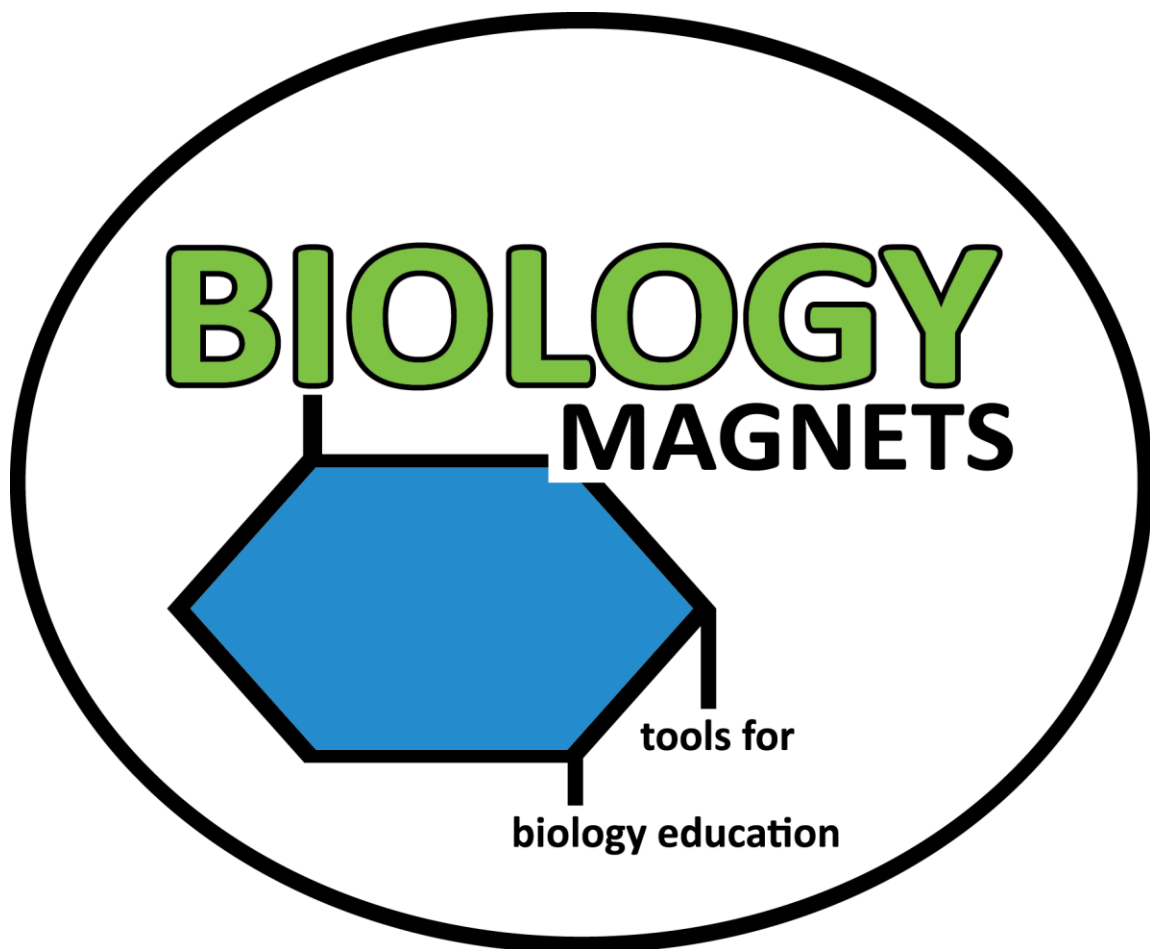


Biology Magnets Module 11: Human Anatomy - Teacher and Student Guides



Teacher Information

This module uses magnets designed for teacher and student interaction to guide learning about various parts of human anatomy. Contained in this guide are outlines for lessons that can last from 10 minutes to approximately 60 minutes depending upon teacher preference. The lessons have both teacher-centered and student-centered activities. The student-centered activities are most effective if students are in small groups. It may be necessary to have multiple magnet sets for large classes. Student handouts are provided which can be printed out and given to each student group to help guide their progress as they work with the magnets. If budget or board space is limited, groups can alternate between using a set of magnets and doing other activities. Teachers can refer to the videos posted at the Biology Magnet web site at BiologyMagnets.com for further teaching instructions.

Magnet Care and Maintenance

Biology magnets are made to last for years. Periodically magnets will fall off or are knocked off the plastic. A piece of magnetic tape is included with each module, which should be able to replace around 10-12 magnets if necessary. Simply cut a new magnet and peel off the back to replace. Magnetic tape can be purchased from a hobby store to replace magnets lost over time. Laminate may peel off, especially on small pieces. Use transparent tape to re-attach laminate that comes loose, curling the tape over the back of the magnet. The machines used to cut Biology magnets are not perfectly accurate. Sometimes a bit of white or black outline on the edges occurs or a cut might be slightly off center. Use scissors to remove extra outline that is unnecessary if desired. Note that white outline virtually disappears from view when the magnets are on a white board. Store magnets in the clasp envelopes in which they arrived for easy organization.

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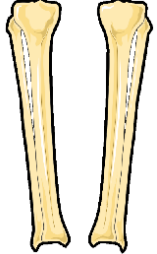
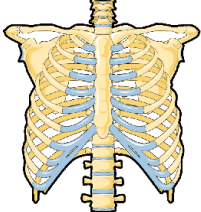

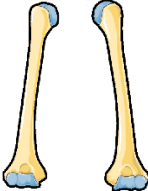

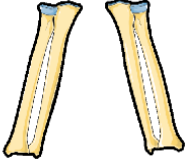
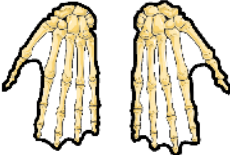
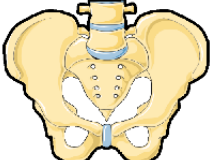
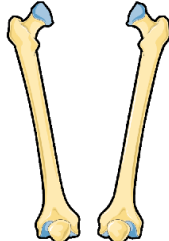
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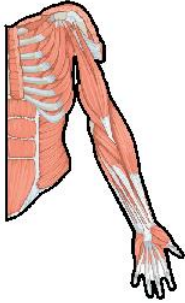


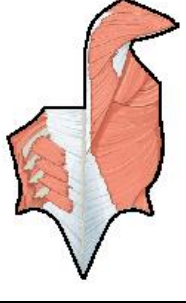



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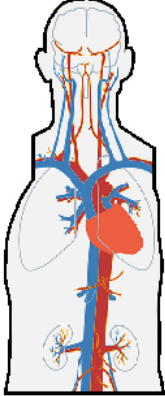
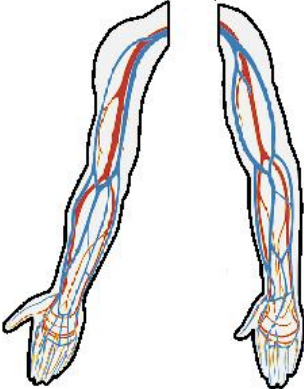
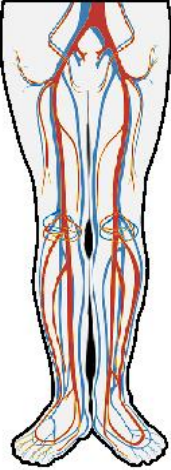
Module 11A – Skeletal System - Materials List

Magnet Name	Quantity	Picture	Magnet Name	Quantity	Picture
Skull	1		Tibia and Fibula	2	
Rib Cage	1		Bones of the Feet	2	
Humerus	2		3" Magnetic Tape Strip	1	
Radius and Ulna	2		Total Pieces	16	
Bones of the Hand	2				
Pelvis	1				
Femur	2				

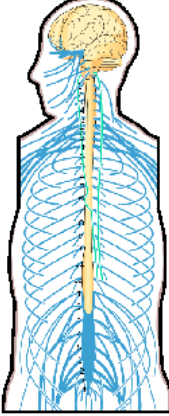
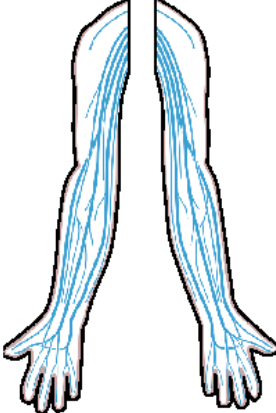
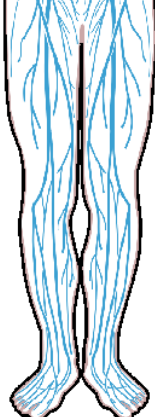
Module 11B – Muscular System - Materials List

Magnet Name	Quantity	Picture	Magnet Name	Quantity	Picture
Muscles of the face	1		Posterior Left Arm Muscles	1	
Left Upper Anterior Torso Muscles	1		Posterior Right Arm Muscles	1	
Right Upper Anterior Torso Muscles	1		Posterior Back Muscles	1	
Anterior Leg Muscles	2		Posterior Leg Muscles	2	
Posterior Head and Neck Muscles	1		Total Pieces	11	

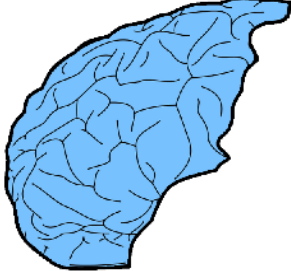

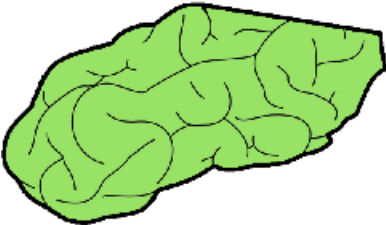


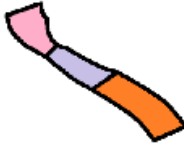
Module 11C– Circulatory System - Materials List

Magnet Name	Quantity	Picture
Circulatory System Upper Torso and Head	1	
Circulatory System Arms	2	
Circulatory System Lower Body	1	
Total Pieces	4	

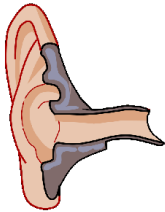
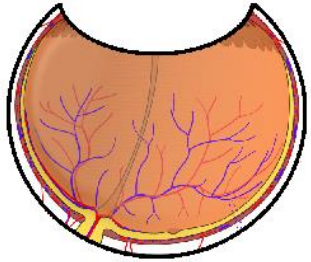








Module 11D – Nervous System - Materials List

Magnet Name	Quantity	Picture
Nervous System Upper Torso	1	
Nervous System Arms	2	
Nervous System Lower Body	1	
Total Pieces	4	

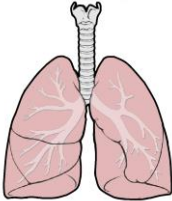
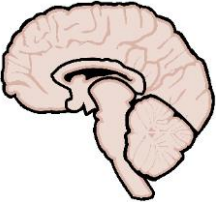
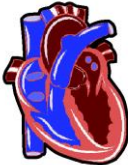

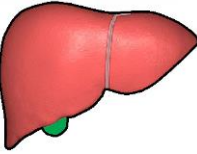

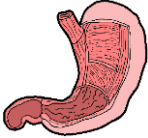



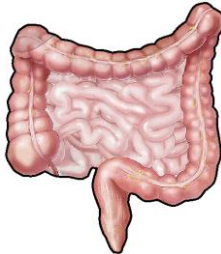

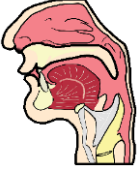
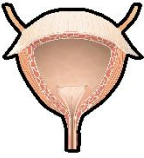

Module 11E – Parts of the Brain - Materials List

Magnet Name	Quantity	Picture
Frontal Lobe	1	
Parietal Lobe	1	
Temporal Lobe	1	
Occipital Lobe	1	
Cerebellum	1	
Pons, Medulla, Spinal Cord	1	
Total Pieces	6	

Module 11F – Parts of the Eye and Ear - Materials List

Magnet Name	Quantity	Picture	Magnet Name	Quantity	Picture
Outer Ear	1		Retina, Choroid, Sclera	1	
Ear Ossicles	1		Cornea	1	
Eardrum	1		Lens	1	
Inner Ear	1		Iris	1	
Auditory Nerve	1		Ciliary Muscles	2	
			Total Pieces	11	

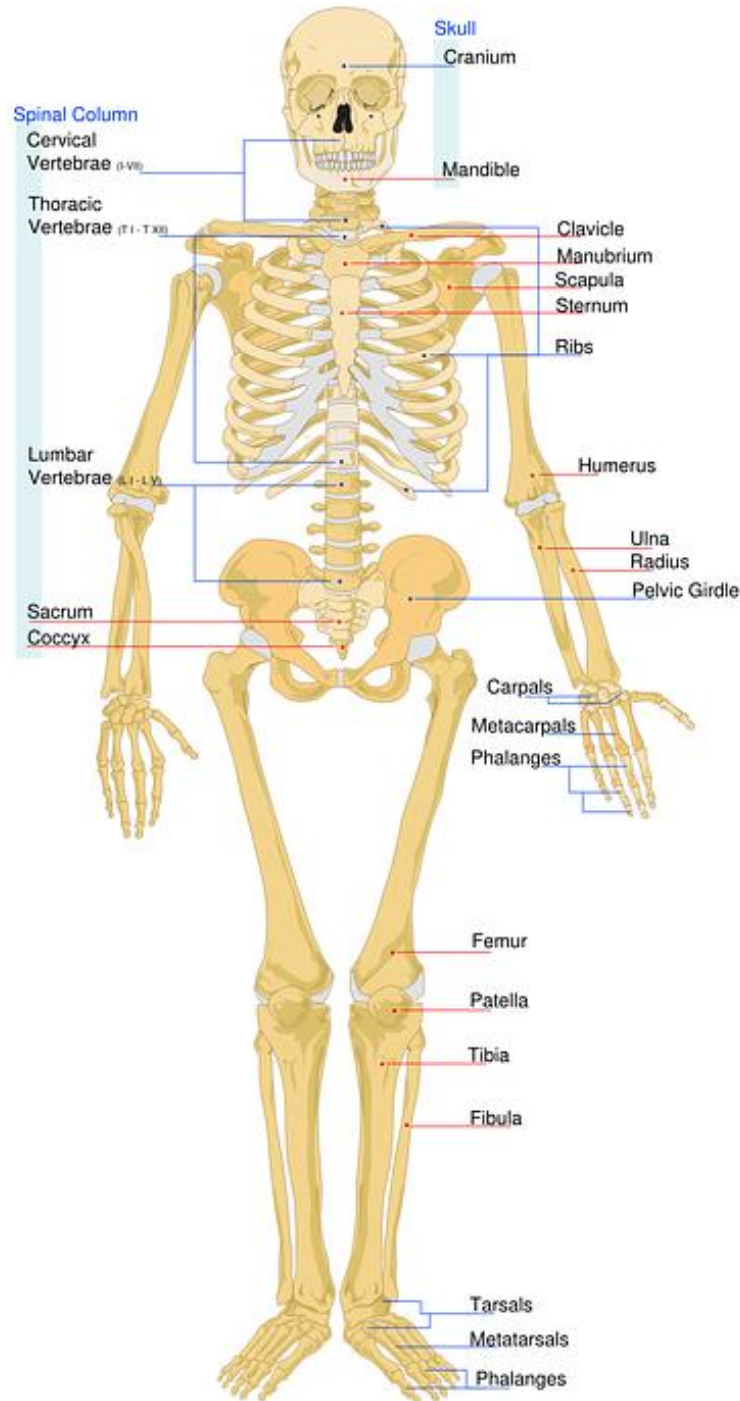
Module 11G – Body Organs - Materials List

Magnet Name	Quantity	Picture	Magnet Name	Quantity	Picture
Lungs	1		Brain	1	
Heart	1		Female Reproductive Tract	1	
Liver	1		Spleen	1	
Stomach	1		Duodenum	1	
Pancreas	1		Thyroid Gland	1	
Intestines	1		Thymus	1	
Upper Respiratory Tract	1		Urinary Bladder	1	
Kidneys	2		Total Pieces	16	

Lesson 11A – Skeletal System (10-60 minutes)

Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figure below **(11.A.1)**. After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.

Figure 10.A.1 – Skeletal System



Extra exercises:

Bone types: Bones come in various types, such as long bones, short bones, flat bones, sesamoid bones, and irregular bones. Students can research and locate the various types of bones and their location on the skeleton. Report the results to other groups or to the teacher.

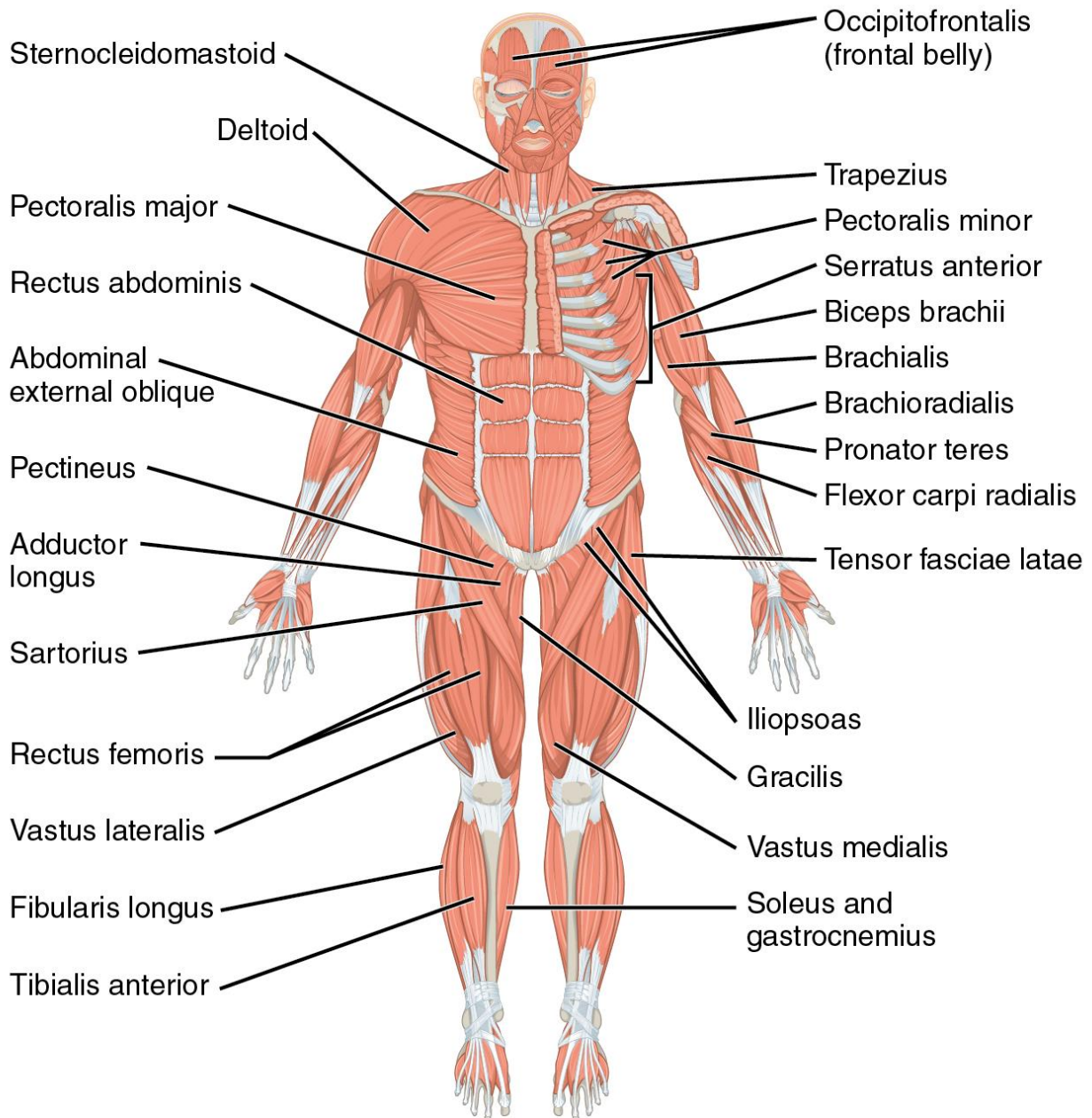
Parts of the bones: The bones of the skeleton each have specific protrusions, ridges, cavities, and openings. Students can research a bone and learn the various parts of that particular bone. Report the results to other groups or to the teacher.

Joints: Where adjacent bones contact each other is called a joint. Students can research the various types of joints and report to other groups or the teacher the location and names of the joints.

Lesson 11B – Muscular System (10-60 minutes)

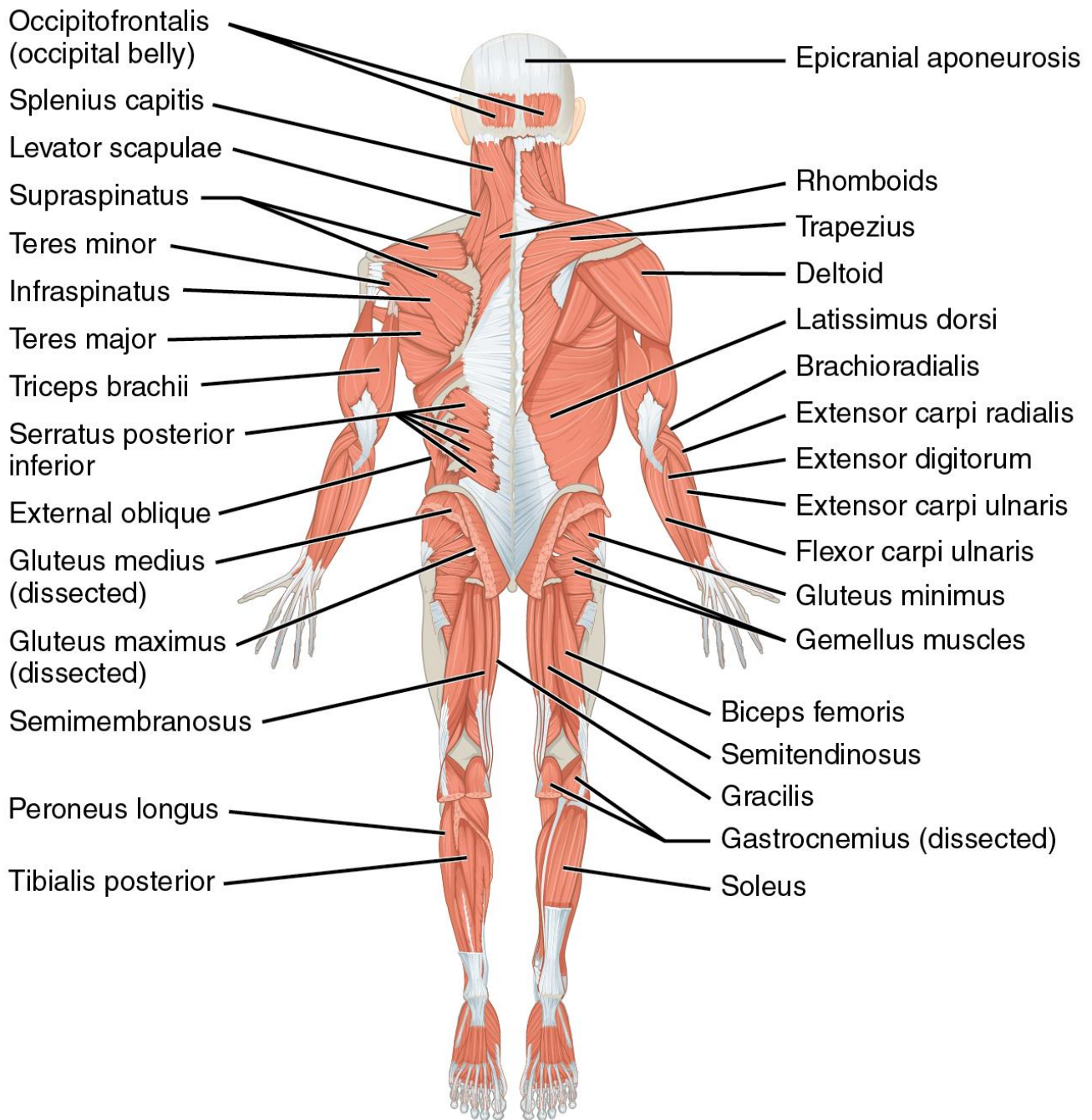
Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figures below (11.B.1,2). After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.

Figure 11.B.1 – Muscular System Anterior



Major muscles of the body.
Right side: superficial; left side:
deep (anterior view)

Figure 11.B.2 – Muscular System Posterior



Major muscles of the body.
Right side: superficial; left side:
deep (posterior view)

Extra exercises:

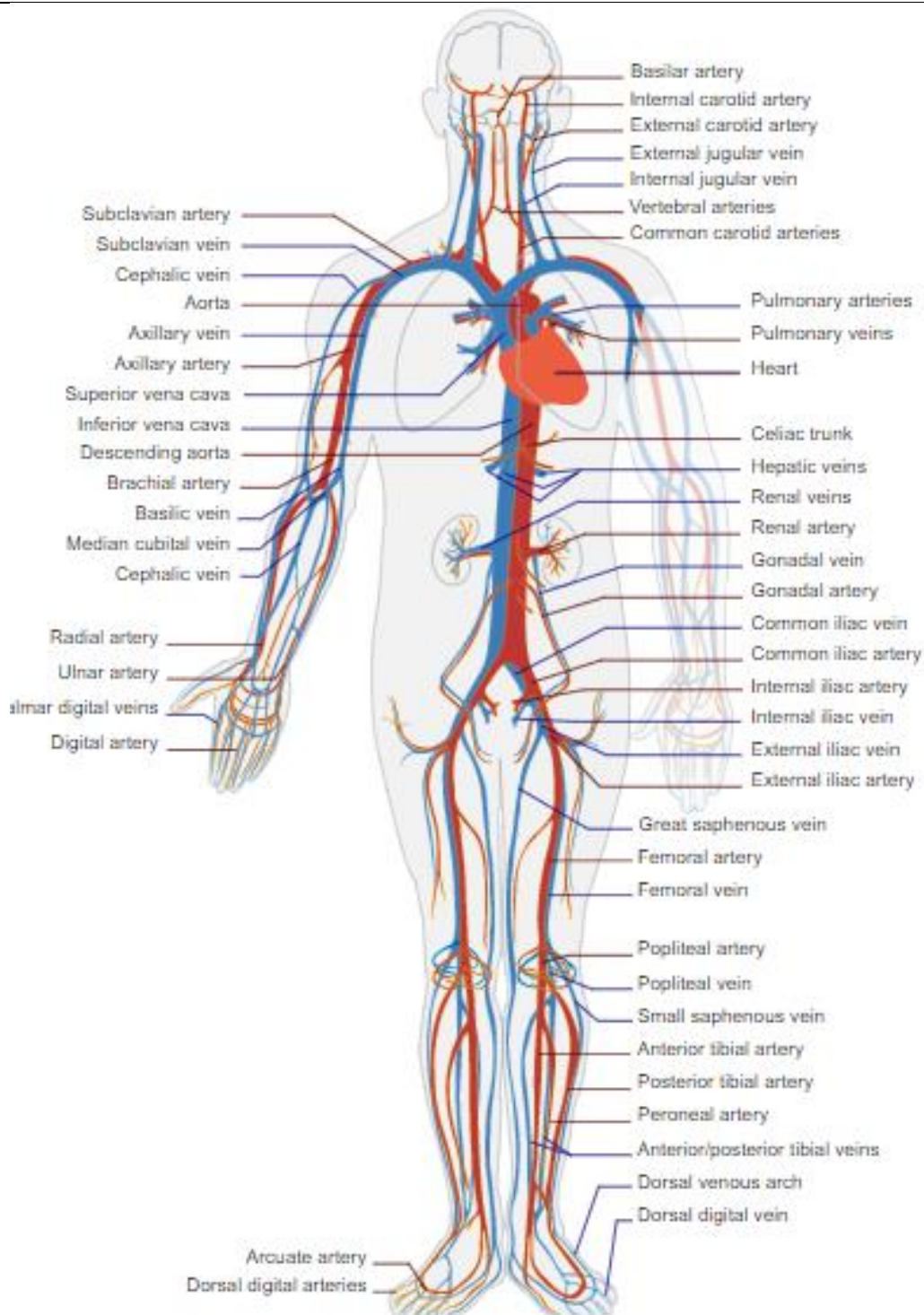
Muscle origin, insertion: Each muscle has a bone with which it has an origin and an insertion. Students can research the origin and insertion for each particular muscle. Students can report their findings to other groups or to the teacher.

Muscle movement: Each muscle causes a specific movement. Students can research the movement caused by contraction of the particular muscle. Students can report their findings to other groups or to the teacher.

Lesson 11C – Circulatory System (10-60 minutes)

Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figure below **(11.C.1)**. After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.

Figure 11.C.1 – Circulatory System



Extra exercises:

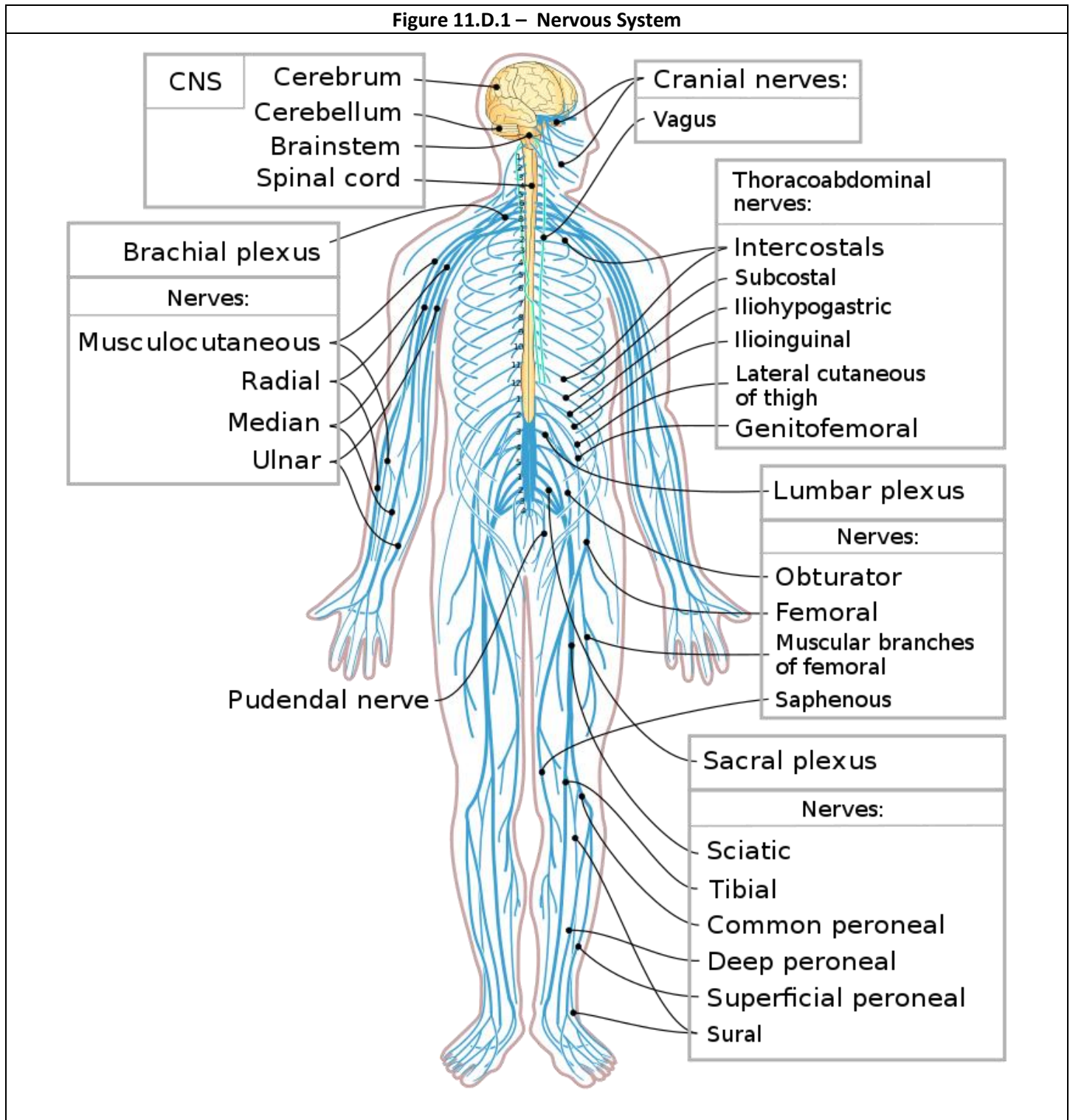
Systemic vs. Pulmonary Circulation: Blood circulation to and from the organs is the systemic circulation, and circulation to and from the lungs is pulmonary circulation. Students can differentiate between the two and demonstrate that to their teacher or other groups.

Oxygenated vs. deoxygenated blood: The vessels of the circulatory system are colored red if the blood contained within them is oxygenated and blue if it is deoxygenated. Students should be able to differentiate which arteries are oxygenated/deoxygenated and which veins are oxygenated/deoxygenated. Students can report their findings to the teacher or other groups.

Other blood vessels: There are many other blood vessels in the body that have names but are not shown on this diagram (e.g. coronary arteries). Have the students research other named vessels and show their location to the teacher or other groups.

Lesson 11D – Nervous System (10-60 minutes)

Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figure below **(11.D.1)**. After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.



Extra exercises:

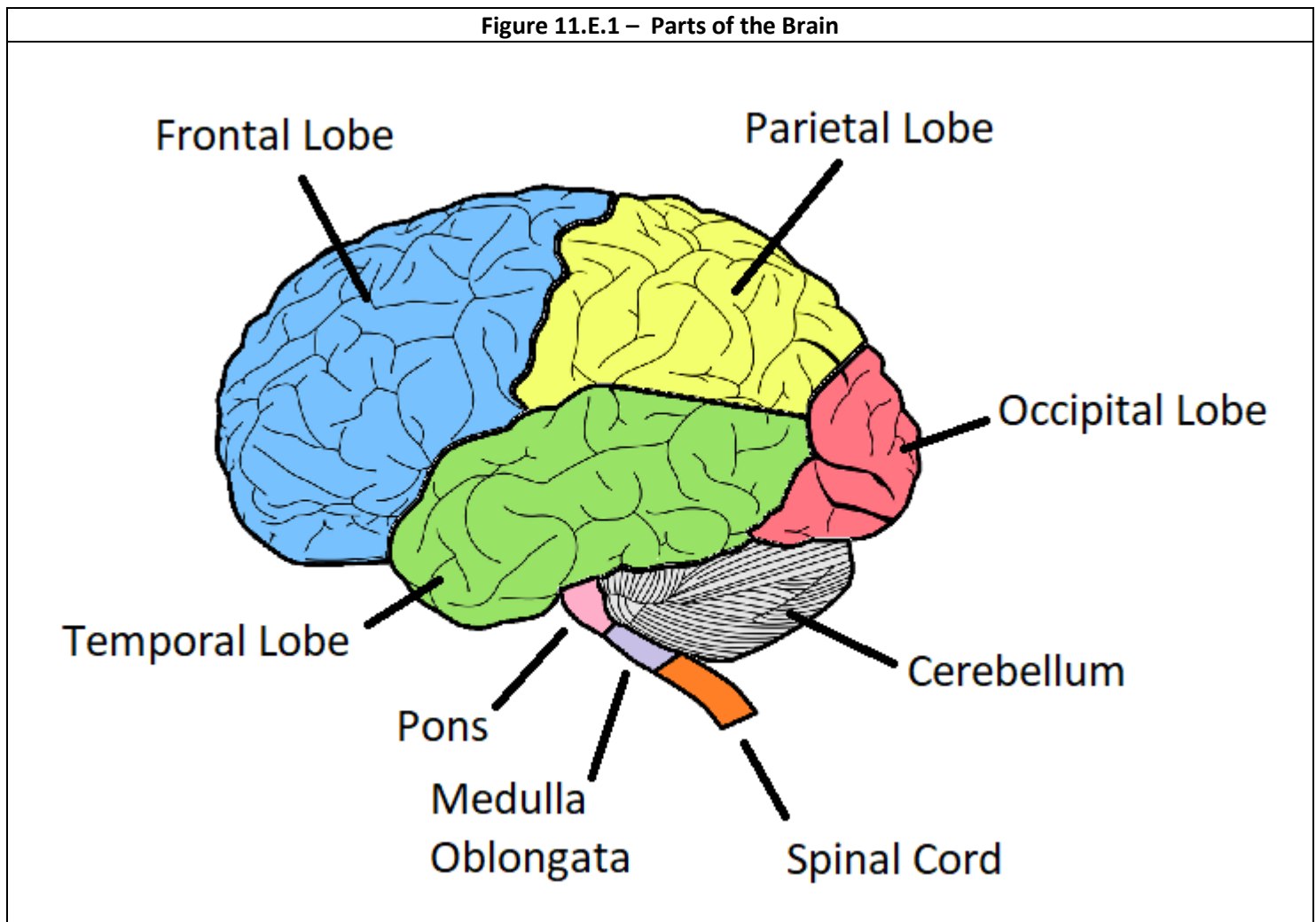
Cranial Nerves: There are 12 cranial nerves, only one of which is shown on the diagram. Students can research and learn the various names, locations, and functions of the cranial nerves and report their findings to the teacher or other groups.

Nervous system divisions: The nervous system is divided into many divisions, including central, peripheral, sensory, motor, autonomic, somatic, sympathetic, and parasympathetic. Students can research the divisions and relate the various parts of the diagram to those divisions. Students can report their findings to the teacher or other groups.

Lesson 11E – Parts of the Brain (5-30 minutes)

Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figure below (11.E.1). After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.

Figure 11.E.1 – Parts of the Brain



Extra exercises:

Functions and Functional Regions of the Cerebrum: Each lobe of the cerebrum has particular functions. The cerebrum also has several functional regions including Broca's area, Wernicke's area, the motor cortex, the sensory cortex, and many others. Students can research the various functions and functional areas of the cerebrum and report their findings to the teacher or other groups. Students can write on the magnets using dry erase markers if desired to show locations.

Anatomical Parts of the Cerebrum: There are many parts of the cerebrum that scientists have named, such as gyri, sulci, fissures, notches, and many others. Students can research and name various parts of the cerebrum and report their findings to the teacher or other groups. Students can write on the magnets using dry erase markers if desired to show locations.

Lesson 11F – Parts of the Ear and Eye (10-60 minutes)

Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figure below (11.F.1,2). After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.

Figure 11.F.1 – Parts of the Ear

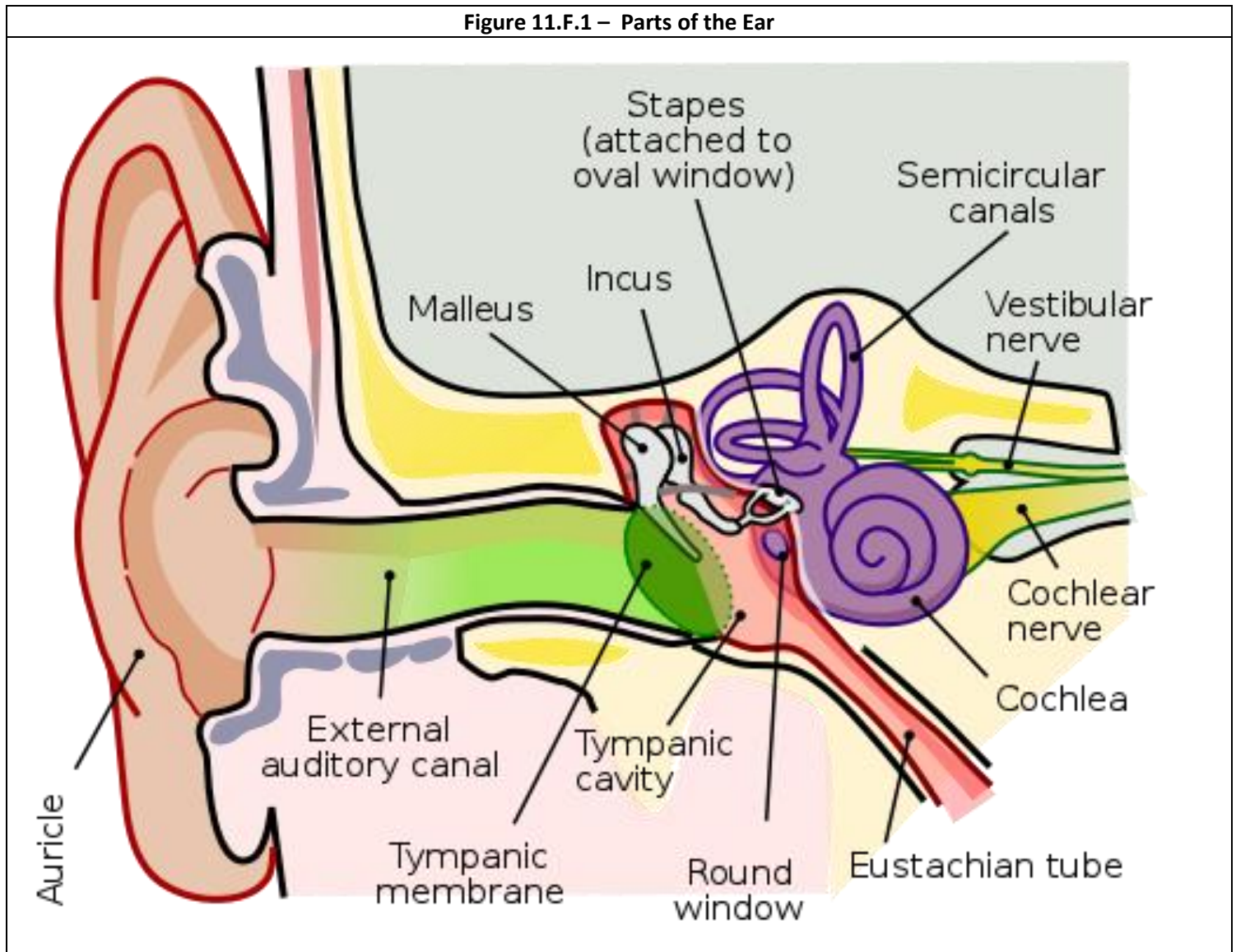
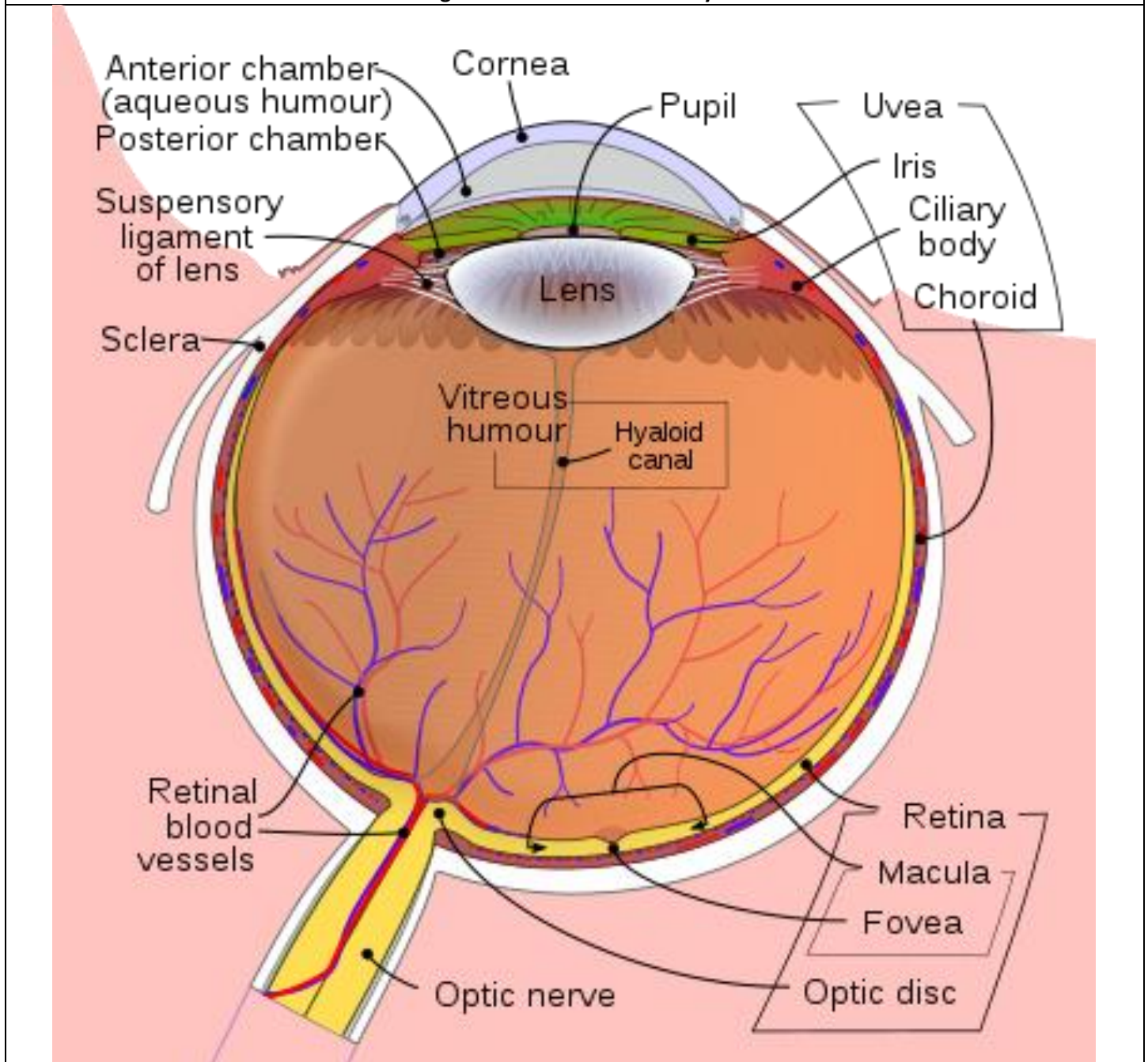


Figure 11.F.2 – Parts of the Eye



Extra exercises:

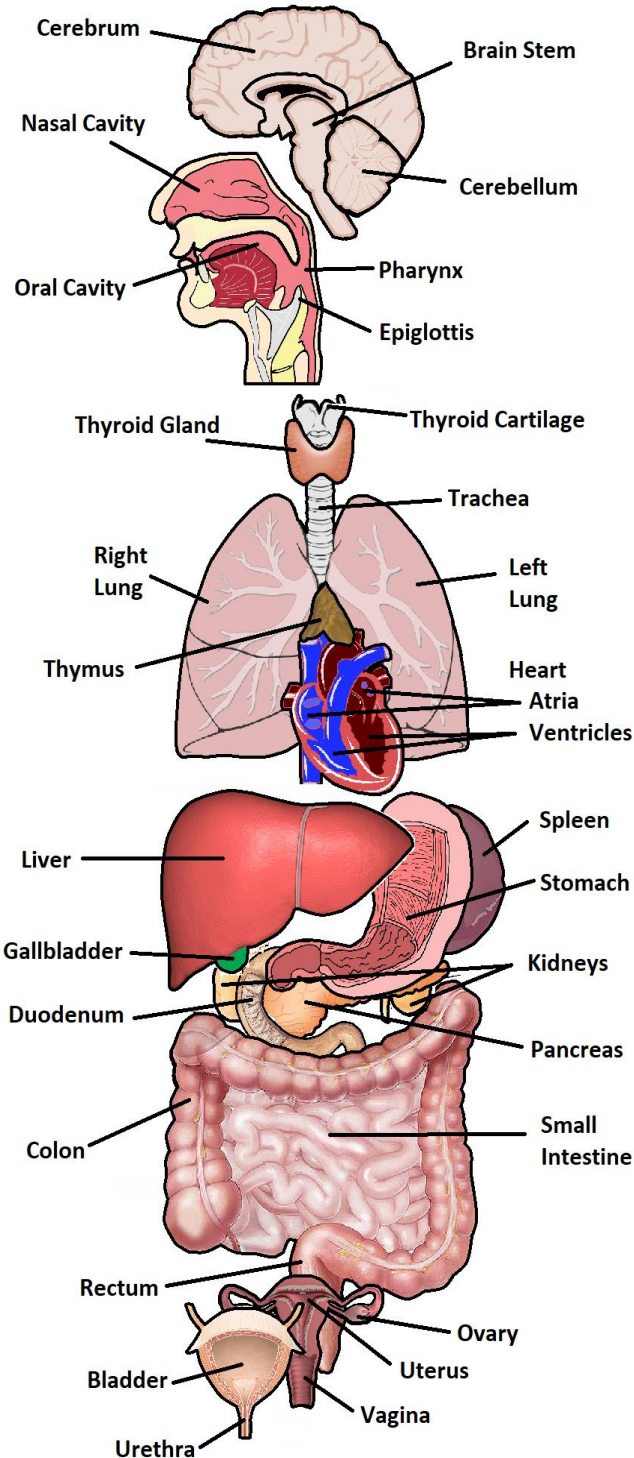
Parts of the inner ear: The inner ear has many different parts which work together to produce the sense of hearing and balance. Have students research the parts of the inner ear and semicircular canals and relate them to the magnets. Students can report their findings to the teacher or other groups.

Eye and Ear diseases and disorders: There are many diseases, disorders, and injuries that cause problems with hearing and vision. Students can research the various dysfunctions and relate them to the anatomical components of the magnets. Students can report their findings to the teacher or other groups.

Lesson 11G – Body Organs (10-60 minutes)

Student/Teacher-Centered Activity (10-30 minutes): In the Anatomy lessons, the teacher places the magnets on the board in their proper locations, going over the names of the different anatomical structures as is shown in the figure below **(11.G.1)**. After showing and naming all of the structures, students should work in groups to do the same. Student groups can be given the figure below to check their knowledge, but in the end, the students should be able to name all of the parts without looking at the figure. Have students say the names to their group members, then say them to the teacher when they are ready.

Figure 11.G.1 – Body Organs



Extra exercises:

Placement of Organs in Three Dimensions: Students should not only place the organs correctly superior to inferior but should make sure they place the organs correctly anterior to posterior. Notice the bladder is anterior to the uterus with the rectum posterior. The kidneys and spleen are posterior to the stomach. The thyroid and thymus are anterior to the trachea. Students should practice placing these correctly in their group and then demonstrate it to the teacher.

Organ Anatomy: Each organ has specific parts other than those listed on figure 11.G.1. Students can research the anatomy of different organs and relate them to magnets. Students can report their findings to the teacher or other groups.

Organ Disease and Dysfunction: Many diseases, disorders, and injuries cause problems with body organs. Students can research the various dysfunctions and relate them to the anatomical components of the magnets. Students can report their findings to the teacher or other groups.