



## Newtown Public Schools

BOE C&I Sub Committee Meeting  
October 21, 2025

BOE Conference Room 1  
Municipal Building  
3 Primrose Street  
Newtown, CT 06470  
5:30 PM

*As citizens of our community, we will conduct ourselves in accordance with Newtown's Core Character Attributes as displayed in our character tree. We will be responsible for our actions and show respect for each other. We will interact peacefully, productively, and politely. We will be trustworthy and honest and show compassion toward others. Newtown's continued success is contingent upon our ability to persevere, to follow through with our commitments, and to stay focused on the greater good.*

### AGENDA

1. **CALL TO ORDER**
2. **PUBLIC PARTICIPATION**
3. **APPROVAL OF MINUTES**
4. **NEW BUSINESS**
  - A. Discussion and Possible Action on the following Newtown High School curricula
    1. Anatomy and Physiology
    2. Writing Center Theory and Practice
5. **PUBLIC PARTICIPATION**
6. **ADJOURNMENT**

**BOE C&I Sub Committee Meeting  
September 16, 2025**

**BOE Conference Room  
3 Primrose Street  
Newtown, CT 06470**

## **MINUTES**

### **In attendance:**

Frank Purcaro, Assistant Superintendent  
Chris Gilson, C&I Chair  
John Vouros, Board Member  
Sarah Connell, Clerk  
No Public

### **1. CALL TO ORDER**

- a. Mr. Gilson called the meeting to order at 5:32 pm.

### **2. PUBLIC PARTICIPATION**

- a. None

### **3. APPROVAL OF MINUTES**

MOTION: *Mr. Vouros moved to approve the minutes of June 3, 2205. Mr. Gilson seconded. Motion passes unanimously.*

### **4. NEW BUSINESS**

- a. Preliminary Review of State Assessment Results
  - i. Mr. Purcaro presented his slides (attached in the minutes) to the committee regarding the state assessment data. This presentation will be presented to the full Board this evening. The assessments that Mr. Purcaro reported on were SBAC, NGSS and SAT. He also spoke about reflection and next steps for the District to continue to succeed.
  - ii. Mr. Purcaro continued by saying that this data ties all the District's efforts together, including professional development.
  - iii. Mr. Vouros asked who is observing what the teachers are teaching. Mr. Purcaro responded that Mr. Ross and Mr. Walsh from NMS had been able to go into the classroom and observe more. It is harder for the high school because of the amount of teachers but the Department Chairs are absolutely observing their departments. Mr. Purcaro's goal is for more transparency, especially in the learning walks. They will go in a team and work on critical thinking and collaboration.
  - iv. The committee discussed the differences between the scores pre pandemic and post pandemic. The obvious changes have a lot of different factors to take into consideration.

- v. Mr. Purcaro believes that the trend is moving in a positive direction but the District data team will dive deeper into this data to find different areas to improve on.

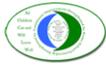
**5. PUBLIC PARTICIPATION**

- a. None

**6. ADJOURN**

- a. Mr. Vouros moved to adjourn the meeting. Mr. Gilson seconded. Motion passes unanimously.

The meeting was adjourned at 6:55 pm.



## Anatomy and Physiology: CP (Under Review/Revision)

Newtown High School / High School / Science

4 Curriculum Developers | Last Updated: Thursday, Jun 12, 2025 by Allegretto, Tara

### Unit Calendar by Year

Unit	Au	Sep					Oct			Nov				Dec				Jan				Feb				Mar				Apr				May				Ju						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38						
Introduction to the Human Body		█																																										
Tissues of the Human Body							█																																					
The Skeletal System									█																																			
The Muscular System														█																														
The Nervous System																	█																											
Transport (Circulatory and Respiratory...)																				█																								
Absorption and Excretion (Digestive and...)																													█															
Reproduction and Fetal Development																																												
Protection (Immune and Integumentary...)																																												

9 Units found





## Unit Plan

### Introduction to the Human Body

Newtown High School / High School / Science

Week 1 - Week 6 | 4 Curriculum Developers | Last Updated: Jun 12, 2025 by Allegretto, Tara

## Concept-Based Curriculum Unit Template

### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is to review important biological concepts relevant to anatomy and physiology and to introduce essential anatomical terms and concepts that spiral throughout the course.

### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

**Lens:** Biological Concepts / Language

**Concepts:**

Anatomy

Structure

Function

Complementarity

Hierarchy/Emergent properties

Properties

Homeostasis

Metabolism

Maintenance of life

Cavities

Membranes

Organization

Relative position

Vocabulary

Regions

Identification

Cells

Organelles

Transport

Signaling

Feedback

Coordination

### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. Structure dictates function (complementarity) on the molecular and macroscopic level for optimal maintenance of life.
2. Using universal vocabulary facilitates clear identification of structure, regions, and relative position.
3. As the anatomical hierarchy evolves, emergent properties expand their functions.

### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. How is the human body organized to accomplish all of life's processes, all while maintaining homeostasis at the level of the organ, all the way down to a cellular level? C
- 1b. What is meant by structure determines function? C

4. Metabolism maintains an organism's homeostasis.
5. Errors in metabolism contribute to failure to maintain homeostasis and disease.
6. Dividing the body into membrane-lined cavities separates each entity allowing for organization.
7. Organelles work together to carry out cellular functions, which contributes to the maintenance of homeostasis within the organism.
8. The transport of molecules within and between cells allow for signaling communication and coordination of various cell types.

1c. What are microscopic and macroscopic level examples that demonstrate complementarity? C

2a. Is universal vocabulary really essential? P

2b. What are the body regions and where are they located? F

2c. What are the 9 abdominopelvic regions and where are they located? F

2d. What are the 4 abdominopelvic quadrants and where are they located? F

2e. What anatomical vocabulary and regional terminology is appropriate to use when describing the location of various body parts in relation to others? F

2f. What terms are used to describe the plane at which a cross section is cut along? F

2g. What is the difference between gross and microanatomy? F

3a. What are the characteristics of life that all humans share? F

3b. What are the 5 requirements for maintaining life and how does each contribute to survival in humans? F

3c. What are the levels of organization within the body, from smallest to largest? F

4a. What is homeostasis? F

4b. What are examples of feedback loops that are essential for keeping the body homeostatic? F

4c. What is the relationship between response to stimuli and maintaining homeostasis? C

4d. How do feedback mechanisms maintain homeostasis? C

5a. What leads to errors in metabolism? F

5b. What are the consequences of errors in metabolism? C

6a. Which membranes line the Thoracic, Abdominal, Cranial, Pericardial, Plural, Pelvic cavities? F

6b. Where are the Thoracic, Abdominal, Cranial, Pericardial, Plural, Pelvic cavities located? F

6c. Which organs are housed in each body cavity? F

6d. How does the presence of membranes and cavities aid in organization and efficiency within the body? C

6e. What is the difference between a visceral and a parietal membrane? F

7a. What are the organelles of the cell and what is the function of each? F

7b. How do multiple organelles work together to carry out a common task? What would be the consequence of "losing" a given organelle? C

8a. What types of signals can initiate a signal transduction pathway? F

8b. What defines passive transport/diffusion?/Active transport? F

8c. What is the importance of specificity in receptor proteins. Include the difference

- between intracellular and membrane receptors and the types of ligands they would bind to? C
- 8d. What is the importance of a second messenger in certain signal transduction pathways? C
- 8e. What types of cellular responses can be initiated by cell signaling? C
- 8f. How does cellular transport play a role in maintaining homeostasis? C
- 8g. How can a solution be classified (hyper, hypo, or isotonic) based on information given about its water and solute concentrations? C

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

### Student will Know

- the characteristics of life that all humans share.
- the requirements for human life and the role each plays in survival.
- the role of each organelle within the cell.
- the levels of organization in order from least to most complex.
- the definition of complementarity and examples at the macro and microscopic levels.
- the way transport and feedback impact homeostasis.
- the types of transport (Passive- Diffusion, Osmosis, Facilitated Diffusion v. Active- Endo/Exocytosis, movement against the gradient).
- the importance of a second messenger in certain signal transduction pathways.
- the several types of responses that can be triggered by a transduction pathway.
- the name and location of each body region.
- the name of and location of each body cavity.
- the name and location of the membranes surrounding the organs and body cavities.
- the name and location of each region and quadrant of the abdominopelvic cavity.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
- 7. Other.

### Notes

Determine the most essential organelles needed in the cell to carry out that specific function, given the description of a cell's function,.

Identify an organelle based on a diagram or description of its structure.

Describe the relationship between response to stimuli and homeostasis.

Draw an example of a feedback loop, clearly labeling all parts.

Determine whether a solution is hypertonic or hypotonic or isotonic based on its description.

Explain the importance of cell signaling and communication in maintaining homeostasis.

Provide examples of a real-world example of a breakdown in cell communication and how that impacted homeostasis in the organism.

Analyze data to determine the effect of a feedback mechanism on homeostasis.

## Standards

*The content standards that are taught and/or assessed in this unit.*

**NGSS: Science Performance Expectations**  
**NGSS: HS Life Sciences**  
**HS.Structure and Function**  
 Performance Expectations [Show Details](#)

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Show Details](#)

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Show Details](#)

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

**1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.**

Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

**2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.**

Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

Much of science deals with constructing explanations of how things change and how they remain stable.

Feedback (negative or positive) can stabilize or destabilize a system.

### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)(secondary to HS-LS3-1)

Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

##### LS1.B: Growth and Development of Organisms

In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Unit 1: Introduction to Anatomy Notes [HS-LS1- 1, 2, 3, 4](#)

What is Life Activity [HS- LS1- 2](#)

Lab 1: Body Organization and Terminology and "Mini-Me" Labeling

(see assessments) [HS-LS1-2](#)

## Portrait of the Newtown Graduate

Lab 2: Dissection of Sheep Brain (see assessments) [HS-LS1-2](#)

Plate 1: Unit 1 (see assessments) [HS-LS1A](#)

Inquiry Feedback Activity [HS-LS1-3](#)

[Inquiry Activity\\_ Feedback.pdf](#)   [What is life?](#)  

[Copy of Fun with Terminology \(Intro\).pptx](#)  

[Newtown Concept 2 Notes - Homeostasis and Regulation.pptx](#)  

[Newtown Concept 3 Notes - Anatomy Basics.pptx](#)  

## Vocabulary

*Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.*

## Resources

*Teacher and student resources used to support the learning.*

Body Region Flashcards

Task Cards

["Types of Cells" Assignment HS-LS1](#)

Directional Terms Coloring Assignment

Anatomical Terms Digital Interactive Notebook Activity

Mr./Mrs. Potato Head- Directional Terminology Practice

Videos:

[Crash Course: Intro to Anatomy and Physiology](#)

[Amoeba Sisters: A Tour of the Cell](#)

[Amoeba Sisters: Homeostasis and Negative/Positive Feedback](#)

[Bozeman: Positive and Negative Feedback Loops](#)

[Corporis: The Easiest Way to Learn Directional Terms](#)

[Corporis: The Easiest Way to Learn Anatomical Regions](#)

Videos, Text, Websites, Optional Activities

[Intro coloring 1.pdf](#)  

[Copy of Anatomical Terms Activity - Student \(TA\)](#)  

[Research and Report - Human Cells.pptx](#)  

[Task Cards - Biology Review.pdf](#)  

[Card Sort - Regional Terms.pdf](#)  

[Terminology - Potato Head.docx.pdf](#)  

## Assessments

*The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.*

**Lab 2: Dissection of Sheep Brain | Formative | Lab Assignment**

[Dissection of the Sheep Brain.pdf](#) [Lab 2\\_ Brain Dissection Grade Slip - Sheet1.pdf](#)

No Standards Assessed

**Body Region Quiz | Formative | Written Test**

[Body Region Quiz](#)

No Standards Assessed

**Lab 1: Body Organization and Terminology and "Mini-Me" Labeling | Formative | Lab Assignment**

Lab 1: Body Organization and Terminology Lab Grade Sheet

 \_Mini-Me\_Labeling Activity.pdf

No Standards Assessed

**Unit 1 Plate | Formative | Visual Arts Project**

Unit 1 plate is an illustration of an important image to the unit that serves not only as a way to learn the correct anatomy of specific relevant structures, but also allows students to demonstrate their ability to put care and effort into their work.

Plate Drawing Grading Criteria.docx

 Plate drawing grading criteria

No Standards Assessed

**Introduction to the Human Body Exam | Summative | Written Test** Biology Review : Quiz 1 CP 2023A Biology Review : Quiz 1 CP 2023B

No Standards Assessed

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## Differentiation

*Core learning activities, resources and assessments that meet the needs of all learners.*

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### Tissues of the Human Body

Newtown High School / High School / Science

Week 7 - Week 9 | 4 Curriculum Developers | Last Updated: Jun 26, 2024 by Allegretto, Tara

## Concept-Based Curriculum Unit Template

### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is to introduce the types of body tissues that can be found throughout the body and to make connections between the structures of each of the tissue types, and their functions.

### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

#### Lens: Structure and Function

##### Concepts:

Structure

Function

Complementarity

Properties

Identification

Cells

Coordination

Tissues

Stem Cells

##### Differentiation

Protection

Absorption

Lubrication

Movement

Stability

Flexibility

### Generalizations

*Critical conceptual relationships that students are expected to UNDERSTAND at the end of the unit.*

1. The **structure** of cells correlates to their **function**, which is an example of **complementarity**.
2. **Stem cells** go through **differentiation** to become various types of cells with a variety of **functions**.
3. **Coordination** between **cells** allows for multiple cells to act as a single functioning unit, known as **tissue**.
4. The **properties** of **tissues** are their basis for **identification** and determine their **functions**, which include **protection, absorption, lubrication, movement, stability, and flexibility**.

### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. Where are the apical, basal, and lateral surfaces on epithelial cells? F
- 1b. What is a goblet cell? F
- 1c. What are the functions of each of the following cell types (adipocyte, osteocyte, chondrocyte, lymphocyte, erythrocyte, leukocyte, thrombocyte) F
- 1d. How does the shape of the apical surface of epithelial cells correspond with the function of its specific tissue type? C
- 1e. How does the shape of a cell influence function and location of a given type of epithelial tissue? C

## Unit Plan

1f. How does the type of secretions a goblet cell produces influence their location? C

2a. What is a stem cell? F

2b. What is the significance of the mesenchymal stem cell? F

2c. How do stem cells generate other types of cells? C

3a. What is the definition of tissue? F

3b. What are the classifications of tissue in the human body? F

3d. How do cell communicate to allow for coordination between cells? C

4a. What are the various functions of the different types of epithelial tissues? F

4b. What are the various functions of the different types of connective tissues? F

4c. What are the functions of blood, bone, and cartilage? F

4d. What is the function of nervous tissue? F

4e. What are the similarities and differences between skeletal, cardiac, and smooth muscle tissue in terms of the structure and function? C

4f. What is the difference between exocrine and endocrine glands? F

4g. How does the structure of nervous tissue contribute to its function? C

4h. How does the structure of the various types of epithelial tissue contribute to their functions? C

4i. How does the structure of the various types of connective tissue contribute to their functions? C

4j. How does the structure of bone, blood, and cartilage contribute to their function location in the body? C

4k. How does the number of cell layers influence function and location of a given type of epithelial tissue? C

4l. Why do most cancers arise in epithelial tissue? C

4m. How does the characteristics of the given fibers and ground substance, along with their abundance in a given type of tissue, contribute to the function of that tissue? C

4n. Would a break or a sprain be a more "desirable" injury? P

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

### The students will know

- the various cell surfaces and how the structure of the apical surface relates to the function of the cell type.
- the function of goblet cells and where they can be found within the body.
- the function of stem cells, specifically mesenchymal stem cells in the production of connective tissue.
- the definition of "tissue" and the various classifications of tissues throughout the human body.
- how intercellular junctions play a role in the communication and coordination of cells.
- the functions of various epithelial and connective tissue types.
- how the structure of each is related to its function and where it is located.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
- 7. Other.

### Notes

Identify types of epithelial tissue when given slide samples of each, based on their structural makeup and defining characteristics.

Identify types of connective tissue when given slide samples of each, based on their structural makeup and defining characteristics.

Identify types of muscle tissue when given slide samples of each, based on their structural makeup and defining characteristics.

- the function of all types of cartilage, blood, and bone and how the structure of each is related to its function and where it is located.

Identify nervous tissue cells when given a slide sample, based on its structural makeup and defining characteristics.

Identify the various surfaces of an epithelial cell on a tissue sample slide.

Propose a function of a sample tissue by observing the characteristics of the cells found in that tissue.

Follow the digestive system from start to finish and identify the types of epithelial tissue found in each part and explain why that tissue type is appropriate based on the function of that part.

Follow the respiratory system from start to finish and identify the types of epithelial tissue found in each part and explain why that tissue type is appropriate based on the function of that part.

Make connections between tissue injury/abnormalities and disease.

## Standards

The content standards that are taught and/or assessed in this unit.

### NGSS: Science Performance Expectations

#### NGSS: HS Life Sciences

#### HS.Inheritance and Variation of Traits

Performance Expectations [Show Details](#)

- HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. [Show Details](#)

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

##### LS1.B: Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students listen to and record "Tissues" Notes during a series of interactive lectures. [HS-LS1A](#), [HS-LS1B](#).

Complete Zombie "Tissue Box" [HS-LS1A](#), [HS-LS1B](#)

Complete Tissue Plate Drawing [HS-LS1A](#)

Complete Pig Foot Dissection [HS-LS1-2](#), [CCC- Patterns/Structure and Function](#)

Tissues (CP)  

## Vocabulary

Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.

tissue  
organ  
epithelial tissue  
connective tissue  
skeletal muscle  
smooth muscle  
cardiac muscle  
neuron  
squamous  
cuboidal  
columnar  
apical  
cilia  
microvilli  
simple  
stratified  
exocrine gland  
endocrine gland  
goblet cells

## Resources

Teacher and student resources used to support the learning.

Intro to Epithelial Tissue (CP)

Epithelial Tissue Review

CT, MT, NT Review

Butterfly Children Article and Video

Digestive System- Tissue Identification

COVID Article- "The Spector of Endothelial Injury..."

Review Game- Spoons

### Videos

Crash Course: ET [https://www.youtube.com/watch?v=IUe\\_Rl\\_m-Vg](https://www.youtube.com/watch?v=IUe_Rl_m-Vg)

Crash Course: CT <https://www.youtube.com/watch?v=D-SzmURNBH0>

Crash Course: Types of CT <https://www.youtube.com/watch?v=Jvtb0a2RXaY>

What is Epi Tissue <https://www.youtube.com/watch?v=0NEV-Rd7OgA>

Corporis- Epi Tissues for Beginners

<https://www.youtube.com/watch?v=kHBjEQGrSw4>

Corporis- CT for Beginners <https://www.youtube.com/watch?v=MYgtO1w4nCO>

Professor Dave Explains CT: [https://www.youtube.com/watch?v=ec0PTOUQ\\_zo](https://www.youtube.com/watch?v=ec0PTOUQ_zo)

Professor Dave Explains ET: <https://www.youtube.com/watch?v=oe-Z9tOKBfU>

Digestive System- Tissues.pdf  

The Spector of Endothelial Injury in COVID-19.pdf  

Copy of Histology Review Game - Spoons.pdf  

Science   Copy of Intro to ET for CP  

Copy of Copy of CT, MT and NT Worksheet  

Copy of CT, NT, MT worksheet Key.pdf  

Copy of Copy of Tissues of the Human Body: Shape/Function Connections  

[Copy of Copy of Epithelial Tissue Review CP](#)  [Copy of Copy of Copy of \(Article\) Gene Therapy for the "Butterfly Children"](#)  [EB Video- Explained](#)  [EB- Video Example](#)  

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## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

### Tissues of the Body= Plate Drawing | Formative | Visual Arts Project

[Plate 1- Tissue of the Human Body \(CP\)](#)[2 Standards Assessed](#)

### Zombie Tissue Box | Formative | Visual Arts Project

[Copy of Zombie Tissue Box Template](#)[Copy of Copy of Zombie Histology Box 2022 CP](#)[Copy of Zombie Tissue Box Project Score Slip](#)[3 Standards Assessed](#)

### Pig Foot Dissection | Formative | Lab Assignment

[Copy of CP Pig Foot Dissection- Notebook Requirements](#)[Copy of Lab 3: Pig Foot Dissection Score Sheet](#)[4 Standards Assessed](#)

### Tissue Summative Test | Summative | Written Test

[Copy of Unit 2: Tissues of the Body Test \(CP\) 2022](#)[4 Standards Assessed](#)

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## Differentiation

Core learning activities, resources and assessments that meet the needs of all learners.

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## Test Prep Connections

As appropriate, include activities that build skills for standardized testing, such as IABs.

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## Unit Plan

### The Skeletal System

Newtown High School / High School / Science

Week 10 - Week 13 | 4 Curriculum Developers | Last Updated: Jun 28, 2024 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is to discuss how the structure of the skeletal system, both at the microscopic and macroscopic level, allows it to carry out its many functions. This unit also addresses types of movements the [skeletal system](#) allows and how joint structure determines the types of movements allowed.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

##### Lens: Structure and Function

##### Concepts:

Structure  
Function  
Strength  
Process  
Interaction  
Movement  
Joint  
Bone  
Fracture  
Cells  
Homeostasis  
Health  
Diet  
Exercise  
Hormones  
Organization

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. The microscopic **structures** within **bone** tissue contribute to **strength** and **function**.
2. The overall **structure** and **organization** of **bones** allow for them to carry out specific **functions**.
3. **Interactions** between various **bone cells** work to build up and break down **bone** to maintain **bone health** and maintain **homeostasis**.
4. **Diet, exercise, and hormones** correlate to the quality of **bone growth, health, and strength**.
5. The **process** of repairing **bone fractures** involves multiple **bone cell** types.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What is the function of red bone marrow and where is it located within the bone? F
- 1b. What is the function of yellow bone marrow and where is it located within the long bone? F
- 1c. What are the main differences between compact and spongy bone, in terms of structure and location? F
- 1d. What structures make up the microscopic anatomy of compact bone? F
- 1e. How does the structure of the osteon contribute to the strength of bone? C
- 1f. Why are bones living organs? C

6. Structure and types of **movements** determine a **joint's** classification.

- 2a. What are the functions of the skeletal system? F  
 2b. Which bones are considered part of the axial skeleton/appendicular skeleton? F  
 2c. What are distinguishing characteristics of long, short, irregular, flat, and sesamoid bones? F  
 2d. What and where are the bones of the human body? F  
 2e. How does the shape of the different bone types contribute to their functions? C

3a How do osteoblasts and osteoclasts contribute to bone formation, healing, and maintenance? C

- 4a. What hormones influence bone growth and what role does each play? F  
 4b. What is the significance of the epiphyseal plate? C  
 4c. What nutritional factors impact bone health? C  
 4d. How does exercise impact bone health? C  
 4e. How much of one's bone health results from personal choice versus genetics? P

- 5a. What are the various types of bone fractures? F  
 5b. How does a bone fracture heal? C

- 6a. What are examples of gliding, pivot, hinge, ball and socket, condylar, and saddle joints? F  
 6b. What types of movements are possible at gliding, pivot, hinge, ball and socket, condylar, and saddle joints? F  
 6c. What motions are indicated by the terms abduction, adduction, circumduction, flexion, extension, dorsiflexion, plantar flexion, elevation, depression, rotation, supination, pronation, inversion, and eversion? F  
 6d. How are joints classified based on their structure? C  
 6e. How are joints classified based on their function? C  
 6f. How does the structure of a joint determine the type of movement allowed at that joint? C

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

### Students will know

- the functions of the skeletal system.
- the distinguishing characteristics of long, short, irregular, flat, and sesamoid bones.
- how the shape of the different bone types contributes to their functions.
- the function and location of red bone marrow.
- the function and location of yellow bone marrow.
- the main differences between compact and spongy bone, in terms of structure and location.
- how the structure of the osteon contributes to the strength of bone.
- how osteoblasts and osteoclasts contribute to bone formation, healing, and maintenance.
- the significance of the epiphyseal plate.
- the nutritional factors that impact bone health.
- the hormones that influence bone growth and the role each plays.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
- 7. Other.

### Notes

label select structures that make up the microscopic anatomy of compact bone and describe the function of each.

defend why bone is considered a living organ.

identify whether bones are considered part of the axial skeleton/appendicular skeleton.

identify whether a bone is classified as a long, short, irregular, flat, or sesamoid bones based on appearance and/or description of function.

label the bones of the human body.

- the impact of exercise on bone health
- the difference between hypertrophy and atrophy and how each occurs.
- the steps of healing a bone fracture.
- the types of joints.
- how joints are classified based on structure and function.
- the types of movements possible at each joint type

explain how hormones influence bone cells in order to maintain homeostasis.

classify joints based on their function.

classify joints based on their structure.

describe and demonstrate the types of movements are possible at gliding, pivot, hinge, ball and socket, condylar, and saddle joints.

identify joints as gliding, pivot, hinge, ball and socket, condylar, and saddle joints based on description of movement at that joint, and location in the body.

identify the type of bone fracture based on description and/or image.

describe and demonstrate the following motions: abduction, adduction, circumduction, flexion, extension, dorsiflexion, plantar flexion, elevation, depression, rotation, supination, pronation, inversion, and eversion.

## Standards

*The content standards that are taught and/or assessed in this unit.*

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

**1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.**

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

**2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.**

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

- Much of science deals with constructing explanations of how things change and how they remain stable.
- Feedback (negative or positive) can stabilize or destabilize a system.

### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

##### LS1.B: Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students **will**

listen to and record "Skeletal System Notes" during a series of interactive lectures. [HS-LS1A](#), [HS-LS1B](#), [CCC- 1, 2, 6, 7](#)

listen to and record "Movement Notes" during a series of interactive lectures. [HS-LS1A](#), [HS-LS1B](#), [CCC- 1, 2, 6, 7](#)

complete Yoga Joint Analysis Activity [CCC 1, 2, 6 HS-LS1A](#)

complete Skeletal System Plate Drawing ( *Microscopic Anatomy of Compact Bone*) [HS- LS1A](#)

complete Skeletal System Discovery Stations (Includes pdf of Questions, pdf of station slides, BBD to label) [HS-LS1A](#), [HS-LS1B](#), [CCC- 1, 2, 6, 7](#)

complete Movement Video Project [HS-LS1A](#), [CCC- 1, 2, 6](#)

complete Bone Classification Sort [HS-LS1A](#)

Copy of Bone Classification Sort (Student)  

Copy of Skeletal System Discovery Station.pdf  

Copy of Copy of 8 Yoga Joint Analysis  

Copy of Skeletal system Coloring Blank.pdf  

 BBD POSTERS to Print.pdf  

 Discovery Stations - Skeletal System (1).pdf  

 Concept 1 Notes - Skeletal System  

 Concept 2 Notes - Movement  

 Copy of Plate 2: Compact Bone Anatomy  

## Portrait of the Newtown Graduate

### Vocabulary

*Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.*

Hematopoiesis

Cartilage

Ligament

Tendon

Joint (articulation)

Osteon

Lamella

Central (Haversian) canal

### Resources

*Teacher and student resources used to support the learning.*

Skeletal System Coloring Worksheets

Whack-a-Bone Labeling Game

Videos Linked Below

Trabeculae  
 Lacunae  
 Osteocyte  
 Osteoblast  
 Osteoclast  
 Ossification  
 Fracture  
 Synarthrosis  
 Amphiarthrosis  
 Diarthrosis  
 Gliding joint  
 Hinge joint  
 Ball and Socket joint  
 Pivot joint  
 Condylar joint  
 Flexion/Extension  
 Hyperextension  
 Rotation  
 Supination/Pronation  
 Abduction/Adduction  
 Circumduction  
 Elevation/Depression  
 Dorsiflexion/Plantar flexion  
 Inversion/Eversion

Copy of Skeletal system Coloring Blank.pdf  

 Whack-a-Bone Labeling Game  

 Crash Course Video- JOINTS  

 Types of Bones Video  

 Crash Course Video- Skeletal System  

 Types of Movement Video  

## Assessments

*The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.*

### Skeletal System Quizzes | Formative | Written Test

Review Quiz  
 Labeling Quiz

 Copy of CP Quiz - Skeletal System.docx  Copy of Copy of Skeleton Labeling Practice

[1 Standard Assessed](#)

### Skeletal System Plate Drawings (2) | Summative | Visual Arts Project

Microscopic Anatomy of Compact Bone

 Copy of Copy of Plate Drawing Grading Criteria.docx  Copy of Plate 2: Compact Bone Anatomy

[3 Standards Assessed](#)

### Skeletal System Test | Summative | Written Test

 Copy of Skeletal System/Movement Exam CP 2023

[9 Standards Assessed](#)

## Differentiation

*Core learning activities, resources and assessments that meet the needs of all learners.*

## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*





## Unit Plan

### The Muscular System

Newtown High School / High School / Science

Week 14 - Week 17 | 4 Curriculum Developers | Last Updated: Jun 27, 2024 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is to demonstrate how the structure of muscle allows for it to carry out its many roles in the body and to review the physiology of muscle contraction.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

##### Lens: Structure and Function

##### Concepts

Muscles  
Movement  
Support  
Structure  
Function  
Muscle fibers  
Sarcomere  
Contraction  
Relaxation  
Energy  
Adenosine Triphosphate (ATP)  
Organization  
Location  
Interaction  
Identification  
Tissue  
Heat  
Force

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. **Support** from skeletal **muscles** allows for **movement** and generation of **heat** for the body.
2. **Muscle fibers** are specialized cells and their **structure** allows for their specialized **function**.
3. **Interactions** between the components of a **sarcomere**, the contractile unit of skeletal muscle, allow for muscle **contraction** and **relaxation**.
4. The **organization** of **muscle tissue** contributes to its function.
5. The body converts chemical **energy** to usable **energy** in the form of **ATP**, which powers **muscle contraction**.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What are the functions of the muscular system? F
- 1b. What is the difference between isometric and isotonic contractions? F
- 1c. How do the structural characteristics of muscles enable their function in the body? C
- 2a. What are the features of a muscle cell? F
- 2b. How does the unique structural makeup of a muscle fiber allow for it to carry out its specialized function? C

6. **Identification** of specific **muscles** is based on their **structure** and **location** in the body.
7. **Muscles** apply a **force** that allow bones, which act as **levers**, to move at a joint, leading to body **movement**.

- 2c. How is a muscle cell unique compared to other body cells? C
- 3a. What is a sarcomere? F
- 3b. What is the sliding filament theory? F
- 3c. What is the role of acetylcholine in a muscle contraction? F
- 3d. How do the structures of actin and myosin and their interaction allow them to carry out their functions? C
- 3e. How does the nervous system interact with the muscular system to allow for a muscle contraction? C
- 3f. How does contracting and releasing of a muscle lead to movement? C
- 4b. What is the classification of a muscle based on its level of involvement in specific movements? F
- 4c. How are cells and tissues organized to make up a muscle? C
- 4d. Why are muscles considered organs? C
- 5a. What is the formula for cellular respiration? F
- 5b. Where does cellular respiration occur within a cell? F
- 5c. What is muscle fatigue and what leads to it? F
- 5d. How is cellular respiration linked to muscle contraction? C
- 6a. What are the locations of the main upper limb muscles? (biceps brachii, brachialis, brachioradialis, and triceps brachii) F
- 6b. What are the locations of the main lower limb muscles? (sartorius, adductors, quadriceps femoris, hamstrings, calf muscles, and tibialis anterior) F
- 6c. What are the locations of the main posterior muscles? (trapezius, latissimus dorsi, erector spinae, and gluteal muscles) F
- 6d. What are the locations of the main head and neck muscles? (epicranius, masseter, temporalis, buccinators, and trapezius) F
- 6e. Where in the body can skeletal muscle, cardiac muscle, and smooth muscle be found? F
- 6f. What are the distinguishing characteristics of skeletal muscle, cardiac muscle, and smooth muscle? C
- 6g. Is one muscle or one type of muscle more important than another? P
- 7a. What is a lever? F
- 7b. What is a fulcrum? F
- 7c. Where does the muscle apply effort in relation to the load in a first class lever? F
- 7d. Where does the muscle apply effort in relation to the load in a second class lever? F
- 7e. Where does the muscle apply effort in relation to the load in a third class lever? F
- 7f. What is an example of a first/second/third class lever within the body? F
- 7g. How do bones act as levers and joints act as fulcrums within the body? C

## Content Knowledge

Critical facts and information that students are expected to **KNOW** at the end of the unit.

### Students will know

- the overall function of the muscular system.
- the difference between skeletal, smooth, and cardiac muscle in terms of location, structure, and function.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 7. Other.

### Notes

- the unique structures within a muscle fiber and the role each plays in the muscles cells ability to do its job.
- how actin and myosin work together to allow for muscle contraction and relaxation.
- how the nervous system interacts with the muscular system to initiate muscle contraction.
- the role of acetylcholine in muscle contraction.
- the difference between isometric and isotonic muscle contractions.
- the formula for cellular respiration and where in the cell it occurs.
- the contributing factors to muscle fatigue.
- the relationship between a lever and a fulcrum.
- examples of first/second/third class levers in the body.
- how bones act as levers and joints act as fulcrums within the body.

- defend the claim that a muscle is considered an organ.
- identify the specified muscles of the upper limbs, lower limbs, posterior side, head, and neck.
- sketch and label a diagram of the structure of skeletal muscle.
- label the components of a muscle cell.
- classify muscles based on their level of involvement in a specific motion.
- explain the connection between cellular respiration and muscle contraction.
- identify types of levers found at various joints based on where the muscle applies force in relation to the load.

## Standards

The content standards that are taught and/or assessed in this unit.

### NGSS: Science and Engineering Practices

#### NGSS: 9-12

#### Practice 1. Asking questions (for science) and defining problems (for engineering)

Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions to determine relationships, including quantitative relationships, between independent and dependent variables.
- Evaluate a question to determine if it is testable and relevant.

#### Practice 3. Planning and carrying out investigations

Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Select appropriate tools to collect, record, analyze, and evaluate data.
- Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.
- Manipulate variables and collect data about a complex model of a proposed process or system to identify failure points or improve performance relative to criteria for success or other variables.

#### Practice 4. Analyzing and interpreting data

Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.

#### Practice 6. Constructing explanations (for science) and designing solutions (for engineering)

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.
- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.
- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

#### Practice 7. Engaging in argument from evidence

Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.

- Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

**1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.**

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

**2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.**

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

**5. Energy and Matter: Flows, Cycles, and Conservation – Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.**

- Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)(secondary to HS-LS3-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

##### LS1.C: Organization for Matter and Energy Flow in Organisms

- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another and release energy to the surrounding environment and to maintain body temperature. Cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. (HS-LS1-7)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students listen to and record Unit 5 Notes during a series of interactive lectures. [LS1.A 1](#) [LS1.A2](#), [LS1.C](#), [CCC 1, 2, 5, 6](#), Complete "Structure of a Skeletal Muscle" Plate Drawing [LS1.A- 2](#) Complete Movement Video Project [HS-LS1A](#), [CCC- 1, 2, 6](#) Muscle Fatigue Lab [-LS1.C](#), [CCC 1, 2, 5, 6](#), [EP 1, 3, 4, 6, 7](#)

Copy of Fatigue Lab.docx  

Copy of Copy of Muscle Anatomy and Contractions Handout.docx  

 Concept 3 Notes - Muscular System- 2023  

## Portrait of the Newtown Graduate

Plate 3: Skeletal Muscle Structure  

## Vocabulary

Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.

Insertion  
 Origin  
 Primer mover (agonist)  
 Antagonist  
 Synergist  
 Fixator  
 Myofibrils  
 Myofilaments  
 Sarcomeres  
 Muscle fibers  
 Sarcoplasmic reticulum  
 Mitochondria  
 Cellular respiration  
 T-tubules  
 Myosin  
 Actin  
 Troponin  
 Tropomyosin  
 Adenosine Triphosphate (ATP)  
 Fascicles  
 Epimysium  
 Perimysium  
 Endomysium  
 Resting membrane potential  
 Action potential  
 Neuromuscular junction  
 Motor neuron  
 Contraction  
 Relaxation  
 Muscle fatigue  
 Fast twitch  
 Slow twitch

## Resources

Teacher and student resources used to support the learning.

Muscle Anatomy and Contractions Handout  
 Sliding Filament Theory Flow Chart  
 Internal Muscle Structure DIN (Digital Interactive Notebook)  
 Muscles and Physics (Types of Levers) Worksheet  
 Poke a Muscle (Labeling Game)

### Videos Linked Below

Copy of Copy of Internal Muscle Structure DIN Slides  

Copy of Answers- Internal Muscle Structure DIN Slides  

Copy of Copy of Muscle Anatomy and Contractions Handout.docx  

Copy of Copy of Sliding Filament Flowchart - master copy - shared on FB  

 Poke a Muscle Game  

 Copy of Muscles and Physics (Types of Levers)  

## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

### Structure of Skeletal Muscle Plate Drawing | Summative | Visual Arts Project

Copy of Copy of Plate Drawing Grading Criteria.docx

Plate 3: Skeletal Muscle Structure

2 Standards Assessed

### Muscle Fatigue Lab | Formative | Lab Assignment

16 Standards Assessed

### Muscular System Test | Summative | Written Test

Copy of Copy of Muscular System Test CP

9 Standards Assessed

### Movement Video Assignment | Summative | Other Visual Assessments

Assesses connections between the Skeletal and Muscular Systems.  
Has been used as the midterm assignment.

 Copy of CP Anatomy and Physiology Midterm Project 2023-24

3 Standards Assessed

Muscular System Quiz | Formative | Written Test

Labeling Quiz

 Copy of Muscle Quizzes 2023

1 Standard Assessed

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## Differentiation

*Core learning activities, resources and assessments that meet the needs of all learners.*

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### The Nervous System

Newtown High School / High School / Science

Week 18 - Week 20 | 4 Curriculum Developers | Last Updated: Jun 12, 2025 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of the unit is to show how the parts of the nervous system work together to manage the functions of the body.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

##### Lens: Structure and Function

##### Concepts

Structure

Function

Classification

Transmission

Action Potential

Voltage

Sodium Potassium Pump

Neurotransmitters

Receptors

Protein Channels

Stimuli

Integration

Response

Brain

Neuron

Central Nervous System

Peripheral Nervous System

Senses

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. The **Central Nervous System** and the **Peripheral Nervous System** work together to receive **stimuli** from the external environment, **integrate** that information, and generate a **response**.
2. The **structure** of a **neuron** determines its **function** and **classification**.
3. **Neurotransmitters** bind to **receptors** on **neurons** and muscles to allow for the **transmission** of an **action potential**.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What are the functions of the nervous system? F
- 1b. What structures make up the central nervous system (CNS)? F
- 1c. What structures make up the peripheral nervous system (PNS)? F
- 1d. What is the function of the motor division of the PNS? F
- 1e. What is the function of the sensory division of the PNS? F
- 1f. What is the function of the somatic division of the motor nervous system? F
- 1g. What is the function of the autonomic division of the motor nervous system? F

4. **Protein channels** open to allow for change in **voltage** across the membrane of a **neuron**, which allows for the **transmission** of a nerve impulse. The **sodium potassium pump** resets the **voltage**.

5. The **brain** is segmented and each segment has its own designated **function**.

6. **Senses** detect **stimuli** from the internal and external environment and the **brain** interprets that information by the process of **integration**.

7. **Reflexes** allow for quick **integration** and **response** to **stimuli**.

1h. What is the function of sympathetic division of the autonomic nervous system? F

1i. What is the function of the parasympathetic division of the autonomic nervous system? F

1j. How do the various divisions of the nervous system allow the body to adapt to changes in the external and internal environment? C

1k. How do the sympathetic and parasympathetic divisions of the autonomic nervous system work in opposition to one another? C

1l. Is the nervous system the most important system? P

2a. What types of cell make up nervous tissue? F

2b. What are the parts of neuron? F

2c. How can a neuron be classified based on its structure and function? C

3a. What is a neurotransmitter? F

3b. How does the shape of a neurotransmitter determine its function? C

3c. How is a signal transmitted from one neuron to another? C

4a. What are the three ways protein channels can be gated? F

4b. What types of protein channels are involved in the conduction of an impulse? F

4c. What voltage changes occur across the cell membrane during an action potential? F

4d. What are the steps of an action potential? F

4e. How does the sodium potassium pump maintain resting potential? C

4f. How does depolarization and repolarization of the membrane contribute to the transmission of a nerve impulse? C

4g. Is it important for a neuron to reset to resting potential after an action potential is complete? P

5a. What are the three main parts of the brain and where are they located? F

5b. What are the general functions of each of the three main parts of the brain? F

5c. What are the 4 lobes of the cerebral cortex? F

5d. What types of activities are under the control of each of the 4 lobes of the cerebral cortex? F

5e. What is the function of the meninges? F

6a. What are the 6 senses the body uses to receive information from the environment and respond? F

6b. Which senses are general senses and which are special senses? F

6c. What type of receptors receive electromagnetic stimuli? F

6d. What types of receptors receive chemical stimuli? F

6e. What types of receptors receive stimuli in the form of sound waves? F

6f. What are the main sense organs associated with seeing, hearing, smelling, tasting, touching, and balance? F

6g. What types of sensations can be sensed by touch receptors? F

6h. What type of energy conversion occurs for each sense as the signal gets transmitted? F

6i. Is there one sense more important than the others in regard to helping to maintain homeostasis? P

7a. What are the steps of the reflex arc? F

7b. What is the benefit of having certain neural pathways organized as a reflex arcs? C

7c. Does out survival depend on out reflexes? P

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

### Students will know

- the functions of the nervous system.
- the structures make up the central nervous system (CNS).
- the structures make up the peripheral nervous system (PNS).
- the function of the motor division of the PNS.
- the function of the sensory division of the PNS.
- the function of the somatic division of the motor nervous system.
- the function of the autonomic division of the motor nervous system.
- the function of sympathetic division of the autonomic nervous system.
- the function of the parasympathetic division of the autonomic nervous system.
- how the various divisions of the nervous system allow the body to adapt to changes in the external and internal environment.
- how the sympathetic and parasympathetic divisions of the autonomic nervous system work in opposition to one another.
- the types of cells that make up nervous tissue.
- the general function of neurotransmitters.
- how the shape of a neurotransmitter determines its function.
- how excitatory and inhibitory neurotransmitters function differently.
- how a signal is transmitted from one neuron to another.
- the three ways protein channels can be gated.
- the types of protein channels are involved in the conduction of an impulse.
- what voltage changes occur across the cell membrane during an action potential.
- how the sodium potassium pump maintain resting potential.
- the importance of resting potential.
- how depolarization and repolarization of the membrane contribute to the transmission of a nerve impulse.
- the general functions of each of the three main parts of the brain.
- which activities are under the control of each of the 4 lobes of the cerebral cortex.
- the function and location of the thalamus.
- the function and location of the hypothalamus.
- the function of the meninges.
- how grey and white matter differ in structure and function.
- the 6 senses the body uses to receive information from the environment and respond.
- which senses are general senses and which are special senses.
- the type of receptors that receive electromagnetic stimuli
- the types of receptors that receive chemical stimuli

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 7. Other.

### Notes

Students will be able to

- identify the parts of a neuron
- classify a neuron based on its structure and function
- list the steps of an action potential
- label the main parts of the brain (cerebrum, cerebellum, and medulla oblongata)
- label the 4 lobes of the cerebral cortex

- the types of receptors that receive stimuli in form of sound waves
- the main sense organs associated with seeing, hearing, smelling, tasting, touching, and balance.
- the types of sensations that can be sensed by touch receptors.
- the type of energy conversion that occurs for each sense as the signal gets transmitted.
- how the information received by receptors in the eye is integrated to allow for vision.
- how the chemical information received by receptors in the nose is integrated to allow for smell.
- how the chemical information received by receptors in the mouth is integrated to allow for smell.
- how the information received by hair cells in the ear is integrated to allow for hearing.
- how the mechanical information received by receptors on the skin is integrated to allow for touch sensing.

## Standards

The content standards that are taught and/or assessed in this unit.

### NGSS: Science and Engineering Practices

#### NGSS: 9-12

#### Connections to the Nature of Science: Most Closely Associated with Practices

##### Scientific Investigations Use a Variety of Methods

- Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

##### Crosscutting Statements

**1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.**

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.
- Empirical evidence is needed to identify patterns.

**2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.**

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.
- Systems can be designed to cause a desired effect.
- Changes in systems may have various causes that may not have equal effects.

**3. Scale, Proportion, and Quantity – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.**

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

**4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.**

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

- Much of science deals with constructing explanations of how things change and how they remain stable.
- Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.

#### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

#### LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students will

listen to and record Nervous System Notes during a series of interactive lectures. [LS1. A, All CCC Listed Above](#)  
 complete Inquiry Activity- Action Potential (See Video Links Below that are helpful to show as students approach each section of the activity) [S&E](#)  
 complete Action Potential Card Sort (Instruction doc and cards (slideshow form) included [LS1.A](#)  
 complete Senses Lab Activity [LS1.A](#) , [CCC: Cause and Effect](#), [Mechanism and Prediction](#)  
 read and answer "Stress Article" Questions [LS1.A](#)  
 complete Neuron Plate [LS1.A](#) , [CCC: Patterns](#)

Copy of Action potential card sort.pptx  

Copy of Copy of Senses Lab Updated  

Copy of Inquiry Activity-Action Potential.pdf  

Copy of Stress Article.pdf   Copy of Stress Article  

Copy of Neuron Plate.pdf  

Copy of Action Potential Card Sort Activity  

 Sodium Potassium Pump - Amoeba Sisters  

 The Neuron    Action Potentials  

 Synapses  

 Concept 1 Notes Mod - Nervous System  

 Concept 2 Notes Mod - Senses.pptx  

## Portrait of the Newtown Graduate

### Vocabulary

Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.

### Resources

Teacher and student resources used to support the learning.

soma (cell body)  
 dendrites  
 axon  
 nerve  
 axon terminal  
 myelin sheath  
 nodes of Ranvier  
 sensory neurons  
 motor neurons  
 interneurons  
 resting membrane potential  
 threshold  
 action potential  
 nerve impulse  
 depolarization  
 repolarization  
 hyperpolarization  
 synapse  
 meninges  
 cerebrum  
 cerebellum  
 brain stem (medulla oblongata)  
 neurotransmitter  
 mechanoreceptor  
 thermoreceptor  
 photoreceptor  
 chemoreceptor  
 reflex  
 olfactory  
 gustatory  
 hair cells

Crash Course: Action Potential Worksheet to go with Video  
 Inside Out Video Worksheet  
 Nervous System Review Sheet

### Videos Linked Below

Copy of Copy of Action Potential Crash Course.docx  

Copy of Copy of Action Potential Crash Course Key.docx  

Copy of Copy of Inside Out - Emotions, Memory, and the Brain -  
 COPY FOR SHARING  

Copy of Unit 7: Nervous System Review  

## Assessments

*The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.*

### Senses Lab Activity | Formative | Other written assessments

This activity allows students to experience their senses and to make observations. There are no right or wrong answers when it comes to this lab, there fore there is no rubric. Students are given a score based on their completion of their observations and their participation in the lab.

Copy of Copy of Senses Lab Updated

### 3 Standards Assessed

### Neuron Plate Drawing | Summative | Visual Arts Project

Copy of Copy of Plate Drawing Grading Criteria.docx Copy of Neuron Plate.pdf

### 1 Standard Assessed

### Nervous System Test | Summative | Written Test

### 13 Standards Assessed

 Copy of Unit 7: Nervous System Test (CP)  

## Differentiation

*Core learning activities, resources and assessments that meet the needs of all learners.*

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### Transport (Circulatory and Respiratory Systems)

Newtown High School / High School / Science

Week 21 - Week 27 | 4 Curriculum Developers | Last Updated: Jun 12, 2025 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is for students to understand the pathway of oxygen and carbon dioxide flow through the respiratory and circulatory systems, as well as how the heart functions to pump blood to deliver oxygen to tissues and remove carbon dioxide from the body.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

**Lens:** Structure and Function

Concepts:

Structure

Function

Circulation

Blood

Cells

Oxygen

Carbon Dioxide

Tissues

Agglutinogens

Antibodies

Blood type

Blood Vessels

Heart

Lungs

Transport

Pathway

Cardiac Cycle

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. The **structure** of the **heart** correlates to the **function** of each of its components.
2. The **structure** of **blood vessels** dictate their **function** within the **pathway** of **circulation**.
3. **Agglutinogens** on red **blood cells** determine **blood type** and which **antibodies** are present within the **blood**.
4. The **cardiac cycle** is controlled by **intrinsic** and **extrinsic factors**.
5. The **structure** of the **lungs** correlates to the **function** of each of its components.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What types of molecules are transported by the circulatory system? F
- 1b. Where is the heart located within the body? F
- 1c. What are the four chambers that make up the heart and where are they located? F
- 1d. What are the 4 valves within the heart and where are they located? F
- 1e. What are the major blood vessels that bring blood to and from the heart and where are they located? F

6. **Lungs** provide a reciprocal **function** that constitutes breathing.
7. **Circulation of blood** allows for the **transport** of **oxygen** from the **lungs** to the **tissues** of the body, and **carbon dioxide** from the **tissues** of the body to the **lungs**.

- 1f. What is the function of the circulatory system? C
- 1g. What is the purpose of valves within the heart? C
- 1h. How are the heart, blood vessels, and blood used to accomplish the functions of the circulatory system? C

- 2a. What are examples of diseases of the blood vessels and what causes these diseases? F
- 2b. What instrument can be used to measure blood pressure? F
- 2c. How is blood pressure measured? F
- 2d. What is the function of arteries? C
- 2e. What is the function of veins? C
- 2f. What is the function of capillaries? C
- 2g. What is the significance of the two numbers that make up a blood pressure reading? C
- 2h. How does the structure of arteries allow them to carry out their function? C
- 2i. How does the structure of veins allow them to carry out their function? C
- 2j. How does the structure of capillaries allow them to carry out their function? C

- 3a. What components make up blood? F
- 3b. What factors contribute to blood type? F
- 3c. How does blood play a critical role in maintaining homeostasis? C
- 3d. Can a person in need of a blood transfusion receive blood from anyone? C
- 3e. Should donating blood be mandatory/more encouraged? P

- 4a. What instrument is used to measure the cardiac cycle? F
- 4b. What extrinsic control contribute to the regulation of the cardiac cycle? F
- 4c. What instrument can be used to hear a heart beat? F
- 4d. What sounds are detected by a stethoscope? F
- 4e. What is an arrhythmia and what are some specific examples? F
- 4f. How does the intrinsic cardiac conduction system work? C

- 5a. What is the function of the respiratory system? F
- 5b. Which structures within the respiratory system are considered part of the conducting zone? F
- 5c. What is the job of the conducting zone? F
- 5d. Which structures within the respiratory system are considered part of the respiratory zone? F
- 5e. What is the job of the respiratory zone? F
- 5f. What is the structural organization of the lungs? F
- 5g. What is the pathway of oxygen within the respiratory system? F
- 5h. What is the pathway of carbon dioxide within the respiratory system? F
- 5i. How does gas exchange occur in the lungs and in our tissues? C
- 5j. How does the type of epithelial tissue lining each structure within the respiratory system correlate to the function of that structure? C
- 5k. How does the respiratory system and the circulatory system work together to accomplish the function of the respiratory system? C

- 6a. What is the role of the diaphragm in breathing? F
- 6b. What is the relationship between volume, pressure, and air flow? F
- 6c. How does inspiration and expiration work together to allow for breathing? C

6d. How does the nervous system play a role in the process of breathing? C

6e. How does the muscular system play a role in the process of breathing? C

6f. Why is breathing required to maintain homeostasis at the cellular level? C

6g. Is someone who relies on machines to assist in critical life functions, such as breathing and circulation considered "alive"? P

7a. What pathway does oxygen take from the lungs to body tissues? F

7b. What pathway does carbon dioxide take from body tissues to the lungs? F

7c. What is the difference between pulmonary, systemic, and coronary circulation? C

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

Students will know:

- the function of the circulatory system.
- the types of molecules that are transported by the circulatory system.
- where the heart located within the body.
- the four chambers that make up the heart and where are they located.
- the 4 valves within the heart and where are they located.
- the major blood vessels that bring blood to and from the heart and where are they located.
- the purpose of valves within the heart.
- how the heart, blood vessels, and blood used to accomplish the functions of the circulatory system.
- the function of arteries and how the structure of arteries allow them to carry out their function.
- the function of veins and how the structure of veins allow them to carry out their function.
- the function of capillaries and how the structure of capillaries allow them to carry out their function.
- examples of diseases of the blood vessels and what causes these diseases.
- what instrument is used to measure blood pressure.
- how blood pressure is measured.
- the significance of the two numbers that make up a blood pressure reading.
- which components make up blood.
- the factors that contribute to blood type.
- how blood plays a critical role in maintaining homeostasis.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
- 5. Effectively apply the analysis, syntheses, and evaluative processes that enable productive problem solving.

- which blood types can be donated/received by individuals with each of the four blood types.
- which instrument is used to measure the cardiac cycle.
- which extrinsic control contribute to the regulation of the cardiac cycle.
- which instrument can be used to hear a heart beat.
- the heart sounds are detected by a stethoscope.
- examples of arrhythmias and their potential causes.
- how the intrinsic cardiac conduction system work.
- the function of the respiratory system.
- which structures within the respiratory system are considered part of the conducting zone.
- the job of the conducting zone.
- which structures within the respiratory system are considered part of the respiratory zone.
- the job of the respiratory zone.
- the structural organization of the lungs.
- the pathway of oxygen within the respiratory system.
- the pathway of carbon dioxide within the respiratory system.
- how gas exchange occurs in the lungs and in our tissues.
- the type of epithelial tissue lining each structure within the respiratory system and how it correlates to the function of that structure.
- how the respiratory system and the circulatory system work together to accomplish the function of the respiratory system.
- the role of the diaphragm in breathing.
- the relationship between volume, pressure, and air flow.
- how inspiration and expiration work together to allow for breathing.
- how the nervous system play a role in the process of breathing.
- how the muscular system play a role in the process of breathing.
- why breathing is required to maintain homeostasis at the cellular level.
- the pathway does oxygen take from the lungs to body tissues.
- the pathway does carbon dioxide take from body tissues to the lungs.
- the difference between pulmonary, systemic, and coronary circulation.

## Standards

*The content standards that are taught and/or assessed in this unit.*

### NGSS: Science and Engineering Practices

#### NGSS: 9-12

#### Practice 1. Asking questions (for science) and defining problems (for engineering)

Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information.
- Ask questions that arise from examining models or a theory, to clarify and/or seek additional information and relationships.
- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

#### Practice 3. Planning and carrying out investigations

Planning and carrying out investigations in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.
- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
- Select appropriate tools to collect, record, analyze, and evaluate data.
- Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

#### Practice 4. Analyzing and interpreting data

Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.
- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.
- Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

#### Practice 6. Constructing explanations (for science) and designing solutions (for engineering)

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.
- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.
- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

#### Practice 7. Engaging in argument from evidence

Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.

- Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.
- Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

#### Connections to the Nature of Science: Most Closely Associated with Practices

##### Scientific Investigations Use a Variety of Methods

- Science investigations use diverse methods and do not always use the same set of procedures to obtain data.

##### Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory.

#### NGSS: Crosscutting Concepts

##### NGSS: 9-12

##### Crosscutting Statements

1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.
- Mathematical representations are needed to identify some patterns.

2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.
- Changes in systems may have various causes that may not have equal effects.

3. Scale, Proportion, and Quantity – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

- Systems can be designed to do specific tasks.
- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.
- Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

- Much of science deals with constructing explanations of how things change and how they remain stable.
- Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.
- Feedback (negative or positive) can stabilize or destabilize a system.

**NGSS: Disciplinary Core Ideas**

**NGSS: 9-12**

**LS1: From Molecules to Organisms: Structures and Processes**

**LS1.A: Structure and Function**

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)(secondary to HS-LS3-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

**LS1.B: Growth and Development of Organisms**

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students will

listen to and record Unit 7a Notes during a series of interactive lectures. [LS1. A](#), [LS1. B](#), [All CCC Listed Above](#)

listen to and record Unit b Notes during a series of interactive lectures. [LS1. A](#), [LS1. B](#), [All CCC Listed Above](#)

complete Pig Heart Dissection [CCC: Patterns](#)

complete Real World Reading: Blood Transfusions [LS1. A](#)

complete Plate Drawing: The Heart [CCC: Patterns](#)

complete Plate Drawing: The Respiratory Zone [CCC: Patterns](#)

## Portrait of the Newtown Graduate

complete Discover Stations: Cardiovascular System (optional review) [LS1. A](#), [LS1. B](#)  
 complete Heart Table Graffiti (option, but great review and students enjoy it!) [CCC: Patterns](#)  
 complete Blood Typing Practice Activity [LS1. A](#),  
 complete "Gas Exchange Between the Heart and Lungs" Worksheet [LS1. A](#),  
 complete Lung Capacity Lab , [All Engineering Practices Listed Above](#)

- Copy of Heart Table Graffiti  
- Conclusion for Lung Capacity Lab  
- Copy of Plate: The Respiratory Zone  
- Copy of Lung Capacity Lab.pdf  
- Copy of Conclusion for Lung Capacity Lab  
- Copy of 2023 Pig HEART DISSECTION  
- Copy of Copy of Blood Typing  
- Copy of Copy of Big Body Diagram - Cardiovascular System TO LABEL.pptx  
- Copy of Discovery Stations- Cardiovascular System.pdf  
- Copy of Plate- Heart.pdf  
- Copy of Real World Reading-Blood Transfusions.pdf  
- Copy of Copy of Gas Exchange Between the Heart and Lungs  
-  Concept 3 Notes - Respiratory System.pptx  
-  Concept 2 Notes - Cardiovascular System  
-  Concept 1 Notes - Blood.pptx  

## Vocabulary

*Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.*

Blood  
 Plasma  
 Leukocytes  
 Thrombocytes  
 Erythrocytes  
 Hemoglobin  
 Hematopoiesis  
 Erythropoietin  
 Hemostasis  
 Antigens  
 Antibodies  
 Agglutinogens  
 Rh factor  
 Blood Flow  
 Blood Pressure  
 Blood vessels  
 Arterioles  
 Arteries  
 Capillaries  
 Veins  
 Venules

## Resources

*Teacher and student resources used to support the learning.*

Professor Dave Explains- Respiratory- Video with Questions (good review or intro)  
 Respiratory System Worksheet (Kids Health) - (good review or intro)  
 Cardio Review Sheets  
 Blood Typing Game- Good review activity for blood types

- Copy of Professor Dave Explains Respiratory Worksheet (TA)  
- Copy of Respiratory System Worksheet Kids Health (TA)  
- Copy of Cardiovascular System- Review.docx  
- Copy of Copy of Blood Typing Game  
- Copy of Heart, Circulation, and Blood Quiz Review  
-  Copy of Copy of Respiratory System Review  

Valve  
 Contractile  
 Cardiac muscles cells  
 Pacemaker cells  
 heartbeat  
 systole  
 diastole  
 pulse  
 electrocardiogram  
 bronchioles  
 gas exchange  
 cellular respiration  
 diffusion  
 bulk flow  
 lung capacity

## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

### Plate: The Respiratory Zone | Summative | Visual Arts Project

Copy of Copy of Plate Drawing Grading Criteria.docx Copy of Plate: The Respiratory Zone

3 Standards Assessed

### Plate: The Human Heart | Summative | Visual Arts Project

Copy of Copy of Plate Drawing Grading Criteria.docx Copy of Plate- Heart.pdf

2 Standards Assessed

### Lung Capacity Lab | Formative | Lab Assignment

Copy of Lung Capacity Lab.pdf Copy of Conclusion for Lung Capacity Lab Copy of Lung Capacity Lab Score Sheet

20 Standards Assessed

### Pig Heart Dissection | Formative | Lab Assignment

Copy of 2023 Pig HEART DISSECTION Copy of Lab 5: Heart Dissection Score Slip

6 Standards Assessed

### Transport Test | Summative | Written Test

Copy of Copy of Respiratory System Test -CP Copy of Unit 5: Cardiovascular System Test (CP) 2023

18 Standards Assessed

### Cardiovascular System Quiz/Respiratory System Quiz | Formative | Written Test

One quick check midway Through the Cardio Section as a formative check in.

Copy of Heart Anatomy and Blood Flow Quiz (CP)

9 Standards Assessed

### Respiratory Disease Presentation | Formative | Oral Report

Copy of Copy of Respiratory System Disorder Project.docx Copy of Copy of Respiratory System Disorders Sign Up Sheet.docx

6 Standards Assessed

## Differentiation

*Core learning activities, resources and assessments that meet the needs of all learners.*

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### Absorption and Excretion (Digestive and Urinary Systems)

Newtown High School / High School / Science

Week 28 - Week 33 | 4 Curriculum Developers | Last Updated: Jun 12, 2025 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is for students to develop an understanding of how the body effectively and efficiently absorbs nutrients and excretes wastes from the foods they eat to acquire necessary raw materials for maintaining homeostasis.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

##### Lens: Structure and Function

Concepts:

Structure

Function

Digestion

Excretion

Macromolecules

Enzymes

Filtration

Body systems

Organs

Homeostasis

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. **Body systems** work together to achieve the common goal of maintaining **homeostasis**.
2. The **structure** and arrangement of each of the **organs** within the digestive systems **allows** for the efficient **function** of that **body system**.
3. Mechanical **digestion** and chemical **digestion**, by acids and **enzymes**, break down **macromolecules** into products that will be absorbed and used to help the body maintain **homeostasis**.
4. The urinary system allows for **filtration** of waste from the blood and for the **excretion** of that waste from the body.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. How does the digestive system work with the circulatory system to accomplish its main function? C
  - 1b. How does the digestive system work with the nervous system to accomplish its main function? C
  - 1c. How does the digestive system work with the muscular system to accomplish its main function? C
  - 1d. How does the urinary system work with the digestive system to complete its functions? C
  - 1e. How does the urinary system work with the nervous system to complete its functions? C
  - 1f. How does the urinary system work with the circulatory system to complete its functions? C
- 2a. What is the function of the mouth and the structures within it? F
  - 2b. What is the function of the esophagus? F
  - 2c. What is the function of the stomach? F

- 2d. What is the function of the gallbladder? F
- 2e. What is the function of the liver? F
- 2f. What is the function of the pancreas? F
- 2g. What are the three segments of the small intestine and what processes occur in each section? F
- 2h. What are the three segments of the large intestine? F
- 2i. What is the main function of the large intestine? F
- 2j. Where are the organs of the alimentary canal (mouth, esophagus, stomach, small intestine, large intestine, rectum, anus) located in the body? F
- 2k. Where are the accessory organs (salivary glands, teeth, gallbladder, liver, pancreas) located in the body? F
- 2l. What is the significance of sphincters within the digestive system? F
- 2m. What is the function of the digestive system? C
- 2n. How does the structure of the small intestine allow for maximum absorption of nutrients? C
- 2o. How does the types of epithelial tissue lining each organ within the alimentary canal correlate to the type of action that occurs in that organ? C
- 2p. How does the body show that homeostasis is not maintained within the digestive system? C
- 2q. Are bacteria of the digestive system more helpful or harmful? P
- 3a. What are the four major macromolecules broken down by the digestive system? F
- 3b. What are the monomers that results from the breakdown of each of the macromolecule types? F
- 3c. What are the products of digestion of each of the macromolecules types used for in the body? F
- 3d. What are the steps of the digestive process and in which organ does each step occur? F
- 3e. Which enzymes are responsible for the breakdown of carbohydrates and where does digestion of carbohydrates occur? F
- 3f. Which enzymes are responsible for the breakdown of lipids and where does digestion of lipids occur? F
- 3g. Which enzymes are responsible for the breakdown of proteins and where does digestion of proteins occur? F
- 3h. Which organs are responsible for chemical digestion? F
- 3i. Which organs are responsible for mechanical digestion? F
- 3j. Why must macromolecules be broken down by the digestive system? C
- 3k. What is the difference between chemical and mechanical digestion? C
- 4a. What are the functions of the renal arteries and the renal veins? F
- 4b. What is the role of the nephron? F
- 4c. What are the structures within the nephron and what is the role of each? F
- 4d. What are the roles of the ureters, bladder, and urethra in the urinary system? F
- 4e. Where are the kidneys, ureters, bladder, and urethra located in the body? F
- 4f. What are the major functions of the urinary system? C
- 4g. How do nephrons filter blood to make urine? C
- 4h. *How does the structure of the ureter, bladder, and urethra impact function and efficiency?* C
- 4i. What can indicators within a urinalysis test indicate about an individual's health? C
- 4j. Are the kidneys the most critical organ in the urinary system? P

4k. What is the most important organ/organ system in the human body? P

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

Students will know:

- how the digestive system works with the circulatory system to accomplish its main function.
- how the digestive system works with the nervous system to accomplish its main function.
- how the digestive system works with the muscular system to accomplish its main function.
- how the urinary system works with the digestive system to complete its functions.
- how the urinary system works with the nervous system to complete its functions.
- how the urinary system works with the circulatory system to complete its functions.
- the function of the mouth and the structures within it.
- the function of the esophagus.
- the function of the stomach.
- the function of the gallbladder.
- the function of the liver.
- the function of the pancreas.
- the three segments of the small intestine and what processes occur in each section.
- the three segments of the large intestine.
- the main function of the large intestine.
- which organs are part of the alimentary canal and where they are located in the body.
- which structures are accessory structures and where they are located in the body.
- the significance of sphincters within the digestive system.
- the function of the digestive system.
- how the structure of the small intestine allows for maximum absorption of nutrients.
- how the types of epithelial tissue lining each organ within the alimentary canal correlate to the type of action that occurs in that organ.
- how the body shows that homeostasis is not maintained within the digestive system, by identifying various diseases of the digestive system.
- how bacteria of the digestive system is helpful or harmful.
- the four major macromolecules broken down by the digestive system.
- the monomers that results from the breakdown of each of the macromolecule types.
- the products of digestion of each of the macromolecules types used for in the body.
- the steps of the digestive process and in which organ each step occurs.
- which enzymes are responsible for the breakdown of carbohydrates and where digestion of carbohydrates occurs.
- which enzymes are responsible for the breakdown of lipids and where digestion of lipids occurs.
- which enzymes are responsible for the breakdown of proteins and where digestion of proteins occurs.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 4. Demonstrate innovation, flexibility and adaptability in thinking patterns, work habits, and working/learning conditions.
- 5. Effectively apply the analysis, syntheses, and evaluative processes that enable productive problem solving.

- which organs are responsible for chemical digestion.
- which organs are responsible for mechanical digestion.
- why macromolecules *are* broken down by the digestive system.
- the difference between chemical and mechanical digestion.
- the functions of the renal arteries and the renal veins.
- the role of the nephron.
- the structures within the nephron and what is the role of each.
- the roles of the ureters, bladder, and urethra in the urinary system.
- the location of the kidneys, ureters, bladder, and urethra in the body.
- the major functions of the urinary system.
- how nephrons filter blood to make urine.
- how the structure of the ureter, the bladder, and the urethra allow them to carry out their functions.
- what indicators within a urinalysis test indicate about an individual's health.

## Standards

*The content standards that are taught and/or assessed in this unit.*

### NGSS: Science and Engineering Practices

#### NGSS: 9-12

#### Practice 3. Planning and carrying out investigations

Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Select appropriate tools to collect, record, analyze, and evaluate data.

#### Practice 8. Obtaining, evaluating, and communicating information

Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

- Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

#### Connections to the Nature of Science: Most Closely Associated with Practices

##### Scientific Investigations Use a Variety of Methods

- Science investigations use diverse methods and do not always use the same set of procedures to obtain data.

##### Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory.

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.
- Systems can be designed to cause a desired effect.

- Changes in systems may have various causes that may not have equal effects.

3. Scale, Proportion, and Quantity – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

**5. Energy and Matter: Flows, Cycles, and Conservation – Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.**

- Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

- Much of science deals with constructing explanations of how things change and how they remain stable.
- Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.
- Feedback (negative or positive) can stabilize or destabilize a system.

### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

##### LS1.B: Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

##### LS1.C: Organization for Matter and Energy Flow in Organisms

- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another and release energy to the surrounding environment and to maintain body temperature. Cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. (HS-LS1-7)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students will:

- listen to and record Unit 8a Notes during a series of interactive lectures. [LS1.A](#), [LS1.B](#), [LS1C](#), [All CCC listen above](#)
- listen to and record Unit 8b Notes during a series of interactive lectures. [LS1.A](#), [LS1.B](#), [LS1C](#), [All CCC listen above](#)
- complete "Poop Scoop" assignment [CCC 1 and 2](#)
- complete Digestive System Discovery Stations [LS1.A](#), [LS1.B](#), [LS1C](#)
- Fetal Pig Dissection- Culminating activity where students can view major components of all body systems discussed throughout the year) [CCC 1 and 6](#), [LS1.A](#), [SEP 3 and 8](#)

## Portrait of the Newtown Graduate

Kidney Lab Stations [LS1.A](#), [LS1.B](#), [LS1C](#)

- Copy of Discovery Stations: Digestive System.pdf  
- Copy of Poop Scoop.docx (TA)  
- Discovery Stations - Digestive System.pdf  
- Copy of Dissection - Fetal Pig  
- Prelab Fetal Pig Dissection Video 1  
- Prelab Fetal Pig Dissection Video 2  
- Copy of Concept 1 Notes - Digestive System.pptx  
- Copy of Concept 2 Notes - Nutrition and Metabolism.pptx  
- colitis\_sup.pptx   colitis\_notes- teacher notes.pdf  
- colitis case study 2025 - STUDENT.pdf  
- Copy of Concept 3 Notes - Urinary System (H).pptx  
- Lab Stations - Kidneys.pdf  

## Vocabulary

Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.

alimentary canal  
 ingestion  
 propulsion  
 bolus  
 peristalsis  
 salivary glands  
 epiglottis  
 gastric juices  
 chyme  
 bile  
 enteric nervous system  
 chemical digestion  
 mechanical digestion  
 sphincter  
 excretion  
 defecation  
 metabolism  
 urination  
 urinalysis

## Resources

Teacher and student resources used to support the learning.

What your Poop Says About you article (can be used in conjunction with "Poop Scoop Assignment")  
 Digestive System Coloring Assignment  
 Digestive System Review

- Copy of Poop Scoop.docx (TA)  
- Copy of Digestive System Coloring.pdf  
- Copy of Digestive System Review  

## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

Fetal Pig Dissection | Summative | Lab Assignment

 Fetal Pig Dissection (Newtown) 2025

No Standards Assessed

**Digestive System Test | Summative | Written Test**

Generally the last full summative, unit specific exam.

 Copy of 2024-Test A - Digestive System (CP).docx

No Standards Assessed

**Fetal Pig Dissection Practical | Summative | Written Test**

 Copy of Fetal Pig Lab Practical

[12 Standards Assessed](#)

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## Differentiation

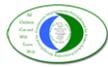
*Core learning activities, resources and assessments that meet the needs of all learners.*

---

## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

---



## Unit Plan

### Reproduction and Fetal Development

Newtown High School / High School / Science

Week 34 - Week 36 | 4 Curriculum Developers | Last Updated: Jun 12, 2025 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is for students to follow fetal development, from conception to birth, and to explore how and what kinds of complications could potentially impact mother and baby.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

**Lens:** Growth and Development

**Concepts:**

Fertilization

Development

Growth

Organ Systems

Tissues

Organs

Cells

Meiosis

Mitosis

Differentiation

Labor

Birth

Process

Errors

Complications

Male

Female

Hormones

Menstrual Cycle

Cesarean Section

Fetus

Lactation

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. The **structure** of the **organs** within the **male** and **female** reproductive **systems** contribute to the overall **function** of those **systems**.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What are the functions of the male reproductive system? F
- 1b. What are the functions of the female reproductive system? F

2. **Hormones** are involved in regulating **puberty** in both **males** and **females**, and **lactation** and the **menstrual cycle** in **females**.
3. **Meiosis** results in sex **cells** which come together during **fertilization** to conceive a new life.
4. **Mitosis** is the replication of **cells** which results in **growth**, while **differentiation** of those **cells** results in the **development** of various **tissues, organs**, and **organ systems**.
5. The **process** of **labor** results in the **birth** of a baby.
6. **Errors** at any stage of **development** or during **labor** can lead to **complications** for the developing embryo/fetus and/or the mother.

- 1c. What are the primary sex organs of the female reproductive system? F
- 1d. What are the roles of the primary sex organs of the female reproductive system? F
- 1e. What are the primary sex organs of the male reproductive system? F
- 1f. What are the roles of the primary sex organs of the male reproductive system? F
- 1g. Where are sperm made? F
- 1h. What is the pathway taken by sperm to leave the body? F
- 1i. What is the significance of the different accessory gland secretions to the sperm in semen? F
- 1j. What are the different erectile tissues of the penis? F
- 1k. What are the three layers of the uterine wall? F
- 1l. What are the roles of the layers of the uterine wall? F
- 1m. What is the path of the oocyte from ovulation to implantation? F
- 1n. How do each of the erectile tissues allow the penis to function as the male copulatory organ? C
- 1o. How does the structure of the fallopian tube assist in its function? C
  
- 2a. What leads to milk production in females? F
- 2b. Where is milk made in lactating females? F
- 2c. What are the main events of the ovarian cycle, along with timing? F
- 2d. What are the main events of the uterine cycle, along with timing? F
- 2e. What is the hypothalamic-pituitary-gonadal (HPG) axis? F
- 2f. How does the HPG axis regulate puberty? C
- 2g. How is puberty different between male and females? C
- 2h. How do gonadotropins and female sex hormones regulate the ovarian and uterine cycles? C
  
- 3a. What are the phases of the female menstrual cycle? F
- 3b. What is fertilization and what is the result? F
- 3c. How do hormones regulate the menstrual cycle? C
- 3d. How does meiosis result in sperm and egg cells? C
  
- 4a. What developmental milestones are reached by the end of each month of development? F
- 4b. What is differentiation? F
- 4c. How does mitosis lead to growth of an organism? C
- 4d. How does pregnancy impact the mother physically and mentally during each stage? C
- 4e. How does the developing fetus receive nutrients? C
- 4f. How do a mother's choices impact the developing fetus (i.e. nutrition or otherwise)? P
  
- 5a. What factors can impact a mother's pregnancy, labor, and delivery experience? F
- 5b. What are some examples of complications that can occur during labor and delivery? F
- 5c. How do specific labor and delivery complications impact the baby and the mother? C
- 5d. Do all families have equal access to proper prenatal and postnatal care? C
- 5e. Is postnatal care for the mother more important than prenatal care? P
  
- 6a. What are some examples of congenital abnormalities that could result from errors during meiosis, mitosis, and development? F

- 6b. What are some examples of pregnancy complications that could result from errors during meiosis, mitosis, and development? F
- 6c. How do specific congenital abnormalities impact the baby? C
- 6d. How do specific pregnancy complications impact that baby and the mother? C

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

Students will know:

- the functions of the male reproductive system.
- the functions of the female reproductive system.
- the primary sex organs of the female reproductive system.
- the roles of the primary sex organs of the female reproductive system.
- the primary sex organs of the male reproductive system.
- the roles of the primary sex organs of the male reproductive system.
- where sperm are made.
- the pathway taken by sperm to leave the body.
- the significance of the different accessory gland secretions to the sperm in semen.
- the different erectile tissues of the penis.
- how each of the erectile tissues allow the penis to function as the male copulatory organ.
- the path of the oocyte from ovulation to implantation.
- what causes females to lactate?
- the structure of the fallopian tube assists in its function.
- the three layers of the uterine wall.
- the roles of the layers of the uterine wall.
- where the milk is made in lactating females.
- what the hypothalamic-pituitary-gonadal (HPG) axis is.
- how the HPG axis regulates puberty.
- how puberty is different between male and females.
- what the main events of the ovarian cycle are, along with timing.
- what the main events of the uterine cycle are, along with timing.
- how gonadotropins and female sex hormones regulate the ovarian and uterine cycles.
- the phases of the female menstrual cycle.
- what fertilization is and the result.
- how hormones regulate the menstrual cycle.
- how meiosis results in sperm and egg cells.
- developmental milestones reached by the end of each month of development.
- the term differentiation.
- how mitosis leads to growth of an organism.
- how pregnancy impacts the mother physically and mentally during each stage.
- how the developing fetus receives nutrients.
- factors *that* can impact a mother's pregnancy, labor, and delivery experience.
- examples of complications that can occur during labor and delivery.
- how specific labor and delivery complications impact the baby and the mother.

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- the importance of prenatal and postnatal care for mother and baby.
- examples of congenital abnormalities that could result from errors during meiosis, mitosis, and development.
- examples of pregnancy complications that could result from errors during meiosis, mitosis, and development.
- how specific congenital abnormalities impact the baby.
- how specific pregnancy complications impact the baby and the mother.

## Standards

The content standards that are taught and/or assessed in this unit.

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

**1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.**

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

**6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**

- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

- Feedback (negative or positive) can stabilize or destabilize a system.

#### Connections to the Nature of Science: Most Closely Associated with Crosscutting Concepts

##### Science is a Human Endeavor

- Technological advances have influenced the progress of science and science has influenced advances in technology.

##### Science Addresses Questions About the Natural and Material World.

- Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions.
- Many decisions are not made using science alone, but rely on social and cultural contexts to resolve issues.

### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)(secondary to HS-LS3-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

##### LS1.B: Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

[This is a different format- I think you had verbs for the other units](#)

Notes on fertilization and pregnancy/development. [LS1](#), [LS2](#)

Pregnancy Development Complications Assignment [LS1.A](#), [LS1B](#), [CCC 1 and 6](#)

Delivery Day! (Labor and Delivery Nurse comes to give a presentation on the process of labor and delivery and answer student's questions about the process and nursing in general.

[LS1.A](#), [Connections to nature of Science](#)

Copy of Pregnancy/Developmental Complications Assignment  

 Copy of Concept 2 Notes - Fertilization.pptx  

 Copy of Concept 3 Notes - Pregnancy and Development.pptx  

 Copy of Concept 1 Notes - Reproductive System.pptx  

## Portrait of the Newtown Graduate

### Vocabulary

*Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.*

mitosis  
meiosis  
differentiation  
fertilization  
growth  
development  
mutation  
congenital  
positive feedback  
menstruation  
ovulation

### Resources

*Teacher and student resources used to support the learning.*

### Assessments

*The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.*

Pregnancy/Developmental Complications Assignment | Summative | Oral Report

Research and Present

Copy of Pregnancy/Developmental Complications Assignment

[6 Standards Assessed](#)

### Differentiation

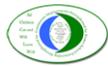
*Core learning activities, resources and assessments that meet the needs of all learners.*

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### Protection (Immune and Integumentary Systems)

Newtown High School / High School / Science

Week 37 - Week 38 | 4 Curriculum Developers | Last Updated: Jun 12, 2025 by Allegretto, Tara

#### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

The purpose of this unit is to show how the various components of skin, the immune system, and the lymphatic system work together to protect that body from disease.

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

##### Lens: Protection

##### Concepts:

Structure  
Function  
Homeostasis  
Glands  
Protection  
Lymph  
Tissues  
Immunity  
Vaccination  
Antibiotics  
Skin  
Tissue  
Hair  
Cure  
Bacteria  
Viruses  
Disease  
Cells

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. The **structure** of the **tissues** and the accessory **organs** found within the **skin** contribute to the **function** of the integumentary system.
2. The structures within the **skin**, such as **glands**, **hair**, and **nails** contribute to the maintenance of **homeostasis**.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What are the functions of the integumentary system? F
- 1b. What is the role of the dermis? F
- 1c. What is the role of the epidermis? F
- 1d. What are the 4 types of epidermal cells and what are their roles? F
- 1e. What is the hypodermis and what is its function? F

3. **Lymph**, along with the structures of the lymphatic system **function** to help fight **disease** and maintain **homeostasis**.
4. Various **cell** types contribute to fighting **disease** and establishing **immunity**.
5. **Immunity** can be established naturally or through **vaccination**.
6. **Antibiotics cure disease** caused by **bacteria**.

- 1f. How does the integumentary system aid in maintaining homeostasis? C
- 1g. How does the integumentary system work together with other body systems to maintain homeostasis? C
- 1h. How do the types of epithelial and connective tissue found within the skin contribute to the ability of skin to do it's function? C
- 2a. What is the structure and function of hair? F
- 2b. What is the structure and function of the nail? F
- 2c. Where are eccrine sweat glands located and what is their function? F
- 2d. Where are apocrine sweat glands located and what is their function? F
- 2e. Where are sebaceous glands located and what is their function? F
- 2f. What types of sensory receptors are found in the skin? F
- 2g. What sensations do each of the types of touch receptors in the skin perceive? F
- 3a. What is the function of the lymphatic system? F
- 3b. How does the lymphatic system work together with cardiovascular system and the immune system? F
- 3c. Where is lymph made? F
- 3e. Where does lymph collect? F
- 3f. What are the types of lymphatic ducts? F
- 3g. What types of cells make up lymphoid tissues and organs? F
- 3h. What are the functional roles of primary lymphoid tissues? F
- 3i. What are the structures that carry out the function of primary lymphoid tissues? F
- 3j. What are the functional roles of secondary lymphoid tissues? F
- 3k. What are the structures that carry out the function of secondary lymphoid tissues? F
- 3l. What is the significance of lymph nodes? F
- 3m. What are the roles of the thymus, the spleen, the tonsils, Peyer's patcher, and the appendix in the lymphatic/immune system? F
- 3n. How is lymph transported throughout the body? C
- 4a. What is the function of the immune system? F
- 4b. What cells, tissues, and organs work together to make up the immune system? F
- 4c. What various methods can immune cells use to destroy pathogens? F
- 4d. What is the role of B cells and T cells in immunity? F
- 4e. What are the steps of the inflammatory response?
- 4f. How do antigen presenting cells aid in the immune response? C
- 5a. What is the difference between innate and adaptive defense? F
- 5b. What are the two lines of innate defense? F
- 5c. What is the difference between active and passive immunity? F
- 5d. How are humoral and cellular immunity different? F
- 5e. How are humoral and cellular immunity similar? F
- 5f. How can active immunity be acquired both naturally and artificially? C
- 5g. How can passive immunity be acquired both naturally and artificially? C
- 5h. How can the immune system fail? C
- 6a. What is antibiotic resistance? F
- 6b. What contributes to antibiotic resistance? F
- 6c. What will happen if antibiotics no longer work? F
- 6d. What could serve as an alternative to antibiotics? F

- 6e. How is antibiotic resistance an example of evolution? C  
 6f. Should we stop producing new antibiotics and explore other options? P

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

### Students will know

- **Integumentary**

- the functions of the integumentary system.
- how the integumentary system aids in maintaining homeostasis.
- how the integumentary system works together with other body systems to maintain homeostasis.
- the role of the dermis.
- the role of the epidermis.
- the 4 types of epidermal cells and their roles.
- what the hypodermis is and what its function is.
- the structure and function of hair.
- the structure and function of the nail.
- where eccrine sweat glands are located and what function is.
- where apocrine sweat glands are located and what their function is.
- where sebaceous glands are located and what their function is.
- the types of sensory receptors found in the skin.
- the sensations that each of the types of touch receptors in the skin perceive.

### **Lymphatic**

- the function of the lymphatic system
- how the lymphatic system works together with the cardiovascular system and the immune system
- where lymph is made
- how lymph is transported throughout the body
- where lymph collects
- the types of lymphatic ducts there are
- the types of cells that make up lymphoid tissues and organs
- the functional roles of primary lymphoid tissues
- the structures that carry out the function of primary lymphoid tissues
- the functional roles of secondary lymphoid tissues
- the structures that carry out the function of secondary lymphoid tissues
- the significance of lymph nodes
- the roles of the thymus, the spleen, the tonsils, Peyer's patcher, and the appendix in the lymphatic/immune system

### **Immune**

- the function of the immune system
- the cells, tissues, and organs work together to make up the immune system
- the difference between innate and adaptive defense
- the two lines of innate defense
- the various methods immune cells use to destroy pathogens
- the steps of the inflammatory response
- how the humoral and cellular immunity are different
- how are humoral and cellular immunity are similar
- the difference between active and passive immunity

## Critical Skills

Critical skills that students are expected to be able to **DO** at the end of the unit.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
- 5. Effectively apply the analysis, syntheses, and evaluative processes that enable productive problem solving.

how active immunity can be acquired both naturally and artificially

how passive immunity can be acquired both naturally and artificially

the role of B cells and T cells in immunity

how antigen presenting cells aid in the immune response

how the immune system can fail

what is antibiotic resistance

what contributes to antibiotic resistance

how antibiotic resistance is an example of evolution

what will happen if antibiotics no longer work

what could serve as an alternative to antibiotics

potential alternatives to antibiotics to cure bacterial disease

## Standards

*The content standards that are taught and/or assessed in this unit.*

### NGSS: Science and Engineering Practices

#### NGSS: 9-12

#### Practice 3. Planning and carrying out investigations

Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Select appropriate tools to collect, record, analyze, and evaluate data.
- Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.
- Manipulate variables and collect data about a complex model of a proposed process or system to identify failure points or improve performance relative to criteria for success or other variables.

#### Practice 4. Analyzing and interpreting data

Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.
- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.

#### Practice 6. Constructing explanations (for science) and designing solutions (for engineering)

Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.
- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.
- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

#### Practice 7. Engaging in argument from evidence

Engaging in argument from evidence in 9-12 builds on K-8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.

- Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.

### NGSS: Crosscutting Concepts

#### NGSS: 9-12

#### Crosscutting Statements

1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.
- 2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.**
- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.
- 5. Energy and Matter: Flows, Cycles, and Conservation – Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.**
- Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.
- 6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions.**
- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.
- 7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**
- Much of science deals with constructing explanations of how things change and how they remain stable.
- Feedback (negative or positive) can stabilize or destabilize a system.

#### NGSS: Disciplinary Core Ideas

#### NGSS: 9-12

#### LS1: From Molecules to Organisms: Structures and Processes

##### LS1.A: Structure and Function

- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

#### LS4: Biological Evolution: Unity and Diversity

##### LS4.B: Natural Selection

- Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2), (HS-LS4-3)
- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

##### LS4.C: Adaptation

- Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3), (HS-LS4-4)
- Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)

[Interactive version of NGSS](#)

[NGSS Resources](#)

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

Students **will**

listen to and record Unit 3 Notes during a series of interactive lectures. [HS-LS1A](#), [HS-LS4B](#), [HS-LS4C](#), [CCC- 1](#), [2](#), [5](#), [6](#), [7](#) complete UV Radiation Investigation Inquiry Lab [Science and Engineering Practices 1](#), [2](#), [5](#), [6](#), [7](#), [HS-LS1A](#)

## Portrait of the Newtown Graduate

complete Integumentary System Plate Drawing (This image is the same image as the "Skin Coloring" assignment.) [HS- LS1A](#)

complete "Tattoo You" Reading and Questions [HS-LS1A](#)

watch and Discuss "The Biology of Skin Color" [HS-LS4B](#), [HS-LS4C](#)

Copy of Unit 3: Integumentary System  

Copy of Skin Coloring.pdf   Copy of Tattoo You.docx  

Copy of Tattoo Reading Questions  

Copy of Honors Pig Foot Dissection- Notebook Requirements  

 HHMI: The Biology of Skin Color  

 Copy of Copy of Copy of UV Radiation Investigation  

 bad\_burn\_key TEACHER.pdf  

 bad\_burn Case study 2025.pdf  

 bad\_burn\_notes TEACHER.pdf  

 typical\_cold\_key TEACHER.pdf  

 typical\_cold\_notes TEACHER.pdf  

 typical\_cold Case Study 2025.pdf  

## Vocabulary

*Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.*

Keratin  
 Melanocytes  
 Melanin  
 Dendritic  
 Langerhans Cells  
 Tactile epithelial  
 Merkel cells  
 Hair  
 Hair follicles  
 Arrector pili  
 Eccrine sweat glands  
 Apocrine sweat glands  
 Macrophages  
 Lymphatic vessels  
 Lymph  
 Lymph nodes  
 Lacteals  
 T cells  
 B cells  
 Immunity  
 Pathogen  
 Antigens  
 Antibodies  
 Phagocytes  
 Inflammation  
 Vaccination  
 Antigen-presenting cells  
 Vaccination

## Resources

*Teacher and student resources used to support the learning.*

Skin Coloring Assignment

### Video Links Below

Copy of Skin Coloring.pdf  

 TedEd: The Science of Skin  

 Amoeba Sisters: Integumentary System  

 Crash Course: Skin Deep  

 Crash Course: Skin Deeper  

## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

**Integumentary System Test | Summative | Written Test**

[14 Standards Assessed](#)

**Integumentary System Quiz | Formative | Written Test**

Check in on first half of notes.

[5 Standards Assessed](#)

**Integumentary System Plate Drawing | Summative | Visual Arts Project**

Create an Exact Replica of the drawing provided, to scale, with proper labeling, following any instructions given by the teacher.

Image on second page of attached document.

Copy of Skin Coloring.pdf

Copy of Copy of Plate Drawing Grading Criteria.docx

[2 Standards Assessed](#)

**Sunscreen Lab | Formative | Lab Assignment**

Copy of Copy of Copy of UV Radiation Investigation

Copy of Sunscreen Inquiry Lab- Score Sheet

[9 Standards Assessed](#)

**Pig Foot Dissection | Formative | Lab Assignment**

Copy of Honors Pig Foot Dissection- Notebook Requirements

Copy of Lab 3: Pig Foot Dissection Score Sheet

[4 Standards Assessed](#)

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## Differentiation

Core learning activities, resources and assessments that meet the needs of all learners.

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## Test Prep Connections

As appropriate, include activities that build skills for standardized testing, such as IABs.

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## Unit Plan Tutoring

Newtown High School / High School / English Language Arts

Week 1 - Week 20 | 3 Curriculum Developers | Last Updated: Jun 10, 2025 by Lye Jr, Victor

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### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

To create an understanding of the tutoring process and sessions and the role of a writing center tutor.

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#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

Lens: Tutoring

Concepts: Writing, conversations, anticipation, needs, reflection, sessions, tutor, writer

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## Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. Effective tutors meet the needs of the writer without judgment.
2. Tutoring requires conversations about writing rather than editing someone's work.
3. Tutors anticipate writers' needs and adjust their sessions as necessary.
4. Tutoring makes better writers, not better papers.
5. Constant reflection on writing and tutoring creates a well-rounded tutor.

## Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. How does a rubric direct a tutoring session? (F)
- 1b. How do tutors meet the writer where they are? (C)
- 1c. Can a tutor conduct a session without relying on judgment? (P)
  
- 2a. How does the tutor start a conversation with a writer? (F)
- 2b. How does a tutor establish credibility with a writer? (C)
- 2c. Can a tutor establish rapport with a writer in a short period of time? (C)
  
- 3a. What questions does a tutor ask to understand what a writer needs? (F)
- 3b. How does a tutor know what a writer needs? (C)
- 3c. What adjustments are necessary for a successful tutoring session? (C)
  
- 4a. Why is it necessary for a writer to read their work aloud? (F)
- 4b. How can a tutoring session make someone a better writer? (C)
- 4c. How does a tutor know if a session was successful? (P)
  
- 5a. How does a tutoring session benefit the tutor? (F)
- 5b. How does written reflection on the tutoring experience allow for a better understanding of the process? (C)
- 5c. How do tutors adapt and adjust to meet their needs and the needs of the writer? (P)
- 5d. What makes a good tutor? (P)

## Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

Students will:

- independently conduct a tutoring session with another student while delivering helpful and insightful guidance.
- react to the needs of a writer in a session
- demonstrate the maturity and understanding to meet a writer where they are
- have a greater understanding of the writing process and the writing center's role in it.
- effectively demonstrate the skills to successfully pass a UCONN class.

## Critical Skills

*Critical skills that students are expected to be able to **DO** at the end of the unit.*

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 6. Value and demonstrate personal responsibility, character, cultural understanding, and ethical behavior.

## Standards

*The content standards that are taught and/or assessed in this unit.*

[CCSS: English Language Arts 6-12](#)

[CCSS: Grades 11-12](#)

[Capacities of the Literate Individual](#)

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

- They build strong content knowledge. [Show Details](#)
- They respond to the varying demands of audience, task, purpose, and discipline. [Show Details](#)
- They come to understand other perspectives and cultures. [Show Details](#)

### Writing

**Production and Distribution of Writing 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.**

- W.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

**5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.**

- W.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

**6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.**

- W.11-12.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

### Language

**Knowledge of Language 3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.**

- L.11-12.3a. Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.
- L.11-12.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

- conduct tutoring sessions with students across disciplines and levels
- conduct tutoring sessions with reluctant writers
- constantly reflect on practice and ways to improve

## Portrait of the Newtown Graduate

## Vocabulary

*Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.*

## Resources

*Teacher and student resources used to support the learning.*

- *Everything is an Argument* by Andrea Lunsford and John Ruszkiewicz
- *They Say/I Say* by Gerald Graff
- OWL at Purdue
- Secondary School Writing Center Association website/conference
- University of Connecticut Writing Center
- University of Connecticut library and resources

<https://www.youtube.com/watch?v=k2JZViSNgPg>

<https://www.jstor.org/stable/377047>

Secondary School Writing Center Association tool kit

- [SSWCA resources](#)  
- [Richard Kent on Writing Centers](#)  
- [Creating Student Leaders in the Writing Center](#)  
- [The Writing Center Revolution](#)  
- [How to build on your writing center experience](#)  
- [Second School Writing Center Association](#)  
- [UCONN Writing Center](#)   [UCONN resources](#)  

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## Assessments

*The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.*

### Reading Journal | Summative | Narrative Writing Assignment

Expository Essay

As part of the UCONN credit for this class, students will maintain a reading journal for the readings that are required for this class.

[3 Standards Assessed](#)

### Tutoring sessions | Summative | Other oral assessments

Other oral assessments

students will be assessed on the tutoring sessions conducted throughout the semester.

[5 Standards Assessed](#)

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## Differentiation

*Core learning activities, resources and assessments that meet the needs of all learners.*

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### Effective Writing

Newtown High School / High School / English Language Arts

Week 3 - Week 13 | 3 Curriculum Developers | Last Updated: Jun 10, 2025 by Lye Jr, Victor

### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

Lens: Writing,

Concepts: tutors, rubric, college essay, argument, thesis, feedback

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. A strong rubric contributes to good writing
2. College essays require constant revisions in order to obtain perfection.
3. All good writing is an argument.
4. Establishing a strong thesis is essential for a competent argument.
5. Feedback is essential in any creative piece to clarify the purpose of the story.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. What does a rubric tell the writer about what the teacher is looking for? (F)
- 1b. How does a tutor use a rubric to conduct a tutoring session? (C)
- 1c. Are rubrics subjective? (P)
- 2a. What is necessary for a good college essay? (F)
- 2b. How does an author decide what the reader should know about them? (C)
- 2c. What is voice? (F)
- 2d. How does an author establish their voice? (C)
- 3a. How does a writer construct an argument? (C)
- 3b. How does evidence support an argument? (C)
- 3c. What's the difference between argument and opinion? (P)
- 4a. What is necessary for a solid thesis statement? (F)
- 4b. How does a thesis establish an argument? (F)
- 4c. How does a strong thesis create the paper? (C)
- 5a. What is the difference between feedback and opinion? (P)
- 5b. What makes good creative writing? (C)
- 5c. How does a reader establish trust with an author? (C)
- 5d. How does a tutor give feedback on a creative piece? (F)

#### Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

#### Critical Skills

*Critical skills that students are expected to be able to **DO** at the end of the unit.*

## Students Will:

- understand what is necessary for a good college essay
- create their own college essay
- deconstruct a writing rubric to understand what teachers are looking for
- establish what makes a good creative piece
- write their own short story.

- 2. Work independently and collaboratively to solve problems and accomplish goals.
- 4. Demonstrate innovation, flexibility and adaptability in thinking patterns, work habits, and working/learning conditions.
- 5. Effectively apply the analysis, syntheses, and evaluative processes that enable productive problem solving.

## Notes

Writing Centers

## Standards

The content standards that are taught and/or assessed in this unit.

## CCSS: English Language Arts 6-12

## CCSS: Grades 11-12

## Capacities of the Literate Individual

## Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, &amp; Language

- They demonstrate independence. [Show Details](#)
- They build strong content knowledge. [Show Details](#)
- They comprehend as well as critique. [Show Details](#)

## Writing

**Text Types and Purposes 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.**

- W.11-12.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

**2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.**

- W.11-12.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

**Production and Distribution of Writing 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.**

- W.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

**5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.**

- W.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

## Speaking &amp; Listening

**Comprehension and Collaboration 1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.**

- SL.11-12.1b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
- SL.11-12.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

## Language

**Knowledge of Language 3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.**

- L.11-12.3a. Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.
- L.11-12.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

- peer-to-peer tutoring sessions within the classroom
- modelling effective peer-tutoring sessions
- research assignments on effective writing and tutoring centers
- visit writing center as a student
- develop tutorials based on the needs of the students who visit the writing center.

## Vocabulary

Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.

## Resources

Teacher and student resources used to support the learning.

- *The Bedford Guide for Writing Tutors* by Leigh Ryan and Lisa Zimmerelli
- *The Longman Guide to Peer Tutoring*
- Selected Essays on peer tutoring, writing, and writing center theory
- University of Connecticut Writing Center
- University of Connecticut Library and Resources

<https://www.youtube.com/watch?v=k2JZViSNgPg>  

<https://www.youtube.com/watch?v=pX6FLd3UHJY>  

<https://www.youtube.com/watch?v=akNaYTeHVDU>  

<https://owl.english.purdue.edu/owl/>  

 Writing Rubric    UCONN Library  

## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

### College Essay | Summative | Extended Essay

Expository Essay

 College Essay Rubric.pdf

9 Standards Assessed

### Short Story | Summative | Expository Essay

Extended Essay

 Story Story Rubric.doc

5 Standards Assessed

## Differentiation

Core learning activities, resources and assessments that meet the needs of all learners.

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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## Unit Plan

### Writing Across Disciplines

Newtown High School / High School / English Language Arts

Week 14 - Week 20 | 3 Curriculum Developers | Last Updated: Jun 10, 2025 by Lye Jr, Victor

### Concept-Based Curriculum Unit Template

#### Purpose of the Unit

*The overarching goal(s) of the unit.*

#### Conceptual Lens/Concepts

*Concepts are the "big ideas" of the unit. The conceptual lens is a particular concept that focuses the thinking of the unit.*

Lens: Interdisciplinary Writing

Concepts: students, disciplines, tutoring, college, reflection

#### Generalizations

*Critical conceptual relationships that students are expected to **UNDERSTAND** at the end of the unit.*

1. Writing is important in all disciplines
2. Students need to learn to reflect and edit all writing.
3. Tutoring across disciplines requires the same skill set.
4. In college, one must understand that all classes examine a student's ability to write.

#### Guiding Questions

*A combination of Factual (F), Conceptual (C) and Provocative/Debatable (P) questions that lead to the generalizations. Label each question (F), (C) or (P).*

- 1a. How are writing rubrics different across disciplines? (F)
- 1b. What are teachers in non-English classes looking for in writing (C)
- 1c. How do tutors approach writing from non-English classes? (C)
- 2a. How do students approach writing outside of English Class? (C)
- 2b. Do students take the same care with writing assignments outside of English classes? (P)
- 2c. What structural changes should take place to make writing across disciplines more important? (P)
- 3a. What services can the writing center offer for other disciplines? (F)
- 3b. What skills do tutors need to tutor other disciplines? (C)
- 3c. Should teachers across disciplines send their students to the writing center? (P)
- 4a. What skills do writers need at the next level? (F)
- 4b. How can tutors transfer their skills to college? (C)

#### Content Knowledge

*Critical facts and information that students are expected to **KNOW** at the end of the unit.*

Students will:

- analyze writing across disciplines
- work to promote the writing center for non-English writing

#### Critical Skills

*Critical skills that students are expected to be able to **DO** at the end of the unit.*

- 2. Work independently and collaboratively to solve problems and accomplish goals.

- discuss writing across disciplines with teachers
- present their findings on writing to the class
- 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.

## Standards

The content standards that are taught and/or assessed in this unit.

**CCSS: English Language Arts 6-12**

**CCSS: Grades 11-12**

**Capacities of the Literate Individual**

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

- They build strong content knowledge. [Show Details](#)
- They value evidence. [Show Details](#)
- They use technology and digital media strategically and capably. [Show Details](#)

### Writing

5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

- W.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

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## Core Learning Activities

The learning activities that support the acquisition of content knowledge, attainment of critical skills and lead to the generalizations of the unit. Activities should be clearly articulated, include teacher instructions and identify optional vs. assured experiences.

## Portrait of the Newtown Graduate

## Vocabulary

Academic and content-specific vocabulary needed to support knowledge, understanding and/or skills.

## Resources

Teacher and student resources used to support the learning.

students will have to interview teachers across disciplines to discuss their approach to writing

## Assessments

The means by which students will demonstrate what they know (content knowledge), what they can do (critical skills), and what they understand (generalizations) as a result of their learning from the unit.

Writing Center Theory and Practice Final | Summative | Oral Report

Other oral assessments

 WCTP Final Project

4 Standards Assessed

## Differentiation

Core learning activities, resources and assessments that meet the needs of all learners.

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## Test Prep Connections

*As appropriate, include activities that build skills for standardized testing, such as IABs.*

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