

Unit 02: Cells (Weeks 7-12)

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **6 weeks**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

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 to determine relationships, including quantitative relationships, between independent and dependent variables.

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.

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.

Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.

Connections to the Nature of Science: Most Closely Associated with Practices Scientific Investigations Use a Variety of Methods

Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.

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

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

Crosscutting Statements

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.

Some systems can only be studied indirectly as they are too small, too large, too fast, or too slow to observe directly.

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.

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)

SCI.1-LS1	From Molecules to Organisms: Structure and Processes
SCI.1.LS1.A	Structure and Function

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.

Interdisciplinary Connections: NJSL for ELA, Social Studies, Science and/or Math

Section

LA.RL.9-10.1	Cite strong and thorough textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
LA.RL.9-10.2	Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details and provide an objective summary of the text.
LA.RL.9-10.3	Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.
LA.RL.9-10.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).
LA.RL.9-10.5	Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create specific effects (e.g., mystery, tension, or surprise).
LA.RL.9-10.6	Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.4	Analyze how economic conditions and societal changes influence employment trends and future education.
CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.
CAEP.9.2.12.C.6	Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

The cell is the basis of structure and function for all living things. All metabolic processes that sustain life occur within the cell.

Meaning

Essential Questions

Essential Questions

- What distinguishes a prokaryotic cell from a eukaryotic cells?
- What are the functions of the individual organelles within the cell?
- How are materials transported into or out of the cell?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- All living things are made of one or more cells, which are either prokaryotic or eukaryotic.
- Cells contain organelles that are responsible for creating and packaging proteins, creating energy, or protecting genetic information.
- Cells have a phospholipid membrane that regulates what enters and/or leaves the cell in order to maintain homeostasis.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know...

- The cell theory
- Prokaryotic cells are unicellular, smaller, do not contain membrane bound organelles, nor a nucleus; Eukaryotic cells can be unicellular or multicellular, are larger, have membrane bound organelles and a nucleus.
- Plant cells and animal cell both contain a cell membrane, nucleus, nucleolus, RER, SER, golgi bodies, ribosomes, mitochondria, and have a cytoskeleton
- Animal cells differ because they also contain lysosomes and centrioles; plant cells have a cell wall, a central vacuole, and chloroplasts/plastids.
- Diffusion is a type of passive transport in which the movement of particles from areas of high concentration to areas of lower concentration.
- Osmosis is the diffusion of water.
- There are three types of osmotic solutions: hypertonic, hypotonic, and isotonic
- Active transport requires energy and includes exocytosis and endocytosis (phagocytosis and pinocytosis)

Skills

Skills

Student will be skilled at ...

- Prepare a microscope slide of living cells using appropriate stains
- Find and identify organelles of living and preserved cells under a microscope
- Synthesize a creative analogy to compare the organelles of a cell to those of a model of student's choice
- Apply knowledge of osmosis to predict the change in mass of an egg when placed in different osmotic solutions
- Describe, illustrate, and explain the changes a plant cell undergoes when placed in both hypertonic and hypotonic solutions

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- Teacher derived notes
- Powerpoint/Google Slides presentation
- Worksheets
- Articles
- Lab materials

Formative Assessment Strategies

Formative Assessment Strategies

- Informal assessments (All call, thumbs up, Kahoot)
- Daily Do-Nows
- Exit tickets (Short answer responses, feedback forms)
- Quizzes
- Lab reports

Learning Activities/Unit of Study

Learning Activities/Unit of Study

- Cheek cell and onion cell microscope lab
- Onion osmosis lab
- Egg osmosis activity
- Cell flip up diagram
- Cell analogy
- Drinking too much water..article
- Virtual cell interactive internet activity
- Cell Transport webquest
- Various practice worksheets

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how

much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just

may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.