SCIENCE

PENGUINS ARE BIRDS

GRADES: 3-7

This piece accompanies last week's science piece.

MATERIALS:

- photocopy a bird graphic onto overhead film, which will be displayed on the front chalkboard.
- a copy of the bird graphic for each student to complete
- pencils
- crayons
- erasers

METHOD:

- The teacher leads a discussion by asking-" who can tell me the different body parts of a bird?" She will then wonder aloud. "if a penguin is a bird, what would we call his body parts?" The teacher allows students to contribute their answers to this discussion until she feels they have adequately discussed all the parts of a
- bird and how they are similar to those parts on a penguin.
- 3. The penguin graphic is shown on the overhead. The teacher asks students if they think they could complete a graphic/chart like this.
- The students complete their charts looking at the one on the overhead if needed.
- 5. When the students have completed writing in the names of the penguin body parts, the teacher tells them they may color the penguin using the appropriate colors.
- 6. The teacher uses the following literature sources and Internet sites to supplement the discussion.

LITERATURE SOURCES:

- Goodnight Opus- Berkeley Breathed
- A Penguin Year- S. Bonner
- A Wish for Wings That Work: An Opus Christmas Story-Berkeley Breathed
- Cuddly Duddly- Jez Alborough
- Hector and Christina- Louise Fatio
- Little Penguin's Tale-Audrey Wood
- Mr. Pin: The Chocolate Files- Mary Elsie Monsell
- Mr. Popper's Penguins Richard and Florence Atwater
- Penguin Day Victoria Winteringham
- Penguin Moon- Annie Mitra
- Penguin Pete- Marcus Pfister
- Penguin Pete and Little Tim- Marcus Pfister
- Penguin Pete and Pat- Marcus Pfister
- Penguin Pete, Ahoy- Marcus Pfister
- Penguin Pete's New Friends- Pfister Marcus
- Penguins of ALL People! Don Freeman
- Tacky the Penguin- Helen Leister
- The Penguins are coming-R. Penney
- The Spy Who Came North from the Pole- Mary Elise Monsell
- Three Cheers for Tacky- Helen Lester

INTERNET RESOURCES:

- http://members.aol.com/MGoudie/penguincapers.html Penguin Capers
- http://www.penguin-place.com/post/links.html-Penguin
 Links
- http://www.geocities.com/Heartland/Lake/4482/pengbigbk.h tm-Penguin Big Book Pattern
- http://www.geocities.com/Heartland/Lake/4482/penglinedsh
 eet.htm-Penguin Lined sheet
 http://www.stemnet.nf.ca/~mwhitt/penguin/penguin.htmlPenguins
- http://www.neaq.org/learn/bap/index.html-Be A Penguin!
- http://www.geocities.com/Heartland/Lake/4482/penguinbook
 s.htm-Penguin and Antarctic Book List

- http://www.teachers.net/lessons/posts/532.html-Penguins (Pre-School, Science)
- http://www.libsci.sc.edu/miller/penguins.htm-Penguins
- http://www.geocities.com/Athens/Troy/5059/polar.html Polar Unit
- http://www.geocities.com/Athens/Agora/7914/winter.html#W INTER-Hummingbird's Season's Winter
- http://www.coreknowledge.org/CKproto2/resrcs/lessons/1po lar.htm-Core Knowledge – Lesson Plans
- http://www.eduplace.com/tview/tviews/weber11.html Antarctic Antics: A Book of Peng..
- http://tqjunior.advanced.org/3500/-Arctic Animals Home
- http://octopus.gma.org/surfing/antarctica/penguin.html Penguin Adaptation
- http://ourworld.compuserve.com/homepages/Peter_and_Barba ra_Barham/faq.htm-Pete & Barbara's Penguin FAQ page
- http://www.amazon.com/exec/obidos/ASIN/B00000K590/qid=94 2505739/sr=1-6/103-0567417-7175859-Baby Penguin Puppet
- http://home.capu.net/~kwelch/pp/-The Penguin Page
- http://www.teachers.net/lessons/posts/1129.html-reader's theatre Tacky the .
- http://www.eduplace.com/tview/tviews/smith30.html Cinderella Penguin, or The Glass...
- http://www.penguin-place.com/-Penguin Place (gift source)
- http://www.geocities.com/Heartland/Lake/4482/penguingrap hics.htm-Penguin graphics and clipart
- http://www.pinn.net/%7Eefm/index.html-I Like Penguins
 !!!
- http://www.burlington.k12.il.us/whanslik/popular2.htm Popular penguin questions and answers
- http://www.antarctic.com.au/encyclopaedia/bio/Penguins.h tml-Penguins
- http://www.kinderart.com/sculpture/penguins.htm Penguins, Penguins
- http://lfa.ivv.nasa.gov/concentrate/concentrate.html-Concentrate!

http://www.penguin.net.nz/games/games.html-Penguins in
 New Zealand – Games

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ENZYME INHIBITION

GRADES: 9-12

MATERIALS:

You will require one of each of these items for each group (groups of 4 or 5)

- I sock
- I blind fold
- I plastic cup
- 40 pennies
- 20 nickels

METHOD:

Regular enzyme activity

- One group member is the blind folded "enzyme". The 40 pennies are spread out on the desk in front of the enzyme.
- The enzyme then has 30 seconds to gather as many pennies as possible and place them into the cup. They may only use one hand, and they can only pick up one penny at a time.
- 3. When the 30 seconds is done, each group counts an records the number of pennies in the cup. This number

will account for the number of "substrate" molecules the enzyme reacted with during that period.

4. Have each group report what their "reaction rate" was. i.e. number or pennies. Record this number in graph format on an overhead transparency.

Non-competitive Inhibition

- Repeat the activity above except have the enzyme wear the sock on their hand.
- 2. Again record the "reaction rate" on the graph.

Competitive Inhibition

- 1. Repeat the activity again, without the sock on the hand.
- This time the nickels will be mixed in with the pennies. Ask the blind folded enzymes to pick up only the nickels and put them in the cup.
- 3. Note the "reaction rate" again.

Discussion

 The enzyme inhibition leads to lower reaction rates, how will this effect homeostasis?

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PENGUIN BLUBBER MITTEN

GRADES: 3-7

In this lesson, the students will discover if the layer of blubber on penguins can keep them warm.

MATERIALS: Each table group of students will need:

- one blubber mitten which is composed of a double layer of sandwich bags with 5 tablespoons of Crisco between the first and second bag
- a bowl of ice water with ice cubes
- a pencil and paper for each table "recorder" to write down student's reactions
- a "penguin" book (i.e. A Penguin's Year, by Susan Bowers)

METHOD:

- 1. Concept(s) discussed prior to the lesson-Penguins have a layer of blubber on their bodies to keep them warm. This is an important part of their bodies. Other animals also have blubber to help them exist in their habitats. The students should also have prior knowledge of penguins from prior days study in this unit. Students should be aware that the Arctic and Antarctic areas of the world are very cold and that some animals do live in these cold areas.
- 2. The teacher asks students what keeps them warm in cold weather? Their clothes. She can then ask what keeps a dog or cat warm? Their fur.The teacher reminds the students that penguins live in the very coldest area of our world. She asks students what they think keeps a penguin warm. (feathers, blubber).
- 3. Using a T graph the teacher should list the answers students give about the different creatures. She should ask the students if they would like to find out what keeps the penguin warm when he goes into the icy cold water.
- 4. The teacher introduces the story A Penguins Year by Susan Bowers (or any other suitable book). She should tell the students that this story will tell them how penguins stay warm. They are to listen to the story and remember two pieces of information that tells how

penguins stay warm. She will then give them the opportunity to explain these two bits of information when they have completed reading the story.

- 5. When the story has been completed the teacher should question the students for the answers to why penguins do not get cold in the Arctic. The teacher writes these answers on the T graph that was created before the story was read. The teacher asks the students if they believe that blubber can keep penguins warm. She then asks them if they would like to test the idea of blubber keeping the penguins warm.The teacher will tell the students that this experiment is the next portion of the activity.
- 6. The teacher brings out the supplies. She brings out a can of Crisco and tell the students that this is the blubber. She then brings out zipper bags and put Crisco in between two layers of the bags. With the students observing, the teacher zips the two baggies together and ask for student volunteers to come up and touch the skin of the penguin (baggies). What does it feel like inside the bag? What does the blubber feel like? Warm, cold, cool etc.The teacher should inquire if any students would like to see how cold the ice water would be with the blubber covering.
- 7. The teacher tells the students that each will be allowed to try out the blubber mitten. She divides up the students into table groups. Each table group gets one blubber mitten, one bowl of ice water and a blank paper. The teacher asks for one student who would like to write down what their friend's reactions are.When the students get to their table group, one student at a time will put on the blubber mitten, while another student steadies the bowl of ice water. The third student will write down descriptive words the first students expresses. Each student will have a turn trying on the blubber mitten (if they wish to).
- 8. The students return to the meeting area after everyone

has had a turn to try on the mitten. They bring their recording sheets with them and the students discuss their reactions to the blubber mitten.

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DISEASE TRANSMISSION

GRADES: 7-12

The purpose of this lab is to show students how diseases can be transmitted from person to person. It can be used in a science or health class.

MATERIALS:

- clear plastic condiment cups (they can be found at any local party store)
- baking soda
- distilled white vinegar
- distilled water
- medicine droppers (the clear plastic are cheap and work just as well as the glass medicine droppers)
- Phenol Red Indicator
- 2 large cups or pitchers

METHOD:

 Before class, teachers should mix 3-4 tablespoons of baking soda with distilled water in a large cup or pitcher. In another large cup or pitcher, mix approximately 3-4 table spoons of vinegar with distilled water. (Measurements do not have to be exact with this experiment)

- 2. Once the two solutions have been prepared, fill one of the condiment cups with the baking soda and distilled water solution. This is your basic/infected solution. Set this cup in a place where you will be able to remember that it is the basic solution. Only one student should receive this solution.
- 3. Next, fill all of the other cups with the vinegar and distilled water solution. These will be your acidic/uninfected solutions. These cups will be given to all other students in the classroom.
- 4. Explain to the students, before passing out any materials, that the lab that they will be conducting deals with disease transmission. It will show how one person who is infected with a disease can infect other people, and how they can in turn infect other people.
- 5. Explain that each student will receive a cup filled with a clear solution, and a medicine dropper. If the students wish, they may observe their solutions but may not touch them in any way. Tell the students that the solutions represent bodily fluids. Explain that after they receive their solutions they will have approximately 3-5 minutes to mingle and use their medicine droppers to exchange solutions/ bodily fluids with 3 other students. The students must exchange fluids. Some of their solution should be dropped into a classmates cup and that same person must drop some of their solution into their cup). Example- If I were exchanging bodily fluids with you, I would drop some of my solution into your cup and would then allow you to drop some of your solution into my cup. Make sure that the students do not touch each other's solution with their medicine droppers. This might contaminate their medicine droppers. Try to watch them, and make sure they are holding their droppers a few centimeters or maybe an inch above each others cup. Also try to avoid any spilling of the solutions. If the students spill their

solutions, this might ruin the results of the experiment.

- 6. Once the students have mingled and exchanged solutions/ bodily fluids, have them come back to their seats and sit quietly. Once everyone is seated, explain to the students that you will come around the classroom with an indicator called phenol red. Let them know that this indicator is used to show a color change in acids and bases. When phenol red is placed in an acid solution it turns the solution yellow. When placed in a basic solution, it turns the solution pink/red. Let them know that you will place a few drops of indicator in their cup. If they have exchanged solutions/ bodily fluids with the one infected person in the class or someone who the infected person came into contact with, they are now infected and their solution will turn pink/red. If they have not exchanged solutions/ bodily fluids with anyone who was infected, their solution will turn yellow.
- 7. Lastly, count how many people are infected at the end of the experiment. Remember, only one person received the infected (basic) solution at the beginning of the experiment.

EXTENSIONS:

Have students track the virus/disease back to the original carrier. (To do this, after students have mingled and exchanged solutions/ bodily fluids, have them write down the names of the 3 classmates that they exchanged with. Once they have done this, have them transfer this information on the board under their name.

Example- Karen Joey

Lucy Mike

Leslie Sheila

Frank Gary

In the example, you can see that Karen exchanged solutions/ bodily fluids with Lucy, Leslie, and Frank. Joey exchanged solutions/ bodily fluids with Mike , Sheila, and Gary.

Once all students have listed their information on the board and have go back to their seats, you would then go around the classroom and drop the phenol red indicator in the cups. When the color changes take place, you will be able to see with the naked eye who was infected and who was not. Now start tracking the disease on the board.

First, erase all of the names of the people who were not infected. (After this you will probably only be left with 4-5 students names on the board). The next step is process of elimination.

This is a great activity and the students love it. The students grasp an understanding of how one person can infect several people and how easy it is to come in contact with that person if you are not careful. Have fun!!!

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SHADOWS

GRADES: 3-6

This is a fun one to two day lesson on shadows and the sun's movement.

MATERIALS:

chalk

- sun
- black top (preferably away from where students play)
- paper
- pencil
- compasses (optional)
- •golf tees
- cardboard (at least 9 x 12)
- glue
- tape

METHOD:

- Brainstorm ideas about shadows with students. See what they already know. Tell them you will go outside and trace shadows.
- 2. Go outside to a black top or concrete area early in the morning. Have students in pairs. Find north and have them face north. Trace a student, feet and all as a demonstration. Have them write the name of the person traced and time in the feet.
- 3. Allow time for pairs to trace each other. Make sure they are spaced far apart so the afternoon shadow will not touch another student's shadow.
- 4. Talk about what the shadows look like.
- 5. Go back inside and have them get out paper.
- 6. Write the words shape and orientation on the board. Ask if they know what it means. Give definitions for them to write down. (Shape - size of shadow) (Orientation -Direction of shadow) Then talk about sun rising and setting. It rises in the east and sets in the west. Ask them to predict using the vocabulary words what the shape and orientation will be at about 2pm. Have them write this down.
- 7. Have them check at morning recess and lunch recess how their shadows look.
- 8. Go back out at the end of the day. Trace this shadow and discuss results. Talk about how the sun moves and how it

affects the shadow. Look at predictions from the morning and discuss the differences to what actually happened.

EXTENSION:

The next day you can have them make shadow trackers with paper, golf tees and cardboard. They can be in groups of 4 and track the shadow each hour. Tape paper to cardboard. Glue tee in the middle. Draw the shadow and put the time. Discuss what this looks like and how the sun moves. Simulate the sun with a flashlight in a darkened room and recreate the traced shadows. Discuss where sun is in relation to cast shadow. (Always behind the object... casts a shadow in the opposite direction)

Play Shadow Tag for PE! They love it!

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THE PLAGUE GENERATION

GRADES: 4-9

In this lesson, the student will be able to make predictions, test, and draw conclusions about the rate a plague can be spread.

MATERIALS (for 30 Students):

- 30 plastic cups
- a base (clear detergent, etc) that looks like water
- indicator (Can be made from dissolved ex-lax pill) phenolphthalein
- •water

METHOD:

- 1. Fill 28 cups half full of water
- 2. Fill 2 cups half full of base
- 3. Give each student a cup with a liquid
- Tell students that two cups contain the plague while the others do not – No smelling, shaking, tasting, etc.
- 5. Each student will share liquids with others; student A pours his liquid into cup of student B, student B then pours half of it back into cup of student A. They each proceed to two other doing the same thing, until all 30 have shared 3 cups. At this time predict how many of the 30 cups now hold the plague germs.
- 6. Add a few drops of indicator to each cup.
- 7. Observe
- 8. Conclusions: Discuss the rate the plague spread. Does the information relate in some way to real life situations? What are some of the errors that could cause you to draw the wrong conclusions.

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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).
- 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:

- Put a metal container into a large bowl with ice; you will use this cool container later.
- Bring 1/2 cup of water to a boil in a saucepan on the stove.
- 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:

- (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:

- 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 hardboiled 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!

submitted by

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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!)

submitted by

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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.
- 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?
- 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",. 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. submitted by

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