# SCIENCE

**BUBBLES, BUBBLES, BUBBLES**

**GRADES: 4-8**

This is a great lesson to use while teaching the scientific method. The challenge for the students is: Can you make a better bubble solution?

**MATERIALS:**

- water in a plastic container
- glycerin or white corn syrup
- liquid detergent
- stir stick
- aluminum tray with a straw

**METHOD:**

1. Measure 100 ml of water into your container.
2. Add small amounts of the other ingredients.
3. Make sure to record what you have added and the amounts you used.
4. Pour a small amount of your bubble maker, make the biggest bubble possible!
5. Gently burst your bubble and measure the diameter of your broken bubble (make sure to record this number).
6. If you are not happy with your recipe, try adding more of one of the ingredients.

NOTE: I used a chart where the kids could record how much of what ingredient they used, and what the result was. They loved it.

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**UNDER THE SEA CREATURES**

**GRADES: 4-8**

**MATERIALS:**

- wallpaper books
- newspapers
- stapler
- glue
- other materials: foam pieces, sand, jiggly eyes, sequins, glitter, etc.

**METHOD:**

- Choose a shape from an undersea creature such as a fish, snail, clam, starfish, octopus or seahorse.
- Draw the shape onto the wallpaper. (Note: Students can draw the shape based on their ability. My students received their shapes already pre cut.)
- Place another piece of wallpaper behind the sheet of wallpaper, wrong sides together.
- Cut the shape on both pieces of paper.
- Using a glue bottle, trace the glue around the wrong side of one of the shapes leaving about a 5″ opening for stuffing. (Note: Depending on student skill levels, this may be a hand-over-hand activity.)
- Place the other sheet on top of the glued piece, wrong sides facing each other.
- Staple around the edge of both glued together shapes.
- Crumple newspaper and "stuff" your sea creature with it.
- Glue and staple shut when completely stuffed.
- Have an assortment of the other materials listed above available for the students. Talk with students about fish having scales, octopuses having tentacles, etc. This helps them to think about what they may glue to

their creatures.  Decorate both sides.  One side may have to wait until creature has had sufficient drying time on one side.

- Using a hole punch, punch a hole near the top of the creature and place a paper clip through the hole.  Now the creature is ready for display from the ceiling on a "fishing line."

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**ROCK CANDY**

**GRADES: 3-8**

Making candy with your class is a sweet way to learn about rocks. The way you cool the candy influences the size of the candy particles. Through this activity the students learn that the speed of cooling influences the size of particles in rocks.

**MATERIALS:**

- salt
- vanilla extract
- sugar
- spoon
- stove
- saucepan
- metal container
- bowl of ice
- water,
- a measuring cup and spoon

**METHOD:**

1. Put a metal container into a large bowl with ice; you will use this cool container later.
2. Bring 1/2 cup of water to a boil in a saucepan on the stove.
3. Slowly add 2 1/2 cups of sugar, mixing it gently with a spoon.
4. Add 2 tsp. of vanilla and 1/4 tsp. of salt. Keep stirring the candy mixture as you heat it.
5. Heat the mixture to a slow boil until the sugar dissolves.
6. When all the sugar is dissolved, turn off the stove.
7. Take the container that you cooled with ice (pot a) and pour half the candy mixture into it.
8. Leave the remaining candy mixture in the pot (pot b) and let it cool.
9. Have the class observe the size of the crystals in the two different containers.
10. Have the students work together to answer these questions: Draw a picture of the crystals in the pot a and pot b. Which pot has the large crystals and which had the small crystals?
11. After the groups have made their observations; discuss this with the class.
12. Have some students share their pictures.
13. Ask for a hypothesis on why the cooler pot had small crystals and the warm pot (pot b) had larger crystals.
14. Record the students responses.
15. Conclusion: The class should draw the conclusion that; the speed of cooling influences the size of particles in rocks.
16. The candy that cooled quickly produced small crystals. It looks sandy. The candy that cooled slowly produced large lumpy crystals. Rocks that are formed through heating and cooling behave the same way. For example, granite has large grains and basalt has small grains. Do

you think granite and basalt cooled at different rates? Which one cooled faster and why?

17. Eat the candy now!!!!!
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**GRADES: 4-8**

Science teachers who want to offer their students many opportunities for hands-on or problem-based activities can often be frustrated when students keep asking,What do I do next? A difficult type of reading for many students (and adults!) is the technical reading that goes with following directions. This activity gives students a chance to both follow and write directions with a favorite toy – Legos. It can be done at any time of year, but during December, when the small stocking stuffer size Legos are plentiful, is a great time to gather the kits you'll need. This activity has been adapted from a Science Olympiad event called "Write It, Do It" and has been very popular in my classroom.

**MATERIALS:**

- multiple identical packets of stocking stuffer size Legos, enough for every two students in your class – these sets are usually inexpensive and available around the holidays – there are usually about 16 pieces per kit
- Polaroid camera (optional) or graph paper and colored pencils

**METHOD:**

1. (Ahead of time) Put each individual set of Legos in its

own Ziploc (or similar brand) sandwich bag for easy organization and storage. With one set, build your own creation. Now write up the directions (no pictures!) for how to build the creation you have made. Make copies so that you can store a set of directions in each bag.

2. Pass out the Lego bags and directions to each team of two students. Their task is to use those directions and try to build your creation. When each team is finished, show them your model so that they can see if they were able to follow the directions. Expect to see lots of variations of your design. Some of the students will no doubt feel that your directions were hard to follow. This is a perfect lead-in to the next step.
3. Challenge them to build their own creations, and then write the directions for how to build theirs. Tell them to remember what was easy or difficult about following your directions, and don,t let them use illustrations.
4. Each team of students should take a picture of their model, take the model apart and put the directions with the pieces in the bag. Each set of directions should have the team members, names on it, and the names should also be on the picture, which they give to you (to be an answer key for the next builders). Note: If you don,t have access to a Polaroid camera, have the students draw colored pictures of what their Lego models look like instead, before they dismantle them. Give them graph paper to draw their designs on so that it will be easier for them to get the proportions correct.
5. On another day, hand out the bags, and have different teams attempt to put together their classmates, Lego creations. Or, if you teach several sections of the same class, have the next class try to build using the directions from the previous class. As you gather good examples of directions from the students, the Lego sets and directions can be set up as independent learning stations in the room.

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**A SCIENCE ATTITUDE SURVEY**

**GRADES: 4-12**

**MATERIALS:**

- a copy of the following survey

**METHOD:**

Have the students mark True or False for each question. Have them also give a reason for their response.

1. Scientists have already found answers to most of the questions about nature. T F

2. Scientists make observations using their senses. T F

3. Our senses often play tricks on us. T F

4. American scientists have made few contributions to science. T F

5. As a rule men make better scientists than women. T F

6. Scientists are too busy at their work to have much fun. T F

7. Scientists have no definite method they can follow when they set out to solve a problem. T F

8. After making a discovery scientists must also try to find ways to use it. T F

9. Tools for taking accurate measurements are essential to the scientists' work. T F

10. Science has been part of human existence since our earliest ancestors thousands of years ago. T F

11. A scientist can make a general conclusion after an experiment once. T F

12. When I graduate I would like to choose a career in a field related to science or technology. T F

13. Science has played a great part in improving our standard of living. T F

14. Scientists often make errors and become frustrated because their experiments are not successful. T F

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**THE FUN OF SCIENTIFIC INVESTIGATIONS**

**GRADES: 2-8**

**MATERIALS:**

- two eggs per pair of students, one raw, one hard-boiled, plus a couple extras for eggs broken extra early
- permanent markers—about 5

**METHOD:**

1. Query the Egg: You have just been given two eggs. One of your eggs is fresh and one is hard-boiled. Choose one of

the eggs and put a mark on it. Do you think the marked egg is (Circle one) Raw Hard-boiled

2. Now, do a scientific investigation and discover all the ways your two eggs differ that could be used to tell any hard-boiled egg from any raw one. (That means that size, shape, color, specks, etc.,. can’t be listed, as, if you write that the small one is hard-boiled, it means that all small eggs are hard-boiled.) It might help if you pretend that your dad is going to make cookies and that your little brother mixed up the hard-boiled eggs in the refrigerator and you need to find all the hard-boiled eggs and all the raw ones. (No, you may not break the eggs to find out, and yes, please do keep your eggs over the desk because if the eggs drop on the floor the raw egg, at least, is going to be a real mess to clean up!)
3. Make a list the ways you have found to tell all hard-boiled eggs from all raw eggs:
4. Would you like to change your original hypotheses? If so, now is your chance The marked egg is (circle one) Raw Hard-boiled Why do you think this?
5. Now, how are you going to prove it? That’s right, but you only get one chance. Go up to your teacher and break your egg over the bowl, and, if you are right, you’ll get salt and/or pepper and be able to eat it. If not, you get to clean up the mess, so be careful!

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**OBSERVATION PRACTICE: DEMONSTRATING THE COLLAPSING CAN**

**GRADES 3-12**

This experiment is the old stand-by, collapsing can. In this version, I use it to teach how to write a complete observation, and one set of procedures for scientific problem-solving.

**MATERIALS:**

- empty, undented soda can
- bowl of cold water
- method of heating
- dark colored background (i.e. cardboard)

**METHOD:**

- Before I begin, I tell the students the names of tools I am using and also that the bowl contains cold water.
- I direct them to watch the demonstration carefully, and then write down everything they observed. They must try to remember everything.
- I then proceed to do the demonstration in silence, modeling listening for the sounds of boiling water. I put up a dark colored background so that they can see the presence of steam when the water boils.
- I make a show of emptying the soda can of water, then putting back in only one tablespoon of water. They watch me light the burner, placing the can over the burner, and wait for the water in the soda can to boil. I then take the can carefully with tongs, and invert it into the bowl of cold water. The can's collapse is dramatic and instantaneous!

**OBSERVATIONS:**

After they write what they have observed, I ask them to voice the one big question they have!

**USING SCIENTIFIC PROCEDURES:**

1. What is the QUESTION you have now?
2. What is your guess or HYPOTHESIS about why the can

collapsed? (I solicit several guesses, then select one to work with for part 3. If there is time, we may do more than one. Students suggest many things, and help each other explain.)

3. Let's TEST your hypothesis: Describe how we would test your idea to see if it is right or not. (Together, the students and I design a test. Usually the hypotheses involve temperature changes, weakness of aluminum cans, and other suggestions which can be tested by varying where the hot water is, if the can is inverted or not, or whether or not the can needs to have boiling water in it to collapse. Then we try out their ideas. They are told to use complete sentences in all reporting, and to include drawings.)
4. CONCLUSION: What happened in your test? Were you right? What if you were not right – how would you change your hypothesis? Write another explanation for why the can collapsed. (Answer all the questions, please!)

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## OBSERVATION SKILLS PRACTICE: UNKNOWN POWDERS

**GRADES 5-12**

In this experiment we will see if you are able to observe 3 powders very carefully.

**MATERIALS:**

- piece of aluminum foil
- ruler
- scissors
- medicine dropper
- wooden stirring rod

- small container of water.
- sugar (unlabeled to all but the teacher)
- Plaster of Paris (unlabeled to all but the teacher)
- baking powder (unlabeled to all but the teacher)

**PROCEDURE:**

1. Cut out 3 squares of aluminum foil. Make them 5 cm on each side.
2. Bend the edges of the foil to make a shallow dish. Make 3 of them. Label them A, B, & C.
3. Get a level spoonful of powder A. Put it in dish A. Add 15 drops of water. Stir it.
4. Observe carefully. Write your observations.
5. Get a level spoonful of powder B. Put it in dish B. Add 15 drops of water. Stir it.
6. Observe carefully. Write your observations.
7. Get a level spoonful of powder C. But it in dish C. Add 15 drops of water. Stir it.
8. Observe carefully. Write your observations.
9. One powder was sugar. How could you tell which one it was?
10. One powder was Plaster Of Paris. Which one?
11. One powder was Baking Powder. It made bubbles. Which one was it?

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**OBSERVING A CANDLE**

**GRADES 4-12**

Observation practice is one of the most important activities in a science classroom. Here is one that gives the students practice, while dealing with an ordinary, but often ignored, daily object.

**MATERIALS:**

- candles
  matches
  plastic stand (or some other type of holder)**You can copy these questions directly onto a student worksheet.**

**MOST PEOPLE HAVE USED CANDLES. VERY FEW PEOPLE HAVE TAKEN THE TIME TO OBSERVE A CANDLE CAREFULLY. THAT IS WHAT YOU WILL DO NOW.**

ANSWER QUESTIONS 1-8 BEFORE YOU LIGHT YOUR CANDLE.

1. Draw the candle.
2. What is the color of the string at the top of the candle?
3. Describe what the candle feels like.
4. Can you see any marks, or spots, inside the candle?
5. Look at the bottom of the candle. Is the string the same color as at the top?
6. Describe how hard the candle is. Tell if it is hard in some places, and soft in others.
7. Say something about the candle.
8. Say something about the candle.

**LIGHT YOUR CANDLE. TAKE IT TO YOUR DESK. STAND IT UP ON YOUR PLASTIC SQUARE. BE CAREFUL!**

ANSWER THESE QUESTIONS AFTER YOU LIGHT YOUR CANDLE.

1. How much of the exposed string (1/2, 1/3, etc.) is surrounded with flame?
2. What colors are in the flame?
3. The greatest part of the flame is what color?
4. Draw the flame. Be sure to show the string.
5. Is there any smoke?

6. What must you do to make smoke?
7. What color is the smoke?
8. Where is the flame dark?
9. Does the flame come to a sharp point?
10. What can you do to change the shape of the flame?
11. Draw a line to show how far into the candle the light goes.
12. Does the top of the candle have a little cup of melted wax?
13. Is the cup the same on all sides?
14. Is wax dripping down the side of the candle?
15. Draw the wax that is dripping down the side of the candle.
16. Let ONE DROP of melted wax fall onto your hand. How hot is it?
17. For how long a time does the drop of melted wax stay hot?
18. Does the candle make any noise as it burns?
19. Can you read the page by the light of your candle?
20. Does the burning candle produce an odor?

EXTRA CREDIT! What other things can you observe about your candle?

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**POP! POP! POP!—SEEDS**

**GRADES: K-3**

A great method for teaching the scientific method to early elementary children.

**MATERIALS:**

- science worksheet on observing and predicting seeds
- hand lenses
- popcorn kernels
- popcorn popper

**METHOD:**

1. First I made up a worksheet about observing and predicting seeds. The worksheet says "Observing Seeds on Top&quot,. The first part was to have the students look at unpopped and popped kernels and record the differences of color and shape. They do this by making a chart. Then the next part was to predict how many seeds were in a teaspoon. I drew a teaspoon on the worksheet and left a blank for guessing how many unpopped kernels would fit in a teaspoon and then they actually had to count how many were in there by placing the kernels in it.
2. Now to finally start the lesson. First I popped some popcorn and had the students use their senses to look, listen, and smell the popcorn being popped. After it was popped, they used the remaining two senses, taste and feel, to explore it. We talked about the popcorn and related the senses to it.
3. Next we did the worksheet and used hand lenses when trying to observe the popped and unpopped kernels. I did this in small groups of about six students and it worked out really well. When we were all done and there was popcorn leftover then they could eat it. They had lots of fun eating it.

**INTEGRATING WITH OTHER SUBJECTS:**

SOCIAL STUDIES: Read the book "Popcorn Book" by Tomie DePoala

LANGUAGE ARTS: Act out a popcorn skit from aims lesson plan called "pop!pop!pop!". In the book you will find a skit called "Popcorn Story" and a page of popcorn kernels and a popcorn maker. I xeroxed three pages off so I would have 10 kernels and xeroxed the popcorn maker off and colored them, laminated them and velcroed them together on a piece of cardboard. As I read the name of the person they would come to the board and take one off as if they were eating it.

READING: read the book "Popcorn" (about a Halloween party)

ART: You could have them make a popcorn necklace or a popcorn collage with popped and unpopped kernels.

I taught this to a group of kindergartners and they really enjoyed it very much!!! (especially eating the popcorn) This lesson takes about a week to do so you don't have to rush it all in one day.

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