

Handmade Paper

How to make paper from recycled materials

Standards Addressed

Visual Arts Standard:

B. Art History, Citizenship, and Environment: B.4.7.

Visual Environmental Education Content Standard:

C. Environmental Issue Investigation Skills: C.4.4.

Key Concepts/ Content

✳ To compare handmade paper to papermaking processes used in mills. The basic processes are pulping, draining, drying, and finishing.

✳ To identify environmental issues involved in papermaking.

✳ The paper made in this exercise can be used as a cover for the students' journals.

Teacher Background

Paper was made by hand for thousands of years until, during the Industrial Revolution of the 18th century, machinery was invented that could mass-produce paper. Over 5,000 years ago, the Egyptians made a type of paper from an aquatic plant called papyrus. The stems were split, woven, and then dampened and beaten into flat sheets, which were polished smooth with stones. The Chinese patented the true paper as we know it today. Old fishing nets and ropes were beaten into a pulp with water, before draining and pressing the pulp into sheets, which were then dried in the sun before use. Later, plant fibers and silk threads were used. The Japanese have a long and continuing tradition of various plant materials used as the raw material in papermaking, e.g., gampi and mitsumata plants.

Today our western world acquires most of our raw material for paper production from wood pulp. Our state's first paper mill was started near Milwaukee in 1848 – the same year Wisconsin became a state. The amount of wood needed to produce a ton of paper varies with the kind of wood being used and with the kind of paper being produced. A general average is that it takes about 4 tons of wood (or around 10 trees, 70 feet tall and 10 inches in diameter) to make a ton of paper. Wisconsin paper mills generally produce more than 4.7 million tons of paper annually, thus leading the nation for over 40 years as America's #1 papermaking state. The first Wisconsin paper mill produced 15 reams of paper a day. Today's mills can produce some paper grades at over 6,000 feet per minute or nearly 70 miles per hour.

The trees used for paper depend upon the kind of paper that is going to be made. In general, the species include the softwood jack pine, red pine, and white pine tree species and the hardwood aspen tree species.

Getting Ready

Lay out examples of various kinds of paper for student exploration. Ask students to discuss their similarities and differences. Differences observed may be in color, surface texture, and thickness. Paper can be identified by function, e.g., computer, wallpaper, writing, packaging, and drawing. (See *Paper Makes Wisconsin Great!* in the reference section of this activity.) Ask students if they know how paper is made and the materials that are used. Provide background information on the history of papermaking and facts of forestry use. Discuss the recycling efforts in paper.

Introduce the mill papermaking process of pulping, draining, drying, and finishing. Explain that this process is simplified into art making (see activity sheet).

Safety Issues



- ◆ Students will be using electricity in this activity. Be sure the blender and all other appliances are away from water.
- ◆ Pulp spilled onto floor is slippery.

- Materials Needed**
- ✦ Used paper (newspaper, wrapping, shopping bag, lunch bag, and homework)
 - ✦ Plastic bucket (ice cream bucket works well)
 - ✦ Water
 - ✦ 8-inch or deeper plastic tub
 - ✦ 2 wooden picture frames (or constructed wood frames measuring 5 x 7 inches)
 - ✦ Blender
 - ✦ Opened sheets of newspaper
 - ✦ Sponge
 - ✦ Iron
 - ✦ Plastic window screen (7 x 9 inches)
 - ✦ Duct tape
 - ✦ Forest plant materials, e.g., flowers, grasses, feathers, ferns, leaves, or conifer needles - pulled apart.

Procedures

1. Tear up used paper into tiny pieces, 1/2 inch or smaller.
2. Soak paper pieces in bucket. The soaking is to break down and rehydrate the fibers in the paper. Hot water will speed the process up.
3. Fill blender three-quarters full of paper pieces and water. Start the blender on low with pulsing until it becomes pulp (mixture will have a “wet mush” appearance).
4. Make mould and deckle (see activity sheet). Stack the deckle and mould, and prepare paper receiving area.
5. Pour the pulp from the blender into the plastic tub and repeat the pulp blender process until there is enough in the plastic tub to submerge your screen by at least 4 inches. Depending upon the size of the plastic tub, it may take at least 8 blenders full to begin. Mix the pulp in the plastic tub with your hand.
6. Add forest plant materials into the wet pulp and mix.
7. Lower the screen into the plastic tub using the motion illustrated on the activity sheet. Lift the screen up, hold-

ing it level and letting the water drip back into the tub. The pulp will be lying on the top of the screen.

8. Remove the top frame. Turn upside down so paper is resting on the couching materials and newspaper blotter. Gently sponge the excess water off the paper through the screen. Remove most of the liquid, but don't make it too dry or it won't release when you pull up the frame.
9. Carefully peel off the screened frame. If the pulp has been blotted thoroughly, it will adhere to the couching cloth.
10. Close the opened newspaper carefully over the handmade paper and use a warm iron to dry it. Gently "blot" the iron on the paper. Turn the paper over and continue drying the paper by blotting it with the iron.
11. When completely dry, peel off your recycled paper.
12. Discussion/Conclusion:
Uses for student handmade paper:
Options:
 - Mount a pressed leaf from an adopted tree.
 - Draw or paint a picture of some aspect of our forest resource.
 - Mount a poem about trees.
 - Make more sheets and make a book.

**Evidence of
Student
Understanding**

1. Teacher observations of students engaged in successfully completing papermaking process.
2. Student participation in class discussion.
3. Evaluation of students' creative uses of handmade paper.

References/ Resources

- 📖 *Creative Handmade Paper* by David Watson, Search Press Limited, 1991.
- 📖 *Making Paper from Trees*, Forest Products Laboratory Forest Service, U.S. Department of Agriculture, Madison, WI, 1978, 753.367
- 📖 *Nature through Science & Art*, by Susie Gwen Criswell (Director Office of Environmental Awareness, Smithsonian Institution), TAB Books, Division of McGraw-Hill, Inc. 1994
- 📖 *Paper Makes Wisconsin Great! A Multi-Disciplinary Educational Program for Upper Elementary Grades* from the Wisconsin Paper Council, 250 N. Green Bay Road, P.O. Box 718, Neenah, WI, 54957-0718. (920) 722 1500, www.wipapercouncil.org
- 📖 *Forest Trees of Wisconsin*, Poster. Bureau of Forestry. Wisconsin Department of Natural Resources. PUBL FR 101 - 95 (included in this packet).
- 📖 *Educator Fact Sheets*
(see Appendix)

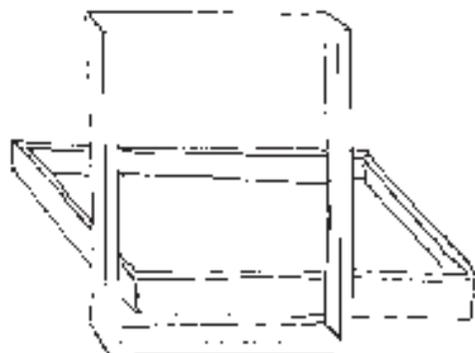
Activity AS Sheet

Handmade Paper Making the mould and deckle

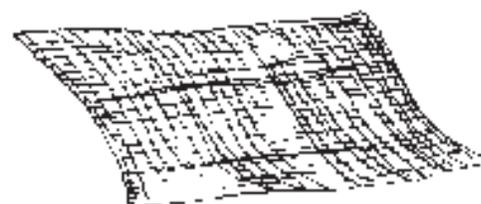
This mould and deckle setup is designed to make a 5- x 7-inch sheet of handmade paper. Use the paper as a cover for the journal entries, or cover a small box to hold the pressed leaves the students gather. If the students each make two sheets of handmade paper, they will have a front and back cover. An interesting cover can be made by cutting a circle in the center of the paper. Place a pressed, dried leaf in that center as you laminate it. Laminate the second piece as the back cover.

ASSEMBLING THE MOULD AND DECKLE:

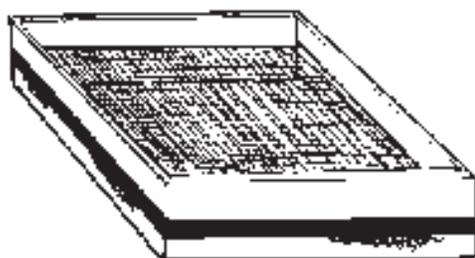
Make two identical frames out of 2-inch-wide and 1/2-inch-thick wood strips. OR get picture frames. Mould and deckles measuring more than 5 x 7 inches are difficult for the students to handle and make it harder to produce a nice piece of handmade paper.



Cut out a 7- x 9 inch rectangle of screen. Plastic window screen works best.



Fold the screen over the frame, using a few staples to hold it in place. Tape it securely all around the frame with duct tape.



To use this setup, stack these on top of one another as shown above. The screen faces up. The top frame forms a catch tray allowing the pulp to settle on the screened frame. After most of the water has drained, take that frame off and move to the drying area.

Refer to the next activity sheet for more complete papermaking methods.

Activity A Sheet

Handmade Paper

MILL PAPER

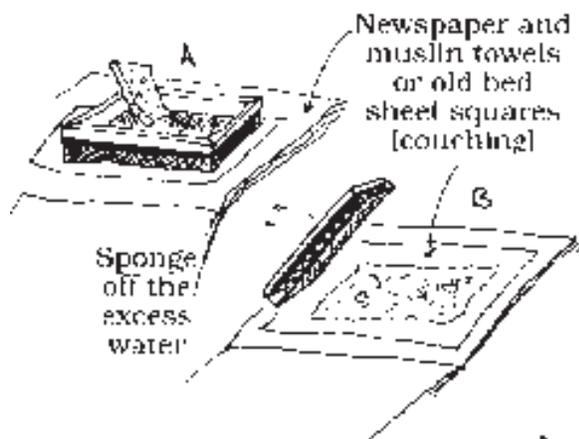
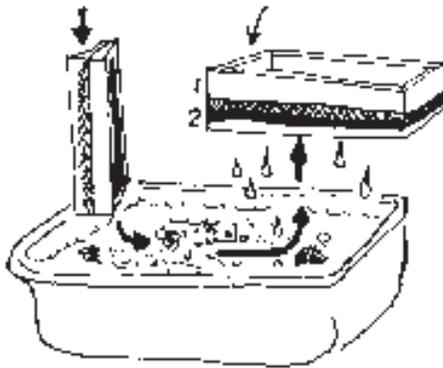
HANDMADE PAPER

Blender with water plus paper



One inch squares of recycled papers

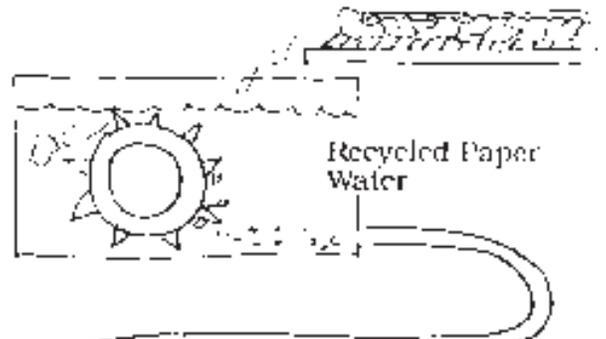
Mould and Deckle



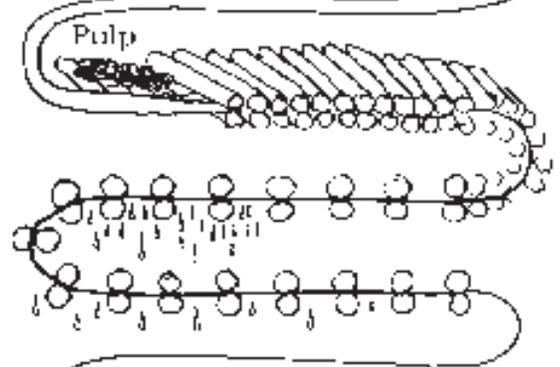
Iron dry or lay in bright sun outside



PULPING



WATER IS PRESSED OUT OF PULP



DRYING

