Unit 4: Structure and Function

CONTENT AREA: General Physical Science	GRADES: 7	UNIT: 4 of 8
Pacing: Approx. 1 Month (December)		
Science and Engineering Practices **Planning and Carrying Out Investigations -** Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. **(MS-LS1-1)** **Developing and Using Models -** Develop a model to describe phenomena. **(MS-LS1-2)**	**Disciplinary Core Ideas** ● LS1.A: Structure and Function ● All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) ● Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)	**Crosscutting Concepts** **Scale, Proportion, and Quantity** ● Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) **Structure and Function** ● Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2) - ***Connections to Engineering, Technology and Applications of Science*** **Interdependence of Science, Engineering, and Technology** ● Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1)
Performance Expectations: MS-LS1-1, MS-LS1-2		
Evidence Statement(s): MS-LS1-1, MS-LS1-2		
Essential Question: How do cells contribute to the functioning of an organism?		
21st Century Skills: 9.2.8.B.3, 9.2.8.B.4		
Career Ready Practices: CRP4, CRP6, CRP7		
Technology:HS-ETS1-1 HS-ETS1-3		
Technical Terms (Suggested)	**Core Instructional Materials**	**Assessment Statement**

Cells Living Non-Living Organisms Unicellular Multicellular Nucleus Chloroplasts Mitochondria Cell Membrane Cell Wall Structures Functions Passive Transport Active Transport ** All terms should be taught in context rather than in isolation. These terms should be addressed after conceptual understanding.**	MS-LS1-1 - Chromebook, internet access, smartboard, notebook, pen, pencil, whiteboard. MS-LS1-2- Computer, Internet access, smartboard, notebook, pen, pencil, whiteboard.	Students who understand the concepts are able to: ● Conduct an investigation to produce data that provides evidence distinguishing between living and nonliving things. ● Conduct an investigation to produce data supporting the concept that living things may be made of one cell or many and varied cells. ● Distinguish between living and nonliving things. ● Observe different types of cells that can be found in the makeup of living things.

Modifications

English Language Learners	Special Education	At Risk	Gifted & Talented
Scaffolding	Word walls	Teacher tutoring	Curriculum compacting
Word walls	Visual aides	Peer tutoring	Challenge assignments
Sentence/paragraph frames	Graphic organizers	Study guides	Enrichment activities
Bilingual dictionaries/translation	Multimedia	Graphic organizers	Tiered activities
Think alouds	Leveled readers	Extended time	Independent research/inquiry
Read alouds	Assistive technology	Parent communication	Collaborative teamwork
Highlight key vocabulary	Notes/summaries	Modified assignments	Higher level questioning
Annotation guides	Extended time	Counseling	Critical/Analytical thinking tasks
Think-pair-share	Answer masking		Self-directed activities
Visual aides	Answer eliminator		
Modeling	Highlighter		
Cognates	Color contrast		

5E Model

Performance Expectation: MS-LS1-1

Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

Engage: Anticipatory Set	Is It Alive PowerPoint http://www.curriki.org/xwiki/bin/view/Coll_kfasimpaur/Isitalive Introduction to Cells Video: https://vimeo.com/37107992
Exploration: Student Inquiry	Interactive Cell Model: http://www.cellsalive.com/ Cheek Cell Lab: https://docs.google.com/document/d/16ZM9fNEwHrl2wjFBAZj74zC9av0fZTvWr2nDT4mjKzg/edit Post-Lab Reflection Questions 1. How are the three specimens (2 stained and one unstained) alike? 2. How are the three specimens different? 3. What benefit would there be for looking at cells without stain? 4. Was it easier to see the cell structures when they were clumped together or isolated by themselves? Why would that be? 5: What cell structures were you able to view under the microscope? Why were they visible? 6. What cell structures were you NOT able to view? 7. What shape are cheek cells? Is this easy to figure out? Why or why not? 8. List two real-life situations in which looking at cells under a microscope benefits mankind.
Explanation: Concepts & Practices	In these lessons: Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices. Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): LS1.A: Structure and Function All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).
Elaboration: Extension Activity	Related Activites Better Lessons: LS1-1
Evaluation: Assessment	Assessment Task A: Cheek Cell Lab- Post Reflection Questions Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. 1. How are the three specimens (2 stained and one unstained) alike? 2. How are the three specimens different? 3. What benefit would there be for looking at cells without stain? 4. Was it easier to see the cell structures when they were clumped together or isolated by themselves? Why would that be? 5: What cell structures were you able to view under the microscope? Why were they visible? 6. What cell structures were you NOT able to view? 7. What shape are cheek cells? Is this easy to figure out? Why or why not? 8. List two real-life situations in which looking at cells under a microscope benefits mankind. Assessemnt Task B: Lab Rubric?

5E Model

Performance Expectation: MS-LS1-2. **Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.**	
Engage: Anticipatory Set	Parts and Functions of a Cell: http://www.pbslearningmedia.org/asset/tdc02_vid_nucleus/ Parts of a Cell: http://freevideolectures.com/Course/2548/Biology/34
Exploration: Student Inquiry	Lesson 1: Make a Cell Model http://sciencenetlinks.com/lessons/cells-1-make-a-model-cell/ Lesson 2: The Cell as a System http://sciencenetlinks.com/lessons/cells-2-the-cell-as-a-system/
Explanation: Concepts & Practices	In these lessons: Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices. Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): LS1.A: Structure and Function Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell.
Elaboration: Extension Activity	Students will compare a cell to a particular system of their choice. Students can choose to compare a cell to a school, sports team, a bicycle or home. They can create a blueprint poster or a 3D model. The model or blueprint will have to showcase their analogy and each of the parts and their functions. The title of your poster will be "A Cell Is Like a…." The poster will actually show your system – NOT the cell. All the parts you include in your poster will be described as part of the system. Student will then explain their cell comparison.
Evaluation: Assessment	Assessment Task A: Make a Cell Model Develop and use a model to describe phenomena. Description: Students should understand the basic functions of the cell structures highlighted in this lesson, as well as have a better understanding of the usefulness and limitations of models. Assess students on their answers to the student sheet as well on their participation in class discussions. Assessment Task B: The Cell as a System- Reflection Questions Students should be able to clearly state why the factory, and more importantly the cell, can be thought of as systems. They should also be able to explain how the individual parts of the cell system operate within the larger context of the cell, and that the processes necessary for life take place within each cell. Ask the following questions to assess this understanding, telling students to think about the cell as a system: When this system is working, what does it do? (It produces proteins.)

	For this system to work, must it receive any input? (Yes; for example, energy ultimately from the sun.) What, if any, output does this system produce? (It produces proteins.) Identify at least four parts of this system. Describe what each part does, and tell how each part contributes to the system as a whole. Can any one part of the system do what the whole system does? Justify your response. (Answers will vary. Students should realize that the organelles need to work together to produce proteins.) Identify at least two parts of this system that must interact if the system is to function. Describe how these parts interact. Can you identify any subsystems within the whole system? (Answers will vary, but students should be able to describe at least one subsystem.) Describe how the functioning of this system would change if one of the parts wears out. In what ways is it useful to think of the cell as a system? (In general, thinking about a cell as a system helps in understanding individual cell organelle functions, and how they operate within the larger context of the cell.)

How do cells contribute to the functioning of an organism?

Students demonstrate age appropriate abilities to plan and carry out investigations to develop *evidence* that living organisms are made of cells. Students gather information to support explanations of the relationship between structure and function in cells. They are able to communicate an understanding of cell theory and understand that all organisms are made of cells. Students understand that special structures are responsible for particular functions in organisms. They then are able to use their understanding of cell theory to develop and use physical and conceptual models of cells. The crosscutting concepts of *scale, proportion, and quantity* and *structure and function* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *planning and carrying out investigations*, *analyzing and interpreting data*, and *developing and using models*, Students are also expected to use these to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING PEs and DCIs
1	**Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.** *[Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.]*	MS-LS1-1
2	**Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.** *[Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.]*	**(MS-LS1-2)**

The Student Learning Objectives above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Evidence Statements: MS-LS1-1 **Planning and Carrying Out Investigations** Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions. Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation.	**LS1.A: Structure and Function** All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). **LS1.A: Structure and Function** **Within cells, special structures are responsible for particular functions, and the cell membrane forms**	**Crosscutting Concepts** LS1.1 **Scale, Proportion, and Quantity** **Phenomena that can be observed at one scale may not be observable at another scale.** **Connections to Engineering,Technology and Applications of Science**

Evidence Statements: MS-LS1-2 **Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. Develop and use a model to describe phenomena.	**the boundary that controls what enters and leaves the cell.**	**Interdependence of Science, Engineering, and Technology** **Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.** LS1.2 **Structure and Function** Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.

Connections to other DCIs in this grade-band: MS.LS3.A
Articulation of DCIs across grade-bands: **HS.LS1.A ; 4.LS1.A ; HS.LS1.A**
Common Core State Standards Connections: *ELA/Literacy -* **WHST.6-8.7 ;** **SL.8.5** ***Mathematics -*** ***6.EE.C.9***