

LESSON: Plants “To Dye For”**GRADE:****4****OBJECTIVES:****Measurement & Data**

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit-

- **4.MD.A.1** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),*

MATERIALS & RESOURCES:

- Pre-washed cotton or muslin material, or old white t-shirts; (enough for each child to have a small piece)
- Onion skins, carrots, red onions, beets, spinach, grass (1st option)
- Knife
- Water
- 3 glass bowls
- 3 large, old saucepans
- Stove
- Sieve
- Alum, (available in spice rack at groceries)
- Book- *Welcome to Kaya’s World*, Raymer,(pp. 34-35)
- Access to website with eco prints at: [Haar Eco Prints](http://hdl.handle.net/2097/9118)
<http://hdl.handle.net/2097/9118>
- Marigolds, zinnias, cosmos, Coreopsis (2nd option)
- Glass jars
- Sun
- Tablespoon, quart, and gallon measure
- Pencil or black marker
- Large paper

PRESENTATION:

Read pp. 34-35 from *Welcomes to Kaya’s World*. Ask students what plants could be used for dyes, and show them the onions, carrots, etc., asking what colors might result. Students will use observation skills to see what colors are produced, while observing variables such as amount of plant matter and different methods. They’ll also be using measuring skills and representing quantities in a table.

DIRECTIONS: First Method

1. Teacher or adult assistants chop up hard plant materials, such as carrots, onions, beets, while students can tear spinach, peel yellow onionskins, or collect grass. Divide into color categories, (onion skins and carrots for yellow; red onions and beets for pink; spinach and grass for green), and place in glass bowl with enough water to cover them. Soak overnight.
2. Pour contents of each bowl into different stainless steel pans. Bring to boil on the stove and simmer gently for one hour. Check frequently and add water when needed.
3. Strain the dye through a sieve to remove the plant material.
4. Measure the liquid. For every quart of dye, add 1 tablespoon of alum. Alum is a mordant, which helps set the dye. Keep track of how much liquid and how much alum are used.
5. Wet your fabric, wring it out, and put it in the steel pan with your dye. Put pan on stove and simmer slowly until fabric is a little darker than you want it. The fabric will look lighter when it dries.
6. Run cold water over your fabric to rinse it and hang it outdoors to dry.
7. Divide a large piece of paper into 2 columns, one for liquid dye and one for alum. In first column, list gallons of dye used and convert it to quarts, then into pints. In second column, list measuring cup amount used, then convert into tablespoons and teaspoons.

DIRECTIONS: Second Method

1. Layer marigolds, zinnia, cosmos, and coreopsis on wet white t-shirt or fabric, and scrunch in glass jar.
2. Leave jar in the sun all day to solar dye fabric.
3. Remove from jar at the end of the day and hang outside (if possible) to dry.

FOLLOW UP: Have class discuss which method worked the best and why. Did some plants work better than others? Talk about how both of these methods might be helpful to the environment. Is treating the environment with respect similar to treating people with respect?

TIME: This lesson has to be spread out over several days. Actual hands on time:
first method: 2-2 ½ hours; second method: 45 minutes