



# Science Activities

Title: **The Paper Crane**

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## Recycled Paper

Key Words: paper, cellulose fibers

Concept: Paper is made from plant fibers, which can be recycled and used again and again.

Making paper from natural plant fibers is a very old process that originated in China (about 100 A.D.). The idea of reusing or recycling materials to make paper is as old as paper making. The first paper was made from mulberry bark, scraps of old linen cloth, hemp, and old fishing nets (all of these are plant products). In this episode, Linda Forgach made paper from old cotton jeans. Recycling works well for paper because paper is made from cellulose plant fibers that can be used and reformed into sheets of paper again and again. Now try making new paper from old paper scraps.

Materials: scraps of construction paper, magnifying glass, water, bowl, electric blender, plate, small milk carton or other small container, fiberglass window screen, embroidery hoops (larger than a coffee can lid), coffee can, cookie cutters (the kind that are open on both top and bottom), newspapers, paper towels, tray, books

Directions:

1. Have students tear collected scraps of paper into pieces smaller than 1 inch and place them in a bowl. (The paper can be sorted by color or mixed together.) Ask students to hold up a scrap of paper and look closely at the torn edge with a magnifying glass (or microscope). Explain to students that the tiny threads they see are the cellulose plant fibers that are used to make paper. To make new paper the plant fibers must be separated from each other and then rearranged to form a new sheet of paper.
2. Add water to the bowl of paper scraps and leave them to soak overnight
3. The next day, pour 4 cups of water and about 1/4 cup of the soaked paper pieces into an electric blender. Blend until the paper is completely broken up. (Don't be tempted to add more paper. You could burn out the blender motor.) This is your paper pulp. Pour a small amount of the pulp out onto a plate. Have the students look and feel the paper fibers. Explain that the blender has separated the cellulose fibers from each other.
4. Stretch fiberglass screen across an embroidery hoop by stretching the screen across the inner ring and fitting the outer ring over it to hold the screen securely in place, just as you would with fabric. Trim extra screen from the edges and



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- place the screen-covered hoop over the open end of a coffee can.
5. Pour about 1/3 cup of the paper pulp into a small, clean, milk carton. Have a student place a cookie cutter on top of the screen and slowly pour the pulp from the milk carton into the cookie cutter. Ask the student to completely cover the inside shape of the cookie cutter with not more than ¼ inch of pulp. Give the water a moment to drain from the pulp and then have the student remove the cookie cutter leaving a pulp shape on the screen.
  6. Ask the student to turn the screen with the pulp shape over onto a stack of newspapers. Then have the student absorb some of the water by lightly pressing straight down on the back of the screen with a paper towel. This will also help to press the pulp shape onto the newspaper. Next ask the student to slowly pick up the screen in a rolling motion, watching that the pulp shape sticks to the newspaper. After several students have placed shapes on the newspaper, cover them with dry newspapers, a flat tray, and several books. After about 15 minutes, remove the shapes and place them onto dry newspapers to finish air drying.
  7. When students have mastered the technique, they can add some variety to the shapes they make by pouring a very thin layer of pulp into a cookie cutter and then laying items such as scraps of yarn, paper dots, or torn paper pieces into the cookie cutters and finally pouring additional paper pulp over the items. The finished shapes will have the items embedded in them.

## Paper Testing

Key Words: paper, making comparisons, measurement, function and properties

Concept: Different papers have different qualities.

Although all paper is made from cellulose plant fibers, all paper is not alike. Cellulose fibers from different plants produce different kinds of paper and even paper made from the same kind of plant can be very different because of differences in how the paper was made and dried.

Materials: Different kinds of paper cut into ¼ inch x 6-inch strips (i.e., construction paper, brown grocery bag paper, origami paper, copy paper, toilet paper, paper towel, newspaper), large paper clips, tape, wire clothes hanger, heavy washers, paper, pencil

Directions:

1. Give each group of students one strip of each kind of paper, a hanger, a paper



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clip, some tape, and some washers. Ask students to describe each kind of paper and talk to the students about what each kind of paper is used for. Ask them to predict which is the strongest. Be sure that students can identify each kind of paper by name. Choosing papers of different colors (as well as different types) will help students identify them. You may need to make a key on a bulletin board showing each type of paper and its name.

2. Have students hang their hangers from a doorknob or the back of a chair.
3. Then ask students to tape the ends of one of their paper strips together to make a loop around the bottom wire of the hanger.
4. Have them pull out and down the center wire of a paper clip to make a hook and place this hook through the bottom of the paper loop.
5. Ask students to slowly place washers one at a time onto the hook until the paper breaks. Then have them record the type of paper and the number of washers it took to break the paper.
6. Have students repeat the process for each type of paper. Ask them to keep a record of their findings.
7. Ask students to make a chart showing the papers in order from the weakest to the strongest. Each group can share their findings with the class and discuss similarities and differences between their findings and the findings of other groups. Ask students to explain how the strengths of the papers might relate to their uses. (e.g., Paper towels do not have to be strong, but they do need to be absorbent. Newsprint must be strong enough to go through a printing press, but also light weight. Origami paper needs to be thin and yet strong enough to be folded many times and not tear.)