Unit 08: From Cells to Organisms
UNIT PLAN

8th Grade Science
Suggested Duration: 9 Core Instructional Days and 1 Assessment Day

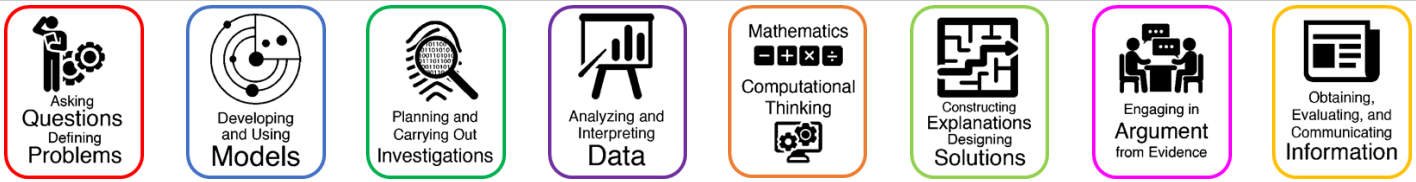
TABLE OF CONTENTS

UNIT NARRATIVE

This unit is designed to guide students through foundational concepts in biology, including the development of cell theory, the characteristics and types of cells, and the intricate systems of the human body. Through hands-on activities, models, and discussions, students will explore how life operates at both cellular and systemic levels. In Lesson 1, students will explore the historical development of cell theory, including contributions by scientists such as Hooke, Schleiden, Schwann, and Virchow. They will learn that all organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function. In lesson 2, students will compare the characteristics of prokaryotic and eukaryotic cells and distinguish between plant and animal cells. In lessons 3-4 students will focus on the functions of the cell organelles. Finally in lessons 6-8, students will review the functions of the systems in the human body which they previously learned in 7th grade.

Focus on Disciplinary Literacy

In science, disciplinary literacy is synonymous with the science and engineering practices. The SEPs are the context through which all science concepts should be taught. In the lessons, you will find the Science and Engineering practices icons when the SEPs are being explicitly used by students.



CONTENT STANDARDS

Below are the standards **taught** and **assessed** in this unit.

Readiness Standards
8.13A Identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells.
Supporting Standards
6.13A describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function. 7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems

UNDERSTANDINGS AND QUESTIONS

Important big ideas and processes for the unit.

Enduring Understandings

- It took hundreds of years, many experiments, and many scientists to establish The Cell Theory. The theory states that the cell is the basic unit of life, all living organisms are composed of cells, and all cells come from pre-existing cells.
- Cells can be categorized as prokaryotic or eukaryotic based on their structure and complexity, with eukaryotic cells further differentiated into plant and animal cells.
- Organisms can be classified by basic characteristics including whether they are prokaryotic and eukaryotic, unicellular and multicellular, autotrophic and heterotrophic.

Essential Questions

- What are the three components of the cell theory?
- What are the functions of cells?
- How are prokaryotic and eukaryotic cells different? How are they similar?
- How are plant cells and animal cells similar? How are the different?

Common Misconceptions

- Thinking that cell theory was one scientist's idea, failing to appreciate how collective contributions built upon each other
- Ignoring the diversity of organisms and thinking that all organisms have cells that are structured the same way
- Overemphasizing microscopes by thinking that the only way to study cells is through microscopes
- Thinking that all single-celled organisms (e.g., bacteria and protists) are prokaryotic
- Thinking that all multicellular organisms (e.g., plants and animals) are eukaryotic
- Thinking that all prokaryotic organisms, particularly bacteria, are harmful and cause diseases
- Thinking that all autotrophic organisms are green due to chlorophyll

- Confusing the roles of the cell wall and cell membrane
- Thinking that the purpose of the cell wall is only for structural support
- Thinking that chloroplasts are present in all plant cells
- Thinking that the nucleus controls everything in the cell
- Thinking that the nucleus only contains genetic material (DNA) and missing the importance of the nucleolus for ribosome synthesis, regulating gene expression, and playing a central role in cell control and division
- Thinking that each system functions independently without any interaction or dependence on other systems
- Thinking that each organ or system has only one primary purpose (e.g., thinking that the lungs are only for breathing, forgetting their role in gas exchange)

ROADMAP

ROADMAP AT A Glance: Unit 08 From Cells to Organisms				
Day	**Date**	**TEKS**	**Lesson**	**Lesson Title**
1		6.13A	1	Cell Theory
~~2~~		8.13A	2	Prokaryotic VS. Eukaryotic Cells
3		8.13A	3	Cell Organelles Part 1
4		8.13A	4	Cell Organelles Part 2
5		7.13A	5	Human Body Systems Part 1
6		7.13A	6	Human Body Systems Part 2
7		7.13A	7	Human Body Systems Part 3
8		7.13A	8	Human Body Systems Part 4
9			Unit Exam	TX_SCI_6thScience_S26_UE8 Scanning Deadline:

Lesson #01: Cell Theory	Date:

Objective

SWBAT describe the contributions of the scientists who developed the cell theory and summarize the 3 main statements of the cell theory

Standards

TEKS 6.13A describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function

Vocabulary

Cell theory

Science Practices

3. Planning and carrying out investigations
6. Constructing explanations and designing solutions
8. Obtaining, evaluating, and communicating information

Recurring Themes and Concepts

Instructional Notes

- Students will engage in a lab investigation using the microscope to explore the history of the development of the cell theory.
- The students will then complete a reading to learn to review the cell theory and the functions of cells.
- Students will describe the contributions of Hooke, Von Leuwenhoek, Schleiden, Schwann, and Virchow to the cell theory.

Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.

☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle

☐ Justify their reasoning and support their ideas with evidence.

☐ Engaging in investigation

Students Do and Know

Do

- Students will engage in a lab investigation using the microscope to explore the history of the development of the cell theory.

Know

- The scientist that developed the cell theory
- The 3 main parts of the cell theory

Lesson #02: Prokaryotic VS. Eukaryotic Cells	Date:

Objective

SWBAT describe the differences in prokaryotic and eukaryotic organisms

Standards

TEKS 6.13identify and compare the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular and multicellular, and autotrophic and heterotrophic

Vocabulary

Cell wall
Chloroplasts
Eukaryotic cells
Micron
Multicellular
Nucleoid Region
Nucleus
Organelle
Prokaryotic Cell
Unicellular

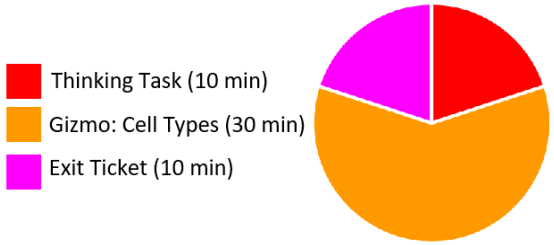
Science Practices

2. Developing and using models
7. Engaging in argument from evidence

Recurring Themes and Concepts

Instructional Notes

- Students will engage in an Explore Learning Gizmo to view different types of prokaryotic and eukaryotic plant and animal cells.
- Students will complete a 3 circle Venn diagram about the structures of prokaryotic, eukaryotic plant, eukaryotic animal cells.



Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.
☐ Engage in a simulation to explore different types of cells.

Students Do and Know

- Students will engage in an Explore Learning Gizmo to view different types of prokaryotic and eukaryotic plant and animal cells.

Cells can be categorized as prokaryotic or eukaryotic based on their structure and complexity, with eukaryotic cells further differentiated into plant and animal cells.

Lesson #03: Cell Organelles Part 1	Date:

Objective

SWBAT Describe the structure and function of eukaryotic organelles.

Standards

TEKS 8.13A Identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells.

Vocabulary

Cell membrane
Cell wall
Chloroplast
Cytoplasm
Ribosome
Endoplasmic reticulum
Golgi apparatus
Lysosome
Mitochondria
Chloroplast
Nucleus
vacuole

Science Practices

7. Developing and Using Models
8. Constructing Explanations

Recurring Themes and Concepts

D. Systems and System Models
F. Structure and Function

Instructional Notes

- Students describe the structural differences between bacteria, animal cells and plant cells
- Students explain what an organelle is.
- Describe the structure and function of eukaryotic organelles.
- Discuss how eukaryotic cell structure involves each of the four biological molecules: carbohydrates, lipids, proteins, and nucleic acids.

Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

- Students identify, in a model of a eukaryotic cell, where each organelle is located
- Students describe the structure and function of each organelle
- Students connect each organelle's function to its structure

- Eukaryotic cells have membrane-bound organelles.
- Each organelle has a specific structure that allows it to perform a specific function (structure = function).
- Both prokaryotes and eukaryotes have cell membranes, cell walls, DNA and ribosomes.

Lesson #04: Cell Organelles Part 2	Date:

Objective

SWBAT Create a model of a eukaryotic cell as an efficient system using organelle description cards.

Standards

TEKS 8.13A Identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells.

Vocabulary

Cell membrane
Cell wall
Chloroplast
Cytoplasm
Ribosome
Endoplasmic reticulum
Golgi apparatus
Lysosome
Mitochondria
Chloroplast
Nucleus
vacuole

Science Practices

7. Developing and Using Models
8. Constructing Explanations

Recurring Themes and Concepts

D. Systems and System Models
F. Structure and Function

Instructional Notes

- Justify the identification of the cell type shown in a picture.
- Describe how structure is related to function within a eukaryotic cell.
- Create a model of a eukaryotic cell as an efficient system using organelle description cards.
- Justify predictions about cell structure difference between specialized eukaryotic cells

Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

- Students make a claim about a cell type by looking at a picture and then defend their claim with evidence.
- Students create a model of a eukaryotic cell using organelle description cards.
- Students make predictions about structure differences between several “specialized” cells.

- Eukaryotic cells have membrane-bound organelles.
- Each organelle has a specific structure that allows it to perform a specific function (structure = function).

Lesson #05: Human Body Part 1	Date:

Objective

SWBAT identify the main functions of the Digestive, Urinary, Circulatory, and Respiratory systems and discuss how these 4 systems are interrelated.

Standards

TEKS 7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems

Vocabulary

Digestive System
Urinary System
Circulatory System
Respiratory System

Science Practices

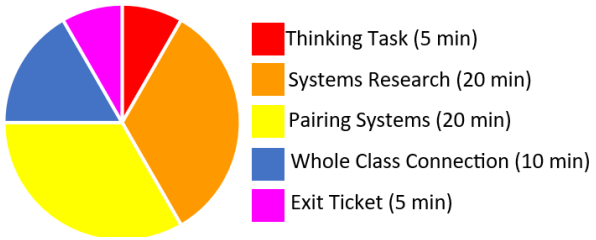
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Recurring Themes and Concepts

D. Systems and System Models
F. Structure and Function

Instructional Notes

- Students will conduct research and complete a graphic organizer to identify the functions and main organs of each system.
- Students will work in groups to identify a pair of systems that they believe are the most interrelated. Students will provide evidence to support their claim. Students will engage in academic discourse to ultimately reach an understanding that shows how all systems are related to one another.
- Students will engage in a whole class discussion led by the teacher to understand how all 4 systems are interrelated.
- Students will create a descriptive title for the lesson that ties all four systems together. The title should provide context to the function and connections of these systems.



Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

Do

- Students will identify the main functions of the Digestive, Urinary, Circulatory, and Respiratory systems and discuss how these 4 systems are interrelated.

Know

- The digestive, urinary, circulatory, and respiratory systems work together seamlessly to ensure the body acquires, utilizes, and removes the resources necessary for survival.

Lesson #06: Human Body Part 2	Date:

Objective

SWBAT identify the main functions of the Skeletal, Muscular, Integumentary, and Immune systems and discuss how these 4 systems are interrelated.

Standards

TEKS 7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems

Vocabulary

Skeletal System
Muscular System
Integumentary System
Immune System

Science Practices

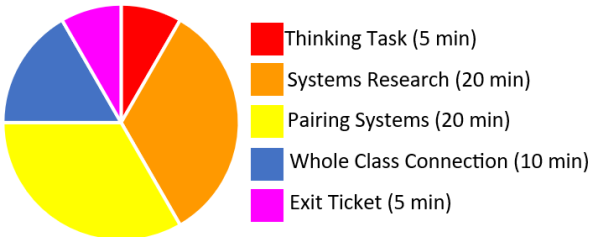
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Recurring Themes and Concepts

D. Systems and System Models
F. Structure and Function

Instructional Notes

- Students will conduct research and complete a graphic organizer to identify the functions and main organs of each system.
- Students will work in groups to identify a pair of systems that they believe are the most interrelated. Students will provide evidence to support their claim. Students will engage in academic discourse to ultimately reach an understanding that shows how all systems are related to one another.
- Students will engage in a whole class discussion led by the teacher to understand how all 4 systems are interrelated.
- Students will create a descriptive title for the lesson that ties all four systems together. The title should provide context to the function and connections of these systems.



Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

Students will identify the main functions of the skeletal, muscular, integumentary, and immune systems and discuss how these 4 systems are interrelated.

The skeletal, muscular, integumentary, and immune systems collaborate to protect the body, enable movement, and defend against external threats.

Lesson #07: Human Body Part 3	Date:

Objective

SWBAT identify the main functions of the Nervous, Endocrine, and Lymphatic systems and discuss how these 3 systems are interrelated.

Standards

TEKS 7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems

Vocabulary

Nervous System
Endocrine System
Lymphatic system

Science Practices

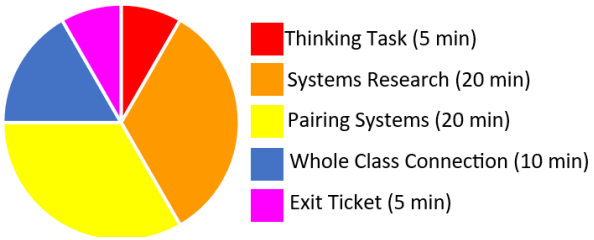
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Recurring Themes and Concepts

D. Systems and System Models
F. Structure and Function

Instructional Notes

- Students will conduct research and complete a graphic organizer to identify the functions and main organs of each system.
- Students will work in groups to identify a pair of systems that they believe are the most interrelated. Students will provide evidence to support their claim. Students will engage in academic discourse to ultimately reach an understanding that shows how all systems are related to one another.
- Students will engage in a whole class discussion led by the teacher to understand how all 3 systems are interrelated.
- Students will create a descriptive title for the lesson that ties all four systems together. The title should provide context to the function and connections of these systems.



Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

Students will identify the main functions of the lymphatic, endocrine, and nervous systems and discuss how these 3 systems are interrelated.

The lymphatic, endocrine, and nervous systems collaborate to protect the body, enable movement, and defend against external threats.

Lesson #08: Human Body Part 4	Date:

Objective

SWBAT identify the main functions of the circulatory, respiratory, skeletal, muscular, digestive, urinary, integumentary, nervous, immune, lymphatic and endocrine systems and discuss how these systems are interrelated.

Standards

TEKS 7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems

Vocabulary

No new vocabulary

Science Practices

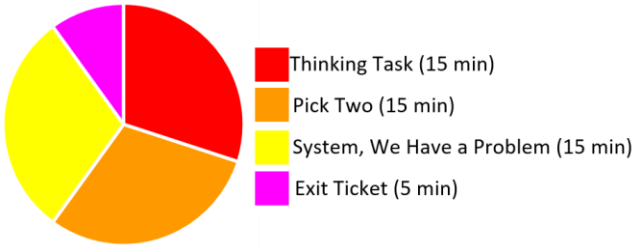
7. Engaging in argument from evidence

Recurring Themes and Concepts

D. Systems and System Models
F. Structure and Function

Instructional Notes

- Students will complete a card sort to match system name, function, and major organs.
- Students will select two system names from a hat and must tell how those systems are connected.
- Students will select one system name from a hat and describe how they think that would affect the human body and any other systems that would be affected if the selected system fails.
- Students will complete graphic organizers to review functions, main organs, and connections of human body systems.



Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look for students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

Do

Students will complete graphic organizers to review functions, main organs, and connections of human body systems.

Know

The human body systems each have specialized organs that work together to perform a specific function, but all of the systems work together to maintain homeostasis and keep our bodies functioning.

UNPACKED STANDARDS

Focus standards for this unit.

Standard:	6.13A describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function;

Specificity

Cognition: Describe

Content: the historical development of cell theory

Including but not limited to:

- Cell theory – a fundamental principle that describes the basic structural and functional unit of all living organisms, consisting of three main principles:
  - All organisms are composed of one or more cells.
  - Cells are the basic unit of structure and function in organisms.
  - All cells come from preexisting cells.
- History of cell theory
  - Discovery of cells
    - Robert Hooke – 1665
      - Improved the design of the existing compound microscope
      - Observed a piece of cork, and to him, the cork looked as if it was made of pores or small compartments.
      - He called these pores “cells” because they reminded him of the cells in a monastery.
    - Antoine van Leeuwenhoek – 1677
      - Developed a single lens microscope
      - Detected single celled organisms from pond water and saliva that he referred to as “animalcules” – later confirmed as bacteria and protozoa
  - Establishment of the first two principles of cell theory: that all living organisms are composed of cells and that the cell is the basic unit of structure in organisms.
    - Theodore Schwann & Mattias Schleiden – 1838
      - Studied animal and plant cells respectively
      - Identified key differences between animal and plant cells
      - Put forth the cell theory, the idea that cells were the fundamental units of both plants and animals
  - Establishment of third principle of cell theory: that all organisms are composed of one or more cells
    - Rudolf Virchow – 1855
      - Studied tissues and cells being generated by cellular division under a microscope

Cognition: explain

Content Builder

Cell theory’s historical development can be summarized in three stages. In the 17th century, scientists used microscopes to observe cells, and Robert Hooke named them while studying cork. In the 19th century, Schleiden, Schwann, and Virchow made important contributions, proposing that all plants and animals are made of cells and cells arise from pre-existing cells through division. By the mid-19th century, cell theory was established, stating that all living organisms are composed of cells, which are the fundamental units of structure and function. Cells play a vital role in an organism’s functions and processes, dividing and specializing as organisms grow. Students may struggle understanding the timeline of scientific discoveries or remembering the contributions of different scientists.

Instructional Implications

When you teach this concept, remember to:

- Present a clear and concise timeline of the historical development of cell theory, highlighting the key contributions of scientists Robert Hooke, Matthias Schleiden, Theodor Schwann, and Rudolf Virchow.
- Explain that Rudolph Virchow is credited with cell theory but his work was built on the work of other scientists, including Robert Hooke, Antonie van Leeuwenhoek, Matthias Schleiden, and Theodor Schwann.
- Use illustrations, models, and videos to demonstrate the microscopic world of cells.
  - Start with fundamental concepts such as the definition of cells, their characteristics, and their functions. All living organisms are composed of one or more cells.
  - A cell is the basic structural and functional unit of living organisms.
  - All cells arise from pre-existing cells.
- Help students see the Recurring Theme and Concept of *structure and function* in this standard.

.

Vocabulary

Cell
Cell theory
Organism

Content: how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function
Including but not limited to:

- Organisms are composed of one or more cells.
  - All living things are composed of cells.
    - Plants
    - Animals
    - Bacteria
  - Cells can be different sizes, shapes, and functions.
- Cells come from preexisting cells.
  - New cells are only produced through the process of cellular division.
- Cells are the basic unit of structure and function.
  - Fundamental unit of life
  - Perform all of the necessary functions for an organism to survive and thrive

Student Misconceptions

- Thinking that cell theory was one scientist's idea, failing to appreciate how collective contributions built upon each other
- Ignoring the diversity of organisms and thinking that all organisms have cells that are structured the same way
- Overemphasizing microscopes by thinking that the only way to study cells is through microscopes

Possible STAAR Stimuli

Investigation	Chart/Table	Visual/Image/ Illustration
Model	Informational Text/List	

Standard:	8.13A Identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells

Specificity

Cognition: identify
Content: the function
Including but not limited to:

- Cell membrane – regulates what goes into and out of the cell in plant and animal cells
  - Semi-permeable – allows some substances to enter and leave the cell and blocks other substances; "gatekeeper"
  - Provides protection
- Cell wall – gives structure to plant cells
  - Tough and rigid
  - Provides strength and support
  - Semi-permeable – allows some substances to enter and leave the cell and blocks other substances
- Nucleus – contains genetic material and controls the use of genes in plant and animal cells
  - Coordinates cell activities
  - Responsible for the reproduction of a cell
- Ribosomes – make protein molecules in plant and animal cells
  - Protein is required for cell growth and repair.
- Cytoplasm – fluid that surrounds the organelles in plant and animal cells

Content Builder

Cells are the basic building blocks of all living things, including plants and animals. Each cell has specialized structures that perform essential functions vital to the organism's survival and functioning. These structures include the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles. Students may struggle to learn about multiple cellular components and their functions simultaneously, leading to confusion and difficulty in retaining the information.

Instructional Implications

When you teach this concept, remember to:

- Use visual aids, diagrams, and models to illustrate cells and their organelles.
- Incorporate hands-on activities (e.g., laboratory experiments or virtual simulations) so students can observe organelle functions in action.
- Introduce the functions of each cellular organelle one by one, gradually building upon students' knowledge.
- Use analogies and real-life examples to connect the functions of cellular components to everyday experiences (e.g., likening the cell membrane to a security gate that controls entry and exit like a building's entrance).
- Compare and contrast the functions of organelles in plant and animal cells, highlighting their similarities and differences.
- Help students see the Recurring Theme and Concept of *structure and function* in this standard.

- Jelly-like fluid
- 80% water

- Mitochondria – converts energy from food into energy that a cell can use in plant and animal cells
  - Sometimes called the "powerhouse" of the cell or "mighty" mitochondria
- Chloroplast – site of photosynthesis in plant cells
  - Contains chlorophyll, which absorbs sunlight (solar energy) and is converted to chemical energy (glucose) during photosynthesis
  - Gives plants a green color
- Vacuole – storage area within cells
  - Plant cells – place for water storage
    - Larger than animal cell vacuoles
    - Creates pressure in a cell to provide structure when full; causes wilting when empty
  - Animal cells – place to store waste products

Vocabulary

Cell	Cytoplasm	Organelle
Cell membrane	Function	Ribosome
Cell wall	Mitochondria	vacuole
chloroplast	nucleus	

Student Misconceptions

- Confusing the roles of the cell wall and cell membrane
- Thinking that the purpose of the cell wall is only for structural support
- Thinking that chloroplasts are present in all plant cells
- Thinking that the nucleus controls everything in the cell
- Thinking that the nucleus only contains genetic material (DNA) and missing the importance of the nucleolus for ribosome synthesis, regulating gene expression, and playing a central role in cell control and division

Possible STAAR Stimuli

Investigation	Chart/Table	Diagram
Visual/Image/ Illustration	Model	Informational Text/List

Standard:	7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems

Specificity

Cognition: identify and model
Content: the main functions of the systems of the human organism
Including but not limited to:

- Circulatory system
  - Delivers nutrients and oxygen to all cells
    - Removes carbon dioxide and waste from cells
    - Heart, Blood vessels (arteries and veins), Blood
- Respiratory system
  - Takes in air (oxygen)
  - Gets rid of waste gases (carbon dioxide)
    - Trachea, Diaphragm, Lungs

Content Builder

The human body is a complex organism consisting of different systems that work together to sustain life and ensure proper functioning. Understanding the main functions of these systems is crucial to understanding how the body works. Identifying and modeling these functions provides a comprehensive understanding of the interconnected operations of the human body. Students may struggle because the number of systems and their distinct functions can be overwhelming, leading to confusion and difficulty in retaining the information.

Instructional Implications

When you teach this concept, remember to:

- Use diagrams, charts, and interactive models to help students visualize and understand body systems and functions.

- Skeletal system – made of bones and cartilage; functions include support the body and give it its shape
  - Protects internal organs
  - Allows for movement
- Muscular system
  - Causes parts of your body to move
  - Types of muscles:
    - Skeletal – moves limbs
    - Smooth – moves food through the digestive system
    - Cardiac – pumps blood through the circulatory system
- Digestive system
  - Breaks food down into nutrients and energy
    - Mechanical and chemical digestion
  - Gets rid of solid wastes from digestion
    - Mouth, salivary glands, tongue, teeth, esophagus, stomach, small intestine, large intestine, liver, gall bladder, pancreas, anus
- Urinary system
  - Removes waste from the body
    - Kidneys, Urinary bladder
- Reproductive system – producing offspring
  - Male
    - Testicles, Penis, Sperm
  - Female
    - Ovaries, Uterus, Vagina, Egg
- Integumentary system
  - Protective outer covering
    - Skin, Hair, Nails
- Nervous system
  - controls all of the body's activities, receives information about the environment, stores memories, and allows you to think
    - Brain, Spinal cord, Nerves, Sense organs
- Immune system
  - protects and fights against infection and disease
    - White blood cells
- Endocrine system
  - sends chemical messages throughout the body through the blood stream
    - Glands, Hormones

- Help students connect the functions of each system to real-life examples and situations. Discuss how these systems work together to maintain health and perform daily activities.
- Engage students in hands-on activities, experiments, or simulations that allow them to explore the functions of different systems.
- Help students see the Recurring Theme and Concept of *structure and function* in this standard.

Vocabulary

Circulatory	function	muscular	respiratory
Digestive	immune	nervous	skeletal
Endocrine	integumentary	reproductive	Urinary

Misconceptions

- Thinking that each system functions independently without any interaction or dependence on other systems
- Thinking that each organ or system has only one primary purpose (e.g., thinking that the lungs are only for breathing, forgetting their role in gas exchange)

Possible STAAR Stimuli

Investigation	Chart/Table	Diagram
Visual/Image/ Illustration	Model	Informational Text/List

VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

6th Grade	7th Grade	8th Grade
6.13A describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function		8.13A Identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells
	7.13A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems	

VOCABULARY GLOSSARY

Domain-specific words and definitions for this unit.

Key Content Vocabulary
List and define key vocabulary terms • **Cell Wall:** controls what enters and exits the cell • **Cell theory:** states that the cell is the basic unit of life, all living organisms are composed of cells, and all cells come from pre-existing cells • **Chloroplasts:** organelle in plant cells that is the site of photosynthesis • **Eukaryotic cell:** a cell that has a membrane-bound nucleus and other membrane-bound organelles • **Micron: t**he units used to measure in microscopy • **Multicellular:** an organism that is made of one or more cells • **Nucleoid region:** area of a prokaryotic cell where genetic material is located • **Nucleus:** organelle in eukaryotic cells that contain the cell's genetic material and controls the rest of the cell's functions • **Organelle:** structures found in eukaryotic cells • **Prokaryotic cell:** a simple, single-celled (unicellular) organism that lacks a nucleus, or any other membrane-bound organelles. • **Unicellular:** an organism that is made of only 1 cell

- **Lymphatic System**: The lymphatic system helps protect your body from infections and keeps fluid levels in balance. It includes lymph nodes, lymph vessels, the spleen, thymus, and tonsils. This system filters out harmful substances, carries white blood cells to fight germs, and removes excess fluid from tissues to prevent swelling.
- **Endocrine System**: The endocrine system controls many important functions in your body by producing hormones, which are chemical messengers. It includes glands like the pituitary gland, thyroid, adrenal glands, pancreas, and reproductive glands (ovaries or testes). These hormones help regulate growth, metabolism, reproduction, and how your body responds to stress.
- **Nervous System**: The nervous system is the body's control center, responsible for sending and receiving messages to help the body function. It includes the brain, spinal cord, and nerves. The nervous system controls voluntary actions, like moving, and involuntary actions, like breathing, while helping the body respond to changes in the environment.
- **Skeletal System**: The skeletal system provides the body with structure, support, and protection for vital organs. It is made up of bones, cartilage, ligaments, and joints, and it also produces blood cells in the bone marrow and stores important minerals like calcium.
- **Muscular System**: The muscular system is responsible for movement, both voluntary (like walking) and involuntary (like your heart beating). It is made up of three types of muscles: skeletal muscles, which are attached to bones and help you move; smooth muscles, found in organs like the stomach; and cardiac muscle, which makes up the heart.
- **Integumentary System**: The integumentary system acts as the body's outer layer of protection, preventing germs from entering and helping regulate body temperature. It includes the skin, hair, nails, and glands that produce sweat and oil to keep the skin healthy and hydrated.
- **Immune System**: The immune system defends the body against harmful germs like bacteria and viruses that can cause illness. It includes white blood cells, lymph nodes, the spleen, thymus, and tonsils, which work together to detect and destroy invaders and keep the body healthy.
- **Circulatory System**: The circulatory system is responsible for transporting blood throughout the body, delivering oxygen and nutrients to cells while removing carbon dioxide and other waste products. It consists of the heart, blood, and blood vessels, including arteries, veins, and capillaries.
- **Digestive System**: The digestive system breaks down food into smaller molecules that the body can absorb and use for energy, growth, and repair. It includes the mouth, esophagus, stomach, intestines, and accessory organs such as the liver, pancreas, and gallbladder.
- **Respiratory System**: The respiratory system facilitates the exchange of gases by bringing oxygen into the body and removing carbon dioxide. It includes the nose, trachea, lungs, and diaphragm, working together to allow breathing and gas exchange with the bloodstream.
- **Urinary System**: The excretory system removes waste products and excess water from the body to maintain a stable internal environment. It includes the kidneys, ureters, bladder, and urethra, which work together to filter blood and produce urine.

Consumable Materials and Lab Supplies for Unit 8 (1 per group of 4 students unless noted)

Lesson	Commercial Vendor	Lab Supplies (Science Vendor)
Lesson 01: Cell Theory		Microscopes Slides and cover slips Prepared slides or make slides of: Cork Cells Unicellular organisms or pond water Plant cell (onion or elodea) Animal cell (cheek cell) Methylene blue or iodine Onion root mitosis
Lesson 02: Prokaryotic and Eukaryotic Cells	Computer with internet access	
Lesson 04: Cell Organelles Part 1	Computer with internet access	
Lesson 05: Cell Organelles Part 2	supplies for creating model such as dry erase markers and a mini whiteboard; medium sized construction paper, pencils, and markers; or a laptop or table	
Lesson 06: Human Body Systems Part 1	Computer with internet access	
Lesson 07: Human Body Systems Part 2	Computer with internet access	
Lesson 08: Human Body Systems Part 3	Computer with internet access	
Lesson 09: Human Body Systems Part 4	Computer with internet access	