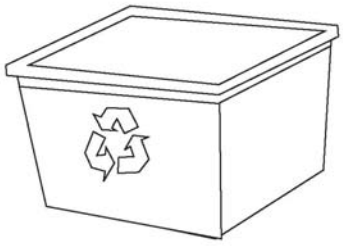

Feed the Bin

Paper vs. Plastic Debate
Grades 9-12

Materials: Research material & suggested websites for paper & plastic (included), grading rubric (included).
Activity Time: 2-4 class periods
Concepts Taught: environmental issues, recycling, debate skills, research skills, oral presentation
Correlations to NCSCOS: English I: Objectives 2.01, 2.02, 4.01, Competency Goal 3; **English II:** Objectives 2.01, 2.02, 3.01, 3.04, 4.04; **English III:** Objective 2.01, Competency Goal 3; **English IV:** Objective 2.01, Competency Goal 3; **AP English:** Objective 2.01, Competency Goal 3; **Chemistry:** Objective 2.04; **Earth/Environmental Science:** Objectives 1.05, 1.06, 2.07; **AP Earth/Environmental Science:** Objectives 5.04, 7.02, 7.04; **Civics and Economics:** Objectives 9.04, 9.08, 10.01, 10.05; **Contemporary Issues in North Carolina History:** Competency Goal 1; **Computer/Technology Skills:** Objectives 3.02, 3.03, 3.04

Objectives:

- Students will work collaboratively to research the life cycles of paper and plastic bags.
- Students will determine whether paper or plastic bags are a better choice and prepare arguments to defend their choice.
- Students will participate in a team debate utilizing their prepared arguments.

Background:

- Recycling helps save natural resources such as energy, landfill space, and raw materials and creates jobs.
- The three arrow symbol represents the three steps of recycling: 1) collection of recyclables, 2) manufacturing new products from recyclables, and 3) buying recycled.
    - It is important to complete all three steps in the process in order for the recycling cycle to work.
    - There are benefits and costs (both financial and environmental) to recycling certain materials.

Lesson:

1. Review the concepts above with students. Remind them that they will follow a certain procedure to recycle paper, plastic, and aluminum at their school. Reiterate to students that they must make a choice each time they recycle. Information about recycling is from the National Energy Education Development Project (NEED) entitled Museum of Solid Waste and Energy, pages 24 and 31 (see below).
2. An age-old question heard each time you visit the grocery store is “Paper or plastic?” Students will work together to determine which they think is the better choice to make for the environment. Explain that the students will work in 2 teams to debate their decision.

Students can choose the paper side or the plastic side. Alternatively, teachers can assign the students to the two teams.

3. The debate will involve several steps. Each student should be involved with a step. The first stage is research. Web sites for each side of the debate are included. Students should choose what they feel to be the stronger points.
4. Another step is "opposition research." Students should research the other side's information, so that they can be prepared to counter any arguments made. The Internet will be the best source of information. (Books are also useful, but may be outdated in terms of correct data.)
5. Students must then write their opening argument (2 minutes) and their closing argument (1 minute). Ideas of counter points should be written and organized in a manner so that speakers can easily find the information.
6. Lastly, speakers should practice their opening and closing arguments. All students will have the opportunity to speak by raising their hand. The teacher must call on a student to speak.
7. Both teams will gather to conduct the actual debate. Depending on the time available, you may want to allow 15-30 minutes for the debate between the opening and closing arguments. (Depending on the class, the debate may go longer than this!) Use the included rubric to grade debate teams.
8. After the debate has concluded, ask students to vote which they will choose when they go to the grocery store. There is no correct answer – both paper and plastic have advantages & disadvantages. One side may make a stronger argument, however.

Paper vs. Plastic Websites

Life Cycle of Plastic:

- http://perc.ca/waste-line/hidden/
- http://lifecycle.plasticsresource.com/

Life Cycle of Paper:

- http://www.afandpa.org
- **BOOK** Recycled paper from start to finish by Samuel G. Woods

Life Cycle of Both:

- http://www.nedlac.org.za/research/fridge/plastics/executive1.pdf
- http://www.nedlac.org.za/research/fridge/plastics/life.pdf
- http://techalive.mtu.edu/meec/module14/title.htm
- http://www.ilea.org/lcas/franklin1990.html
- http://www.ecocycle.org/askeco-cycle/20030613.cfm
- http://www.loyno.edu/lucec/paper.html
- http://www.angelfire.com/wi/PaperVsPlastic

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Paper vs. Plastic Debate Rubric

CATEGORY	4	3	2	1
Respect for Other Team	All statements, body language, and responses were respectful and were in appropriate language.	Statements and responses were respectful and used appropriate language, but once or twice body language was not.	Most statements and responses were respectful and in appropriate language, but there was one sarcastic remark.	Statements, responses and/or body language were consistently not respectful.
Information	All information presented in the debate was clear, accurate and thorough.	Most information presented in the debate was clear, accurate and thorough.	Most information presented in the debate was clear and accurate, but was not usually thorough.	Information had several inaccuracies OR was usually not clear.
Rebuttal	All counter-arguments were accurate, relevant and strong.	Most counter-arguments were accurate, relevant, and strong.	Most counter-arguments were accurate and relevant, but several were weak.	Counter-arguments were not accurate and/or relevant
Use of Facts/Statistics	Every major point was well supported with several relevant facts, statistics and/or examples.	Every major point was adequately supported with relevant facts, statistics and/or examples.	Every major point was supported with facts, statistics and/or examples, but the relevance of some was questionable.	Every point was not supported.
Presentation Style	Team consistently used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Team usually used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Team sometimes used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	One or more members of the team had a presentation style that did not keep the attention of the audience.
Organization	All arguments were clearly tied to an idea (premise) and organized in a tight, logical fashion.	Most arguments were clearly tied to an idea (premise) and organized in a tight, logical fashion.	All arguments were clearly tied to an idea (premise) but the organization was sometimes not clear or logical.	Arguments were not clearly tied to an idea (premise).
Understanding of Topic	The team clearly understood the topic in-depth and presented their information forcefully and convincingly.	The team clearly understood the topic in-depth and presented their information with ease.	The team seemed to understand the main points of the topic and presented those with ease.	The team did not show an adequate understanding of the topic.

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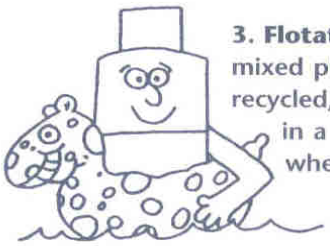
Please Note: Information below is taken from NEED Book: Museum of Solid Waste and Energy pages 24 and 31.

RECYCLING*plastic*

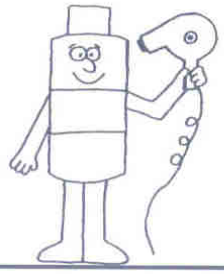
A recycling plant uses seven steps to turn plastic trash into recycled plastic:*

1. Inspection Workers inspect the plastic trash for contaminants like rock and glass, and for plastics that the plant cannot recycle.

2. Chopping and Washing The plastic is washed and chopped into flakes.



3. Flotation Tank If mixed plastics are being recycled, they are sorted in a flotation tank, where some types of plastic sink and others float.



4. Drying The plastic flakes are dried in a tumble dryer.

5. Melting The dried flakes are fed into an extruder, where heat and pressure melt the plastic. Different types of plastics melt at different temperatures.

6. Filtering The molten plastic is forced through a fine screen to remove any contaminants that slipped through the washing process. The molten plastic is then formed into strands.

7. Pelletizing The strands are cooled in water, then chopped into uniform pellets. Manufacturing companies buy the plastic pellets from recyclers to make new products. Recycled plastics also can be made into flower pots, lumber, and carpeting.

*From *Garbage* magazine, January/February 1991.

RECYCLED PAPER

Recycled paper is made from waste paper, usually mixed with fresh wood pulp. If the paper contains ink, the paper must be **deinked**. Deinking also removes fillers, clays, and fiber fragments.

Almost all paper can be recycled today, but some types are harder to recycle than others. Papers that are waxed, pasted, or gummed—or papers that are coated with plastic or aluminum foil—are usually not recycled because the process is too expensive.

Even papers that are recycled are not usually recycled together. Waste papers should be sorted. You shouldn't mix newspapers and cardboard boxes together for recycling.

Different grades of paper are recycled into different types of new products. Old newspapers are usually made into new newsprint, egg cartons, or paperboard. Old corrugated boxes are made into new corrugated boxes or paperboard. High-grade white office paper can be made into almost any new paper product—stationery, newsprint, or paper for magazines and books.

Sometimes recyclers ask you to remove the glossy inserts that come with newspapers. The newsprint and glossy inserts are different types of paper.

Glossy inserts have a heavy clay coating that some paper mills cannot accept. Besides, a paper mill gets more recyclable fibers from a ton of pure newsprint than it does from a ton of mixed newsprint that is weighed down with heavy clay-coated papers.

NOT ALWAYS RECYCLABLE

Unlike most other recyclables, paper cannot be recycled over and over again. Eventually the fibers become too weak and short to be used again. That is why virgin paper fiber is usually mixed with recycled paper when new paper products are made. Most cardboard boxes are a mixture of 50 percent new and 50 percent recycled fibers.

SAVING ENERGY

So does paper recycling save energy? Yes it does, although the energy savings are not as spectacular as they are with aluminum and steel recycling.

PAPER*recovery*

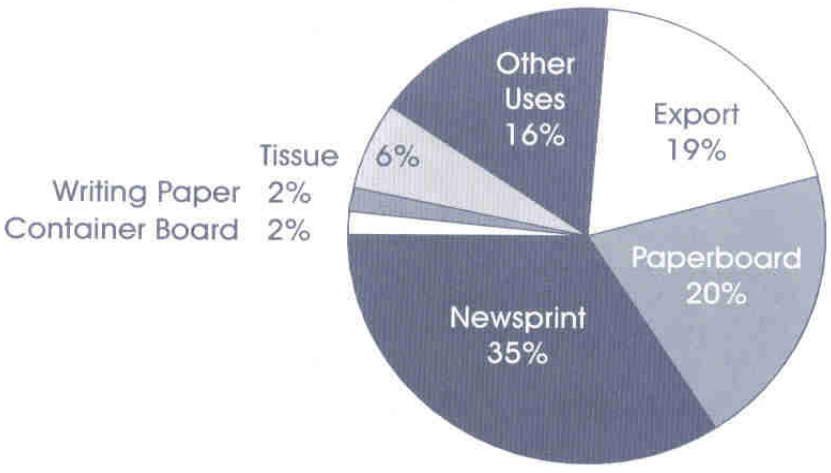
In 1995, the paper industry in the U.S. reached its goal to recover 40 percent of all paper. Today, we recover about 42 percent of the paper we use.

When the industry's goal of 50 percent recovery is achieved, 20 million tons more paper will be recovered than landfilled.

Today, more than a third of all the paper that is recovered in the world is recovered in the U.S.

Old corrugated containers (boxes) account for nearly 50 percent of the total paper that is recycled.

WHAT HAPPENS TO RECOVERED PAPER



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