

6.1 Light

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **8 weeks**
Status: **Published**

Course Pacing Guide

Unit	MP/Trimester Weeks	
Intro to MS Science and Light	1	5
Thermal Energy	1	8
Weather and Climate	2	9
Plate Tectonics	2, 3	6
Natural Hazards	3, 4	6
Cells and Systems	4	8

Unit Overview

During the first two weeks of school, sixth graders engage in developing classroom norms to guide their work together and begin exploring the nature of science. This focus on teamwork and communication helps students see science as a collaborative process, and leads into the first unit on light and matter.

The light and matter begins with a perplexing phenomenon of one-way mirrors and how such a material acts as both a mirror and a window. Students investigate the phenomenon further using a scale model built from two boxes combined together to stimulate the light and dark rooms on either side of a piece of one-way mirror film. Through this students consider: Why do we sometimes see different things when looking at the same object?

Enduring Understandings

- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light.
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends.

Essential Questions

- How can something be a mirror and a window at the same time?
- What happens if we change the light?
- What happens when light shines on the one-way mirror?
- How do similar amounts of light transmit through and reflect off the one-way mirror?
- How do light and the one-way mirror interact to cause the one-way mirror phenomenon?
- Why does the music student not see the adults?
- Why do the music student and the adults see the music student but the music student can't see the adults?
- Why do we sometimes see different things when looking at the same object?

New Jersey Student Learning Standards (No CCS)

SCI.MS-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
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Interdisciplinary Connections

MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
LA.RI.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.W.6.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.SL.6.5	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

Technology Standards

TECH.8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
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21st Century Themes/Careers

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
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.

Instructional Strategies & Learning Activities

Throughout this unit, students will:

- Ask questions about the one-way mirror phenomenon that they investigate in the classroom using the box scale model and manipulating light on different materials
- Develop a shared set of classroom norms to guide their work together
- Agree upon ways to represent science ideas they figure out and use those representations to develop models for explaining how light interacts with different kinds of matter
- Develop and use a model for explaining how the one-way mirror acts like a mirror on the light side of the systems and acts like a window on the dark side of the system

Learning activities include:

- Exploring an anchoring phenomenon
- Creating an initial model
- Creating a Driving Question Board and an Ideas for Investigation chart
- Investigating a box system and one-way mirror
- Collecting, analyzing and interpreting data that describes how various materials affect the amount of light reflected and transmitted
- Reading a text excerpt about smooth and bumpy surfaces
- Planning and carrying out an investigation: exploring different mirror surfaces
- Reading a text excerpt about mirror coatings
- Modeling how light inputs transform into signals that the brain processes
- Planning and carrying out an investigation: adding light to scenario

Differentiated Instruction

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Meaningful Student Voice & Choice
- Relationship-Building & Team-Building
- Self-Directed Learning
- LMS use
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Grouping
- Rubrics
- Jigsaws
- Assessment Design & Backwards Planning

- Student Interest & Inventory Data

Formative Assessments

- Model Trackers
- Student Science Notebooks
- Student Self-Assessment Discussion Rubric
- Exit Tickets/Google Form Reflections
- Representing and Explaining Room A (based on revised model)
- Student Peer Feedback

Summative Assessment

- Students will create a final model and write individual scientific explanations based on final models

Benchmark Assessments

- Fall/Winter LinkIt Assessments

Resources & Technology

- Adapted from OpenSciEd Light and Matter Unit
- Digital simulations and video clips
- Light meters for data collection

BOE Approved Texts

N/A

Closure

Individual classes and lessons will end with a closure activity that reinforces what students figured out during class, and helps navigate toward next steps.

Closure activities may include:

- Scientists' Circle
- Post-it reflection
- Google form exit ticket
- Group performance reflection
- Science notebook jot

ELL

- Alternate Responses
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- Google Translate

Special Education

Accommodations will be made in accordance with students' IEPs. The following list provides examples:

- Shorten assignments to focus on mastery of key concepts.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Keep workspaces clear of unrelated materials.
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Allow the student to complete an independent project as an alternative test.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.

- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits

At Risk

Examples may include:

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring

- Have parent sign homework/behavior chart

Gifted and Talented

Examples may include:

- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking