Bear Elective Adventure- Super Science

OVERVIEW: Scouting and science go together so well. Both encourage young people to stay curious and ask a lot of questions. So encourage Scouts to think of questions, make hypotheses, and then test those hypotheses. That's how science is done. Sometimes our predictions are right, and sometimes they're wrong. Either way we're learning.

While this adventure requires a lot of supplies and is very project heavy, it's not too difficult if you make sure to spend some time planning. Also, in addition to other related Cub Scout adventures, check out the NOVA Award program, too. It's a great S.T.E.M. program outside the regular advancement track.

Supplies Needed-

- Access to the internet using a computer, tablet, or smart phone.
- Multiple balloons.
- A garment or blanket made of wool or fleece.
- A plastic or rubber comb.
- A collection of some or all of the following:
    - Tissue Paper
    - Aluminum Foil
    - Cardboard Scrap
    - Paper Scrap
    - Yarn or String
    - Pompom
    - Chenille Stem
    - Ribbon
    - Cloth
    - Foam
    - Coin
- An empty 2-liter, plastic bottle.
- Foam Beads
- Five to Eight 8 oz. Clear Cups
- Three Fresh Eggs
- Salt
- Sugar
- A Spoon
- Water
- A Drinking Straw
- Measuring Cups and Spoons
- A Large Jar or Clear Vase
- Cooking Oil
- Food Coloring- Red, Blue, Yellow, and Green

Adventure Requirements

Do at least 4 of the following:

1. Make static electricity by rubbing a balloon or a plastic or rubber comb on a fleece blanket or wool sweater. Explain what you learned.
2. Conduct one other static electricity investigation. Explain what you learned.
3. Do a sink-or-float investigation. Explain what you learned.
4. Do color-morphing investigation. Explain what you learned.
5. Do a color-layering investigation. Explain what you learned.

Suggested Teaching Approaches (notes for den leaders, parents or helpful adults)- Note these investigations are described in your Bear Handbook as well.

Topic	Teaching Approach
1. Make static electricity by rubbing a balloon or comb.	When you rub a balloon on wool or fleece, negatively charged electrons jump from the material to the balloon. This gives the balloon a negative charge. You're going to see if different items will cling to the negatively charged balloon. They will if the atoms that make them up don't cause the electrons to discharge immediately from the balloon. Try to make the following items stick to the balloon, but before you do, make a prediction about which ones will or won't: tissue paper, aluminum foil, cardboard scraps, paper scraps, yarn, a pompom, chenille stems, ribbon, cloth, foam, and a coin. Record your results
2. Conduct one other static electricity investigation.	Keep playing with static electricity. You can use your charged balloon to see if it attracts or repels certain objects like ping pong balls or aluminum cans. What will happen when you put your charged balloon next to a gentle stream of water? Or can you make a charged balloon stick to a wall? OR try this one: Fill a two liter plastic bottle with foam beads like the ones in beanbags. Rub the bottle on your hair. Just like a balloon, the bottle will collect electrons from your hair. What happens to the foam beads inside? And what will happen when you touch the bottle with your hand? Think about where the electrons are going and what kind of charges result.
3. Do a sink-float investigation.	Again, as you set this investigation up, make predictions as to what you think will happen and whether you think the eggs will float or sink in the

	water. To complete the investigation, first set up three cups, half filled with water. Dissolve two tablespoons of salt in Cup 1 and two tablespoons of sugar in Cup 2. Leave Cup 3 alone. Predict whether an egg will float or sink in each cup. Cup 3 is your control, meaning you haven't made any changes to the water. The variable- or the change- is the substance you've dissolved in the other two cups. Put the eggs in the cups, and record your results. Do salt and sugar change things?
4. Do color-morphing investigation.	Oil and water do not mix. They have very different densities. But putting them together can end in some cool results. First, fill your large vase halfway with water. In a measuring cup, mix 2 tablespoons of cooking oil with 3 drops of food coloring. Add that mixture to the water. Watch what happens when the water-based food coloring moves from the oil to the water. Try this with different color combinations.
5. Do a color-layering investigation.	This one will seem complicated. Take your time. You may need to experiment with the ratio of sugar to water to make it work. The version below is different from the one in the handbook. Set up 5 clear cups. First, add ***sugar*** to them as follows: Cup 1= no sugar Cup 2= 1 teaspoon Cup 3= 2 teaspoons Cup 4= 3 teaspoons Cup 5= 4 teaspoons Next add 1 Cup of ***water*** to each cup. Stir to dissolve the sugar. Now, in each cup, add 2 drops of different colored food coloring. Feel free to add no color to one if you like. You now have 5 different color mixtures with different mixes of sugar in them. That means they will have different densities, too, and differing densities don't mix well. You will now proceed to "stack" your colors and make a rainbow. Take your straw and cover the top with your finger. Dip the straw into Cup 1 and release the top of the straw. This will allow water into the straw. Cover the straw and again and life the straw out. You should have a small section of water from Cup 1 in the straw. Now dip the straw deeply into Cup 2 and quickly release and cover the straw. When you pull it out, the water from the first two cups should be separated. The challenge is now to proceed to rest of the

	cups, always moving from less dense to more. It may take some practice, and sometimes the colors end up mixing a bit. But your goal is to have a small rainbow in the bottom of your straw with your densest color at the bottom and the least dense at the top. How did it go? Did you mess up? You wouldn't be the first!! As always, Do Your Best.