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# K-12 Partnership Lesson Plan

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# *Thinking about Waste*

## Overview

Waste generation in the U.S. is an enormous problem, as 230 million tons of trash is generated each year. Students must begin to learn about these issues because natural resource depletion and environmental degradation may directly affect their lives in the future. This lesson is designed to get students thinking about how to cut waste in their own lives. They will draw pictures of the Earth in 100 years under two different scenarios. They will also list some ways that the school and families at home can reduce waste, which will be posted in the school hallway. Students should come away from the lesson with a positive outlook, that waste generation can be significantly cut, which will benefit everyone in the world.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Understand that an immense amount of waste is generated in the US
* Identify ways that they can reduce consumption and reuse or recycle waste
* Predict what will happen in 200 years if nothing is done to control consumption and waste generation
* Know how to begin or enhance the recycling program at their school and homes

**Length of Lesson**

1 hour

**Grade Levels**

Middle School

**Standards covered (NGSS)**

Disciplinary Core Ideas:

* **MS-ESS3-4**: construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems

Cross Cutting Concepts:

* Patterns
* Energy and matter in systems

Science and Engineering Practices

* Constructing explanations and designing solutions
* Obtaining, evaluating, and communicating information

***Previous Michigan Standards Met:***

* **III.5.M5.6 (LEC 11):** describe ways in which humans alter the environment
* **II.I M5.5 (new):** develop an awareness of and sensitivity to the natural world

**Materials**

* Blank paper
* Colored pencils, crayons, or markers

**Background**

### *Strategy:* *theoretical storyline*: applying principles to processes in systems

###  *Observations, patterns, and explanations*

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| --- | --- | --- |
|  Observations or experiences (examples, phenomena, data) | Patterns (laws, generalizations, graphs, tables, categories) | Explanations (models, theories) |
| Develop specific ways in which waste generation can be reduced, both at home and at school | Reducing consumption could have a huge impact on future life in Earth as the human population gets larger and resources become more scarce. | Human waste generation is tremendous (230 million tons per year in the US) and is vastly depleting natural resources. |
| Application: Model-based Reasoning |
| Inquiry: Finding and Explaining Patterns in Experience |

###  *Introduction/Anticipatory Set*

### The following information should be shared with students:

* People in the US produce around 230 million tons of trash each year, or 4.5 pounds per person per day. If we buried this much trash in one location, we would need to dig a hole the size of a football field that was 87 miles deep!
* Only 30% of the trash in the U.S. is recycled. However, in 1990, only 16% of waste was recycled, so we are improving.
* The office paper that is thrown away each year could be used to build a 12 foot high wall from New York to Los Angeles (2,700 miles).
* Each ton of recycled paper saves 17 trees; 380 gallons of oil; 3 cubic yards of landfill space; 4,000 Kilowatts of energy; and 7,000 gallons of water.
* Recycling a stack of newspapers three feet high will save one tree from being cut down
* The amount of time to degrade for the following items is:
* banana -- 3 to 4 weeks
* paper bag -- 1 month
* cotton rag -- 5 months
* wool sock -- 1 year
* cigarette butt -- 2 to 5 years
* leather boot -- 40 to 50 years
* rubber sole (of the boot) -- 50 to 80 years
* tin can (soup or vegetable can) -- 80 to 100 years
* aluminum can (soda pop can) -- 200 to 500 years
* plastic 6-pack rings -- 450 years
* plastic jug -- 1 million years
* Styrofoam cup -- unknown? forever?
* glass bottle -- unknown? forever?
* Recycling aluminum takes only 5% of the energy compared to mining aluminum

### Activities of the session

1. Introduction above
2. Based on the above given facts, have the students divide up a blank sheet of paper into two sides. On one side, have them draw a picture of the way they view the Earth in 100 years if we do nothing extra to curb consumption or waste generation.
3. Ask students to report on their drawings
4. Then make sure to tell the students that we are getting better at reducing consumption and ask the students about some things they have already done to reduce consumption in order to build their confidence that there are positive actions taking place.
5. On the back of their paper, have them list five additional things they could do at school and five things they could do at home to reduce the amount of waste that is generated and landfilled.
6. Make a master list on the board of all suggestions for the methods the students describe and reduce the “all class list” to five suggestions in each category. This “all class list” can then be decorated and posted in the school hallway.
7. Have the students use the other half of their paper to draw their vision of the Earth in 100 years if we continue to improve our recycling and consumption rates.

**Conclusion**

If possible, students can hang their drawings in the hallway along with the “all class list” of ways to reduce waste generation. Students should be reassured that they are already doing things to accomplish this goal and there are realistic ways to further improve the situation. The teacher can share ways in which waste is reduced at their own house.

**Extensions and Modifications**

Students can take the project further by actually implementing a waste reduction program at their school. There may be minor or major things that they can do. They can also take the lessons home to their parents to talk to them about waste reduction.

**Assessment**

Students should get a participation grade based on:

* Completion of the drawing
* Generation of ideas for reducing waste
* Extra points can be given to the student who design and post the “all class list”

**Post-lesson Comments and Reflection**

*12.11.06*

*This lesson was semi-successful. The students seemed very aware of the importance of reducing the amount of waste generated in our society. However, the difficult part about teaching it is that we* **can actually do something about this problem!** *The students enjoyed drawing pictures about the world and seem enthused about doing something to correct over-consumption.*

*I would highly recommend following up this lesson with an actual project that gets students involved with reducing waste at their school. This may end up being a large project, but very worth while. The students need to learn not just that there are waste problems, but what and how they can actually correct the problem.*