

### 3-D Science Concept Organizer – 3<sup>rd</sup> Grade Light Example

**Phenomena or anchoring event:**

- Have students watch a shadow puppet video. (see example in resources) Ask students: How are the puppets in this video created?

**Big Idea(s):**

The total amount of energy in the Universe is always the same but can be transferred from one energy store to another during an event.

- Light is a form of energy that travels in a straight line until it strikes an object. The path of light can be directed and is the cause of shadows and colors that we see.

**Strand: 5**      **Concept(s):** Concept 3: Energy and Magnetism  
Investigate different forms of energy.

**Performance Objectives:**

PO 1. Demonstrate that light can be:

- reflected (with mirrors)
- refracted (with prisms)
- absorbed (by dark surfaces)

PO 2. Describe how light behaves on striking objects that are:

- transparent (clear plastic)
- translucent (waxed paper)
- opaque (cardboard)

**Grade Band Endpoints from Disciplinary core Ideas Learning Progression****PS4: Waves and Their Applications in Technologies for Information Transfer**

(K-2 Grade Band)

- Some materials allow light to pass through them, others allow only some light through, and others block all the light and create a dark shadow on any surface beyond them (i.e., on the other side from the light source), where the light cannot reach. Mirrors and prisms can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.)



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	(3-5 Grade Band) <ul style="list-style-type: none"><li>• An object can be seen when light reflected from its surface enters the eyes; the color people see depends on the color of the available light sources as well as the properties of the surface.</li></ul>
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<b>Strand 1 – Inquiry Process</b>  <b>Performance Objectives:</b> <b>Concept 1: Observations, Questions, and Hypotheses</b> Observe, ask questions, and make predictions. PO 1. Formulate relevant questions about the properties of objects, organisms, and events of the environment using observations and prior knowledge. PO 2. Predict the results of an investigation based on observed patterns, not random guessing. <b>Concept 2: Scientific Testing (Investigating and Modeling)</b> Participate in planning and conducting investigations, and recording data. PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry. PO 2. Plan a simple investigation (e.g., one plant receives adequate water, one receives too much water, and one receives too little water) based on the formulated questions. PO 3. Conduct simple investigations (e.g., related to plant life cycles, changing the pitch of a sound, properties of rocks) in life, physical, and Earth and space sciences. PO 4. Use metric and U.S. customary units to measure objects.	<b>Grade Band Endpoints from Science and Engineering Practices Learning Progressions</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"><li>• Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.</li><li>• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.</li></ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"><li>• Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.</li><li>• Identify the evidence that supports particular points in an explanation.</li></ul>
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PO 5. Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).

**Concept 3: Analysis and Conclusions Organize and analyze data; compare to predictions.**

PO 1. Organize data using the following methods with appropriate labels:

- bar graphs
- pictographs
- tally charts

PO 2. Construct reasonable interpretations of the collected data based on formulated questions.

PO 3. Compare the results of the investigation to predictions made prior to the investigation.

PO 4. Generate questions for possible future investigations based on the conclusions of the investigation.

PO 5. Record questions for further inquiry based on the conclusions of the investigation.

**Concept 4: Communication Communicate results of investigations.**

PO 1. Communicate investigations and explanations using evidence and appropriate terminology.

PO 2. Describe an investigation in ways that enable others to repeat it.

PO 3. Communicate with other groups to describe the results of an investigation



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Unifying Concepts:	Grade Band Endpoints from Crosscutting Concepts Learning Progressions
Constancy, Change, and Measurement	<b>Cause and Effect</b> Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Connections
<b>Strand 2: History and Nature of Science</b> None applicable to this unit
<b>Strand 3: Science in Personal and Social Perspective</b> None applicable to this unit
<b>Other Content Standards:</b> 3.RI.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. 3.RI.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. 3.RI.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area. 3.W.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. 3.SL.1a Come to discussions prepared having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. 3.SL.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.



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References	
<b>Prerequisites or Co-requisite Performance Objectives (Background Knowledge)</b>	Based on school or district curriculum: how the objectives are bundled, and the sequence objectives are taught.
<b>Materials and Resources</b>	Shadow Puppet Video <a href="https://www.youtube.com/watch?v=oWQ3Ep3NdiA">https://www.youtube.com/watch?v=oWQ3Ep3NdiA</a> Readworks.org passage on <a href="#">light</a> Trade book example: <i>I See Myself</i> by Vicki Cobb
<b>Assessments</b>	School or district determined