Engineering: Shade

Objective: Students will understand the need for protection from sunlight. They will design and build a structure that can block the sun to create a shaded area.

Docent Lab Guidelines:
1. Schedule a date and time with your teacher and other docents to have the students come into the lab. Estimated time for this lab is 45- 60 min.
2. Input the day and time into the Science Lab Master schedule Calendar. Please make sure you include set up and clean up time to the class time, add your teacher's name, and title of the lab "Engineering:Shade."
3. Arrive and set up tables with the same material items and amount of each item onto tables for each group (Groups of 4-6 students).

Materials: All Materials are Reusable. Do not throw anything away! If things need replacing, let the Coordinator know.
● *Sun and Shade* book for intro
● Popsicle sticks
● Masking Tape
● Wooden Dowels
● Wooden Clothespins
● Wooden Blocks
● Thick Paper Toilet Rolls
● Green Cotton Cloths (1 per group)
● Pre-made Creatures (1 per group- made out of pipe cleaners & UV beads)

● Grab blue trays from the Pantry Cabinet to build structures onto.

Introduction:
Read the book provided titled, *Sun and Shade* written by Mary Lindeen to the whole class.

Ask students, "What does it feel like to be in the sun?" and "What does it feel like to be in the shade?"

Show students pictures of similar areas that are shaded & not shaded. Discuss the differences and similarities.

Ask what do you know about the sun?

    Good things: Provides light to help plants grow, gives people vitamin D, brings heat & seasons to the planet, provides energy, etc.
    Bad things: Can burn plants, animals and people's skins, can give us a disease/cancer, can make our bodies & planet too warm, etc.

Introduce students to the pre-made creatures and explain what is so special about them. -They are made with UV beads which glow and change colors when in the sun/light.
Explain that their job today is to keep the creatures safe in the shade because if their bodies/beads light up, then they are too warm and not protected from the sun. They are going to help the creatures stay cool and protected from the sun's harmful UV rays. "Do you think you can build something that will keep them cool and protected?"

Activity:
- Explain to the students that they will be working as a group and will need to work together to protect their creatures from changing from the sun. Bring the class outside to see how the creatures all change in the sun. (You can also explain that the creatures change color in the sun if you do not wish to bring them outside).
- Divide the class into groups of 4-6 students.
- If there are enough docents available at each table, have them ask students to first discuss some ideas they have for how they could build a shade structure with the supplies on the table.
- If there are not enough docents available to be at each table, ask the students to volunteer some ideas they have to build a shade structure with the materials on the tables.
- After ideas are discussed, have students work together to use the materials on the blue trays to design and build a small structure to provide shade for their creature. They can use their creature to test whether or not they have built something with enough shade protection in the sunlight outside of the lab.
- When all groups are done, have students rotate around to each table to look at every other group's build inside the lab. Ask them not to touch other classmates' work as it may cause an accident.
- After looking at everyone's structure, carefully carry all structures outside to "test" if they protected their creatures from the sun.
- **Reminder**: Do not throw any supplies away, except for tape. We reuse all of these supplies.

Cleanup:
- Return creatures back to the lab box so they do not get lost or taken.
- Please take each group's structure apart **after** the class leaves and put everything back in the lab box for the next class.