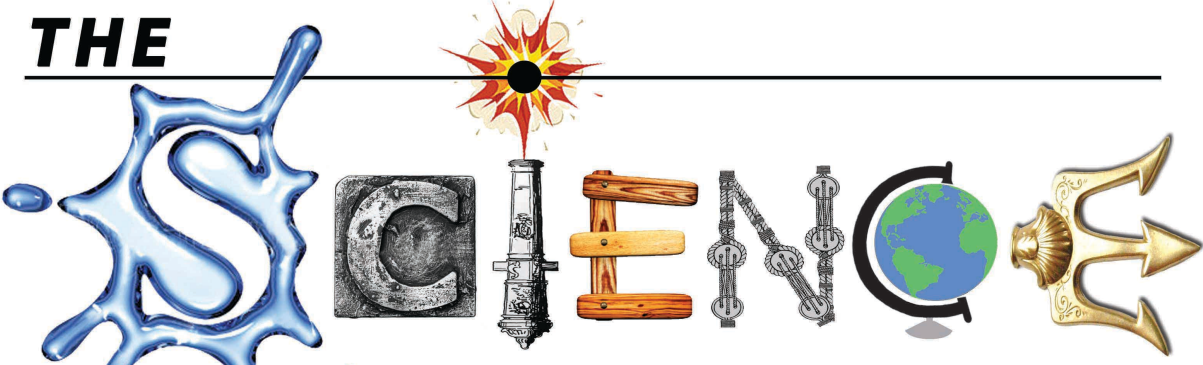


**Study Guide v.2/2015**

**“Pirate School: The SCIENCE of Pirates!”**

**THE**

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**SCIENCE**

**OF PIRATES!**

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## **OVERVIEW:**

"Pirate School: The SCIENCE of Pirates!" is an uncommon and engaging matinee assembly for students Grades 3-5, promoting curiosity in the sciences by presenting *S.T.E.A.M* curricula with a comical, nautical twist!

The aim of this assembly is to excite with the allure of swashbuckling fun while introducing simple concepts and technologies outlined in the *Next Generation Science Standards*.

Subjects covered will include: Optics, Simple Machines & Engineering, Navigation & Astronomy, Aero & Hydrodynamics and rudimentary physics of how a Cannonball flies.

## **WHY A NAUTICAL-THEMED SCIENCE SHOW?**

Mariners and seafaring explorers have pushed science and technology forward ever since early humans launched the first log raft.

The Earth is over 75% water and humans have always needed to safely and effectively interact with the aqueous part of our world to survive; to discover new lands, trade goods & services, harvest nourishment from the deep and bring it to market swiftly.

Mariners have needed to build ships strong enough to survive the harsh conditions at sea and swift enough to maneuver around hazards and outrun enemies. Sailors used simple machines to hoist the heavy objects required for life on the water: to raise the sails and spars that propel their ships; move and aim the cannon

that protect them; to load their massive cargo holds with goods, precious spices and treasure.

Seafarers have developed technologies to help them navigate their ships across vast uncharted waters and return to their homeport safely.

They use telescopes to see far off hazards or enemies. They use compasses affected by the Earth's magnetic poles and created clocks and devices to accurately pinpoint their position on the Earth while sailing upon the ever-shifting oceans. These navigational devices and techniques use astronomy, mathematics and mapmaking.

## **WHAT TO EXPECT DURING “The SCIENCE of Pirates!”**

“The SCIENCE of Pirates!” aims to excite students’ curiosity in the realm of Science, Technology, Engineering and Math (S.T.E.M).

Students will attend a 60-minute “Pirate School!” that combines entertaining, comic “Pirate Lessons” with subjects all directly supporting many Next Generation Science Standards found in the S.T.E.M curricula.

These demonstrations of techniques, tools and concepts were devised or developed by mariners throughout history, and students will experience them demonstrated via graphic visuals, on-stage demonstrations, hands-on student volunteers, full-audience participation and related follow-up classroom activities.

## TOPICS COVERED AND CLASSROOM ACTIVITIES

The following are several topics covered during “Pirate School: The SCIENCE of Pirates!” and suggestions for classroom activities.

1) Oceans and Maps: The prevailing winds and currents of our Earth are created by multiple processes including the planets’ rotation, rising hot air at the Equator and High and Low pressure air.

- Color Map of the World to show 75% of globe is covered with water.
- Use coins, sand, or cut paper to demonstrate 75% of something and have a greater sense of the extent the earths surface is covered with water.
- Make an ocean in a bottle. Oil 2/3, water with blue food color 1/3.

2) Navigation: Knowing ones position on the seas before Satellite Navigation was a mathematical equation involving graphing, accurate time keeping, use of Compasses and triangulation with land-based and Celestial objects.

- Discuss the Magnetic Poles.
- Make a Compass: Rub needle on fabric, lay on cork floating on water in a paper cup. Discover North.
- Observe and discuss Longitude/Latitude/Equatorial lines on Globe.
- Make a map of an Ocean with land-masses on either end. Draw graph of longitude and latitude. Chart a course from one point to another to avoid islands and prevailing winds.

3) How does a sailboat work? Wind/air pressure on a Wing: The principle of the Bernoulli effect is demonstrated to show how “lift” comes into play with how a sailboat works.

- Explore Low v High Pressure. Blow on the curved edge of a slice of paper, like wind over a wing or a sail. Observe how the paper rises up as air flows over it. Low press on top and high pressure on bottom creates Lift.
- Experiment with Bernoulli effect: Use plastic garbage bag to replicate on-stage demonstration.

4) How does a spyglass work? Optics and Refraction of Light were important to seafarers for obvious reasons- in order to see hazards far out to sea.

- Make a spyglass. Project uses two small magnifying glasses, paper-towel roll and tape.
- Discuss Refraction.
- Discuss how a Lens works.
- Bend light using different materials: water, glass, mirror.

5) How do you lift a cannon? Simple Machines will be demonstrated from a simple rope, to a pulley to a more complex block and tackle system.

- Make a lever with a fulcrum.
- Make a Pulley: Use clothesline pulley and rope or spools, wire and yarn to make a Pulley. Have a competition to lift more weight.
- Discuss where pulleys are used in modern life: Elevators, flagpoles, cranes, etc.

6) How does a cannonball resemble a tennis ball? The Magnus Effect is demonstrated to show how spin and resistance effects balls in flight.

- Demonstrate the Magnus Effect in the classroom with rolled paper and a plank.
- At gym or recess, experiment with spin on a kick-ball or soccer ball to affect its trajectory one way or another.

## **WHY PIRATES?**

While it's true that the term "Pirate" refers to a criminal of the seas; those who broke the rules and robbed law-abiding people, we at Pirate School! derive our particular character from a Era just before that of the dangerous and violent "Golden Age of the Buccaneer" (1650-1725).

Well before the temptation led some sailors "turn pirate" and attack the giant Spanish Galleons bound for Europe, laden with gold from Central and South America—mariners behaved by a different code of honor and were full of curiosity and lust for adventure!

This period of time was called "The Age of Discovery and Exploration" roughly between 1400 to 1600, when citizen-explorers like Vasquez, Columbus, Drake, Piri Reis and Zhenghe, pushed out into the unknown, much like the brave astronauts of our time.

The alluring theme of "Pirates" has captivated our imaginations, not so much due to their criminal exploits, which are to be condemned, but inspired from great literature ("Treasure Island" and "Peter Pan") and of the Hollywood swashbuckler films ("Captain Blood," etc) that thrilled many generations for a hero's quest for adventure, piles of treasure and what glorious mysteries lay beyond distant horizons.

In this light we take our cue and aim to satisfy children's universal curiosity about the briny Buccaneers of yore while subtly boosting their knowledge and self-esteem by prompting them to be more empathetic, courageous and curious corsairs.

## **WHO IS THE PERFORMER?**

David Engel is a veteran New York-based variety performer and physical comedian who has been delighting audiences since 1989 with his special blend of theatrical "action clown" productions.

David performs over 250 shows a year entertaining thousands of kids at theaters, festivals, libraries, schools, parks departments, and family resorts. His signature show, Pirate School! is currently tours to performing arts centers nation-wide.

His work has won various professional awards and been featured in New York Magazine's "BEST OF NY: KIDS!" David has performed in forty U.S states, eleven European countries, the Caribbean, Singapore and in The People's Republic of China. For thirteen years he worked as a "clown doctor" with the Big Apple Circus' world-renowned in-hospital Clown Care Program.

Hallmarks of his various "action clown" shows include eccentric props, magic, bubble-play puppetry, a rich musical and special effects score, unexpected improvisation and loads of active "on-their-feet," full-audience participation.

David's work is nonviolent, and non-gender specific and aims to incite curiosity, empathy, social-courage and empower today's increasingly distractible youth.

# PIRATE SCHOOL!

## What's So Funny?

Pirate School! is described as a "Sea-Faring Vaudeville" and a "Slapstick Comedy." What does that mean?

Before television, movies and radio, people used to go to theaters for entertainment. Many went to plays, music concerts or opera but it was the vaudeville style that combined a little bit of everything. Each performance was made up of a series of separate, unrelated acts grouped together. Types of acts included dancers, comedians, trained animals, magicians, impersonators, popular and classical musicians, acrobats, singers, jugglers, escape artists and anything that would entertain an audience.

Pirate School! is a "One-Man Vaudeville" because there is only one performer who does a variety of things. He does magic. He sings. He is a ventriloquist. He does slapstick comedy. He is shot out of a cannon.

Just kidding. He does not get shot out of a cannon.

**slapstick [slæp stk] noun.**

**a. comedy characterized by horseplay and physical action.**

**b. boisterous form of comedy marked by chases, collisions, and silly jokes.**



**THE  
FUNNY  
BONE**

**NOT  
LAUGHING**



### WHAT MAKES THINGS FUNNY?

Comedy is a hard thing to do. It's not just telling jokes. Comedy is full of opposites and contradictions. Surprises. And what makes one person laugh, may not get a chuckle from another. Here are some guidelines for what makes us laugh.

#### IT'S EXPECTED...

An adult gives a kid a big rubberband to hold without letting go. The kid lets go and the rubberband snaps on the adults rear-end. We expect the kid to let go. That's funny.

#### IT'S UNEXPECTED...

We are told we will now see a cannon ball. We are shown a rubber duckie. We expected a cannon ball. We weren't expecting to see a duckie. That's funny.

#### IT'S FAMILIAR...

We know a pirate sword is sharp. That's familiar. If the Pirate (unexpectedly) grabs it with his hand (which is also funny) and says "Ouch!" quite loud. That's familiar. That's funny.

#### IT'S UNFAMILIAR...

We usually try to keep our underwear hidden from view. When 300 people see them, that's unfamiliar. That's funny (but only if it's the other guy's underwear).





# PIRATE SCHOOL!

## Were There Girl Pirates?

In the Golden Age of Sail (from 1550-1900) women around the world couldn't easily escape a life of marriage, children and housework. Some had the same irresistible urge for adventure and freedom as men did. Female pirates often had to work in secret and disguise themselves as men to survive in the world of piracy (see pictures on the right).

Female pirates ruled waters throughout the world, but today are often forgotten next to their more plentiful male crewmates. While dashing male pirates have dominated books and movie screens for ages, female pirates are often left behind or ignored by history.

Ching Shih sailed the China Sea in the early 1800's. A brilliant female pirate, she commanded 1800 ships and about 80,000 sailors. Anne Bonney and Mary Reade were the most famous English female rovers. Among their many exploits, they saved their ship from capture while their all male crew over-slept. One legendary meeting took place between the most powerful ruler of the day, Queen Elizabeth I of England and the famous Irish Pirate "Queen" Grace O'Malley. Both Queens were so impressed by each other that they ceased fighting and became friends.

While their bad deeds were certainly wrong, it is clear that the famous female pirates possessed an incredible amount of courage and individuality.



Anne Bonney and Mary Reade



BFFS and Pirates!

Girls Rule!



## Questions for your Class

Would you want to live a life on the High Seas?  
How many girls replied "Yes"? How many Boys?

Did anyone say "No"? and Why?

According to what you know about Pirates, are there any differences between what girls can do and what boys can do?

Explain any differences.

# PIRATE SCHOOL!

## Theater Etiquette

**W**hen a play is ready to go on stage, it still needs one very important group of people: the audience. That's where you guys come in.

As an audience member you have a very important role. You are the reason the actors are performing. If you are behaved and attentive, the actors will be free to perform without distraction and they will do an even better job. When problems arise, this is usually from audience members not being adequately prepared for the performance. If you are a veteran theater-goer, the following is just a refresher course. If you are a rookie, this will help you prepare for the show.

### HERE ARE A FEW THINGS TO REMEMBER:

**LET'S START ON TIME:** ENTER THE THEATRE QUICKLY AND QUIETLY.

**PLAN AHEAD:** IF YOU NEED TO MAKE A TRIP TO THE BATHROOM, PLEASE DO THIS BEFORE THE START OF THE PERFORMANCE.

**IT'S A LIVE SHOW, NOT A MOVIE:** SNACKS, DRINKS, AND GUM ARE NOT ALLOWED IN THE THEATRE.

**KEEP IT REAL:** PERFORMANCES CANNOT BE RECORDED, PHOTOGRAPHED, OR VIDEOTAPED. FLASHES AND BLINKING RED LIGHTS ARE EXTREMELY DISTRACTING TO PERFORMERS.

**YOU ARE NOT ALONE:** STUDENTS WHO MUST LEAVE THE THEATRE DUE TO ILLNESS OR DISRUPTIVE BEHAVIOR WILL BE ESCORTED BY AN ADULT. IF YOU HAVE TO SAY SOMETHING TO YOUR NEIGHBOR, KEEP IT SHORT AND IN A WHISPER.

**BE COOL:** SEATS, EQUIPMENT AND FIXTURES WITHIN THE THEATRE ARE NOT TO BE TAMPERED WITH. THE COST OF REPAIR OR REPLACEMENT OF DAMAGED THEATRE PROPERTY MAY BE CHARGED TO YOUR SCHOOL.

**BE LOUD:** LET THE PERFORMERS KNOW THAT YOU APPRECIATE THEIR WORK WITH APPLAUSE...LOTS OF IT!

**BE RESPECTFUL:** LAUGHING AT FUNNY PARTS, SINGING OR RESPONDING IF THE ACTOR ASKS YOU TO IS TERRIFIC, BUT OTHERWISE PLEASE REFRAIN FROM TALKING, MASSIVE FIDGETING, TEXTING OR OTHER DISTRACTING BEHAVIOR--THE ACTORS CAN SEE AND HEAR YOU!

**HAVE FUN:** MAKE THE BEST OF YOUR DAYS OUTING. SIT BACK, RELAX AND ENJOY THE SHOW!

