



# Eco printing on paper

## in the classroom

A STEAM  
LESSON



### HS-PS1-5

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

### VA: Cr1.1.a

Use multiple approaches to begin creative endeavors.

### VA: Cr2.1.IIa

Through experimentation, practice, and persistence, demonstrate acquisition of skills and knowledge in a chosen art form.

### VA: Cn10.1.Ia

Document the process of developing ideas from early stages to fully elaborated ideas.

### CCSS.MATH.CONTENT. HSS.MD.B.5.B

Evaluate and compare strategies on the basis of expected values.

## STEAM extension



Students can create a graph or table using the different measurements of mordants/chemicals used with each type of leaf and record results by creating a lab report of the entire experiment.



The teacher can also have PH strips to test the water used and see if results vary by using tap water vs. distilled or filtered water.



Students can also discuss the life cycle of a leaf and record the different results depending on the time of year and what stage the leaf was in when printed. Every leaf is different.

## Objectives

*Students will...*

- Print watercolor papers using various leaves from nature for use in journaling, collage or altered books
- Record process in different stages using different materials and experiments to achieve a variety of results



# Activities

**Note:** Students should wear vinyl gloves throughout the entire process.

1. Start by explaining the materials and different foliage that can be used.
2. Demonstrate the process from beginning to end.
3. Students will create their bundles by spritzing each pre-cut sheet of paper with alum and copper sulfate mixture, dipping their leaves in iron water and placing leaves vein side down onto each sheet of paper. The various vegetables listed below can be used to obtain certain colors:
  - a. Onion skins for yellow/orange
  - b. Beets for pink
  - c. Red cabbage for blue
  - d. Purple carrots for purple
  - e. Rusty objects (if used) will be dipped in iron water as well. They will become a part of your unique prints and designs and will print orange or possibly black.
4. Place the two pieces of wood on the outside of the bundle and tie everything together tightly. Think of the wood or tiles as the “bread” of the sandwich.
5. The teacher will steam or simmer the bundles for at least 2-3 hours and students will open their bundles during the next class period when cooled. If doing the process yourself, you may open after steaming.





# Process / Tips

- Cover all tables with plastic, as this can get very messy. Remember, you are working with strong, natural dyes and even though they are safe, they will stain.
- While students are making their bundles, the instructor should be boiling acorns, walnuts, teas (cut open tea bags), and onion skins in water with one cup of vinegar. Please note that if steaming, students will receive a cleaner print. If they simmer their bundles in the dye bath of acorn/walnut mixture, their paper will be dyed along with their prints.
- Ideally, this process will work with a small class or art club. However, it also depends on the size of your pot or steamer as to how many bundles/sandwiches will fit.
- If you're not using a proper steamer, you will need to place bricks in the pot so that you can avoid immersing bundles in your dye bath. If simmering, then add enough water to cover all bundles in the pot without overflowing.
- Instructors should always wear rubber gloves when handling bundles, as they get very hot. Use tongs if available.
- When students are done bundling, show them various examples found on the internet of different eco printing results, as well as examples made by the teacher.
- The next day, the students will open their bundles to see the results. Each student will have completely different results! Tell students not to be discouraged if their prints didn't come out strong. They can always try again, wrapping the bundles as tight as possible. The tighter the bundle, the stronger the print. Printed papers, when dry, can be used for journaling, altered books, cards, wall hangings, collage, etc. The possibilities are truly endless.
- Leaves can be frozen in zippered plastic bags if you want to do this project in the winter months. Or they can be pressed in old phone books, which is a great use for recycling them.
- There are several flowers and vegetables that can be printed on paper but fade away on fabric. If you want to do this in the spring, experimenting with different flowers and vegetables can add some beautiful colors to your prints.

## Notes

- Questions about the process can be emailed to [paigedestinal973@gmail.com](mailto:paigedestinal973@gmail.com)
- Also, keep in mind that there are many variables in this technique and that you should expect different results every time.
- This process explained here is only for paper. There is an entirely different process for printing on fabric. Email the address above for inquiries.

## Vocabulary

**Eco-Printing** — A process developed by India Flint that creates prints of leaves using the natural pigments, tannins, and acids present in leaves. Variations are achieved by combining them with mordants, moisture, and heat on fabric and/or paper.

**Tannins** — Tannins are a class of astringent, polyphenolic bio molecules that bind to and precipitate proteins and various other organic compounds including amino acids and alkaloids. The term "tannin" refers to the use of oak and other bark in tanning animal hides into leather.

**Mordant** — A substance, typically an inorganic oxide, that combines with a dye or stain and thereby fixes it in a material.

**Alum** — A colorless astringent compound that is hydrated double sulfate of aluminum and potassium, used in solution medicinally and dyeing and tanning.

**Copper** — A mordant used in natural dyeing that "saddens" or brings out the colors in the natural dyes.

**Iron** — A mordant used to bring out the tannins or natural pigments in the leaves that makes the print darker.





# Materials list

**Heat Source** — Hot plate, stove, or camp stove using propane. ([WA32082](#))

**Large Pot or Steamer** — You will want this pot to be dedicated to eco printing and nothing else. To save money, purchase one from a thrift store. The larger the better.

**Paper** — Watercolor paper will work best, but any paper can be used. You will need 10 sheets or an accordion folded bunch per student if they are making a book. Paper should be cut to the size of the wood blocks or tiles used. ([9701004](#) or [9716081](#))

**Spray bottles filled with hot water and 1 tablespoon each of Alum and Copper Sulfate** — One spray bottle per table is usually enough.

- Alum ([SA09334](#))
- Copper Sulfate ([SB07680](#))

**Pieces of wood or tiles** — Two per student to “sandwich” bundles before steaming or simmering.

**Ferrous sulfate (iron)** — All leaves will be dipped in iron solution prior to placing on paper, vein side touching paper. If you use ferrous sulfate, dilute 1 teaspoon per 2 cups of water. You can also make a homemade iron solution using rusty metal in vinegar that soaks for 2 weeks in a plastic container.

**Vinegar** — Use white distilled vinegar in plastic containers for dipping red cabbage, onion skins, purple carrots, beets or eucalyptus.

**Rusty objects** — Use washers, keys, door hinges, or any flat piece of metal that can be layered into your “sandwich” and used to enhance your prints.

**Vegetables** — Canned beets, red cabbage, yellow onion skins, purple carrots and eucalyptus is optional. You will also need a knife to slice these ahead of time.

**Personal protective equipment** — Rubber gloves for the instructor, vinyl gloves for students, and if room is not ventilated, a face mask for each student may be necessary due to the strong smells of the iron water. ([C20030](#))

**Cotton twine** — Several spools to tie wood or tiles together. ([K00129](#))

**Scissors** — To cut twine. ([9731962](#))

**Masking Tape** — You will only need masking tape to label your bundles. Before steaming your bundles, everyone should write their name with a pen or permanent marker and tape it on the twine. ([9740906](#))

**Leaves** — Gather leaves with students or gather them ahead of time. Try to choose a variety of oak, maple, sweet gum, sumac (not poison), walnut, and fruit/flower/nut bearing trees. Each one will produce a print.

**Other items for color** — Onion skins, walnuts, acorns and various teas that have fruits in them.

