Purpose
Youth explore the use of primary and secondary color mixing to create dyes for use on several mediums.

Facts to Know
Group size: three to four children per adult volunteer
Time frame: group meeting 30 to 60 minutes
Recommended ages: 5- to 7-year-olds (kindergarten through second grade)
Materials:
- Red, yellow and blue food coloring (one each per member)
- Ice cube tray (one per member)
- Resume paper (cotton based), or heavy duty, white paper towels. Copy paper will work in a pinch. (one sheet per member)
- Scissors (one per member)
- White cotton bandanas or napkins (one per member)
- Freezer zip-top bags (one per member)
- Large plastic tablecloths or drop cloths
- Paper towels (several per member)
- Several bottles of water
- Newspapers
- Toothpicks
- Three colors of cold-water fabric dye (Rit brand works well)
- Rubber bands
- Six plastic bottles with no-drip tips or caps (ketchup bottles or café condiment bottles work well)
- Two large plastic tubs
- Club soda or lemon-lime flavored soda

Background Knowledge
Color mixing takes place when two or more colors come together to form a new color. Any two (or more) colors can be mixed to create new colors. However, only three basic colors are needed to create just about all other colors. These colors are called “primary colors”. The three primary colors are red, yellow and blue. In this lesson youth will mix primary colors to create secondary colors (orange, green and purple), then they will transfer their color mixing skills to create a tie-dye project.
Prior to the meeting, ask members to wear old or protective clothing.

1. Begin by covering a table with plastic. Then give each member an empty ice cube tray; red, yellow and blue food coloring; and a bottle of water.

2. Members will use a bottle of water to fill each of the empty ice cube spaces in their tray two-thirds full with water. Trays should not be more than two-thirds full in any cube spaces.

3. Now members should use the red, yellow and blue food coloring to color the water in their trays. Use the following mixes to color the cube spaces.
   a. Three drops red = red, a primary color
   b. Three drops yellow = yellow, a primary color
   c. Three drops blue = blue, a primary color
   d. One drop red + two drops yellow = orange, a secondary color
   e. Two drops yellow + one drop blue = green, a secondary color
   f. One drop blue + one drop red = violet, a secondary color

4. Members may try any combination of drops to color the remaining cube spaces. Members might try to make a brown, light green or deep indigo.

5. Save the members' color mixing trays to use as dye trays in the Dip and Dye activity.

This next activity can be done using the colors mixed in the ice cube trays. Create a drying area for shapes by laying several newspapers out over a table.

1. Give each member a piece of cotton paper. Members should fold the piece of paper in half the long way.

2. Now have members cut two or three large symmetrical shapes from the cotton paper. Symmetrical shapes are shapes that are the same on both sides when folded in half, down a line of symmetry. Some examples of symmetrical shapes are circles, squares, rectangles, triangles, butterflies, hearts, tulips, stars, arrows, vases, leaves and even some letters. For the youngest members, having templates for tracing before cutting might be helpful.

3. Next, members will fold each of their symmetrical shapes down the line of symmetry and at least once more. Now each shape should have at least two folds in it.

4. The art of dip and dye has been practiced for hundreds of years and originates in Japan and China. Using the color mixing trays, members will dip, alternately, each corner and edge of their shapes in the dyes they created in their trays. Do not submerge any shape completely. The cotton paper will wick the color throughout the paper from the points where it has been dipped.

5. Encourage members to leave some white areas in the center of the shape where the dyes can mix as they are wicked up by the paper.

6. Once members are satisfied with dipping, they will gently unfold each shape and lay it flat to dry on a pile of newspapers.
Prior to the meeting, mix two sets of cold-water fabric dyes, each with three colors. Mix the dye and water according to the package’s directions in the plastic squeeze bottles; shake to mix. To minimize cleanup, wear an apron, smock or old shirt, and use plastic drop cloths on the floor and over the tables.

1. With an adult’s help, members will poke up little peaks all over a bandana or napkin. To do this members hold the ends of the cloth together and twist the cloth to a peak. Then wrap each peak tightly with several rubber bands.

2. When the members are ready to apply dye, they bring the rubber-banded article to one of the plastic tubs. An adult will hold the article to be dyed near the bottom of the tub while a member slowly squeezes dye on the article. Members should hold the tip of the dye bottle close to the article to be dyed to prevent splash-back dyeing. Members could use one, two or all three colors of dye on their article.

3. Once finished dyeing, members will place the dyed article in a sealed zipper bag and let it sit for 30 minutes.

4. After 30 minutes, or at home, members will undo the rubber bands and gently rinse the article under warm water in a sink.

5. Send members home with a copy of the package’s directions for final set of the dye and care of the article.
Reflect: Bringing Closure

Cloverbud Color Brew (10 minutes)

Prior to the meeting, make several trays of colored ice cubes in red, yellow, and blue.

1. At the meeting, pour each member a glass of clear soda.
2. Then review the color mixing using primary colors to create secondary colors. Ask members which color they would like to make their soda.
3. Members choose three colored ice cubes to chill their soda. As the cubes slowly melt, review what colors the soda will turn. Enjoy!

Apply: Going Beyond

1. Dye flowers a favorite color. Place white carnations in a vase with colored water and watch the flower petals change color throughout the day. Use food coloring to color the water; the darker the better! Be sure the flowers have a fresh cut on the stem before putting them in the dyed water.

2. Marbleizing your own paper. On a sheet of wax paper, spread a smooth, even layer of shaving cream using a ruler. Dribble drops of food coloring on the shaving cream and gently swirl the surface with a toothpick. Lay a piece of cotton paper over the colored shaving cream. Gently press the paper down to remove air bubbles. Peel the paper up and squeegee off the shaving cream with the ruler. Lay the paper flat to dry.

3. Try your hand at making natural plant dyes. Collect natural plant materials to make homemade dyes. Yellow onion skins will make yellow dye, raspberries will make pink, grass will make green and mulberries will make purple. Several methods for making the dye can be found online.