Me and My Shadow

**Standard(s) Addressed: Physical Science**
Students know energy comes from the sun to the Earth in the form of light.
Students know sunlight can be blocked to create shadows.

**Lesson Objective:** The primary objective is for students to understand that a shadow is a dark image cast on the ground or some other surface by a body blocking light. The shadows cast while outside will change according to the position of the Sun in the sky. Students will continue looking at how the Sun’s position changes during the day. The Sun appears to be moving throughout the day however this is due to the Earth rotating on its axis, not to the actual movement of the Sun (the Sun is stationary). It is important to remind the students during this activity that while the Sun appears to move across the sky, it is actually the Earth on which we are standing that is moving.

**Materials:** sidewalk chalk, meter sticks, student science journals, colored pencils

**Student Talk Strategies: (Descriptions at end of lesson)**
- Think-Pair-Share

**Classroom Management:** Students should be reminded of rules while working in a lab setting as well as working with a partner. It will be important to review the expectations of the lessons and how students should record their shadows.

<table>
<thead>
<tr>
<th><strong>ENGAGE:</strong> Connect to Prior Knowledge and Experience, Create Emotionally Safe Learning Environment, Preview New Vocabulary</th>
<th>Estimated time: 5 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher’s Role</strong></td>
<td><strong>Teacher Questions</strong></td>
</tr>
<tr>
<td>1. Teacher asks students to think about different shadows they have seen.</td>
<td><strong>Think, Pair, Share:</strong> Students think about their answer then share with the person next to them and finally report to class.</td>
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</tbody>
</table>
Teacher will randomly call on students to chart experiences. | share your experience. |  

**EXPLORE:** *Hands-On Learning, Contextualize Language, Use of Scaffolding (Graphic Organizers, Thinking Maps, Cooperative Learning), Use of Multiple Intelligences, Check for Understanding*  

Estimated Time: 10-15 min. for each drawing

<table>
<thead>
<tr>
<th>Teacher’s Role</th>
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<tr>
<td>1. Students will go outside at different times of the day to outline their shadows on the playground. Be sure it is a sunny day! Pick a spot on the playground where the sun will not be blocked by a building later in the day.</td>
<td>1. Before we go outside, write a prediction in your journal what your shadow will look like. Will your shadow look just like you? Consider the size and shape.</td>
<td>1. Students will write the date and title in their journal. Copy question and write their predictions.</td>
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<tr>
<td>2. Instruct students to: work with a partner; when outside, students should space themselves away from others. The first drawing should be around 9:00, then before you go to lunch and again before you go home. Each time the students go out, teacher instructs students to use a different colored pencil for journal and if possible a different colored chalk. IMPORTANT- Students always begin by placing their feet in the same place.</td>
<td>2. Each student needs to bring the journal and a red colored pencil, 1 piece of chalk and 1 meter stick per team. You will go outside and take turns tracing each other’s shadow. Stand with the sun to your back (It is easiest to trace and copy if you keep your hands by your side). Begin tracing the feet first, after you have completed tracing the shadow, measure the shadow, write the measurement and the time of day next to each, along with your name. Draw a smaller version in your journal (draw the first on the middle of the page).</td>
<td>2. Students gather materials to go out to playground. Students take turns tracing each other’s shadow, measure and record time of day. Then they return to class and discuss their observations and how they compared to their predictions.</td>
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<tr>
<td>3. Teacher asks students to make a prediction of what they think their shadow will look like at lunch. Teacher instructs students to write down the position of the sun in the sky.</td>
<td>3. Write your prediction of how you think your shadow will look when you draw it at noon. Will it be the same? Will it change in any way? Taller, shorter?? Why do you think so? Gather your materials and use a blue pencil this time for your journal.</td>
<td>3. Students write their predictions, which will vary. Then with their partner repeat the activity.</td>
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</tbody>
</table>
4. Teacher repeats step 3 at 1:45 or later.

4. Repeat step 3 at least an hour and a half later using a green pencil. Remind students to begin their tracing with their feet in the same place.

4. Students write their prediction and return for the final drawing in the afternoon.

**EXPLAIN: Listening, Speaking, Reading, and Writing to Communicate Conceptual Understanding**

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<tr>
<td>1. The teacher asks the students to observe their shadows.</td>
<td>1. Observe your shadows, notice the shape, size and also the time of day and where the sun was at that time of day. Where was the sun at noon? What did your shadow look like? Why?</td>
<td>1. Students will follow along as their classmates explain their observations. They will answer questions. Students respond: Right above us, straight up Like me but smaller The light travelled in a straight line and my body did not block much of the light</td>
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<tr>
<td>2. Teacher hands out a piece of paper or sentence strip for students to write one statement students can make after the lesson. Teacher will randomly call groups to share statements. Each team will share a statement and teacher will clarify any misconceptions.</td>
<td>2. Review your predictions from the morning and discuss with your partner the differences between your prediction and what actually happened then share with another team. Write down one statement that you all agree on.</td>
<td>2. Students work in pairs and then share ideas with another team. Students write one statement that they have learned from this lesson.</td>
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</table>

**EVALUATE: Thinking Maps, Summarize Lesson and Review Vocabulary, Variety of Assessment Tools, Games to Show Understanding**

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<td>1. Teacher instructs students to fill out a tree map to help organize their observations. They write claims and evidence to express their understanding.</td>
<td>1. Fill out a tree map listing observations under the 3 different times of the day. 1. Position of the sun 2. Shape 3. Measurements of shadow</td>
<td>1. Students will work in pairs to fill out a tree map using the information collected throughout the day. Students will write a closing statement about how the Sun’s position in the sky changes and how that affects the shadow.</td>
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</tbody>
</table>
Are the shadows of taller people the same or different from those of shorter people?  

How are the shadows the same and how are they different?  

It depends on the time of day.  

The shadows are my shape but they get all squished in the middle of the day and they get long at the afternoon. They move around too and point in different directions.

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EXTEND: Group Projects, Plays, Murals, Songs, Connections to Real World, Connections to Other Curricular Areas  

Estimated time: 10-15 minutes

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| 1. Teacher helps students make connections to how they can alter the shadows of things by the way they position them.  
2. Write a poem about your shadow. Look at teacher directions. | 1. How could you change the shadow of an object?  
Here are some objects you can use for your investigation: hula hoops, a circle of cardboard, and a pencil. Feel free to use other objects. Record your observations.  
2. Write a poem about your shadow. | 1. Students do additional investigations with hula hoops (making their shadows look flat, oval, and round), a circle of cardboard (turning it to make shadows of different shapes), a pencil (making the pencil’s shadow look as small as possible, and holding the pencil closer or farther from the ground). Students will write a poem about their shadow. |

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**Student Talk Strategies**  
Adapted from *Avenues*, Hampton Brown, 2007.

**Think, Pair, Share**

- Students think about a topic suggested by the teacher.  
- Pairs discuss the topic.  
- Students individually share information from their discussion with the class.

- The opportunity for self-talk during the individual think time allows for the student to formulate thoughts before speaking.  
- Think time allows students to think about the concepts and the language before producing.  
- Discussion with a partner reduces performance anxiety and enhances understanding.

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**Teacher Background Information**

As the sun moves across the sky, the shadow will change position and it will change in size. When we stand in the sunlight, some of the light is blocked while some light passes on in a straight-line path. We cast a shadow-- a region where light rays cannot reach because light cannot travel through opaque objects. If the shadow is close to its source, it is sharp-edged because the sun is so far away. At midday, when the sun is close to overhead, a shadow is short. In the early morning or late afternoon, when the
sun is at an angle, shadows are longer.
Directions for Writing a Cinquain or Haiku

Cinquain
Teacher Lesson

Background for Teacher
The cinquain is a highly structured form of poetry. It requires a fluent and flexible writer. The format commands attention to word choice, word meaning, syllabication, and parts of speech, while at the same time expressing a meaningful message. To the unskilled writer, the focus often becomes following the rigor of the format rules rather than writing to create meaning or to achieve a musical sense in the poetry.

True Cinquain

Line 1: 1 word title (noun) 2 syllables
Line 2: 2 descriptive words (adjectives) 4 syllables
Line 3: 3 words that express action 6 syllables
Line 4: 4 words that express feeling 8 syllables
Line 5: 1 word (synonyms or reference to title in line 1) 2 syllables

Modified Cinquain

Line 1: 1 word title (noun)
Line 2: 2 descriptive words (adjectives)
Line 3: 3 words that express action
Line 4: 4 words that express feeling
Line 5: 1 word (synonyms or reference to title in line 1)

Due to the structured nature of the cinquain form, teachers often choose to introduce a modified version of the cinquain. Using the modified cinquain with less-experienced students and offering more experienced students the option to use either form, frees students to choose words for expression rather than for mechanics.

Haiku: A haiku is a short poem, only three lines long. The form originated in Japan but is a popular poetic format in almost every language today. The format is 5/7/5 i.e. first line - five syllables, second line - seven syllables, third line – five syllables. It is written in the present tense and deals with life, especially nature, as the writer finds it at that moment.

Line 1: 5 syllables
Line 2: 7 syllables
Line 3: 5 syllables
Me and My Shadow

Student name:

Data Table: Enter each time and shadow drawing with a different colored pencil. Trace over the feet each time with new drawing. What differences do you notice?

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Drawing of Shadow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
Claims and Evidence:
My shadows are the same because ________________________.

My shadows are different because ________________________.

My shadows are alike because they all ________________________.

They are different because ________ is ________ while ________ is ________.

The shadows of taller people are ________________ and the shadows of shorter people are ________________.

Extension.
Do additional investigations with hula hoops (making their shadows look flat, oval, and round), a circle of cardboard (turning it to make shadows of different shapes), a pencil (making the pencil’s shadow look as small as possible, and holding the pencil closer or farther from the ground).

<table>
<thead>
<tr>
<th>Object</th>
<th>Drawing of Shadows</th>
</tr>
</thead>
<tbody>
<tr>
<td>hula hoop</td>
<td></td>
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<tr>
<td>circle of cardboard</td>
<td></td>
</tr>
<tr>
<td>pencil</td>
<td></td>
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