Teacher Resource Guide:
Bill Blagg's The Science of Magic

The lessons and activities in this guide are driven by the Ohio Early Learning and Development Standards (2012) and the Ohio Revised Science Education Standards and Model Curriculum (2011) which serve as a basis for what all students should know and be able to do in order to become scientifically literate citizens equipped with knowledge and skills for the 21st century workforce and higher education.

21st century skills of creativity, critical thinking and collaboration are embedded in process of bringing the page to the stage. Seeing live theater encourages students to read, to develop critical and creative thinking skills, and to be curious about the world around them.

This Teacher Resource Guide includes background information, questions and activities that can stand alone or work as building blocks toward the creation of a complete unit of classroom work.

cuyahoga arts & culture
Ohio Arts Council

The Ohio Arts Council helped fund this organization with state tax dollars to encourage economic growth, educational excellence and cultural enrichment for all Ohioans.

Playhouse Square is supported in part by the residents of Cuyahoga County through a public grant from Cuyahoga Arts & Culture.

ABOUT THE PERFORMER

The Man Behind the Magic

To say that Bill Blagg has had a magical life would be no exaggeration. From the moment he received his first magic kit in 1985, his world was never the same. Bill professionally launched his magic performing career in 1996, at the ripe age of 16. Bill became a stand-out in the magic community, due in part to his off-the-cuff personality and his high-energy performance style.

After graduating college with honors, Bill hit the road to perform magic full-time. Today, Bill has one of the largest touring illusion shows in the country. His show has been featured on NBC, CBS AND FOX television.

Having a love for both magic and science, Bill combined the two to create his one-of-a-kind, educational show called *The Science of Magic*. The show takes students on a rare, exciting, never-before-seen journey behind the scenes of the magic world. Students discover first-hand how magicians utilize science to create the impossible.

Bill lives in Milwaukee, WI with his wife Kristin. When he's not performing he can be found at his workshop, working with his dad to create new illusions to thrill his audiences.

For more information on Bill Blagg, visit his official web site: http://www.billblagg.com/

Magic and Science

Both magic tricks and science experiments can leave people scratching their heads in amazement. Sometimes it seems there is little difference between magic and science. What are magic tricks anyway? Magic tricks are really just illusions. The magician knows the secret of how to do the trick. To the audience, the trick appears to be magic because they don't understand how the trick was done.

Many magic tricks are just simple science experiments. The magician adds a few magic words to make you believe that something supernatural and mysterious is happening. Magicians are master showmen and work very hard to fool audiences by using misdirection and manipulating their senses. In the end, there is a scientific explanation for how the trick works that has nothing to do with magic or magic words.

Coming to the Theater

Playhouse Square is an exciting field trip destination! As the country's largest performing arts center outside of New York, the not-for-profit Playhouse Square attracts more than one million guests to 1,000+ performances and events each year. Playhouse Square thus acts as a catalyst for economic growth and vitality within the region. When you visit, be sure to note the GE Chandelier, the world's largest outdoor chandelier, and the retro Playhouse Square sign with its 9-foot-tall letters!

As audience members, you and your students play a vital role in the success of the performances. You are part of a community that creates the theater experience. For many students, this may be their first time viewing a live theater production. We encourage teachers to discuss some of the differences between coming to the theater and watching a television show, attending a sporting event or viewing a movie at the cinema. Here are a few points to start the discussion:

- Students are led into the theater and seated by an usher.
- Theaters are built to magnify sound. Even the slightest whisper can be heard throughout the theater. Remember that not only can those around you hear you; the performers can too.
- Appropriate responses such as laughing or applauding are appreciated. Pay attention to the artists on stage; they will let you know what is appropriate.
- There is no food, drink or gum permitted in the theater.
- Photography and videotaping of performances is not permitted.
- When the houselights dim, the performance is about to begin. Please turn your attention toward the stage.
- After the performance, you will be dismissed by bus number. Check around your seat to make sure you have all of your personal belongings.

An exciting destination for field trips and more!

Pre-Show Activities

PRE-SHOW DISCUSSION TOPICS

Use the following questions to start classroom discussions prior to attending *The Science of Magic*:

- What is magic?
- Name some famous magicians?
- What is your favorite magic trick?
- Does anyone in our class know a magic trick?
- If you could learn how to do one magic trick, what would magic trick would you like to learn? Why?
- Do magicians have magical powers or do they use science to fool us?
- Where do magicians learn how to do magic?

Magic Terms

Abracadabra: Magic word used to help magician "make something happen." In reality, it is derived from ancient cabalistic symbols and at one time was believed to hold real power. The word may be derived from the Hebrew Ha-b'rakah, meaning "the blessing" or "the sacred name."

Ace: Either the playing card with a singular pip, or the side of a die with only one spot. From the Latin *as*, or unit.

Attract: to come together

Center of Gravity: the point where the effect of gravity on an object is equal

Fakir: A performer of seemingly miraculous feats (such as fire walking, snake charming and lying on a bed of nails), usually with some religious significance. This term is sometimes mistakenly used to describe a magician or conjurer; the proper Indian term for "magician" is really *jadoo wallah*.

Hat Production: Not the production of hats, but rather the seemingly impossible production of many items from a single hat. Hartz's "Devil of a Hat" routine and Thurston's "All Out of a Hat" were spectacular productions. These effects lost popularity when fashion changed and men no longer wore hats; today, the hat would seem to be a prop rather than an "ordinary object."

Hocus Pocus: Nonsense phrase used to help the magician "make something happen." Some feel that the word is a corruption of a Latin phrase used in the Mass; others say that it was the name of a magician. Still another source considers it a reference to the Norse folktale sorcerer Ochus Bochus. It could also be a meaningless phrase, created for its sound alone.

Illusions: something that produces a false impression of reality

Misdirection: focusing attention on one thing in order to distract attention from another

Perspective: the way an object appears to the eye

Levitate: to float in air

Magnetism: the invisible force that causes items to attract or repel each other

Mirror: an object with at least one reflective surface

Mirror Image: the image seen when looking into a mirror

Plane Mirror: a mirror with a flat surface; most common type of mirror

Presto: magic word taken from the musical term *presto*, for "quickly"

Reflection: the bouncing of light from a surface

Refraction: the change in direction of light as it moves from one transparent substance to another

Profonde: Large pocket in the tails of a long tuxedo coat that allows the magician to vanish items by tossing them down and behind him, into his pocket.

Servante: Pouch or shelf positioned on the magician's side of a table, hidden from the spectator's view, but allowing the magician to dispose of items by secretly dropping them onto the servante while the hands seem to always remain in full view above the table.

GRADE BAND THEME: INTERCONNECTIONS WITHING SYSTEMS
Earth and Space Science (ESS)
Topic: Earth's Resources
Content Statement (3): *Earth's nonliving resources have specific properties.*

GRADE BAND THEME: ORDER AND ORGANIZATION
Physical Science (PS)
Topic: Matter and Motion
Content Statements (6):

- *All matter is made up of small particles called atoms.*
- *Changes of state are explained by a model of matter composed of atoms and/or molecules that are in motion.*

GRADE BAND THEME: ORDER AND ORGANIZATION
Physical Science (PS)
Topic: Conservation of Mass and Energy
Content Statement (7): *The properties of matter are determined by the arrangement of atoms.*

The Floating Egg

Sometimes a magician seems to make things float in air. In this project you won't make things float in air, but you will make an egg float in water.

Materials

- Quart (liter) jar
- Tap Water
- Scissors
- Ruler
- Masking Tape
- ½ Cup Salt
- Felt-tip pen
- Uncooked Egg
- Large Spoon

The Setup

1. Fill the jar half full of water
2. Cut a 3" piece of tape and stick it to the outside the salt container. Use the pen to write on the tap "Magic Swimming Powder."
3. Place the egg and spoon on the table.

Magic Science Time!

1. Tell your audience: "I am going to teach an egg how to swim."
2. Begin by showing the audience that the egg doesn't know how to swim by placing the egg in the jar filled with tap water. The egg will sink to the bottom. Remove the egg from the jar with the spoon.
3. Tell the audience that for the egg to swim you need to add magic swimming powder to the water. Pour the salt in the water and stir with the spoon. Say some magic words like "Abracadabra" or "Hocus Pocus."
4. Place the egg in the water – the egg will float!

Discussion

1. How did the magic powder help the egg float?
2. hat was created by mixing the powder in the water?
3. Why didn't the egg float without the powder?

Explanation

All matter floats or sinks depending on its density. Less dense substances float on more dense substances. The egg floats in salt water because the egg is less dense than the salt water. However, the egg is denser than tap water, so it sinks.

Salt water is a solution that contains both salt and water. A solution occurs when a solid is dissolved in a liquid.

Tap Water

Salt Water

GRADE BAND THEME: INTERCONNECTIONS WITHING SYSTEMS
Physical Science (PS)
Topic: Light, Sound and Motion
Content Statement (5): *Light and sound are forms of energy that behave in predictable ways.*

The Broken Pencil

Materials:

- A glass
- Tap Water
- Pencil

The Setup

1. Fill the glass about two-thirds (2/3) full of tap water.
2. Place the glass of water and pencil on the table.

Magic Science Time!

1. Hold the pencil in front of you. Tell the audience: I'm going to break the pencil by simply sticking it in this glass of water."

2. Hold the pencil upright in the water so that the tip of is about halfway between the surface of the water and the bottom of the glass. Make sure the pencil is near the back of the glass, away from the audience.

3. Move the pencil back and forth in the water, keeping it upright. Ask them what they see. It will appear as though the pencil is broken when in the water.

4. Remove the pencil from the water.

Explanation

This trick works because of refraction. Light travels in straight lines, but when it travels from one transparent substance to another the light rays bend. This is refraction. When light travels from a more dense transparent substance, such as water, to a less dense substance, such as air, the light refracts, or bends noticeably. Light travels at different speeds in substances with different densities.

Light reflected from the pencil appears to the audiences to be in one place when it travels to their eyes through the air, and in another place when it is refracted through water.

Post-Show Activities

MAGIC TRICKS FOR YOUNGER STUDENTS

Crayon ESP

The Big Reveal

Child picks a crayon from a box. You guess the color with mind-reading powers!

Prop:

A small box of crayons.

Secret Steps

1. Stand with your back to your child. Put your hands behind your back and ask her to pick a crayon out of the box and place it into your hands.

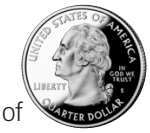
2. Once you can feel it in your fingers, turn to face your child with your hands concealed behind you. While you're talking about the magic, scrape the crayon with your right thumbnail so some wax gets stuck between your finger and the nail.

3. Keeping the crayon behind your back in your left hand, transfer your child's thoughts to your own with your right hand. Wave your fingers in front of her face, repeating, "I'm reading your thoughts" and "I'm moving them into my mind."

4. As you're waving your hand in front of your eyes, sneak a glimpse of the color under your thumbnail.

5. Reveal the answer, adding a few dramatic *abracadabras* for effect.

It'll Cost You



Preparation: You'll need a quarter, a piece of tinfoil just bigger than the quarter, and a small square of paper (big enough to fully cover the coin). Place the tinfoil over one side of the quarter and around the rim, and gently rub it to set the coin's impression on the foil. Remove the quarter and cut off any excess foil.

Trick: Place the foil quarter in the palm of your hand and show the audience; tell them you're going to make it disappear. Place the piece of paper over the quarter, wave your magic wand, say the magic words and remove the paper. When the audience sees that it's still there, say you'll try again. When it doesn't work for the third time, apologize to the audience and crumple the paper and the foil into a tiny ball. Make sure the paper covers the foil so it looks like the quarter has been crushed.

Magic Touch

Preparation: Fill an aluminum pie plate with just enough water to cover the bottom. Arrange some toothpicks in a square in the middle of the pie plate, making sure their tips overlap so they stay together. Dip another toothpick in dish detergent.

Trick: Have your audience gather around the pie plate, which you can either set on a table or the ground. Tell them that you will fill a toothpick with your power, and then use it to make the square of toothpicks separate. Take out your toothpick dipped in dish detergent, say your magic words, and place the soap-dipped end into the middle of the square. The soap will cause the toothpicks to fly apart in the water.

MAGIC TRICKS FOR OLDER STUDENTS

The Linking Paper Clips

The Big Reveal:
Two plain old paper clips spring into the air and mystifyingly link themselves together!

Props:
A dollar bill and two paper clips.

Secret Steps

1. Take 1. The dollar bill and accordion-fold it into thirds so it's shaped like an S.
2. Attach one of the paper clips to the front of the bill from the top, with the shorter side of the clip facing you. The clip should go over the outer layer of the folded bill as well as the middle layer, and it should be clipped near the edge of the bill, not the fold.
3. Attach the other paper clip to the back of the bill from the top, with the shorter side facing away from you. Again, the clip should go over the outer layer of the folded bill as well as the middle layer.
4. Take one end of the bill in each hand and give it a quick snap. The clips will fly into the air, and when you pick them up, they'll be attached. How? Magic, of course.

Brain Power

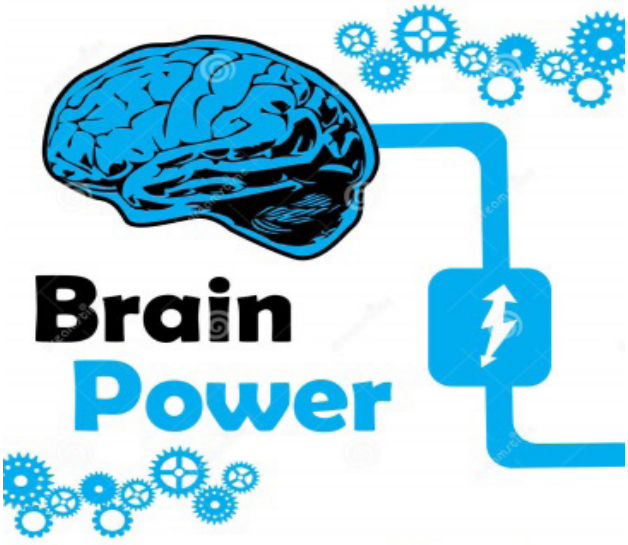
Preparation: Before you perform the trick, choose a friend to assist you and explain to them how it works. Tell your assistant to always inquire about the audience-chosen object after an item that's the color black. Your assistant will appear to be "testing" your powers in front of the audience.

Trick: Tell your audience that you have psychic powers. Ask your friend to assist you, and then instruct the audience that they must choose an object when you leave the room. When they call you back in, ask the audience to concentrate on the item and then ask your assistant to start testing your powers. Have your assistant go through different objects in the room asking: "Is it the yellow chair? Is it the green rug?" etc. Astound everyone when you correctly identify the object!

All Fall Down

Preparation: Get a dishtowel, a plastic cup and a small, flat eraser. Sit at a table and have your audience stand on the opposite side.

Trick: Put the eraser on the table and cover it with the cup; then place the dishtowel on top. Lift both the cup and dishtowel up, revealing the eraser, and ask your audience to concentrate on it. While they're focused on the eraser, discreetly drop the cup into your lap, but continue holding the towel as if the cup were still there. Then put the towel back over the eraser and smash your hand down on it; at the same time, drop the cup from your lap to the floor. Lift the towel to show that the eraser is still there, but that the cup has fallen "through" the table.



Critical Response Questions

Students develop their comprehension when they reflect upon what they wondered about, noticed and felt. Ignite a classroom discussion with the following critical response questions:

1. **What was your favorite magic trick in the show and why?**
2. **How do magicians create magic tricks?**
   - *They use the steps of the scientific method. They develop a theory (a hypothesis), then they test it. If it fails they change one variable and test it again. They repeat this process over and over until they get their theory to work.*
3. **Do magic tricks always work?**
   - *No. Just like scientists, magicians must keep experimenting to find ways to make illusions work. Some ideas NEVER work and others take YEARS to create!*
4. **How do magicians use mirrors to make magic?**
   - *They use mirrors to reflect light to make a person think they are seeing something (a mirror image) that is not really there.*
5. **What type of mirror did Bill use to make things disappear in the magic box?**
   - *Plane mirror.*
6. **Can a solid pass through a solid?**
   - *No. When molecules are tightly packed together they form a solid. In a solid, the molecules can't move or separate in order to allow another solid to pass through.*
7. **Since a solid can't scientifically pass through another solid, how did Bill pass through the plate of metal?**
   - *Bill used misdirection and controlled perspective on the sheet of metal to create the illusion of him passing through it.*
8. **What can you do with an object when you find its center of gravity?**
   - *Make it balance.*
9. **After everything Bill taught us during the show do you think the teacher was really floating in mid-air at the end of the show?**
   - *Mention the passing of the metal hoop as proof of no supports. Use this question to spawn creative methods of how the teacher was floating.*

Activity: *Create experiments to test the student's hypotheses on how they think the teacher floated. Were their hypotheses correct? Why or Why not?*

RESOURCES

Books

52 Series: Cool Tricks for Kids Cards by Chronicle Books. Chronicle Books Pubishing, (September 1, 2008).

101 Ways to Amaze & Entertain: Amazing Magic & Hilarious Jokes to Try on Your Friends & Family (101 Things) Flexibound by Peter Gross (Author), Walter Foster Jr. Creative Team (Author). Walter Foster Jr. Special edition (October 5, 2015).

Big Magic for Little Hand: 25 Astounding Illusions for Young Magicians by Joshua Jay. Workman Publishing Company, 2014

Card Tricks for Beginners by Wilfrid Jonson. Dover Magic Books Publications, 2004.

Easy-to-Do Card Tricks for Children (Become a Magician) by Karl Fulves. Dover Publications, 1989.

Kids' Magic Secrets: Simple Magic Tricks & Why They Work by Loris Bree. Marlor Press Publisher, 2003.

Joshua Jay's Amazing Book of Cards: Tricks, Shuffles, Stunts & Hustles Plus Bets You Can't Lose by Joshua Jay. Workman Publishing Company; Pap/DVD edition, 2010.

Magic Science: 50 jaw dropping, mind-boggling, head-scratching activities for kids by Jim Wiess. San Francisco: Jossey-Bass, 1998.

Science Magic Tricks by Nathan Shalit. New York: Rinehart and Winston Publishing, 1981.

Web Sites

About Magic
www.magic.about.com

Good Tricks
www.goodtricks.net

Best Magic Trick Resources
www.blifaloo.com/magic/resources.php

Learn Magic Tricks:
www.learnmagictricks.org

Card Magic Tricks
www.learncardmagictricks.co.uk

Magic Tricks
www.magictricks.com

Card Trick Central
www.cardtricksite.com

Mr. Magician
www.mrmagician.co.uk

Free Magic Tricks
www.freemagictricks4u.com

You Tube

www.youtube.com/user/MagicTricks

www.youtube.com/watch?v=eRtLOABCWOY

Apps

Magic-Tricks Tutorials:

This app teaches tricks in four categories:

- Card Tricks
- Coins
- Mind Reading
- Objects

Magic-Tricks Tutorial explains the basics of magic tricks in easy-to-follow step-by-step-instructions. Additionally, the pictures help you to better understand the instructions and recreate the tricks. From the "Disappearing Coin" over the "Heart of Cards" to "Mind Reading," the whole spectrum of magic tricks is presented here. We explain magic tricks which can easily be understood by the layman, but are still impossible to figure out for the audience. Do you have what it takes to be a great illusionist? Find out by getting the Magic-Tricks Tutorial app. For Droid Phones. ***FREE***

Magic – Card

Possible Presentation

The audience is asked to randomly pick a card from a deck of playing cards. You whip out your iPhone and ask the audience to rub the selected card on the back of your iPhone. A card then suddenly appears floating face-down on the home screen of the iPhone. You magically remove the card from the screen with a flick of your finger and with the iPhone in the audience's hand, it magically reappears on the screen showing the actual value of the card chosen by the audience! For iPhones. $3.99