Unit 2 - Metabolism

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

In this unit, students will review the important body systems and how they interact with each other.

Enduring Understandings

A functioning human body has molecules from food (glucose and amino acids) and molecules from air (oxygen) in its cells.
Cells can only use molecules that are small enough to enter a cell.
The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
Systems can work together to form a larger more complex system.
A problem with a body system can result in fewer oxygen, glucose, and/or amino acid molecules getting to the body's cells.
In order to release energy, cells need both glucose and oxygen molecules.
Inside the cell, the atoms that make up glucose and oxygen can be rearranged to make different molecules.
This chemical reaction is called cellular respiration and releases energy.
Cells can grow and repair themselves by combining amino acid molecules to form larger protein molecules.
This growth and repair requires energy release from cellular respiration.
Engineers analyze the data from testing in order to improve upon their designs.

Essential Questions

How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?
What does the human body need to function? (1.2)
Which molecules do cells need to function? (1.3)
How do molecules from food and air get to the cells in the body? (2.1)
How can having a medical condition affect the delivery of molecules to cells in the body? (2.2, 2.3, 2.4)
Which molecules do the cells need to release energy? (3.1)
How do oxygen and glucose molecules release energy in the cells? (3.2)
What can happen in the cell as a result of energy released through cellular respiration? (3.3)
Can we develop nutrition bars that will provide the proper balance of protein, and carbohydrates for target populations?

Learning Objectives

Students will be able to make observations in the Simulation and read a short article to discover which molecules are taken in by the cells.
Students will be able to explore several medical conditions with the Sim and through text.
Students will be able to explain how diabetes affects Elisa's (simulation) body systems and the molecules that get to her cells.
Students will explore the effects of activity on their own bodies
Students will read an article and conduct additional investigations in the Simulation.
Students will design a health bar to meet the metabolic needs of populations affected by natural disasters. (Climate Change)
Students will be able to identify and explain the value of iterative tests, how to balance trade-offs, and how to analyze the results in order to inform their next decisions.
Students will gather evidence and prepare a final proposal that justifies the choices they made relative to the criteria.

Standards: Content

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.
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.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
MS-LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Standards: Interdisciplinary

Assessment Evidence

Formative	Teacher observations, Class discussions, Lab Activities, Key concepts and vocabulary quizzes, Warm Ups, Open Ended Responses, Modeling, Simulations, Innovators Monthly Research
Summative	In correlation with the NJSLS, students must demonstrate the following as summative assessments: 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 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. MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism Summative assessments will include but are not limited to: lesson activities, summative tests, lab skills, demonstrations, and vocabulary quizzes
Alternative & Benchmark	Alternative assessments as required by student IEP/504/I&RS - Read to the student and chart oral responses. Word banks, sentence frames, oral responses, graphic organizers, observations, and anecdotal notes. Benchmark – LinkIt Benchmark Assessment, Teacher Generated Assessments
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, Websites and digital interactives/models, Multi-media presentations, Video Streaming, Amplify Digital Curriculum, Generation Genius, BrainPop, Mystery Science, Microsoft 365,

Primary and Secondary Source Documents, Lab Materials as needed, Amplify Readings, Labs, Simulations

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
X	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness		Relationship Skills
X	Responsible Decision-Making		Social Awareness
X	Self-Management		

21st Century Skills & Themes

X	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting
X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
X	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
X	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		