

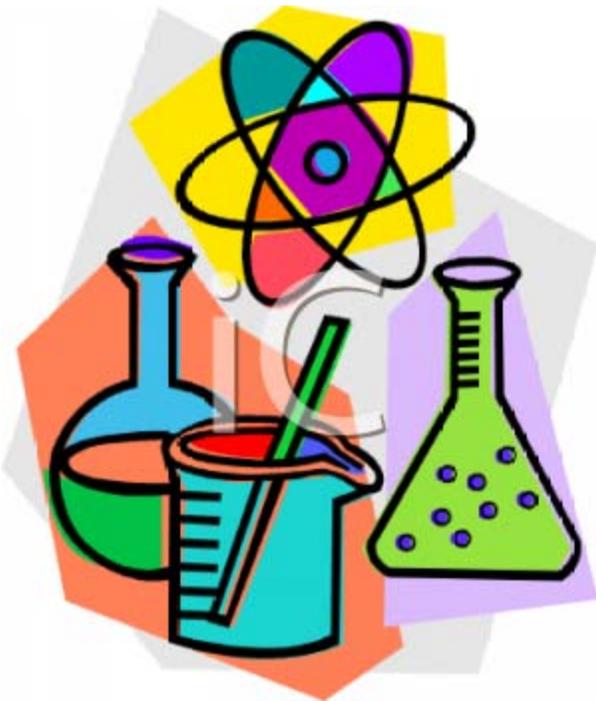
# The Science of Leadership

The following pages contain activities that explain the Science Experiments and activities used in the "Science of Leadership" workshop that I did at NAWD/NCSA Conference on December 4, 2015. I hope they help you be an incredible teacher and trainer. I also hope they inspire. Thank you for attending the workshop...or just checking out some of these resources. If you have any questions or comments, please email me at [phupfer@piusi.org](mailto:phupfer@piusi.org).

Mother Teresa said, "We cannot all do GREAT things, but we all can do small things with GREAT love." I know you will put some GREAT LOVE into all that you do.

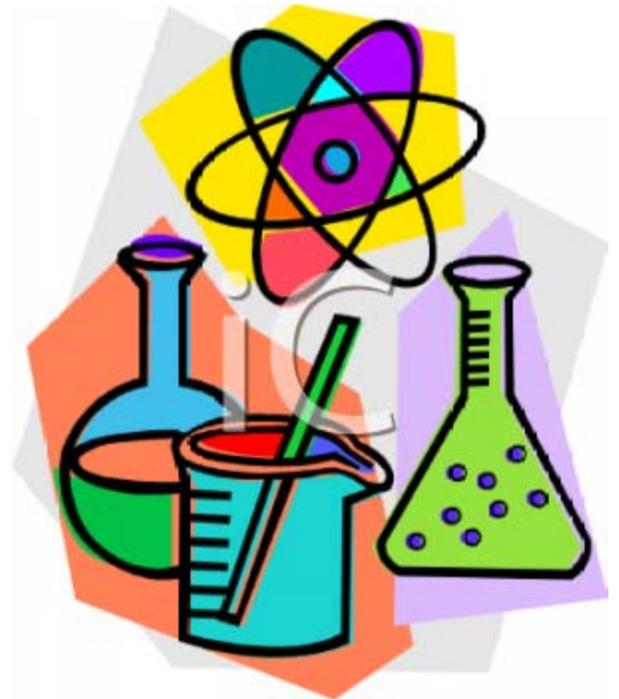
Sincerely,

Patty ☺



# Websites I Like A Lot:

- [Stevespanglerscience.com](http://Stevespanglerscience.com) - Great website for science lessons/demos/videos/orders/friendly help and advice. Start searching around the site and you get lost in all of the wonderful, easy to understand info.
- [middleschoolscience.com](http://middleschoolscience.com) - It's full of ideas for class lessons and demos. Great for looking for specific ideas or something you can't find anywhere else. A wonderful site!
- [Values.com](http://Values.com) - videos and inspirational messages. Good idea to show one as a thought starter and then have students write about it.
- [Leavenothingunsaid.com](http://Leavenothingunsaid.com) - be inspired and learn how to write notes of kindness and appreciation
- [Differencemakers.com](http://Differencemakers.com)
- [Youtube.com](http://Youtube.com)
  - Kid President videos
  - Rick and Dick Hoyt videos
  - The Spangler Effect



## PERCEPTIONS EXERCISE

Each person perceives life in a unique way. How people act or react is affected by their perspective, life experiences, personal history, etc. To be an effective leader, or to be successful in "customer service," we need to be aware of these factors.

Time Required: Approximately 20-30 minutes

Activity: Leader tells participants they are going to hear some scenarios and then be asked to respond to a question about that scenario. Remind them you are solely asking for their reaction, so it is important not to ask their neighbor for input. They should go with their first reaction to the question. (Ask them to number their papers as you read the scenarios.)

Perception Scenarios and questions:

1. Your neighbor bought an expensive car. How much did it cost?
2. Your teacher is really old. How old is she?
3. You have been "going out" with someone for a long time. How long has it been? What is "going out"? How serious is it?
4. You took a test. You did OK. What grade did you get?
5. You got in a lot of trouble at school. What is a lot?
6. A friend says she'll call later. When is later?
7. You went to the mall and bought a really expensive shirt. How much was it?
8. You miss school and ask the teacher to give you the make-up work. He says he'll get it to you soon? When is soon?

Process:

- After going through the questions, go through each one as a group to see what the range of answers is for each question. For example, in Question 1, someone might say \$10,000, someone might say \$80,000 or anywhere in between. List on a board or flip chart the range of responses.
- Lead some discussion about why the answers have such a wide range, what "personal history" people bring to their responses, and have participants talk about how perceptions may affect someone's frustration level when they don't feel like they are being heard. Also discuss how they can affect people's perceptions in the future. (Are all teenagers only thinking about themselves? Are all old people crabby? Do all car dealers cheat you out of money? Are homeless people lazy? Do kids only listen to loud rap music?)
- As always, tie this exercise in to your audiences' particular program and "customers," be they student councils, youth programs, adult volunteers, the public, teachers or any other group.

## BRIDGE BUILDING (Group Process)

Time: 30-40 minutes

Purpose: For members to participate in a team building activity that helps them understand aspects of group process skills (communication, roles in groups, problem solving, organization)

Action: Divide large group into groups of 5-6 participants.

### PROCESSING:

- What happened in the group during the talking phase and the non-talking stage?
- How did you communicate?
- Did a leader(s) emerge?
- What roles did members play?
- What made the successful teams successful?
- What does this teach you about real life situations?

### Some Lessons Learned...

- Good things can happen when you just stop talking!
- The best leader might not be vocal!
- Sometimes the simplest things work the best!
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Tell the group that in a few minutes you will give each group a stack of newspapers and some tape. (NOTE: DO NOT pass out materials until after the 7 minutes of planning time.) Their task is to build a bridge strong enough to hold the milk jug/can (show it to them) and tall enough to allow the milk jug/can to pass under it. (The milk jug/can will be pushed through on its side.)

Rules: They may only use the newspaper and tape to build the bridge. They may not use people, tables or any articles from their pockets or bags. They may not attach it to the floor, table or any other object. They may come to the front of the room to measure the can or lift it but may not test it on or under their bridge.

Tell the group they will have 7 minutes to plan how they are going to build the bridge. Encourage them to plan carefully and to be sure everyone knows what his or her job will be - fold paper, tear tape. Once the planning time is over, they will have 8 minutes to actually build the bridge.

After answering any questions, give them the 7 minutes to plan. Give time cues of "3 more minutes", "one minute left", etc.

After the planning time is up, distribute materials to groups. Tell them not to touch them until you say, "GO." Remind them to work as quickly and efficiently as possible. **BUT - OOPS! - You forgot to tell them they may not talk or write notes at all during the building.**

Time 8 minutes. You may be a little flexible on the time but not too much. Give time cues. If desired, play some music during the building.

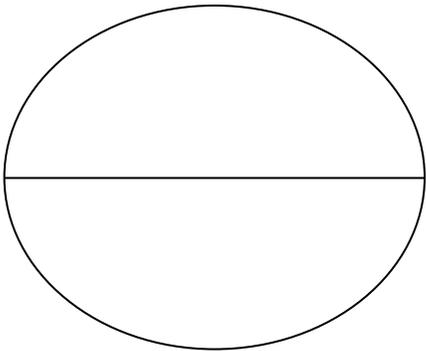
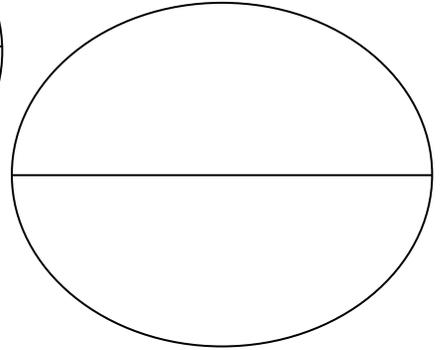
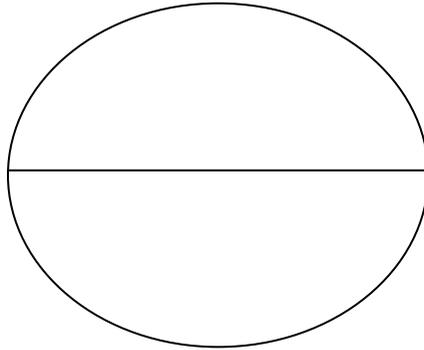
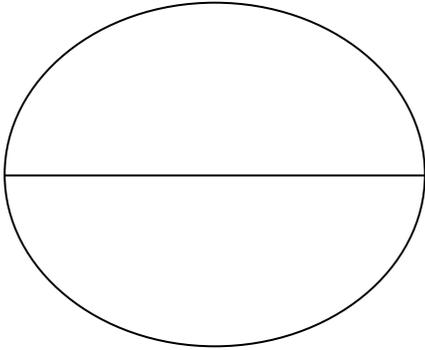
Call time and have each group test the bridge to see if their group has been successful.

# Worst Case Scenario Planning

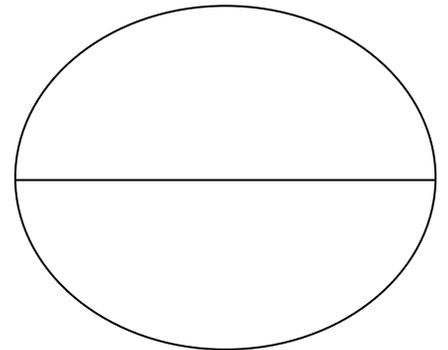
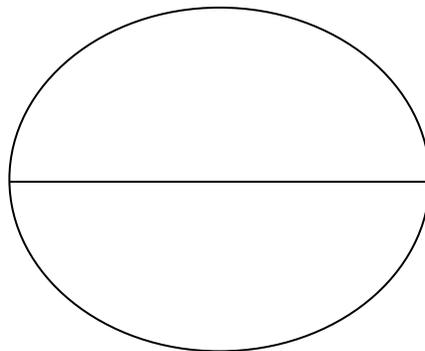
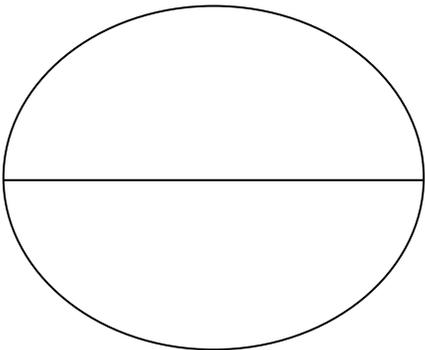
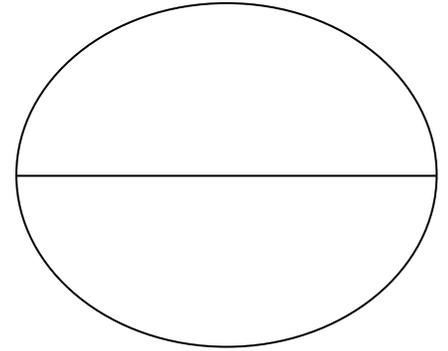


FILL THE TOP HALF OF EACH SHAPE WITH A SPECIFIC STRATEGY FOR MAKING SURE YOUR EVENT IS A FAILURE.

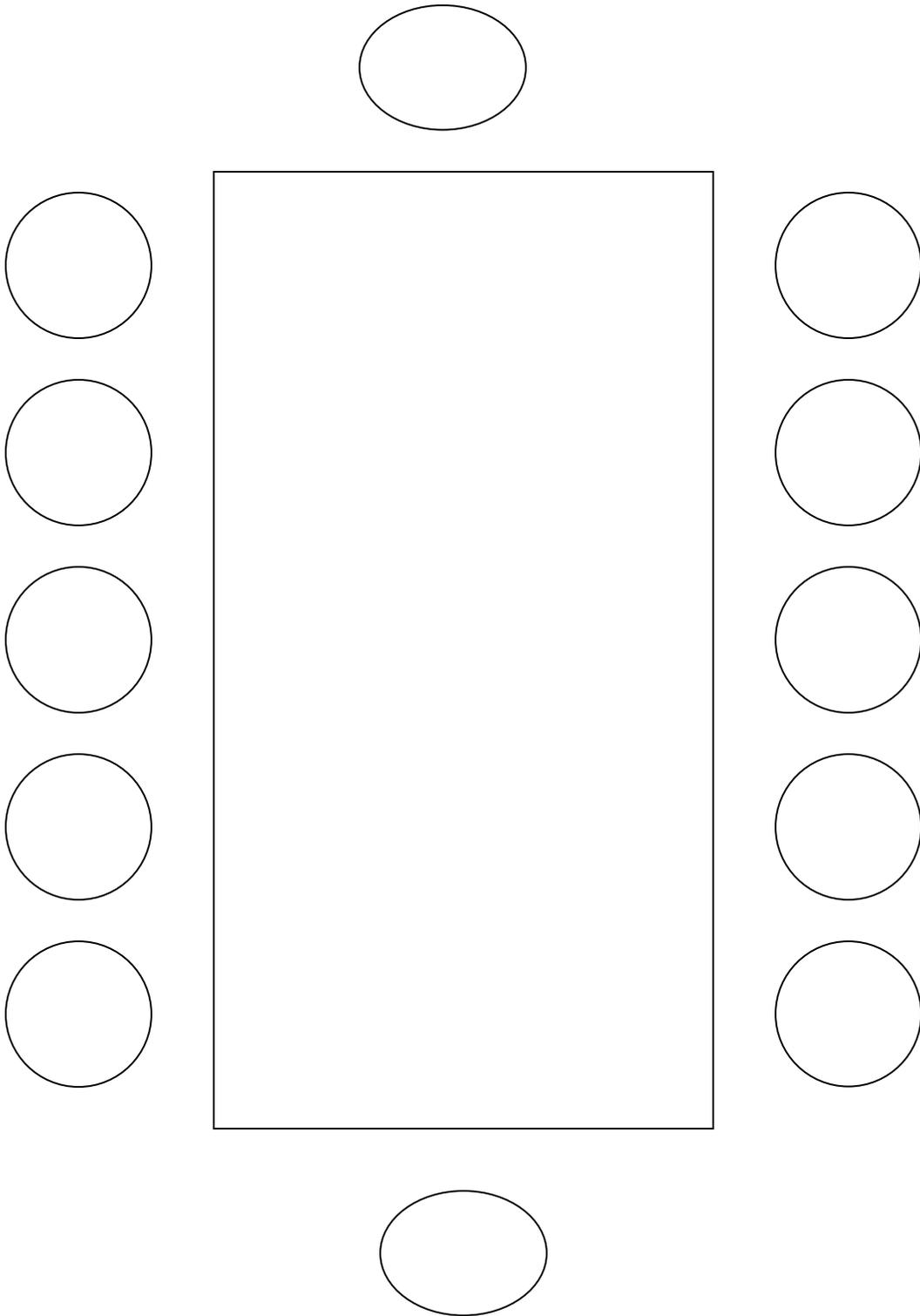
AFTER DISCUSSING THE WORST EVENT EVER, WRITE DOWN THE OPPOSITE OF WHAT YOU WROTE IN THE TOP TO ENSURE THAT YOUR EVENT IS A SUCCESS.



HOW TO PLAN THE WORST  
(DANCE) IN SCHOOL  
HISTORY...



# Who's At Your Table?





## **Science Lesson: Drops of Water on a Penny**

### **Leadership Lesson: Sticking Together**

How many drops of water can you put on a penny without them overflowing? Can you fit more on the “heads” side or on the “tails” side? How come the water seems to form a bubble over the penny as you add more and more drops? What happens if you use soapy water or rubbing alcohol? It all has to do with surface tension and how some molecules (like water) seem to stick together.

How about your group/class/team/family – do you stick together? How do you feel when you have a safety net so even if you mess up there are always people there to pull you back? Who is your safety net?

#### **Action:**

1. Give everyone a penny, a piece of paper towel and a dropper (also called a pipette.)
2. A cup of water should be near each person.
3. Have the group members guess how many drops of water they can drip on the penny before the water spills over the sides.
4. Show the group how to hold the dropper to deliver consistent drops each time. The dropper should be held at a 45° angle to the penny.
5. At no time should you touch the tip of the dropper to the penny or the water already on the penny yet the dropper should be close to the penny as you proceed.
6. Lay the penny on the piece of paper towel.
7. Fill your dropper with water.
8. Position the dropper at the correct angle and start dripping the water on the penny counting each drop.
9. Make sure the drops are full drops and not filled with air bubbles.
10. If the dropper is getting empty, fill it up with more water.
11. Be careful not to bump the table or you could disturb the water on yours or others pennies.
12. At the first sign of water overflowing, stop counting and record your data on the table below or in a notebook.
13. Do another trial to confirm your results.
14. Use the other side of the coin, a different coin. Does it make a difference? Why?
15. What do you notice about how the water on the penny looks?
16. Now try the whole experiment again using soapy water. (Let the bubbles settle before dropping it on the penny.) Or use rubbing alcohol instead. Is anything different about those trials?
17. Continue the discussion using the “Leadership Connections” found below.

## Leadership Connections!!

- Surface Tension is an inward and downward pulling force. Each molecule of water is pulled equally by every other molecule in the liquid. Since the molecules at the top don't have others above it they are pulled inward and that is what helps create the domed look of the water on the penny. There are forces in our lives that pull us in a direction, too.
- What are some of the forces in your life right now that are pulling you in various directions? Are they positive forces or negative forces?
- Which way are you being pulled right now?
- When is it better to stick with the group and when is it better to break free from the pull of a group?
- Share the 'Stuck in a Bucket Crab Story' with the group. Choose an ending that is fitting for your group.
- Your thoughts...

# Drops of Water on a Penny



How many drops of water can you drop on a penny before the water spills over?

Heads \_\_\_\_\_ (your guess)    Actual (Trial 1) \_\_\_\_\_    Actual (Trial 2) \_\_\_\_\_

Tails \_\_\_\_\_ (your guess)    Actual (Trial 1) \_\_\_\_\_    Actual (Trial 2) \_\_\_\_\_

1. Hold dropper at a 45° angle when dropping water on the penny.
2. Do not touch the tip of the dropper to the water on the penny.
3. Put penny on a paper towel.
4. Count only the full drops of water that fall onto the penny.

When you put water drops on a penny, the drops pile up into a dome because of **surface tension**. Surface tension is produced by the force of attraction between water molecules. Within the liquid, each water molecule is attracted to its neighboring molecules, making them "stick" together. The water molecules at the top, however, "stick" only to the water molecules next to and below them. That's because there are none above them. This unbalanced attractive force causes the water to act as if it had a thin "skin" on the surface. (Have you ever seen a bug sitting on top of a puddle? It is this skin-like quality produced by surface tension that allows small insects to rest on the water's surface.) As you add more drops, the force of gravity becomes stronger than the force of attraction among the water molecules at the surface. This causes the water to spill over the edge of the coin.

Soap in the water breaks up the bonding nature of the water and lessens the surface tension. You will notice that no "bubble" forms as you drop the soapy water drops on the top of the penny. Rubbing alcohol is the same. The bonds between the molecules do not have the same force of attraction therefore it does not have the same surface tension as regular old water.

What leadership lessons can you learn from this experiment?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

## **"THE STUCK IN A BUCKET CRAB STORY"**

A little boy and girl were on the beach building a sand castle and playing in the waves when they came upon a man who was fishing the surf. They asked him what he was catching and he replied that the sea was full of crabs and he was going to catch all that he could and then have a delicious dinner of crab legs and watermelon.



The children noticed that there were at least 7 crabs already in the bucket but it looked like they were trying to escape. The children thought that he might not have anything for dinner soon if he didn't put a lid on the bucket so they said, "You better put a lid on the bucket or all of the crabs you are going to have for dinner will escape."

The man replied, "Well, you see, when these crabs are in the bucket and one tries to crawl away, another crab will reach out with its pinchers and pull it back into the bucket. Because of that reason, I will have a delicious dinner tonight. None of my crabs will get away!"

And that's how it is with people. (now you get to chose your ending.)

Ending #1 – Sometimes we want to do something different and we try to get out of the bucket (our life as we know it.) But we might stray from the good values we were brought up with. We choose bad habits or hang out with the wrong people. It is good that we have this group/class/team/family to pull us back, to welcome us back into a loving and caring group.

Ending #2 – Sometimes we want to do something different – change a negative habit to a positive one, get better grades, get a better job, work towards reaching a goal, leave the environment that we are in – but there are always people who will try to pull us back and stop us from becoming something better. That is when we need extra strength to pull harder and get past those negative influences. That is when we need to dream those big dreams and go after them. Don't let others choose your fate.

## The Spinning Penny

1. Squeeze a penny through the mouth of a clear balloon. Make sure that the penny goes all the way into the balloon so that there is no danger of it being sucked out while blowing up the balloon.
2. Blow up the balloon. When properly inflated, the balloon will be almost clear in the middle and cloudy at the area near the neck and at the end opposite the neck. The cloudiness at the ends is unstretched latex, which provides stress relief. If the balloon is completely clear all over, it is overinflated.
3. Tie off the balloon and you're ready to go.
4. Grip the balloon at the stem end as you would a bowling ball. The neck of the balloon will be in your palm and your fingers and thumb will extend down the sides of the balloon.
5. While holding the balloon palm down, swirl it in a circular motion. The penny may bounce around at first, but it will soon begin to roll around the inside of the balloon. The best orbit or path for the coin is one parallel to the floor.
6. Once the coin begins spinning, use your other hand to stabilize the balloon. Your penny should continue to spin for 30 seconds or more.

Try using different sized coins and compare how long it takes for the coin to stop spinning once you stop swirling the balloon. Does the size of the coin make any difference?

### **How does it work?**

The Spinning Penny is almost like scientific poetry in motion. To understand how and why it works, you have to look at the forces that are acting on the penny. The shape of the balloon makes the penny move in a circular path - otherwise the penny would want to continue to move in a straight line. Another force to consider is friction. There's very little friction between the edge of the penny and the balloon. More friction would cause the penny to slow down and stop.

The real force in action here is called *centripetal force*, which means center-seeking. This is a force that is always directed toward the center of the circle and is actually responsible for keeping the penny moving in a circular motion inside the balloon.

(From [stevespanglerscience.com](http://stevespanglerscience.com))

## The Screaming Balloon

Warning: If you are a kid, DO NOT let your parents read this! You'll find that your balloon is always popped! Why, you may ask? Keep going... you'll see.

1. Squeeze the hex nut through the mouth of the balloon. Make sure that the hex nut goes all the way into the balloon so that there is no danger of it being sucked out while blowing up the balloon.
2. Blow up the balloon, but be careful not to overinflate the balloon, as it will easily burst. Tie off the balloon and you're ready to go.
3. Grip the balloon at the stem end as you would a bowling ball. The neck of the balloon will be in your palm and your fingers and thumb will extend down the sides of the balloon.
4. While holding the balloon, palm down, swirl it in a circular motion. The hex nut may bounce around at first, but it will soon begin to roll around the inside of the balloon. What is that sound? Could the balloon be screaming? The sound every parent loves...
5. Once the hex nut begins to spin, use your other hand to stabilize the balloon. Your hex nut should continue to spin for 10 seconds or more.

What happens when you change the size of the balloon or the size of the hex nut? Try using a marble instead of a hex nut. Does the marble make the balloon "scream?" Experiment with other objects whose edges may vibrate against the balloon.

### How does it work?



This is actually a 2 for 1 experiment - you're learning about the science of motion and sound. The hex nut circles inside the balloon due to *centripetal* force. Centripetal force is the inward force on a body that causes it to move in a circular path. It is a "center-seeking" force. A hex nut has 6 sides, and these flat edges cause the hex nut to bounce or vibrate inside the balloon. The screaming sound is made by the sides of the hex nut vibrating against the inside wall of the balloon.

To prove this, repeat the experiment using a penny in place of the hex nut (see [The Spinning Penny experiment](#)). While the penny spins beautifully inside the balloon, the "spooky" sound is gone. The Screaming Balloon makes for a great Halloween party giveaway or a fun science experiment for teachers to do in class.

## Leadership Connections!!

- Have students make observations about what is happening, first with the penny and then with the hex nut in the balloon. How can you relate these observations to being a leader?
- If you look closely, the penny leaves tracks on the inside of the balloon but it doesn't make any noise. How come the penny doesn't make any noise? How come it leaves tracks? There are quiet leaders and very vocal leaders. Some times the only reason you know the quiet leaders were there is because they leave tracks. They leave a legacy behind that makes a difference to your school, organization, business or friendship. Who are the quiet leaders in your life?
- The hex nut creates a lot of noise. Vocal leaders can make a difference too, by rallying the troops and getting you motivated for a task. Who are the "loud" leaders in your life?
- The hex nut makes intermittent marks inside the balloon because its edges are not smooth. It's our job as teachers to smooth out the rough edges.
- The penny took a little bit of work to get going but then it kept going. Some leaders need a little help to get started or to get a project off the ground, but once they do that, the project keeps rolling along.
- The hex nut is hard to get moving and once it starts moving it makes a lot of noise but then slows down quickly. Some leaders are very outspoken and boisterous about projects but they don't always produce results.
- We need leaders like the strong, silent type and like the loud, boisterous type. When do you need each type of leader? Why might you like both kinds of leaders in your group?
- Your thoughts...

# Salt and Marble Mystery



Finding the toy surprise in your favorite breakfast cereal is never easy. Most of the time you're forced to dig through the cereal or dump it out just to find the lousy toy. Stop the digging! Believe it or not, there's a science to finding the toy surprise. A classic science puzzle will teach you how to make the toy surprise rise to the top of the cereal... without ever opening the box!

It's easy to make the toy surprise rise to the top of the cereal if you understand the physics of friction. Of course, you'll need a little practice with a science toy before you're a master toy snatcher.

## Materials

- Plastic [test tube](#) with an end cap
- Salt
- Marble



1. Fill the test tube 3/4 full with salt.
2. Place the marble on top of the salt.
3. Seal the end of the test tube with a cap (or a cork). The trick is to get the ball from one end of the tube to the other, through the salt.

One might think that since the marble is much more dense than the salt, it will sink to the bottom when the sand is agitated. The opposite is actually true.

### **How does it work?**

Hold the tube vertically with the marble at or near the bottom. As you shake the tube up and down, the marble will actually rise through the column of salt. Each time the tube is jerked upwards, both the marble and the salt move up at the same speed. Because the salt particles are lighter and smaller, they experience greater relative friction than the marble when rubbing against each other. This causes the salt particles to slow down faster. After each shake, more salt particles are packed underneath the marble, until it magically emerges from beneath the salt.

### Leadership Connections!!

- Little bits of friction between the salt molecules causes those molecules to slow down which makes the marble rise to the top. There are people in our lives that might cause friction (parents telling us to clean our room, say “please and thank you”, get our homework done; teachers who want you to rewrite a paper, practice your math problems, try out for the play; friends that make you go work out with them, yell at you for doing something “stupid”, challenge how you treated someone.) These bits of friction help us rise to the top.
- Who should I thank for being that bit of friction that helped me do something special?
- Am I a good friction to others? Why?
- Your thoughts...

## **AFFIRMATION BINGO**

<b>Thank someone for something specific</b>	<b>Compliment someone else's hairstyle</b>	<b>Recite a few lines of a nice poem or song to someone</b>	<b>Give someone a friendly hug</b>	<b>Ask "How are you?" and listen to the answer</b>
<b>Give someone a shoulder rub</b>	<b>Say "I'm glad you're here!" and mean it</b>	<b>Share something you have with someone else</b>	<b>Hold the door open for someone and greet them with warmth and a smile</b>	<b>Share an encouraging thought or story</b>
<b>Compliment someone's taste in clothing</b>	<b>List three good things about someone</b>	<b>Tell someone you care about him or her</b>	<b>Say "I love you" to someone</b>	<b>Compliment someone's taste in music</b>
<b>Tell someone what he or she adds to the group</b>	<b>Laugh at someone's favorite jokes</b>	<b>Strike up a conversation with someone in line with you</b>	<b>Applaud someone for a job well done. Tell them why it was a good job</b>	<b>Offer to get someone something to drink</b>
<b>Hum someone's favorite song</b>	<b>Write a real letter to someone who really needs it</b>	<b>Talk to one person whom you don't normally strike up a conversation</b>	<b>State a positive wish for someone</b>	<b>Leave a handmade card or note on a teacher's desk or a parents dresser</b>

## **SCATTERGORIES**

Use the first letter of your name to answer the following...  
Go around in a circle. Start with a different person each time.

1. What is your name?
2. A four letter word?
3. A vehicle?
4. Name of a City?
5. A boy's name?
6. A girl's name?
7. Name of a beverage?
8. Something you wear?
9. Name of a celebrity?
10. A food item?
11. A reason for being late?
12. A cartoon character?
13. Something you shout?
14. Name of a game?

