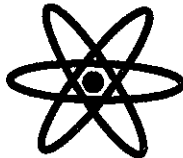


# Color Wonders

Leader Guide  
For Daisy Girl Scouts

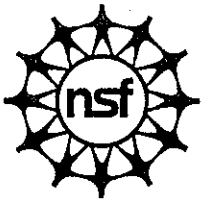


**BRIDGING**  
T H E  
**GAP**

A collaboration  
Between  
Discovery Place, Inc.  
and Hornets' Nest Girl Scout Council.

# **BRIDGING** T H E **GAP**

A collaboration between Discovery Place, Inc.  
and Hornets' Nest Girl Scout Council.  
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The activities described in this Leader Guide are intended to be used under the direct supervision of adults. Discovery Place, Inc. and Hornets' Nest Girl Scout Council cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from failing to follow the supplied directions, or from ignoring the cautions contained in the text.

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**Color Wonders  
Table of Contents**

Introduction .....2

How to Use This Guide ..... 3

Explanation of Icons Used in This Guide ..... 3

Rainbow Stew .....5

Beautiful Butterfly .....9

Whipped Topping Painting ..... 14

Colored Water .....17

Chromatography Flowers .....19

These activities are designed to simplify the Investigation Activities found on pages 113-124 in the "Guide for Daisy Girl Scout Leaders". They are designed to be fun, easy, and inexpensive. The layout of each activity contains simple instructions for preparation, as well as for sampling the activity before presenting with the Girl Scouts. All GSUSA guidelines should be followed when doing these activities.



## Introduction

As Girl Scout leaders and professionals, it is our goal to provide quality programs designed to enable girls to meet the many challenges of the future. Bridging the Gap (BTG) does that by providing easy, fun, and inexpensive activities that build confidence, both in the girls who do them, and in the leaders who guide them. All BTG activities are designed to be hands-on explorations of science, engineering, and mathematics (SEM), where the only limits are the boundaries of the imagination. Here, there is rarely a right or wrong answer. Instead, there is a sense of accomplishment in discovering something new in every effort.

As leaders, BTG gives **you** the opportunity to provide a more successful SEM program for your girls. By providing simple activities, in an easy-to-follow format, BTG will enable you to guide your troops with confidence in both the execution and the success of your SEM programming.

With the increasing importance of science and mathematics in our everyday lives, from balancing a checkbook to surfing the Internet, as well as in the professional world of the future, building confidence and excitement in exploring SEM activities is essential to the success of our girls in the world of tomorrow. But, beyond the immediate challenge of these specific activities, there is even a greater importance attached to motivating our girls to explore science, engineering, and mathematics.

## Gender Equity and SEM

Girl Scout Councils across the country have done extensive research in the area of gender bias and how girls are affected by it, with a particular view toward science, engineering, and mathematics. In developing materials to be used by troop leaders, special attention has been given to teaching methods and attitudes that our girls have been exposed to in the conventional classroom.

We know that in formal classroom settings, girls are not always encouraged to develop an interest in advanced science and mathematics studies. Research shows that both male and female teachers tend to expect more from boys, especially in the areas of science, engineering, and math, and, as a result, often unconsciously promote a learning bias. Sometimes this bias is a result of lower expectations for girls, and often reflects a teacher's personal lack of confidence in their own command of the material.

As Girl Scout adults, we need to encourage girls to explore their interests in science, not only for those who seek to become scientists, but also for those who want to become good parents, homemakers, businesswomen, and/or political leaders. Science and math are part of everyday life, from managing the household budget (accounting), to rearranging the furniture (geometry), and even while cooking dinner (chemistry).

The only way that we, as Girl Scout leaders and professionals, can implement a successful SEM program with our girls, is to motivate their natural excitement and curiosity, while reexamining our own perceptions as to what science is, and the role it plays in our lives.

We need to project an enthusiasm for the subject matter, a confidence in using the materials and in teaching the activity. We, the role models, must be excited at the opportunity to expand our knowledge through hands-on experiences in science, engineering and math, so that our girls will feed off that enthusiasm, and actively seek to gain the experiences that all of the data suggests they have been missing.

Bridging the Gap lets **you and your girls** explore, ask questions, take risks, and stretch your interests as far as your enthusiasm will allow. After all...

***Learning is directly proportional to the amount of fun you have!!!***



## Why SEM is essential for your Girl Scouts

According to data from the Departments of Education and Labor:

- While girls score higher than boys in reading from the 4th grade on, they fall behind boys in science and math test scores as they move further through high school.
- Over the past few years women were awarded fewer than 25% of the degrees in chemistry, less than 20% of the degrees in physics and math, and less than 1 of every 10 degrees awarded in engineering.

This happens despite research that indicates:

- Engineering will be among the highest paying and fastest growing occupations over the next decade.
- Women with good math skills earn more than women without good math skills.
- The fastest growing occupations - computer technology, engineering, and statistical analysis - all require strong backgrounds in science, technology, math, and/or engineering.

## Tips for Leaders Beginning SEM Activities

- Examine your own attitude about science and math before attempting the following activities.
- Practice the activities yourself.
- Take risks, get messy, explore, and observe.
- Have fun doing the activities.
- Develop a sense of confidence knowing that it works. It's easy, it's fun, and you can do it.
- Hold high expectations for the girls.
- Encourage the girls to take risks, get messy, explore, and observe.
- Invite the girls to have fun doing the activities.
- Don't readily give the girls answers. Instead, encourage them to discover on their own.
- Help the girls achieve a sense of accomplishment and confidence knowing they can do it.
- Whenever possible invite real role models, female engineers and scientists, to talk with your troop about their careers, and how the girls can start planning a career of their own.



## How To Use This Guide

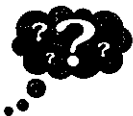
The activities in this guide are intended to be as user-friendly as possible. They were developed to be easy to do, easy to set up, and virtually always successful. Each refers to a corresponding section from an official Girl Scout Leader handbook, and that is noted on the 'Contents' page as well as in each activity. For your convenience, we have included an overview, the estimated amount of time you'll need in doing the activity with the troops, the materials needed, safety and clean-up suggestions, and planning suggestions in order to better prepare to do the activity with your girls.

The step-by-step instructions include tips, cautions, questions to challenge your girls, and explanations. Since trying the activities yourself before the troop meeting is strongly encouraged, we have included instructions with most of the activities on how to do it by yourself first. Please read all sections of the activity before trying with your girls. With many of the activities we have included references and resources at the end of the section, or in the back of the Leader Guide, to direct you to areas where your girls may explore further, or where specialty items might be purchased.

You will also find various icons throughout the guide which are placed to draw special attention for the following reasons:



When you see this **pay close attention** to the instructions.



These are questions you may wish to use to challenge your girls.



Look here for an explanation of what is happening and why.



This icon indicates a more in-depth explanation of what is happening.



Here you will find hints on making an activity easier.





**NOTES**

**How To Do It**

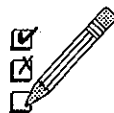
Rainbow Stew Recipe (enough mixture for 30 girls)

- 1/3 cup sugar
- 1 cup cornstarch
- 4 cups of cold water
- food coloring (blue, yellow, and red)

1. Prepare the cornstarch mixture:
  - In a mixing bowl, combine the cornstarch and the sugar.
  - In a saucepan over medium heat, pour 4 cups of cold water and slowly stir in the cornstarch mixture.
  - Continue heating until the mixture becomes thick, stirring constantly.
  - Let the mixture cool thoroughly.
2. Divide the mixture into three equal parts, placing each in a separate bowl.
3. Add several drops of red food coloring to one bowl, blue to the second bowl, and yellow to the third bowl of the mixture.
4. Mix each color well into the cornstarch.
5. Place 2-3 heaping tablespoons of each of the colored mixtures in one resealable sandwich bag, and seal it.
6. Squish the colored mixtures together to see what colors form.

**Before the Meeting**

Make the rainbow stew mixture and prepare enough bags for each girl to have one. It is best not to fill the plastic sandwich bags with the rainbow mixture before arriving at the activity site.



*If you fill the plastic sandwich bags with the 2-3 tablespoons of each of the colored mixtures at the activity location, you will avoid the problem of having them accidentally mix together during transport. Then, seal the top of each of the bags with tape so they can't be opened accidentally. Label each bag with a girl's name.*

A large vertical rectangular area with rounded corners, containing 25 horizontal lines for writing. The word "NOTES" is printed at the top left of this area.



**NOTES**

We see colors because light reflects off an object into our eyes. Sometimes, all of the white light hitting an object is reflected back to our eyes and the object looks white. When the object absorbs all of the light, and none is reflected, the object looks black. When only some of the light is reflected, it appears to be a color, depending on how much of the light is reflected, and what type of light is reflected.

Some colors are called primary colors, because we can mix them to make other colors, but we can not mix other colors to get them. In this case, we mixed primary colors, red, yellow, and blue, to make other colors.

**More to Explore**

Additional activities and book resources are included at the end of this Leader Guide.







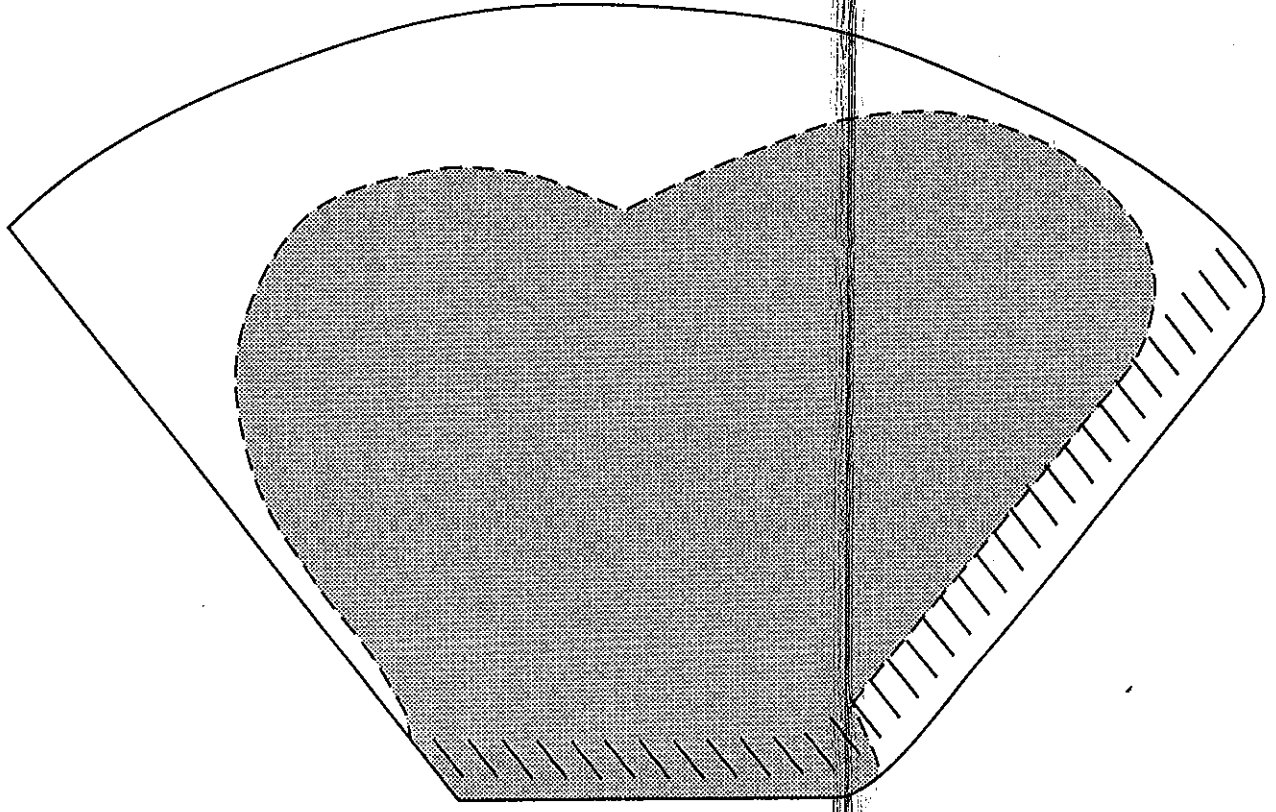


**NOTES**



Essentially, the first 4 activities in this Leader Guide are variations of the same theme. In the previous experiment, we took a substance in primary colors and mixed them to create new colors. Now, we have taken the primary colors in a liquid form and allowed the absorbed water to slowly mix them at various concentrations, creating different colors, and different shades of colors. The following activities, 'Whipped Cream Painting' and 'Colored Water' also allow the girls to combine primary colors and create new colors, but give them more control over how much of each color they will add to the new 'mixture'.

If your girls are interested in looking at a different aspect of color, try the activity 'Chromatography Flowers', at the back of this Leader Guide, or refer to the additional activities and book resources also included at the end of this Leader Guide.







NOTES



*The girls can lick their fingers, and even their paintings, when they are finished, as long as everything is clean.*

4. Throw the paper in the trash and have the girls wash their hands.



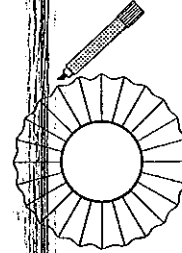




NOTES

**How To Do It**

1. Fill a plastic cup with approximately 1/4-inch of water.
2. Trace a line around the inner circle of the coffee filter with a brown or black marker, as shown in the diagram below.



3. Fold the filter in half, and then in quarters.



4. Place the bottom point of the filter into the cup of water, so that the ink doesn't touch the water. The water will slowly creep up the filter and separate the brown or black ink into bands of different colors.

*Permanent markers will not separate, and some water-soluble ones work better than others. Experiment with different brands of markers to see which ones separate into the best colors.*

5. After the water has crept up the filter, and the ink has spread and separated, remove the filter from the water, unfold it, and place it on a flat surface or plate to dry.



**Before the Meeting**

1. Prepare cups of water for each girl. Fill cups with 1/4-inch of water so that each girl taking part in the activity has one.

**Doing the Activity with the Girls**

1. Give each girl a coffee filter, a brown or black marker, and a plastic cup with water.
2. Have the girls draw a line around the inner circle of the coffee filter, fold it in half, and then fold it in half again, and place the bottom point into the water.





**NOTES**

**More to Explore**

As an extension of this activity, have the girls test different types of black or brown pens to see the difference in the ink patterns. Gather a number of different brands of felt tip pens (such as Sharpie, Vis-à-vis, Pilot, Crayola, Marks-a-lot, etc.), and have the girls test them all, observing the results, and comparing colors and patterns. Different brands will use different blends in creating black, and this will cause them to create different chromatography patterns. Since the pattern is distinctive, you could use it to identify which pen the ink came from.

As another extension, have the girls try different colors of water-soluble markers and observe if they also separate, and into what colors. Some marker colors, such as red, may have only one color of ink and will not separate into different colors. Have the girls explore how different colors and different brands compare.

**Additional Activities and Resources**

Primary colors are different for ink and light. Primary colors for light are green, blue, and red. These are the additive primary colors, and when blended together, create white light.

Ink, food coloring, and other things which reflect light, have a different set of primary colors – cyan (a bluish tone), yellow, and magenta (a red-dish tone). They are subtractive primary colors, because when you mix them all together, in the correct proportions, all of the color light is absorbed, none is reflected back for you to see, and so the object would look black.

There are a couple of excellent books available to introduce youngsters to color and its properties. *Science Book of Color* by Neil Ardley contains very simple experiments and explanations that can take your girls farther. As a leader resource, the Eyewitness book *Light* by Dorling-Kindersley offers great illustrations, explanations, and even some simple demonstrations, while *Fun with Science - Light* by Brenda Wolpole is highly illustrated, with experiments dealing specifically with color.

A large vertical rectangular box with rounded corners, containing 25 horizontal lines for writing. The word "NOTES" is printed at the top left of the box.

**Materials List for *Color Wonders* activities**

**Rainbow Stew**

**Tub Contents:**

None

**You provide:**

- 1 cup corn starch
- 1/3 cup sugar
- cold water
- medium saucepan
- 4 spoons
- food coloring (one each blue, yellow, red)
- masking tape
- 3 small mixing bowls
- 1 box of resealable plastic sandwich bags

**Beautiful Butterfly**

**Tub Contents:**

None

**You provide:**

*For each girl:*

- No. 4 size cone-shaped coffee filter
- A pencil or pen
- Scissors
- 2 Paper plates
- Plastic sandwich bag

*Additional supplies:*

- 1 box of plastic sandwich bags
- Red, blue and yellow food coloring (1 set for every 3-4 girls)
- Water

**Whipped Topping Painting**

**Tub Contents:**

None

**You provide:**

- One 16-ounce container of non-dairy whipped topping
- One container each of red, yellow, and blue food coloring
- One roll of waxed or freezer paper (freezer preferred)
- Table covering
- 3 bowls for mixing
- Scoop or spoon



## Colored Water

### Tub Contents:

- 10 white ice cube trays
- 30 eye droppers

### You provide:

- One package red, yellow and blue food coloring
- One package 9-ounce plastic cups (3 cups for each girl)
- One roll paper towels or sponges
- Water

## Chromatography Flowers

### Tub Contents:

None

### You provide:

*For each girl:*

- 8-inch basket type coffee filter
- 9-ounce plastic cup
- Paper plate
- Brown and black non-permanent, water-soluble marker

**Bridging the Gap**  
***Color Wonders***  
**Troop Leader Survey**

Today's Date: \_\_\_\_\_ Number of Girls Participating: \_\_\_\_\_

1. Approximately how long did you spend on each of the following activities?

**Rainbow Stew** \_\_\_\_\_ minutes    **Colored Water** \_\_\_\_\_ minutes  
**Beautiful Butterfly** \_\_\_\_\_ minutes    **Chromatography Flowers** \_\_\_\_\_ minutes  
**Whipped Topping Painting** \_\_\_\_\_ minutes

2. What activity did you or your girls enjoy the most, and why?

3. What activity did you or your girls like the least, and why?

4. Were your girls interested in exploring any of the activities further?     Yes     No

5. Which one(s)?

6. What did you do to fulfill that interest?

7. What can be done to make this more successful for your girls?

Thank you for your help and for your opinions!!!

Please return all forms to:

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We encourage you to visit our website at [www.bridginggap.org](http://www.bridginggap.org) *Let us hear from you!*