

TEACHER INSTRUCTIONS

LESSON 1: Recycled Robot

Essential Question: How can we use recyclable materials in new and innovative ways that can protect the environment?

Time: Two 45-minute periods, plus one week to collect building materials

Materials: Paper, pencils, recyclable/reusable materials for building (clean aluminum foil, bottle caps, empty food boxes, egg cartons, plastic food containers, paper towel tubes, plastic bottles, jar lids, cans, etc.), paper bags or boxes to collect materials, **Student Worksheet A: Create a Recycled Robot—Brainstorm**, **Student Worksheet B: Create a Recycled Robot—Draw Your Design**, paint, paintbrushes, tape, glue, scissors, markers

THINK About Earth

1. Have students keep a log of all the trash they create in a day. Ask them to write down each item and how they disposed of it. (*Did it go in a garbage can, recycling bin, or compost pile? Maybe they reused the trash, for example, using a paper scrap for an art project.*)
2. Discuss students' logs in class.
3. Ask: *Why might all the waste people produce be a problem for Earth? (It can lead to overflowing landfills, pollute nature, and harm wildlife.)*

DISCOVER the Three R's

4. Share that students can practice the three R's: **Reduce** (use less things), **Reuse** (use things again), and **Recycle** (turn old things into new things). Visit iwanttoberecycled.org for additional resources and information on recycling.
5. Have students think back to their trash logs and answer the following question: *Could certain items you threw away be reduced, reused, or recycled?* Use this prompt to start a discussion about how people can use the Three R's in their daily lives.

EXPLORE Creative Ways to Use the Three R's

6. Explain that people have created innovations (*new ideas that can solve a problem or improve people's lives*) that help protect Earth and use less of its **natural resources** (*such as trees or water*).
7. Introduce students to the **Maker Movement**—a community of people focused on creating and building their own crafts, inventions, and gadgets. Show kids some of the Earth-friendly projects that have been presented by Makers at gatherings called Maker Faires around the world.
 - > **Liter of Light** turns used plastic bottles into low-cost lighting for people without access to electricity: literoflightusa.org.
 - > **SolePower** is a device that uses the power of walking to generate electricity: solepowertech.com.
 - > **Ecovative Design** makes packing materials from mushrooms that break down naturally in the environment, unlike plastics: ecovatedesign.com/how-it-works.

MAKE a Recycled Robot

8. Tell students that they're going to become Makers themselves by reusing recyclable items in their own arts-and-crafts project. Provide students with a list of acceptable materials for them to bring from home over the course of a week. (**Note:** You may want to avoid glass items as they could break. Also, be mindful of any cans or other metals with sharp edges.) Have students sort the collected items by material into bags or bins.
9. Organize students into small groups. Hand out **Student Worksheet A: Create a Recycled Robot—Brainstorm** and **Student Worksheet B: Create a Recycled Robot—Draw Your Design** to each group. Tell students that they will use the worksheets to brainstorm and design a robot that could help care for Earth. For example, their robot could plant trees or recycle trash.
10. Have students build their robot. When done, ask each group to present their creation to the class and explain how their robot could help the environment.
11. Remember to sort and recycle any leftover building materials with your other paper, plastic, and metal recyclables.

LESSON 2: Earth-Friendly City

Essential Question: What are ways that cities and urban environments are working to become more eco-friendly?

Time: Two class periods, plus one week to collect building materials

Materials: Interactive whiteboard or computer, Internet access, U.S. map, **Student Worksheet C: Build an Earth-Friendly City**, pencils, paper, recyclable/reusable materials for building (clean aluminum foil, bottle caps, empty food boxes, egg cartons, plastic food containers, paper towel tubes, plastic bottles, jar lids, cans, etc.), paint, paintbrushes, tape, glue, scissors, markers

THINK About Cities

1. Explain that individual people aren't the only ones who can use the Three R's. Whole communities can reduce, reuse, and recycle to protect Earth.
2. Ask students to think about and write some of the things a city needs to work (*buildings, roads, transportation, electricity, water, sewers, etc.*).
3. Discuss and write how keeping a city running can use up Earth's natural resources and make waste.

DISCOVER How Cities are Protecting Earth

4. Explain that more and more cities are finding ways to run that won't harm the environment. Share the following examples of Earth-friendly innovations that are making cities better places for people and Earth.
 - > Cars use up resources and pollute the environment. But in cities such as **Minneapolis, Minnesota**, people can rent public bikes to ride around the town. The bike-share program encourages people to drive less.
 - > **San Francisco, California**, is the first city in the United States where people must recycle food scraps. The city composts the scraps, turning them into fertilizer that local farmers use to grow crops.
 - > Cities often have a lot of concrete and few green spaces. **Chicago, Illinois**, addressed that problem by creating a rooftop garden on top of City Hall—an 11-story office building.
5. As you talk about each city, point to its location on a U.S. map. Students will see that people in many places are helping to protect the environment. Lead them to understand that all people share Earth and the responsibility of taking care of it.

EXPLORE More Ways Cities Are Going Green

6. Have students do their own research to learn about additional ways cities are working to be more environmentally friendly.

MAKE an Earth-friendly City

7. State that students will now design their own Earth-friendly cities. Assign them into small groups. Have students discuss and decide on an innovation for their city. They can use the brainstorming skills learned in Lesson 1 and **Student Worksheet A** to collect their ideas. Hand out **Student Worksheet C: Build an Earth-Friendly City** to each student. Have them work together to complete the worksheet. Students will use it to map the layout of their city. Explain that innovators, architects, and urban planners create aerial maps before building.
8. When students are done designing their cities, explain that they will now use recyclable items to build them. Your class can use leftover materials from their robot projects in Lesson 1. If you need more materials, ask students to bring in recyclable items from home.
9. Have student groups construct their eco-city beginning with laying their city out, drawing in roads and parks, and wrapping up by creating their 3D innovations and buildings.
10. Have students display their projects around the classroom and present their ideas.
11. Remember to sort and recycle any leftover building materials with your other paper, plastic, and metal recyclables.

