

Mixing Colors

Teacher Information

Some objects, such as traffic lights and neon signs, appear colored because the light that they give off contains a limited range of wavelengths. Most objects appear colored because their chemical structure absorbs certain wavelengths of light and reflects others. When white light strikes a banana, for example, it absorbs all other colors except yellow which is reflected to our eyes. The light entering the eye falls on the retina that lines the back and sides of the eyeball. Cells in the layers absorb the light and convert it to electrical signals. These travel through nerves to the brain where they are interpreted as color.

The following series of activities will enable students to experiment with colors. It is not important that students fully understand the scientific principles behind the effects they observe but, rather, that they learn to make the observations and learn how to describe them.

Overview: *Students will work with pigments or colors of dyes to discover the possible combinations which result from mixing primary colors.*

Materials

- dropper bottles of red, green, blue, and yellow food coloring (one set per group)
- 9 oz. clear plastic cups (set of 6 per group)
- red, blue, green, yellow crayons
- toothpicks
- paper towels
- black permanent marker
- What Color Do You See? data sheet (page 15)
- Color Chart data sheet (page 16)

Lesson Preparation

- Make sets of six plastic cups for each group, labeled as follows:

red + green

green + blue

blue + yellow

red + yellow

blue + red

yellow + green

Mixing Colors *(cont.)*

Lesson Preparation *(cont.)*

- Fill the cups nearly full with water
- For each group make trays of materials listed below:
 - ✓ set of 6 cups of water, labeled with colors
 - ✓ 6 toothpicks
 - ✓ paper towel
 - ✓ 1 green and 1 yellow crayon
 - ✓ 2 blue and 2 red crayons
- If the activity is too complex for this class, arrange for adults or older students to work with each group as needed.

Activity

1. Show the students red, green, blue, and yellow food coloring and have them tell you the names of their colors. Explain that they are going to use the food coloring in water and observe what they see happening.
2. Divide the students into small groups and distribute a tray of materials to each group. Distribute a copy of the data sheet to each student and review it with them before they begin.
3. Divide the cups of water among the members of each group along with the food coloring and crayons which match the first color to be added to each cup.
4. Assign each member of the group to do a different color combination in his or her cup of water, and then show the results with the other members so they can complete their records.

Closure

- Have students compare the results of their experiments. (See Answer Key.)
- As a culmination of this activity, have the students complete the Color Chart data sheet.
- After they complete the chart, students will use the cups of colored water they just created and add the third color as shown in the equation. To help them understand how to do this, have each group do the first combination as you monitor their progress. They will need to add yellow to the red + green cup and green to the red + yellow cup and compare the new color before writing the answer to the equation.

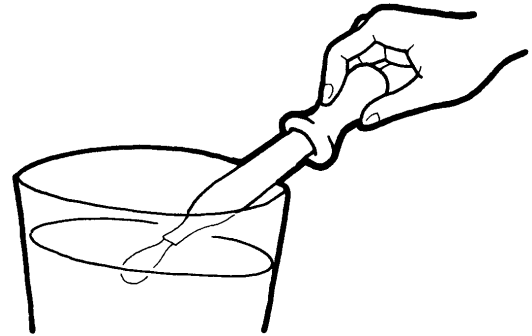
Mixing Colors (cont.)

What Color Do You See?

Name: _____ Date: _____

Instructions

1. Put one drop of the first color into the cup.
2. Watch what happens to the coloring.
3. Use a crayon which is the same color as the drop to show how the drop spread in the water.



I added _____ coloring to the water.

4. Add a drop of the next color to the water and watch it sink and mix with the other color.
5. Use the toothpick and stir the water until the colors are mixed.
6. Add the second color and stir it into the water. Hold the cup up to the light so it will shine through the water to make it easier to see the new color. Write the two colors you mixed in the water and the new color which appeared.

I added _____ and _____ and got the new color _____.

7. Look at the color equations below and find the one you have just done. In the box, write the new color which appeared when these two colors were mixed. Other members of your group have added different colors to their water. Look at the color of the water in each of their cups. Finish the chart below to tell what color appears when the two colors are mixed together.

Red + Green =

Red + Yellow =

Green + Blue =

Blue + Red =

Blue + Yellow =

Yellow + Green =

Mixing Colors *(cont.)*

Color Chart

Name: _____ Date: _____

Instructions: Use the What Colors Do You See? data sheet to give the names of the colors that appear when you mix two colors in water. The color mix of red + yellow has been done for you as an example of how to finish this chart.

	Red	Green	Blue	Yellow
Red				orange
Green				
Blue				
Yellow				

Begin with the two colors which have been mixed in the cups and mix the third color following the equations below. Write the name of the new color which appeared.

1. Red + Green + Yellow = a new color _____
2. Green + Blue + Red = a new color _____
3. Blue + Yellow + Green = a new color _____

Now, pour all the cups of colored water into a large clear container and hold it up to the light to see what color the water has become. Write the name of the color this combination of colors makes.

red + blue + green + yellow = _____

Answer Key

Changing Letters (page 10)

Letters which are underlined can be recreated using the mirror.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A	B	C	D	E	F	G	H	I	J	K	L	M
H	H	O	O	H	H	O	I		U	I	I	I
	D		I		I	U	A		I	H	I	W
							V		V	A		V
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
V		V		D	O	I	O	X	XX		I	
I		I		K				M	M		X	
		B		H				W				
		H		B								
		D		I								

Note: These are not all the possibilities. Accept any answers which students can prove.

What Color Do You See? (page 15)

- red + green = brown
- green + blue = dark green
- blue + yellow = green
- red + yellow = orange
- blue + red = lavender or purple
- yellow + green = light green

Color Chart (page 16)

See previous combinations for answers to the color chart.

- Red + Green + Yellow = amber/brown
- Green + Blue + Red = blue/brown
- Blue + Yellow + Green = green
- Red + Blue + Green + Yellow = green/brown

Note: These colors may vary, depending upon the amount of coloring added to the water.

Mixing Paints (page 18)

- (A) Red + Green = brown
- (B) Red + Yellow = orange
- (C) Green + Blue = dark green
- (D) Blue + Red = brown
- (E) Blue + Yellow = dark green
- (F) Yellow + Green = dark green