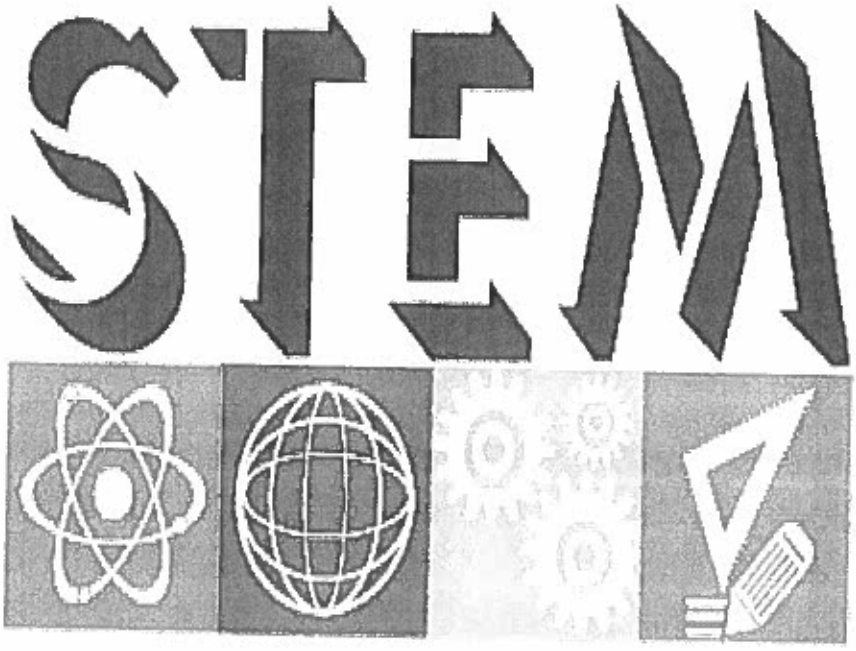
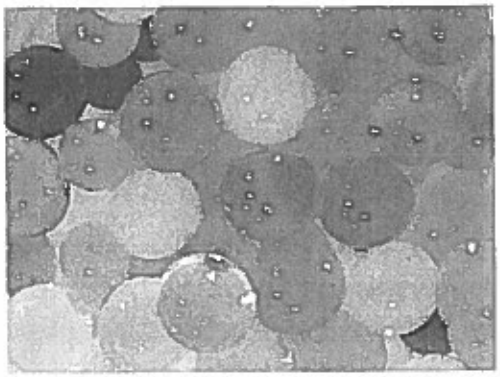


Activities and Great Things to do at HOME!!

Make a Bouncing Polymer Ball

NAME_____



Polymer balls can be quite beautiful. Use clear glue to make translucent balls.

Balls have been toys practically forever, but the bouncing ball is a more recent innovation. Bouncing balls were originally made of natural rubber, though now bouncing balls can be made of plastics and other polymers or even treated leather. You can use chemistry to make your own bouncing ball. Once you understand the basic technique, you can alter the recipe for the ball to see how the chemical composition affects the bounciness of the ball, as well as other characteristics.

The bouncing ball in this activity is made from a polymer. **Polymers are molecules made up of repeating chemical units**. Glue contains the polymer polyvinyl acetate (PVA), which cross-links to itself when reacted with borax.

Materials

Here's a list of materials you need to gather to make bouncing polymer balls:

- borax (found in the laundry section of the store)
- cornstarch (found in the baking section of the store)
- white glue (e.g., Elmer's glue - makes an opaque ball) or blue or clear school glue (makes a translucent ball)
- warm water
- food coloring (optional)
- measuring spoons
- spoon or craft stick to stir the mixture
- 2 small plastic cups or other containers for mixing
- marking pen
- watch with a second hand
- metric ruler
- zip-lock plastic baggie

Focus Question: Can you create a polymer ball using glue and borax?

1. Label one cup with an **X** for Borax Solution and the other cup **B** Ball Mixture.

2. Pour 20 ml **warm** water and 1/2 teaspoon borax powder into the cup labeled X 'Borax Solution'. Stir the mixture to dissolve the borax.

3. Pour 1 tablespoon of glue into the cup labeled 'Ball Mixture', add 4 drops food coloring if desired. Stir in 1 tablespoon of cornstarch until combined. Continue stirring until completely mixed and sticky.

4. Spoon the glue mixture into the cup of borax water and let sit for 15 seconds. Allow the ingredients to interact on their own for 10-15 seconds and then stir them together to fully mix. Once the mixture becomes impossible to stir, take it out of the cup and start molding the ball with your hands.

5. The ball will start out sticky and messy, but will solidify as you knead it.

6. Once the ball is less sticky, go ahead and bounce it!

7. You can store your plastic ball in a sealed Ziploc bag when you are finished playing with it.

8. Don't eat the materials used to make the ball or the ball itself. Wash your work area, utensils, and hands when you have completed this activity.

Things to Try with Bouncing Polymer Balls

If you use the scientific method, you make observations before experimenting and forming or testing a hypothesis. You've followed a procedure to make a bouncing ball. Now you can vary the procedure and use your observations to make predictions about the effects of the changes.

- Observations you can make and then compare as you change the composition of the ball include the diameter of the finished ball, how sticky it is, how long it takes to solidify into a ball, and how high it bounces.

- Experiment with the ratio between the amounts of glue, cornstarch, and borax. Adding more cornstarch will make a ball that stretches and bends. Using less borax will produce a 'goopier' type of ball. Add more glue for a slimier ball.

MAKE A STATIC-POWERED DANCING GHOST!

YOU WILL NEED:

- A piece of tissue paper
- A balloon
- Scissors
- A head of hair
- Spooky Music (optional)

WHAT TO DO

1. First cut out a ghost shape in the tissue as shown about 1.5 inches (4 cm) long and add some eyes with a marker. If you are using 2-ply tissues, peel apart the 2 layers to get the tissue as thin as possible. Cut out a few ghosts for more fun and place them on a flat surface. You might want to make some out of regular paper to compare. (Some readers found slightly heavier ghosts easier to control.)

2. Blow up the balloon and tie it. Then rub it really fast through your hair for about 10 seconds. This will add a static charge.

3. Slowly bring the balloon near the ghost, and the ghost will begin to rise toward the balloon. (Our ghost "arms" actually reached toward the balloon as we got it near.) If the balloon is charged enough, the ghost will rise and float right up to the balloon, even when it is several inches away. With a little practice, you can get the ghost to rise, float, and even dance around. TIP: The easiest way to make the ghost rise without it sticking to the balloon is to tape the very tip of the bottom of the ghost to a table. The ghost will rise and move along with the balloon. With a good charge, the balloon can control the ghost from several inches away.

HOW DOES IT WORK?

When you rub the balloon through your hair, invisible electrons (with a negative charge) build up on the surface of the balloon. The electrons have the power to pull very light objects (with a positive charge) toward them – in this case, the tissue ghost!

Try it out and let us know how it goes.

Name _____ Teacher_____

How Clouds Make it Rain!!

Challenge: How many drops of water can your cloud hold before it rains?

Materials: Plastic cup, water, shaving cream, blue food coloring, pipette

Directions:

- Fill a cup full of water
- Place a dollop of shaving cream on the top of the water
- Drop blue colored water 1 drop at a time on the shaving cream

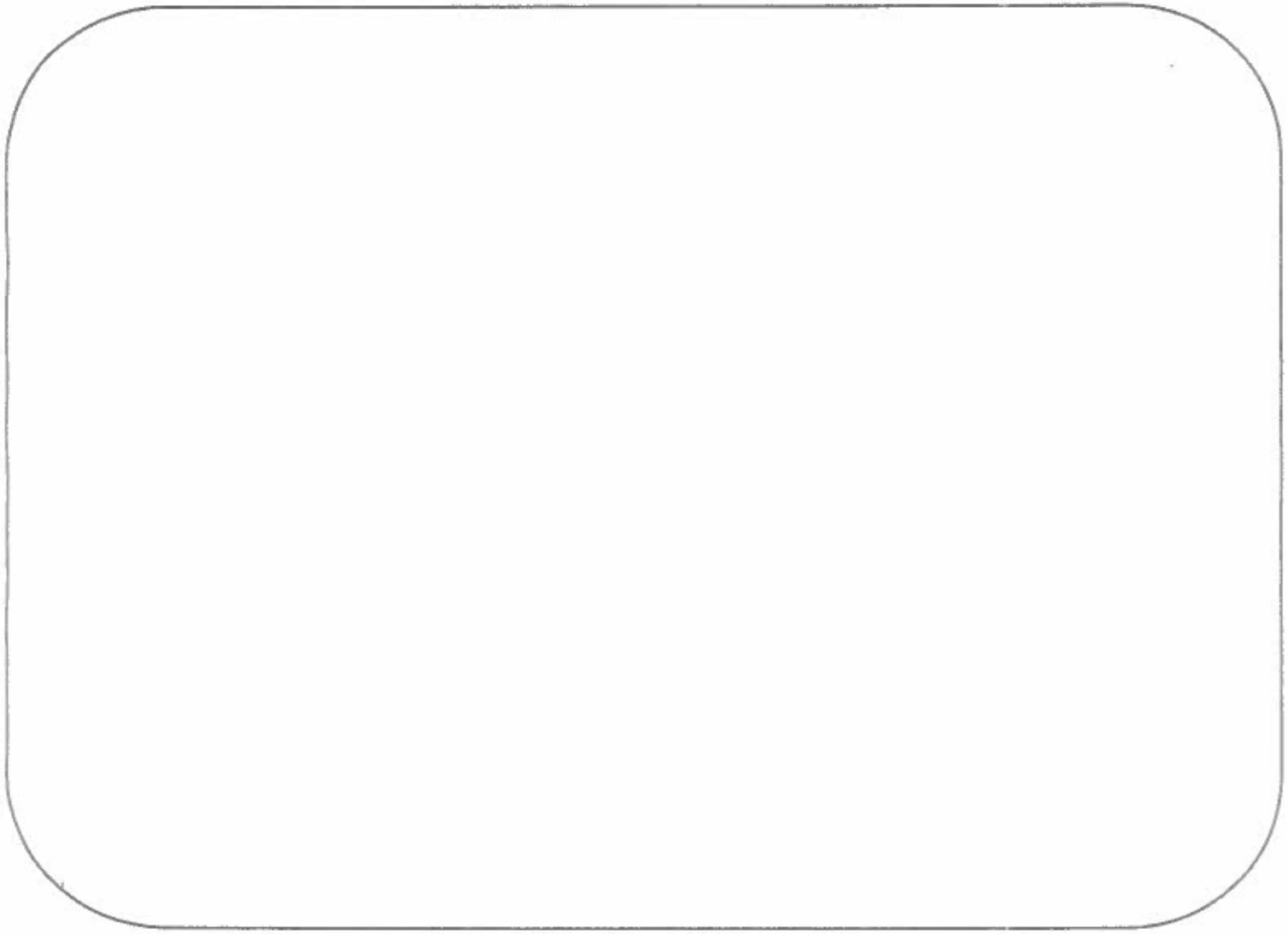
Predict how many drops of blue food coloring it will take before your cloud begins to rain?

I think that it will take _____ drops before it begins to "rain".

Draw what you notice happening

_____ drops of blue water	_____ drops of blue water	_____ drops of blue water

Draw a diagram to show how this experiment is similar to a rain cloud. Make sure to use labels.



Vocabulary

_____

_____

_____

_____

_____

_____

Explain what happens when you added drops of blue water to the cloud of shaving cream?

I claim that

_____

_____

_____

How is this similar to a rain cloud?

I know this because

_____

_____

_____

_____

BLOBS IN A BOTTLE!

YOU WILL NEED:

- 1 clean 1-liter clear soda bottle
- 3/4 cup of water
- Vegetable oil
- Fizzing tablets (such as Alka Seltzer)
- Food coloring

WHAT TO DO

1. Pour the water into the bottle.

2. Use a measuring cup or funnel to slowly pour the vegetable oil into the bottle until it's almost full. You may have to wait a few minutes for the oil and water to separate.

3. Add 10 drops of food coloring to the bottle we like red, but any color will look great.) The drops will pass through the oil and then mix with the water below.

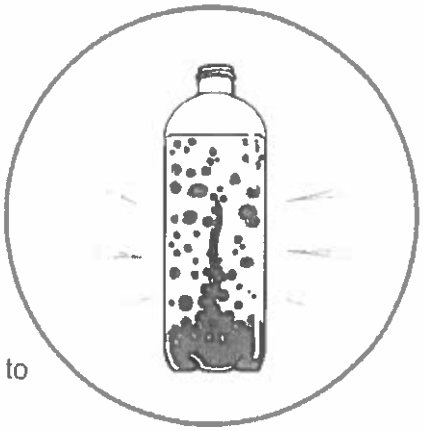
4. Break a seltzer tablet in half and drop the half tablet into the bottle. Watch it sink to the bottom and let the blobby greatness begin!

5. To keep the effect going, just add another tablet piece. For a true lava lamp effect, shine a flashlight through the bottom of the bottle.

HOW DOES IT WORK?

To begin, the oil stays above the water because the oil is lighter than the water or, more specifically, less dense than water. The oil and water do not mix because of something called "intermolecular polarity." That term is fun to bring up in dinner conversation. Molecular polarity basically means that water molecules are attracted to other water molecules. They get along fine, and an loosely bond together (drops.) This is similar to magnets that are attracted to each other. Oil molecules are attracted to other oil molecules, they get along fine as well. But the structures of the two molecules do not allow them to bond together. Of course, there's a lot more fancy scientific language to describe density and molecular polarity, but maybe now you'll at least look at that vinegrette salad dressing in a whole new way.

When you added the tablet piece, it sank to the bottom and started dissolving and creating a gas. As the gas bubbles rose, they took some of the colored water with them. When the blob of water reached the top, the gas escaped and down went the water. Cool, huh? By the way, you can store your "Blobs in a Bottle" with the cap on, and then anytime you want to bring it back to life, just add another tablet piece.



MAKE IT AN EXPERIMENT:

The above is a DEMONSTRATION. To make it a true experiment, you can try to answer these questions:

1. Does the temperature of the water affect the reaction?

2. Does the size of the bottle affect how many blobs are produced??

3. Does the effect still work if the cap is put on the bottle?

4. Does the size of the tablet pieces affect the number of blobs created?

Name _____ School _____

Erosion Challenge

Challenge: How can you use materials to stop erosion on a small hill?

Materials: Long plastic container, salt, sand or soil mixture, cups(plastic and paper), paper clips, toothpicks, craft sticks, index card, water, ruler, pencil

Directions:

- Use a cup full of sand/soil in the large pan to create a small hill
- Choose the materials you will use to help stop erosion.
- Poke a few small holes in a paper cup. Hold the cup over the hill.
- Pour 100 ml of water through the cup to create a light rain. Record your observations
- Poke many larger holes in the cup. Pour 200 ml of water through the cup for a heavy rain. Record your observations
- Record what you noticed. Use a ruler to measure erosion from your hill. Draw or take pictures
- Write about your observations

Draw and label your small hill and the erosion that you noticed

Before water	Light rain	Heavy Rain

Vocabulary: _____ _____

_____ _____ _____

Explain what combination of materials worked best to help stop erosion during a light rain?

I claim that

I know this because

Explain what combination of materials worked best to help stop erosion during a heavy rain?

I claim that

I know this because

LIQUID LAYERS

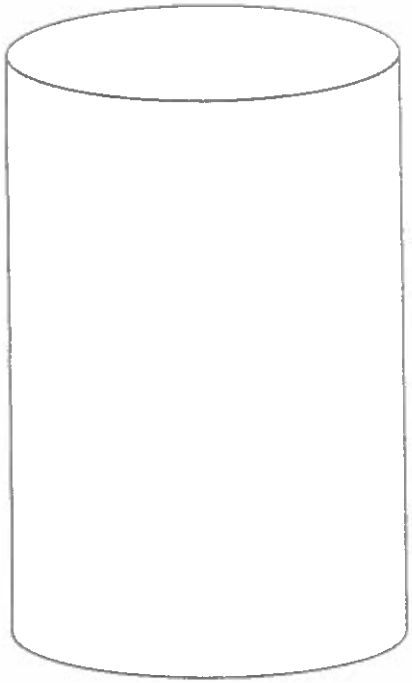
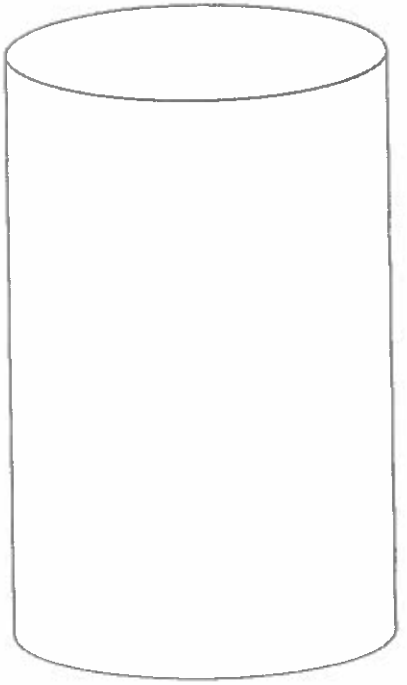
Name_____ Grade Level _____

Challenge: Can you layer at least 3 different liquids? Can you get one liquid to "float" on top of another liquid?

Prediction: What do you think might happen when liquids are put in the same cup?

_____

Observations: Draw pictures and use labels to show what happened when you layered liquids

Trial 1	Trial 2	Trial 3
		

What happens when liquids are layered in the same cup?

What did you see?

Why do you think this happened?

Liquid	Density
Rubbing Alcohol	0.79
Baby oil	0.83
Vegetable oil	0.92
water	1.00
milk	1.03
Dawn Dish soap	1.06
Honey	1.42
vinegar	1.00
Light corn syrup	1.33
Maple syrup	1.37

Density Chart

Draw a picture of water

Draw a picture of corn syrup

Chromatography for Kids

Does your child love colors? Conduct this colorful science project with your child to learn about *chromatography*, the process of separating color pigments. Let's get to it!

What You Need:

Paper towels
Clothespin or magnet
Pipe cleaner
Tablespoon
Water-soluble markers
Coffee filters
Clear cup
Water
Pencil

What You Do:

1. Take a coffee filter and mark a line two inches from the bottom.
2. Instruct your child to fold the coffee filter in half.
3. Have him decorate above the mark with markers.
4. Pour two tablespoons of water into the cup.
5. Fold the coffee filter in half twice, and put it in the cup.
6. The colors will travel upwards on the filter! Ask your child to notice the different colors on the filter.
7. Take the filter out, and let it unfold and dry.

What's Happening?

Colors are made up of molecules! The coffee filter absorbed the liquid, and the color molecules get dissolved. Some of these color molecules are smaller and lighter than others, so they move at different speeds. That's why the colors look separate!

Incorporate Art in Your Science Project!

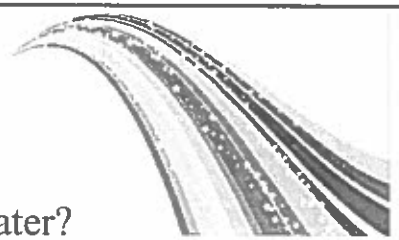
Make a butterfly: Cut out your coffee filter to make it look like a butterfly, and hang it with a clothespin or magnet.

Make a flower: Fold the filter up into fourths. Put a pipe cleaner underneath, making it look like a flower! To make the flower look full, you can puff the filter up.

NAME _____ Grade _____

Teacher _____ School _____

Chromatography Challenge



Materials: Coffee filter (cut into 1/4) Washable black marker Transparent cup water 2 cm timer

STEP 1 **Prediction:** What will happen to the black line when we put the filter in water?

_____

STEP 2 **Record**: Draw and label what you observe. Draw the beginning, middle, and end of the experiment (Time for 5 minutes)

Beginning	Middle	End

STEP 3 ***Observe:*** What happened?

_____

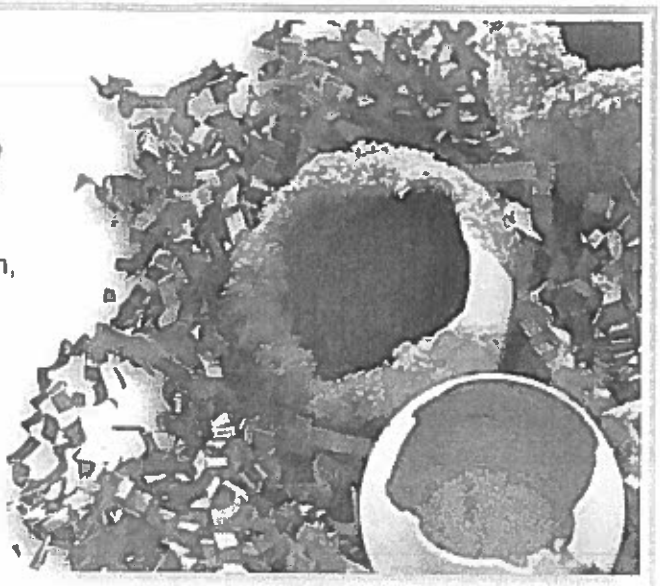
_____

STEP 4 ***Results:***

1. How many colors do you see? _____
2. Write down colors that you were able to see

STEP 5: I learned that the color black _____

MAKE SOME EGG SHELL GEODES



This project comes to us from Melissa Howard who is a Mom, Blogger, and photographer. This project nicely demonstrates how real-life geodes are formed in igneous and sedimentary rock. It also demonstrates super-saturated solutions and shows a nice variety of crystal shapes and formations.

YOU WILL NEED:

- clean eggshells
- water
- a variety of soluble solids: table salt, rock salt, sugar, baking soda, Epsom salts, sea salt, borax, or cream of tartar
- small heat proof containers (coffee cups work well)
- spoons
- food coloring
- egg cartons and wax paper or mini-muffin tins

WHAT TO DO:

1. Crack the eggs for this project as close to the narrow end as possible. This preserves more egg to use as a container for the solution.
2. Clean the eggshells using hot water. The hot water cooks the lining and allows you to pull the skin (egg membrane) out of the inside of the egg using your fingers. Make sure to remove all the egg membrane, if any membrane stays inside the shell it is possible that your eggshell will grow mold and your crystals will turn black.
3. Use an egg carton lined with waxed paper or mini-muffin tins to hold the eggs upright.
4. Use a saucepan to heat the water to boiling. .
5. Pour half a cup to a cup of water into your heatproof container. If you poured half a cup of water into the container, add about a ¼ cup of solid to the water. Stir it until it dissolves. Likewise if you used a cup of water, add about ½ a cup of solid to the water. You wanted to add about half again the volume of the water as a solid to the mixture. When the initial amount of solid is dissolved continue adding small amounts of the solid until the water is super-saturated. Super-saturated simply means the water has absorbed all it is able to absorb and any solid you add will not dissolve.
6. Add food coloring.
7. Carefully pour your solution into the eggshell, filling it as full as possible without over-flowing it or causing it to tip.

Find a safe place to put your shells while the water evaporates. Crystals will form inside the eggshells as the water evaporates over several days.

HOW DOES IT WORK?

Dissolving the crystals in hot water created what is called a "super-saturated solution." This basically means that the salts took advantage of the energy of the hot water to help them dissolve until there was no more space between molecules in the solution. As the solution cooled, the water lost its energy and the crystals are forced from the solution to become a solid again. Since this happens slowly along with the evaporation, the crystals have time to grow larger than they were when the experiment started. Natural geodes in rock are form in much the same way as mineralized water seeps into air pockets in rock. This is also how rock candy crystals are formed.

NAME _____ Grade _____

Teacher _____ School _____

Leprechaun Tower Challenge

Materials: straws pipe cleaners tape pennies
sm. dish/cup to hold pennies (with Leprechaun picture attached)

STEP 1: Make a plan with your group.
Draw and label your tower.

Before

Step 2: Draw your tower.
Use labels to show the material you used

After building

STEP 3: Prediction I think our tower will hold _____ pennies.

STEP 4: TEST How strong is your Tower? Place one penny in at a time.

STEP 5: Record your results Our tower held _____ pennies

STEP 6: What happened to your tower when you added pennies?

_____

_____

_____

_____

STEP 7: What changes would you make to improve your tower?

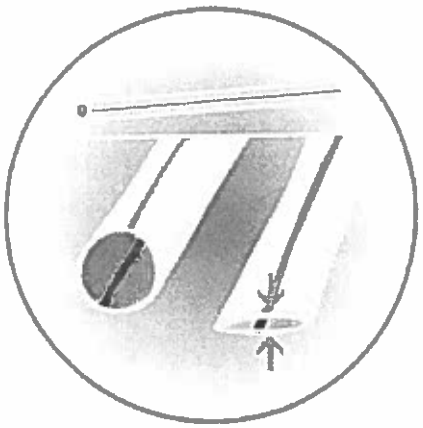
_____

_____

MAKE A SIMPLE DUCK CALL!

YOU WILL NEED:

- One plastic straw from your kitchen or local fast food restaurant
- Scissors
- Lungs (don't worry you already have them)



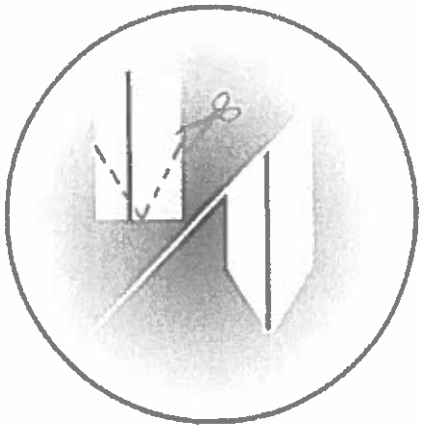
WHAT TO DO

1. Use your fingers to press on one end of the straw to flatten it – the flatter the better.

2. Cut the flattened end of the straw into a point (see below).

3. Flatten it out again real good.

4. Now take a deep breath, put the pointed end of the straw in your mouth and blow hard into the straw. If all goes well you should hear a somewhat silly sound coming from the straw. The smaller you are, the harder it may be to get a good sound – sometimes adults can get more of a sound thanks to their bigger lungs. If you still have trouble, try flattening it out some more or cutting the straw in half.



5. Don't stop there – try cutting the straw different sizes to see how the sound changes, or make another identical straw and add the pointed end of the new straw to the uncut end of the first straw (to make the first straw longer) The sound will be very different, (more like a moose call!) and you will have to blow even harder, but give it a try.

HOW DOES IT WORK?

This is science? It sure is. You see all sounds come from vibrations. That little triangle that you cut in the straw forced the two pieces of the point to VIBRATE very fast against each other when you blew through the straw. Those vibrations from your breath going through the straw created that strange duck-like sound that you heard. Now you will never be bored again when you go to a fast food restaurant! Have fun!

MAKE IT AN EXPERIMENT:

The project above is a DEMONSTRATION. To make it a true experiment, you can try to answer these questions:

1. Which size straw call sound the most like a duck?

2. Which length of straw is the easiest to get a sound? Which is the hardest?

3. Does the diameter of the straw affect the sound it produces?

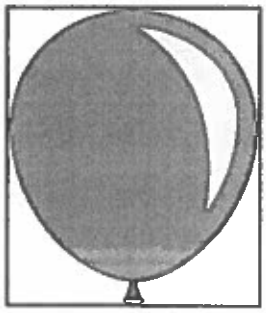
Name_____ Teacher _____ (primary)

Expanding Balloon Challenge

Challenge: Can you combine a solid and a liquid to blow up a balloon?

Materials: Balloon, water bottle, vinegar, baking soda

Prediction: What do you think might happen when you combine the materials to blow up a balloon? Circle what you think will happen

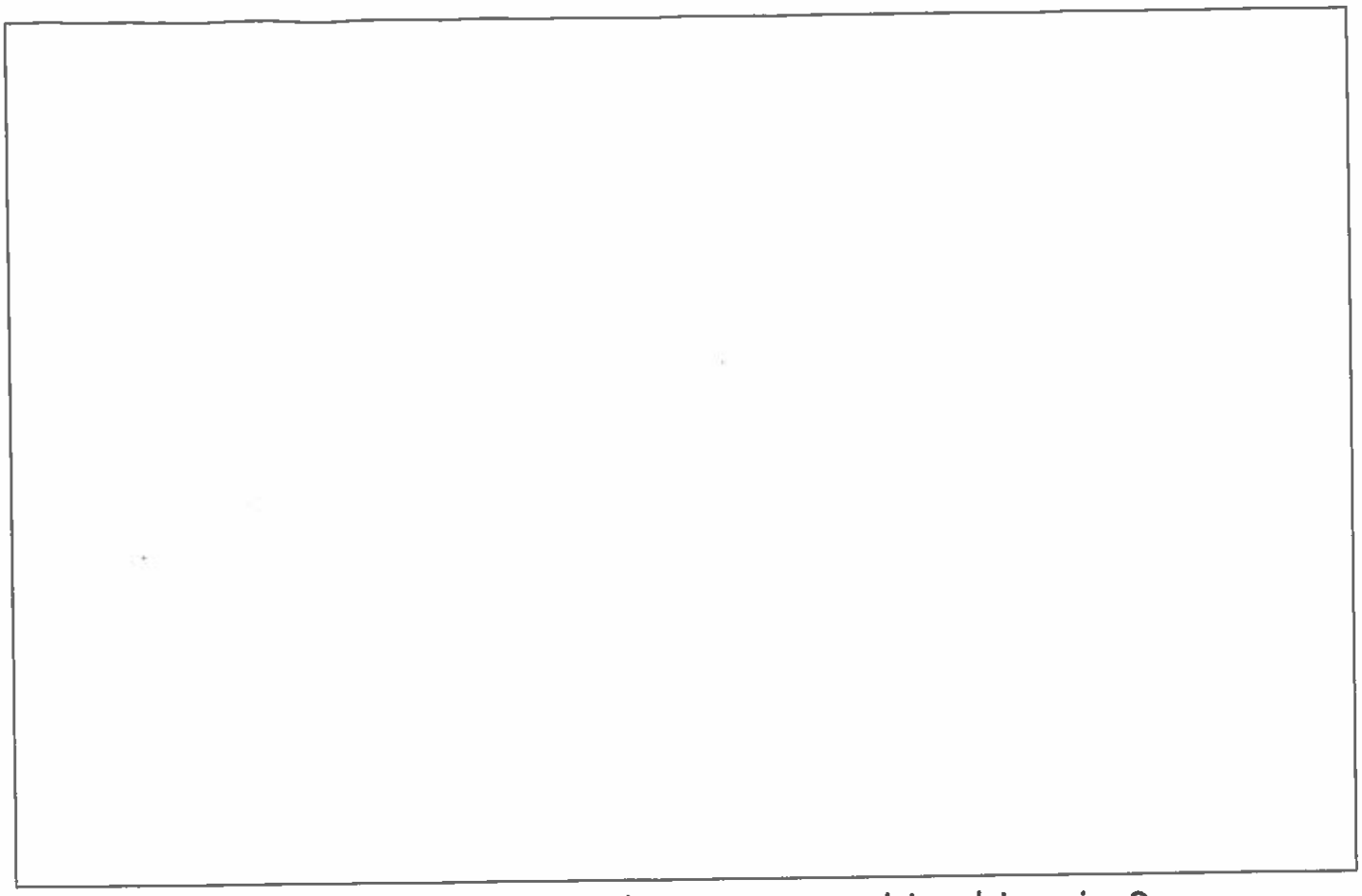



Procedure: Expanding Balloon

- ☐ Fill the water bottle with 25 ML of vinegar
- ☐ Stretch out your balloon and use a funnel to add 4 tbsp of baking soda to your balloon
- ☐ Fit your balloon to the top of your bottle. Make sure that it is tight on the top of the bottle.

1. Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
2. Pour the 40 ml of water into the soft drink bottle.
3. Add the teaspoon of baking soda and stir it around with the straw until it has dissolved.
4. Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.

Observations: Draw what you see



What happens when these ingredients are combined in a jar?

What did you see?

I SAW

I SAW

Name _____ School _____

Teacher: _____

April STEM Challenge

What will happen to Peeps when they are placed in cups, different types of liquids are added to each cup, and they sit in that liquid for 10 minutes?

This is my prediction:

Water	Oil	Vinegar	Milk	Tonic Water

This is what actually happened:

Water	Oil	Vinegar	Milk	Tonic Water

I was surprised that

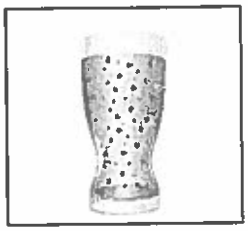
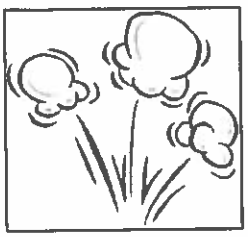
I claim that

Name_____ Teacher _____

School District _____ Grade Level _____

Challenge: What happens when these ingredients are combined in a jar?

Prediction: What do you think might happen? Circle what you think will happen.


Procedure: HOPPING CORN

- ☐ Fill the jar with 2 ½ cups of water and add a couple drops of food coloring
- ☐ Add 2 tbsp of baking soda and stir well until it is all dissolved
- ☐ Add a small handful of popping corn kernels
- ☐ Add 6 tbsp of white vinegar and record what happens

Observations: Draw what you see

What happens when these ingredients are combined in a jar?

What did you see?

What did you notice?

Why do you think this happened?