Unit 03: Human Machine

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

Standards Alignment

New Jersey Student Learning Standards

Practice 2. Developing and using models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

Develop and/or use models to describe and/or predict phenomena.
Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.

Practice 7. Engaging in argument from evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

Construct and/or support an argument with evidence, data, and/or a model.

Crosscutting Statements
2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

Cause and effect relationships are routinely identified, tested, and used to explain change.

4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

A system can be described in terms of its components and their interactions.

LS1: From Molecules to Organisms: Structures and Processes
LS1.A: Structure and Function

Plants and animals have both internal and external structures that serve various functions in growth, survival,behavior, and reproduction. (4-LS1-1)

LS1.D: Information Processing

Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

PS4: Waves and Their Applications in Technologies for Information Transfer
PS4.B: Electromagnetic Radiation

An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

SCI.1-PS4	Waves and their Applications in Technologies for Information Transfer
SCI.1.PS4.B	Electromagnetic Radiation
SCI.1-LS1	From Molecules to Organisms: Structure and Processes
SCI.1.LS1.A	Structure and Function
SCI.1.LS1.D	Information Processing
4-LS1-2	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4-LS1	From Molecules to Organisms: Structures and Processes
4-PS4	Waves and their Applications in Technologies for Information Transfer
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

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

TECH.8.2.5	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.5.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.5.C.5	Explain the functions of a system and subsystems.
TECH.8.2.5.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.5.D.3	Follow step by step directions to assemble a product or solve a problem.

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

LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
LA.K-12.NJSLSA.R2	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.RI.4	Reading Informational Text
	Key Ideas and Details
LA.RI.4.1	Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
LA.RI.4.2	Determine the main idea of a text and explain how it is supported by key details; summarize the text.
LA.K-12.NJSLSA.W	Writing
	Text Types and Purposes
LA.RI.4.3	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.K-12.NJSLSA.W2	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.K-12.NJSLSA.SL	Speaking and Listening
	Comprehension and Collaboration
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.W.4.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
LA.W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
LA.SL.4.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

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

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit… ...is for students to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction and students will be able to describe that an object can be seen when light reflected from its surface enters the eye by developing a model. (4th Grade NGSS Storyline)

Meaning

Essential Questions

Essential Questions

- How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction?
- How do animals use their perceptions and memories to make decisions?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

(Crosscutting Concepts)

- A system can be described in terms of its components and their interactions.
- Cause and effect relationships are routinely identified.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

(Disciplinary Core Ideas)

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.
- An object can be seen when light reflected from its surface enters the eye.

Skills

Skills

Student will be skilled at …

(Science and Engineering Practices)

- Construct an argument with evidence, data, and/or a model.
- Use a model to test interactions concerning the functioning of a natural system.
- Develop a model to describe phenomena.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Texts

- *Science Notebooks: Writing about Inquiry* by Lori Fulton & Brian Campbell
- *Perfect Pairs: Using Fiction and Nonfiction Picture Books to Teach Life Science, Grade 3-5* by Melissa Steward and Nancy Chesley

E-Texts (link below)

- *Next Generation Science Standards: A Framework for K-12 Science Education*
- *Next Generation Science Standards: Developing Assessments*
- *Next Generation Science Standards: Guide to Implementing the Standards*
- *Next Generation Science Standards: Science Teacher's Learning: Enhancing Opportunities, Creating Supportive Contexts*
- *Next Generation Science Standards: Surrounded by Science*

Websites (links available in Unit Overview)

- Next Generation Science Standards
- Mystery Science
- New Jersey Center for Teaching and Learning
- Better Lessons
- New Jersey Model Curriculum

E-Texts

Formative Assessment Strategies

Formative Assessment Strategies

Daily Formative Assessments:

- Teacher Observation
- Notebook or Journal (see link below for ideas)

Mystery Science-Specific Formative Assessments:

- End of Mystery Assessments
- End of Unit Assessment

Science Notebooks

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Lesson Components (See Lesson Guides to assist with planning.)

1. Watch Exploration video.

2. Engage in Activity.

3. Refine, extend, and/or assess student understanding with "Optional Extras".

The Unit Overview, Lesson Guides, and associated resources are available in the 4th Grade Science Folder for Unit 3 on Google Drive (link below).

Unit 3: Human Machine

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.