Living Environment Unit 1A - Introduction to Biology

Unit Overview: Science is the investigation of natural phenomena through observation and experimentation. Scientists make use of the scientific method in order to investigate the natural world. All living things share a set of unique characteristics and processes that define life. The cell is the basic unit of life and the understanding of structure and function of cell parts is critical to student’s understanding of living things. While reviewing basic laboratory and microscopy techniques, students will explore the similarity and differences between unicellular and multicellular organisms.

Essential Questions:
- How do scientists study the natural world?
- What characteristics do all living things share?
- What is the basic unit of life and how does it function?
- What are the major principles of the cell theory?
- What is the difference between a prokaryote cell and an eukaryote cell?
- What are the structures and functions of the organelles in the eukaryote cell?
- How do materials move in and out of a cell?
- How and why do cells undergo mitosis?

MST Standard 1 – Science
Key Idea 1: The central purpose of scientific inquiry is to develop explanations of a natural phenomenon in a continuing and creative process.
Key Idea 2: Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

MST Standard 4 – Science
Key Idea 1: Living things are both similar and different from each other and from nonliving things.
Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.
Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life.
Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

New York State Science Learning Standard Performance Expectation
HS-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out essential functions of life through systems of specialized cells.
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS-LS1-4: Use a model to illustrate cellular division (mitosis) and differentiation.
### BPS Science Department Living Environment - Unit 1A

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Skills, Practices, or Expectations</th>
<th>Specific Standards / Performance Indicators</th>
<th>NYSSLS Disciplinary Core Ideas</th>
<th>Resources</th>
<th>Content Vocabulary</th>
<th>Measurement of Student Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.21.2020 - 11.06.2020</td>
<td><strong>Scientific Process:</strong> Student will learn that science is a way of thinking, questioning, and gathering evidence.</td>
<td><strong>MST Standard 1- Science</strong></td>
<td><strong>LS1.A: Structure and Function</strong></td>
<td>Systems of specialized cells within organisms help them perform the essential functions of life.</td>
<td>• Systems of specialized cells within organisms help them perform the essential functions of life.</td>
<td>• biology&lt;br&gt;• biosphere&lt;br&gt;• species&lt;br&gt;• cell&lt;br&gt;• DNA&lt;br&gt;• system&lt;br&gt;• biodiversity&lt;br&gt;• data&lt;br&gt;• organism&lt;br&gt;• homeostasis&lt;br&gt;• hypothesis&lt;br&gt;• independent variable&lt;br&gt;• dependent variable&lt;br&gt;• experiment&lt;br&gt;• metabolism&lt;br&gt;• constant&lt;br&gt;• observation&lt;br&gt;• theory&lt;br&gt;• microscope&lt;br&gt;• life processes&lt;br&gt;• cell theory&lt;br&gt;• organelle&lt;br&gt;• cytoplasm&lt;br&gt;• cytoskeleton&lt;br&gt;• prokaryote&lt;br&gt;• eukaryote&lt;br&gt;• nucleus&lt;br&gt;• ribosome&lt;br&gt;• mitochondria&lt;br&gt;• cell wall&lt;br&gt;• chloroplast&lt;br&gt;• endoplasmic</td>
</tr>
<tr>
<td></td>
<td><strong>Characteristics of Life:</strong> Students will be able to express that all living things share common characteristics.</td>
<td><strong>Key Idea 1</strong></td>
<td><strong>LS1.C: Life Processes</strong></td>
<td>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.</td>
<td>• 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.</td>
<td><strong>Higher Order Questions from LE Regents Exams</strong>&lt;br&gt;LE Regents Exams are hyperlinked for ease of access to questions.</td>
</tr>
<tr>
<td></td>
<td><strong>Cell Theory:</strong> Students will be able to list three major principles of The Cell Theory.</td>
<td><strong>Key Idea 2</strong></td>
<td><strong>LS1.B: Cell Structure</strong></td>
<td>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.</td>
<td>• 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.</td>
<td><strong>Ticket Out&lt;br&gt;• Think-Pair –Share&lt;br&gt;• Formative Assessment&lt;br&gt;• Weekly Quiz&lt;br&gt;• Unit Test&lt;br&gt;• Homework&lt;br&gt;• Review Questions&lt;br&gt;• DDI process using data from Edocrinia &amp; Castle learning to generate data</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Cell Structure:</strong> Students will identify the structures and functions of the organelles of a Eukaryotic cell.</td>
<td><strong>Key Idea 3</strong></td>
<td><strong>LS1.D: Cell Transport</strong></td>
<td>• 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 levels.</td>
<td>• 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 levels.</td>
<td><strong>LS1.A: Structure and Function&lt;br&gt;LS1.B: Cell Structure&lt;br&gt;LS1.C: Life Processes&lt;br&gt;LS1.D: Cell Transport&lt;br&gt;LS1.E: Cell Division and Mitosis</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Cell Transport:</strong> Students will understand how molecules move through the cell membrane.</td>
<td><strong>Key Idea 4</strong></td>
<td><strong>LS1.E: Cell Division and Mitosis</strong></td>
<td>Feedback mechanisms maintain a living systems internal conditions within certain limits and mediate behaviors, allowing it to remain alive</td>
<td>• Feedback mechanisms maintain a living systems internal conditions within certain limits and mediate behaviors, allowing it to remain alive</td>
<td><strong>LS1.A: Structure and Function&lt;br&gt;LS1.B: Cell Structure&lt;br&gt;LS1.C: Life Processes&lt;br&gt;LS1.D: Cell Transport&lt;br&gt;LS1.E: Cell Division and Mitosis</strong></td>
</tr>
</tbody>
</table>

---

**NOTE:**
- Students must be logged into their BPS google document Labs, and is itself a component of the next levels. 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. 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 levels. Feedback mechanisms maintain a living systems internal conditions within certain limits and mediate behaviors, allowing it to remain alive. BPS Science Department 2021 Living Environment Unit 1A
### MST Standard 4 Science  
**Key Idea 1**

1.2 - Describe and explain the structures and functions of the human body at different organizational levels (e.g., systems, tissues, cells, organelles)

1.2a - Important levels of organization for structure and function include organelles, cells, tissues, organs, organ systems, and whole organisms.

1.2c - The components of the human body, from organ systems to cell organelles, interact to maintain a balanced internal environment. To successfully accomplish this, organisms possess a diversity of control mechanisms that detect deviations and make corrective actions.

1.2f – Cells have particular structures that perform specific jobs. These structures perform the actual work of the cell. Just as systems are coordinated and work together, cell parts must also be coordinated and work together.

1.2g – Each cell is covered by a membrane that performs a number of important functions for the cell. These include separation from its outside environment, controlling which molecules enter and leave the cell, and the recognition of chemical signals. The processes of diffusion and active transport are important in the movement of materials in and out of cells.

1.2i – Inside the cell a variety of specialized structures, formed from many different molecules, carry out the transport of materials (cytoplasm), extraction of energy from nutrients (mitochondria), protein building (ribosomes), waste disposal (cell membrane), storage (vacuole), and information storage (nucleus).

1.3 - Explain how a one-celled organism is able to function despite lacking the levels of 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.

- Disease is a failure of homeostasis. Organisms have a variety of mechanisms to prevent and combat disease. Technological advances including vaccinations and antibiotics have contributed to the prevention and treatment of disease.

#### Learning Center at the University of Utah

**Cells**

**Required NYS Lab - Diffusion Through a Membrane**

*NYS Diffusion Through a Membrane video* - Video use should be for instructional reference and not a substitute for live lab instruction.

| reticulum | Golgi apparatus |
| vesicle | lysosome |
| centriole | cell membrane |
| phospholipid | fluid mosaic model |
| selective permeability | receptor |
| osmosis | concentration gradient |
| diffusion | isotonic |
| hypertonic | hypotonic |
| facilitated diffusion | active transport |
| passive transport | endocytosis |
| phagocytosis | exocytosis |
| mitosis | cell cycle |
| cytokinesis | asexual reproduction |
| mitosis | binary fission |
| tissue | organ |
| organ system | cell differentiation |
| stem cell | |
organization present in more complex organisms.

**1.3a** – The structures present in some single-celled organisms act in a manner similar to the tissues and systems tissues found in multicellular organisms, thus enabling them to perform all of the life processes needed to maintain homeostasis.

**Key Idea 2**

**2.1** – Explain how the structure and replication of genetic material result in offspring that resemble their parents.

**2.1d** – In asexually reproducing organisms, all the genes come from a single parent. Asexually produced offspring are normally genetically identical to the parent.

**Key Idea 5**

**5.2a** – Explain disease as a failure of homeostasis.

**5.2** – Homeostasis in an organism is constantly threatened. Failure to respond effectively can result in disease or death.

**Key Idea 7**

**7.3** – Explain how individual choices and social actions can contribute to improving the environment.

**7.3a** – Societies must decide on proposals which involve the introduction of new technologies. Individuals need to make decisions which will assess risks, costs, benefits, and trade-offs.

- feedback
- negative feedback
- positive feedback
Resources
http://ngss.nsta.org/Classroom-Resources.aspx - Searchable NYSSLS/NGSS aligned resources curated by NSTA
Buffalo Public Schools Science Department LE Webpage – BPS Living Environment curriculum resource hub
BPS Science Department Recommended Virtual Labs – Virtual lab resources with embedded links to virtual labs and student sheets. Must be logged into BPS google document account through BPS Gmail account to access.
NYS Regents Living Environment Exams 2010-2020 NYSED’s Office of State Assessment webpage for released Regents Living Environment Examinations
NYS MST Science Learning Standards Living Environment Current NYS Living Environment Standards
NYS P-12 Science Learning Standards (HS) – NYSSLS High School Standards for Living Environment
NYSED Bilingual Glossaries – NYS Statewide Language Regional Bilingual Education Resource for NYSED approved bilingual glossaries.

English Language Learners (ELL) Enhancements
To access hyperlinked material, you must be logged into your BPS Google Drive

<table>
<thead>
<tr>
<th>Listening</th>
<th>Speaking</th>
<th>Reading</th>
<th>Writing</th>
<th>Instructional Accommodations (depending on the student’s needs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Cross-linguistic Practices: Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates.)</td>
<td>● Sentence Frames - to begin a sentence - such as Evolution is… or I think that evolution is…</td>
<td>● Supplementary Text to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension.</td>
<td>● Sentence Frames - to begin a sentence- such as Biodiversity is… or An example of competition is….</td>
<td>● Extended time for tests in class, projects and assignments</td>
</tr>
<tr>
<td>● Build background knowledge</td>
<td>● Academic Conversation Starters: Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include- I expect ____ to happen. My data shows that. This helps students have a more science focused dialogue.</td>
<td>● Visual Aids - Pictures or models to support vocabulary words and concepts</td>
<td>● Cloze passages with word banks</td>
<td>● Directions read. Broken down as necessary</td>
</tr>
<tr>
<td>● Activating Prior Knowledge</td>
<td>● Choral Reading - To build fluency, self-confidence and motivation with reading/speaking</td>
<td>● Video to review or introduce a topic – use closed captioning to help students read along while they listen to the content</td>
<td>● Word banks</td>
<td>● Model how to complete the activity in the lesson</td>
</tr>
<tr>
<td>● Visuals - GIFs, pictures - will assist students in understanding what they are listening to. Use visual thinking strategies to set the lens for learning.</td>
<td>● Create movement to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning</td>
<td>● 4 Square / Frayer models to help students gain a deeper understanding of vocabulary.</td>
<td>● Graphic Organizers to help break down the writing process and organize thoughts</td>
<td>● Oral simplification of directions or questions</td>
</tr>
<tr>
<td>● Video to review or introduce a topic – use closed captioning to help students see the words and pronunciations while they listen to the content.</td>
<td>● Performance Level Descriptors</td>
<td>● Highlighting important text to assist students in answering questions after the reading.</td>
<td>● Standards-based sentences</td>
<td>● Translated version of test when available. Student may have both version English and native language version</td>
</tr>
<tr>
<td>● Word stretching / Vowel stretching when instructing allows student to listen closely to the pronunciation of the word</td>
<td></td>
<td>● Chunking - Break reading of text into chunks or paragraphs</td>
<td>● Performance Level Descriptors</td>
<td>● Use of approved bilingual glossaries from NYS in each subject</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This document provides teachers with a description of what output they can expect from students

BPS Science Department 2021 Living Environment Unit 1A
# BPS Science Department Living Environment - Unit 1A

**Special Education Modifications**
- Pre-teach vocabulary
- Use picture vocabulary
- Scaffold Depth of Knowledge questions
- Provide copy of notes/notes in “cloze” form
- Use of Think, Pair, and Share strategy to help process information
- Scaffold written assignments with the use of graphic organizers
- Allow for multiple ways to respond (verbal, written, response board)
- Provide model of performance task
- Modify informational text to fit the needs of the students
- Provide a digital or paper interactive notebook
- Present complex tasks in multiple ways
- Provide mnemonic strategies for Living Environment concepts

**In Class Assessments**
- Provide review packet or review sheet of concepts covered on the test
- Practice similar questions prior to the test
- Provide multiple options for projects
- Give a timeline of when things are due and remind them of the process often.
- Use of timer in class
- Break all complex tasks into chunks

**Step Up to Writing**
- Informal Outline
- Color-Coding – Informative/Explanatory Text
- Two-column notes
- I-V-F Topic Sentence progressing to Four Step Summary Paragraph
- CUPS – Capitalization, Usage, Punctuation, Spelling
- Transitions

**Technology**
- Audio reading of text
- Text to type functions
- Videos to clarify/visualize Living Environment concepts
- Record class lecture/discussions and make accessible to student
- Nearpod - interactive presentations of notes
- Playposit - show a video clip about the topic and add your own questions for them to answer as they watch
- Allow students to type answers in chat on Teams

**Other**
- Arrange seating for maximum engagement and minimum distraction
- Accessible lab space (counter level)

---

**SUTW Strategies**
- Informal Outline
- Color-Coding – Informative/Explanatory Text
- Two-column notes
- I-V-F Topic Sentence progressing to Four Step Summary Paragraph
- CUPS – Capitalization, Usage, Punctuation, Spelling
- Transitions

---

**Performance Level Descriptors**
This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening Scroll for grades 9-12. (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary.

---

**Special Education students must have accommodations as per Individual Educational Plan (IEP)**