Strawberry Bottles

Reference: Adapted from Bottle Biology, http://www.bottlebiology.org/investigations/terraqua_build_1.html

Overview: Children set up self-watering containers to grow a strawberry plant start, and observe them throughout the week.

Subject area: Backyard Science

Grade level: 3rd – 5th

Oregon Benchmarks/Common Core Standards:

- *3-LS1 From Molecules to Organisms: Structure and Processes*
  3 LS1-1.: Develop models to describe that organisms have unique and divers life cycles but all have common birth, growth, reproduction, and death
- *4-LS1 From Molecules to Organisms: Structures and Processes*
  LS1.A.: Structure and Function
- *5-LS1 From Molecules to Organisms: Structures and Processes*
  LS1.C.: Organization for Matter and Energy Flow in Organisms

Objectives:
Children will be able to:

1. Build a hanging, self-watering container for their strawberry plant
2. Explain how the plant will get water, based on their container design

Prep time: 30 minutes

Lesson time: 45 minutes

Materials needed:

- Two 2-liter soda bottles per child, with caps (for Build Option 1); or two 2-liter bottles per child, with caps (for Build Option 2) – for build options and building instructions, go to http://www.bottlebiology.org/investigations/terraqua_build_1.html
- Print-out building instructions to give to each child (this is optional; you can also explain the building steps)
- Cotton string (cotton clothesline works well)
- Power drill
- Scissors
- String to hang bottles
- Clear packing tape
- Hole punch

- Water, soil, and a strawberry plant start for each child (dig up a plant with good roots, rather than a new runner with few roots)

Space needed: Flat and stable work surface to build the containers.

Staff needed: Ideally, one staff for every 3-4 children, to help them with some of the cutting and taping.

Preparation steps:

1. Drill a hole in the bottle caps ahead of time, big enough to thread the wick through. If choosing Build Option 2, the "lid" bottle does not need a hole drilled in its cap.
2. Have all materials set-up for children.

Pre-test of knowledge:
Good to review what plants need to survive – water, sunlight, air, nutrients.

Presentation steps:

1. Ask children what plants need to survive. Take all answers, but focus on sunlight, water, air, and nutrients.
2. Tell children that they will be building a special container that will grow a strawberry plant, and will water the plant all on its own! Everyone will watch their container throughout the week and will get to take them home on Friday.
3. Either hand out print-out of building instructions, or explain steps, and then help children through the steps. (see http://www.bottlebiology.org/investigations/terraqua_build_1.html)
4. Pre-wet your cotton wick and pre-water the soil before adding the plant.
5. Plant your strawberry starts in approximately 5 inches of soil (covering the roots, but not the leaves) before adding the lid (if using Build Option 2), and secure with packaging tape. The packaging tape is extra insurance that the bottle will not fall apart.
6. Punch holes in the sides of the top bottle (Build Option 1), or middle bottle (Build Option 2), and thread a string through it, so they can be hung up and observed. Hang in a sunny spot.
7. Allow at least four days for children to observe their Strawberry Bottles before taking them home.

Assessment:
Ask children to explain their container design, and how the plant will survive.

Variations:
EXTENSION: You can discuss capillary action, and how water wicks up a tube. If possible, get a few capillary tubes and color a little water (easier to see), and demonstrate or have students observe on their own how water wicks up a capillary tube via capillary action. Explain how the surface tension of water helps this happen, and that the wick in the Strawberry Bottles has air-

spaces that are like hundreds of small capillary tubes. The same goes for the pore spaces in the soil…this is how the water gets from the bottom of the bottle up into the soil, and to the plant's roots.

Also, you can use other plants, it's just nice to have children take home a plant that they can transplant into their own yard and reap some yummy fruits from it in the future! ☺

Notes:
Be sure to pre-wet the wicks, and pre-water the soil! The capillary action is not strong enough to provide enough water if everything starts out dry. It's like "priming a pump!"

Allow at least four days for children to observe their Strawberry Bottles before taking them home.