

UNIT 5

ABSORPTION

& EXCRETION

TEACHER NOTES

PREVIEW

DETAILS FOR HOW TO BEST IMPLEMENT
THIS CURRICULUM IN YOUR CLASSROOM

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Included by Folder:

1- Implementation

- Read First (this document) with **16** pages of teacher notes for how to implement this curriculum
 - Includes links to YouTube video lectures for each set of PowerPoint notes on **page 18**
- NGSS alignment overview
- Unit Plans for 50-minute and 90-minute (block) pacing + editable versions
- How to Write a Great Study Guide resource

2-Packets

- 33-page packet of all student handouts for the entire unit including:
 - Cornell note outlines, activities, labs, projects, and practice
- Packet answer key
- 4-page guide to accessing and using the paperless digital version of the packet through Google Drive™

3-Notes

- Concept 1 Notes: Digestive System – 15 slide ppt
- Concept 2 Notes: Nutrition and Metabolism – 15 slide ppt
- Concept 3 Notes: Urinary System – 13 slide ppt

****All ppts have editable text and are fully animated in presenter mode****

4-Activities

- Big Body Diagram – Digestive System
- Big Body Diagram – Urinary System
- 8 Digestive System Discovery Stations
- Fetal Pig Dissection – **3** page student handout and **6** implementation slides
- Inquiry Activity – Intro. to the Digestive System implementation slides
- 5 Kidney Lab Stations + editable version
- Gallery Walk Feedback sheet
- Research and Report implementation slides

5-Assessments

- Digestive System Quiz (14 questions)
- Unit 5 Test – Versions A and B (multiple choice rearranged)
 - 3 page test of multiple choice and open response + 3 page answer sheet
- Unit 5 Test HONORS – Versions A and B (multiple choice rearranged)
 - 3 page test of multiple choice and open response + 3 page answer sheet

All assessments come with an editable version and detailed answer key

Teacher Notes:

Overview:

This unit is designed to be everything you need to teach an absorption and excretion unit in a high school Human Anatomy and Physiology course. Content covered includes: the digestive system, nutrition and metabolism, and the urinary system. This product includes PowerPoint notes (with corresponding lecture videos), a packet of student handouts for all activities, labs, and projects, and summative assessments including 1 quiz and 1 unit test. The unit test is provided in both CP (college prep, or on-grade level) and Honors (advanced) versions. All other resources are designed to be used with both groups, with differentiation suggestions included, where applicable. The student packet also comes in a paperless digital version that can be used in Google Drive™ and/or Microsoft OneDrive™.

Packet instead of Interactive Notebook:

I started creating packets for my students over six years ago, and I love them so much more than interactive notebooks. While interactive notebooks are great resources that work for many teachers, I have found the packet strategy to be a more appropriate tool for using in the secondary classroom setting with my students. I love using the packet for many reasons:

1. I only have to make copies **one time** each unit instead of copying handouts every day. Even though it takes a while to copy the packets for each student, it saves so much time on a day to day basis. (Also I've often recruited seniors to be my "Teacher's Aide" and have trained them to copy all of my packets for me. I haven't seen a copier in YEARS and it's glorious!) You can also now go **DIGITAL** and **PAPERLESS** with the Google Drive™ version of the packet, if you prefer!
2. It puts responsibility back on the students to maintain their A&P binder with their packet, while also aiding them in practicing organization skills. It has been incredibly effective for my lower level students especially. Even though it is a lot of papers to receive at once, I can watch them put it in their binder and leave it there, rather than having to hang on to numerous individual papers passed out each day. It has really eliminated the need for a textbook too, so students really only have to remember to bring ONE thing to class – their binder with their packet!
3. It makes it so easy to be absent last minute. If you or your child gets sick, sub plans are a breeze. You don't have to send your teacher neighbor to make copies for you – because your students already have everything they need. You just have to tell the sub which pages the students need to work on for the day. It was especially helpful for my long-term substitute when I was on maternity leave!
4. The structure of the packet provides a more helpful method than interactive notebooks in preparing students for college – which should be one of our goals as high school teachers. The packet helps students learn how to structure notes (one of the reasons why I love teaching them how to write Cornell notes) and how to stay organized.
5. They are a time saver in so many ways – no more time wasted regularly passing out handouts or having to cut and paste things into a notebook.
6. Students do a better job keeping up with returned graded work because every page is numbered, so they can put graded assignments right back into the packet where it came from, setting them up to more likely refer back to graded work as they study.
7. You no longer need a filing cabinet – you can keep all of your curriculum and keys organized into easy to grab binders! See picture on **page 18**.

Teacher Notes:

In short...

The best statistical evidence I have in support of why I love the packet strategy so much is that I had a **96% pass rate** on my state's standardized End-of-Course Biology exam for non-Honors students and a **100% pass rate** for Honors students, using this same strategy in my Biology 1 course. This was at a South Carolina public school with over 50% of the students being below the poverty line. My average score on the EOC (all 200+ students combined that I taught during my time there) was a 90%. I believe this success is due to multiple factors, but I attribute a lot of it to the packet-based curriculum I have designed. Honestly, I could go on and on about the packet as an organizational resource and why I love it so much, but I think you will find that you feel the same if you choose to test it out!

Next Generation Science Standard Alignment:

When writing each of my A&P units, I tried to incorporate as many different states' A&P standards as possible, while most importantly keeping the content within the scope of the NGSS style. While NGSS doesn't have specific standards for Anatomy and Physiology, there are many DCI's, science & engineering practices, and crosscutting concepts that align with my A&P curriculum, such as:

- **HS-LS1-2:** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- **HS-LS1-6:** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

You can find more information about NGSS alignment in the **"NGSS Alignment"** document in the **Implementation folder**.

Prior Knowledge:

This is the fifth unit I teach in Anatomy and Physiology, so I would expect students to have prior knowledge on topics covered in my **Intro. to Anatomy unit** (including anatomical terminology, an introduction to histology, homeostasis and feedback mechanisms, and key topics reviewed from biology), **Support and Motion unit** (including skeletal system, movement, and muscular system), **Control and Coordination unit** (including nervous system, senses, and endocrine system), and my **Transport unit** (including blood, cardiovascular system, and respiratory system.) A&P is traditionally an upperclassmen science course, so I would expect all of my students using this curriculum to have previously taken a course in Biology **AND** a course in Chemistry. If that is NOT the case for your students, keep that in mind as you move forward with this unit (or any of my other A&P units!) as you may need to provide further support for them to be successful with the content.

When to use:

This is designed to be the fifth unit in an Anatomy and Physiology course. I believe the resources I have provided in this product are everything you need to teach an Absorption and Excretion unit. **However**, if you know that your students don't have the prior knowledge I've mentioned above, or if you teach through a section of this unit and realize your students want to go deeper or may need more support, you may need to make some additions for your students. Every class is different and some will need more support than others – and that is totally okay! You can easily add pages manually prior to copying the packet for your class.

Teacher Notes:

Assessment:

I did not include point values on any of the handouts in the packet in order to provide you the freedom to grade things how you so desire. On the next few pages I am going to provide you an overview of **my** grading strategy for you to reference. Feel free to adopt this or do entirely your own thing. It is completely up to you!

After much research and number crunching over the last few years, this is the simplest and most accurate grading technique that I have come up with. I divide my gradebook into two simple categories: **MAJOR** grades and **MINOR** grades. Within each category, different assessments are worth different amount of points based on length, depth, and complexity. Below I will give you an idea of what goes into each category.

Major Grades = 60% of the student's overall grade

- **Tests = 100 pts**
 - Unit 5 only has 1 test, which would count as a 100 pt major grade.
- **Quizzes = 25 pts**
 - This unit has 1 quiz (on the Digestive System) which would count as a 25 pt major grade.
- **Projects = 100 pts**
 - I like to do 1 project per quarter to give students an opportunity to show their understanding of the content in a non-traditional way. For this unit I would:
 - Count the Digestive System Children's Book Project as a 100 pt major grade

Minor Grades = 40% of the student's overall grade

- **Activities/Labs/Practice = 10-100 pts**
 - The amount of points I give students is **completely dependent** on the length and depth of the activity. I also do not grade many of the in-class assignments the students do, because there are so many of them! Instead, we would just go over them as a class. If I did want to assign a grade, I often just circle the class and do a spot check grade for completion before drawing names and going over as a class. For instance, in this unit, I would not collect and grade:
 - Discovery Stations: Digestive System and Big Body Diagram (*I would spot check for **40 pts** that they answered each question and labeled the diagram before going over!*)
 - Dissection: Fetal Pig (*You could spot check for a **25 pt** completion grade*)
 - Research and Report: Vitamins and Minerals
 - Lab Stations: Kidneys (*I would spot check that they completed each station for **25 pts total, 5 pts each**, before going over*)
 - In general, an activity that lasts only half of a 50-minute class period would usually only be worth about 25 pts. An activity that lasts a full class period or two is usually worth about 50 pts, and an activity that takes more than two class periods to complete would be worth 100 pts. For instance, in this unit I would collect and grade for accuracy:
 - Activity: Modeling the Digestive System for **25 pts**
 - Project: Digestive System Children's Book for **100 pts**, if not counted as a major grade like mentioned above
 - Webquest: From Food to Fuel for **25 pts**
 - Research Activity: The Science Behind Fad Diets for **50 pts**
 - Lab Activity: Urinalysis for **50 pts**

Teacher Notes:

Assessment (continued):

Minor Grades = 40% of the student's overall grade

- **Daily Quizzes/Bell Ringers = 5 pts per day**, usually totaling **25 pts for the week** (if there is one every day)
 - This is something I have fallen in love with doing, but not every teacher does which is why I do not include my daily quizzes/bell ringers with this product (if you would like to purchase for this unit, you can find them in my store. They are \$5 per unit or cheaper as a bundle.)
 - I call my bell ringers “Prime Times” because I believe that the first 5 minutes of class is the most important time of the day. I love that my students are in a routine and come in ready to work as soon as they get to my room because they know they will have a Prime Time.
 - If you would like to know more about how I implement these, again, check them out in my store! The gist is that students have 3-5 questions a day on the board when they come in. They use the same sheet of paper each day to write their answers on. I give them 5 minutes at the start of class to answer the questions, then they pass them over and I collect them and grade each day. They count for 5 pts a day. At the end of the week I add up the points based on how many we did and give them a score for the week.
 - **I grade these for accuracy but I allow students to use their notes.** This way I ensure students are writing good notes, keeping up when they are absent, and getting the basics of what we covered the day before. I also like it because I go over the answers as soon as I collect them so I know if the majority of students are getting what we did the day before so I can address issues before we move on to new material. It is my favorite way to check in with each student **DAILY** to know where they are with the material!!
- **Homework = Concept Study Guides = 10 pts each**
 - Anatomy and Physiology can be so much memorization, so the most important use of a student's time at home (*in my opinion*) is to be **studying**. However, most students don't know how to study! This is why I have students create their own study guides to practice this skill. Here is how I do this:
 - I divide each unit into 3-6 concepts (Note: This unit has 3 concepts.) Students make a study guide for each concept and turn them in at different points throughout the unit to be graded for 10 pts each. I return them **within a day** so they can have them to study for their unit tests.
 - For their study guide they must **answer all objectives** and **define all vocabulary** on the first two pages of the packet. They do not have to write anything for the *italicized objectives*, as those represent skills that would be hard to show mastery of on paper, however they do need to be able to do ALL of the objectives on the assessment.
 - All summative assessments provided in this product and future products are aligned with the objectives and vocabulary outlined on the front page(s) of each packet, making this an effective resource to base their study guides off of.
 - I do allow them some freedom in this. Some students like to type these, some hand write them. I also encourage students to make them as **visual** as possible. *They shouldn't write their study guides in paragraph form.* I encourage them to make Venn diagrams, tables, and other charts to make their study guides visually appealing – and something they would actually like to study from. I do not show them examples of how to do this, because I want them to find their own method that works best for them!
 - For instance, a lot of students make flashcards, flipcharts, or use Quizlet (an online flashcard making tool) for the vocabulary portion. This is great, but I do make them turn these in with their study guide so I can check them. For Quizlet, students just print them out and staple to the back of their objectives.
 - To provide guidance for students as they make their first study guide, see the “**How to Write a GREAT Study Guide**” document in the **Implementation** folder.
 - I find these especially useful because so much of this course builds upon itself, and I want to encourage my students to really learn material for the long-term, and not just cram it in the night before a test. If students make good study guides, they will be incredibly useful resources for them to reference throughout the year as they review for future tests. It will also be a valuable skill for them to have if they move on to higher education.

Teacher Notes:

Materials:

- Hole-punched copies of packet for each student to put in their binders (*or distributed digital paperless packets to students via Google Drive™ or Microsoft OneDrive™*) - can be found in the **Packets** folder
- Copies of the Big Body Diagrams (Digestive System and Urinary System) for students to put together (can be found in the **Activities** folder)
- Ability to project and use PowerPoints during lecture
- Access to technology for multiple activities where students will need to conduct research and scan QR codes
- Printed (and I prefer laminated so that they hold up each year – you won't regret it!!) copies of the following (can be found in the **Activities** folder):
 - Discovery Stations: Digestive System
 - 1 set = 8 stations
 - *I'd print and laminate just 2 sets unless you have big classes and want 3-4 of each*
 - Lab Stations: Kidneys
 - 1 set = 5 stations
 - *I'd have 2-3 copies of each station card for bigger classes so kids don't get bunched up*
- Materials needed for the Lab Stations:
 - Tech. devices for accessing the QR codes (smart phones, iPads or laptops work!)
 - (optional) Headphones (*I have students bring their own in when needed, but always like to have a few extra just in case*)
 - <https://www.amazon.com/AmazonBasics-Lightweight-On-Ear-Headphones-Black/dp/B07FXF7HXN>
- Materials needed for the Urinalysis Lab Activity:
 - Stopwatches
 - Supplies to make fake urine samples:
 - Water
 - Yellow and red food coloring
 - Apple juice
 - Lemon juice
 - Vinegar
 - Milk
 - Blood meal
 - Albumin
 - NaOH (optional)
 - Nitrites (optional)
 - Droppers
 - Urinalysis test strips
 - Can be found at a science supply store or on Amazon here:
https://www.amazon.com/s?k=urinalysis+test+strips&crd=W962LXP5EFRR&sprefix=urinalys%2Caps%2C186&ref=nb_sb_ss_i_1_8
 - Specimen containers (optional)
 - <https://www.amazon.com/Vakly-Sterile-Specimen-Individually-Bagged/dp/B072K31PGH?th=1>
- Large pieces of colored paper and markers (*or chalk*) for the Intro. to the Digestive System Inquiry Activity
- Chalk and meter sticks (*or tape, yarn, and index cards*) for the Digestive System Modeling Activity
- Poster board for making CER posters for the Fad Diet Research Activity
- Coloring utensils like markers or colored pencils for labeling diagrams
- Copies of quizzes and tests
- (optional) Fetal pigs, dissection tools, and safety equipment if you choose to incorporate the fetal pig dissection lab

Note: If you have access to any physical specimens, definitely feel free to incorporate them into any stations or add to the test as a lab practical! I just wrote this unit for teachers with minimal resources, so it can be taught without any physical samples!

Teacher Notes:

Implementation:

Over the next few pages I will be providing commentary for how to implement this unit, based on the **unit plans** included in the **Implementation** folder. Be sure to have a copy of the unit plan open or printed out as you read through this so it makes the most sense. For this unit, I use the same resources for both my CP (on grade level) and Honors students, and just have lower expectations for the assessments for my lower level classes. Feel free to use the editable cover pages in the **Packets** folder to differentiate your expectations for your students even more. For general implementation, I give CP students a lot more support and guidance as I teach them, and the honors students are expected to work more independently. If there are any other differences between implementation for both levels, I will include those in the notes. Also, check out the **NGSS Alignment Overview** document in this folder for tips on how to teach through this unit using NGSS phenomena.

Please use the unit plans and these notes as a **guideline** for your class. Teaching and plans have to be flexible and be able to be adjusted based on student needs. This unit is written to take anywhere from 18-21 days (depending on if you do the fetal pig dissection and if you have them do the Digestive System Children's Book Project at home or in class), but you can cut out some of the activities, have them do the project at home, or use the YouTube lecture videos (links on **page 18**) to do a flipped classroom style if you need to squeeze it into a shorter period of time. Editable versions of unit plans are provided for that exact reason!

Note: All implementation notes are based off a 50-minute class period. A 90-minute block unit plan is provided in the **Implementation** folder for reference.

- Day 1: I like to start with the Intro. to the Digestive System Inquiry Activity. Implementation slides can be found in the **Activities** folder. I divide my students into groups of 3-4, depending on your class size. Collect all phones, if you don't already, so that students are working completely off their combined prior knowledge and nothing else! Supply them with either (A) Large pieces of paper, like the kind you can get from the art teacher, and markers (MY PREFERRED OPTION), or (B) Chalk and the ability to go outside. They will have to trace someone in their group on their paper or the ground and then label and draw where they believe the organs of the digestive system go. I then have them come up with how they think digestion works as a group by summarizing how pancakes become poop. They can write this on an index card if working outside or on the side of their large paper if doing the inside option (I prefer the inside option for this activity so we can hang them around the room after and then go back and see how accurate they were as we actually learn about the system!) If doing the outside option you will need to take pictures of each one in case it rains between now and when you go over. I don't like to discuss these or go over them until we are going over the Discovery Stations for the Digestive System on day 4. When going over you can even have students go up with a ruler and see if they got the proportions/scale right for an adult. Below is a list of the average sizes of each organ for reference. If time, start lecturing through Concept 1 Notes. Make sure to check out the "notes" section of the PowerPoint slides for fun facts and video clips to break up the lecture.
 - **Pharynx:** anywhere from 12-14 cm long
 - **Esophagus:** anywhere from 25--33 cm long, about 2 cm in diameter
 - **Stomach:** about 30.5 cm long (about 12 in.) and 6 in. wide (some say the size of a fist, but it is very stretchy so it can get much bigger!)
 - **Small intestine:** 6 m long (20 ft)
 - **Large intestine:** 1.5 m long (5 ft)
 - **Gallbladder:** 7-10 cm (3-4 in.) long and 4 cm in diameter if full
 - **Liver:** about 14 cm (heavy too! About 3 lbs!)
 - It varies by age how big it is: <https://www.healthline.com/health/normal-liver-size#liver-size-by-age>
 - **Pancreas:** 15 cm (6 in.)

Teacher Notes:

- Day 2: Before class begins, set up the Discovery Stations: Digestive System from the **Activities** folder all around the classroom. I print these full page, in color, and laminate them so they last every year. Lecture through Concept 1 Notes to introduce the Digestive System (slides 1-8 only!) I like to go over each of the steps in the digestion process prior to going through each structure in the Discovery Stations so that students have some background knowledge before they dive in to how each structure contributes to accomplishing the overall goal. After the first part of the notes, pass out copies of the Big Body Diagram: Digestive System in the **Activities** folder to each student and have them assemble them (see instructions below.) Then they can start reading and working through the 8 different Discovery Stations, in any order.
 - **How to assemble the Big Body Diagrams:**
 - When printing, make sure to select "Fit".
 - Have students cut along the dotted line on the left page.
 - Line up the pages and tape the left page over the right page. I put a little piece of tape on the top and bottom of the front, then flip over and add more tape on the back for reinforcement.
 - Students can hole punch the left side and then fold the right side in to store in their binders (see pictures on **pages 16-17**)
- Day 3: I give the students the entire class to work through the Discovery Stations for the Digestive System and color and label their BBD! I let students work in pairs or on their own, if they prefer!
- Day 4: Finish Discovery Stations and labeling the BBD (as needed) and go over. I refer back to the Intro. to the Digestive System Inquiry Activity from Day 1 at this time as well! I draw popsicle sticks and go over after (see side note below). Then finish lecturing through Concept 1 notes (slides 9-15). If you have access to microscopes and slides, you can pre-set some tissue samples around the room for students to look at when discussing the histology of the GI tract.
 - Side note: I LOVE using popsicle sticks to go over things as a class when calling on students. At the beginning of the year, I write each student's name on a stick and I keep a plastic bag (or cup) of sticks for each class. I try to make sure I use this bag to call on every student at least once a class period. I also use this any time I need to make pairs or lab groups so that students know it is completely random!!
 - You will notice in the Discovery Stations that I introduced some GI related diseases/health issues throughout each station since I didn't include a specific research project or assignment related to them in this unit (trying to switch it up for those of you who are using the full year curriculum since every other unit so far has had some sort of disease-related project!) If you find your students are really interested in any/all of these health issues, you can expand more on them as you go over the stations if you want! You can use the "Research and Report" method (described on Day 11 in Concept 2) and come up with a list of topics your students want to know more about, and then divide them into groups and assign them topics to research. Give them 15 minutes to research and then come back as a class and report their findings! It is a great way to cover a broad list of topics in a short amount of time, plus put the responsibility back on the students to acquire and communicate information, rather than relying on you to deliver all of the content to them!
- Day 5: Divide students into groups of 2-3 to do the Digestive System Modeling Activity. Details can be found on the next page. If time allows, let them work on their Concept 1 study guide. Instructions for how I have students do these can be found on **page 6** of this document and a helpful tool for students called "How to write a GREAT study guide" can be found in the **Implementation** folder.

PREVIEW

More Teacher Notes in actual product

Course: Human Anatomy and Physiology

Unit 5 Absorption and Excretion

Learning Objectives

Student will be able to...

- Describe the overall function of the digestive system and how it works alongside at least three other body systems to accomplish this function.
- Explain why macromolecules must be broken down by the digestive system and what the end products are used for.
- List the steps of the digestive process and the structures in which each step occurs.
- Differentiate between mechanical and chemical digestion.
- Explain the significance of absorption and how the structure of the small intestine (specifically its histology) helps it accomplish this function.
- Describe the significance of the gallbladder, liver, and pancreas to the digestive system.
- Distinguish between the enzymes that accomplish the digestion of each macromolecule, and where the digestive process starts in the GI tract for each.
- Explain the role of the sphincters and valves in the digestive system, including at least two specific examples.
- Summarize the role of the hepatic portal system of the liver and how it interconnects the digestive and cardiovascular systems.
- Describe the relationship between the gallbladder and the liver.
- Differentiate between the structures and functions of the exocrine and endocrine components of the pancreas.
- Sketch and label a picture of the three subdivisions of the small intestine AND the three major sections of the large intestine and briefly describe the unique roles of each.
- Summarize the role bacteria in the colon play in the digestive process.
- Summarize how the digestive process is regulated, including examples of stimuli and the key structures where regulation occurs.
- Describe three examples of health issues/diseases that result from a failure to maintain homeostasis in the digestive system.
- Be able to identify the name and summarize the function of a structure of the digestive system when given a description, picture or physical specimen for reference.
- Summarize the role of each of the essential nutrients in the body.
- Explain where we get carbohydrates, lipids, and proteins from in our diet and how they get digested in the body, including essential enzymes and locations of the breakdown process.
- Differentiate between water-soluble and fat-soluble vitamins.
- Describe the connection between digestion and the maintenance of homeostatic body temperature.
- Summarize the three stages of processing food for energy, including where each occurs.

The following assessments will provide evidence of student learning:

Classwork/Labs:

- Discovery Stations: Digestive System - labeling the Big Body Diagram
- Activity: Modeling the Digestive System
- Project: Digestive System Children's Book
- Webquest: From Food to Fuel
- Research and Report: Vitamins and Minerals
- Research Activity: The Science Behind Fad Diets
- Big Body Diagram: Urinary System
- Lab Stations: Kidneys
- Lab Activity: Urinalysis
- Dissection: Fetal Pig

Homework:

- Concepts 1-3 Study Guides

Quizzes/Tests:

- Concept 1 Digestive System Quiz
- Unit 5 Test: Concepts 1-5

Next Generation Science Standards by NSTA:

HS-LS1-2
HS-LS1-6

See "NGSS Alignment" document for further detail.

Unit Plans (+ EDITABLE VERSIONS)

Includes 50-MINUTE and 90-MINUTE pacing

Day	Learning Objectives	Methods/Activities	Assessments	Homework	Standards
1	Digestive System	-Inquiry Activity: Intro. to the Digestive System -(if time) Start Concept 1 Notes p.7-8 (slides 1-7)	-Informal questioning and discussion		HS-LS1-2
2	Digestive System	-Concept 1 Notes p.7-8 (slides 1-8) -Assemble Big Body Diagram: Digestive System -Start Discovery Stations: Digestive System p.3-6 and labeling the BBD	-Informal questioning and discussion		HS-LS1-2 HS-LS1-6
3	Digestive System	-Discovery Stations: Digestive System p.3-6 and labeling the BBD	-Informal questioning and discussion		HS-LS1-2 HS-LS1-6
4	Digestive System	-Finish Discovery Stations: Digestive System p.3-6 and labeling the BBD (as needed) then go over -Finish Concept 1 Notes p.9-10 (slides 9-15)	-Informal questioning and discussion -BBD and Discovery Stations p.3-6		HS-LS1-2 HS-LS1-6
5	Digestive System	-Activity: Modeling the Digestive System p.11 -Work on Concept 1 study guide, if time	-Digestive System Modeling Activity p.11	-Concept 1 study guide -Study for Digestive System Quiz	HS-LS1-2
6	Digestive System	-Collect Concept 1 study guide -Digestive System Quiz (over Concept 1) -Introduce Project: Digestive System Children's Book p.12-13 (go over and let students begin working on it and planning out their pages)	-Concept 1 SQ -Digestive System Quiz		HS-LS1-2
7	Digestive System	-Go over quizzes -Work on Children's Book Project p.12-13	-Informal questioning and discussion		HS-LS1-2
8	Digestive System	-Work on Children's Book Project p.12-13	-Informal questioning and discussion	-Finish anything needed for project	HS-LS1-2
9	Digestive System Nutrition and Metabolism	-Children's Book Project p.12-13 presentations -Start Webquest: From Food to Fuel p.14-17	-Children's Book Project p.12-13 -Informal questioning and discussion		HS-LS1-2 HS-LS1-6
10	Nutrition and Metabolism	-Finish and go over Webquest: From Food to Fuel p.14-17 -Start Concept 2 Notes p.18-19 (slides 1-8)	-Webquest p.14-17 -Informal questioning and discussion		HS-LS1-2 HS-LS1-6

33-page Packet with all student handouts for the entire unit.

Unit Topic: Absorption and Excretion

Essential Question: How does the body effectively and efficiently absorb nutrients and excrete waste from the food we eat in order to acquire necessary substances for maintaining homeostasis?

Concept 1: The Digestive System

Objectives:

- Describe the overall function of the digestive system and how it works alongside at least three other body systems to accomplish this function.
- Explain why macromolecules must be broken down by the digestive system and what the end products are used for.
- List the steps of the digestive process and the structures in which each step occurs.
- Differentiate between mechanical and chemical digestion.
- Explain the significance of absorption and how the structure of the small intestine (specifically its histology) helps it accomplish this function.
- Describe the significance of the gallbladder, liver, and pancreas to the digestive system.
- Distinguish between the enzymes that accomplish the digestion of each macromolecule, and where the digestive process starts in the GI tract for each.
- Explain the role of the sphincters and valves in the digestive system, including at least two specific examples.
- Summarize the role of the hepatic portal system of the liver and how it interconnects the digestive and cardiovascular systems.
- Describe the relationship between the gallbladder and the liver.
- Differentiate between the structures and functions of the exocrine and endocrine components of the pancreas.
- Sketch and label a picture of the three subdivisions of the small intestine AND the three major sections of the large intestine and briefly describe the unique roles of each.
- Summarize the role bacteria in the colon play in the digestive process.
- Summarize how the digestive process is regulated, including examples of stimuli and the key structures where regulation occurs.
- Describe three examples of health issues/diseases that result from a failure to maintain homeostasis in the digestive system.
- Be able to identify the name and summarize the function of a structure of the digestive system when given a description, picture or physical specimen to reference.

Vocabulary:

Alimentary canal
Ingestion
Propulsion
Bolus
Peristalsis
Salivary glands
Epiglottis
Gastric secretory glands
Chyme
Bile
Bile duct
Segmentation
Mesentery
Enteric nervous system

Concept 2: Nutrition and Metabolism

Objectives:

- Summarize the role of each of the essential nutrients in the body.
- Explain where we get carbohydrates, lipids, and proteins from in our diet and how they get digested in the body, including essential enzymes and locations of the breakdown process.

Vocabulary:

Nutrients
Calories
Vitamins
Minerals
Metabolism

Absorption and Excretion Unit

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1

Concept 3: The Urinary System

Objectives:

- Describe the major functions of the urinary system and how it works alongside at least three other body systems to accomplish these functions.
- Defend the claim that the kidneys are the most critical organ in the urinary system.
- Differentiate between the roles of the renal arteries and renal veins in the kidney.
- Explain the importance of nephrons.
- Summarize the process of how nephrons filter blood in order to make urine, including where each step occurs.
- Summarize the methods used to regulate kidney filtration.
- Describe the roles of the ureters, bladder, and urethra in the urinary system.
- Describe at least three indicators in a urinalysis test and what they can tell you about a patient's condition.
- Be able to identify the structural components of a nephron when given a description, picture or physical specimen to reference.
- Be able to identify the major regions and blood vessels of the kidneys when given a description, picture or physical specimen to reference.
- Be able to identify the name and summarize the function of a structure of the urinary system when given a description, picture or physical specimen to reference.

Vocabulary:

Urination
Renal cortex
Renal medulla
Renal pelvis
Fibrous capsule
Renal corpuscle
Glomerulus
Renal tubules
Glomerular filtration rate
Urinalysis

Absorption and Excretion Unit

2

The first two pages of the packet split the unit into 3 concepts: Digestive System, Nutrition and Metabolism, and Urinary System. Each concept is broken down into objectives and vocabulary that students will use to create study guides from. An editable version of these 2 pages is included for you to customize for your class!

Along with activity handouts, lab sheets, and project guidelines, each packet also includes **Cornell note outlines** that go along with each PowerPoint.

Sample Concept 1 Notes: Digestive System **Cornell Note outline**

Concept 1 Notes: The Digestive System

Questions/Vocabulary

Overview

Digestion:

Ingestion

Propulsion

Absorption and Excretion Unit

Mechanical breakdown

Chemical digestion

Absorption

Absorption and Excretion Unit

Digestive Enzymes

Digestive enzymes	What they digest	Product that is formed

Absorption and Excretion Unit

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9

Regulation

Summary Concept 1

Describe the critical role the digestive system plays in maintaining homeostasis and how at least 4 other body systems work alongside the digestive system to accomplish this role.

Absorption and Excretion Unit

10

Cornell Notes leave a margin for students to highlight terms and write questions as they go back and study their notes. Cornell Notes also leave room at the end of notes for students to summarize what they learned. The summary sections have questions to help them summarize.

Packet includes student handouts for:

8 Digestive System Discovery Stations

Digestive System Modeling Activity

Digestive System Children's Book Project description and rubric

6 QR Code Based Kidney Lab Stations

Urinalysis Lab Activity

Fetal Pig Dissection

Digestive System Children's Book Project sample

Digestive System Discovery Stations sample

Discovery Station: Digestive System

Analyze the Big Book (Digestive System) for the digestive system. Then take your BIG and then discover around the room to read and discover more about this system. Do not leave the station until you have answered all of the questions below and have signed your BIG at the end.

Station 1: Mouth

1. Color and label the structure of the mouth on your BIG, including the tongue, salivary glands, and hard and soft palate.
2. What steps in the digestion process does the mouth play a role in?
3. What key structures within the mouth contribute to accomplishing this role?
4. Define the term **bolus** in your own words.
5. What would happen if our salivary glands failed to function?

Station 2: Pharynx and Esophagus

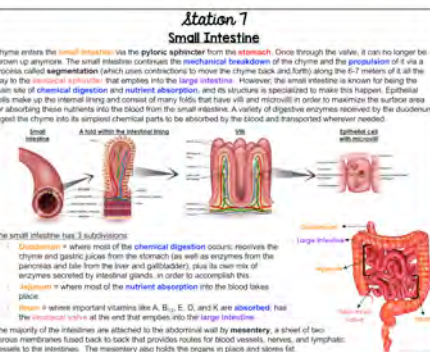
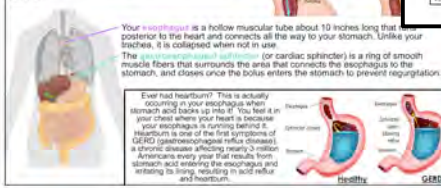
6. Color and label the pharynx, esophagus, and esophageal sphincter on your BIG. Include labels for the trachea and the gastroesophageal sphincter where the esophagus meets the stomach.
7. What two organs contain the pharynx play a role in?
8. How do the soft palate (uvula) and the epiglottis contribute to distinguishing between the functions of these two organs?
9. Why is it called "heartburn"? Is it really heart-related or not?

Station 3: Stomach

Color and label the stomach on your BIG. Include labels for the pyloric sphincter, lesser and greater curvatures, and the fundus.

Station 2: Pharynx and Esophagus

The mouth begins the process of **propulsion** through the voluntary act of swallowing the bolus. Propulsion of the bolus is continued as it enters the pharynx and is moved into the **esophagus** through smooth muscle contractions in a process called **peristalsis**. The pharynx connects to both the trachea and trachea, which lead to the lungs, and the **esophagus**, which leads to the stomach. In order to ensure that the bolus is propelled towards the stomach via the esophagus and not the lungs, a small flap of cartilage called the **epiglottis** blocks off the trachea each time we swallow.



Project: Digestive System Children's Book

Overview: We all know that we have to eat in order to stay alive, but what fewer people really understand is how our bodies actually process and use the food that we eat. In this project, you will create a children's book on the digestive system to creatively demonstrate your understanding of the system and process, while also helping to educate someone else! Your book must be written in a voice that is appropriate for an 8-10 year old to read and understand, so you have to know the content well enough to be able to simplify it, but still explain it correctly. The goal is to be scientifically accurate in your content and creatively engaging in your story line and illustrations.

Book Requirements:

- 1. Cover page with a title and relevant illustration.
- 2. Minimum of 10 pages - and each page must include an illustration along with words.
- 3. Purpose of digestion process (what is it for? why do we just eat the food we eat, or is it?)
- 4. Scientific explanation of each step in the digestive system, including:

- Ingestion
- Propulsion
- Mechanical breakdown
- Chemical digestion
- Absorption
- Egestion

4. Demonstrate a clear understanding of the system.

- Mouth
- Pharynx
- Esophagus
- Stomach
- Small intestine
- Large intestine
- Rectum
- Anal sphincter
- Pancreas

4. Demonstrate a clear understanding of the system.

- Minimum scientific accuracy for an 8-10 year old
- Creative, neat, colorful, safe page
- All information must be accurate
- All content must be written in a child's voice
- Neatly written or typed

Evaluation: On the following page, write a 100-point grade. The score is based on the following criteria:

- Content (40%)
- Illustrations (40%)
- Overall Project (20%)

Due:

Completed and submitted by:

Digestive System Children's Book Project Rubric

	Excellent (40 points)	Satisfactory (30 points)	Needs Improvement (20 points)	Unsatisfactory (10 points)
Content (40%)	All content is scientifically accurate and follows the required format. The book is a high-quality, professional-looking product that would be a valuable resource for other students.	The majority of the content is scientifically accurate and follows the required format. The book is a good-quality, professional-looking product that would be a valuable resource for other students.	Some of the content is scientifically accurate and follows the required format. The book is a fair-quality, professional-looking product that would be a valuable resource for other students.	Most of the content is scientifically inaccurate and does not follow the required format. The book is a low-quality, unprofessional-looking product that would not be a valuable resource for other students.
Illustrations (40%)	All illustrations are creative, neat, colorful, and clearly labeled. The illustrations are of high quality and are well-integrated into the book.	The majority of the illustrations are creative, neat, colorful, and clearly labeled. The illustrations are of good quality and are well-integrated into the book.	Some of the illustrations are creative, neat, colorful, and clearly labeled. The illustrations are of fair quality and are somewhat integrated into the book.	Most of the illustrations are uncreative, messy, and not clearly labeled. The illustrations are of low quality and are poorly integrated into the book.
Overall (20%)	The book is a high-quality, professional-looking product that would be a valuable resource for other students. It is well-written, well-illustrated, and follows the required format.	The book is a good-quality, professional-looking product that would be a valuable resource for other students. It is well-written, well-illustrated, and follows the required format.	The book is a fair-quality, professional-looking product that would be a valuable resource for other students. It is well-written, well-illustrated, and follows the required format.	The book is a low-quality, unprofessional-looking product that would not be a valuable resource for other students. It is poorly written, poorly illustrated, and does not follow the required format.

Total Score: _____

Completed and submitted by: _____

Station 1: How the Kidneys Work

Scan the QR Code below, watch the video, and then answer the questions that follow.



1. What are three functions of your kidneys? What is considered their main role?
2. How many liters of blood are filtered by the kidneys in a 24-hour period?
3. What is the role of nephrons? How does our blood arrive to the nephrons?
4. List and describe the functions of the two structures of the nephron.
5. Through what structures does urine leave the kidneys? What do these empty into?
6. What happens if you haven't had enough water to drink?
7. How else can the kidneys have an impact on our blood?
8. What would happen to our bodies if we didn't have kidneys?

Lab Station: Kidneys

Station 1: How do the kidneys work?

Station 2: Kidney Stones

Station 3: Polycystic Kidney Disease

Station 5: Kidney Case Studies

Select ONE of the following case studies below that most intrigues you. Scan the QR Code of your selected case study, watch the video, and then complete the task that follows.

Option A:

The boy who ate 25 laxative brownies in 1 hour.



Option C:

The diabetic mom who got a fever.



Option B:

The dad who ate a lava lamp before bedtime.



Option D:

The dad who didn't brush his teeth for 40 days.



Create a patient chart on your answer sheet that includes the following information:

- Patient's name
- Age
- Gender
- What the patient did
- Reported symptoms
- Pre-existing condition(s) (if any)
- Diagnosis
- How the kidneys specifically are affected
- Treatment

QR Code Based Kidney Lab Stations sample

Packet includes student handouts for:

8 Digestive System **Discovery Stations**

Digestive System Modeling **Activity**

Digestive System Children's Book **Project** description and rubric

6 QR Code Based Kidney **Lab Stations**

Urinalysis **Lab Activity**

Fetal Pig **Dissection**

Urinalysis **Lab Activity sample**

Lab Activity: Urinalysis

Overview: A urinalysis is a diagnostic medical test that tests on the physical and chemical properties of urine that can be used to indicate the presence of various health issues or drug use. In this lab activity, you will be testing simulated urine samples of five different patients in order to come up with potential diagnoses for their health issues. You will make physical observations and then use chemical test strips to chemically observe the urine. The data collected will be used to determine what is going on with the patient.

Pre-Lab: Before getting started testing the patients' urine, research what each of the features below indicate about the patient and fill in the chart so that you can refer to it later in your analysis of each patient's urine and record the data.

What it could be

Color
Clarity
Odor
Blood (+/-)
pH
Glucose (+/-)
Protein (+/-)

Bilirubin (+/-)
Sticks (+/-)
ICG (+/-)

Materials:

- Patient urine samples
- Droppers
- Urination test strips
- Soapwater

Procedures:

1. Observe how to use the urinalysis test strips by watching a demonstration video. As each indicator is tested, fill in the 1st column results table: we will be using only every indicator described at 2.
2. Collect a patient urine sample. Make sure it is clearly marked with your patient's name in the appropriate spot on the data table.
3. Make physical observations (color, clarity, odor, and presence of blood).
4. Use a dropper to place a drop of the urine sample on each indicator (chemical properties). Wait 1 minute, and then record your results in the results table, as needed.

Data:

	Control	Patient 1	Patient 2	Patient 3
Color				
Clarity				
Odor				
Blood (+/-)				

pH					
Glucose (+/-)					
Protein (+/-)					
Bilirubin (+/-)					
Sticks (+/-)					

Analysis and Reflection:

1. For each of the five patients, come up with a suggested diagnosis (what is their health condition? Back up the diagnosis with data/evidence) and an explanation of why you chose this diagnosis (reasoning).
2. Using outside sources for support, determine what an appropriate treatment would be to help each patient.
3. Select one patient to write a brief case study for. Describe this patient (what is their name, age, occupation, etc.). What pre-existing health conditions do they have? Come up with a story of how they came in to the doctor for the urinalysis test in the first place, and what caused them to develop their current health condition. See them through to getting their prescribed treatment (as decided upon in #2) and how the rest of their life was affected.
4. What is something interesting and/or new you learned from this lab activity?

Digestive System Modeling **Activity sample**

Activity: Modeling the Digestive System

Overview: You will work with a partner or within small groups to create a model of the digestive system that can be used to show the path and length that our food travels through the body. Each structure must be clearly labeled and the anatomically correct length for an adult so that your model can show the distance that our food travels from the mouth all the way to the anus. After, you will reflect on the effectiveness of your model.

Reflection:

1. How does your model effectively represent the structure of the digestive system and the path that our food travels?
2. How does this model lack effectiveness in its representation of the digestive system and the path that our food travels?
3. Select one of the ways the model lacks effectiveness from your answer in #2 and describe a specific way that you could improve the model in the future to be a more accurate representation and/or learning tool.
4. What do you understand better now about the digestive system and the path that our food travels after creating this model?
5. What are you still struggling to understand about the digestive system and the path that our food travels, given after this activity today?



Dissection: Fetal Pig

Overview: The digestive and urinary systems play critical roles in the absorption of nutrients and excretion of wastes that help to maintain homeostasis in all of the body systems. Today, you will be dissecting a fetal pig in order to identify the organs of the digestive and urinary systems, as well as to explore the interconnections between the organs of these two systems and the others we've learned about so far this year.

Procedures:

1. Review lab safety procedures, appropriate use of dissection tools, and proper dissection technique. Make sure you have all of the protective safety gear and dissection materials needed before getting started.
2. Begin by examining the outside of the fetal pig. Place your finger on its snout and feel the different structures of the oral cavity. What can you feel? Notice anything interesting?
3. Place the pig lying on its back, ventral side up. Identify the umbilical cord (a tube that carries blood to and from the fetus) and the anus, located near the hind legs and behind the umbilical cord. A small flap of skin (known as the perineal papilla) covers a genital opening (known as the cloaca). In reality, the structure is absent. Record the sex of your pig here.
4. Make incisions to examine the abdominal cavity. Make a longitudinal cut down the center around the umbilical cord on either side. Then make a transverse cut between the two CERVICAL LY. as you only cut through the layers of skin, muscle, and fat, no organs inside from damage. There will be a lot of liquid (mostly water and peritoneal fluid) to remove or soak up with paper towels before going any further.
5. Once made the abdominal cavity, identify the liver, stomach, small intestine, and large intestine. Notice how the stomach is attached to the esophagus. The pancreas is located behind the stomach. Challenge: Identify the hepatic portal vein that carries the gastrointestinal tract to the liver (usually to the liver).
6. Locate the right and left kidneys behind the peritoneum on either side of the spine, and within right to locate the bladder. Notice how the ureters are attached to the bladder. The kidneys can be removed if you can carefully cut the peritoneum, uterus, and ovaries attached to them. Challenge: See if you can identify the cortex and the renal artery (the artery that carries blood to the kidney) and the renal vein (the vein that carries blood away from the kidney).
7. Cut into the peritoneum and gently remove one of the kidneys. Make a cut to divide halves and see if you can identify the three major regions of the kidney.
8. Now make incisions to examine the thoracic cavity. Continue the longitudinal cut up to the neck and open up the thoracic cavity. Remove any excess fluid so that you can more easily see the lungs, the heart, and the trachea. Feel the difference in the right and left ventricles. See if you can find the esophagus running posterior to the heart and connecting to the three lobes of the right lung and the two lobes of the left. Lastly, identify the aorta.



Notes: This is the digestive and urinary system to follow this dissection.

1. Make any additional observations you need before cleaning up.

Observations:

Structure	Description of Structure (Location)	Description of Function
Liver		
Stomach		
Small Intestine		
Large Intestine		
Spleen		
Gallbladder		
Pancreas		
Kidneys		
Ureters		
Bladder		
Uterus		
Heart		
Trachea		
Esophagus		

Reflection:

1. What structures were you able to locate externally prior to cutting the fetal pig with any? If this structure may have been harder to identify?
2. What structures were you able to locate internally prior to cutting the fetal pig with any? If this structure may have been harder to identify?
3. What surprised you about the structure and/or function of any of the structures?
4. How was this experience with this dissection helpful to your understanding of the digestive and urinary systems?
5. How was this experience with this dissection helpful to your understanding of the interconnections between body systems?

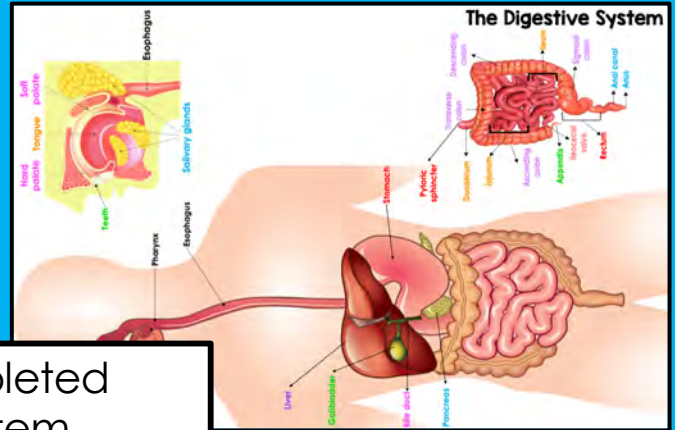
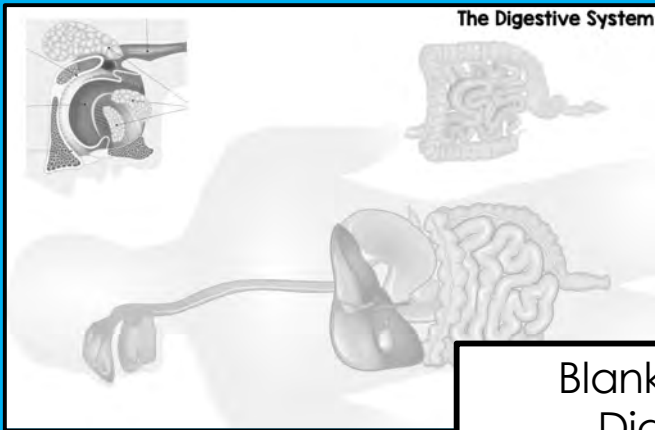
Inside the Abdominal Cavity



Fetal Pig Dissection **sample**

Also included in this unit:

Intro. to the Digestive System **Inquiry Activity**
 Digestive System **Big Body Diagram**
 From Food to Fuel **Webquest**
Research and Report Vitamins and Minerals Activity
 The Science Behind Fad Diets **Research Activity**
 Urinary System **Big Body Diagram**



Blank vs. Completed
 Digestive System
Big Body Diagram sample

Webquest: From Food to Fuel

Go to Google and search "Metabolism: From Food to Fuel" and click the first link: <https://www.genetics.utah.edu/content/metabolism/> This will take you to the LearnGenetics "Metabolism: From Food to Fuel" page. Click "Digestion" and answer the questions below.

- Fill in the chart below summarizing how each macromolecule is digested. After, go back through and highlight each enzyme mentioned that plays a role.

	Sources	Breakdown	Absorption
Carbohydrates			
Proteins			
Nucleic Acids			

From Food to Fuel
Webquest sample

- What do nucleic acids from our food get broken down into? What can these be used for?

- Why do fats have to be transported in packages?

Research Activity: The Science Behind Fad Diets

Overview: An estimated 4.2 trillion dollars were spent in the health and wellness industry in 2017. Tap into any social media or walk by the rows of magazines in the grocery checkout lane and you will be saturated by advertisements for the latest fad diets and wellness trends, all in an effort to promote "self-care". But does the science behind nutrition and metabolism actually back up these popular diets that are being promoted everywhere we see? How can you trust that the products, routines, methods you are hearing and reading about are actually safe and good for your health, both in the long-term and the short-term? Or is it all just a magnificent marketing play and money-making scheme?

Task: Your goal will be to research a topic related to fad diets and trends in the health and wellness industry and make an evidence-based claim about its scientific validity and safety. You will communicate to the class your findings by making and presenting a CER (claim-evidence-reasoning) poster that your classmates will read through and ask questions about in a gallery walk. You should choose a topic that allows you to specifically investigate a facet of this industry. You must obtain teacher approval before getting started.

Rubric:

	Content	Appearance	References	Presentation	Overall
	Formal citation format. Detailed notes were taken.	Formal citation format. Notes were mostly taken.	Formal citation format. Notes were somewhat taken.	Student can answer questions about the poster and the research done. Knowledge of topic is clearly evident.	Overall work is colorful, visually appealing, organized, and accurate. Work stands out from the rest and shows evidence of extra effort.
	Formal citation format. Notes were mostly taken.	Formal citation format. Notes were mostly taken.	Formal citation format. Notes were mostly taken.	Student can answer questions about the poster and the research done. Knowledge of topic is somewhat evident.	Overall work is somewhat colorful, visually appealing, organized, and accurate. More effort needed.
	Formal citation format. Notes were mostly taken.	Formal citation format. Notes were mostly taken.	Formal citation format. Notes were mostly taken.	Student cannot answer questions about the poster and the research done. Knowledge of topic is not evident.	Overall work is not colorful, visually appealing, organized, and accurate. Lack of effort is evident.

The Science
 Behind Fad Diets
**Research
 Activity sample**

Due: _____ Topic: _____ Teacher Approval: _____

Attn: _____

25

Includes access to **Paperless Digital** version of the **student packet** that can be used in **GOOGLE DRIVE** or **MICROSOFT ONEDRIVE**

Pre-lab
Add Text Here!

Vitamins
Add Text Here!

Minerals
Add Text Here!

Metabolism
Add Text Here!

Neurotransmitters
Add Text Here!

Enzymes
Add Text Here!

Summary Concept 2
Summarize the main ideas from this concept, as if you were explaining the concept to another person not in your class. Use the italicized questions above to help guide your summary.

Lab Activity: Urinalysis

Overview: A urinalysis is a diagnostic medical test that analyzes the physical and chemical properties of urine that can be used to indicate the presence of various health issues or diseases. In this lab activity, you will be using simulated urine samples of five different patients in order to come up with potential diagnoses for their health issues. You will make physical observations and then use analysis test strips to chemically observe the urine. The data collected will be used to determine if that is going on with the patient.

Pre-Lab: Before getting started testing the patients' urine, research what each of the factors below indicate about the patient and fill in the chart so that you can refer to it later as you make your analysis of each patient's urine and overall health.

What it could indicate about the patient's condition	
Color	Add Text Here!
Clarity	Add Text Here!
Odor	Add Text Here!
Blood (+/-)	Add Text Here!
pH	Add Text Here!
Glucose (+/-)	Add Text Here!
Protein (+/-)	Add Text Here!

Bilirubin (+/-) Add Text Here!

Nitrite (+/-) Add Text Here!

MCV (+/-) Add Text Here!

Materials:

- Patient urine samples
- Drip tubes
- 5 analysis test strips
- Napkin

Procedures:

1. Observe each of the five patients' test strips for anything a demonstration of a urinalysis test on the control specimen. As each indicator is tested, fill in the 1st column of the data table below with the results (normal or not normal). The testing one every indicator is recorded above or not recorded on the test strip.
2. Collect a patient urine sample. Make note of which patient(s) you will be testing so that you can record your observations in the appropriate spot on the data table.
3. Make physical observations (color, clarity, odor, and presence of blood) and record in the data table.
4. Use a dropper to place a drop of the urine sample on each reaction of the urine test strip or test the chemical properties. Wait 60 seconds, and then record your results in the data table. Refer to the test strip reference chart as needed.

Data:

	Control	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
Color	?	?	?	?	?	?
Clarity	?	?	?	?	?	?
Odor	?	?	?	?	?	?
Blood (+/-)	?	?	?	?	?	?

Analysis and Reflection: Use your data to determine your primary (one) or secondary (two) of patient.

1. For each of the five patients, come up with a suggested diagnosis (disease) for their health condition. Back up the diagnosis with data (evidence) and an explanation of why you chose this diagnosis (reasoning).
Add Text Here!
2. Using outside sources for support, determine what an appropriate treatment would be to help each patient.
Add Text Here!
3. Select one patient to write a brief case study for. Describe this patient (what is their name, age, occupation, etc.). What pre-existing health conditions do they have? Come up with a story of how they came to be the doctor for the urinalysis test in the first place, and what caused them to develop their current health condition. Now, from through to getting their prescribed treatment (as decided upon in #2) and how the rest of their life was affected.
Add Text Here!
4. What is something interesting and/or new you learned from this lab activity?
Add Text Here!

Perfect for teachers in 1:1 classrooms, looking to integrate more educational technology, or go PAPERLESS! Get all of the same content, organization, and ease of the paper packet, without all of the copies!

3 Powerpoints of Notes

Covering 3 different concepts

Over 40 slides, all with *editable text*

Fully **animated** presentations in slide show mode

Sample slides from Concept 1 Notes: Digestive System

Digestion

The "disassembly line" of our food

1. Ingestion: eating

- Teeth begin **mechanical breakdown** with chewing
- Salivary glands begin **chemical digestion** by releasing enzymes that start digesting starches

2. Propulsion: movement of food through the GI tract

- Starts with voluntary swallowing of the **bolus**

- Continues with involuntary **peristalsis**

= the contraction and relaxation of smooth muscles in the esophagus, stomach, and intestines to move food through the canal



Regulation

- The enteric nervous system communicates with the CNS via the **vagus nerve** (the longest cranial nerve in the body!)
 - Has both sensory and motor functions
 - Connects the brain to the GI tract (among other structures)
- Hormones** play a significant role as well
 - G cells produce **gastrin**
 - Enterendocrine cells release hormones like **serotonin** and **histamine**
 - These hormones increase/activate the release of HCl and stimulate muscle contractions in the stomach and intestines



Sample slides from Concept 2 Notes: Nutrition and Metabolism

Vitamins

- Vitamins** = organic compounds that help the body get the nutrients it needs

- Most function as **coenzymes**, acting alongside a particular enzyme

- Ex. Vitamin B acts as a coenzyme in the oxidation of glucose for energy

- Can be **water-soluble** or **fat-soluble**

- Water-soluble** (B-complex vitamins and C) get absorbed with water in the **GI tract**

- Our bodies don't store these, so if they aren't taken into a cell within an hour of ingestion they get excreted!

- Fat-soluble** (A, D, E, and K) are absorbed with other lipids in the **small intestine**

- Our bodies can, and do, store these!

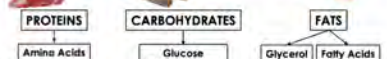


Metabolism

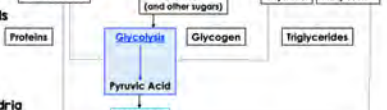
Stage 1: GI Tract



Stage 2: Tissue Cells



Stage 3: Mitochondria



Sample slides from Concept 3 Notes: Urinary System

Kidneys

- 3 major regions:

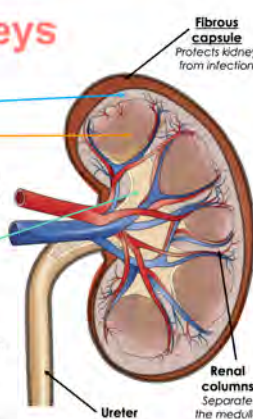
- Renal Cortex**

- Renal Medulla**

- Formed mostly of parallel bundles of urine collecting tubules and capillaries (which give the striped look)

- Renal Pelvis**

- Funnel shaped tube with smooth muscle walls to propel urine via peristalsis into the ureters and on to the bladder

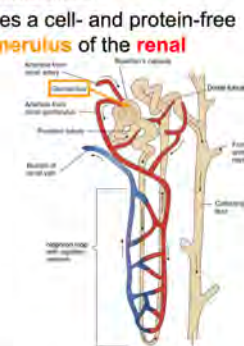


Nephron Function

How they filter blood and make urine

- Glomerular filtration:** Creates a cell- and protein-free filtrate from blood in the **glomerulus** of the **renal corpuscle**

- Passive process
- Glomeruli** act as mechanical filters between blood and glomerular capsule
- Hydrostatic pressure pushes fluids (like water) and solutes (like glucose, a.a., and nitrogenous wastes) through membrane



PLUS check out my [YouTube channel](#) for **lecture videos** that go with each set of notes!

Assessments

Digestive System Quiz

Quiz is vocabulary-focused and includes matching, fill in the blank, and brief application questions.

Unit 5 Test

CP (College Prep, or on grade level) and Honors versions included!

A combination of multiple choice, matching, and open response questions

Versions A and B for both tests

(MC rearranged to prevent cheating)

Includes 3-page answer sheet to minimize copies each year

Unit 5 Absorption and Excretion Test

Part 1 Multiple Choice: Select the letter choice that best answers the question and record on your answer sheet. (10 pts)

1. The duodenum is another name for which structure?
a. Stomach b. Duodenum c. Large intestine d. Small intestine
2. Which of the following correctly matches the subdivisions of the small intestine with its role?
a. Central villi are mostly absorbed in the duodenum.
b. The majority of chemical digestion occurs in the duodenum.
c. Villi are mostly absorbed into the blood from the jejunum.
d. All of the above are accurate matches of structure to function.
3. In which of the following structures does chemical digestion occur?
a. Mouth b. Esophagus c. Small intestine d. Stomach
4. Which of the following structures creates a reference that makes it possible for us to digest food?
a. Duodenum b. Liver c. Small intestine d. Stomach
5. Which of the following structures secretes enzymes that help us digest carbohydrates, lipids, and proteins?
a. Liver b. Mouth c. Duodenum d. Large intestine

Part 2 Fill in the Blank: Write the letter choice that best answers the question and record on your answer sheet. (10 pts)

6. The duodenum is the first part of the small intestine.
7. The jejunum is the middle part of the small intestine.
8. Which of the following organs does not secrete enzymes that help us digest food?
a. Duodenum b. Liver c. Stomach d. Gallbladder
9. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach
10. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach
11. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach
12. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach
13. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach
14. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach
15. Which of the following structures does not secrete enzymes that help us digest food?
a. Mouth b. Esophagus c. Small intestine d. Stomach

Unit 5 Test sample

Digestive System Quiz

Part 1 Matching: Match the vocabulary term with the definition. All terms will be used once. (1 pt each, 10 pts total)

Term	Definition
1. Villi	a. The small intestine
2. The b	b. The large intestine
3. The c	c. The stomach
4. Villi	d. The duodenum
5. Villi	e. The jejunum
6. The d	f. The ileum
7. The e	g. The cecum
8. Villi	h. The appendix
9. Villi	i. The sigmoid colon
10. The	j. The rectum

Part 2 Fill in the Blank: Write the letter choice that best answers the question and record on your answer sheet. (10 pts)

11. The large intestine is the part of the digestive system that absorbs water and electrolytes.
12. The small intestine is the part of the digestive system that absorbs nutrients and electrolytes.
13. The stomach is the part of the digestive system that stores food and begins the process of digestion.
14. The duodenum is the first part of the small intestine.
15. The jejunum is the middle part of the small intestine.
16. The ileum is the last part of the small intestine.
17. The cecum is the first part of the large intestine.
18. The appendix is a small, finger-like projection from the large intestine.
19. The sigmoid colon is the part of the large intestine that leads to the rectum.
20. The rectum is the part of the large intestine that stores feces before it is eliminated from the body.

Quiz sample

Unit 5 Absorption and Excretion Test Answer Sheet

Part 1 Multiple Choice: Select the letter choice that best answers the question and record on your answer sheet. (10 pts)

Question	Answer
1. The duodenum is another name for which structure?	a. Stomach b. Duodenum c. Large intestine d. Small intestine
2. Which of the following correctly matches the subdivisions of the small intestine with its role?	a. Central villi are mostly absorbed in the duodenum. b. The majority of chemical digestion occurs in the duodenum. c. Villi are mostly absorbed into the blood from the jejunum. d. All of the above are accurate matches of structure to function.
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Part 2 Fill in the Blank: Write the letter choice that best answers the question and record on your answer sheet. (10 pts)

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Unit 5 Test Answer Sheet sample

Detailed **Answer Keys**
• **Editable Versions** of all assessments are included!

NGSS Alignment Overview

Absorption and Excretion Unit

Essential Question: How does the body effectively and efficiently absorb nutrients and excrete waste from the food we eat in order to acquire necessary substances for maintaining homeostasis?

Overall Standards Addressed

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

HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

Suggested Introductory Phenomena:

- **Anchoring phenomenon:** You can't live without at least one kidney, and they are often considered to be the MVP!
 - Connects to → Lab Stations: Kidneys
- **Everyday phenomenon:** Your gastrointestinal tract is a 30-ft long (9 m) tube from one hole (your mouth) to another through this tube, somehow your body is able to extract the nutrients it needs and excrete the waste that it doesn't.
 - Connects to → Inquiry Activity: Intro. to the Digestive System
 - Connects to → Activity: Modeling the Digestive System
- **Everyday phenomenon:** How our bodies work as effective machines to turn food to fuel to meet all of our cells' needs.
 - Connects to → Webquest: From Food to Fuel
- **Everyday phenomenon:** 4.2 trillion dollars were spent in the health and wellness industry in 2017. With all of the health and exercise fads, which of these "trends" are actually supported by science, versus pseudoscience?
 - <https://calstatehawaii.edu/health-science/our-student-research-focus/>
 - Connects to → Research Activity: The Science Behind Fad Diets

Curricular Connections to Standards (expanded):

Activity/Lab/Project	Science and Engineering Practices
Inquiry Activity: Intro. to the Digestive System	Develop and use models Construct explanations and design solutions Engage in argument for evidence
Big Body Diagram: Digestive System Discovery Stations: Digestive System	Develop and use models Construct explanations and design solutions

	Obtain, evaluate, and communicate information	Systems and system models Energy and matter Structure and function Stability and change
Activity: Modeling the Digestive System	Develop and use models	Patterns Scale, proportion, and quantity Systems and system models Structure and function
Project: Digestive System Children's Book	Develop and use models Construct explanations and design solutions Obtain, evaluate, and communicate information	Cause and effect Scale, proportion, and quantity Systems and system models Energy and matter Structure and function
Webquest: From Food to Fuel	Obtain, evaluate, and communicate information	Cause and effect Scale, proportion, and quantity Systems and system models Energy and matter Structure and function Stability and change
Research and Report: Vitamins and Minerals	Obtain, evaluate, and communicate information	Energy and matter Stability and change
Research Activity: The Science Behind Fad Diets	Analyze and interpret data Engage in argument for evidence Obtain, evaluate, and communicate information	Cause and effect Scale, proportion, and quantity Energy and matter
Big Body Diagram: Urinary System	Develop and use models	Structure and function
Lab Stations: Kidneys	Analyze and interpret data Obtain, evaluate, and communicate information	Cause and effect Structure and function Stability and change
Lab Activity: Urinalysis	Ask questions and define problems Plan and carry out investigations Analyze and interpret data Construct explanations and design solutions	Patterns Cause and effect Energy and matter Structure and function

When writing each of my A&P units, I tried to incorporate as many different states' A&P standards as possible, while most importantly keeping the content within the scope of the NGSS* style. While NGSS doesn't have specific standards for Anatomy and Physiology, there are many DCI's, science & engineering practices, and crosscutting concepts that align with my A&P curriculum.

This 3-page document is a helpful resource for teachers who are using the Next Generation Science Standards while they teach Anatomy and Physiology.

This document also includes a list of suggested introductory phenomena. Tips for transitioning to NGSS can be found on my blog [here](#). Tips for using phenomena can be found [here](#).

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

THANK YOU!



I hope you find this resource to be useful to you in your classroom and that your students enjoy it as well!

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If you enjoy this resource, PLEASE leave feedback for me! I'd love to hear specifically what you enjoyed and how you used this in your classroom so that I can continue to create resources that are beneficial to you and your students. Your encouragement and feedback mean so much to me!

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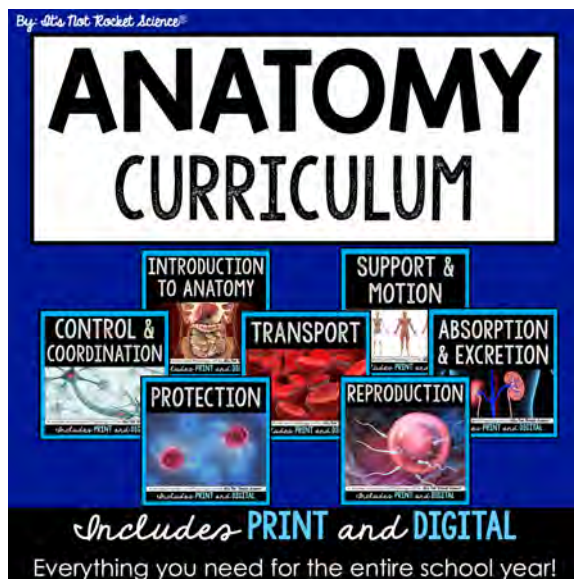


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This unit is a part of my **FULL YEAR Anatomy & Physiology Curriculum Bundle**:



Other **Absorption and Excretion resources** you may like:

