Lesson Plan: Ilene's Crystal Creation Lab

Materials Needed

- 1 cup of water
- 2-3 cups of white granulated sugar (more is better!)
- A clean glass jar or cup (a mason jar works perfectly)
- A small saucepan
- A wooden skewer or a piece of clean cotton string tied to a pencil/craft stick
- A clothespin (to hold the skewer/pencil in place)
- Optional: Food coloring (1-2 drops for colored crystals)
- Optional: A magnifying glass for closer observation
- "My Crystal Scientist's Log" (notebook or printed sheets) and crayons/pencils

Lesson Details

Subject: Science (Chemistry & Earth Science)

Age Group: 7 years old (Approx. 2nd Grade)

Time Allotment: 30 minutes for setup, 5-10 minutes of observation daily for 5-7 days.

1. Learning Objectives

By the end of this lesson, Ilene will be able to:

- Follow a multi-step scientific procedure with adult assistance to create a supersaturated solution.
- Observe and record changes over several days using drawings and simple descriptive words in a science log.
- Explain in her own words how crystals grow (e.g., "The sugar molecules needed a place to grab onto and started building up").
- Creatively design a "museum label" for her finished crystal, describing its properties (color, shape, texture).

2. Alignment with Standards (Example: NGSS)

- **2-PS1-1:** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. (This entire lesson is a hands-on investigation of how a material, sugar, changes its properties.)
- **Science and Engineering Practices:** Planning and Carrying Out Investigations; Analyzing and Interpreting Data.

3. Instructional Strategies & Lesson Activities

Part 1: The Crystal Quest (Introduction - 5 minutes)

1. **Engage:** Start by asking questions to spark curiosity. "Ilene, what do you think of when you

hear the word 'crystal'? Where have you seen them?" (Examples: salt, sugar, snowflakes, pretty rocks like amethyst).
2. **Explore:** Look at some sugar grains with a magnifying glass. "These tiny little pieces are already crystals! Today, we're going to convince them to join together and form one giant, beautiful crystal that we can see... and even eat!"

Part 2: The Scientist at Work (Experiment & Setup - 20 minutes)

Important Safety Note: An adult must handle all steps involving the stove and hot water.

1. **Prepare the "Seed":** If using a wooden skewer, wet it and roll it in granulated sugar. This gives the new crystals a rough place to start growing. Set it aside to dry completely. If using a string, simply tie it to the middle of a pencil.
2. **Create a Supersaturated Solution:**
    - **Adult Step:** Bring 1 cup of water to a boil in the saucepan. Turn the heat down to a simmer.
    - **Ilene's Step (with supervision):** Start adding the sugar, one half-cup at a time. Stir until it dissolves completely before adding more.
    - Keep adding sugar until no more will dissolve and you see grains collecting at the bottom. This is called a "supersaturated solution" – it's holding more sugar than it normally can!
    - **Adult Step:** Remove the pan from the heat. Let it cool for about 15-20 minutes. It should still be warm, but not dangerously hot.
3. **Assemble the Crystal Lab:**
    - **Adult Step:** Carefully pour the warm sugar solution into the glass jar.
    - **Ilene's Step:** If you want colored crystals, add one or two drops of food coloring now and give it a gentle stir.
    - Lower the prepared skewer or string into the center of the jar. Make sure it doesn’t touch the bottom or the sides. Rest the pencil across the top of the jar or use a clothespin to hold the skewer in place.
4. **Find a Home:** Place the jar in a quiet spot where it will not be disturbed. Crystals love peace and quiet to grow!

Part 3: The Observation Phase (Daily Check-in - 5-10 minutes per day)

1. **The Crystal Scientist's Log:** Each day, Ilene should visit her experiment and record her observations in a notebook.
2. **Guiding Questions for her log:**
    - What does it look like today? Can you draw the shape of the crystals?
    - Are the crystals getting bigger? Where are they growing the most?
    - What color is it? Does it sparkle?
3. Encourage her to use descriptive words like "bumpy," "spiky," "clear," "sparkly," or "square."

Part 4: The Grand Reveal (Closure & Creative Application - 15 minutes)

1. After 5-7 days, or when the crystal has stopped growing, carefully remove it from the jar and let it dry on a plate or paper towel for a few hours.
2. **Celebrate the Result:** Admire the crystal! Use the magnifying glass to see the shapes up close. Discuss the process. "Why do you think the crystals grew on the stick?" (Answer: The sugar molecules in the water were crowded and as the water evaporated, they needed a place to go, so they grabbed onto the sugar seed and each other).
3. **Museum Curator Activity:** Have Ilene create an official museum label for her crystal. It could include:
    - **Official Name:** (e.g., "The Sparkle Diamond of Ilene")
    - **Discovered By:** Scientist Ilene
    - **Properties:** (e.g., Color: Pink; Shape: Bumpy and Square; Texture: Super sweet!)

4. Since it's sugar, she can enjoy her edible science experiment!

4. Differentiation and Inclusivity

- **For Support:** The "Crystal Scientist's Log" can be primarily drawing-based. Provide sentence starters for written descriptions, such as "Today I see _____." The adult can handle more of the precise measurements while Ilene focuses on pouring and stirring with guidance.
- **For a Challenge/Extension:**
  - Set up a second experiment at the same time using salt instead of sugar. Compare the growth rate and the final crystal shapes. (Salt crystals are more square).
  - Research real-world crystals like quartz or diamonds. How are they similar to or different from the sugar crystal?
  - Experiment with growing crystals on a pipe cleaner bent into a fun shape (like a star or her initial).

5. Assessment Methods

- **Formative (during the lesson):**
  - Observe Ilene's ability to follow directions during the setup process.
  - Ask clarifying questions ("What do you think will happen when we add more sugar?").
  - Review her daily "Crystal Scientist's Log" to see her observations and thinking.
- **Summative (at the end of the lesson):**
  - The completed "Museum Label" will serve as a creative summary of her learning and observation of the crystal's properties.
  - Ask Ilene to explain the steps for growing a crystal to another family member, demonstrating her understanding of the process.