01_ Physical Science 1 - Can I Believe My Eyes?

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **9 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Science and engineering—significant parts of human culture that represent some of the pinnacles of human achievement—are not only major intellectual enterprises but also can improve people's lives in fundamental ways. Although the intrinsic beauty of science and a fascination with how the world works have driven exploration and discovery for centuries, many of the challenges that face humanity now and in the future—related, for example, to the environment, energy, and health—require social, political, and economic solutions that must be informed deeply by knowledge of the underlying science and engineering.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Learning Set 1: How Does Light Allow Me to See?

What are the characteristic properties and behaviors of waves? What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there? How do organisms detect, process, and use information about the environment? What are the predictable patterns caused by Earth's movement in the solar system?

Learning Set 2:What Happens When Light Reaches an Object?

What are the characteristic properties and behaviors of waves? What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there? What is energy? What are the predictable patterns caused by Earth's movement in the solar system?

Learning Set 3: How Can Light Have Different Colors?

What are the characteristic properties and behaviors of waves? What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there? What are the predictable patterns caused by Earth's movement in the solar system? How do organisms detect, process, and use information about the environment?

Learning Set 4: Is There Light I Cannot See?

What are the characteristic properties and behaviors of waves? What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there?

CONTENT AREA STANDARDS

6-8.MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
6-8.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.
6-8.MS-PS4-3	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
6-8.MS-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
6-8.MS-PS3-4	Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
6-8.MS-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.K-12.2	Reason abstractly and quantitatively.
MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
TECH.9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

1. An object can be seen if four conditions are met: there is an object, an eye, a source of light, and a direct path
between the object and the eye.
2. Light must enter the eye or sensor to be seen or detected.
3. The brighter an object appears, the more light that reaches the eye or detector from it.
4. Light travels in straight lines.

5. Light continues traveling until it reaches an object that scatters or absorbs it.
6. A shadow is formed behind an object that blocks the path of light.
7. A shadow is seen by detecting that less light reaches the eyes from it than from the area surrounding it.
8. Scattering occurs when light bounces off an object in all directions. This occurs when the surface of the object is
rough and unpolished.
9. Reflection occurs when light bounces off an object only in a certain direction. This occurs when the surface of the
object is smooth and polished.
10. A reflection of one object is seen in a second object only if the second object reflects light, not if it scatters it.
11. Some objects are transparent and let light pass through them.
12. When light reaches an object, it is scattered (or reflected), transmitted, absorbed, or some combination of these.
13. Light can make things happen when it is absorbed.
14. When different colored lights are mixed, they appear as a new color, brighter than the original colors.
15. White light is a mixture of all colors of light—it is the brightest color. Black is the color associated with the absence
of light.
16. Filters color light by absorbing certain colors and transmitting the rest.
17. Colored objects scatter only certain colors of light and absorb the rest.
18. There are many different wavelengths of light. Most of these cannot be seen.
19. Different wavelengths of visible light appear to us as different colors.

Procedural Knowledge

Students will be able to:

- Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
- Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
- Analyze and interpret data to determine scale properties of objects in the solar system.
- Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
- Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

EVIDENCE OF LEARNING

Formative Assessments

MS-ESS1-3: Physical Science 1: Reading 5.3: Stars and the Solar System

MS-LS1-8: Physical Science 1: Activity 1.1: Anchoring Activity--Strange Images, Reading 1.1: Look at This!, Activity 1.2: Driving Question Board, Activity 2.1: Probing Ideas: Seeing Objects around the Room, Activity 2.2: Determining the Conditions for Sight--The Light Box, Reading 2.2: Picture This!, Activity 4.1: How the Eye Works--Overview, Reading 4.1: Eyes in the Animal Kingdom, Activity 9.3: How Color Sensors Work, Reading 9.3: Making Color Photographs

MS-PS3-4: Physical Science 1: Activity 8.2: Investigating Heating by Light, Reading 8.2: Solar Power Plants, Reading 8.4: Solar Energy

MS-PS4-1: Physical Science 1: Activity 6.1: Reflection, Activity 6.2: Investigating Scattering and Reflection, Activity 7.2: Measuring Light Transmission, Homework 12.1: Is the Remote Emitting Light?

MS-PS4-2: Physical Science 1: Activity 3.1: Preparing to Develop Models, Reading 3.1: Modeling, Activity 3.2: Building the Consensus Model, Reading 3.2: Faster than a Speeding Bullet, Homework 4.1: Exploring Shadows, Activity 5.1: Introducing Shadows, Homework 5.1: A Midnight Crime, Activity 5.2: All Shadows Are Not the Same, Homework 6.2: Investigating Scattering and Reflection-Part 1, Activity 6.3: Explaining Scattering, Reflection and Images, Homework 6.3: Scattering and Reflection-Part 2, Reading 6.3: Polishing Objects, Activity 7.1: Evaluating the Light Model, Homework 7.2: Transmission of Light-Part 1, Activity 7.3: revising the Light Model, Homework 7.3: Transmission of Light-Part 2, Activity 8.1: Light Makes Things Happen, Homework 8.2: Absorption of Light, Activity 8.3: Keeping Track of Light, Activity 8.4: Revisiting Phenomena Caused by Light, Homework 8.4: Absorption of Light, Activity 9.1: Mixing Colors of Light with Projectors, Activity 9.2: Mixing Colors of Light on Computers, Activity 10.1, Analyzing Color Composition, Reading 10.1: Rainbows, Activity 10.2: Revisiting the Consensus Model, Reading 10.3: Diffraction, Activity 11.1: Revisiting Learning Sets 1-3, Activity 11.2: Explaining How We See Objects, Including Optical Illusions, Activity 12.1: What Is Leaving a Remote Control?, Reading 12.1: Infrared Light, Activity 12.2: Introducing the Wave Model, Activity 13.1: Investigating UV Light, Homework 13.1: UV Light and UV/IR Imagery, Reading 13.1: Nonvisible Light, Homework 13.2: UV Light and UV/IR Imagery

MS-PS4-3: Physical Science 1: Reading 7.3: Using Light in Optical Fibers, Activity 13.2: How Would the World Look If People Could See UV and IR Light?

Summative Assessments

- Benchmark Assessments
    - Multiple Choice Assessment administered at the end of each marking period.

Alternative Assessments

- Oral Presentations
- Questions for Comprehension
- Performance Tasks
- Scientific Journals/Notebooks
- Self-Assessment
- WebQuests

RESOURCES (Instructional, Supplemental, Intervention Materials)

IQWST Unit Materials for Physical Science 1 Learning Set 1-4

A Framework For K-12 Science Education

Onlne Resources provided by IQWST not included in the program (to be used as support/reinforcement/enrichment): https://docs.google.com/spreadsheets/d/1VpyFCL4_50_-1w2NhcGpdNNZ2jj6aJJegcIUNCy_uzQ/pubhtml

INTERDISCIPLINARY CONNECTIONS

Collaboration with Math and Language Arts teachers is an essential part of the IQWST curriculum.

Information Writing

Current Events

Topography

Data collection/analysis

Computations

Statistics

Enginereering

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

IQWST provides audio recording for all readings in student workbook-available through teacher portal online

Reading differentiation strategies are embedded in the IQWST program and all students prepare for reading through a 'Getting Reading' section which begins each reading.

The sections are desgined to engage students, generate interest, activate prior knowledge and provide a purpose for reading. Teachers use advance organizers for desired readings and to encourage students to plan and annote the passages.

A word wall is developed through vocabulary aquisition in the program. Students develop the word wall as words are learned in context and through experience in class. This helps to build meaning and understanding which support students when reading text.

Students are encouraged to ask questions and post them to the Driving Question Board. This DQB helps students develp a greater level of understanding and encourages students to work together to solve problems in and outside of class.

Supoort will be provided to students when writing in the student manual and use of teh computer, printing, and pasting into the manual is acceptable if there is a present need.