

Problem 2.5 Take Cover! Design Problem

Teacher Notes

Introduction

You observed the Sun's patterns during the day with your Sun tracker. How would you describe the pattern of the Sun during the school day? You have also learned that UV rays from the Sun can cause damage to skin and to eyes. Protecting yourself from UV rays is important.

In the story Angelina, Mylo, and Suzi loved to play at recess, but they needed to take breaks because the Sun's rays were making them uncomfortable. The three friends mentioned the heat, the bright light, and possible sunburn as reasons that they were sitting in the shade. You have probably experienced how playing in the bright Sun can make you hot and tired. You also know that UV rays are part of the problem.

In the story the three friends are trying to think of a way to protect their playground at times when the Sun is so bright and hot. How can you help them? You are going to design, build, and test a model of a playground that offers areas of shelter from the Sun's harmful UV rays.

Equipment

- iPad® tablet
- iPad Apps:
 - Canvas by Instructure
- UV flashlight
- Suggested materials for playground construction:
 - UV-sensitive beads (5 per group)
 - Poster board, construction paper, or butcher paper for playground surface
 - Aluminum foil
 - Card stock
 - Pipe cleaners
 - Plastic wrap
 - Modeling clay
 - Other materials determined by teacher
- Launch Log

Procedure

1. Remind students that their design problem is to work in a team to design, create, and evaluate a playground with sheltered areas to protect students from UV exposure. To be successful, UV-sensitive beads scattered under the sheltered areas should not turn colors when the structure is exposed to natural sunlight or when a UV flashlight (optional) passes overhead.

The playground models can be two-dimensional drawings, or students can create models of playground pieces from available materials. Remember that the emphasis is on creating sheltered areas that are protected from UV rays and not on the creation of playground equipment. Teachers should determine the size limitations on the playground models.

2. Materials for building the playground model and the shelters will be determined by the teacher. Students use materials the teacher makes available in the classroom such as poster board, construction paper, butcher paper, card stock, pipe cleaners, modeling clay, or aluminum foil. The teacher may allow students to bring in materials from home if desired.
3. The students document their work as they follow the steps of the design process in their Launch Logs. Teachers will facilitate student work using the guide that follows.
4. The first step in the process is **Ask**.
 - a. Guide a discussion where students **Ask** questions to gather information that will help them define the problem.
 - b. Students may ask questions about available materials or why the students would want to provide shelter from the Sun.
 - c. Students write or draw the problem faced by the group of fictional characters under the **Ask** section of the Launch Log.
5. The second step in the design process is **Explore**.
 - a. Allow students to **Explore** ideas by talking in small groups about possible ideas for creating sheltered areas on a playground. Remind students that during this part of the process, no ideas are too silly.
 - b. Using the Launch Log as a guide, have students sketch ideas for their playground and the sheltered areas.
 - c. Allow students to examine the available materials that they can use to create their playground and the sheltered areas. The UV beads will be used during the Evaluate step to test how well their design works. Available materials may be displayed on a table for students to observe or held up in front of the group one at a time.
6. The third step in the design process is **Model**.
 - a. Ask the students to circle their best design; this is the one that solves the problem of creating a playground with areas sheltered from the Sun.
 - b. The teacher facilitates the creation of the playground models.
 - c. Students document their models in their Launch Logs by drawing the final version of the design under the heading **Model**.
 - d. The students will use the tablet to photograph the model.
7. The fourth step in the design process is **Evaluate**.
 - a. Students test their playgrounds to see if they have areas that provide shelter from UV exposure. To test their model, students place 5 UV beads

around their playground. The teacher (or student) simulates the Sun passing over the playground using a UV flashlight or by exposing the playground to natural sunlight. If the beads do not change colors, the area is protected. Students record their findings in their Launch Logs. Additionally, students explain one strength and one weakness of their model.

8. The fifth step in the design process is **Explain**.
 - a. Students use the iPad app entitled Stage: Interactive Whiteboard and Document Camera to take a photo of their model in action and either write or draw over the top of the image to explain how the sheltered areas work.
 - b. The students use this image and explanation to present their model to the class.
9. The teacher then leads a discussion on the features, strengths, and weaknesses of the models.

Conclusion Questions for Discussion

1. Describe how your playground solved (or did not solve) the design problem.
2. What other materials could have been used to provide protection from UV rays?
3. How could your school playground be changed to include areas (or more areas) that give students protection from the Sun?