



# Science Sampler

Grades K-5

# Program Overview

The focus of this program is for girls to explore and learn more about the fields of science through fun, hands-on activities and experiments.

There are 14 30-45 minute activities in this program that are age appropriate for girls in grades K-5. Some of the activities involve more complex concepts and will require hands-on assistance from adults especially for younger girls. Depending on the length of your program, you can choose as few or as many activities as you would like. There is no order in which the activities need to be done. All of the supplies needed for each activity are listed with the directions on how to complete the activity. It is recommended that you practice each activity before facilitating with a group so you are aware of any issues/problems the girls might encounter.

Each activity fulfills national leadership outcomes from the Girl Scout Leadership Experience, where girls Discover, Connect, and Take Action. Girls achieve these outcomes through the three Girl Scout processes: Girl Led, Learning by Doing, and Cooperative Learning. An important piece of the activities is the reflection that you do with the girls at the end. Doing the reflection in an enjoyable way helps girls process and retain what they have learned through their Girl Scout experience. One easy way to do reflection is to ask the girl: What?, So What?, and Now What?

When choosing the activities, use the information below as a guide:

- One day program- 5 activities
- 4 week program- 6-8 activities
- 6 week program- 12 activities
- Incorporate into troop meetings- 1 activity per meeting

- |                                |                    |                      |
|--------------------------------|--------------------|----------------------|
| 1. Rainbow Stew                | 5. Chemistry Magic | 10. Volcanoes        |
| 2. Whipped Topping<br>Painting | 6. Cool Comets     | 11. Geysers          |
| 3. Waterproof Tissues          | 7. Recycled Paper  | 12. Earthquakes      |
| 4. Bubbles                     | 8. Green Bags      | 13. Lakes vs. Oceans |
|                                | 9. Biome in a Bag  | 14. Tornadoes        |

Through these activities, girls will.....

## Discover

1. Seek challenges in the world
2. Develop critical thinking

## Connect

1. Promote cooperation and team building.
2. Resolve conflicts

## Take Action

1. Feel empowered to make a difference in the world.

## Activity 1: Rainbow Stew

This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

The girls will learn that when primary colors are mixed, new colors are formed.

### Materials Needed:

- 1 cup corn starch
- 1/3 cup sugar
- Cold water
- Medium saucepan
- 4 spoons
- Food coloring (blue, yellow, and red)
- Masking tape
- 3 small mixing bowls
- 1 box of resealable plastic sandwich bags

### Procedure:

1. Prepare the cornstarch mixture (makes enough for 30 girls)
  - a. In a mixing bowl, combine the cornstarch and the sugar
  - b. In a saucepan over medium heat, pour 4 cups of cold water and slowly stir in the cornstarch mixture
  - c. Continue heating until the mixture becomes thick, stirring constantly
  - d. 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.

### Explanation:

When primary colors (red, yellow, and blue) are mixed together, they create secondary colors. Red and blue create purple, red and yellow create orange and yellow and blue create green.

## Activity 2: Whipped Topping Painting

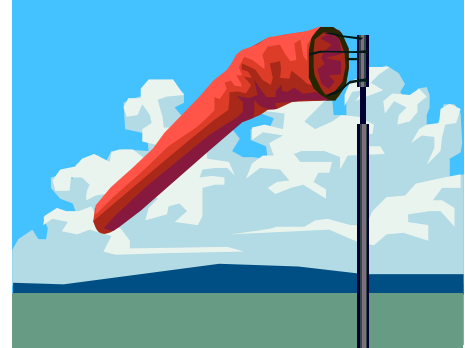
This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

The girls will learn that mixing primary colors together creates new colors.

### Materials Needed:

- One 16 ounce container of non-dairy whipped topping
- One container each of red, yellow, and blue food coloring
- One roll of wax or freezer paper (1 piece per girl)
- Table covering
- 3 bowls for mixing
- Scoop or spoon



### Procedure:

1. Separate the non-dairy whipped topping into three equal parts, one part in each of the three different containers.
2. Add a few drops of each color of food coloring to the whipped topping.
3. Give each girl a piece of wax or freezer paper.
4. Place one spoon of each color whipped topping at the top of each girl's piece of paper.
5. Encourage the girls to use their fingers to take small amounts of the different colors and mix them in various combinations on the paper to see if they can make new colors.
6. While they work, ask them to think about what is happening. Ask what colors they have created and what color combinations created them.

### Explanation:

When primary colors (red, yellow, and blue) are mixed together, they create secondary colors. Red and blue create purple, red and yellow create orange and yellow and blue create green.

## Activity 3: Waterproof Tissues

This activity is most appropriate for 2<sup>nd</sup> -5<sup>th</sup> graders.

### Introduction:

Can a tissue hold water? It can if it is coated with Scotchguard.

### Materials Needed:

- Scotchguard spray
- 2 facial tissues
- Clear plastic, tall 10-ounce cups
- 2 rubber bands
- Newspaper

### Procedure:

1. Cover the work area with newspaper to protect it. Lightly spray both sides of a tissue with Scotchguard. Let it dry completely.
2. Fill one cup with water.
3. Take a second cup and cover the top with a plain untreated tissue. Push the center of the tissue into the cup to form a pocket. Use a rubber band to hold the tissue in place.
4. Cover the top of the third cup with the Scotchguard treated tissue. Form the pocket as before and hold it in place with a rubber band.
5. Pour a small amount of water into the pocket of the plain tissue. Water runs right through it. Carefully pour a small amount of water into the pocket of the Scotchguard treated tissue. The water should stay in the tissue.
6. Eventually, the water will leak through after several minutes.
7. If the demonstration doesn't work perfectly the first time, check:
  - a. Did you coat the tissue with enough Scotchguard? Sometimes two coats of Scotchguard works better.
  - b. Did you wait for the Scotchguard to dry completely?
  - c. Did you pour the water into the pocket gently?

### Explanation:

The issue is made of paper fibers which like and attract water. When you pour water into a regular tissue, water is attracted to the paper fibers and runs right through small holes in the tissue. Scotchguard, however, doesn't like water and repels it. When the tissue is coated with Scotchguard, the water is repelled before it can reach the paper fibers. Eventually, the water will leak through the small holes in the tissue between the paper fibers, but the Scotchguard slows this down a lot.

## Activity 4: Bubbles

This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

What is so fascinating about bubbles? The precise spherical shape, the incredibly fragile nature of the microscopically thin soap film, the beautiful colors that swirl and shimmer, or most likely, a combination? Why does a bubble form a sphere at all? Why not a cube, tetrahedron, or other geometrical figure? Let's look at the forces that mold bubbles.

### Materials Needed: (per group)

- 1 gallon water
- 40 drops of Glycerin (Available at Wal-Mart or similar store)
- ½ cup dishwashing liquid
- Measuring cups
- Large buckets/bowls to mix ingredients in
- Pipe cleaners (1-2 per girl)

### Procedure:

1. Mix all ingredients together into the large bucket/bowl.
2. Stir slowly.
3. Have the girls bend their pipe cleaner into whatever shape they would like.
4. Dip the pipe cleaner bubble wands into the bubbles and gently pull it out.
5. Have the girls blow softly into the center of their bubble wand and watch the bubbles appear.

### Explanation:

A bubble is a thin film of soapy water. Most of the bubbles that you see are filled with air, but you can make a bubble using other gases, such as carbon dioxide. The film that makes the bubble has three layers. A thin layer of water is sandwiched between two layers of soap molecules. No matter what shape a bubble has initially, it will try to become a sphere. The sphere is the shape that minimizes the surface area of the structure, which makes it the shape that requires the least energy to achieve.

## Activity 5: Chemistry Magic

This activity is most appropriate for 4<sup>th</sup>-5<sup>th</sup> graders.

### Introduction:

Girls will learn that chemical reactions can change things into something new. They will change powdered milk into a glue that really works.

### Materials Needed:

- 3 quart package of powdered non-fat milk
- 1 ½ cups vinegar
- 8 ounce box baking soda
- Set of measuring spoons
- Measuring cup
- Hot water (1/3 to 1/2 cup per girl)
- Table covering
- Paper towels
- Plastic wrap
- Paper (white or construction)

*For each girl:*

- 1-ounce medicine cup (2 per girl)
- Plastic spoon
- Basket-type coffee filter
- 9-ounce clear plastic cups (2 per girl)

### Procedure:

1. Have the girls sit in a circle. Ask the girls: Who knows what chemistry is? Try to call on everyone who has a guess. Then say: Chemistry is a science. It is a study of substances, and how they change other substances. A big part of chemistry is using substances to create new substances.
2. Now lead the girls into the next part of the discussion. Since chemistry deals with substances, have them think about what kind of substances they might deal with. Try to get them to focus on the idea of working with liquids, solids, and gases.
3. Ask them: Does anyone know what matter is? Explain that matter is anything that takes up space and can weigh something when it is put on a scale. Matter can be a solid, liquid, or gas.
4. Explain that chemists are scientists who study matter, and can change one kind of matter into another. We are going to be chemists today, and change milk into glue.
5. Hand out the pre-measured cups of hot water, powdered milk, and a plastic spoon to each girl.
6. Begin the activity by having the girls pour their medicine cup full of powdered milk into the hot water, and stirring until the milk is dissolved.
7. Now hand out the medicine cup with vinegar and have them pour it into the milk, and stir.
8. Ask the girls: Is the milk changing? How is it changing? And what does it smell like?

9. While the girls are stirring, hand out the cups with the coffee filters in them. Tell them they will now separate the curds from the whey. Have them pour the curds and whey mixture into the coffee filter in the 9-ounce cup.
10. Tell them to slightly lift the filter, but not entirely out of the cup. The liquid whey should drain through the filter, leaving only the curd. The curd is what you want to keep.
11. Have them squeeze the filter containing the curd to remove as much of the whey as possible.
12. Have them drop the lump of curd back in the original 9-ounce cup, and use their spoon to break it up into small pieces.
13. Add 1 teaspoon of water to each girl's mixture.
14. Next add the baking soda to the mixture and have girls stir the mixture to make the glue.
15. Ask them: Do you see the foaming? This is a chemical change taking place.
16. Then the girls can try their glue by making something with paper. Use plastic wrap to cover the glue so girls can take it home.

**Explanation:**

Milk has a special type of protein called casein in it. When milk sours, or has an acid such as vinegar added to it, the casein clumps together to form curds. The watery liquid that remains is called whey. These curds of casein protein are used to make cheese. The baking soda neutralizes the acid in the vinegar. When the curd no longer has acid in it, it returns to a more liquid form. The foaming you saw when the baking soda was added to the curd was carbon dioxide gas, which is made when the baking soda reacts with the acid in the vinegar. The liquefied casein protein is a natural glue.



## Activity 6: Cool Comets

This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

A comet is a celestial body of rock, dust, gas, and ice that moves in orbit around the sun. Comets are invisible except when they are near the sun. When they are near the sun, they are usually visible only at sunrise or sunset. The head of the comet is the nucleus and it is surrounded by a star like part called the coma. Far out in space, away from the sun, the comet exists only as a nucleus. As the comet approaches the sun the ice changes into a gas. This creates a cloud of dust and gas around the nucleus. As the solar wind blows some of the gas and dust away from the comet's coma, a tail is formed.

### Materials Needed:

- Spoons
- Bowls
- Vanilla ice cream (one scoop per girl)
- Crumbled chocolate cookies
- Finely chopped nuts
- Chocolate syrup
- Whip cream
- 1 liter ginger ale
- Large mixing bowl
- Mixing spoon
- Ice cream scoop
- Napkins

### Procedure:

1. Place one scoop of ice cream into each bowl.
2. Have each girl sprinkle the chopped nuts and chocolate cookie pieces onto her ice cream.
3. Next, have each girl drizzle chocolate syrup over the ice cream. Have each girl add a small amount of ginger ale to her bowl.
4. Next, have each girl add a squirt of whipped topping to her ice cream bowl (to resemble a tail).

### Explanation:

In this activity, each ingredient represents a different part of the comet.

- The ice cream represents the icy nucleus.
- The nuts and crumbled chocolate cookies represent the rock and dust within the nucleus.
- The chocolate syrup represents the organic materials.
- The ginger ale represents the carbon dioxide.
- The whip cream represents the tail.

The most famous comet is Comet Halley. According to Chinese records, there are reports of Comet Halley going all the way back to at least 240 B.C.

## Activity 7: Recycled Paper

This activity is most appropriate for 4<sup>th</sup>-5<sup>th</sup> graders.

### Introduction:

Recycling is the process of using old products to create new ones. This process helps prevent the waste of useful materials, reduces the consumption of fresh raw materials, reduces energy usage, reduces air pollution and water pollution, and helps lower greenhouse gas emissions. For this activity, the girls will take old, use paper and newspaper and create new paper.

### Materials Needed:

- 2 pieces of window screens cut the same size (6x8inches) per girl
- Toilet paper or newspaper shredded
- Mixing bowl
- Cake pan
- Metal fork or blender
- Sponges
- Gallon size Zip Locks
- Plates
- Small bowls

### Procedure:

1. Have each girl, or group of girls, fill a cake pan  $\frac{3}{4}$  full with warm water.
2. Tear the toilet paper and newspaper into small pieces and place them in the water.
3. Have the girls beat the mixture with a metal fork until the mixture is broken down into small fibers and is a pulpy consistency.
4. Have each girl take one of her window screens and place it into the cake pan. Make sure that the pulp and water completely covers the window screen.
5. Have the girls lift their window screen straight up and let a majority of the water drip off the window screen and back into the cake pan. The window screen should be completely covered in fibers.
6. After the window screen has stopped dripping, have each girl place the window screen on the plate and place the other window screen on top of it and press down gently.
7. Using the sponges, have each girl use the sponge and press down gently on top of the window screen and fibers. The sponge should begin to soak up the excess water left in the fibers. Squeeze the sponge out in the bowl provided.
8. Have the girls continue to press down lightly on their window screens until they have soaked up the remaining water from the fibers.
9. Once the girls believe that they have soaked up the remaining water, have them place both window screens into their zip lock bag. If you have time, the girls can leave their window screens out to dry completely.
10. Once the paper is dried completely, have the girls slowly remove the window screens away from the paper.

### Explanation:

By recycling the old paper, you are not only saving trees from being cut down, but recycling also helps decrease the amount of trash that goes into a landfill. In a recycling plant, the old paper is put through a process of removing the ink and is placed into a large blender with water and beaten until the paper is broken down into small fibers. The fibers are then pressed into screens to remove all the water, flattened, and dried. The leftover dried fibers have now become new paper.

## **Activity 8: Green Bags**

This activity is most appropriate for K-5<sup>th</sup> graders.

### **Introduction:**

Recycling is very important to ensure the survival of our planet Earth. Each year thousands and thousands of materials are thrown away which end up in landfills. One item that can be recycled that ends up in landfills, is plastic bags. During this activity, the girls are going to decorate their own canvas bags that can be used instead of a plastic bag.

### **Materials Needed:**

- Fabric markers or permanent markers
- Canvas bags

### **Procedure:**

1. Give each girl her own canvas bag.
2. Have each girl decorate their canvas bag any way they would like.

### **Explanation:**

Plastic bags are from the same source as all plastic: crude oil. Like everything else manufactured from this non-renewable resource, it has two major drawbacks: manufacturing it emits considerable amounts of pollution, and the product is not biodegradable. In other words, it is difficult to produce, and nearly impossible to get rid of once produced. According to the Natural Environment website, 60 to 100 million barrels of oil are required to manufacture a year's worth of plastic bags worldwide, and it takes approximately 400 years at least for a bag to biodegrade. The impact of plastic bags on the environment is enormous. As of August 2010, between 500 billion and 1 trillion plastic bags are being used each year worldwide. Approximately 100,000 sea turtles and other marine animals die every year because they either mistake the bags for food or get strangled in them, says Natural Environment. By using reusable bags instead of plastic bags, you can help cut down on the production and waste of plastic bags.

## Activity 9: Biome in a Bag

This activity is most appropriate for 2<sup>nd</sup> -5<sup>th</sup> graders.

### Introduction:

A biome is an ecological community, like a rainforest, desert, or prairie. During this activity, the girls are going to create their own self sustaining biome in a zip lock bag. The girls won't need to water the seeds again because the water will recycle itself. The roots of the plant will absorb the water and the water will then travel up through the stem of the plant. When the water reaches the leaves, some of it evaporates. By placing the biome in a bag, the bag will not allow the moisture in the air to escape. The moisture will form drops of water in the bag (condensation) and will then fall back down to the ground (precipitation). The cycle that happens is called the water cycle-evaporation, condensation, and precipitation.

### Materials Needed:

- Small clear plastic cups
- Quart sized zip lock resealable bags
- ¼ cup pebbles
- ½ to ¾ cup potting soil
- Seeds (grass, flowers, vegetables)
- Water

### Procedure:

1. Give each girl one small clear plastic cup.
2. Next, have the girls pour pebbles into the bottom half of the cup. The pebbles should be about ½ inch thick.
3. After the girls have added the pebbles, have each girl pour the potting soil on top of the pebbles. The biome should have twice as much soil as pebbles.
4. Once the girls have added the pebbles and soil, they can choose the seed they want to plant in their biome. In order to plant the seeds, have the girls make a trench down into the center of the soil.
5. Add a few seeds to the trench and cover the seeds with soil.
6. After the girls have planted their seeds, have them water the soil until they see the water collect at the bottom of the pebbles.
7. Finally, have each girl place her biome in a zip lock bag and seal it.
8. Place the biome in a bag in a sunny place. In about 3-4 days your plant should start growing.
9. After the girl's plant has started growing and is about 2 inches tall, she can take it out of the bag and let it grow.

### Explanation:

A biome is a large geographical area of distinctive plant and animal groups, which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region. Major biomes include deserts, forests, grasslands, tundra, and several types of aquatic environments. Each biome consists of many ecosystems whose

communities have adapted to the small differences in climate and the environment inside the biome.

## Activity 10: Volcanoes

This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

A volcano is a mountain that opens up downwards to a pool of molten rock below the surface of the Earth. When the pressure builds up under the Earth and becomes too much, an eruption can occur. When an eruption occurs, the gases and rock shoot up through the opening and fill the air with lava fragments. During an eruption, there can also be lateral blasts, lava flows, hot ash flows, mudslides, avalanches, falling ash, and floods.

### Materials Needed:

- Two small water bottles
- Cardboard
- Scissors
- Vinegar
- Baking soda
- Tablespoon and teaspoons
- Food coloring
- Liquid dish soap
- Large plate
- Funnel

### Procedure:

1. Have the girls trace a cone shape onto cardboard and cut it out. Be sure that the cone is big enough to fit over the top of the water bottle when shaped into a cone, and the same height as the bottle.
2. Next, have the girls bend it into a cone shape and tape it together.
3. Using a funnel, fill one of the water bottles 1/3 full with vinegar.
4. Add a few drops of food coloring to the vinegar. Red produces the most natural look.
5. Next, have the girls add one tablespoon of liquid dish soap to the bottle containing the vinegar and food coloring. Set the bottle to one side.
6. Place a second bottle on a plate; carefully add three tablespoons of baking soda to the bottle.
7. Place the cardboard cone over the bottle containing the baking soda; make sure the hole is level with the bottle opening while keeping the bottle on the plate.
8. Using the funnel, have the girls pour the vinegar and soap mixture into the baking soda bottle. Remove the funnel and wait!

### Explanation:

Carbon dioxide gas is produced when vinegar and baking soda are mixed together. This gas creates bubbles in the vinegar and the liquid dish soap. The foaming messy mixture expands and forces itself out of the bottle top.

People and animals are affected by an erupting volcano for as far as 20 miles. Fresh volcanic ash that erupts from the volcano is made up of pulverized rock and can damage the lungs of any

breathing creature. More than 80% of the earth's surface is volcanic in origin. The ocean floor and some mountains were formed by countless volcanic eruptions. Gaseous emissions from volcanoes formed the earth's atmosphere. There are more than 500 active volcanoes in the world.



## Activity 11: Geysers

This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

In this activity, girls will imitate a geyser by observing a reaction between the Mentos and soda.

### Materials Needed:

- 2 liter bottle of carbonated, caffeinated soda
- Mentos
- Outside space

### Procedure:

1. Have the girls spread out around the opened 2 liter bottle of soda.
2. Have each girl take turns dropping one Mentos at a time into the soda bottle.
3. Once the Mentos are in the soda bottle, quickly have the girls move back and observe.

### Explanation:

A geyser needs a water source, usually from miles under the Earth's surface. The geyser also needs a heat source, supplied by the Earth's magma, about 3 miles (4.8 kilometers) under the surface of the Earth. The magma heats the water, but hot water isn't enough. Another key factor is pressure. The water at the top of the geyser puts pressure on the water at the bottom of the geyser shaft. Water under pressure reaches very high temperatures and creates a lot of energy. When the water reaches the boiling point, it begins to come out of the geyser's mouth. The pressure on the water that's left inside the geyser decreases and the remaining water turns to steam as the temperature also decreases. The steam expands, and the geyser erupts in an explosion of water and steam. When the geyser runs out of water and cools down, the eruption stops.

## Activity 12: Earthquakes

This activity is most appropriate for K-5<sup>th</sup> graders.

### Introduction:

This experiment demonstrates the forces that create earthquakes. It also shows the tension that can build up before a quake and the resultant debris created along a fault.

### Materials Needed:

- ½ graham cracker sheet per girl
- Small plate or napkin
- Frosting or pudding
- Knives/spoons

### Procedure:

1. Hand out ½ a graham cracker to each girl as well as a napkin or plate.
2. Have each girl break the graham cracker along the perforation.
3. Next, place the two pieces back together so they touch.
4. Move one piece away from you and one piece towards you keeping the edges touching.
5. Observe the tiny crumbs that form as they move side by side. These represent rocks breaking off the edges of two plates along a fault.
6. Now break one of the halves into two pieces. Notice that the edge is not smooth like the first pieces you made.
7. Put the broken edges back together like the first break.
8. Move one piece away from you and one towards you with the broken edges touching.
9. Notice that the two do not move as easily this time. This is the tension that builds up along a fault before an earthquake.
10. Keep moving the halves until they move. Notice the large pieces that break off. This represents a much larger earthquake than the first time.
11. Finally, it's time to eat your experiment with some frosting or in pudding!

### Explanation:

Earthquakes occur when there are breaks in the crust of the Earth and there is a shifting/moving in the Earth's plates. Usually there are large plates of crust that move against each other. When the plates move side by side, the rubbing together makes vibrations and these are earthquakes. The sliding plates grind off pieces of rock as they move. Most earthquakes occur at seams or faults in the Earth. A fault is where the Earth's plates meet. If the fault is very uneven there can be a build up of extreme pressure. This will cause a much larger earthquake when the rocks break or slip past each other.

Earthquakes have occurred all over the world. A large amount of earthquakes have occurred along the edge of the Pacific Ocean. This area of the Earth is called the Ring of Fire. In the United States, we often think of California and Alaska as the main places where major earthquakes are likely to occur. Earthquakes can occur all over though. The largest fault line in the United States runs through Illinois. In order to measure an earthquake, scientists use a 9 point

scale that was developed by Charles Richter. The Richter scale measures the energy released at a focal point, or epicenter, of the quake. The higher the number on the scale the more powerful the quake.

## Activity 13: Lakes vs. Oceans

This activity is most appropriate for 2<sup>nd</sup> -5<sup>th</sup> graders.

### Introduction:

During this activity, the girls are going to learn about fresh water and salt water, their differences, and facts about both.

Prior to beginning the activity, ask the girls some questions to see what they already know.

1. What is fresh water?
2. What is salt water?
3. Where can they be found?
4. What lives in fresh water? In salt water?

### Materials Needed:

For salt water vs. fresh water activity (per group):

- 2 small clear plastic cups
- Access to water
- Small plastic lightweight chips
- Salt
- 2 spoons
- Pictures of creatures that live in salt water and fresh water

For buoyancy activity (per group):

- Small clear plastic cup
- Vegetable oil
- Blue colored water
- Corn syrup
- Small rocks
- Lima beans
- Beads

### Procedure:

For salt water vs. fresh water activity:

1. In one cup, fill it about  $\frac{1}{2}$  way with fresh tap water. In the other cup, provide them with  $\frac{1}{3}$  cup salt.
2. Have the girls make a hypothesis as to what they think will happen to the small plastic chip when they place it into the cup of fresh water.
3. Have each group place their plastic chip in the cup with fresh water and see what happens.
4. Talk to them about what happened and why they think it happened.
5. Have the girls make a hypothesis as to what will happen to the plastic chip if they add small amounts of salt to the water. Have them add the salt and then mix it. What happens? Did anything change?
6. Have them continue to add small amounts of salt until they see a change.

7. When the girls have seen a change, ask them about what they saw that happened. What is it called when something floats in the water?
8. Talk to the girls about the concept of buoyancy.

For buoyancy activity:

1. First, have the girls fill their plastic cups  $\frac{1}{4}$  of the way with corn syrup. Have the girls make a hypothesis as to what they think will happen when they mix the water and the corn syrup together?
2. Next, have the girls pour into the same cup a layer of blue colored water. Their cup should be half full by now. What happened? Was their hypothesis right?
3. Now have the girls make a hypothesis as to what will happen when they add vegetable oil. Add a small amount of vegetable oil onto the water and corn syrup and observe.
4. After the three liquids are layered, have them guess what will happen to the lima beans, small rocks, and beads.
5. Drop in the rock and see where it stops. Next, put in the lima bean, then finally add the bead.
6. Where did each object stop? Which one is more buoyant than the other?

**Explanation:**

Fresh water is naturally occurring water on the Earth's surface in bogs, ponds, lakes, rivers, and streams, and underground as groundwater in aquifers and underground streams.

Salt water or sea water is water that contains a large quantity of salt in it. The more salt that there is in the water, the denser the water is and the easier it is for things to float in it. Sea water or salt water is mainly found in the sea.

Buoyancy is the ability of an object to float in a liquid, such as water. This concept helps to explain why some things float while others sink. Buoyancy is an important factor in the design of many objects and in a number of water-based activities, such as boating or scuba diving.

## Activity 14: Lava Lamps

This activity is most appropriate for 2<sup>nd</sup> -5<sup>th</sup> graders.

### Introduction:

During this activity, girls will learn about the concept of density. Density is how much mass a material has for a given volume. Ask the girls: which item do they think will be denser, water, vegetable oil, or bead? Where will the water go when added to the vegetable oil? What about the bead?

### Materials Needed:

- Baby soda bottles
- Vegetable oil
- Water
- Alka Seltzer tablet
- Food coloring
- Measuring cup
- Beads

### Procedure:

1. Give each girl a baby soda bottle with the caps off. Do not have the girls put the cap on their soda bottle.
2. Have one girl pour vegetable oil into a smaller container and pour enough vegetable oil into everybody's soda bottle so it is at least 2/3 full.
3. Next, have a girl add one soda bottle full of water in the bottle.
4. Have the girls watch what happens! Do the oil and water mix?
5. After the girls have determined if the oil and water mix, have each young girl drop a few drops of food coloring into the soda bottle. Make sure the girls notice that the food coloring does not mix with the oil but mixes with the water. Ask them why they think this is.
6. After putting in the food coloring, give each girl 1-2 beads and ask her to make a hypothesis about what she thinks will happen to the bead and where it will stop.
7. Next, provide each girl with ½ an Alka Seltzer tablet and drop it into the soda bottle.
8. What happens? The Alka Seltzer will float through oil and start to bubble when it hits the water.
9. After the bubbles have stopped, each girl should put the cap on her soda bottle and seal it tightly.
10. Once the caps are on tightly, the girls can tip the bottle back and forth to watch the tiny droplets of liquid join together to make one big lava blob!

### Explanation:

First of all, you confirmed what you already knew... oil and water do not mix. The molecules of water do not like to mix with the molecules of oil. Even if you try to shake up the bottle, the oil breaks up into small little drops, but the oil doesn't mix with the water. Also, food coloring only mixes with water. It does not color the oil. When you pour the water into the bottle with the oil,

the water sinks to the bottom and the oil floats to the top. This is the same as when oil from a ship spills in the ocean. The oil floats on top of the water. Oil floats on the surface because water is heavier than oil. Scientists say that the water is denser than oil. Here's the surprising part... The Alka-Seltzer tablet reacts with the water to make tiny bubbles of carbon dioxide gas. These bubbles attach themselves to the blobs of colored water and cause them to float to the surface. When the bubbles pop, the color blobs sink back to the bottom of the bottle.