

Merging Marbling and Milk

PA Science Standards:

- Ask questions about objects, organisms, and events.
- Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.
- Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.

Possible National Arts Standards:

- #VA:Cr1.2 Enduring Understanding: Artists and designers shape artistic investigations, following or breaking with traditions in pursuit of creative art making goals.
- #VA:Cr2 Enduring Understanding: Artists and designers experiment with forms, structures, materials, concepts, media, and art-making approaches.

Materials per group:

- At least 1 Qtips per student
- Small dish of Liquid dish soap
- 1 Petri dish (or a deep Styrofoam plate or bowl)
- About ¼ c Whole Milk
- Colored pencils

General supplies:

- 1 4-pack of food coloring
- various types of milk (Skim, 2%, Heavy Cream, almond)
- cookie sheets or trays
- watercolor paper, cut to fit in the trays

Procedure:

Part I: The basic experiment

(This can serve as the entire science aspect, or you can add part two to increase the inquiry.)

1. Split students into small groups.
2. Introduce students to the materials they'll be using. Ask them to hypothesize what would happen if they were combined. Our driving question: What would happen if we combined milk, soap, and food coloring?
 - a. Remind students that a good hypothesis is based on logical thinking of what we already know.
 - b. Pass out lab sheet and have students discuss their hypothesis with their group, and then allow a few to share aloud.
 - i. Prompt each volunteer to explain why he or she came to that hypothesis.
 - c. Have students write their hypothesis. Students who finish early should preview the directions on their lab sheet.
 - d. Go over the directions for the rest of the experiment.

3. While students record, pass out dishes filled with whole milk, Q-tips, soap, and paper towels. Remind students not to bump their table so that the milk is still when the experiment begins.
4. Visit each team and place two-three drops of food coloring in the milk.
 - a. At this point, students write an observation and sketch a bird's eye view of their petri dish.
5. Once the observation is complete, students may follow the directions for the rest of the experiment. (Touch the Q-tip to the soap, and then touch a food coloring spot in the milk.)
 - a. Note: Students have a tendency to play with the Q-tip and milk until it turns into a completely solid greyish brown mess. Encourage teams to touch it once or twice, and then observe.
 - b. At this point, students should record an observation and sketch what it NOW looks like.
6. Have students reflect upon their hypothesis, and guide them into writing a conclusion about what happened.

Part two: Inquiring and designing experiments

1. Why does this happen? Have students make predictions, and write a new hypothesis based on those predictions.
2. Repeat the experiment replacing the whole milk with skim milk. Before students begin, explain the difference between whole and skim milk, or show nutrition labels so that students can discover the similarities and differences.
3. Discuss results. If students think they know why the milk swirls, encourage them to write a new hypothesis so that they can test their theory. (Depending on time, age of students, and available materials, this can be done in small groups or as a demonstration.)
4. Bring students back together and record any conclusions students have discovered.
5. Then, discuss the science behind the experiment, modifying it for your grade level. Find a great explanation here:
<http://www.stevespanglerscience.com/lab/experiments/milk-color-explosion/>

Part 3: Bring in the art

How does knowing the contexts histories, & traditions of art forms help us create works of art & design?

1. Explain that we are going to try to capture the beautiful designs on paper in a similar style to an art form called marbling.
2. Go into the history of marbling. This website is a great resource:
<http://marbleart.us/index.htm>. This site provides more kid-friendly information on Turkey. <http://kids.nationalgeographic.com/explore/countries/turkey/#turkey-istanbul.jpg>
3. If time, you could go through the following steps allowing students to experiment with different types of milk. They could use trial and error to determine which works best for the result they want. Or, follow the directions using almond milk to get the result that most closely resembles the design in the milk.

4. Demonstrate the procedure below. (From Babble Dabble Do's Marble Milk Paper <https://babbledabbledo.com/science-art-for-kids-marbled-milk-paper/>) Split the class into small groups. *Note: Place the stack of paper near your tray. Once the colors start swirling students will have to work quickly to get the best effects.*
 - a. Pour roughly 3-4 tablespoons of almond milk into a tray; basically enough for a thin layer of milk that covers the bottom of your tray.
 - b. Add in drops of food coloring around the milk.
 - c. Touch the Q-tip to the dish soap, and then touch the Q-tip to the food coloring. The soap and food coloring will now start interacting.
 - d. Before the colors get too mixed together take one sheet of paper and lay it on top of the milk mixture. Press down. Gently lift it, set aside to dry, and continue with additional sheets.
 - e. Let everything dry completely.
5. While drying, have students reflect upon their products. Compare and contrast their technique to the traditional technique.

This blog offers pictures of the marbling technique:

<http://www.carlemuseum.org/blogs/making-art/easy-paper-marbling>

Next Steps/extensions:

- Once dry, use the marbled paper as a cover for a science journal that holds the observations and notes from their experiments.
- For a separate project with their results, this website provides a wonderful mixed media project. It is written for grades 6-12, but the idea could be modified successfully for elementary grades.

<https://akronartmuseum.org/display/files/media/lessonplan.pdf>