



“That Which We Call A Rose”

Performing Planetary Nomenclature



Educational Resource Guide for Teachers

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About the Artistic Director:

Vivian Appler is an Assistant Professor in the Department of Theatre and Dance. At the College of Charleston, she teaches courses in theatre history, devised theatre, and script analysis. She has taught at the College of William and Mary, Temple University, the University of Pittsburgh, and Penn State Abington. Her research interests include science and performance, practice-as-research, puppetry and mask, and activist theatre. She is currently developing a monograph about women performing science.

In addition to her scholarly work, she has extensive practical experience in devised and physical theatre. She has acted, directed, devised, and designed puppets in Philadelphia, the San Francisco Bay Area, and Pittsburgh, PA. She holds a certificate in Physical Theatre from the Dell'Arte International School of Physical Theatre. In 2010, she was granted a Fulbright Fellowship for which she worked in residence at the Dimitri Clown School in Verscio, Switzerland, in order to research, write, and design masks and puppets for the science-integrative play, *Particle Play: A Romance for Quarks, Strings, and Other Things*. Her solo show, *In the Still of the Night: Andromeda's Dark Stuff* premiered in 2013. In 2017, she directed Lauren Gunderson's *Silent Sky* at CofC .

A Word from the Artistic Director:

As an interdisciplinary artist, I am especially thrilled that this work has funding from state and national funds in the arts and the sciences. To me, that is the heart of what STEAM (Science, Technology, Engineering, Arts, and Mathematics) means. All of these areas are necessary for the education of creative, versatile, critical students at all phases of learning. Through the STEAM model, arts do not merely support science learning, and neither does science only provide novel content for arts projects. Art and Science practices provide different, complementary platforms by which all learners might enthusiastically direct their inquiries about the world in which we live.

What is Devised Theatre?

Devised theatre is theatre that typically begins with little more than a rehearsal space and a group of eager, committed theatre practitioners. Through a series of improvisatory theatre games or other conceptual ice-breakers, they start to tease out the kinds of stories they'd like to tell and the way they'd like to tell them. Over time, a text emerges, one covered with the fingerprints of each and every participant.

Our Process

From our Actor/Contributors

What were the devising sessions like?

"All sessions begin with us coming together as a company to share where we are, both physically and emotionally, and to connect with one another and prepare to fully immerse ourselves in the creative process for the allotted session time. Many of our earlier rehearsals included a lot of group work activity, creative writing, movement work, research and brainstorming to generate the spine of the pieces we wanted to create. Now our sessions have evolved to become a more focused and critical process. We still remain open to the creative influences from the beginning of the project, but are focusing our attention towards creating a cohesive show that communicates our message. The entire process is very open and intersectional, and encourages all members of the team, regardless of their specific job title, to contribute both intellectually and physically to further developing the show and solving creative problems that we encounter. "

-Meagan McMahon

Can you briefly describe the devising process?

I would say that devising is very much like playing with your friends. In the beginning, everyone uses their imagination to create imaginary characters, choreograph dance moves, sing made-up songs, draw pictures, write stories, etc. Then, we take those creations, we've developed, and choose what we like. Next, we see if we can make a single story from those creations. Afterwards, we play even more, developing a clearer story. This continues until we decide to write our ideas down, making a script. Once we have a clear storyline, we build and rehearse our newly devised play!

-Joe Albrit

Can you describe a breakthrough moment in the devising process?

"Early in the devising process, I was going through a creative crisis. Feeling like I was creatively inept and doing a lot of soul searching, I began working through the book entitled "The Artist's Way" at Vivian's recommendation. After trudging through the book for a few weeks, I began to feel more confident as an artist. A short time after during a devising rehearsal over the summer, Vivian had us work through some object improvisation. My object was a wooden flute, and, as I worked through some silent improvisation alone with my object, I began to develop a narrative about a lonely sailor rowing through space using the sound of the flute as propulsion. Rather than allowing my creativity critic tell me the idea was dumb, I brazenly offered this narrative to the group. It was received very well by the group, which was a huge artistic confidence boost for me. Eventually this storyline worked its way into our Bennu scene and became the basis for our idea of having the birds directing the asteroid through space! I loved being able to contribute creatively to this process and, in this instance specifically, seeing how the ideas of others shaped and grew the seed I developed over the summer."

-Noah Ezell

Synopsis

As a crew of 22nd Century cosmographers head toward Europa (one of the moons of Jupiter) to scout it out as a possible site for a human settlement, they receive a message from Dr. Psyche Sutton, a quirky scientist of the Consortium of Women Cosmographers, with an even quirrier pet. She gives the crew a new mission--one that sends them on an unimaginable adventure! As they travel the solar system, the crew encounters surprises they couldn't dream of and learn lessons about our place in the universe and our responsibility to our planet.

Characters:

Javaron-Chief astronomer/earth cultural expert

Nick-the truth grounder

Jenny-Navigator/Communications Officer

Dr. Psyche- practical astronomer/sweeper of the solar system

Boss-the distracted and volatile boss at Mission Control

Jeff-assistant to "boss"

Themes/Topics Explored:

-Mythology

-Cultural histories

-How planets are named

-Refugees/What it means to be a refugee

-Colonialism

Glossary:

Agnes Mary Clerke	an Irish astronomer and writer, who mainly focused on writing about astronomy. She popularised science by serving as an astronomical historian in her book <i>A Popular History of Astronomy During the Nineteenth Century</i> . She wrote later books that dealt with the make-up of the visible universe, accounts of theories on the evolution of the universe, and more.
Alchemy	a form of speculative thought that served as a predecessor of modern-day chemistry; heavily focused on transforming base metals (lead, copper, etc.) into silver or gold
Annie Jump Cannon	(1863 - 1941) american astronomer who studied photographic plates of the night sky and created the stellar classification system still used today
Area 51	name given to highly classified United States Air Force facility; official name is Nevada Test and Training Range; topic of discussion for conspiracy theorist in regards to aliens and UFOs
astronomer	scientists who are in the field of astronomy who study stars, planets, moons, comets, etc.
astronomy	field of science focused on space, the universe as a whole, and celestial bodies
Bennu	an asteroid found in 1999 with a potentially hazardous (1-in-2,700 chance) of impacting Earth in the late 22nd century. The Egyptian god associated with the Sun and the cycle of life and death. Also, a large, extinct heron species once found in the United Arab Emirates.
Camelot	castle and realm connected to King Arthur; located somewhere in Great Britain, but regarded as entirely fictional by some. Camelot is a name of a crater on the moon where astronauts visited on the Apollo 17 mission.
Caroline Furness	(1869 - 1936) american astronomer who was the first to earn a PhD in astronomy from Columbia; provided significant research on variable stars; professor at Vassar
Cassini-Huygens legacy mission	A collaborative space mission between NASA, the ESA, and the ISA intended to send a probe to study the planet Saturn and its system, including its rings and natural satellites. The spacecraft comprised the Cassini probe and Huygens lander, which landed on Titan. Cassini was the fourth space probe to visit Saturn and the first to enter its orbit. The mission gained its name from two astronomers, Giovanni Cassini and Christiaan Huygens.
climate change	significant change in global or regional climate patterns that last for a significant amount of time; large political topic of discussion since the mid-20th century; believed to have been brought about due to an increase in use of fossil fuels
Cosmographers	a scientist specializing in understanding and describing the nature of the universe
CWC	an acronym meaning the "Consortium of Women Cosmographers." This is a fictional group created for <i>That Which We Call a Rose</i> . A consortium is a group or association. Therefore, the CWC is a group or association of women who work in the field of cosmography.
ecology	a section of biology that focuses on how organisms are connected with each other and their physical environment
Enceladus	sixth largest moon of Saturn; covered by fresh, clean ice and considered a location where life could exist. Also, a giant from Ancient Greek mythology.
ersatz evolutionary	inferior, faulty, or fake development of an organism or process
Europa (moon)	smallest of the four Galilean moons orbiting Jupiter; sixth-largest moon in the Solar System; icy and believed to hold oceans underneath its surface which makes it one location with potential for life to evolve

fissures	crack or narrow opening of considerable length and depth
Fukushima (Fukoshima)	location of a nuclear power plant where a nuclear accident occurred as result of the Tohoku earthquake and tsunami on Friday, 11 March 2011; most severe nuclear accident since Chernobyl (1986)
genus ursus	scientific name in the family Ursidae (meaning bears); from the Latin <i>ursus</i> meaning "bear"
Harriet Tubman	former slave and abolitionist who was the best known conductor of the Underground Railroad; followed the North Star which is located in the Big Dipper or "Drinking Gourd" and other star patterns
ideogram	graphic or picture or symbol that represents a thing or idea without expressing the sounds that make its name (also called an ideograph)
ideograph	see ideogram
inner solar system	area of the solar system that includes the terrestrial planets (dense, rocky composition with few or no moons) and asteroid belt; relatively close to the Sun
interplanetary	traveling between planets
King Arthur	legendary British leader situated in medieval histories and romances who defeated the Saxons; stories of Arthur are mainly based on folklore and literary inventions
Mission control	facility or location that manages space flights from launch until landing
outer solar system	area of the Solar System that houses the giant planets and their moons; largely made of gases and water along with other volatiles (ammonia, methane, ect.)
planetary geology	planetary science focused on the composition and make-up of celestial bodies such as planets
Punch-and-Judy	sequence of short scenes depicting interactions between Mr. Punch and his wife Judy; usually between two characters, one of which who is taunted by Punch's slapstick humor
radiation (surface)	release of electromagnetic waves or subatomic particles that result in ionization
refugee	person who is forced to flee their country due to war, violence, or persecution
res humanitas	"the thing known as human nature / civilization / kindness"; for the benefit of all humanity
solar system	the system of the Sun that is bound by gravity including the objects that orbit it directly or indirectly
Soviet Union (U.S.S.R.)	existed from 1922 - 1991 in northern Eurasia; governed by the Communist Party
striations	set or series of ridges, furrows, or linear lines; stripe-like visual features that can alternate between light and dark
subsurface	being or existing below the surface; usually related to oceans or the earth's surface
subterranean	existing, being, or occurring under the earth's surface; underground
Suffragist	individual who advocates on behalf of gaining the right to vote; women's suffrage
sweeper	one to actively and consistently studies the realm outside of the earth's atmosphere in search of new discoveries
tartigrades (tardigrades)	"water bears" or "moss piglets"; microscopic animals that are virtually indestructible and believed to hold the key to human survival
trajectory	path followed by projectile or object under a given force
Ursa Minor (astronomy)	"the Lesser Bear"; a constellation in northern sky that contains the "Little Dipper" and Polaris

Zeus	Greek god of lightning and thunder; king of the gods on Mt. Olympus
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anatomy	the branch of science concerned with the bodily structure of humans, animals, and other living organisms, especially as revealed by dissection and the separation of parts
Ancient Egyptians	a group of people who lived in the area of modern day Egypt (a country in north Africa) who developed one of the most artistically and culturally impressive societies in the ancient world. Ancient Egyptian civilization lasted for upwards of 3,000 years
Apep	an Ancient Egyptian deity, usually represented as a snake, who embodied chaos and was the opponent of light and truth
Apollo 17	the final Moon landing mission of NASA's Apollo program that resulted in human's landing and walking on the moon
Bakunawa	a serpent-like dragon in Philippine mythology believed to be the cause of eclipses, earthquakes, rains, and wind
Central Station	A location of the Apollo 17 mission.
gravimeter	an instrument used to measure the difference in the force of gravity from one place to another
Hati	A wolf in Norse mythology that chases the moon across the sky in the same way that another wolf, Sköll, chases the Sun
Heat Flow Experiment	an experiment that was carried on the Apollo 15, 16, and 17 missions used to determine the rate of heat loss from inside the moon by measuring the temperature and thermal properties of the moon at its surface and below its surface
Landing site	a site within a landing zone (an area where a craft can land) containing one or more landing points
LM Descent stage	LM stands for Lunar Module which is a lander spacecraft flown from lunar orbit to the Moon's surface during the Apollo program. The purpose of the module's descent stage was to support a powered landing and surface extravehicular activity (activity outside of the landing vehicle)
lunar mass spectrometer	a spectrometer (a tool for measuring bands of light as a method of analysis) that was part of the Apollo mission series used to measure the composition of the atmosphere of the moon
lunar roving vehicle	a battery powered four-wheeled rover used on the Moon in the last three missions of the Apollo program
lunar seismic profiling experiment	an experiment that was a part of the Apollo program used to acquire data on the physical properties of near-surface materials on the Moon. Other objectives were to measure lunar seismic signals produced by detonation of explosive charges on the surface, monitoring natural seismic activity resulting from moonquakes or meteorite impacts, and recording the seismic signals resulting from the liftoff of the Lunar Module and the impact of the spent Lunar Module ascent stage
physiology	the branch of biology that deals with the normal functions of living organisms and their parts
Rahu	one of the nine major astronomical bodies in Indian texts. Rahu is a shadow entity, one that causes eclipses and is the king of meteors. Rahu represents the ascension of the moon in its processional orbit around the earth.
Skoll	A wolf in Norse mythology that chases the Sun across the sky in the same way that another wolf, Hati, chases the moon
Terra Nova	A latin phrase meaning "New Earth"

Kingfisher	a family of small to medium-sized, brightly colored birds. Most species are found in the tropical regions of Africa, Asia, and Oceania. All kingfishers have large heads, long, sharp, pointed bills, short legs, and stubby tails. Most species have bright plumage. Proposed landing site for NASA's Osiris Rex mission.
Nightingale	a small European thrush with drab brownish plumage, noted for the rich melodious song of the male, heard especially at night in breeding season. Landing site for NASA's Osiris Rex mission.
orbit-altering keyhole	an area that an extraterrestrial body can pass through that will alter its current orbit and send it on a different one. In the case of Bennu, this orbit-altering keyhole could send it on a collision course with the Earth later this century
Osprey	a large, fish-eating bird of prey that has a range that extends across most of the world in appropriate habitats. The Osprey is a raptor, and it is brown on the upperparts of its body and predominantly greyish on the head and underparts. Proposed landing site for NASA's Osiris Rex mission.
paradox	a seemingly absurd or self-contradictory statement or proposition that when investigated or explained may prove to be well founded or true
Pliny the Elder	an author from ancient Rome who wrote the encyclopedia <i>Naturalis Historia (Natural History)</i> which became an editorial model for encyclopedias
Ribollita	a famous Tuscan bread soup, a hearty thick soup made with bread and vegetables. There are many variations but the main ingredients always include leftover bread, cannellini beans, lacinato kale, cabbage, and inexpensive vegetables such as carrot, beans, chard, celery, potatoes, and onion. Its name means "reboiled"
Sandpiper	small birds around the size of a teacup that are often seen running near the water's edge on beaches and tidal mud flats. The common sandpiper has a brown upper body and a white underside. The bird is a European and Asian species, but is closely related to the similar looking spotted sandpiper of the Americas. Proposed landing site for NASA's Osiris Rex mission.

Pre-Show Discussion Questions:

Based on what we know so far, what do you think the play is going to be about?

How do you think planets and other bodies in space get their names?

What responsibility do we have to our planet?

Post-Show Discussion Questions:

What do you think the play was about?

Who was your favorite character? Why?

Was the play different from what you thought it would be? How so?

If there was a sequel, what do you think would happen?

What did you think was real/fiction within the plot?

Have your ideas about our responsibility to our planet changed? If so, how?

Kindergarten Lesson Plans

Creating a Bird Mask and Character!

Learning Objectives:

I can:

- Identify parts of a bird
- Explain the function of parts of the bird
- Assemble a mask to resemble a bird
- Recall the definitions of character, costume, and mask
- Create a bird character
- Use body movement to tell a story
- Use exaggerated body movement
- Recall that masks are used in theatre

Materials and Supplies:

Pre-Show

- [Google Slides Presentation](#)
- Paper
- Heavy cardstock cut into ovals or round paper plates with eye holes cut out
- Yellow Construction paper cut into triangles
- Thin sewing elastic
- Scissors
- Hole-punch
- Crayons, markers, colored pencils, paint, feathers etc.
- Construction paper (optional)
- Feathers (optional)
- Glue
- Sample bird mask

Post-Show

- [Google Slides Presentation](#)
- Student masks
- Story Drama Narration

Standards:

South Carolina Academic Standards for Performance Indicators for Science

K.L.2A.3 Develop and use models to exemplify how animals use their body parts to (1) obtain food and other resources, (2) protect themselves, and (3) move from place to place.

South Carolina College and Career Readiness Standards for Theatre Proficiency

Anchor Standard 3: *I can act in improvised scenes and written scripts.*

Benchmark T.P NL.3 I can use body and voice to communicate character traits and emotions in a guided drama experience.

Anchor Standard 2: *I can design and use technical elements for improvised scenes and written scripts.*

Benchmark T.CR NL.2 I can identify technical elements.

Indicator T.CR NL.2.1 I can identify technical elements such as scenery, costumes, makeup, props, lighting and sound in a prompt.

Pre-Show Activity-Creating a Bird Character and Making a Mask!

Teacher-led Instruction- Birds and Characters (5 minutes)

If you'd like, use the attached Google Slides Presentation to guide this introduction!

- Ask your students what they know about birds!
- Then ask them about the body parts of a bird.
- Have them turn and talk to their neighbor about parts of a bird.
- Gather their attention, and ask the whole group again. Help guide them to remember the main parts of a bird.
- Ask students what birds might use each part of their body for?
- Then, ask students what a character is.
- Revoice student answers, if needed, to clarify that characters are people in a story, book, play, or movie.
- Remind them that they will be seeing a play the next day with lots of characters!
- Ask students if characters are always human.

Draw Your Character (10 minutes)

Students should have paper and drawing materials at this point.

- Explain to the students that today they will be creating and designing their own bird character.
- Remind them that their drawing should include each part of the bird, but that beyond that, it can look however they want!
- Go to the slide with several pictures of birds for the students to use as inspiration.
- Encourage them to be creative!
- Circulate around the room to help keep students on track

Teacher led instruction (5 minutes)

Gather students' attention and use the Google Slides Presentation to guide your instruction.

- Ask your students what a costume is!
- Guide them and explain that costumes are worn when people are playing characters.
- Ask your students what a mask is
- Explain that in many kinds of theatre, masks were worn by actors

Make your mask! (25 minutes)

Students should have materials to make their masks at this point. Eye holes should be pre-cut for students. It may also help to have already hole punched the sides of the mask to add elastic. If you have a sample mask, show it to the students so they have an example of what they'll be creating.

Students will:

- Glue the pre-cut beak to the mask
- Decorate their mask with markers, colored pencils, or crayons
- (If there is extra construction paper) Glue pieces of construction paper to their design
- (If you have feathers) Add feathers to their design!
- With the help of the teachers, attach their elastic so it fits their face
- Try on their mask!
- Look around the room to see other students masks!

If time allows, ask students to identify one thing they like about their own mask, and one thing they like about someone else's mask!

Post-Show Activity-Becoming Our Bird Characters!

Imagination Warm Up (5-7 minutes)

Explain that for this activity, we'll have to use our imaginations and sometimes we need to get our imaginations going. Have the students move about the room with controlled bodies. Remind them to be aware of their surroundings and to use walking feet! As they move around, call out different ways they have to walk. For example, walk like:

- You're an astronaut on the moon
- The floor is sticky
- You're walking through Jell-o
- There's a heavy wind coming right at you

Use your imagination to come up with more examples!

Introduction of Animal Characters (10 minutes)

- Ask students what they remember about the bird characters in the play
 - What were they like?
 - What did you think about them?
 - Did they move differently than the human characters?
 - What did their costumes look like?
- Let students know that today, we'll be playing the bird characters that we created a few days prior
- Ask the students to look at their masks and to come up with a name for their bird character
- If time allows, go around the room and have the students share the name of their character

Analyzing Animal Movement (5 minutes)

- Explain to the students that when we play animal characters, we have to move a little differently than when we're playing human characters.
- Show them the [video](#) (in the Google Slides Presentation or linked here) of birds moving
 - Note: it may be helpful to turn the sound off, so that students are focusing on the movement
- While the video is playing, ask them questions about the movement of the birds. Isolate parts of the body to help them be specific. Offer suggestions to guide the discussion.
 - What word would you use to describe the birds movement?
 - Look at the birds head, does it move differently than the wings?
 - How does it use its feet?

Practicing Animal Movement (10 minutes)

- Have the students put on their bird mask
- First, have students practice the movement while seated. Encourage them to practice moving their head like the bird we watched. It may be helpful to keep the video of the bird on at this point.
- Ask students to stand up and spread out.
- Remind students to be aware of their surroundings, voices should be off, and bodies in control

- Ask students to move like a bird
 - Remind them of observations made when watching the video!
 - Guide them through specific activities, use inspiration from what they already know about birds.
 - The bird finds some seeds and eats them
 - The bird flies to another area and lands by their friend
 - It starts to rain, so the bird flies to its' nest and wraps itself in its wings, tucking its' head

Performing Animal Movement (10 minutes)

- Create an audience area and a performance area
- Ask the students in the audience to remove their mask
- Remind students of audience behavior
- Call 4-5 students at a time to come up and share their animal movement with the class
- Feel free to give them suggestions, as you did with the whole group, or let them explore on their own!
- Repeat this until every student has had a turn

This serves as an informal assessment. Did the students take inspiration from things they already know about birds and how they use their body parts? Did the student fully commit to the exploration? Did they respond to any side coaching or suggestions given by the teacher?

Reflect! (5 minutes)

If time allows, ask students reflective questions about the process:

- What did you enjoy?
- What was challenging?
- Did the mask help you feel like your character?
- Did the mask help you as an audience member?
- What was it like to move like a bird?

Adaptations

Material prep for masks too much? Make drawing the bird character the focus of the first lesson! Then have students spend more time answering questions about their character beyond their name: What kind of bird is it? Where does it live? What are its' friend's names? Dive deeper into the character!

Want to do more?

-Explore other kinds of animal movement as you learn about the animal!

-Make masks that exhibit a clear emotion, then have the students express that emotion through their bodies while wearing the mask!

1st/2nd Grade Lesson Plans

Shadow Puppets, Storytelling, and Phases of the Moon

Learning Objectives:

I can:

- Create shadow puppets using paper, scissors, dowel rods, and glue
- Recognize and describe the changes of the moon as it moves through the phases
- Duplicate the shape of the moon phases in my paper cutouts
- Point out changes in the shadow puppet image, while exploring distances from the light source
- Explain that cultures and Ancient people created stories to explain the natural world
- Create a story about why the moon changes in appearance

Materials and Supplies:

Pre-Show

- [Google Slides presentation](#)
- Cardstock or Poster Paper
- Pencils
- Scissors
- Dowel rods or Wooden Skewers
- Tape
- Flashlight or Lamp
- Solid Background

Post-Show

- [Google Slides Presentation](#)
- Paper
- Pencils
- iPads or Recording Device (optional)

Standards:

South Carolina Academic Standards for Performance Indicators for Science

1st Grade:

Standard 1.P.2: The student will demonstrate an understanding of the properties of light and how shadows are formed.

1.P.2A.3 Conduct structured investigations to answer questions about how shadows change when the position of the light source changes.

Standard 1.E.3: The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

1.E.3A.2 Use data from personal observations to describe, predict, and develop models to exemplify how the appearance of the moon changes over time in a predictable pattern.

2nd Grade:

2.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.

South Carolina College and Career Readiness Standards for Theatre Proficiency

Anchor Standard 1: I can create scenes and write scripts using story elements and structure.

Benchmark T.CR NH.1 I can work with others to add dialogue to a story.

Indicator T.CR NH1.2 I can collaborate with peers to improvise multiple dialogue choices.

Anchor Standard 7: I can examine the role of theatre through history and culture.

Benchmark T.C NM.7 I can relate to character experiences of a specific culture.

Indicator T.R NM.7.1 I can recognize how a specific culture explores theatrical elements.

Pre-Show Activity-Making Moon Phase Shadow Puppets!

Introduction-KWL Chart (10 minutes)

Create a KWL (Know, Wonder, Learn) chart on the board or on chart paper with your class! Take notes as the children answer the following questions about the moon phases and light and shadows.

- What do we know?
- What do we wonder about?
- What have we learned?

Grouping Students, Passing Out Materials (5 minutes)

This activity would work best in groups of about 4 students, so that puppets of each phase of the moon can be created. Group your students however you see fit!

The materials needed for creating the puppets are listed above. You know your classroom best! Decide how you'd like students to get their materials.

What are shadow puppets? Introduce the Activity! (5 minutes)

Briefly explain what shadow puppets are: figures that are placed between a light and a screen! Use the google slides presentation and videos included to help explain.

Briefly explain the origin of shadow puppets: they're used in countries all over the world and was created thousands of years ago! They can be very simple or very complex.

Create the Shadow Puppets (15 minutes)

Have the image of the phases of the moon on the Smartboard for students to reference. After students have their materials and are in their groups of about 4 they will:

- Decide which group members are creating which puppets--each member should create 2 moon-phase shadow puppets
- Draw outlines of the puppets on the cardstock or poster paper
- Cut out the shapes
- Use tape to attach the skewer or dowel rod to the back of each puppet

Experiment with the Puppets! (10 minutes)

First, gain the whole group's attention to model how shadow puppets work. Either have sample shadow puppets of your own or use one group's puppets as an example. Show them that placing the puppet in front of the light source creates a shadow image on the wall. Then, let them explore on their own!

Ideally, it would be great to have multiple lamps or flashlights, so multiple groups can explore at one time! If this is the case, have the students explore and experiment in their groups. One member can hold the flashlight, while others explore how changing the distance between the light source and the puppet changes the image. Circulate through the room to encourage this exploration and pose questions to guide learning!

- What happens to the image as you move the puppet?
- Why do you think this happens?
- What order do you think the puppets should go in?

- Why do you think that's the correct order?
- Why do you think the appearance of the moon changes?

If it's not possible to have all groups exploring at once, have each group come up to the light source, pose the questions to the whole class and omit the next step.

Closing-Come together to discuss! (5 minutes)

Have one group, or one member from each group come forward to share their shadow puppets. Pose the same questions you did while circulating to the whole group.

Post-Show Activity-Creating a Moon Phase Myth!

Introduction-Mythology and Moon Phases (5 minutes)

Use the google slides presentation to explain that ancient people used to create stories to explain things in the natural world, like the phases of the moon. Briefly explain the Hindu myth about why the appearance of the moon changed. Ask the students if they remember anything about this topic from the play-what do they remember?

Imagination Warm Up (5-10 minutes)

Explain that for this activity, we'll have to use our imaginations and sometimes we need to get our imaginations going. Have the students move about the room with controlled bodies. Remind them to be aware of their surroundings and to use walking feet! As they move around, call out different ways they have to walk. For example, walk like:

- You're an astronaut on the moon
- The floor is sticky
- You're walking through Jell-o
- There's a heavy wind coming right at you

Use your imagination to come up with more examples!

Group Students (2 minutes)

The students should rejoin their groups from the shadow puppet lesson

Create a Story (20 minutes)

Use the example in the Google Slides presentation to show the students an example story.

Students will:

- Brainstorm as a group. What story could explain why the moon changes in appearance?
- Decide on one idea to use for their story
- Choose someone to write for the group
- Write 3 sentences, telling their story of why the moon changes
- Choose 3 members to read the sentences
- Rehearse reading their story

Circulate to help guide the students in their storytelling!

Perform for the class! (5 minutes)

Have each group share their story with the class!

Adaptations:

-If you have iPads or any similar technology, instead of students writing their sentences, you could have them record them instead! This should be a time saver.

-Instead of students writing sentences, have each student improvise their own story after brainstorming with their group! This could be done in small groups or in whole-group.

-Have the students draw a picture of their story, then explain it to their group or the whole class!

-Mythology too much? Have the students simply answer the question, "Why does the moon change in appearance?" They can brainstorm in their group, then create narration based on that! You could encourage them to come up with a realistic answer and a fantastical answer!

Want to do more?

Create a shadow puppet theatre with your class! Use this [link](#) to learn how.

Create a performance piece! Have each group choose puppeteers and a narrator. Then have the groups perform the shadow puppets in moon phase order while the narrator reads their story! Do you have iPads or other technology? Have the students record their performance piece to share with parents!

Links for Teachers

Various Resources:

[NASA STEM and STEAM Lessons](#)

[Our Blog](#)

[Gazeteer of Planetary Nomenclature](#)

[NASA Solar System Treks](#)

Maps:

[NYT: NASA's Opportunity Rover Dies on Mars](#)

[Mid-2017 Map of NASA's Curiosity Mars Rover Mission](#)

[Moon LRO LROC WAC Global Morphology Mosaic](#)

[Moon LRO LOLA Color Shaded Relief Blue Steel](#)