BUILD A BETTER EARTH: TEACHER INSTRUCTIONS

Use these lessons for an easy, creative way to celebrate Earth Day this April. Empower students to feel prepared to start building a better Earth today, with their scientific curiosity driving them to invent and create.

LESSON 1: Celebrate Plants With an Upcycling Craft

Goal: Students will learn about plants in the ecosystem and upcycle a plastic water bottle into a planter for a windowsill garden.

Time: 45 Minutes

Materials: Class set of the following: **Student Worksheet D**, books (or websites) about plants/ecosystems, plastic bottles, rubber bands, tape, scissors, markers, wildflower seeds, potting soil, used paper with one side blank, 3"x3" piece of cloth per student. For the teacher: one craft knife, one gallon of water.

1. **BEFORE CLASS BEGINS: Precut** the plastic bottles. Cut along the circumference of each bottle (one per student) about one-third from the top. Remove caps.
2. **Introduce** the concept of *transformation*, the change of something from one form into another. Share with students that we are going to explore how plants transform, and also how we can transform old plastic bottles into something new through a process called *upcycling* (reusing something, generally trash, to create a product of greater value). Upcycling is one way people can reduce waste and start building a better Earth today.
3. **Create a KWL (Know, Want to Know, Learned) chart** on the board, inviting students to brainstorm different transformations that occur in an *ecosystem* (a community of animals and plants interacting with their environment). Possible responses for the "Know" column include: seeds turn into plants; animals eat plants for food, meaning the animals turn the plants into energy.
4. **Explore plants' role** in the ecosystem through the concept of *food webs*. Living things are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. This means that the food of almost any kind of animal can be traced back to plants!
5. **Assign students** to use books (or websites) to research more about one of the following: plants, ecosystems, food webs, or a related concept you are up to in your science pacing calendar.
6. **Hand out** Student Worksheet D and the planter materials. Review the worksheet directions with students. Encourage students to get into the habit of reusing the blank backs of paper whenever possible. Have them find paper to reuse. (But have some of your own ready-to-be-reused paper available just in case!)
7. **Display the planters** on the windowsill. Invite students to stand and tour the plant facts, or students can each present their planter and fact to the class.
8. **Complete the KWL chart** as a class. Reinforce how transformation is a natural part of ecosystems, and how people can also make transformation a habit through reuse and upcycling.

EXTENSION ACTIVITY: Review the scientific method. Direct students to come up with a hypothesis about how their plants will grow in the classroom environment (or different windows in the school), and then observe and analyze the data.

LESSON 2: Build an Eco-Friendly School

Goal: In small groups, students will research sustainability issues and then brainstorm an invention that would make their school more eco-friendly.

Time: 45 Minutes

Materials: Class set of **Student Worksheet E**; optional model-building materials, such as paper towel rolls, tape, aluminum foil, etc.

1. **Introduce** the class to the concept of *sustainability*. Tell students to identify a paper product in their classroom, such as a notebook. Ask them to brainstorm items that some people might throw in the trash, but that could instead be recycled into the paper product they chose. Examples include: tissue box, paper towel tube. Explain to students that recycling is one way to achieve sustainability, the idea of using environmental resources carefully so that they don't run out.
2. **Ask** students why sustainable practices are important for the environment. As a class, make a list of natural resources that are *renewable* or *unlimited*, such as sunlight, wind, and water (however, clean drinking water is in limited supply). Then make a list of *limited resources*, which take a very long time to develop naturally again. Examples include: oil and fossil fuels, iron, and forests.
3. **Explain** that when we use a resource faster than it can be produced—or faster than it can decompose (break down)—this is the opposite of sustainable (called *unsustainable*). Unsustainable practices are causing global warming, but people can help combat this by choosing sustainable behaviors (reusing; recycling; replacing fossil fuels with green energy sources, like wind; etc.)—and by being creative and inventing NEW ways of being sustainable.
4. **Assign** a scarce resource or environmental problem to each group. Write the following three problems on the board: pollution, energy use, and landfills. Feel free to add your own. Provide students with books or online resources for researching more about their issue.
5. **Split** students up into groups and hand out **Student Worksheet E**. Tell the class that they'll be working with their teams to design an invention to make their assigned resource or environmental issue sustainable in their school. For example, students can come up with an invention that helps people use less electricity, produce less trash, or automatically recycle.

EXTENSION ACTIVITY: Complete this activity with an "Inventions Fair" in which each small group presents their research and ideas to the class or to the school board, building momentum toward a more eco-friendly school!