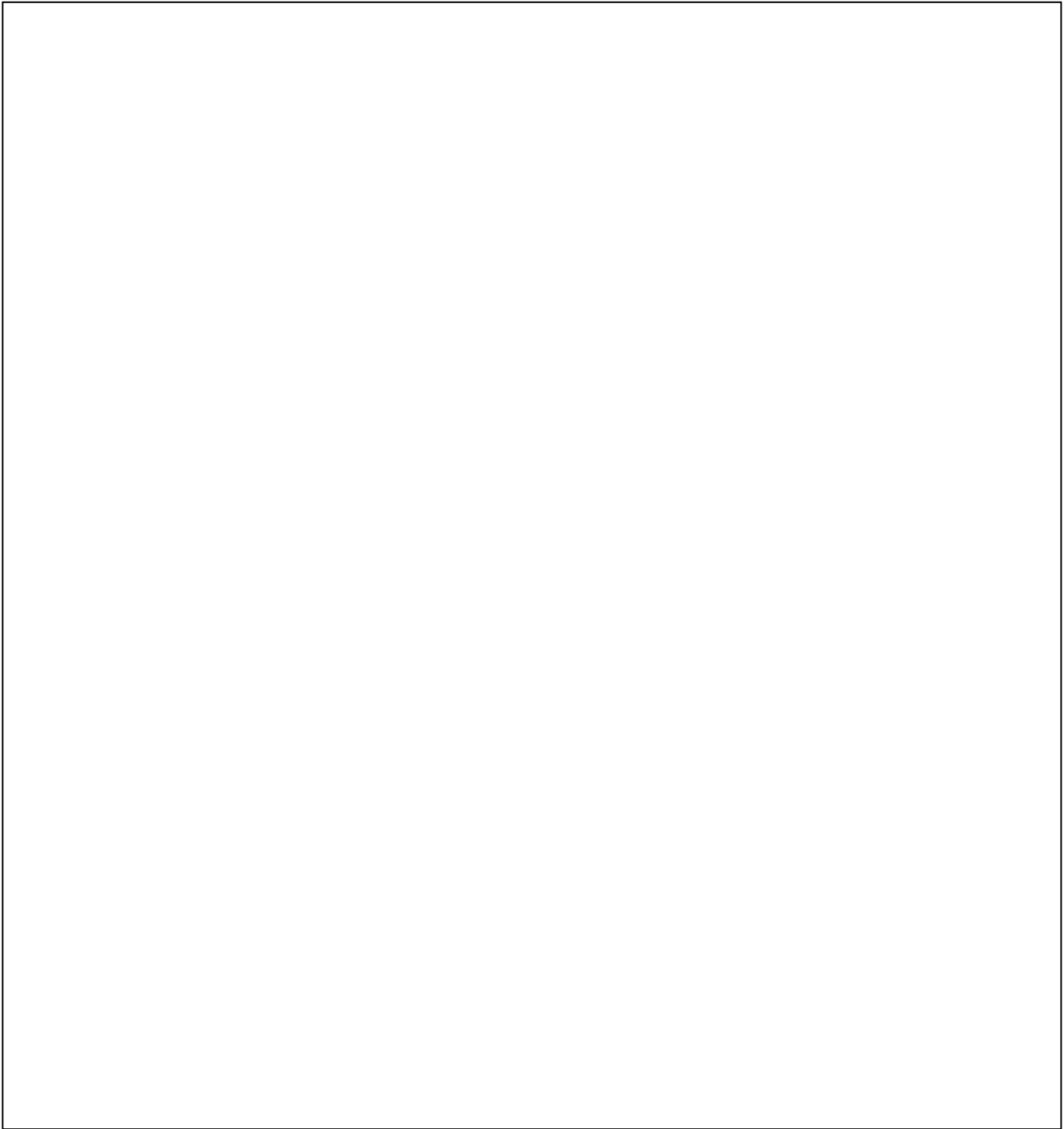
Name the parts of a neuron.

1. _____

2. _____

3. _____

Draw and label a picture of a neuron.



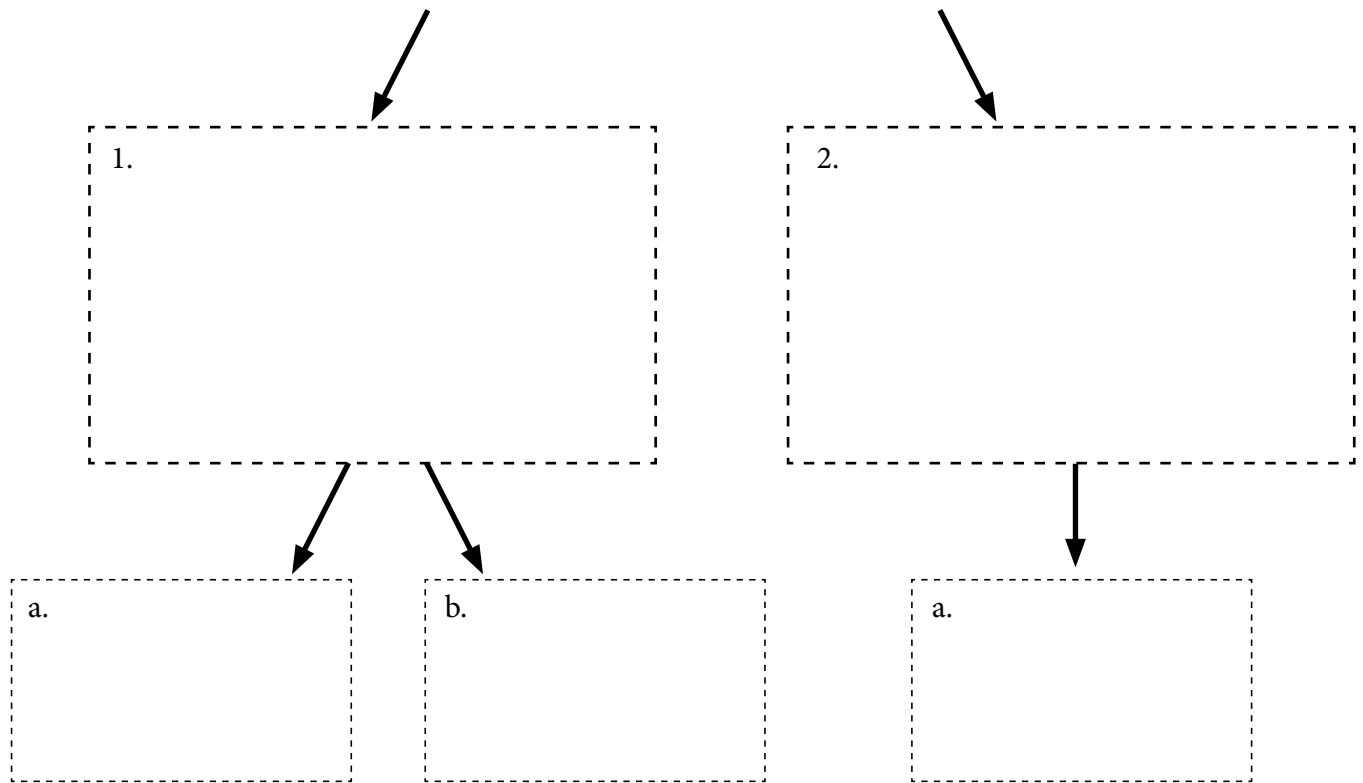


The Basics of the Nervous System

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.

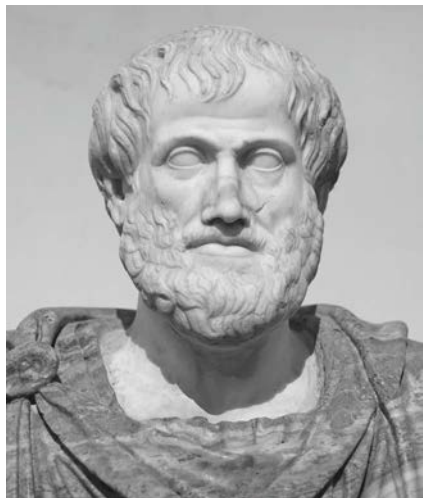
1. _____ 2. _____ 3. _____ 4. _____

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Timeline Shuffle

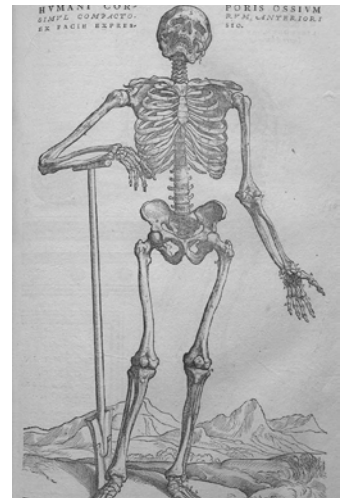
Cut out the following images and paste them in the appropriate spot on the timeline (pages 55-57).



Aristotle



Christ



Andreas Vesalius's *De humani corporis fabrica*



Dr. Alice Hamilton

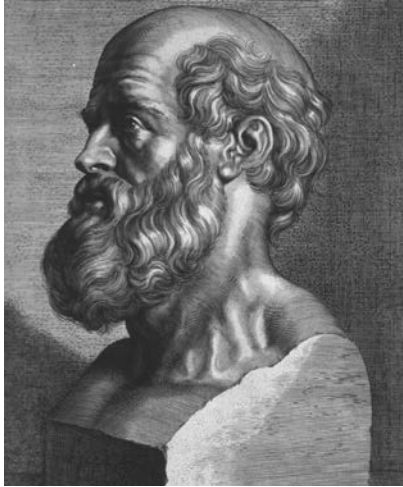


Edwin Smith Papyrus



Dr. Paul Broca

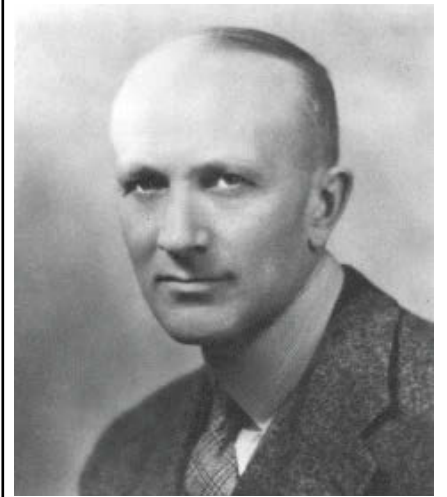
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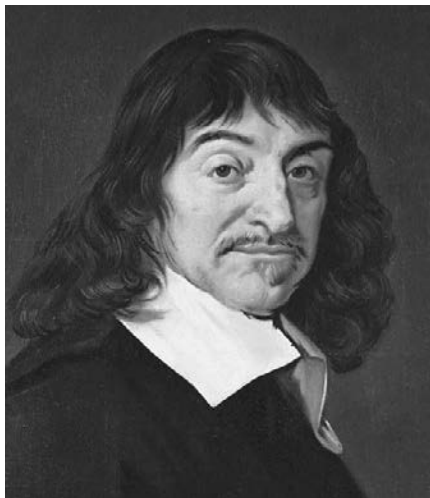
Hippocrates



Dr. Raymond Damadian



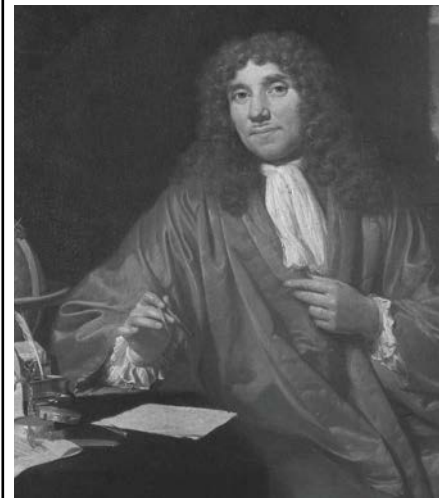
Dr. Wilder Penfield



Rene Descartes



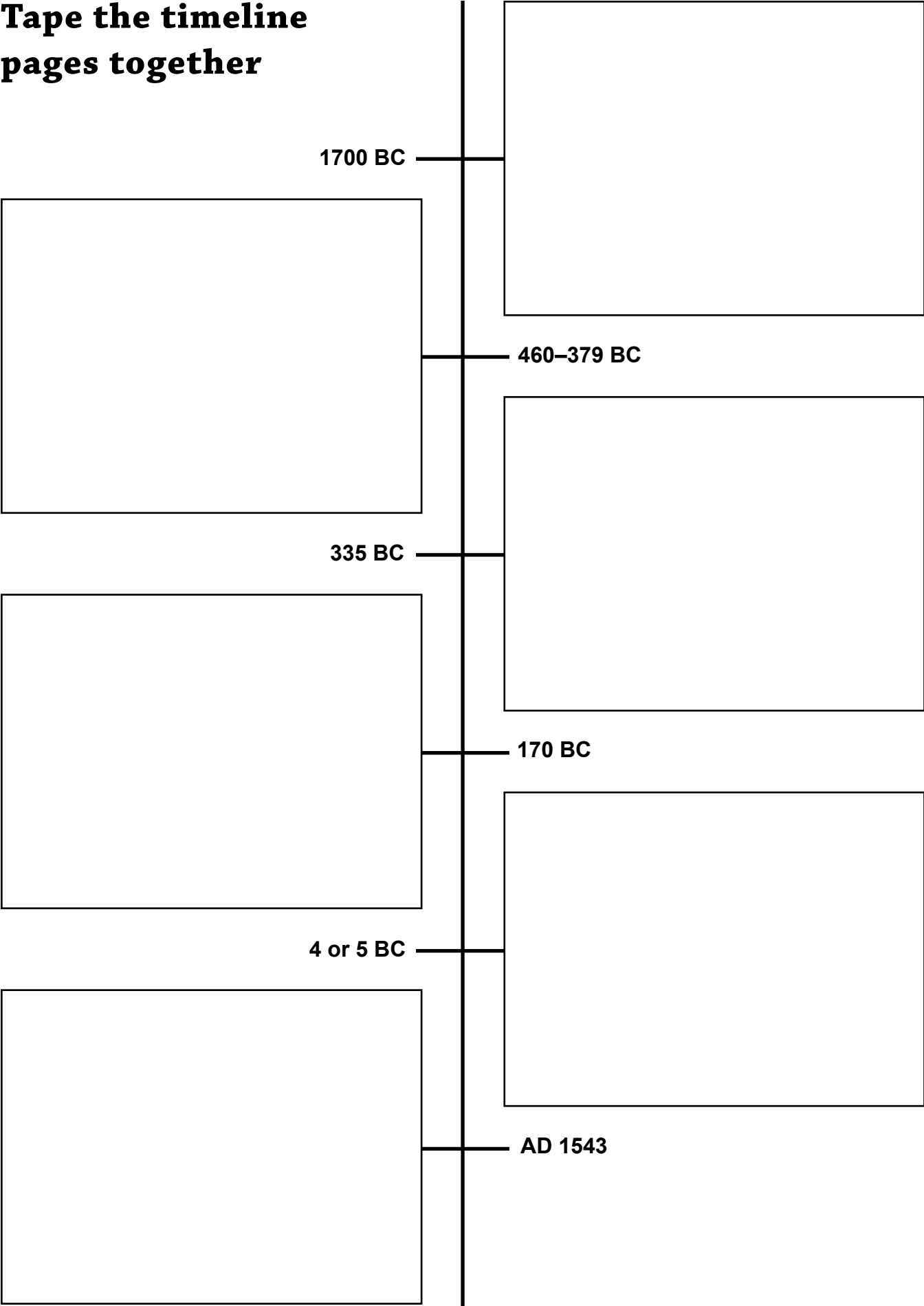
Galen



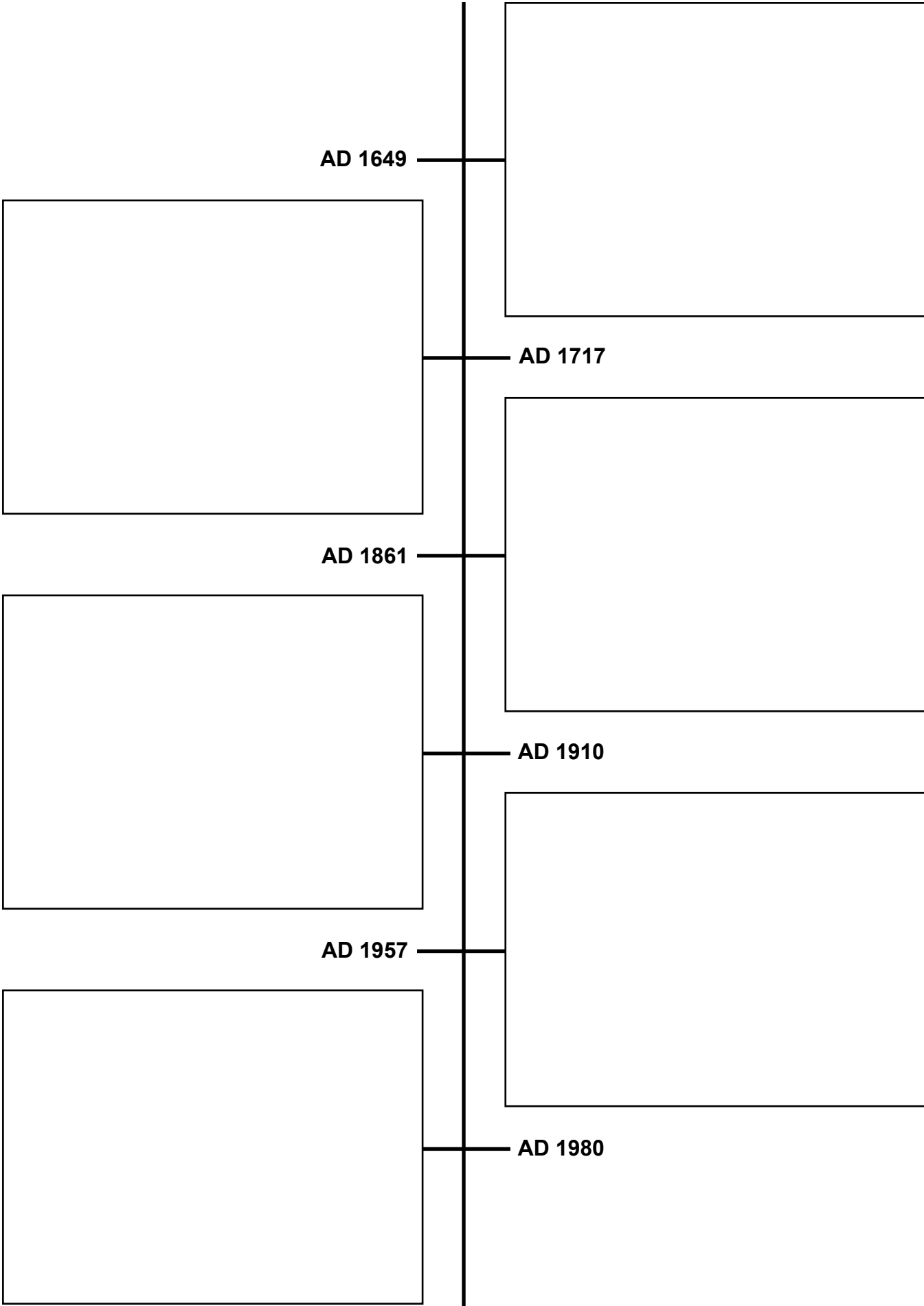
Anthony Van Leeuwenhoek

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pages together**



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AD 1649

AD 1717

AD 1861

AD 1910

AD 1957

AD 1980

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