What's Included?

Unit Planning

- State & NGSS Standards document
- Unit Pacing Guide for 50 min classes
- Vocabulary terms for prefix/suffix work
- Differentiation ideas for honors students and virtual students ***Digital links for virtual learning found here**
- Honors assignment list

Notes

- PowerPoints
  - Epithelial Tissues PPT (24 slides)
  - Connective Tissues PPT (26 slides)
  - Muscle & Nerve Tissues PPT (9 slides)
- Cornell Notes Pages
  - Epithelial Tissues (3 pgs)
  - Connective Tissues (2 pgs)
  - Muscle & Nerve Tissues (1 pg)
- Doodle Notes Pages
  - Epithelial Tissues (2 pgs)
  - Connective Tissues (2 pgs)
  - Muscle & Nerve Tissues (1 pg)
  - Guide to Using Doodle Notes
  - Doodle Note Keys & Examples

Activities

- Epithelial Tissues Modeling Activity (2 pgs)
- Histology Concept Map (4 pgs)
- Connective Tissues Histology Practice (16 slides)
- Answer Keys for all activities

Extensions

- Digging Deeper: Types of Membranes
- Digging Deeper: Tissue Repair & Scars*

*Honors Options

Student Pages

- This folder contains duplicate copies of every student page. They are in order according to the pacing guide for QUICK PHOTOCOPYING if you are using the pacing guide as is.

Review and Assessment

- Editable Task Card Review (16 cards) with answer sheet
- Histology Unit Test (paper)- both Honors and Regular versions with answer sheets

Unit Planning:

What's Included?

Note: This is a slightly smaller unit than the other body system units. It is meant to be an introduction as the concepts appear again in context throughout the rest of the course.

Included Resources by Folder:

Unit Planning
- State & NGSS Standards document
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Not included:

Supplementary Resources
- Ted-Ed video: How to Print 3D Tissues
- Video: See microscope slides of each epithelial tissue explained
- Victoria College: microscope slides of epithelial tissue
- Video: Exocrine v. Endocrine glands
- Connective Tissues Overview
- Connective Tissues Overview & Short Review Quiz
- Case Study on Marfan Syndrome (a connective tissue disorder)

Materials Needed
- Epithelial Tissues Modeling Project: clay or dough, blank paper
- Concept Map Activity: scissors, chalk markers (optional)

Unit Overview Page
plus
Supplementary Resource Ideas
and **Materials Lists**

NGSS and State Standards Document

If your state isn't listed, contact me by email (support@suburbanscience.com) and I'll help you figure out which ones are covered!

Histology Unit Guide

Standards:

Choosing Standards:
Although many states use NGSS, there are some states that do not. I worked hard to find other state standards, but if yours are not addressed, please send me an email at support@suburbanscience.com and I can help you determine which of your state standards are covered in this unit. Thank you!

NGSS for the Unit:
- HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Topic:	State:	Standards:
Types of Tissues	OH	**AP.LO.2** The human body is comprised of four types of tissues: epithelial, connective, muscle and nervous. This topic includes a broad overview of the structure, function and location of each tissue type. Tissues can be studied as an independent unit or as they are encountered within each organ system. Investigations are used to understand and explain types of tissues in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.
	CO	**Standard IV, Objectives 1 & 3** Identify the characteristics and functions of the four principle types of tissue. Compare and contrast exocrine and endocrine glands.
	GA	**SAP1** Obtain, evaluate, and communicate information to analyze anatomical structures of the human body.
	IN	**AP.2.1-2.2** Analyze how each hierarchical level of life contributes to complexity of anatomy and physiological functions. Investigate the relationships among various tissue types as well as the molecular and cellular composition of these tissues. Investigate and be able to describe the histological structural and functional characteristics of the four basic tissue types.
	UT	**Strand 4, Standards 1-2** Identify the general characteristics and functions of each of the four principle types of tissues: epithelial, connective, muscular, nervous. Contrast the following: Exocrine glands, endocrine glands.
	FL	**SC.912.L.14.11** Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
Types of Membranes	OH	None
	CO	**Standard IV, Objective 2** Differentiate between the four basic types of membranes.
	GA	None
	IN	None
	UT	**Strand 1, Standard 3** Differentiate between the four basic types of membranes.

*Note: NGSS is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards were involve in the production of this product, and do not endorse it.

Editable Pacing Guide

Histology Unit Pacing Guide

50 min classes

	Day	Intro	Instruct	Assess	Homework
Types of Tissues	1	Students add to prefix/suffix flashcards: • epithe-, hist-, -ology,	• Epithelial Tissues PPT (Section 1&2) • **Cornell Notes** (Simple Epithelium & Stratified Epithelium)	• Cornell Notes summaries • Informal discussion and questions	
	2	Review differences between simple and stratified epithelial tissues	• **Epithelial Tissues Modeling Project** Materials: multiple colors of clay or dough, blank paper	• Informal questioning during activity • Project graded by use of included rubric	
	3	Prefix/suffix flashcards: • endo-, exo-	• Epithelial Tissues PPT (Section 3) • **Cornell Notes** (Glandular Epithelium) • Examine differences between Exocrine gland slides & Endocrine gland slides on Histologyguide.org	• Cornell Notes summaries • Informal discussion and questions	
	4	Prefix/suffix flashcards: • adipo-, chondro-, cyte-, erythro-, osteo-, leuk-	• Connective Tissues PPT (Section 1 & 2) • **Cornell Notes** (Connective Tissue Proper & Cartilage, Bone, & Blood)	• Cornell Notes summaries • Informal discussion and questions	All: **Digging Deeper: Types of Membranes**
Types of Tissues & Types of Membranes	5	Review homework answers	• Connective Tissues Histology Practice Slides • Muscle & Nerve Tissues PPT (All) • **Cornell Notes** (Muscle & Nerve Tissues)	• Informal check of accuracy during practice slides • Cornell Notes summaries • Informal discussion and questions	Honors: **Digging Deeper: Tissue Repair and Scars**
	6	Honors: Review homework Regular: Review prefix and suffix flashcards	• **Histology Concept Map Activity** Materials: chalk markers (optional) • Early finishers can review prefix/suffix cards or begin studying for test	• Informal check of graphic organizer accuracy	
Review	7	Review prefix and suffix flashcards	• **Histology Task Cards**	• Class discussion of task card accuracy	
Assess	8	• **Study for Test**	• **Unit Test**	• Summative assessment through unit test	

Coincide with State Standards document in Unit Planning Folder

***Bold items** must be photocopied.

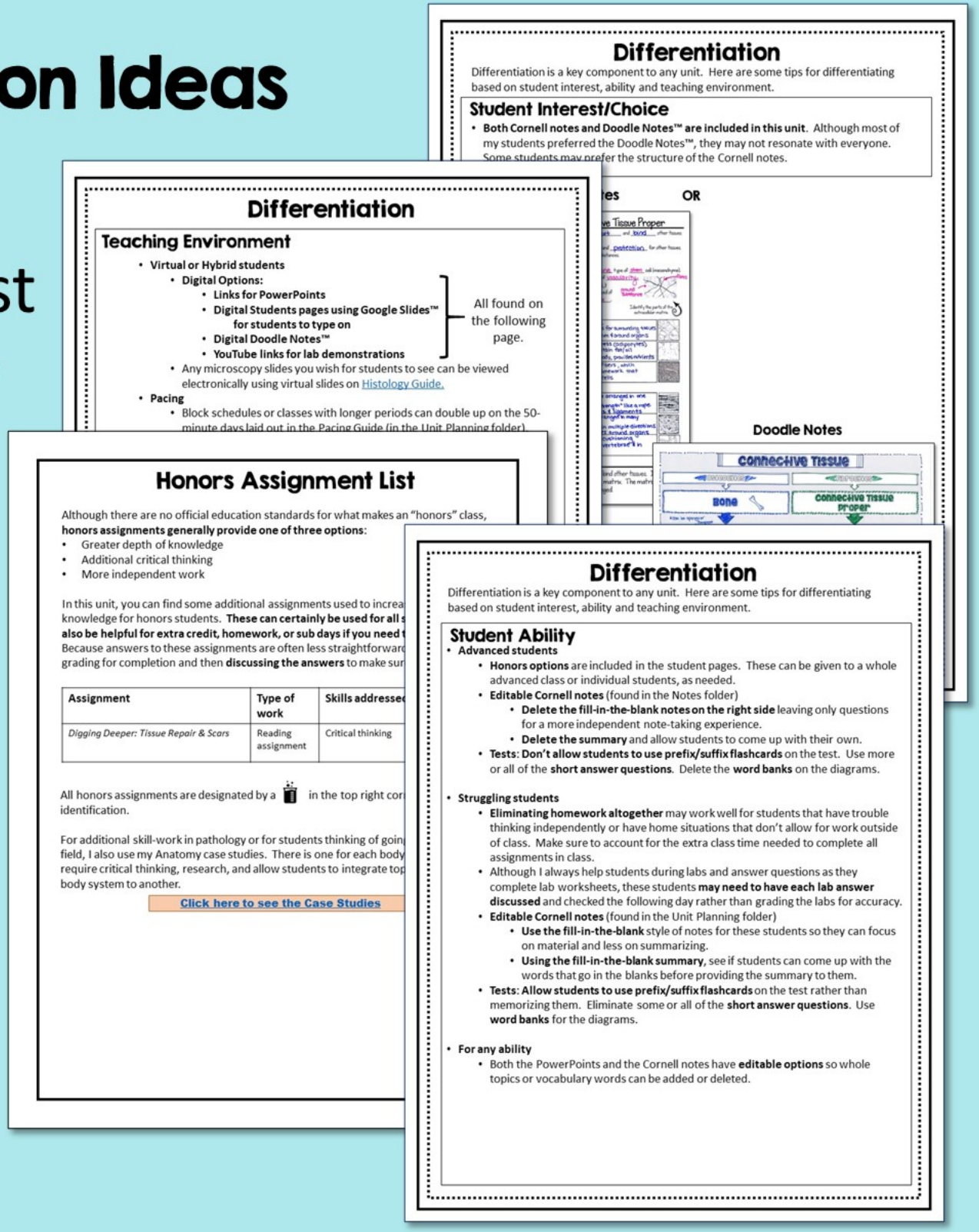
This icon is found on the top right corner of Honors pages for easy identification.

The daily topic coincides with the previous standards document.

Lesson planning is now quick and easy!

Differentiation Ideas for:

- Student Interest
- Student Ability
- Teaching Pace
- Teaching Environment (Virtual, in-class, or hybrid)



Differentiation

Differentiation is a key component to any unit. Here are some tips for differentiating based on student interest, ability and teaching environment.

Student Interest/Choice

- **Both Cornell notes and Doodle Notes™ are included in this unit**. Although most of my students preferred the Doodle Notes™, they may not resonate with everyone. Some students may prefer the structure of the Cornell notes.

OR

Doodle Notes

Differentiation

Teaching Environment

- **Virtual or Hybrid students**
  - **Digital Options:**
    - **Links for PowerPoints**
    - **Digital Students pages using Google Slides™ for students to type on**
    - **Digital Doodle Notes™**
    - **YouTube links for lab demonstrations**

    All found on the following page.
  - Any microscopy slides you wish for students to see can be viewed electronically using virtual slides on Histology Guide.
- **Pacing**
  - Block schedules or classes with longer periods can double up on the 50-minute days laid out in the Pacing Guide (in the Unit Planning folder).

Honors Assignment List

Although there are no official education standards for what makes an "honors" class, **honors assignments generally provide one of three options**:

- Greater depth of knowledge
- Additional critical thinking
- More independent work

In this unit, you can find some additional assignments used to increa knowledge for honors students. **These can certainly be used for all s also be helpful for extra credit, homework, or sub days if you need t** Because answers to these assignments are often less straightforwar grading for completion and then **discussing the answers** to make sur

Assignment	Type of work	Skills addresse
Digging Deeper: Tissue Repair & Scars	Reading assignment	Critical thinking

All honors assignments are designated by a in the top right cor identification.

For additional skill-work in pathology or for students thinking of goin field, I also use my Anatomy case studies. There is one for each body require critical thinking, research, and allow students to integrate top body system to another.

Click here to see the Case Studies

Differentiation

Differentiation is a key component to any unit. Here are some tips for differentiating based on student interest, ability and teaching environment.

Student Ability

- **Advanced students**
  - **Honors options** are included in the student pages. These can be given to a whole advanced class or individual students, as needed.
  - **Editable Cornell notes** (found in the Notes folder)
    - **Delete the fill-in-the-blank notes on the right side** leaving only questions for a more independent note-taking experience.
    - **Delete the summary** and allow students to come up with their own.
  - **Tests: Don't allow students to use prefix/suffix flashcards** on the test. Use more or all of the **short answer questions**. Delete the **word banks** on the diagrams.
- **Struggling students**
  - **Eliminating homework altogether** may work well for students that have trouble thinking independently or have home situations that don't allow for work outside of class. Make sure to account for the extra class time needed to complete all assignments in class.
  - Although I always help students during labs and answer questions as they complete lab worksheets, these students **may need to have each lab answer discussed** and checked the following day rather than grading the labs for accuracy.
  - **Editable Cornell notes** (found in the Unit Planning folder)
    - **Use the fill-in-the-blank** style of notes for these students so they can focus on material and less on summarizing.
    - **Using the fill-in-the-blank summary**, see if students can come up with the words that go in the blanks before providing the summary to them.
  - **Tests: Allow students to use prefix/suffix flashcards** on the test rather than memorizing them. Eliminate some or all of the **short answer questions**. Use **word banks** for the diagrams.
- **For any ability**
  - Both the PowerPoints and the Cornell notes have **editable options** so whole topics or vocabulary words can be added or deleted.

Every student page also comes in a digital version on Google Slides

Virtual, hybrid, or absent students can stay right on track!

Can be used in Google Classroom, Microsoft OneDrive or many other platforms!

Greek and Latin Roots for Medical Terminology Practice

Anatomical Prefixes/Roots/Suffixes:

	Term	Definitio
Histology Terms	hist-	tissue
	adipo-	fat
	chondro-	cartilage
	cyte-	cell
	endo-	within, inner
	epithe-	laid on, covering
	erythro-	red
	exo-	outer, outside
	leuk-	white
	osteo-	bone
	-ology	the study of

Using Prefixes/Suffixes in your Classroom:

Why study prefixes and suffixes at all?

The basis of scientific terminology comes from Latin & Greek. By teaching science students Latin & Greek prefixes, suffixes and root words, they can learn to dissect new scientific terms when they come across them in news articles or textbooks. This is a great way to train our students to be scientifically literate adults. Even if they don't remember all the facts they've memorized in this class, they can interpret scientific information from the media and from their own doctors.

How can you use them in class?

- **How I do it:**
  - **Beginning of the year:** I ask students to bring in a stack of 300 3"x5" index cards. I always have a few extra on hand for students that forget or can't afford them, although they're fairly inexpensive.
  - **Beginning of (almost) every class**: I write any prefixes and suffixes that are relevant to that day's topic on the board along with the definition. Students record the prefix/suffix on one side of an index card and the definition on the other. If there aren't any terms for that day, students can review the terms they already have written down.
  - **On test day:** I add approximately two scientific words to the end of every unit test. These are words that relate to the unit but are not ones we have discussed in class. Students must use the prefixes/suffixes we've studied to interpret the meaning of the new term. For on-level or advanced classes, I recommend not letting students use their index cards on the test, but for low-level students, it may be beneficial to allow it.

xes in your Classroom:

Helpful tips for using cards:

- **Always have a master list of the terms you've given out or keep your own set of notecards.** It may be helpful to have students write the date in the top corner of the card. This allows **absent students** to copy the terms they missed when they return.
- **Starting class with these terms is a great way to give yourself a few more minutes to get organized**. Students can always review their index cards or quiz each other if you need a few more minutes.
- **Students will need some way to keep the cards organized-** put them on a ring, rubber band them together, or keep them in a bag.
- **Students add to these index card stacks throughout the year without removing terms**. The course builds on itself, so it's always beneficial to review terms from previous units as well as the current unit. You may find that some terms are duplicated from one unit to another. **No need to have students write the same term twice.**
- For advanced students, you may want to have them **look up the definition in a textbook** rather than providing it to them.

e sure to mention these prefixes and suffixes again as they come p in class. **Using the terms in context** is the best way for students recognize and remember them.

prep sub plans:

udents can **type the terms into Quizlet** or a similar site and quiz emselves.

udents can **make up scientific terms (real or not)** and have other udents interpret the meaning of the term.

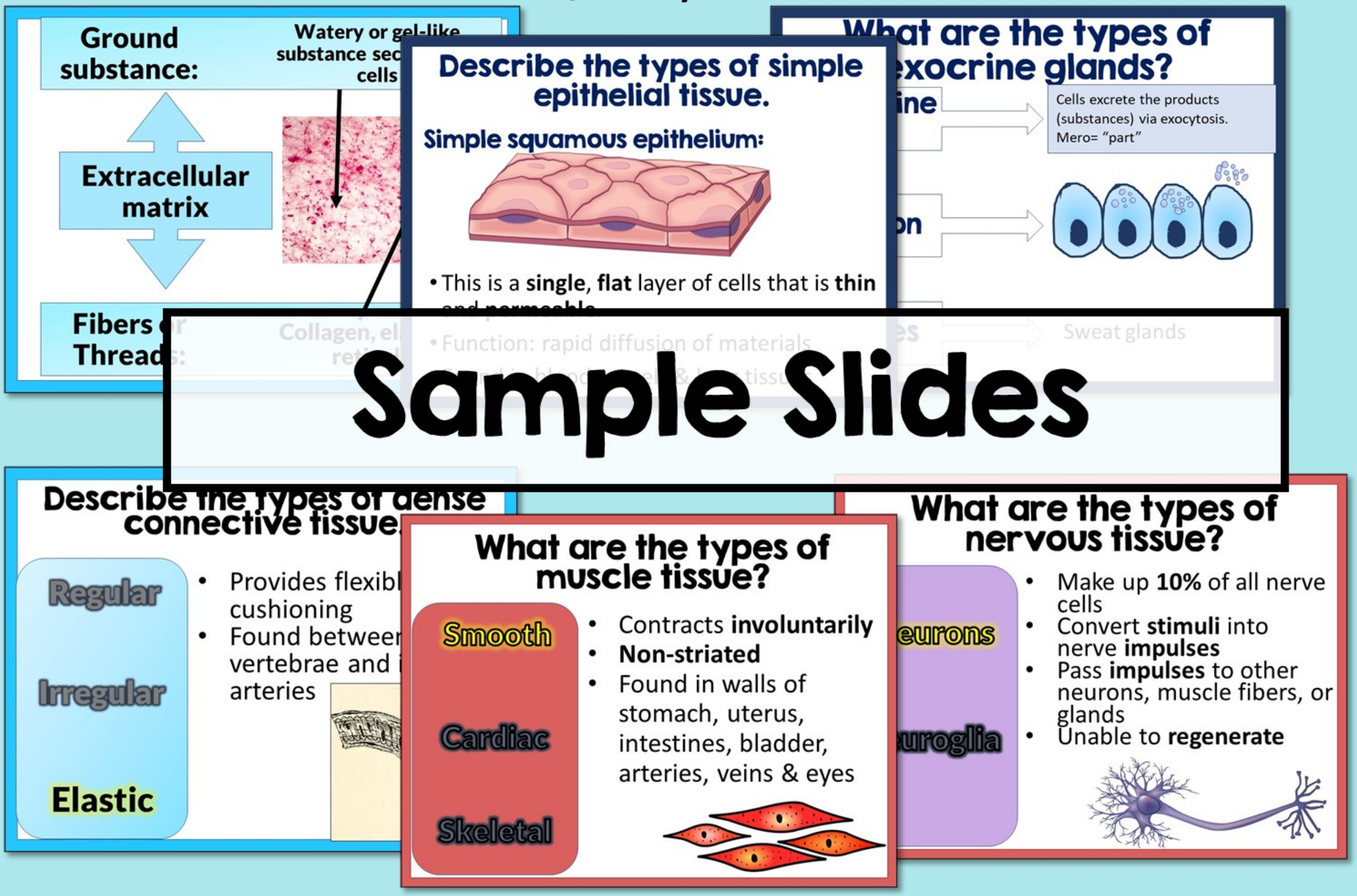
se a blank bingo board (provided on the next page) and have udents fill in the definitions for the current or past unit in any lank. The sub can call out a prefix or suffix and students mark off e definition until someone wins bingo.

*This is another important reason to have a master list or set of cards for all the terms students have already learned.

A great way to encourage scientific literacy and prepare students for higher level science courses.

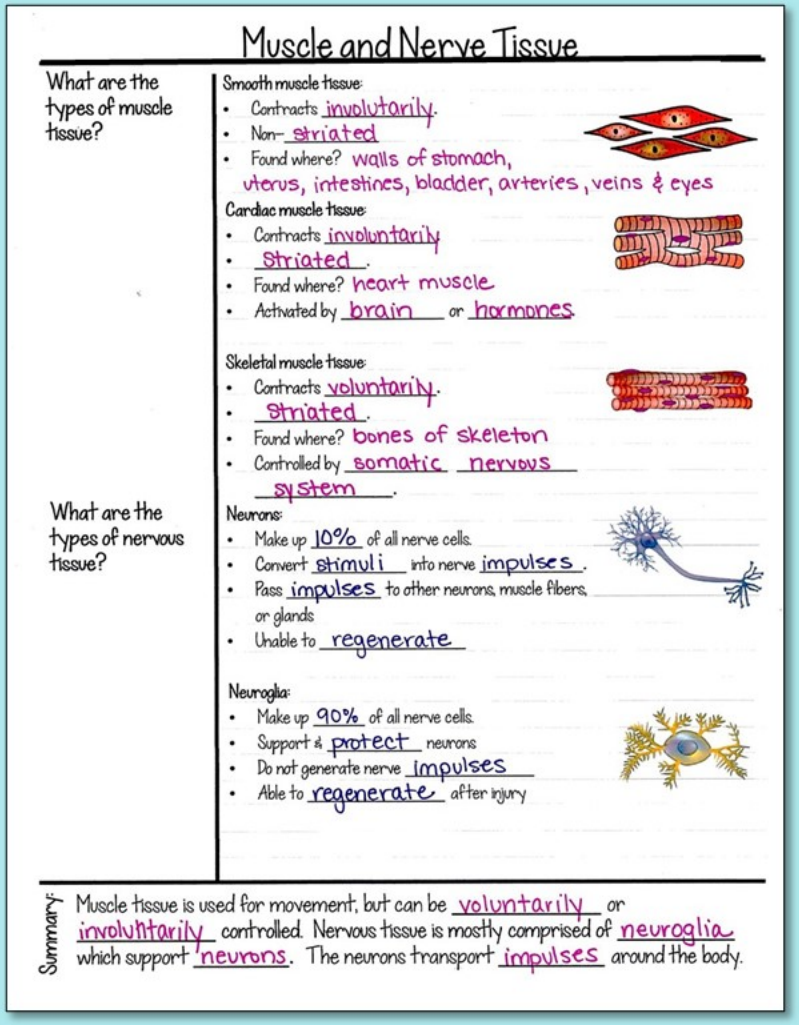
3 Highly Visual PowerPoint Presentations

59 **editable**, fully-animated slides



Two note-taking styles are included:

Cornell Notes



Muscle and Nerve Tissue

What are the types of muscle tissue?

Smooth muscle tissue:
- Contracts involutarily.
- Non- striated
- Found where? walls of stomach, uterus, intestines, bladder, arteries, veins & eyes

Cardiac muscle tissue:
- Contracts involuntarily
- Striated.
- Found where? heart muscle
- Activated by brain or hormones.

Skeletal muscle tissue:
- Contracts voluntarily.
- Striated.
- Found where? bones of skeleton
- Controlled by somatic nervous system.

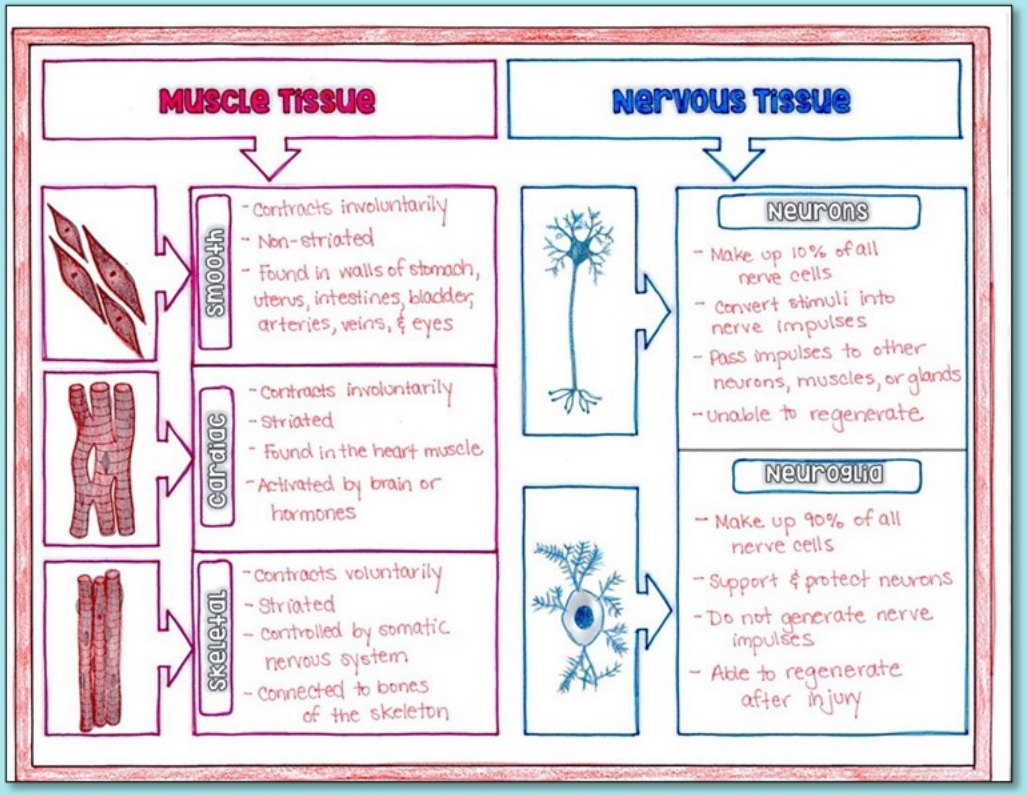
What are the types of nervous tissue?

Neurons:
- Make up 10% of all nerve cells.
- Convert stimuli into nerve impulses.
- Pass impulses to other neurons, muscle fibers, or glands
- Unable to regenerate

Neuroglia:
- Make up 90% of all nerve cells.
- Support & protect neurons
- Do not generate nerve impulses
- Able to regenerate after injury

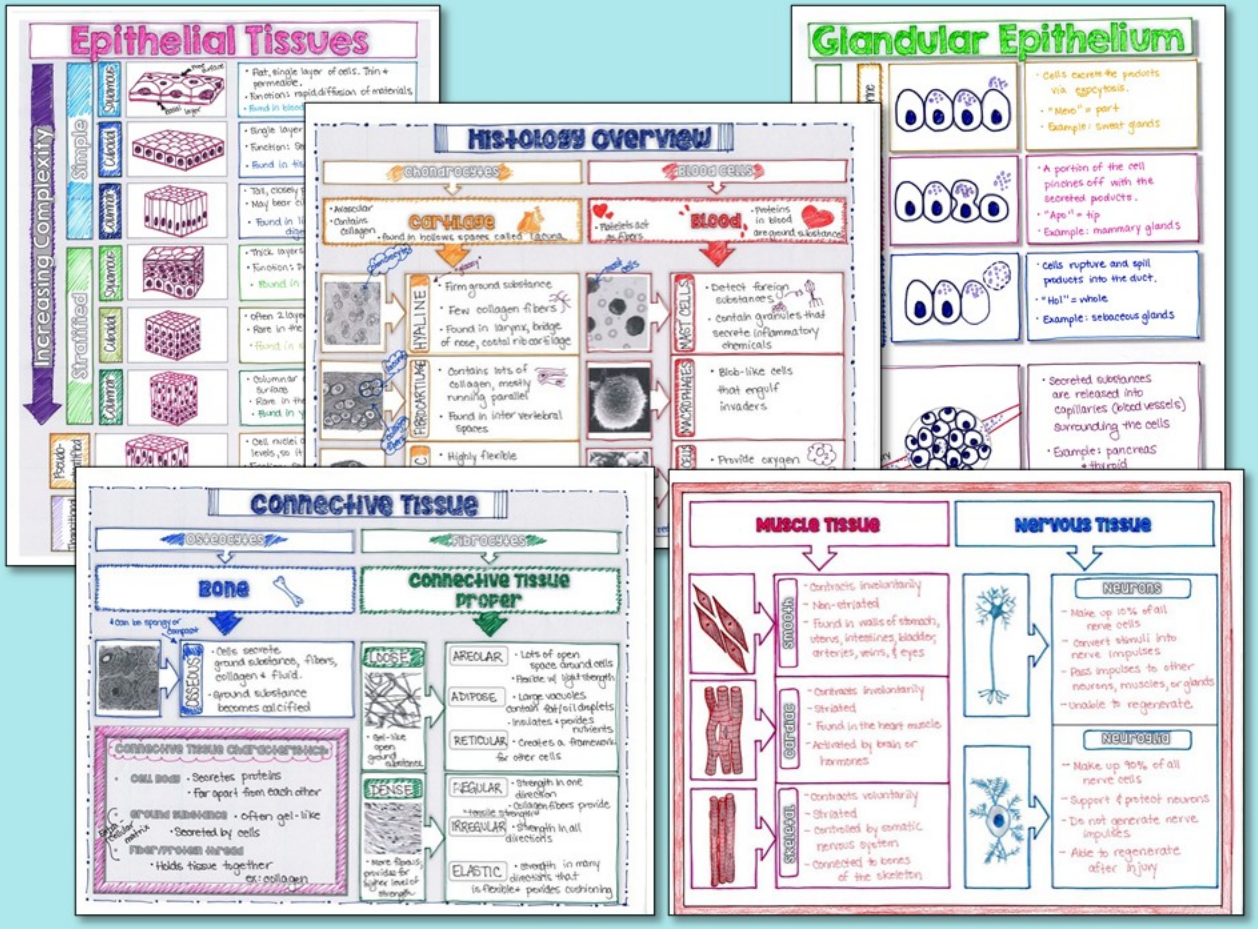
Summary: Muscle tissue is used for movement, but can be voluntarily or involuntarily controlled. Nervous tissue is mostly comprised of neuroglia which support neurons. The neurons transport impulses around the body.

Doodle Notes ™



Both coincide perfectly with the presentation for **error-proof notes**!

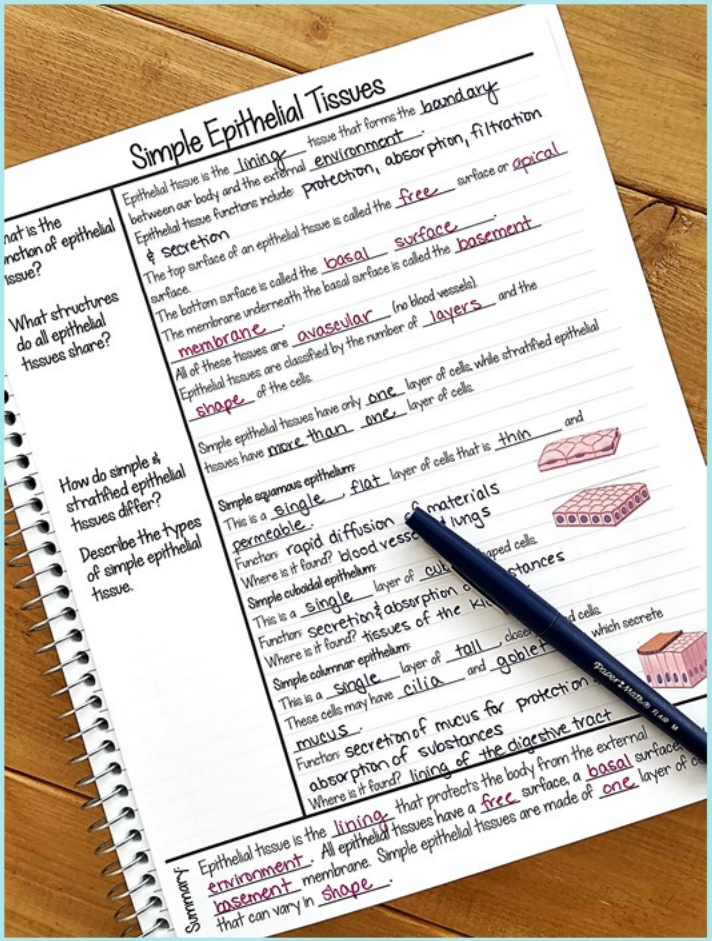
5 pages of Doodle Notes



Doodle Notes™ increase student focus and memory- and they're great fun!

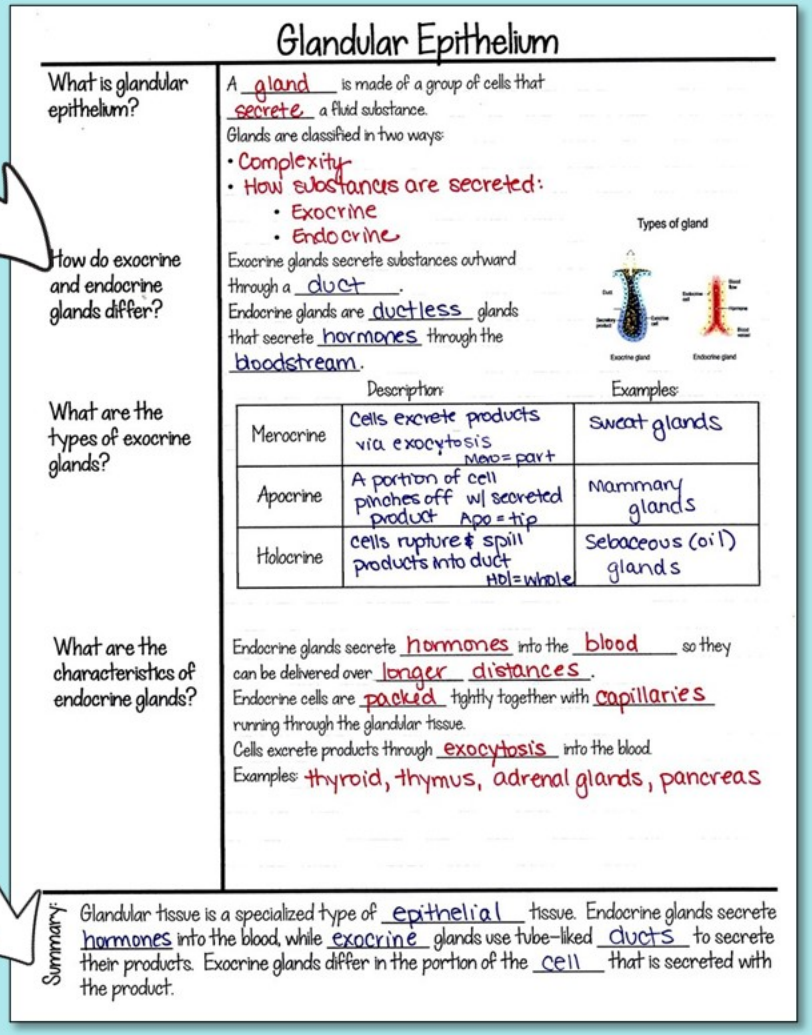
A guide for using them in your classroom is included.

7 pages of Cornell Notes



Big concept questions

Content summary for each page



Glandular Epithelium

What is glandular epithelium?

A gland is made of a group of cells that secrete a fluid substance.

Glands are classified in two ways:

- Complexity
- How substances are secreted:
  - Exocrine
  - Endocrine

How do exocrine and endocrine glands differ?

Exocrine glands secrete substances outward through a duct.

Endocrine glands are ductless glands that secrete hormones through the bloodstream.

Types of gland

Exocrine gland — Endocrine gland

What are the types of exocrine glands?

	Description:	Examples:
Merocrine	Cells excrete products via exocytosis Mero = part	Sweat glands
Apocrine	A portion of cell pinches off w/ secreted product Apo = tip	Mammary glands
Holocrine	cells rupture & spill products into duct Hol = whole	Sebaceous (oil) glands

What are the characteristics of endocrine glands?

Endocrine glands secrete hormones into the blood so they can be delivered over longer distances.

Endocrine cells are packed tightly together with capillaries running through the glandular tissue.

Cells excrete products through exocytosis into the blood.

Examples: thyroid, thymus, adrenal glands, pancreas

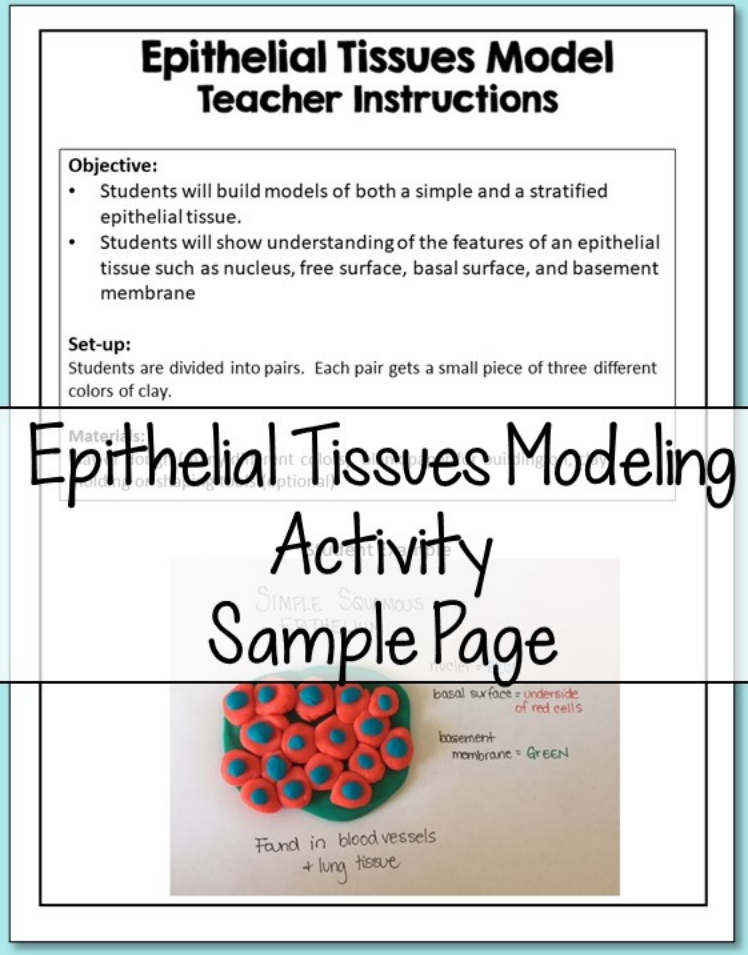
Summary: Glandular tissue is a specialized type of epithelial tissue. Endocrine glands secrete hormones into the blood, while exocrine glands use tube-liked ducts to secrete their products. Exocrine glands differ in the portion of the cell that is secreted with the product.

Each page is **editable**.

Add and delete text, questions, and summaries to meet the needs of your students.

Includes 3 Activities

- Epithelial Tissues Modeling Activity
- Histology Concept Map
- Connective Tissues Histology Practice

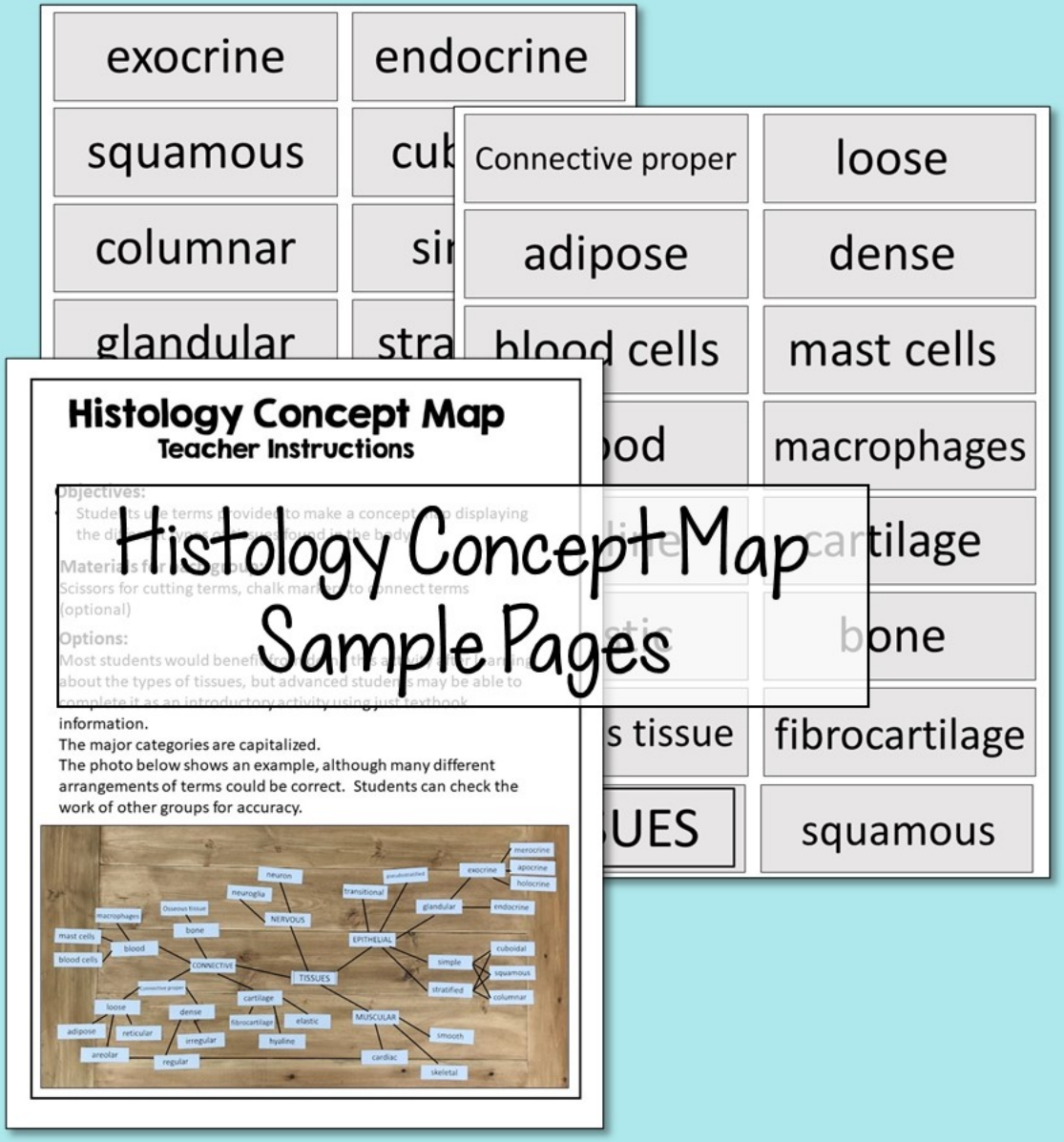


Epithelial Tissues Model
Teacher Instructions

Objective:
- Students will build models of both a simple and a stratified epithelial tissue.
- Students will show understanding of the features of an epithelial tissue such as nucleus, free surface, basal surface, and basement membrane

Set-up:
Students are divided into pairs. Each pair gets a small piece of three different colors of clay.

Epithelial Tissues Modeling Activity Sample Page



exocrine | endocrine
squamous | cub
columnar | si
glandular | stra

Connective proper | loose
adipose | dense
blood cells | mast cells
macrophages
tilage
bone
s tissue | fibrocartilage
UES | squamous

Histology Concept Map
Teacher Instructions

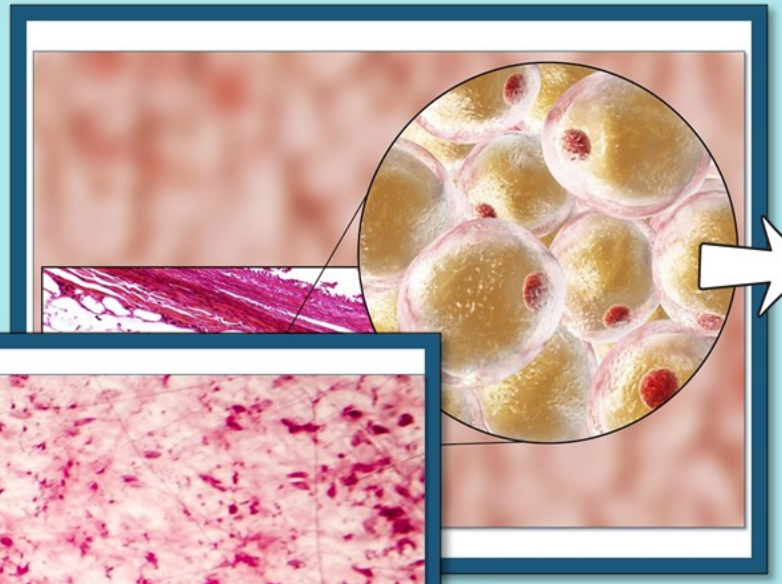
Objectives:
- Students use the terms provided to make a concept map displaying the di[illegible] found in the body.

Materials for [illegible]:
Scissors for cutting terms, chalk mark[illegible] to connect terms (optional)

Options:
Most students would benef[illegible] about the types of tissues, but advanced students may be able to complete it as an introductory activity using just textbook information.

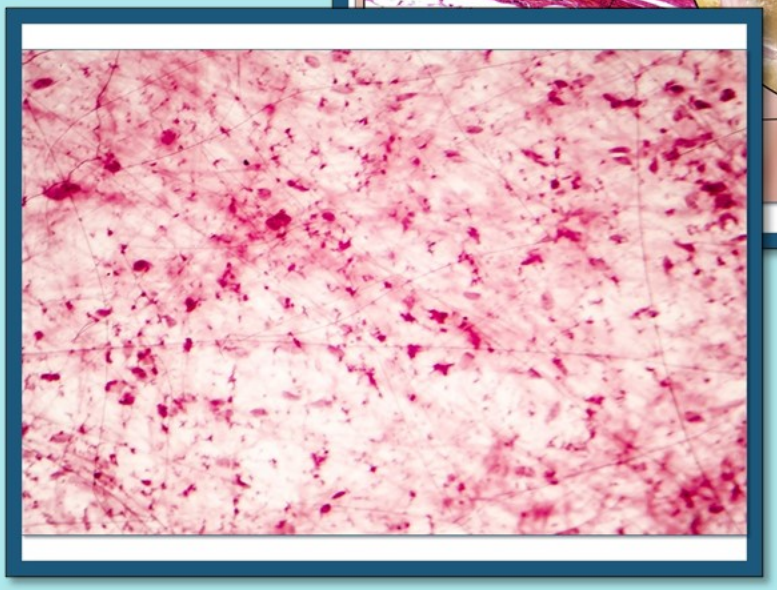
Histology Concept Map Sample Pages

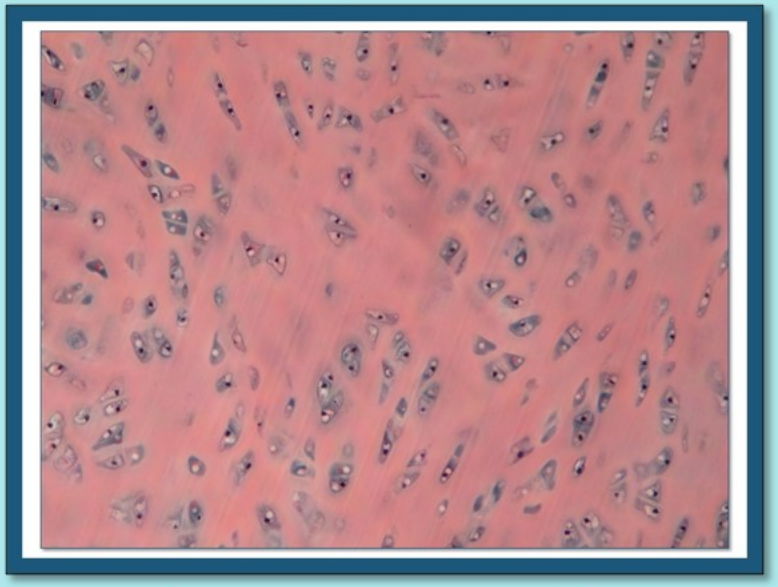
The major categories are capitalized.
The photo below shows an example, although many different arrangements of terms could be correct. Students can check the work of other groups for accuracy.



Type of tissue: Adipose

How do you know?
Large spaces full of oil





Connective Tissues Histology Practice Sample Slides

Students identify histological slides for several types of connective tissues.

Extension Pages

Digging Deeper: Types of Membranes

Body membranes form the boundary between the external environment and the cells of the body. They are more complex than tissues because they are usually formed from two types of tissues: epithelial tissue and connective tissue proper. These membranes can be generally dry like the cutaneous membranes of the skin, or moist like the mucous membranes of the respiratory system. The four types of membranes found in the body are described in the table below.

Type of Membrane	Location	Function
Cutaneous	skin	covers body surface
Mucous	body cavities that open to the outside environment	absorption and secretion
Serous	completely enclosed in a body cavity	prevents friction of organs during movement
Synovial	joints of the skeleton	prevents friction of bones during movement

Discussion Questions:

1. Based on the descriptions above, which type of membrane would the following structures likely be?
   a. Esophagus
   b. Lungs
   c. Pericardial membrane around heart
   d. Within the knee
2. What type of epithelial cells would you likely find on the surface of mucous membranes? Explain your answer.

Digging Deeper: Tissue Repair & Scars

Tissue repair is required any time skin or another organ is injured. The goal of tissue repair is to prevent further damage to the body and to restore tissue strength and function. The ability to fully restore the tissue is dependent on the type of tissue that has been damaged and the severity of the injury.

The process of tissue repair involves three major events: inflammation, proliferation, and regeneration.

1) Inflammation- blood vessels become more permeable, allowing immune cells to enter the wounded area and bringing clotting proteins to heal any broken blood vessels. (This will be discussed in more detail in the lymphatic system).
2) Proliferation- Granulation tissue begins to grow. This delicate pink tissue is filled with new capillaries and fibroblasts. These help to restore nutrients to the area and form the collagen fibers that eventually pull the wound closed.
3) Regeneration- The surface epithelium is restored. Depending on the severity of the wound, the scar will either be invisible or remain as a white line.

Because of its high concentration of fibrous material, scar tissue is strong but does not have the same function or flexibility as the original damaged tissue. Deep and ragged wounds are the most likely to have scar tissue [illegible]

Discussion Questions:

1. Why would immune cells be an important part of tissue repair?
2. Why might it be particularly harmful to have scar tissue in the heart?
3. A strange experiment can help to show the differences between scar tissue and normal skin tissue. If you were to throw flour on the man in the photo, the flour would stick to the man's chest everywhere but on his scar. Give a possible explanation for this.

Greater depth of knowledge, scientific literacy, & critical thinking

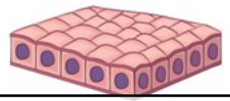
16 Editable Task Cards for Review

1

What are the four main types of tissues and what is the function of each?

2

Identify the following tissue. Explain why you chose this.



Sample Task Cards

11

How do merocrine glands differ from apocrine glands?

12

What two structures are found in the extracellular matrix of all connective tissues?

Using Editable Task Cards

How to set-up:

1. Print the cards on cardstock or paper.
2. Cut the pages so that each card is separate. If you'd like to use them in future years, it may be worth laminating them to protect them from student writing and other damage.
3. Place each task card at a seat around the room.
4. Students will rotate to each seat until all cards are finished. Answers are recorded on their "Task Card Answer Sheet" or notebook paper.

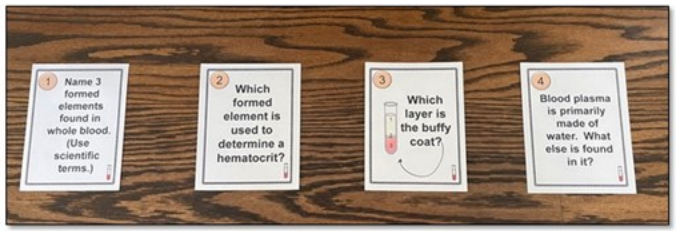
Teacher Tips

*TIP: It is important to [illegible] appropriate. Usually [illegible] Without a timer, students will get backed up while rotating and chaos will ensue. ☺

Modifications:

- These task cards are editable so you can change the text on any card.
- There are additional cards at the end of the document for adding questions. Be sure to add the correct number, as well!

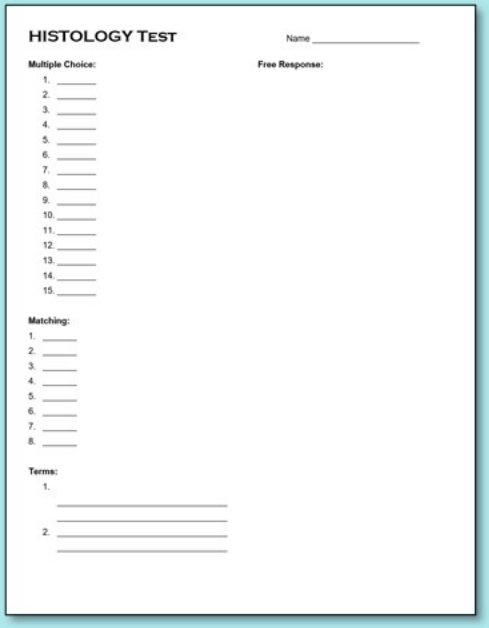
- If moving around your room isn't possible, you can have students pass the cards in one direction.
- Other options:
  - Students can use notes or not depending on the level of memorization you expect prior to reviewing.
  - Students can work in pairs, which adds confidence.



Editable Unit Test

- 15 multiple choice questions
- 8 matching questions
- 2 Greek/Latin term questions
- 5 free response questions

Two Versions: Honors & Regular



HISTOLOGY TEST

Name _____

Multiple Choice:

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

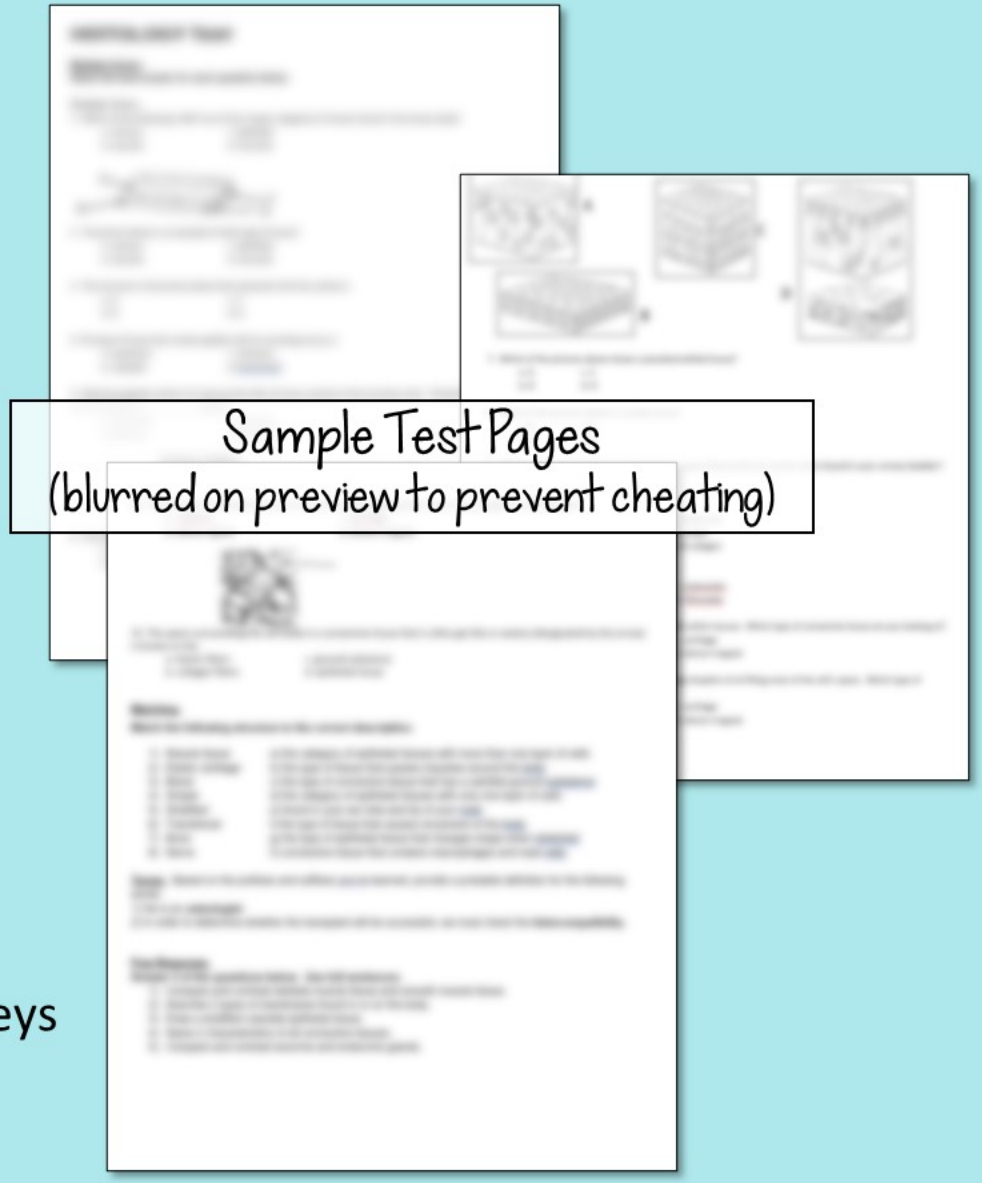
Free Response:

Matching:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Terms:

1. _____
2. _____



Sample Test Pages
(blurred on preview to prevent cheating)

Student answer sheet & answer keys included (both fully editable)

I'd love to hear from you!

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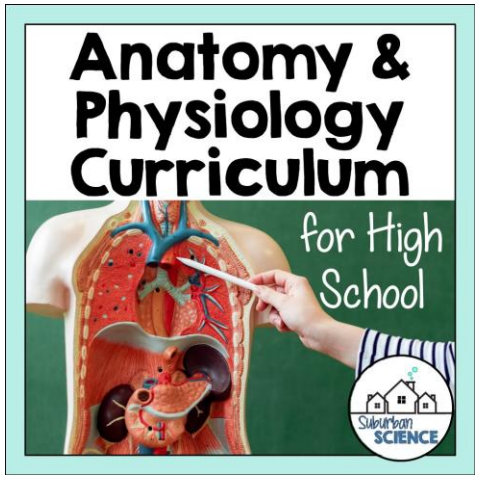

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I sincerely hope this resource will make your school year easier and more fun.

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You can also follow me on TpT or social media:

Sincerely,
Anne from Suburban Science