Fundamentals of Human Anatomy Laboratory Manual

Carly Manz

Iowa State University Digital Press
Ames, Iowa

This book is published by

Iowa State University Digital Press
701 Morrill Rd, Ames, Iowa 50011, United States

www.iastatedigitalpress.com

DOI: 10.31274/isudp.2024.160

Iowa State University is located on the ancestral lands and territory of the Baxoje (bah-kho-dzhe), or Ioway Nation. The United States obtained the land from the Meskwaki and Sauk nations in the Treaty of 1842. We wish to recognize our obligations to this land and to the people who took care of it, as well as to the 17,000 Native people who live in Iowa today.

Contents

Week 1 Lab Activity

Using Anatomical Terminology

Work with your group on filling out the following questions and diagrams. Then complete the practice quiz and check your answers. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 1 Lab Activity Points. Lab instructors will award points based on a good-faith effort to fill out worksheet. They will NOT be grading for correctness. It is ultimately your responsibility to make sure your answers are correct so that this will be a useful study guide for your weekly test. Therefore, **make sure you ask your instructor, undergrad TAs, and your peers for help when you need it.**

Question 1

For the very unfortunate patient in the lecture slides, write out the location of the bullet wounds that your instructor has assigned your group using colloquial language.

Number	Location

Question 2

Is this patient's body in anatomical position? What would have to be changed for them to be in anatomical position?

Question 3

Why is it necessary for this patient's medical team to assume anatomical position and use anatomical terminology when discussing their injuries?

Question 4

Fill in the most accurate directional terms using the image on the PowerPoint slide:

a. Locations 5 and 14 are both on the _____ (R/L) leg. 5 is _____ to 14.

b. Location 6 is _____ to 2 and _____ to 23.

c. Location 7 is _____ to 3.

d. Locations 17-19 are on the _____ (R/L) forelimb. 19 is the most _____. 17 is on the _____ side of the wrist. 18 is on the _____ side of the arm.

Complete the following statements with the most accurate location number:

e. The superior-most location on the body is _____.

f. On the right arm, the most distal location is _____.

Question 5

Fill in the blanks in this diagram using the regional terms listed below.

Acromial	Coxal	Inguinal	Patellar
Antebrachial	Cranial	Lumbar	Pectoral
Antecubital	Crural	Manual	Pedal
Axillary	Digital (hand)	Mental	Plantar
Brachial	Digital (foot)	Nasal	Popliteal
Buccal	Dorsal	Olecranal	Pubic
Calcaneal	Facial	Oral	Sternal
Carpal	Femoral	Optic	Sural
Cephalic	Frontal	Otic	Tarsal
Cervical	Gluteal	Palmar	Umbilical

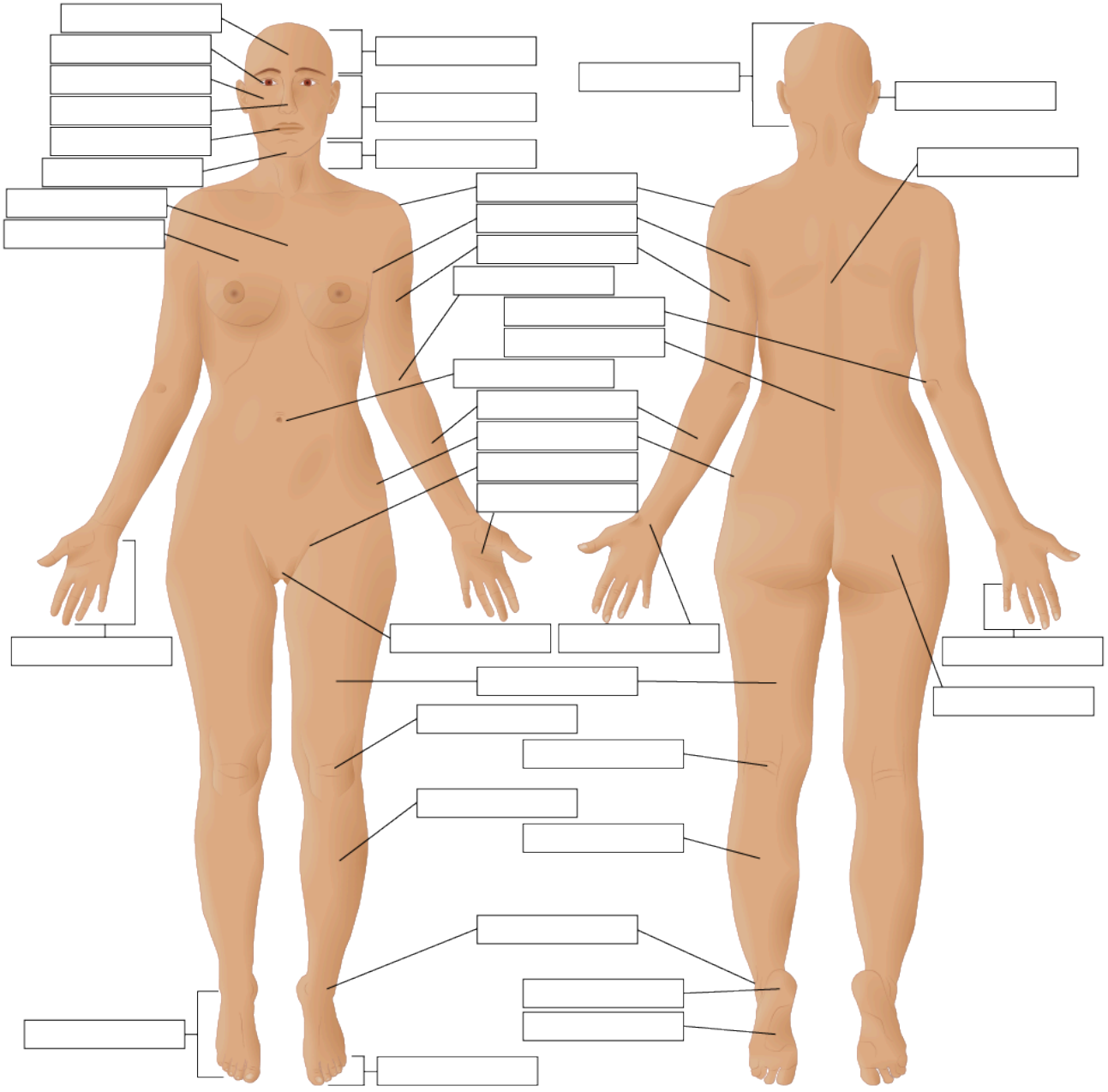


Figure 1. Regions of the Body

Question 6

Now that you have learned how to use anatomical terminology, go back to your assigned bullet wound locations and provide the most accurate description possible for each one.

Number	Location

Question 7

Look at the three CT scan images of the brain in the PowerPoint. For each one, state which type of section is being shown.

a. _____

b. _____

c. _____

Question 8

Write out which body cavity or structure corresponds to the numbers and letters below.

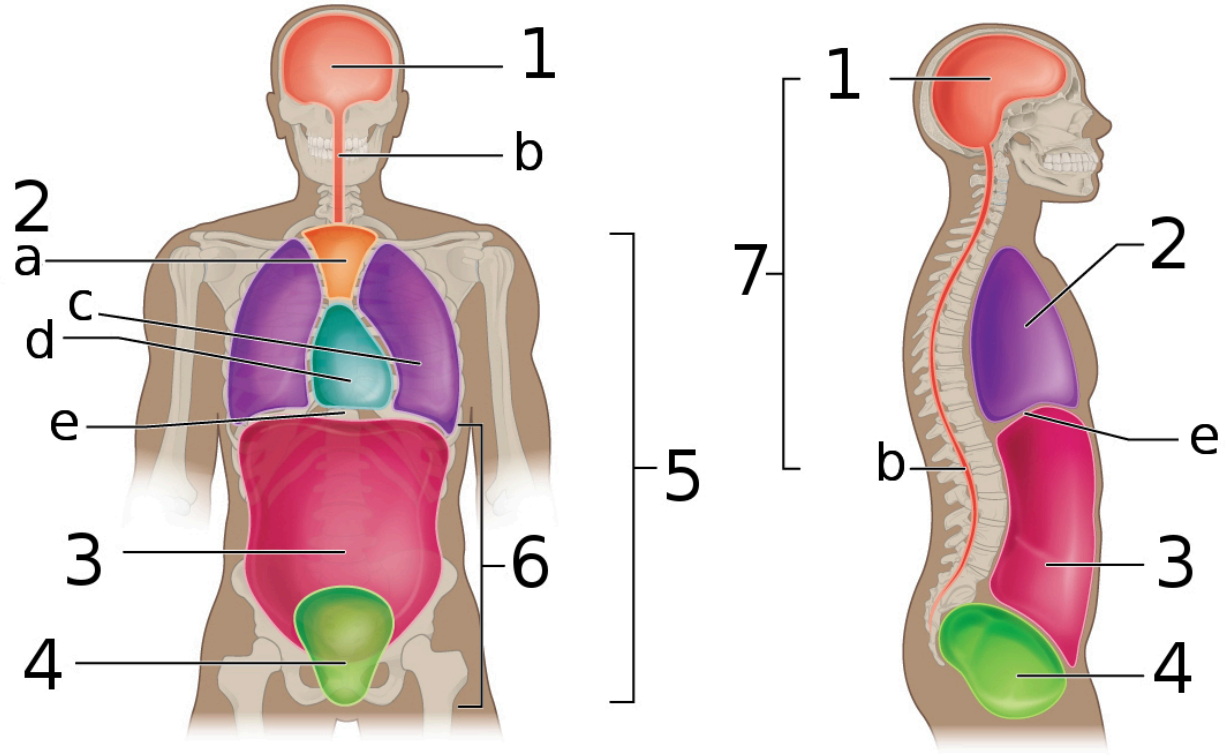


Figure 2. Body structures and cavities

1		**7**	
2		**a**	
3		**b**	
4		**c**	
5		**d**	
6		**e**	

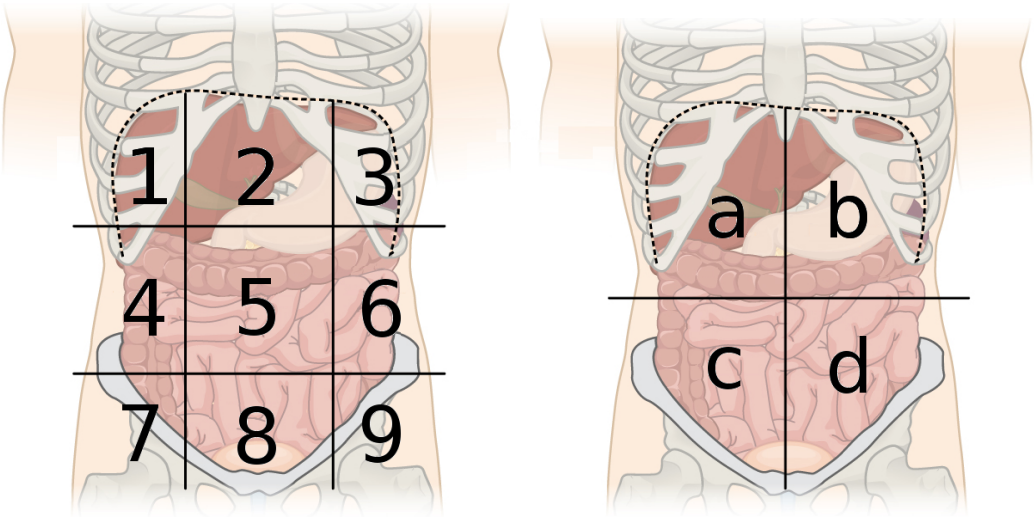
Question 9

Refer to the figure in question 8. Which types of serous membranes would be found in the following cavities and in the particular locations described of those cavities?

Label	Body Cavity	Serous Membrane	Serous membrane on organ surface in cavity	Serous membrane on internal walls of cavity
c				
d				
3				

Question 10

Write out the names of the abdominal quadrants and regions labeled below.



a		4	
b		5	
c		6	
d		7	
1		8	
2		9	
3			

Question 11

Complete the following statements:

The umbilical region is _____ to the lumbar regions and _____ to the hypogastric region.

Within the umbilical region, the serous membrane you would find would be the _____.

Question 12

Starting in Week 2, you will have a Weekly Quiz on the previous week's learning objectives at the start of lab almost every week. Read through the Week 1 Learning Objectives. Do you think you can achieve them all?

Take the sample practice quiz to test yourself. Try to do it without looking at your notes. (Note: the sample quiz is 10 questions long. The real quizzes will have 20 questions.)

1. Describe the anatomical position. _____
2. What is the purpose of the anatomical position? _____
3. Which is more superior – A or B? _____
4. Name the indicated body region. _____
5. Name the indicated body region. _____
6. Using directional terminology, complete this sentence: #4 is _____ to #5.
7. Name the body cavity. _____
8. Name the abdominopelvic region. Use R/L if appropriate. _____
9. What serous membrane would be on this surface? _____
10. Which section of the thoracic region is in the image? _____

TA Check-in for W1 Activity Points

After you have completed all questions in this assignment, check in with your TA. Show them your completed activity. Answer any further questions they may have. Then get a stamp:

Week 2 Lab Activity

Cells and Tissues I

Work with your partner on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 2 Lab Activity Points.

Microscopes

Question 1

Today in lab, you will be using your microscope to look at cells and tissues on specimen slides. Microscopes are valuable tools in the lab for observing these small structures, but they need to be used properly and with care. Answer the following questions about microscope best practices:

a. Which three parts of the microscope can be used to adjust lighting?

b. What is the **only** thing you should use if you need to clean a microscope lens?

c. Which objective lens should you **always** start with when you first focus on a specimen slide?

d. Explain why the coarse focus knob should **only** be used with the lowest power objective lens.

e. If you are using the highest objective lens, what is the total magnification of the specimen?

Question 2

Look at the labeled microscope. For the following terms, write in the number that best matches.

Number	Microscope part	Write out the name to practice spelling
	Coarse focus knob	
	Condenser	
	Condenser adjustment knob	
	Fine focus knob	
	Iris diaphragm	
	Light intensity knob	
	Mechanical stage	
	Mechanical stage adjustment knob	
	4x objective lens	
	10x objective lens	
	40x objective lens	
	Ocular lens	
	Stage	

Cells

Question 3

Look at the model of a simple columnar epithelial cell. For each of the described functions, write the name of the cell structure and the number identifying it that best matches.

Function in the cell	Name of structure	Number on model
Contains DNA/chromosomes; site of mRNA synthesis		
Site of protein synthesis; beginning of endomembrane system		
Sorts, modifies, and tags proteins for their final destination		
Selective barrier for the whole cell; regulates what gets in and out		
Selective barrier for the nucleus; regulates what gets in and out		
Increases surface area of cell for greater absorption		
Site of ribosome creation		
Cellular fluid that is mostly water; site of metabolic processes		
Microtubule origin; helps guide nuclear division during mitosis		
Site of most ATP production during aerobic cellular respiration		
Site of breakdown and recycling of molecules and cellular debris		
Site of lipid synthesis		
Small bubble of membrane used to transport substances in cell		

Question 4

Look at the images of the cells in the whitefish blastulas. For each of the numbers, write the stage of the cell cycle that cell is experiencing and some notes for how you could differentiate each stage on the test next week. The notes do not have to be technical – they should be how you, personally would recognize each stage on a microscope slide.

Number	Stage of cell cycle	Notes on identifying/remembering for text
1		
2		
3		
4		
5		

Tissues I

The goals of this part of the lab are to 1) give you a broad foundation in the characteristics of the tissue types found in the body and 2) prepare you for identifying epithelial tissues from unlabeled slides on the test next week. Keeping the second goal in mind, as you are answering the questions, focus on how you, personally, would be able to ID these tissues. **Make sure you look at the actual slides and provide answers based on what you are actually seeing**.

In the Week 3 lab, you will look at specific types of connective, muscle, and nervous tissue.

Question 5

There are 4 major types of tissue. What is the general function of each type?

Epithelial –

Connective –

Muscle –

Nervous –

Question 6

All of the epithelial tissue types you will need to know for lab are found in **Group A slides**.

A1-3. These all have **simple epithelial tissues**. What does simple mean in this context?

Two distinctive characteristics of epithelial tissues are they are **cellular** and **line structures**. Slides A1-3 each have a good example of simple epithelial tissue – find it. Practically, how can you use those two characteristics to locate epithelial tissue on a slide (i.e., describe what you looked for)?

Simple epithelial tissues are further classified by shape. They can be **squamous**, **cuboidal**, or **columnar**. For slides A1-3, list which subtype of simple epithelial tissue it contains. Briefly describe the cells seen in each subtype and how they are differentiated from the other subtypes.

A1 –

A2 –

A3 –

A4-6. These are all either **pseudostratified** or **stratified epithelial tissues**. What does **"stratified"** mean in this context?

Look at slides **A4-6** and find the epithelial tissue using the same characteristics you used to find the simple epithelial tissues. For each tissue listed below, fill in the number of the slide you found it on and answer the questions associated with it.

Pseudostratified ciliated columnar epithelium on slide: _____

Why is it called pseudostratified?

What are cilia? Where are they located on the columnar epithelial cells?

Stratified squamous epithelium on slide: _____

Estimate the number of layers in the stratified squamous epithelium you see: _____

Describe how the shape of the cells change from the basal layer to the apical layer:

What is the “squamous” part of the classification based on?

Do you see any epithelial cells that have detached from the apical layer and are now in the lumen? What does this tell you about the function of this tissue?

Transitional epithelium on slide: _____

Estimate the number of layers in the transitional epithelium you see: _____

Describe how the shape of the cells change from the basal layer to the apical layer:

What ability does this tissue have that the name “transitional” refers to?

Do you see any epithelial cells that have detached from the apical layer and are now in the lumen? What does this tell you about the function of this tissue?

TA Check-In for W2 Activity Points

After you have completed all questions in this assignment, check in with your TA. Show them your completed activity. Answer any further questions they may have. Then get a stamp:

Week 3 Lab Activity

Tissues II and Integumentary System

Work with your partner on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 3 Lab Activity Points.

Tissues II

The goals of this part of the lab are to 1) recall the characteristics of the general tissue types found in the body from last week and 2) prepare you for identifying connective, muscle, and nervous tissues from unlabeled slides on the test next week. Keeping the second goal in mind, as you are answering the questions, focus on how you, personally, would be able to ID these tissues. **Make sure you look at the actual slides and provide answers based on what you are actually seeing**.

Connective Tissue

All of the connective tissue types are found in groups B-E.

Group B

B1-3. These are all types of connective tissue. What differentiates CT from the other types of tissue?

B1-3 are the four types of connective tissue we will be studying that aren't cartilage, bone, or blood. For each tissue, fill in the label of the slide you found it on and answer the questions associated with it.

Areolar CT on slide: _____

Estimate the amount of space taken up by:

cells_____%

Protein fibers _____ %

Ground substance _____%

Adipose CT on slide: _____

Estimate the amount of space taken up by:

cells_____%

Protein fibers _____ %

Ground substance _____%

On the slide, the cells are mostly composed of a large empty space. What would be here in life?

Dense Regular CT on slide: _____

Estimate the amount of space taken up by:

cells_____%

Protein fibers _____ %

Ground substance _____%

Based on the differences you see in **areolar** and **dense regular CT**, contrast the two in terms of strength, cushioning, and whether they are likely to contain accessory structures (e.g., blood vessels):

Group C

Slides **C1-3** have good examples of cartilage on them. What **category of tissue** is cartilage a subtype of? Does this make sense based on what you are seeing?

Find the cartilage tissue on slides C1-3. What **similarities** do they share? (Describe what you would look for on a test slide to narrow it down to “cartilage”.)

Now ID the specific type of cartilage on each slide. **Describe each type of cartilage,** particularly in terms of the differences that allow you to discriminate it from the other types of cartilage.

Cartilage type	Slide #	Description (how can you tell it apart from the other cartilages?)
Hyaline cartilage		
Elastic cartilage		
Fibrocartilage		

Group D

Group D (1-2) includes two of the more unusual types of CT, blood and bone.

Compact bone is on slide _____

Find one osteon and study it. Estimate the number of layers in your osteon: _____. Do the other osteons have a similar numbers of layers?

What would be found in the **central canal** of the osteon in life? What would be found in the **lacunae**?

Blood is on slide _____

What is the most abundant type of cell in blood? Describe its appearance on the slide.

What are the other types of cells found in blood? What do they look like?

Muscle and Nervous tissue

Slide E

Look at Slide **E1**. Which type of tissue is this? What are the two types of cells that can be seen?

How can you distinguish this tissue type from the others? What would you look for?

Group F

Look at the slides in **Group F.**

Slide F1 has all three muscle tissue types in a row. Identify the types of muscle tissue you see and fill in the table for characteristics you can look for to distinguish each type.

Muscle tissue type on F1	Describe shape of cells	Describe Nuclei (Location, #/cell)	Striations present?	Other useful traits?
On left:				
In center:				
On right:				

Which muscle tissue type is on **F2**? How can you tell?

Tissue Summary

By the end of Weeks 2-3, you will need to be able to identify all of the following tissue types. Place a checkmark to the right of each tissue that you feel confident you can identify. If you don't feel confident, go back and look at it again.

Simple squamous epithelium		Hyaline cartilage	
Simple cuboidal epithelium		Elastic cartilage	
Simple columnar epithelium		Fibrocartilage	
Pseudostratified ciliated columnar epithelium		Compact bone	
Stratified squamous epithelium		Blood	
Transitional epithelium		Skeletal muscle	
Areolar connective tissue		Cardiac muscle	
Adipose connective tissue		Smooth muscle	
Dense regular connective tissue		Nervous tissue	

Integumentary System

Group G Slides

Slides G1-3 are slides of skin. They all have three layers – the epidermis, dermis, and subcutaneous layer. Fill in the types of tissue you see for each layer and its function in terms of the skin.

	Tissue type	**Function**
Epidermis		
Dermis	Areolar and Dense irregular CT	
Subcutaneous Layer (Hypodermis)		

These slides are of **thin skin** (e.g., on the face), **thick skin** (e.g., the palm), and the **scalp**. Describe each slide and guess what type of skin it is using the table below.

Slide	Epidermis (relative thickness, appearance of strata, etc.)	Dermis (appearance, relative thickness, accessory structures, etc.)	Type of skin
G1			
G2			
G3			

Skin model

Now look at the skin model. Identify the structures indicated by the labels and fill out the table.

	Layer of skin or structure name	Descriptive characteristics (1-8) or function (9-15)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

TA Check-in for W3 Activity Points

After you have completed all questions in this assignment, check in with your TA. Show them your completed activity. Answer any further questions they may have. Then get a stamp:

Week 4 Lab Activity

Skeletal System I

Work with your partner on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 4 Lab Activity Points.

Bone tissue and structures

Question 1

Using the **model** of the bone tissue, write out the name for each structure labeled in the table. Then, in the right column, fill in the most accurate descriptor from the below list:

- Site of blood cell formation
- Site of blood vessels/nerves running perpendicular to the long axis of the bone
- Site of blood vessels/nerves running parallel to the long axis of the bone
- Site of osteon bone cells
- Bone remodeling tissue on the outside of the bone
- Bone remodeling tissue on the inside of the bone
- Organizational unit of compact bone
- Organizational unit of spongy bone
- Concentric layers of mineralized bone matrix

	Structure or tissue name	**Best descriptor from above list**
1		
2		
3		
4		
5		
6		
7		
8		
9		

Question 2

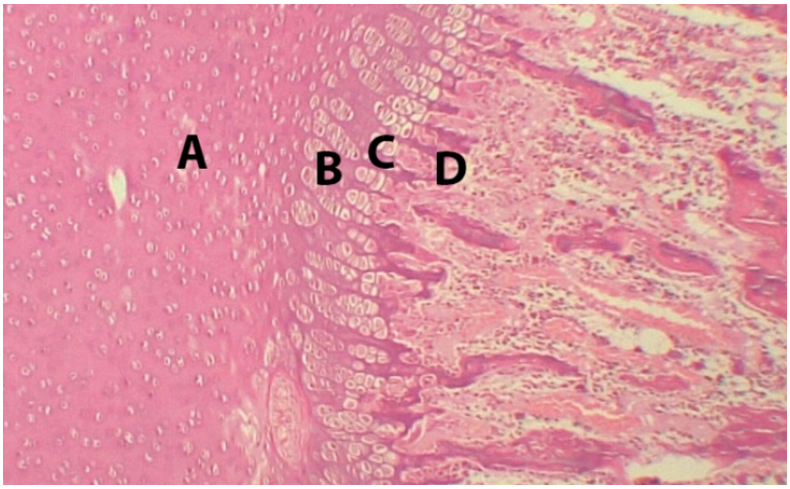
Identify each of the structures or tissues on the long bone.

	Structure or tissue		Structure or tissue		Structure or tissue
1		5		9	
2		6		10	
3		7		11	
4		8		12	

Question 3

In a juvenile, the epiphyseal line is called the epiphyseal plate. What happens at the epiphyseal plate and what is the overall effect on the bone?

Below is an image of an epiphyseal plate. Write the name of each labeled zone. Can you find these zones on the slide in the microscope?



Zone	Name of Zone
A	
B	
C	
D	

Skull bones and features

Question 4

Skull Identification Practice – write the name of the bone that is labeled by each number. Be sure to include **R/L** if appropriate. Some bones have more than one number indicating them.

	Bone		Bone
1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
10		22	
11		23	
12		24	

Question 5

Features of the skull. Fill out the table for each of the features in the skull. **Make sure you identify each of these features on the skulls available in lab.**

Morphological feature of skull	Cranial Bone in which it is Found	Function (what is found in it or attaches to it?)
Carotid canal		
Cribriform plate		
External acoustic meatus		
Foramen magnum		
Jugular Foramen		
Mandibular fossa		
Mastoid Process		
Optic Foramen		
Sella turcica		
Styloid process		
Supraorbital foramen		

Question 6

Identify the sutures indicated on the skull.

	Suture	Plane of the body it lines up with
1		
2		
3		
4		

Axial skeleton inferior to the skull

Question 7

Look at the complete vertebral column on a skeleton and find the boundaries between each of the regions of vertebrae. How do you define a cervical vs. thoracic vs. lumbar vs. sacral vs. coccygeal vertebra based on its location, appearance, or other bones it is articulating with?

	Notes on identification
Cervical	
Thoracic	
Lumbar	
Sacral	
Coccygeal	

Question 8

Skeleton Identification Practice. Write the name of the bone or region that is labeled by each number. Be sure to include R/L if appropriate. Some bones have more than one number indicating them.

	Bone or Region	Notes to help identification
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

TA Check-in for W4 Activity Points

After you have completed all questions in this assignment, check in with your TA. Show them your completed activity. Answer any further questions they may have. Then get a stamp:

Week 5 Lab Activity

Skeletal System II

Work with your partner on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 5 Lab Activity Points.

Bones and features of the Forelimb

Question 1

List the bones or groups of bones found in each region of the forelimb. If there is more than one bone or group in a region, use the anatomical directions to correctly fill out each blank.

<table>
<tr><th>Region</th><th colspan="3">Medial → Lateral</th><th></th></tr>
<tr><td rowspan="2">Shoulder girdle</td><td>_____.</td><td colspan="2"></td><td>_____.</td><td rowspan="10">Proximal
↓
Distal</td></tr>
<tr><td>_____.</td><td colspan="2"></td><td>_____.</td></tr>
<tr><td>Arm</td><td>_____.</td><td></td><td>_____.</td></tr>
<tr><td>Forearm</td><td>_____.</td><td></td><td>_____.</td></tr>
<tr><td rowspan="2">Wrist</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">Hand (all groups)</td><td>_____.</td><td colspan="2"></td><td>_____.</td></tr>
<tr><td>_____.</td><td colspan="2"></td><td>_____.</td></tr>
<tr><td>_____.</td><td colspan="2"></td><td>_____.</td></tr>
<tr><td>_____.</td><td colspan="2"></td><td>_____.</td></tr>
</table>

Question 2

For each of the listed forelimb features, list what bone it is found on and its function.

Forelimb Feature	Forelimb bone it is found on	Function (what is found in it or attaches to it?)
Acromion process		
Glenoid cavity		
Supraspinous fossa		
Infraspinous fossa		
Subscapular fossa		
Greater tubercle		
Lesser tubercle		
Lateral epicondyle		
Medial epicondyle		
Olecranon process		

Question 3

Identify the bone and feature, if applicable. L/R not necessary unless asked on entire skeleton.

	Bone and/or feature		Bone and/or feature
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

Quiz time!

Using the articulated hand model, name all of the carpal bones for your TA. They will stamp here:

Bones and Features of the Hindlimb

Question 4

List the bones or groups of bones found in each region of the hindlimb. If there is more than one bone or group in a region, use the anatomical directions to correctly fill out each blank.

Region	Medial → Lateral				
Pelvic girdle (os coxa)	_____.			_____.	**Proximal ↓ Distal**
	_____.			_____.	
Thigh	_____.			_____.	
Knee	_____.			_____.	
Leg	_____.			_____.	
Ankle	_____.	_____.			
	_____.	_____.			
Foot (all groups)	_____.			_____.	
	_____.			_____.	
	_____.			_____.	
	_____.			_____.	

Question 5

For each of the listed hindlimb features, list what bone it is found on and its function.

Hindlimb feature	Hindlimb bone(s) it is found in	Function (what is found in it or attaches to it?)
Iliac Crest		
Anterior inferior iliac spine		
Ischial tuberosity		
Obturator foramen		
Acetabulum		
Pubic symphysis		
Greater trochanter		
Lesser trochanter		
Linea aspera		
Tibial tuberosity		
Medial malleolus		
Lateral malleolus		

Question 6

Identify the bone and feature, if applicable. L/R not necessary unless asked on entire skeleton.

	Bone and/or feature		Bone and/or feature
20		30	
21		31	
22		32	
23		33	
24		34	
25		35	
26		36	
27		37	
28		38	
29			

Articulations

Question 7

What are the three **functional classifications** of joints? Briefly describe each one.

Question 8

What are the three **structural classifications** of joints? Briefly describe each one.

Question 9

Identify the functional and structural classification of the joint that is labeled on the skeletons.

	Functional classification	Structural classification
1		
2		
3		
4		
5		

Question 10

Look at the knee joint. Can you identify all of the significant components? For each of the categories, list the specific names of each that can be found in the knee.

Bones:	Ligaments and tendons:	Cartilage:

Question 11

Build the rotator cuff out of clay. For each muscle, list the two bony features it attaches to.

Muscle	Scapula feature	Humerus feature
Supraspinatus		
Infraspinatus		
Teres minor		
Subscapularis		

Quiz Time!

Show your TA your clay model. Answer any questions they have regarding the muscles, bones, or bony features on the model. Then get a stamp:

TA Check-in for W5 Activity Points

After you have completed all questions in this assignment and **cleaned your space**, check in with your TA. Show them your completed activity and clean table. Then get a stamp:

Week 6 Lab Activity

Muscular System I

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 6 Lab Activity Points.

Muscle Cell

Identify the structures labeled on the muscle cell and their functions.

Number	Structure	Function
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Muscle groups

Build the quadriceps and hamstrings out of clay. Fill in the missing muscles, bony features, and relative anatomical directions using the provided information.

Quadriceps muscle	Proximal attachment feature	Distal attachment feature	superficial, deep, medial, or lateral
		Patella; tibial tuberosity	
	Intertrochanteric line; linea aspera		
	Greater trochanter; linea aspera		
Vastus intermedius			

Hamstrings muscle	Proximal attachment feature	Distal attachment feature	lateral, medial & deep, or medial & superficial
Semimembranosus		Medial condyle of femur, medial condyle of tibia	
		Medial side of proximal tibia	
	Ischial tuberosity; linea aspera		

Quiz time!

Show your TA your clay model. Answer any questions they have regarding the muscles, bones, or bony features on the model. Then get a stamp:

Cat Muscle dissection

Introductory and Safety Information

Students should wear **closed-toe shoes** for the remainder of the semester. All dissections are to be done while wearing the **gloves** and **safety glasses** provided.

Dissection is the separation of body parts for study; no body parts are removed in dissection. Excess fatty tissue may be removed and discarded in the container provided. Your tools will be a dull probe, your gloved fingers, forceps, and scissors. Scalpels will be provided by your instructor for a few procedures. You are expected to be very careful with the scalpels and should only use them in the ways that your instructor specifies. **If you fail to use the scalpels or other dissection tools in a responsible way, your instructor may ask you to leave the class and forfeit the points for that day.** Misuse of tools includes: 1) using them in a way that is disrespectful or destructive towards the specimens or other materials in the lab, or 2) using them in a way that could cause injury to oneself or others.

Each table will be given a cat to dissect for the rest of the semester. This cat will be shared by the all four students that sit at the same table. You should label the plastic bag the cat will be stored in with some kind of identifier so your group will be able to easily find it each week. It is your responsible to take care of your specimen so it can be used for the next few months. At the end of a lab period, the specimen should be sprayed with Carolina Perfect Solution and stored in plastic bags in a carton with your section's number.

Cat Skeletal Muscle Dissection in Week 6

Because cats are quadrupedal animals, their musculature differs from human musculature in several ways. Muscles that are significantly different in humans are only identified on the human muscular models (marked "model only" on your learning objectives). One muscle that we will dissect can only be found on the cat. All other muscles may be identified on either the models or a cat. You should be prepared to name muscles on different cat specimens dissected in your lab section. Practice naming muscles by working with the cats of all groups to start getting an idea of the anatomical variability you will see.

For muscle dissections, the pair of students with the cat first should only dissect one half (left or right) of the cat. The second pair at the same table will dissect the other half.

Watch the **Week 6 dissection video** on canvas either before or during your dissection. To do the dissection, follow these instructions:

1. Place your cat ventral side up on your dissecting tray. Locate the **sartorius** and **gracilis** muscles. Using your dull probe, separate the two, being careful to not break or cut the blood vessels or nerves. Separate the muscles from the blood vessels and nerves. Then run your dull probe beneath each until its tip protrudes from under the other side of each muscle.
2. To expose the deeper muscles, transect (cut transversely) through the **sartorius** and **gracilis**. Fold them back so you can see the underlying muscles. Use the dull probe to separate the **vastus lateralis**, **rectus femoris**, **vastus medialis**, **adductor longus**, **adductor femoris**, and **semimembranosus.**
3. Turn your cat so it is dorsal side up. Separate the **semitendinosus** and the **biceps femoris**.
4. To expose the deeper muscles, find the **biceps femoris** and transect it. Fold it back and find the **semimembranosus** medially.
5. Dissect the **gastrocnemius** and expose the **calcaneal tendon** (Achilles' tendon). Clean the calcaneal tendon to observe it splitting into two tendons. The superficial one connects to the gastrocnemius and the deep one leads to the **soleus** muscle. Separate the edges of the two muscles.
6. Dissect the **tibialis anterior** on the ventral aspect of the distal hindlimb.

Fill out the table for all of the muscles dissected on the cat today in the order you dissected them. Use the group designations in the first column as a guide. The first muscle has been completed for you. Put a checkmark in the "found in cat" and "found in human" columns ONLY once you have **successfully identified the muscle on your cat dissection and on at least one human model**, respectively.

Group	Muscle name	Region of body (including anatomical direction descriptors)	Found in cat?	Found in human?
Superficial thigh	Sartorius	Anterior superficial thigh		
Quadricep				
Adductor				
				Not in humans
Hamstring				
Leg				

Quiz time!

Show your TA your dissection. Answer any muscle identification questions they have. Then get a stamp:

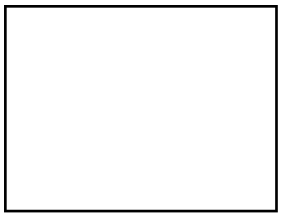
Muscles to identify on the Weekly Quiz

By the end of Weeks 6-7, you will need to be able to identify all of the following muscles on both human models and cats, unless denoted as human or cat only. Place a checkmark to the right of the muscles you feel confident you can identify after today (Week 6 lab).

adductor longus		*pronator teres*	
adductor femoris (cat only)		*rectus abdominis*	
biceps brachii		*rectus femoris*	
biceps femoris		*sartorius*	
deltoid (human only)		*semimembranosus*	
diaphragm		*semitendinosus*	
extensor digitorum		*soleus*	
external oblique		*sternocleidomastoid* (human only)	
flexor digitorum superficialis		*subscapularis* (human only)	
gastrocnemius		*supraspinatus* (human only)	
gluteus maximus (human only)		*temporalis* (human only)	
gluteus medius (human only)		*teres major* (human only)	
gracilis		*teres minor* (human only)	
infraspinatus (human only)		*tibialis anterior*	
internal oblique		*transversus abdominis*	
latissimus dorsi		*trapezius* (human only)	
masseter		*triceps brachii*	
orbicularis oculi (human only)		*vastus lateralis*	
orbicularis oris (human only)		*vastus intermedius*	
pectoralis major (human only)		*vastus medialis*	
pectoralis minor (human only)			

TA Check-in for W6 Activity Points

After you have completed all questions in this assignment and **cleaned your space**, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:



Week 7 Lab Activity

Muscular System II

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 7 Lab Activity Points.

Cat Muscle dissection

Review the dissection safety instructions in the Week 6 Lab Activity. Watch the **Week 7 dissection video** on canvas either before or during your dissection. To do the dissection, follow these instructions:

1. Place the cat on the tray, dorsal side facing up. Dissect the **latissimus dorsi**.
2. Turn the cat so it is ventral side up. Dissect the **biceps brachii** in the proximal forelimb, transecting overlying muscles as necessary. Lift the forelimb up and dissect the **triceps brachii** on the posterior proximal forelimb.
3. The fascia of the muscles of the distal forelimb is especially tough connective tissue. You can use a scalpel and forceps to carefully remove the fur and fascia. If using a scalpel, no one's fingers should be on the specimen. Only cut what you can see. Make sure you don't go too deep and cut muscle. We will only dissect three muscles of the foreleg: the **pronator teres** and **flexor digitorum superficialis** in the anterior compartment and the **extensor digitorum communis** in the posterior compartment.
4. Turn your cat so it is ventral side up. You will now do the most difficult part of the dissection, separating the thin abdominal muscles without entering the abdominal cavity. Run the backside of your dull probe along the **external oblique** muscle so you can see its oblique (superolateral-inferomedial) grain and the margin of the muscle. With your scissors, make a 1 mm nick in the **external oblique** near the middle of the muscle. This should be a very shallow nick that exposes the **internal oblique** underneath. The internal oblique runs superomedial-inferolateral. Insert your dull probe into the nick and work it beneath the **external oblique** to separate it from the deeper **internal oblique**. Once you have clear separation, you can widen the nick further with scissors to make a flap of external oblique that can be folded back.
5. You can then follow the same process, cutting a small nick in the **internal oblique** to find the **transversus abdominus** (running transversely) deep to it. *Do not cut into the abdominal cavity. If you see organ, stop dissecting and try the other side.*
6. Next, find the **linea alba** on the midline of the abdomen and observe the white tendinous sheath lateral to it on either side. The **rectus abdominus** is under this sheath. Make a small nick in the tendinous sheath and run your probe under it to expose the grain of the **rectus abdominis** muscle. It will run superoinferiorly.
7. You will dissect one muscle in the face. Starting at the neck, remove fur and skin superiorly to expose the **masseter** muscle. You can use the scalpel (carefully!) to do this.

Place a T-pin in each muscle dissected in weeks 6 & 7 and practice saying the names of each muscle with your

group. When all groups have their cats ready with the T-pins, inspect the other cats you will see during your test, practicing naming all the muscles on each.

Quiz time!

Show your TA your dissection. Answer any muscle identification questions they have. Then get a stamp:

Muscles of the Human models

Question 1

The below table lists all muscles that you have to identify on human models. For models A, B, C, and F, make a check for each muscle if it can be found on that model.

Muscles	A	B	C	F	Muscles	A	B	C	F
adductor longus					pronator teres				
biceps brachii					rectus abdominis				
biceps femoris					rectus femoris				
deltoid (model only)					sartorius				
diaphragm					semimembranosus				
extensor digitorum					semitendinosus				
external oblique					soleus				
flexor digitorum superficialis					sternocleidomastoid (model only)				
gastrocnemius					subscapularis (model only)				
gluteus maximus (model only)					supraspinatus (model only)				
gluteus medius (model only)					temporalis (model only)				
gracilis					teres major (model only)				
infraspinatus (model only)					teres minor(model only)				
internal oblique					tibialis anterior				
latissimus dorsi					transversus abdominis				
masseter					trapezius (model only)				
orbicularis oculi (model only)					triceps brachii				
orbicularis oris (model only)					vastus lateralis				
pectoralis major (model only)					vastus intermedius				

Question 2

Using model D, identify and write out each muscle that is labeled by a number. Then write in which view (using anatomical directions) that muscle can be seen in. Make sure you include **L/R** if applicable.

Model D: Big Torso

	Muscle name	**View muscle can be seen in**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

Question 3

Using model E, identify and write out each muscle that is labeled by a number. The table is separated into muscles seen in anterior and posterior view. Make sure you include **L/R** if applicable.

Model E: Small full-body model

	Anterior view		**Posterior view**
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15			
16			
17			
18			
19			
20			
21			

Muscles to identify on the Weekly Quiz

By the end of Weeks 6-7, you will need to be able to identify all of the following muscles on both human models and cats, unless denoted as human or cat only. Place a checkmark to the right of the muscles you feel confident you can identify after today (Week 7 lab).

adductor longus		*pronator teres*	
adductor femoris (cat only)		*rectus abdominis*	
biceps brachii		*rectus femoris*	
biceps femoris		*sartorius*	
deltoid (human only)		*semimembranosus*	
diaphragm		*semitendinosus*	
extensor digitorum		*soleus*	
external oblique		*sternocleidomastoid* (human only)	
flexor digitorum superficialis		*subscapularis* (human only)	
gastrocnemius		*supraspinatus* (human only)	
gluteus maximus (human only)		*temporalis* (human only)	
gluteus medius (human only)		*teres major* (human only)	
gracilis		*teres minor* (human only)	
infraspinatus (human only)		*tibialis anterior*	
internal oblique		*transversus abdominis*	
latissimus dorsi		*trapezius* (human only)	
masseter		*triceps brachii*	
orbicularis oculi (human only)		*vastus lateralis*	
orbicularis oris (human only)		*vastus intermedius*	
pectoralis major (human only)		*vastus medialis*	
pectoralis minor (human only)			

TA Check-in for W7 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:

Week 8 Lab Activity

Nervous System I

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 8 Lab Activity Points.

Neuron

Identify the structures labeled on the neuron model and their functions.

Number	Structure name	Description and/or Function
1		
2		
3		
4		
5		
6		
7		

Spinal Cord

Based on the description, identify the structure by name and number it is labeled with.

Number	Structure	Description
		Most superficial meningeal layer, made of dense fibrous connective tissue
		Deepest meningeal layer, found on the outer surface of the spinal cord
		Middle meningeal layer
		Bundle of myelinated axons leaving the spinal cord and carrying motor information away from the CNS
		Area containing the bodies of sensory neurons, with axons bringing sensory information to the CNS
		Space between the vertebra and dura mater, containing adipose tissue, blood vessels, and nerves
		Space between the arachnoid and pia mater, containing cerebrospinal fluid
		Small passageway for cerebrospinal fluid in the gray matter of the spinal cord

The Brain

For each of the regions labeled on the tables, use the brain models to identify the features and take some notes about their description, functions, or how you will remember them for the test.

Number	External Features	Description and/or Function
1		
2		
3		
4		

For each of the regions labeled on the tables, use the brain models to identify the features and take some notes about their description, functions, or how you will remember them for the test.

Number	Mid-sagittal Features	Description and/or Function
5		
6		
7		
8		
9		
10		
11		
Number	**Regions of Cerebrum**	**Description and/or Function**
12		
13		
14		
15		
16		

Brain Dissection

You will dissect a sheep brain with your group. When you get the brain, first identify external structures. Find the dura mater and spinal cord. Are parts of the eye region or olfactory complex still attached? Orient the brain so that you can point out the superior/inferior, anterior/posterior, and left/right views. When you are ready, you will make one long cut with a knife down the midsagittal plane.

Examine the sagittal sections. Follow along with the **W8 dissection video** to identify structures. Below is a list of what you should look for. Make a checkmark when you feel confident you can find them on at least two different sheep brains in the room. Then rewrite the name to practice the spelling.

Brain structure	Found?	Rewrite name
Temporal lobe of the cerebrum		
Frontal lobe of the cerebrum		
Parietal lobe of the cerebrum		
Occipital lobe of the cerebrum		
Cerebellum		
Dura mater		
Arachnoid mater		
Pia mater		
Superior sagittal sinus		
Falx cerebri		
Corpus callosum		
Thalamus		
Hypothalamus		
Pituitary gland		
Epithalamus		
Pineal gland		
Choroid plexus in third ventricle		
Midbrain		
Pons		
Medulla oblongata		
Spinal cord		
Central canal		
Optic chiasm		
Optic nerve (CN II)		
Olfactory bulb (CN I)		

Quiz time!

Check in with your TA once you are feeling confident with the sheep brain. Identify any structures they ask. Then get a stamp:

Cranial Nerves

Using the image of cranial nerves provided in lab, make sure you can identify each cranial nerve by number and name, state whether and it's sensory, motor, or both, and provide its general function. Fill out the below table on Cranial Nerves.

CN Number	Cranial Nerve Name	Function	Sensory, Motor, or Both?
I			
II			
III			
IV			
V			
VI			
VII			
VIII			
IX			
X			
XI			
XII			

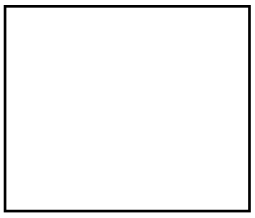
Which cranial nerves can be easily identified on the sheep brain? Can you find any cranial nerves on any of the human brain models?

Quiz time!

Check in with your TA once you are feeling confident with the cranial nerves. Answer any questions they ask using the cranial nerve image. Then get a stamp:

TA Check-in for W8 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:



Week 9 Lab Activity

Nervous System II

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 9 Lab Activity Points.

Structures of the Eye

External eye muscles

Look at the **eye model with the external eye muscles attached**. For each labeled eye muscle, fill in the name, cranial nerve innervation, and direction(s) it moves the eye.

	Eye muscle	Cranial Nerve	Eye movement
1			
2			
3			
4			
5			
6			

Which external and internal structures of the eye can you see on this model? Point them out to your partner. List out the names of the structures that could be identified on a test:

Intrinsic structures

Name the structures labeled on the **large eye model**. Give a brief description of their function.

	Eye structure	Function
1		
2		
3		
4		
5		
6		
7		

Eye Dissection

You will dissect a sheep eye with a partner. When you get your eye, first try to identify any external structures. Can you see parts of the external eye muscles, eyelashes, or optic nerve? Identify the sclera and cornea. Notice that the cornea is cloudy and therefore difficult to see the iris and pupil.

When you are ready to dissect, **make sure you are wearing safety glasses**. Then carefully cut through the sheep eye along the coronal plane, with the cornea on one side and the optic nerve on the other. Follow along with the **W9 dissection video** to identify all of the structures.

Examine the sheep eyes and identify structures from the list below. Make a checkmark when you feel confident you can find them. Then rewrite the name to practice the spelling.

Sheep eye structure	Found?	Rewrite name
Cornea		
Sclera		
External eye muscles		
Optic nerve		
Iris		
Pupil		
Lens		
Vitreous humor		
Optic disc		
Choroid (tapetum lucidum)		
Retina		

Quiz time!

Check in with your TA once you are feeling confident with the sheep eye. Show them your dissection. Identify any structures they ask. Then get a stamp:

Retina

Look at the image of the **layers of the retina**. Provide the name for each layer or structure. Draw a star next to the name of the layer that contains the photoreceptors.

1	
2	
3	
4	

Pull up at least one retina slide on your microscope. Can you identify each of the layers listed above? Does this slide have a portion of the optic nerve?

Structures of the Ear

Model of ear

Name the structures labeled on the **ear model**. Give a brief description of their function or notes on how to identify them.

	Ear structure	Function or how to identify
1		
2		
3		
4		
5		
6		
7		
8		
9		

Cochlea

Look at the image of the **cross-section of the cochlea**. Provide the name for each structure.

1	
2	
3	
4	

Pull up at least one cochlea slide on your microscope. Can you find all of the structures listed above? Does anything look different?

Sensory Stimulus Pathways

Sound through the ear

Trace the pathway of **sound through the ear** as it is converted to nervous signals and sent to the brain. What structures does it go through? Work with your group and use the cards provided to help you. Have your TA check your work.

1		7		13	
2		8		14	
3		9		15	
4		10		16	
5		11			
6		12			

Sound through the eye

Trace the pathway of **light through the eye** as it is converted to nervous signals and sent to the brain. What structures does it go through? Work with your group and use the cards provided to help you. Have your TA check your work.

1		6		11	
2		7		12	
3		8		13	
4		9		14	
5		10			

TA Check-in for W9 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:

Week 10 Lab Activity

Cardiovascular System I

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 10 Lab Activity Points.

Blood

Question 1

Use the provided pictures and below table to differentiate between blood cell types.

#	Blood Cell Type	Basic Function	General Appearance
		Transports oxygen throughout body	
		Phagocytizes pathogens, especially bacteria	
		Phagocytizes allergens, releases chemicals to destroy parasitic worms	
		Releases histamines and heparin during allergic reactions, inflammation	
		Attacks pathogens and virus-infected cells; coordinates immune response	
		Becomes macrophages; Phagocytizes pathogens, cellular debris, dead cells	
		Important component in blood clotting	

Question 2

You and your partner will be attempting to diagnose an individual based on their white blood cell count. You will receive a blood smear slide from your TA. Each student should count 50 WBCs on the slide while scrolling through it in a systematic way. Once the first student has counted the first 50, move the slide enough to make sure your count won't overlap with the second student. The second student should then count the next 50. Record the percentages of different white blood cells seen. Compare the percentages you obtain with the normal values (taken from the lecture textbook).

a. Fill out the below table based on your and your partner's count.

Cell Type	Observed (%)	Normal (%)	High/Low/Normal?
Basophil		0.5-1%	
Eosinophil		1-4%	
Neutrophil		50-70%	
Lymphocyte		20-40%	
Monocyte		2-8%	

b. Based on your results in the table, would you say this individual is healthy? Why or why not?

Question 3

Look at the blood smear image labeled "G". Which of the following is the most likely diagnosis for this individual: strep throat, influenza, allergic reaction, or parasitic worms? Based on what you see in the image, explain your choice of diagnosis.

Question 4

Look at the blood smear image labeled “H”. Which of the following is the most likely diagnosis for this individual: strep throat, influenza, allergic reaction, or parasitic worms? Based on what you see in the image, explain your choice of diagnosis.

Question 5

Look at the blood smear image labeled “L”. Leukemia is cancer of the red bone marrow. There are several different types of leukemia and RBC, WBC, and/or platelets could all potentially be affected. Which blood cells seem to be affected in this individual? Why do you think any or all of the blood cells could be affected in individuals with leukemia?

Question 6

Look at the blood smear image labeled “R”. This patient experienced a stroke and is additionally feeling weakness and pain in their extremities. How could what you see in the image explain these symptoms?

Heart

Question 7

Using the word bank and the table, write out the pathway of blood through the heart and the level of blood oxygenation, beginning with the vena cavae.

Word bank:

Left Ventricle	Right Ventricle	Left Atrium
Right Atrium	Bicuspid Valve	Tricuspid Valve
Superior/Inferior Vena cava	Aorta	Pulmonary Arteries
Pulmonary Veins	Pulmonary Trunk	Aortic Semilunar valve
Pulmonary Semilunar valve	Lung capillaries	

	Structure	**Oxygenated or Deoxygenated Blood?**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Question 8

What is the general function of the valves in the heart?

Question 9

Identify the labeled structures on the model.

1		14	
2		15	
3		16	
4		17	
5		18	
6		19	
7		20	
8		21	
9		22	
10		23	
11		24	
12		25	
13		26	

Question 10

Fill out the below information for the pulmonary arteries and veins by circling the correct answers.

The pulmonary arteries are **red / blue** in the models. This means they are carrying **oxygenated / deoxygenated** blood. The name “artery” means they are carrying blood **towards / away** from the heart. They connect the **right / left** side of the heart with the lungs.

The pulmonary veins are **red / blue** in the models. This means they are carrying **oxygenated / deoxygenated** blood. The name “vein” means they are carrying blood **towards / away** from the heart. They connect the **right / left** side of the heart with the lungs.

Heart Dissection

You will dissect a sheep heart with a partner. When you get your heart, first try to identify any external structures. Can you see the pericardial sac, major vessels coming in and out of the heart, and adipose tissue? Is any part of the diaphragm attached to the pericardium?

When you are ready to dissect, cut through the pericardial sac and observe the external heart. Try to side it. Identify the auricles, and major structures that can be seen on the surface. Then bisect the heart through the apex. Follow along with the **W10 dissection video** for instructions on how to best do this and to identify all of the structures.

Question 11

Describe or draw two different ways that you could side a heart (determine left from right).

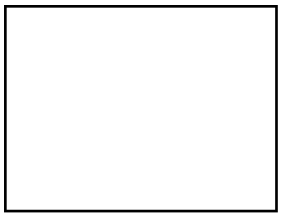
Question 12

Identify all the structures you can on your heart. Then practice reciting the pathway of blood through the heart and pointing at each structure with your probe. Check each structure name when you feel confident that you can find it on the sheep heart.

Sheep heart structures:	**X**	**Bonus structures:**	**X**
Pericardium (fibrous, parietal, visceral)		Superior vena cava	
Apex		Inferior vena cava	
Right auricle		aorta	
Left auricle		R. coronary artery	
Right atrium		L. coronary artery	
Right ventricle		Pulmonary trunk	
Left atrium		Pectinate muscles	
Left ventricle		Trabeculae carnae	
Interventricular septum		Coronary sinus	
Tricuspid valve			
Bicuspid valve			
Pulmonary semilunar valve			
Aortic semilunar valve			
Papillary muscle			
Chordae tendineae			

Quiz time!

Check in with your TA once you are feeling confident with the heart. Identify any structures that they ask. Then get a stamp:



TA Check-in for W10 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:

Week 11 Lab Activity

Cardiovascular System II

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 11 Lab Activity Points.

Blood Vessel Morphology

Question 1

List the layers of a blood vessel from **deep to superficial**.

_____→ _____→ _____

Question 2

Which of the three layers is usually thickest in an artery? In a vein?

Question 3

Why do veins have valves, but arteries do not?

Question 4

Look at the image of the vessel cross sections. Identify the labeled structures and write some notes on how you could differentiate them during a quiz.

	structure	Notes on how to identify
1		
2		
3		

Circulatory Pathways

For each of the below locations, describe the path of blood flow from the heart, to the location, and back to the heart. Vessels you are not responsible for learning are already filled in for you. **Use the labeled human models** to help you identify what each numbered vessel is. Make sure you use **R or L** if applicable.

Question 5: Left side of the face

	Structure or Vessel Name
	Left ventricle
1	
2	
	L. external carotid a. → facial artery → capillaries in face → facial vein → retromandibular vein
3	
4	
5	
	Right atrium

Question 6: Skin of right lateral forearm

	Structure or Vessel Name
	Left ventricle
1	
7	
8	
9	
10	
11	
	Capillary beds in skin
13	
14	
15	
16	
5	
	Right atrium

Question 7: Ascending colon

	Structure or Vessel Name
	Left ventricle
1	
17	
18	
19	
	Capillaries in ascending colon
20	
21	
	Capillaries in liver → hepatic veins
22	
	Right atrium

Question 8: Left kidney

	Structure or Vessel Name
	Left ventricle
1	
17	
18	
23	
	Kidney (filtration as part of urinary system)
24	
22	
	Right atrium

Question 9: Skin of right medial leg

	Structure or Vessel Name
	Left ventricle
1	
17	
18	
25	
26	
27	
	R. popliteal artery → R. anterior tibial artery → capillaries in skin
28	
29	
30	
31	
22	
	Right atrium

Question 10: Pulmonary circulation to left lung

	Structure or Vessel Name
	right ventricle
32	
33	
	Capillaries in lungs
34	
	Left atrium

Question 11

Identify the following labeled blood vessels that are not shown as part of a pathway:

60	
61	
62	
63	
64	

Cat Blood Vessel Dissection

We are returning to our cats to dissect and identify some of the major blood vessels. Watch the **Week 11 dissection video** on canvas to guide your dissection.

Identify all the blood vessels listed below in your cat. Then try to find them in at least one other cat.

Region	Artery	X	Vein	X
Thorax/ Abdomen	Aorta (ascending, arch, thoracic)		Superior vena cava	
	——————-	——	Inferior vena cava	
Abdomen/Pelvic Cavity	R/L Renal artery		R/L Renal vein	
	Superior mesenteric vein		Superior mesenteric vein	
	Inferior mesenteric vein		Inferior mesenteric vein	
	R/L Gonadal artery (testicular or ovarian)		R/L Gonadal vein (testicular or ovarian)	
Pelvic cavity/ Leg	*(common/internal/external iliac arteries have different configuration in cats)*	——-	R/L Common iliac vein	
			R/L Internal iliac vein	
			R/L External iliac vein	
	R/L Femoral artery		R/L Femoral vein	
	——————-	——	R/L Great saphenous vein	

Quiz time!

Check in with your TA once you are feeling confident with the vessels. Identify any structures that they ask. Then get a stamp:

TA Check-in for W11 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:

Week 12 Lab Activity

Lymphatic system & Respiratory system

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 12 Lab Activity Points.

Lymphatic System

Question 1

Look at the lymph node model. Identify each structure. If applicable, state whether the structure would contain lymph or immune cells.

	Lymph node structure	Does it contain lymph or immune cells?
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Question 2

Name the type (region) of lymph nodes indicated on this model.

A: _____ B: _____

What is the path the lymph would take to get back from these nodes to venous circulation? List the major lymph and blood vessels involved:

Question 3

What are the two primary organs of the lymphatic system? What function(s) do they have that makes them primary lymphatic organs? Where are they located?

Primary organ	Lymphatic Function	Location

Respiratory System

Question 4

Look at the sagittally sectioned head. Identify the labeled structures.

1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

Question 5

Identify the structures on the larynx model.

1		5	
2		6	
3		7	
4			

Question 6

Identify the structures on the lung model. Make sure to include L/R if applicable.

1		6	
2		7	
3		8	
4		9	
5		10	

Which structures are only found on the right lung?

Which structures are only found on the left lung?

Question 7

Look at the alveolar tissue slide image. What is the tissue type indicated by #1? Why does it make sense that alveoli consist of this tissue? What would fill the open spaces in life?

Question 8

Look at the image of the trachea slide.

What tissue is #2? What is the function of #2 in the context of the overall structure (trachea)?

What tissue is #3? What is the function of #3 in the context of the overall structure (trachea)?

Respiratory Pathway

Question 9

Starting at the nostrils, list the structures that inspired air passes through or by until it first enters the right lung. Use the terms in the below wordbank.

Word bank

Larynx	Nasopharynx	R. primary bronchus	Laryngopharynx
Epiglottis	Vocal folds	Vestibular folds	Trachea
Oropharynx	Nasal cavity		

	Nostrils	6	
1		7	
2		8	
3		9	
4		10	
5			**R. lung**

Cat Respiratory and Lymphatic Dissection

We will continue to dissect the cats this week and find structures in the lymphatic and respiratory systems. Watch the **Week 12 dissection video** on canvas to guide your dissection.

Question 10

Identify all the structures listed below in your cat. Then try to find them in at least one other cat. Make sure you look at the triple-injected cat to see the lymphatic vessels in the abdomen.

Lymphatic structures in cat:	**X**	**Respiratory structures in cat:**	**X**
Thymus		Larynx	
Spleen		Thyroid cartilage	
Abdominal lymph node		Trachea	
		Carina	
In triple-injected cat:		R + L primary bronchus	
Cisterna chyli		R + L lung	
Lymph vessel (abdominal)		Visceral pleura	
		Parietal pleura	
		diaphragm	

Quiz time!

Check in with your TA once you are feeling confident with the dissection. Identify any structures that they ask. Then get a stamp:

TA Check-in for W12 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:

Week 13 Lab Activity

Endocrine and Digestive system

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 13 Lab Activity Points.

Endocrine system

Question 1

Identify the labeled endocrine structures on the models. Describe the location of these structures using anatomical terminology and your knowledge from previous weeks.

	Endocrine structure	Location in the body
1		Anterior and lateral cervical region, encircling the trachea
2		
3		
4		
5		
6		
7		
8		
9		

Question 2

Which endocrine organ did we also look at during the lymphatic system? Why is it only found in the infant human model and not in the adult models?

Question 3

Which endocrine organ serves as both an exocrine gland (for the digestive system) and an endocrine gland?

Question 4

Which endocrine structures did we find in the sheep brains? Pull out your sheep brain and find these structures again.

Digestive System

Question 5

Identify the structures labeled on the digestive system model.

1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

Question 6

Look at the image of the histology slide of the small intestine.

What type of cells are indicated by #1?

What are names of the structures labeled #2 and #3? What function do they aid the small intestine in doing?

Question 7

Identify the structures on the model of the digestive accessory organs in the abdomen. Then fill in the third column with one of the following descriptors (some will be used more than once):

- Secretes digestive enzymes as an exocrine gland and hormones as an endocrine gland
- Secretes bile
- Stores bile
- Pathway for digestive enzymes
- Pathway for bile
- Common entrance for bile and digestive enzymes into the duodenum

	structure	**descriptor**
1		
2		
3		
4		
5		
6		
7		
8		
9		

Question 8

Look at the teeth in the human skull. What are the four categories of human teeth and how many of each type are in a typical adult mouth? Can you identify them?

Tooth type	Number in adult mouth	Can identify on skull?

Question 9

Identify the salivary glands on the model. Take notes on how you will remember the name and location of each.

	Salivary gland	Notes on remembering name and location
1		
2		
3		

Question 10

Are salivary glands endocrine or exocrine? Why?

Digestive System Pathway

Question 11

Order the structures that food passes through in the digestive tract. Begin with food first entering the **mouth** and end with solid waste being passed out of the body through the **anus.**

Word Bank

ascending colon	cecum	descending colon	duodenum
esophagus	ileocecal valve	ileum	jejunum
lower esophageal sphincter	pharynx	pyloric sphincter	rectum
sigmoid colon	stomach	transverse colon	

	mouth	9	
1		10	
2		11	
3		12	
4		13	
5		14	
6		15	
7			**anus**
8			

Cat Dissection

This week we will find endocrine and digestive structures in the cat. Watch the **Week 13 dissection video** on canvas to guide your dissection.

Identify all the structures listed below in your cat. Then try to find them in at least one other cat.

Endocrine structures in cat:	**X**	**Digestive structures in cat:**	**X**
Thyroid gland		Parotid gland	
Thymus		Esophagus	
R/L adrenal glands		Stomach	
Pancreas (endocrine & digestive)		Gallbladder	
Testes or ovaries		Liver	
		Duodenum	
In sheep brains:		Jejunum (general location)	
Hypothalamus		Ileum	
Pituitary gland		Ileocecal junction	
Pineal gland		cecum	
		Ascending, transverse, descending, sigmoid colons (general locations)	
Bonus Digestive:		rectum	
Main pancreatic duct		Greater omentum	
Common bile duct		Mesentery	
Hepatopancreatic ampulla		Visceral peritoneum	
		Parietal peritoneum	

Quiz time!

Check in with your TA once you are feeling confident with the dissection. Identify any structures that they ask. Then get a stamp**:**

TA Check-in for W13 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:

Week 14 Lab Activity

Urinary and Reproductive system

Work with your group on filling out the following questions. Show your completed lab activity to your instructor before you leave your lab section to receive the Week 14 Lab Activity Points.

Urinary System

Question 1

List out the pathway of blood filtrate as it becomes urine. Start with the **afferent** arteriole and end with the **ureter.** Use the labeled nephron and kidney models to help you identify what each numbered structure is. The correct order of structures in the generation of urine will be out of sequence (for instance, the afferent arteriole will be the first entry, but is not numbered with a 1).

Structure name in correct order of pathway	Number on label

Female Reproductive system

Question 2

List out the pathway of an oocyte, starting with where it is formed in the **ovary** and ending at the **external vaginal orifice**. Use the labeled female reproductive system models to help you identify what each numbered structure is. The correct order of structures in the path of an oocyte will be out of sequence (for instance, the ovary will be the first entry, but is not numbered with a 1).

Structure name in correct order of pathway	Number on label

Question 3

Look at the model of the ovary. Identify the labeled structures.

1		4	
2		5	
3		6	

Male Reproductive System

Question 4

List out the pathway of a sperm cell, starting with where it is formed in the **testes** and ending at the **external vaginal orifice.** Include accessory structures it passes by. Use the labeled male reproductive models to help you identify each numbered structure. The correct order of structures will be out of sequence (for instance, the testes will be the first entry, but is not numbered with a 1).

Structure name in correct order of pathway	Number on label

Kidney Dissection

Question 5

You and your partner will look at a pig kidney that was coronally sectioned. Follow along with the dissection video to identify structures. Below is a list of what you should look for. Make a checkmark when you feel confident you can find each structure.

Kidney structures:	X	Kidney structures:	X
Renal capsule		Calyx (minor/major)	
Renal cortex		Renal pelvis	
Renal medulla			
Renal column		**Bonus:**	
Renal (medullary) pyramid		Renal artery vs. renal vein	
Renal papilla		Ureter	

Cat Dissection

This week we will finish the cat dissections by finding structures in the urinary and reproductive systems. Watch the **Week 14 dissection video** on canvas to guide your dissection.

Question 6

Identify all the structures listed below on your cat. Depending on whether your cat is male or female, you will need to look at least one other cat of the opposite sex to find everything on the list.

Urinary structures in cat:	**X**	**Male Reproductive structures:**	**X**
Kidneys (L/R)		Testis (L/R) (pl. testes)	
Ureters (L/R)		Epididymis (L/R)	
Urinary bladder		Spermatic cord (L/R)	
Urethra		Ductus deferens (L/R)	
		Testicular artery (L/R)	
Female Reproductive structures:		Penis	
Ovary (L/R)		Urethra	
Uterine tube (L/R)		External urethral orifice	
Uterus			
Vagina			

Quiz time!

Check in with your TA once you are feeling confident with the dissections. Identify any structures that they ask. Then get a stamp:

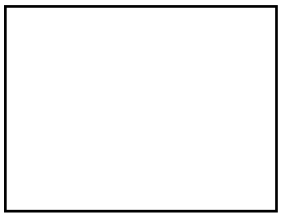
Question 7

If you have extra time this week, look at **"Terms that may be asked on the BIOL 255L practical"** list. Look through those terms and review by identifying relevant structures on the:

- Cat dissection
- Brain dissection
- Heart dissection
- Kidney dissection
- Human models
- Skeletons
- Microscope slides

TA Check-in for W14 Activity Points

After you have completed all questions in this assignment and cleaned your space, check in with your TA. Show them your completed activity and clean table and answer any questions they have. Then get a stamp:



Terms that may be asked on the BIOL 255L practical

There will be 80 1-point identification questions similar to weekly test questions. We will not ask any function questions.When you are prepared for the Lab Practical Exam you will be able to identify these structures:

Directional Terminology (use appropriately)			
Anterior	Posterior	Superior	Inferior
Medial	Lateral	Proximal	Distal

Cell structures			
Centriole	Cytoplasm	Golgi apparatus	Microvilli
Mitochondria	Nucleolus	Nucleus	Plasma membrane
Ribosomes	Rough endoplasmic reticulum	Smooth endoplasmic reticulum	

Stages of mitosis			
Prophase	Metaphase	Anaphase	Telophase

Skin structures			
Apocrine sweat gland	Arrector pili muscle	Dermis	Eccrine sweat gland
Epidermis	Hair root	Tactile corpuscle	Lamellated corpuscle
Sebaceous gland			

Tissue types			
Adipose CT	Areolar CT	Blood	Compact bone
Cardiac muscle	Elastic cartilage	Hyaline cartilage	Nervous tissue
Ciliated pseudostratified columnar epithelium	Simple columnar epithelium	Simple cuboidal epithelium	Simple squamous epithelium
Skeletal muscle	Smooth muscle	Stratified squamous epithelium	Transitional epithelium

Structures of long bones			
Articular cartilage	Compact bone	Diaphysis	Endosteum
Epiphysis	Metaphysis	Periosteum	Red bone marrow
Spongy bone	Yellow bone marrow		

Axial bones			
Ethmoid	Frontal	Lacrimal (R/L)	Mandible
Maxilla (R/L)	Nasal (R/L)	Occipital	Palatine (R/L)
Parietal (R/L)	Sphenoid	Temporal (R/L)	Zygomatic (R/L)
Hyoid	Sternum		

Appendicular Bones			
Calcaneus	Capitate	Clavicle (R/L)	Cuboid
Cuneiform (medial, intermediate, lateral)	Femur (R/L)	Fibula (R/L)	Hamate
Humerus (R/L)	Ilium (R/L)	Ischium (R/L)	Lunate
Navicular	Patella (R/L)	Pisiform	Pubis (R/L)
Radius (R/L)	Scaphoid	Scapula (R/L)	Talus
Tibia (R/L)	Trapezium	Trapezoid	Triquetrum
Ulna (R/L)			

Muscle Cell			
Endomysium	Myofibril	Sarcolemma	Sarcoplasmic reticulum
T tubule	Z disc		

Muscles and muscle groups			
Biceps brachii (R/L)	Biceps femoris* (R/L)	Deltoid (R/L)	Diaphragm
Extensor digitorum (R/L)	External oblique (R/L)	Flexor digitorum superficialis (R/L)	Gluteus maximus (R/L)
Gastrocnemius (R/L)	Gracilis (R/L)	Infraspinatus* (R/L)	Internal oblique (R/L)
Latissimus dorsi (R/L)	Masseter (R/L)	Orbicularis oculi (R/L)	Orbicularis oris
Pectoralis major (R/L)	Pectoralis minor (R/L)	Rectus abdominis (R/L)	Rectus femoris* (R/L)
Sartorius (R/L)	Semimembranosus* (R/L)	Semitendinosus* (R/L)	Sternocleidomastoid (R/L)
Soleus (R/L)	Subscapularis* (R/L)	Supraspinatus* (R/L)	Trapezius
Transversus abdominis (R/L)	Triceps brachii (R/L)	Vastus lateralis* (R/L)	Vastus medialis* (R/L)
***Identify which group these muscles belong to →**	Hamstring Group	Quadriceps Group	Rotator Cuff Group

Neuron structures			
Axon	Dendrites	Neurofibril node (Node of Ranvier)	Neurolemmocyte (Schwann cell, myelin sheath)

Parts of the Brain			
Frontal lobe of cerebrum	Parietal lobe of cerebrum	Occipital lobe of cerebrum	Temporal lobe of cerebrum
Cerebellum	Corpus callosum	Thalamus	Hypothalamus
Medulla oblongata	Pons	Dura mater	

Cranial Nerves			
Olfactory (CN I)	Optic (CN II)	Oculomotor (CN III)	Trochlear (CN IV)
Trigeminal (CN V)	Abducens (CN VI)	Facial (CN VII)	Vestibulocochlear (CN VIII)
Glossopharyngeal (CN IX)	Vagus (X)	Accessory (XI)	Hypoglossal (XII)

Ear Structures			
Auditory tube	Cochlea	External auditory meatus	Semicircular canals
Tympanic membrane	Malleus	Incus	Stapes

Eye Structures			
Cornea	Iris	Lacrimal gland	Lens
Optic disc	Pupil	Retina	Sclera
Superior rectus	Inferior rectus	Medial rectus	Lateral rectus
Superior oblique	Inferior oblique		

Blood cells			
Basophil	Eosinophil	Erythrocyte	Lymphocyte
Monocyte	Neutrophil	Platelet	

Heart			
Aortic semilunar valve	Bicuspid valve	Chordae tendineae	L/R atrium
L/R ventricle	Papillary muscle	Pulmonary semilunar valve	Tricuspid valve

Blood vessels			
Abdominal aorta	Arch of aorta	Brachiocephalic artery	Brachiocephalic vein (R/L)
Common carotid artery (R/L)	Common iliac artery/vein (R/L)	Coronary artery (R/L)	Coronary Sinus
External iliac artery/vein (R/L)	Internal jugular vein (R/L)	Femoral artery/vein (R/L)	Subclavian artery/vein (R/L)
Pulmonary artery (R/L)	Pulmonary trunk	Pulmonary veins (R/L)	Renal artery/vein (R/L)
Inferior vena cava	Superior vena cava		

Lymphatic System			
Cisterna chyli	Palatine tonsil	Pharyngeal tonsil	Spleen
Germinal center	Afferent lymphatic vessel	Efferent lymphatic vessel	Cortical sinus

Respiratory system			
Carina	Cricoid cartilage	Epiglottis	Hard palate
Laryngopharynx	Lung (R/L)	Nasopharynx	Oropharynx
Nasal concha (superior, middle, or inferior)	Primary (main) bronchus (R/L)	Soft palate	Thyroid cartilage
Trachea	Vestibular fold	Vocal fold	

Endocrine System			
Adrenal (suprarenal) gland	Parathyroid gland	Pineal gland	Pituitary gland
Thymus	Thyroid gland		

Digestive system			
Ascending colon	Cecum	Common bile duct	Cystic duct
Descending colon	Duodenum	Esophagus	Gallbladder
Ileum	Liver	Pancreas	Pancreatic duct
Parotid gland	Rectum	Sigmoid colon	Stomach
Transverse colon	Vermiform appendix		

Urinary system			
Kidney (R/L)	Renal cortex	Renal column	Renal papilla
Renal pelvis	Renal (medullary) pyramid	Afferent arteriole	Collecting duct
Distal convoluted tubule	Proximal convoluted tubule	Efferent arteriole	Loop of Henle (nephron loop)
Glomerulus	Ureter (R/L)	Urethra	Urinary bladder

Male Reproductive System			
Bulbourethral gland	Corpus cavernosum	Corpus spongiosum	Ductus (Vas) deferens
Ejaculatory duct	Epididymis	Glans penis	Prostate gland
Seminal vesicle	Testis		

Female Reproductive System			
Cervix	Clitoris	Fimbriae	Labia minora
Uterine (Fallopian) tube	Uterus	Vagina	Ovary
Primordial follicle	Secondary oocyte	Corpus luteum	Corpus albicans