**The Day/Night Cycle and Apparent Motion of the Sun**

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| **Materials:**  - Signs around the room that say North, South, East and West  - Lamp for the sun  - Small earth globes – one for each pair  - A flashlight  - Stickers  - Paper and pencils |

**Engage**

Introduce students to the topics of these lessons: “We are going to be working on understanding the earth, the sun, the moon and the stars. We’re going to start by having you all share your ideas about what we can see in the sky and why the sun appears to move the way that it does.” “Where does the sun go at night?”

(10 minutes)

**Explore**

Point out signs up in the classroom that say NORTH, SOUTH, EAST and WEST. Have the students stand and imagine they are standing outside.

* “Does anyone know where we would see the sun when we first get up in the morning? Is it low in the sky or high in the sky? What direction would we look to see the sun?”
* Have the students point low in the EAST. *You may want to darken the room and use a flashlight for this demonstration.*
* “Where will the sun be in the middle of the day, around lunchtime?”
* Have the students point high and towards the south.
* “Where will we see the sun at the end of the day when it sets?” After students have made their guesses, have them point to the WEST as if the sun is setting.
* Have the students repeat the motion for the whole day again, drawing out arcs with their arms.

(5 minutes) Think-Pair-Share

Ask the students to talk to their partner and explain why they think the sun rises and sets. Ask a few students to share some of their ideas.

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| (10 minutes) The purpose of this sections is the help students kinesthetically experience **rotation** and to help students understand why the sun rises in the east and sets in the west |

* Bring out a lamp for the sun. Ask the students to stand up where they can freely move. Tell them that we are going to act out what happens to make day and night and the rising and setting of the sun.
* “We are all going to pretend that we are each the earth!”
* “Watch what I am going to do – Scientists call this **rotating** but you might also call it spinning or turning. It is important that we all **rotate** in the same direction: **counter-clockwise** because this is the direction that the earth rotates.”
* “Everyone raise their left hand” (Make sure students are raising their left hand.)
* “Point to your left. Now **rotate** towards your left until you are facing away from the sun. If you can’t see the sun, is it day or night?” (night)
* “Now keep rotating in the same direction until you are facing the sun. What time of day is it now?” Noon.
* “Rotate again, slowly and keep looking at the sun. Stop just before you can’t see the sun anymore. It’s now **sunset.** Tap the shoulder that you see the sun over. That is the west where the sun is setting! Keep rotating slowly – now it is night. Keep rotating slowly and stop as you can just see the sun again. Now tap on the shoulder that you see the sun over. Is that the same shoulder as you looked over when the sun set? No! It’s the other shoulder – now you are looking east. So what time is it? Yes, it’s the morning.”
* Repeat this process to emphasize the different times of day and where we (The Earth) are facing compared to the stationary sun. Use the word “rotating” to emphasize its use.
* “Now, think back to the path of the sun that we traced out with our arms. The sun rises in the east and sets in the west because the earth is always spinning counter-clockwise. We see the sun going that way (**trace the path yourself**) because the earth is spinning the other direction.”
* Also ask the students:
* “How long does it take for the earth to rotate once – to face the sun, turn around and face back towards the sun?” **Twenty-four hours or one day**.
* (10 minutes)

**EXPLAIN**

Now give each pair of students an **earth globe**. Ask the students to do the following WITH A PARTNER:

* “Find Annapolis on the globe and put a sticker on it. Now use the globe to explain why the sun rises and sets just like we did as a group when we rotated like the earth. Use the globe to show when it is noon, sunset, midnight, and sunrise happen for where we live near Annapolis.”
* Students should spin the globes counter-clockwise to show the scientific direction of the earth’s rotation. Make sure that each child has a chance to demonstrate this motion.

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| * Explain to the students that the line the globes spin around is called the **axis.** You can substitute any locations here that you know your students might be familiar with.   **EXTEND** |

* “Position the globe so that it is about noon for us in Annapolis. Now find China on the globe. Put a sticker as a person in China. Is it day or night for people in China?”
* “What about Australia? Put a sticker for a person living in Australia.”
* “Position the globe so that it is midnight for us. What time is it now in China? Australia?”
* “Does the sun rise and set in China? In Australia?” Yes, the sun rises and sets as it does here because of the earth’s rotation.

**EVALUATE**

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| Each person in the group should now get out a piece of paper.  “Draw a model of why the sun rises and sets so that we have day and night.” In their groups, have the students compare their drawings.    **Assessment**  At the end of the lesson, the students will draw a model showing why they think we have day and night. Hopefully, they will demonstrate in drawings, arrows, and/or words that it is the rotation of our earth that causes us to face towards and away from the stationary sun.  **Closing** (10 minutes) The purpose of this closing activity is for students to reinforce what they learned in the kinesthetic modeling not necessarily to produce an accurate representation on paper, which may be challenging.  NSTA 2010 Using Children’s Observations |

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