TEACHER GUIDE TO THE

2018-2019 Every Student Initiative Field Trips

Included in this Packet:

PEORIA RIVERFRONT MUSEUM

Introduction

Please read through this document at least once before arriving at the museum for your field trip.

Every Student Initiative

The Every Student Initiative (ESI) is an ambitious new program to bring every student in Central Illinois to the Peoria Riverfront Museum every year. With hands-on learning through objects, a Giant Screen Theater, Dome Planetarium, and rotating exhibits, the Peoria Riverfront Museum is a great place for students to learn in a new environment. ESI supports the museum's mission to encourage life-long learning in students of all ages while connecting them to their community at large.

The Every Student Initiative is privately funded, allowing donors to help their communities by sponsoring field trips to the Peoria Riverfront Museum.

With the Peoria Public Schools, the Barton Family Foundation has sponsored curriculum-related field trips for every student in grades K-8. The field trips are scheduled throughout the year to coincide with the curriculum the Museum can match best. Each trip includes a visit to the Giant Screen Theater or Planetarium and a guided gallery tour. The specific show and gallery are picked based on the current curriculum during that quarter.

This is an excellent opportunity for students to explore what their community has to offer and experience their classroom curriculum in a unique way.

If you have any questions, comments, or concerns, please contact:

Holly Johnson

Every Student Initiative/Group Tours Coordinator

(309) 863-3013

hjohnson@peoriariverfrontmuseum.org

Museum Policies & Expectations

About this guide:

- This guide is intended to help give an overview of your grade level's specific field trip along with pre and post visit activities to help integrate the trip into the classroom.
- Please review this guide prior to your scheduled field trip to ensure a smooth experience.

Arrival/Check-In:

- Please **confirm your final numbers** (students & chaperones) with Holly Johnson **5 days prior** to your visit.
- Do your best to **ARRIVE ON TIME**! Tours are carefully scheduled, and arriving on time makes the day go easier for both you and your students.
    - "On Time" is defined as arriving **5-10 minutes before your first scheduled program** to allow for transition time (e.g.: check-in, bathroom breaks, etc.)
- Upon arrival, one leader should check in at the front desk to report the final tally of students and adults. It is important that you know your total numbers before coming to the front desk. This will ensure your group starts promptly at your designated time.
- Rolling bins will be provided to your group upon arrival to store items like sack lunches and/or coats. We cannot provide cooling or heating services for lunches.
- A museum host/educator will greet the group in the lobby and give a brief orientation.

Bus Loading/Unloading Zones:

- Buses can load and unload at the front entrance of the museum at 222 SW Washington Street. There is a drop-off lane directly in front of the museum.
- There is no on-site bus parking; buses can park under the Bob Michel Bridge.
    - A bus driver map is available online, or at the front desk.

Group Orientation:

- Upon your arrival at the museum, a staff member will briefly explain the museum rules, review your group's specific schedule, and provide chaperones with maps, activity sheets, and gallery guides as needed.

Chaperone Policy:

- Peoria Riverfront Museum recommends one chaperone for every five students; all attending adults are considered a chaperone.
- Chaperones arriving separately can park in the museum parking deck for free.
- All chaperones should be made aware of the tour's itinerary.
    - Chaperone guides are available on the museum's website; please make use of these.

Museum Rules:

Our goal is to provide a successful learning environment for all students. **You can help to create that environment by clarifying our behavioral expectations with your students both before you arrive *AND* by helping us enforce those expectations during your visit.** During your group orientation, a staff member will remind your students of the following rules:

- Walk in the museum. No running.
- Use indoor voices.
- Many of our exhibits are "hands-on," but some are not. We'll help your students to know the difference.
- No food, drink, candy or gum in the galleries.
- Respect others in your group as well as other museum visitors and staff.
- Teachers and chaperones must stay with their groups at all times.
- Photography is permitted in some galleries. Please ask your host for details.

Element 1: Planetarium: *Black Holes*

Learning Standards: 5-PS2-1 (astronomy), 5-ESS1-1, MS-ESS1-2, HS-ESS1-1, HS-ESS1-2 (Earth/Universe); MS-PS2-4, MS-PS2-5 (motion/stability)

All about one of the universe's most mysterious kinds of objects: black holes. The show features some of the most intense visual effects ever created on the subject. Narrated by John de Lancie ("Q" from several of the Star Trek series).

Watch the trailer here: https://www.youtube.com/watch?v=X2NkJu1miSU

Element 2: *Dragons, Unicorns & Mermaids: Mythic Creatures*

Dragons, Unicorns & Mermaids: Mythic Creatures

The world is full of stories about brave heroes, magical events, and fantastic beings. For thousands of years, humans everywhere - sometimes inspired by living animals or even fossils - have brought mythic creatures to life in stories, songs, and works of art.

Today these creatures, from the powerful dragon to the soaring phoenix, continue to thrill, terrify, entertain, and inspire us. We seem to catch glimpses of these creatures all around us: hiding beneath the ocean waves, running silently through the forest, and soaring among the clouds. Some symbolize danger. Others, we think, can bring us luck or joy.

Together mythic creatures give shape to humankind's greatest hopes, fears, and most passionate dreams.

The exhibit element of the 2018-2019 field trips for 5th grade is *Mythic Creatures*. Students will come face to face with mythic creatures from the Western and Eastern Hemispheres through this multi-cultural exhibit.

With a docent, students will compare and contrast 3 pairs of mythic creatures from both the Eastern and Western cultural hemispheres. Students will be asked to form their own conclusions through open-ended questions and a brief discussion on the different aspects of the creatures.

Find more information on this exhibit with the educator guide, found here:

education.amnh.org/mythiccreatures

Feel free to use our Educator Preview Pass to visit the exhibit before the field trip as well. (Found on page 7)

PEORIA
RIVERFRONT
MUSEUM

Educator Preview Pass

Preview the museum before planning your field trip! Educators are invited to come to Peoria Riverfront Museum and visit the galleries and see the Dome Planetarium shows* at no cost.

Print out this pass and bring it and your official school ID to the ticket desk in the main lobby. This pass is good for free admission for one educator.

**Applies to our regularly scheduled public shows only.*

INFO BELOW MUST BE FILLED OUT FOR FORM TO BE VALID

Name _____

School _____ Grade(s) Taught _____

City _____ Email _____

Peoria Riverfront Museum
222 SW Washington Street | Peoria, IL 61602
309.686.7000 | www.PeoriaRiverfrontMuseum.org

Pre-Visit Activity: *Black Holes*

Introduction

Help prepare your students for learning about the awesome force of black holes by familiarizing them with these astronomical concepts. While this can be read verbatim to your students, feel free to find supplemental images or videos to add a visual component to this review. The weight calculation charts are on a separate page in worksheet form for easier distribution, but lead the activity in whichever way works best for your students. The "create a black hole" activity is optional and not necessary for preparation, use your own discretion if that activity is applicable to your students.

Space Overview

What is a planet?

A planet has 3 basic requirements:

1. It must orbit a star
2. It must be big enough to have enough gravity to be forced into a spherical shape
3. It must be big enough that its gravity clears away any other objects of a similar size near its orbit around a star

There are 8 planets in our solar system. What are their names? (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune)

Why is Pluto not considered a planet?

Pluto is considered a dwarf planet, as it is not big enough to clear other objects of a similar size near its orbit. Pluto is located in an icy asteroid belt outside the orbit of Neptune called the Kuiper Belt. In the Kuiper Belt, there are millions of icy asteroids, some of which are similar in size to Pluto. Pluto is one of five dwarf planets: Ceres, Eris, Haumea, Makemake possibly many others waiting to be discovered!

As we learn more about Pluto and the rest of our universe, our definitions of planets might change.

What is a star?

A star is a hot, glowing ball of gas, mostly hydrogen and helium, it is kept hot by internal nuclear reactions held together by its own gravity.

Can anyone name a couple of stars in our sky? (Sun, Sirius, Betelgeuse, etc.) The Alpha Centauri system is the closest to our solar system.

The star in the center of our solar system is called the Sun. It glows white-hot at about 10,000° F and is so large that about 1,300,000 planet Earths can fit inside of it. Yet, the sun is only a mid-sized star. Most of the stars you see in the sky are larger and brighter than the sun, but they are much further away. Without the Sun, there would be no life on earth, as it would be too cold. Most stars have planets orbiting around them.

What is gravity?

Gravity is an invisible force that pulls objects together. For example, the Earth's gravity keeps us on the ground. Everything that has mass has gravity; objects with more mass have more gravity. Gravitational force gets weaker the farther you are from a massive object.

What is an orbit?

An orbit is a path that one object in space takes around another one. Can you name something in orbit? (Planets, asteroids, International Space Station, etc.)

Objects stay in orbit due to a tug-of-war with gravity and momentum. The object's forward momentum tries to keep it moving in a straight line. Gravity acts upon that momentum, trying to pull it back into the planet or larger object.

Weight on earth is due to Earth's combined gravitational force pulling on your mass. If you were on a different planet that has less mass, your weight would be different because of the difference in gravity. This is why on the moon, you can jump a lot higher than on Earth! Try to figure out what these weights would be on different planets or the moon by multiplying the weight by the surface gravity.

Space Places	Surface Gravity
Mercury	0.38
Venus	0.91
Earth	1
Moon	.065
Mars	1.03
Jupiter	2.34
Saturn	0.93
Uranus	0.92
Neptune	1.12

Average Human	137 Lbs.
Cat	22 Lbs.
Dog	50 Lbs.

What is a black hole?

A black hole is an object that we cannot see. It is so massive nothing can escape its pull, including light. A black hole is formed when a star much bigger than the sun runs out of fuel and collapses, squishing down to a smaller size.

We can detect black holes using X-Rays and observing the objects in orbit around it.

Name:_____

Weight in Space Activity

Weight on earth is due to Earth's combined gravitational force pulling on your mass. If you were on a different planet with less mass, you would have a different weight, because weight is determined by gravity! Your mass never changes.

Using the charts provided, calculate the weight of the average human, cat, and dog on different planets by multiplying the weight by the surface gravity. There are also two blank spaces to fill in your own objects and weights!

Planets	Surface Gravity
Mercury	0.38
Venus	0.91
Earth	1
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Mars	1.03
Jupiter	2.34
Saturn	0.93
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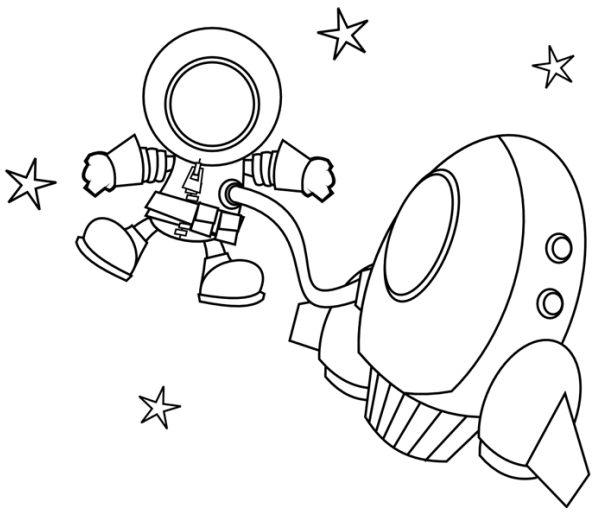
Neptune	1.12



	Earth	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus	Neptune
Average Human	137 Lbs.								
Cat	22 Lbs.								
Dog	50 Lbs.								

Simulate the creation of a black hole

Introduction

This activity will give your students a hands on demonstration into the creation of a black hole via NASA's Afterschool Universe program. Watch a demo of the activity here: https://www.youtube.com/watch?v=pcOxhdu5gh8 and find the official instructions and additional information here under Session 10: https://imagine.gsfc.nasa.gov/educators/programs/au/resources/curriculum.html

Supplies

Aluminum Foil, enough to cover a blown-up balloon per group

1 balloon per group

Scissors/Sharp pencil

Cloth tape measurer (Will be used to measure the balloon's circumference)

Digital scale

Instructions:

1. In groups, have one student blow up a balloon until it is about 6-8" in diameter. Be aware, the larger the balloon, more aluminum foil will be needed to cover it. Once balloon is blown up, cover it carefully in aluminum foil until completely covered.
2. Taking turns, each student should pretend to be the "force of gravity" by gently squeezing the balloon with their hands. The balloon will resist their hands because of the air pressure inside of the balloon.
3. Using the tape measure and scale, measure the circumference of the balloon and the weight.
4. One student, with the scissors or sharp pencil, should carefully pop the balloon without disrupting the aluminum foil too much.
5. The students should now gently start to use their hands as forces of gravity to crush the balloon and aluminum foil until it is about one inch smaller. Measure the circumference and weigh the "dying star" again.
6. Repeat this process, crushing the foil and balloon smaller and smaller while keeping it in a circular shape. Measure and weigh it at every step. Students should notice that while the circumference is decreasing, it isn't losing mass.

Once the collapse started, the core kept a constant mass as it got smaller. The student's measurements on their papers should show that the mass remained the same even as the circumference got smaller. So this is similar to what happens when a star explodes in a supernova and the leftover core collapses to become a black hole. The core keeps getting smaller and smaller even though it is not losing mass.

The students should be told that to make an actual black hole with the effective size of their final (squashed) aluminum ball, you would need to start with several times the mass of the Earth!

Post-Visit activity: Black Hole Model

Introduction

Now that the students have seen the Planetarium show Black Holes, reinforce what they've learned by modeling their very own black hole. This activity will model how gravity wells function in space. As we cannot see a black hole, we must observe their presence using the objects around it.

Supplies

Paper (8 x 12" works best)

Ruler

Scissors

Tape

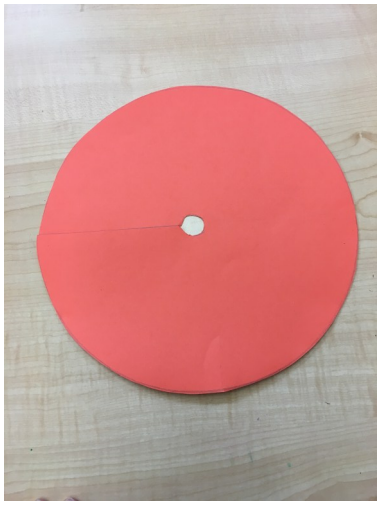
Marbles or small round ball

Cup

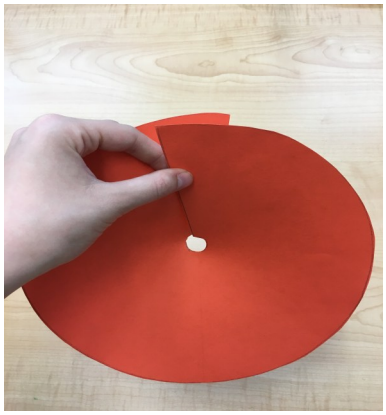
Compass

Instructions

1. Remind your students of the information they learned at the Planetarium by watching this video by Kurtzgesagt first, before beginning the activity: https://www.youtube.com/watch?v=e-P5IFTqB98
2. Explain that what you're making is a form of gravity well. A gravity well is the pull of gravity that a large body in space exerts. The larger the object, the more of a gravity well it has. You are going to pretend at the bottom of your gravity well is a black hole.
3. Using an 8x12" sheet of paper, a compass, and ruler, draw a circle with a diameter of 25cm. Make sure to mark the midpoint.
4. Along the line, cut to the midpoint. Now you can cut a small hole that your marble can fall into at the bottom of the gravity well.



5. Next, make a shallow funnel by overlapping the edges of your cut. Tape it together to hold it in place.



6. Now that you have your funnel, place it in the cup. Note: if you have a very tall and skinny cup, your gravity well might fall over with the weight of the marble. Use a wider, shorter cup to lessen the chance of it falling over, or make sure your students start their marble's orbit on the more stable areas.

7. Your students are ready to start observing the gravity well. Place the marble near the edge of the funnel and push it at a tangent. Students should observe the elliptical orbit and how the marble speeds up the closer it gets to the bottom of the well.