

Mapping Scrap



GRADES
5-8

Through science and engineering we can keep valuable resources in circulation.



PREPARE:

Time Required: 2-3 class periods (90-135 minutes) without extensions

- Gather materials (refer to activity pages).
- Divide students into teams of 3-4.
- Make copies of the Industry Fact Sheets (every team will receive a fact sheet on a different material).
- Make copies of the Recovered Paper ScrapMap™ (at least 1 per every pair of students)
- Make copies of the Blank ScrapMap™ (1 per student).
- Save a cardboard box that has come with some purchase at the school.
- Optional: obtain the poster “The ScrapMap™” (from The ISRI Store).
- Confirm students will have access to computers.



MOTIVATE:

- Show students a cardboard box that has been used to ship something that they might recognize. Ask: “What should we do with it?” (If you’ve done the activity “A to Z” students may have an estimate of how much paper their class uses in a week or a year. This is a good reference as you continue this discussion: “This is another form of paper. We should add it to our estimate of what we use, since many things in this class come in paper containers that we may not even see.”)
- Have students discuss preliminary ideas about what happens to paper and other paper products like the cardboard box you are holding. What other kinds of paper products can be recycled and what happens to them? What are the steps involved? Can the paper or cardboard be turned into something new? Have students write down their ideas. Then, discuss as a class.



TEACH:

- Introduce the concept of a ScrapMap, passing out the one for Recovered Paper (tip, show an image of the handout that appears at the end of this document rather than viewing on the website as the other maps are posted here as well). What do students notice? Have them compare their ideas to this map.
- Discuss Part I questions. Emphasize the Systems and Systems Model cross-cutting concept: “Defining the system under study—specifying the boundaries and making explicit a model of that system—providing a tool for understanding and testing ideas that are applicable throughout science and engineering”. The poster ScrapMap and the ideas it displays illustrate the idea of systems. While many discussions of recycling stop at “Product A can be re-used as Product B” the ideas on the poster go farther. Raw materials need never be “thrown away.” With systems thinking, we can

keep the circle unbroken and the system intact. But to do this requires science, engineering and creativity. That's the theme that should be emphasized as students complete this activity.

- Assign each team a different material to investigate – glass, metals, electronics, aluminum, or rubber, and pass out the corresponding Industry Fact Sheet to each team (1 copy per every 2 students to share).
- Pass out blank ScrapMap templates (one per student). Explain that students may use these to draft out their initial ideas and take notes as they research.
- Have students conduct research on their assigned material in order to create their own ScrapMap, finding at least 3 websites. Students should list their websites and take any necessary notes to construct their map. This may take 1-2 full class periods.
- Have students discuss their findings in their teams, and create one final ScrapMap to present to the class. Maps may be made on posterboard or digitally.
- Have students present their ScrapMaps. Each presentation should be app. 2- 5 minutes and should include a final version of the ScrapMap, either in print or digital form and a thorough description of how the materials are part of a continuous series of steps in the recycling process. Students should also be able to explain at least 2-3 steps students can take to ensure that the chain of recycling is unbroken.
- Once each team has presented, have students discuss the tips they agree can be put in place in the classroom, and develop a plan to put them into action.
- Have teams view ISRI's ScrapMap of the material they studied. Have them use the [Interactive ScrapMaps](#) and compare ISRI's ScrapMap to their own.



REFLECT/ASSESS

Students should be able to:

- Discuss why it is important to keep recycling systems continuously going.
- Explain how they think recycling the materials they researched is helpful to the environment.



EXTEND

Have students consider careers involved in the recycling industry by reading about some of the “[Champions of Recycling](#)” featured on the website. Have students write about a scientist they find particularly interesting and describe the type of work he/she does. Are these careers they could see themselves in someday?



JOURNAL QUESTION

Have students make an argument for which of the steps discussed in “getting to zero” they think would have the most impact on the environment if taken. How would they launch a school-wide campaign to get everyone in the school to make these changes? How could they do this at home or in the community?



WEBLINKS

Industry Fact Sheets
“The ScrapMap” Poster
Interactive ScrapMaps
Champions of Recycling

<http://www.jason.org/partner/isri>

<http://www.isri.org/about-isri/isri-events-and-education/education#.VnRklsYrLIU>

http://www.jason.org/interactive/isri/scrap_map/

<http://www.jason.org/partner/isri>

Activity Pages



Mapping Scrap

Cardboard containers are important components of our national delivery system. Many items in your classroom come shipped or packaged in cardboard boxes or paper containers that you may never see or think about it. Where does cardboard come from? What happens to it after it is sent to be recycled? In this activity, you will analyze a ScrapMap to investigate the steps in recycling paper. A ScrapMap is a way to map out, or illustrate the continuous cycling of materials. After considering how paper products are recycled, you will conduct your own investigation to map out the steps involved in the continuous cycling of a second material, creating your own ScrapMap. Finally, you will develop three ideas for your community to contribute to the circle of recycling and keep the system intact.

Materials

- Cardboard box or paper packaging
- Recovered Paper ScrapMap
- Blank ScrapMap or concept map
- Internet references
- Computer(s)
- Poster board or other means of display
- Markers (optional)
- [Industry Facts Sheets](#)

Part 1: Investigate a ScrapMap

1. In small groups, discuss what you think happens to paper once it's recycled. What kinds of paper products can be recycled? Make a list. What do you think are the steps involved in the recycling process? Can these papers be turned into something new? Explain.
2. Share ideas as a class and discuss.
3. Study the ScrapMap for Recovered Paper. This represents a system. The ScrapMap itself is a model of the system. Discuss the things you do at home, and in the classroom to help keep the system intact. What would happen if nobody recycled their newspapers? How does this system help the environment?

Part 2: Create a ScrapMap

1. In teams, gather information about one of the following materials: glass; aluminum; metal; rubber; or electronics using the Industry Fact Sheet provided by your teacher, and the internet (each material should be researched by at least one group). Find out what happens to these materials in the recycling process. What kinds of new items can be created? Find at least three websites to help you collect your information and list them while you are taking notes. Be certain the sites you find are reliable sources of information. Ask your teacher for help if you are unsure!
2. Create your own ScrapMap to illustrate how the material you have researched is part of a system representing a continuous series of steps in the recycling process. Use the blank ScrapMap to capture your ideas.

Part 3: Present Your Findings

1. In your team, create a 2-5 minute presentation to communicate your findings. Your presentation should include a final ScrapMap of the material you researched, and describe how the recovered materials can be re-used. This can be illustrated on large posterboard, or done as a computer presentation with a program such as PowerPoint. Your presentation should also include 2-3 tips to share with your classmates so that the cycle won't be broken.

2. As a class, discuss the steps you can take in your own classroom to reduce waste in “getting to zero” and develop a plan to put them into action!
3. Use the Interactive ScrapMaps™ to compare the ScrapMap of the material you researched with the one your team created. What new information, if any, is presented?

Reflect and Apply:

1. Why is it important to keep recycling systems continuously going?
2. Paper is easy to recycle, saving forests, energy, and reducing greenhouse gases. More than a billion tons of paper have been recycled in the past two decades. How do you think recycling the materials you and/or your classmates researched help the environment?

Extension:

There are many innovative scientists and engineers involved in the recycling business. Consider what kinds of jobs these scientists might do, and what problems they may need to solve by reading about these “[Champions of Recycling](#)”. Choose a “Champion” you found particularly interesting and describe the work that he/she does, and why this intrigues you. Can you see yourself doing this someday?



JOURNAL QUESTION

Which of the steps discussed in “getting to zero” do you think would have the most impact on the environment if taken? How would you launch a school-wide campaign to get everyone in the school to make these changes? How could you do this at home or in your community?

Recovered Paper ScrapMap



Student Name:

Period:

My ScrapMap of

