Unit 3: Light (Waves)

Content Area: **Science**
Course(s): **Science Gr 1**
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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Science: Grade 1

Unit 3: Light

Belleville Board of Education

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Unit Overview

In this unit, children will...

- provide evidence, based on observations, of the relationship between the amount of light and how an object is seen
- explain, using evidence based on observations, why objects that give off their own light can be seen in the dark
- explain and demonstrate how different materials can allow different amounts of light to pass through
- explain how shadows are made
- observe that light shines in a straight line until it hits an object
- explore how reflection can be used to redirect light
- explore how technology is used to send and receive information using light

Enduring Understanding

- Students will observe reflections in a mirror and use their observations to predict where their partner should stand in order to be visible in the mirror.
- Students will observe the cause-and-effect relationship between where they stand and whether they are visible in the mirror.
- students will make observations to explain how objects can be seen if the objects give off their own light or if light is available to shine on them.
- students will ask questions, make observations, and gather information to describe how light passes through objects.
- students will gather evidence to support or refute ideas about causes relating to how light travels and explore how people use light devices to communicate over distances.

Essential Questions

Essential Questions for Unit 3 Project:

Students can be prepared for their Unit 3 Project by asking the following questions:

- What is light?
- How can we tell that light is shining on something?
- What do we observe?
- How does light travel?
- What happens to light when you put something in its path?

Essential Questions:

- How does light help us see?
- How can you see fireworks in a dark sky?
- How do materials block light?
- How does the artist make the shapes?
- How does light travel?
- How could you point light away from your eyes?

Exit Skills

By the end of Grade 1, Science Unit 3, the students should be able to:

- describe how light helps us see
- identify fireworks as objects that give off light
- explain that fireworks can be seen in the dark because they give off light
- describe how light passes through some objects, but not all objects
- explain that shadows are made when an object blocks light
- use evidence to support their ideas
- explain what kind of surfaces reflect light
- describe how light can be pointed in a new direction
- effectively explain how to use a smooth, shiny surface to point the light away from their eyes

New Jersey Student Learning Standards (NJSLS-S) & NGSS

SEP - Constructing Explanations and Designing Solutions

SEP - Planning and Carrying Out Investigations

DCI - Electromagnetic Radiation

DCI - Information Technologies and Instrumentation

CCC - Cause and Effect

CCC - Influence of Engineering, Technology, and Science on Society and the Natural World

NextGen Science Standards

1-PS4-2	Make observations to construct an evidence-based account that objects can be seen only when illuminated.
1-PS4-4	Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
1-PS4-3	Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

Interdisciplinary Connections

Do the Math! pp. 85, 103, 123

Lesson 1:

Connections to Math

1.MD.B.3 Tell and write time in hours and half-hours using analog clocks.

Connections to English Language Arts

SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Lesson 2:

Connections to Math

1.NBT.A.1 Count to 120, starting at any number less thatn 120. In this range, read and write numerals and represent a number of objects with a written numeral.

Connections to English Language Arts

SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Lesson 3:

Connections to Math

1.OA.A.2 Solve word problems that call for addition of three whole numbers whose sum in less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Connections to English Language Arts

W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).

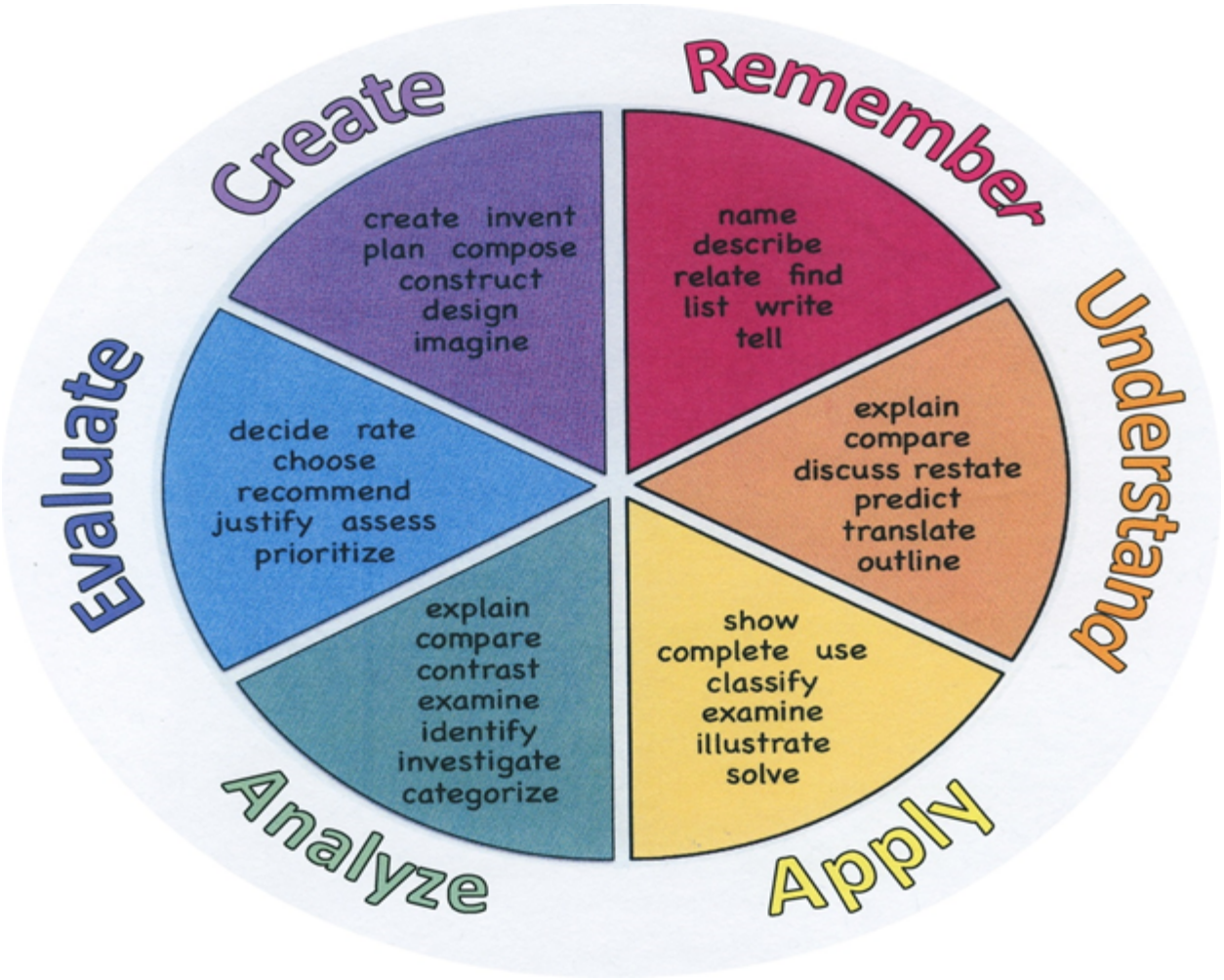
SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Learning Objectives

- SWDAT make observations to explain how objects can be seen if the objects give off their own light or if light is available to shine on them
- SWDAT make observations in different amount of light and record observations
- SWDAT make a claim and support that claim using evidence from their observations during the exploration
- SWDAT ask questions, make observations, and gather information to describe how light passes through objects
- SWDAT investigate beams of light and discover what happens when different materials are placed in the path of the light
- SWDAT gather evidence to support or refute ideas about causes relating to how light travels
- SWDAT explore how people use light devices to communicate over distances
- SWDAT make a claim about how smooth, shiny surfaces affect a beam of light and support their claim with evidence and data from their observation during the exploration

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose Describe	Classify Defend	Choose Dramatize	Categorize Classify	Appraise Judge	Combine Compose

Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



Suggested Activities & Best Practices

Vocabulary Game- Guess the Word

Hands-on Activities: Make Observations in Different Light, Test How Light Passes Through Materials, Test What Happens to Light

Interactive Activity: Message Projector

Unit Project

Take It Further

- Animals That Glow
- Make a Sundial
- Art with Light

Assessment Evidence - Checking for Understanding (CFU)

- Anticipation Guide
- DBQ's
- Evaluation rubrics
- Exit Tickets
- Fist- to-Five or Thumb-Ometer
- HMH End-of-Year Test (Benchmark)
- HMH Mid-Year Test (Benchmark)
- HMH Performance-based Assessment (Alternative)
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Question Stems
- Quizzes (Formative)
- Red Light, Green Light
- Self- assessments
- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Unit review/Test prep
- Unit tests (Summative)
- Web-Based Assessments
- Written Reports

Primary Resources & Materials

HMH Science Dimensions: Teacher Edition, Student workbooks, online resources

HMH Equipment & Safety Kits

HMH Science Dimensions S&E Leveled Readers

- On Level: What Are Forces and Energy?
- Extra Support: What Are Forces and Energy?
- Enrichment: Soccer Moves!

Ancillary Resources

https://ngss-assessment.portal.concord.org/

Technology Infusion

HMH Science Dimensions "Explore online" sections embedded throughout online teacher/student edition to extend student learning

HMH Science Dimensions "Can you explain/solve it?" videos embedded throughout online teacher/student edition

Computer-based assessments

Alignment to 21st Century Skills & Technology

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);
- Social Studies, including American History, World History, Geography, Government and Civics, and Economics;
- World languages;
- Technology;
- Visual and Performing Arts.

CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Media Literacy

21st Century Skills

- Civic Literacy
- Environmental Literacy
- Global Awareness

Differentiation

Leveled Readers (On Level, Extra Support, Enrichment)

Reinforce Vocabulary- To help students remember the vocabulary word, have them take turns mimicking a partner's behavior and use the word in a sentence. Remind students to look for the highlighted word as they proceed through the lesson.

RTI/ Extra Support- Supply students with materials for hands-on discovery.

Extension- Students who want to find out more can do research on a topic from the text

ELL- Point out labels, pictures, captions, and headings throughout the lesson. Discuss real-life connections to content, and provide hands-on examples of materials when possible.

(ELL support resources include a glossary in English and Leveled Readers in Spanish and English)

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Story guides
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Auditory presentations

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Choice boards
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Learning contracts
- Leveled rubrics
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Varied journal prompts
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

- Provide modifications dictated by the IEP/504 Plan
- Modify assessment format
- Check work frequently for understanding

- check work frequently for understanding
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- multi-sensory presentation
- Provide modifications as dictated in the student's IEP/504 plan
- secure attention before giving instruction/directions

English Language Learning (ELL)

- Provide study guides
- Allow students to correct errors (looking for understanding)
- Allowing productions (projects, models, timelines, demonstrations, charts, etc.) to demonstrate student's learning

- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- decreasing the amount of workpresented or required

At Risk

- Tutoring by peers
- Using videos, illustrations, pictures, and drawings to explain or clarify
- Decreasing the amount of work represented or required

- teaching key aspects of a topic. Eliminate nonessential information
- decreasing the amount of workpresented or required
- tutoring by peers

Talented and Gifted Learning (T&G)

- Advanced problem-solving
- Higher order, critical and creative thinking skills, and discovery

- Utilize project based learning for a greater depth of knowledge

- Allow students to work at a faster pace
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize project-based learning for greater depth of knowledge