



**Science Unit:** *Temperate Forest*

**Lesson 19:** *Making Recycled Paper*

School year: 2007/2008

Developed for: Bayview Community Elementary School, Vancouver School District

Developed by: Elaine Humphrey (Scientist), Susan Jung and Teri Taylor (teachers)

Grade level: Presented to grades 1 - 2; appropriate for grades 1-7 with age appropriate modifications such as having an adult with younger students.

Duration of lesson: 1 hour and 15 minutes

### Objectives

1. Students learn how to make recycled paper.
2. To develop awareness of conservation of trees by recycling.

### Vocabulary

<u>fiber</u>	Very thin thread-like strand.
<u>pulp</u>	Fibers used to make paper
<u>slurry</u>	Water and pulp.
<u>couching</u>	Removing the pulp from the mold
<u>renewable resource</u>	A natural resource that can be used to benefit people and can then be replaced. Example: trees--grow more to replace the ones cut down
<u>sizing</u>	Used to glaze paper so that you can write on it

### Materials

- shredded paper scraps
- lots of water
- blender (suggested: have 2 or 3)
- lots of large sheets of plain newsprint for blotting and drying
- embroidery hoop with net curtain piece as a form / mold
- optional: cotton lint (from dryer)
- large Rubbermaid tubs
- lots of sponges (1 per group of 5 children)
- optional: glitter, dried flowers, pine needles, twine, etc.
- spray starch for sizing

### Background Information

Paper is used on a daily basis. It is the one thing that is most often used, both in school and at home. Paper can be made from a wide variety of natural materials such as cotton, hemp, grass, banana plants, and tobacco but it is most often made from pulp that is produced by grinding up trees. Since paper is so important to us, it is necessary to cut down trees. However, we need to make sure that we don't waste paper. By using less paper, we can save trees. There are many ways we can help. We can make sure



we recycle our paper by putting it into the blue bin or recycling bin. We can make an effort to buy 100% recycled paper products. And finally, we can make our own paper.

### In the Classroom

#### Introductory Discussion

1. Brainstorm with the children what paper is used for in daily life. Discuss what was used before the invention of paper: cave painting, Egyptian wall hieroglyphs and clay tablets, papyrus. The word "paper" comes from "papyrus". Ask: "Who invented paper?" Show world map to locate China, where paper was invented by Ts'ai Lun. Locate Europe on the map. Discuss how paper making skills didn't reach Europe for another 1000 years. In Victorian times, paper was still expensive, so they used slates. Talk about how some insects (eg. wasps) make paper. Show a wasps nest, if available.
2. Hand out magnifying glasses and samples of a variety of different papers (eg. Kleenex, newspaper, paper towel, cardboard). Ask children to look at each sample, Guide them to look for fibers. Define fibers.

#### Science Activity/Experiment

1. Demonstrate the steps for making paper:
  - (a) Blend the pulp: Add small pieces of torn paper (about 1 inch squares) into the blender with water: 4 parts water to 1 part scraps. This is called the slurry. Blend on medium setting for 30 seconds or until the mixture is mushy in texture. Pour into Rubbermaid tub. Add 2 liters of water to the tub.
  - (b) Forming the sheet: Hold the paper making mold with both sides hands, with mesh side up. Tilt the mold away from you and slip the far end quickly into the slurry. Hold the mold level under water. Lift it steadily out of the slurry, in a single smooth motion. Practise to get a thin, even layer of pulp on top of the mold. The thickness of your paper depends on how thick your slurry is. If your first sheet of paper is too thick, just add a little more water to the slurry.
  - (c) Couching: Place a piece of blotting material down on several sheets of newsprint. Let the water drain away. Lay the mold pulp side down on the blotter. Push down on the frame and blot the back of the screen with a sponge: just pat. Keep blotting until no more water comes through the mesh when you push on the frame. Remove the pulp from the mold using one hand to press down firmly on one side of the frame. With the other hand quickly pop up the opposite side.
  - (d) Drying & Sizing: Size the paper by spraying the sheets with spray starch. Let the paper air dry on the blotter. It will take several hours to dry completely. Or, use a hair dryer or iron to speed up the process. Slow drying is best.
  - (e) Removing the paper from the blotter: When the paper is completely dry, gently peel the blotter away from the paper. If you like, trim the edges of the paper with scissors.
    - (f) Cleaning up: **DO NOT** pour the slurry down the sink as it will clog the drain. Either drain, dry and put into the garbage or pour the slurry into the toilet. Rinse the mold thoroughly so it's clean and pulp free for the next time you want to make paper.
2. Have children make their own paper in small groups. Have at least 1 adult volunteer to help each small group. Children make 2 or 3 sheets.
3. Children write / draw about their paper making experience.



## SCIENTIST IN RESIDENCE PROGRAM

### NOTES:

\*Molds can be embroidery hoops and pieces of net curtain, which are inexpensive in comparison to commercially available paper making kits . See references below for website with photos.

\*Add glitter, bits of dried flowers, twine, etc. to the paper (after couching step).

\*Instead of spraying with spray starch, add liquid starch to the slurry: 750 mL of slurry to 30 mL liquid starch. Another option for a light sizing is to dissolve 2 packages of gelatin in 250 mL of water and pour into the slurry.

### Closure Discussion

Ask: How does your recycled paper look and feel? What are some ways to use your recycled paper? Why should we recycle paper?

Summarize: Recycling paper saves trees, reduces air pollution, and saves energy. Recycled paper can be used for note paper, wrapping paper, paper towels, stationery, cards, and much more.

If possible, locate reference books to show children how the paper industry works.

### References

1. <<http://gort.ucsd.edu/preseduc/paperdix.htm>> A photo tutorial on papermaking. Preservation Education and Awareness for Library Users. Official web page of the University of California, San Diego. Accessed April 29, 2008
2. <<http://youtube.com>> Search: papermaking

Making Recycled Paper

by \_\_\_\_\_

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Making Recycled Paper

by \_\_\_\_\_

What do you need to make a slurry? Think of at least 5 things. Draw and write.

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What do you need to make a slurry? Think of at least 5 things. Draw and write.

First,

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First,

Then,



Then,

Next,



Next,



Finally,

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Finally,