



NASA @ My Library

2019 Summer Reading Program

**Montana State Library
Museum of the Rockies**

Webinar: Wednesday, February 13, 2019



PRESENTED BY

Amelea Kim
Montana State Library

Jaime Augst
Museum of the Rockies



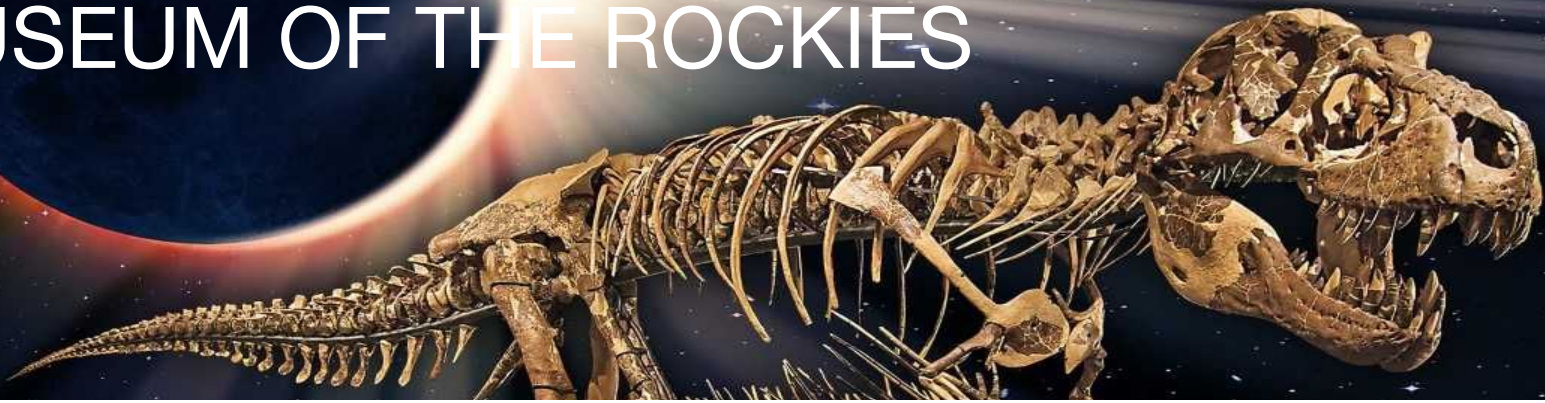


TODAY'S GOALS

To learn about:

- MSL & MOR collaboration
- 2019 Summer Reading: *A Universe of Stories*
- What is NASA @ My Library
- Using the NASA STEM Facilitation Kit
- Applying to receive a kit for your library
- How to locate additional resources

MUSEUM OF THE ROCKIES



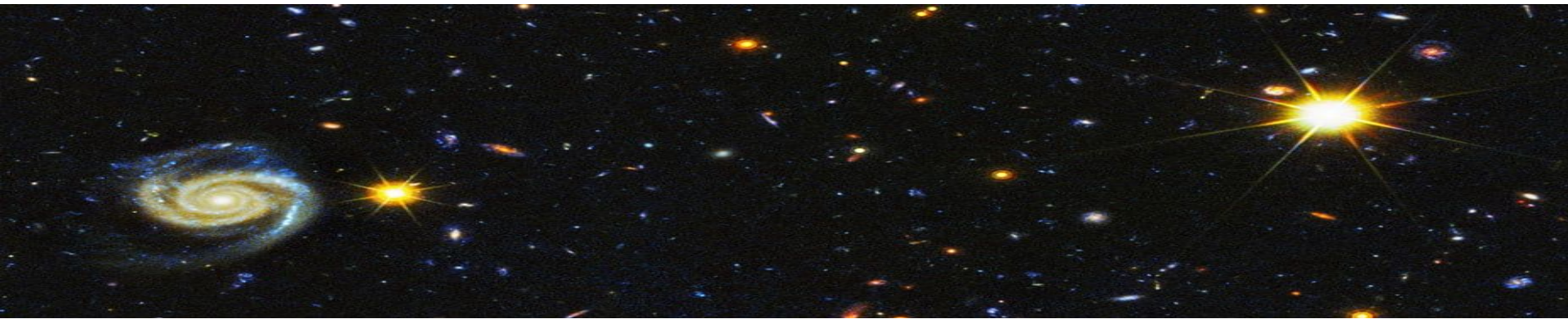
- A college-level division of Montana State University and an independent 501(c)(3) nonprofit institution.
- A Smithsonian Affiliate and accredited by the American Association of Museums
- Most visited museum in the state
- Serves over 15,000 schoolchildren annually on field trips
- Provides outreach materials in paleontology, astronomy, Yellowstone, and Indian Education for All
- Permanent exhibits include:
 - Dinosaurs under the Big Sky
 - Montana History
 - Living History Farm
 - Enduring Peoples: Native American Hall
 - Taylor Planetarium
- Variety of changing exhibits



SUMMER READING KIT PROGRAM

MOR began supporting libraries in 2012 by providing:

- Theme-based kits including curriculum and activity materials for one or multiple programs
- Interactive, STEM focused lessons
- Every library with their own set of resources
 - » No need to send it on!
- A record breaking number of kits in 2018

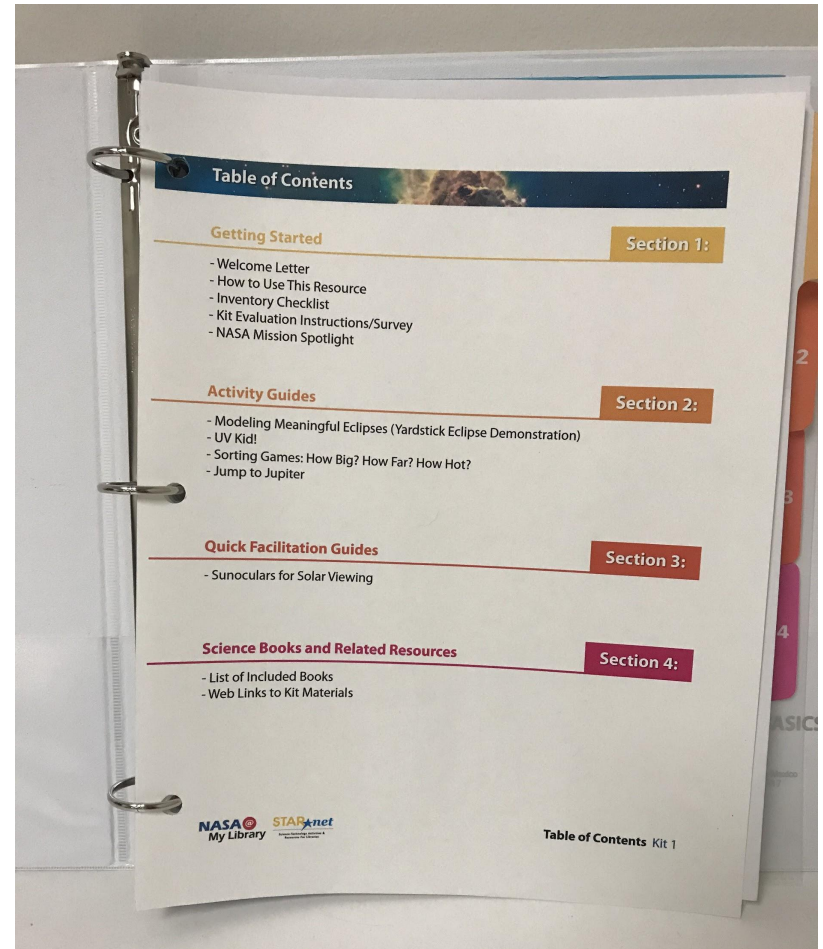


WHAT'S IN IT

- NASA @ My Library Facilitation Kit:
 - 4 STEM activities
 - Curriculum and materials to support each activity
 - Science books and related resources
 - Kit evaluation instructions/ survey
- Calendar of future astronomical events
- Blackfeet & Crow Astronomy Teachers Guides
- Women in STEM information

NASA @ My Library Grant

- One of 14 State Libraries selected
- Meant to increase and enhance STEM learning opportunities for library patrons in Montana
- \$5,000 in grant funds, 2 STEM kits



- *Modeling Meaningful Eclipses* (20-40 min.)
- *UV Kid!* (40-60 min.)
- *Sorting Games: How Big? How Far? How Hot?* (10-30 min.)
- *Jump to Jupiter* (40-60 min.)



LUNAR AND
PLANETARY
INSTITUTE



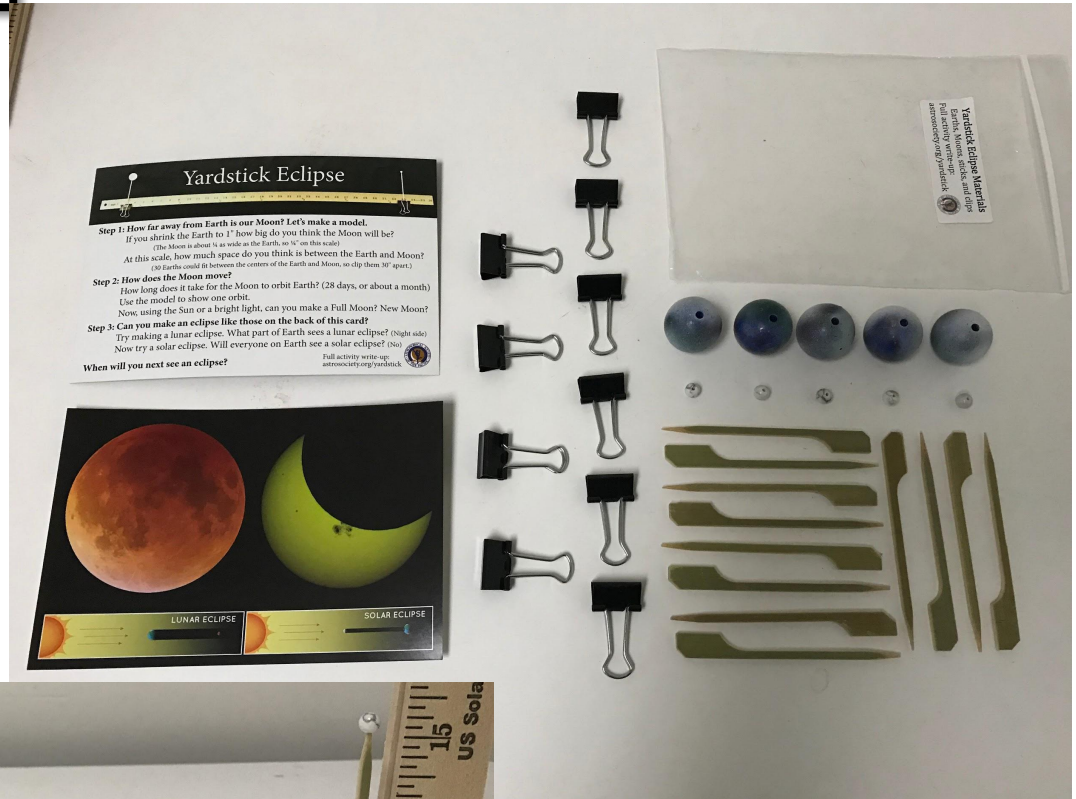
STAR★net

Science-Technology Activities &
Resources For Libraries

Activity 1: Modeling Meaningful Eclipses

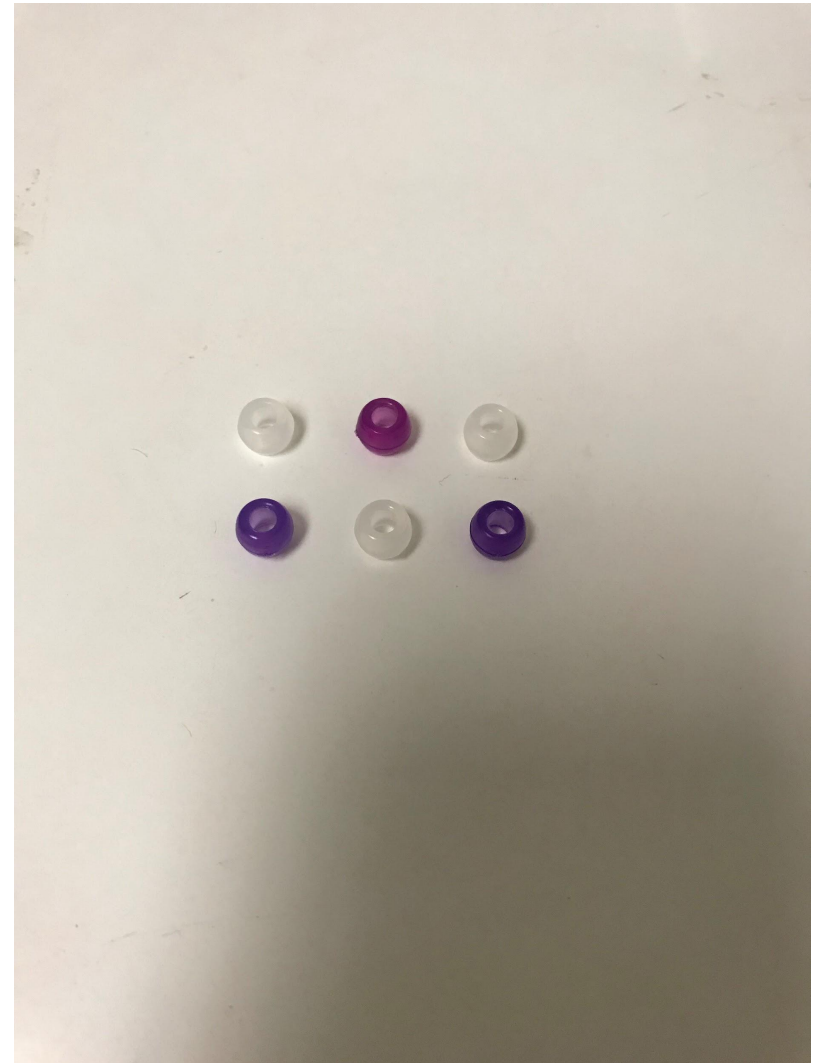


Activity 1: Modeling Meaningful Eclipses

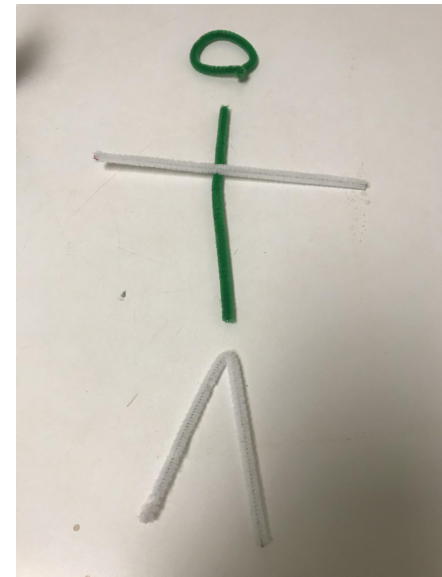




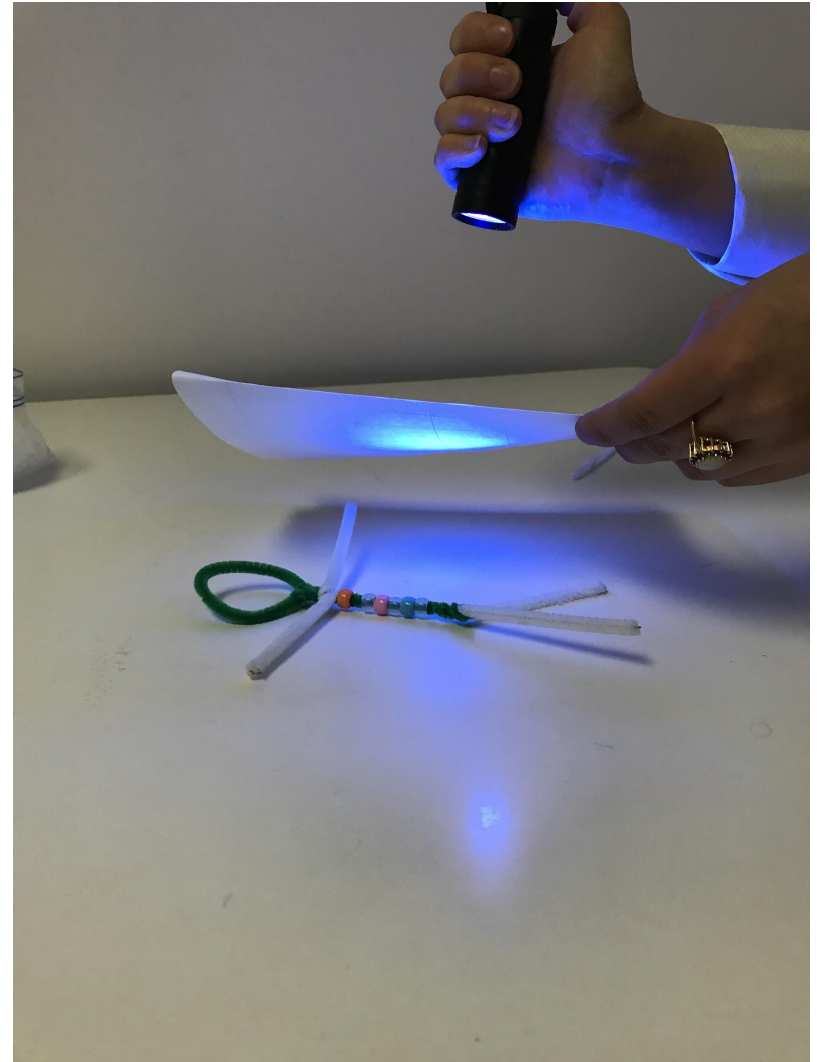
Activity 2: UV Kid



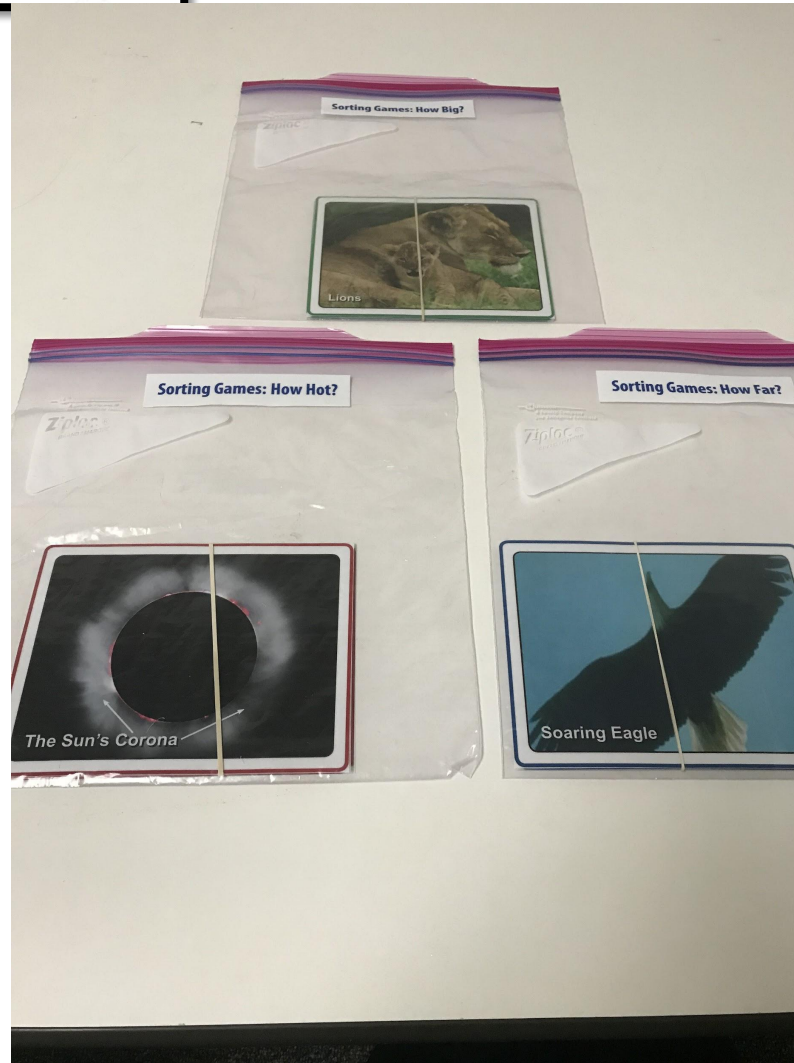
Activity 2: UV Kid



Activity 2: UV Kid



Activity 3: Sorting Games





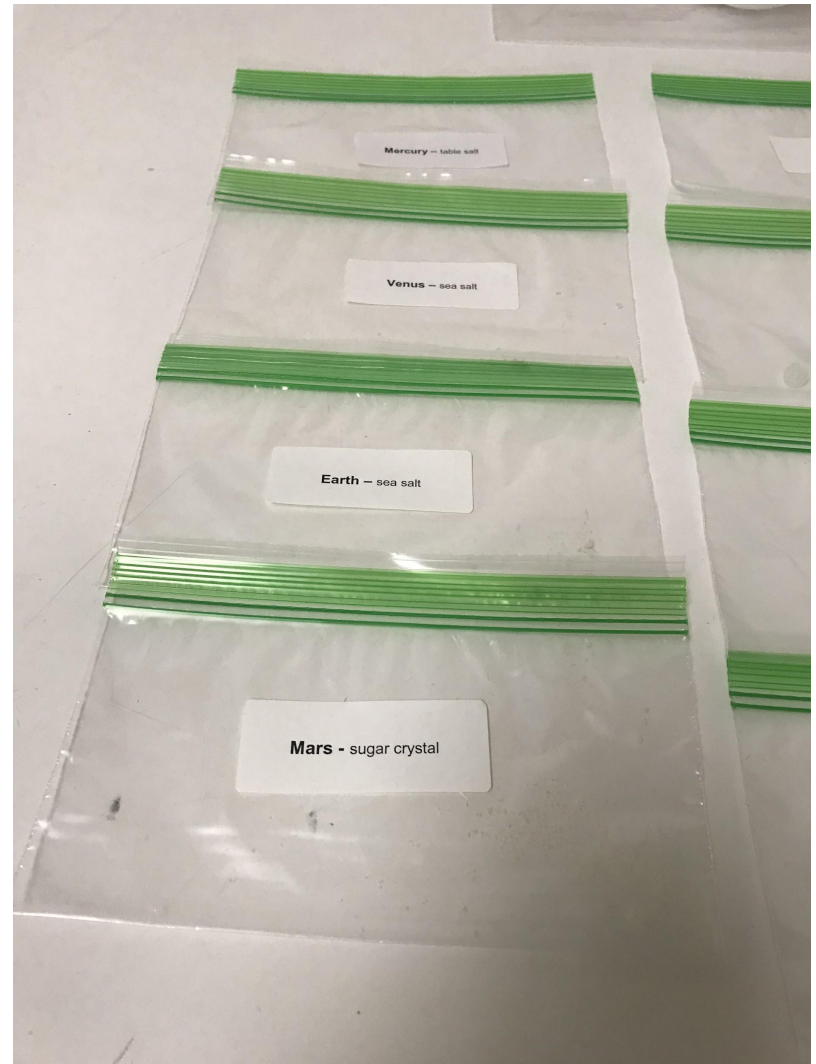
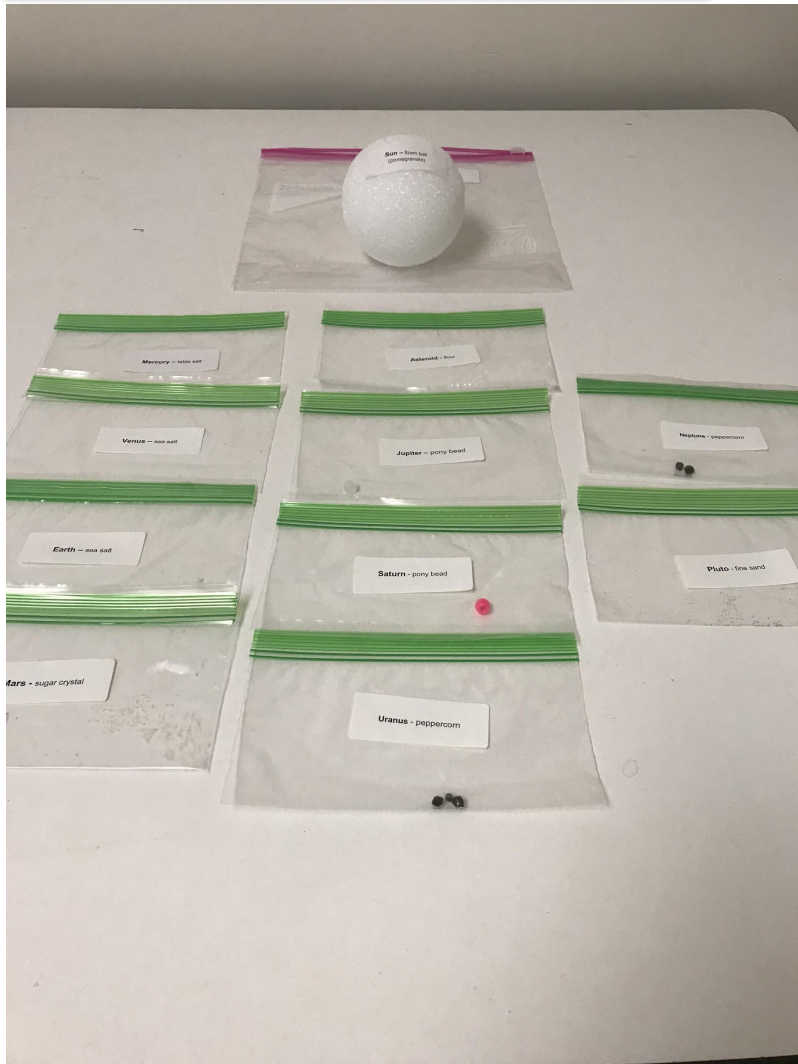
Activity 3: Sorting Games



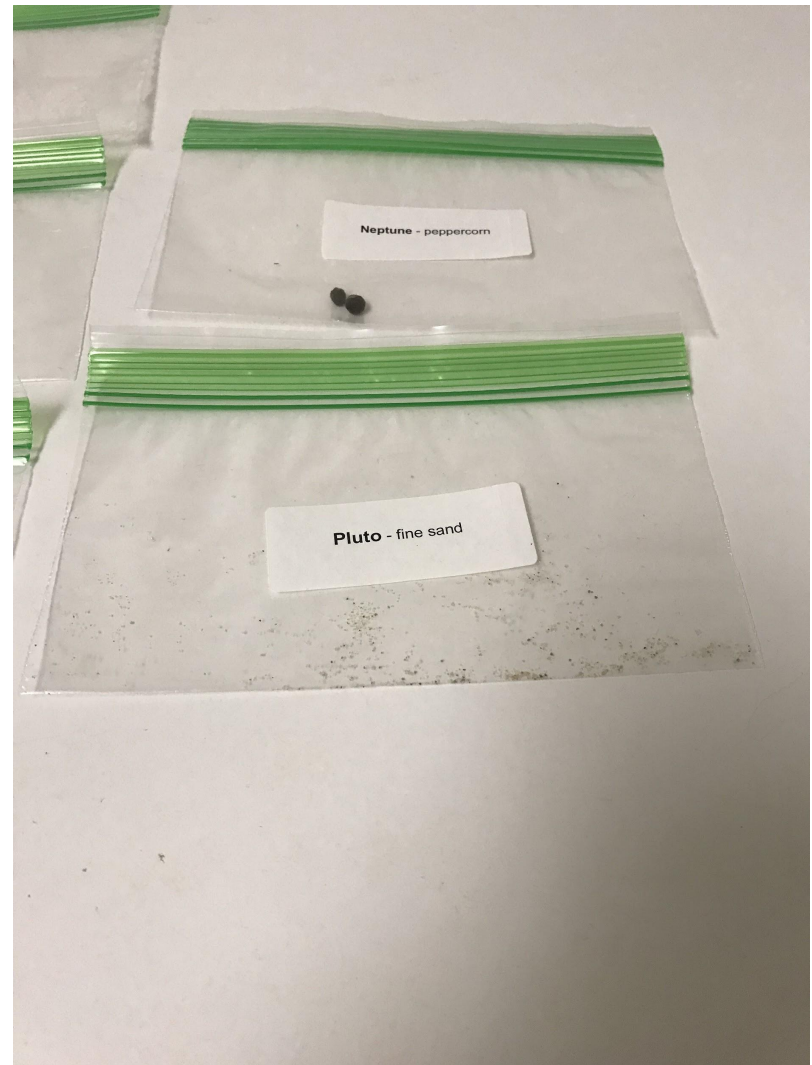
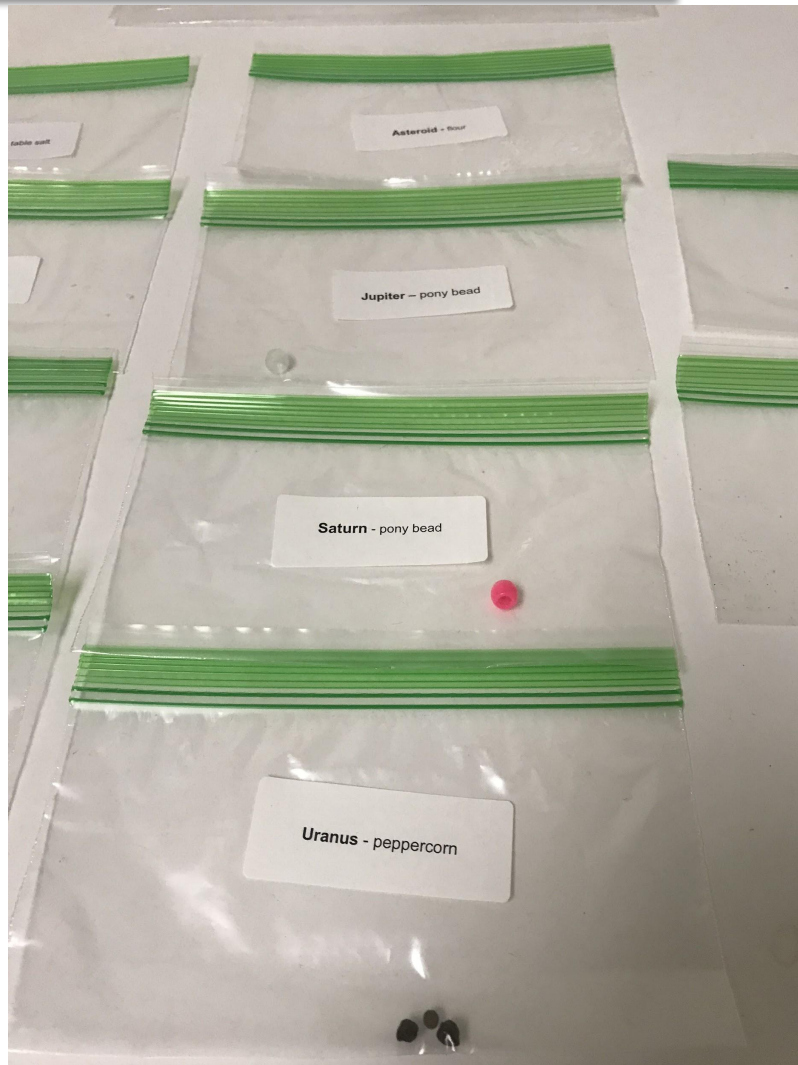
Activity 3: Sorting Games



Activity 4: Jump to Jupiter



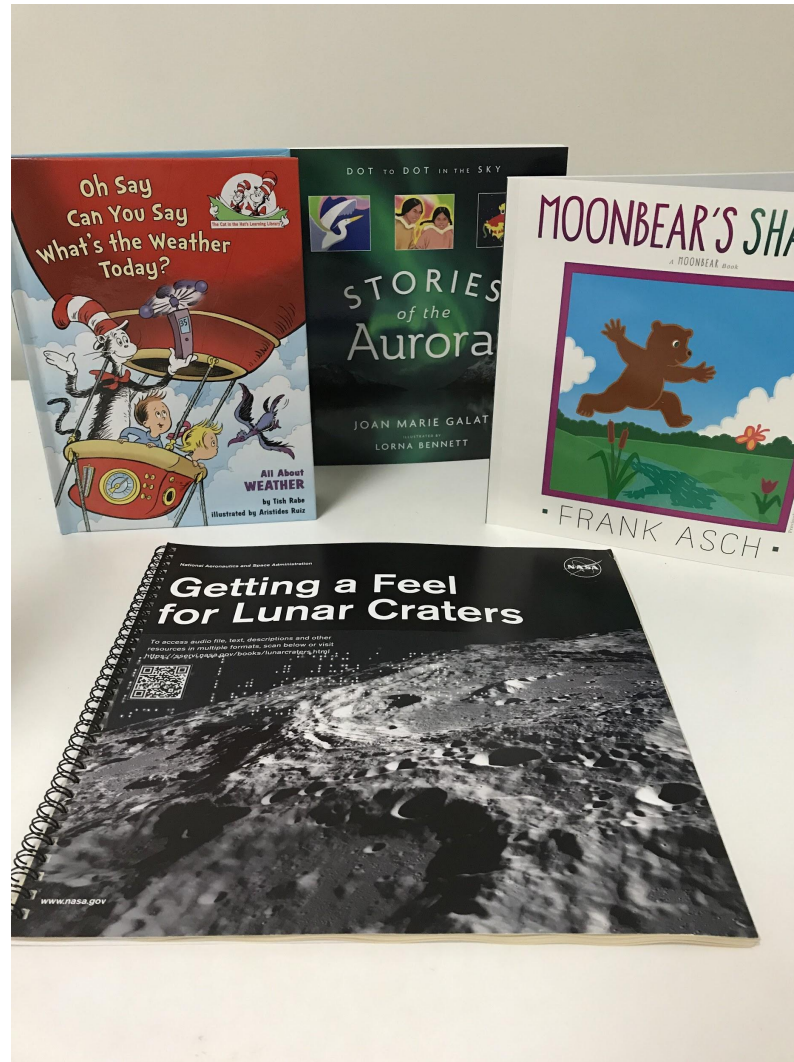
Activity 4: Jump to Jupiter



Activity 4: Jump to Jupiter



Other Kit Materials

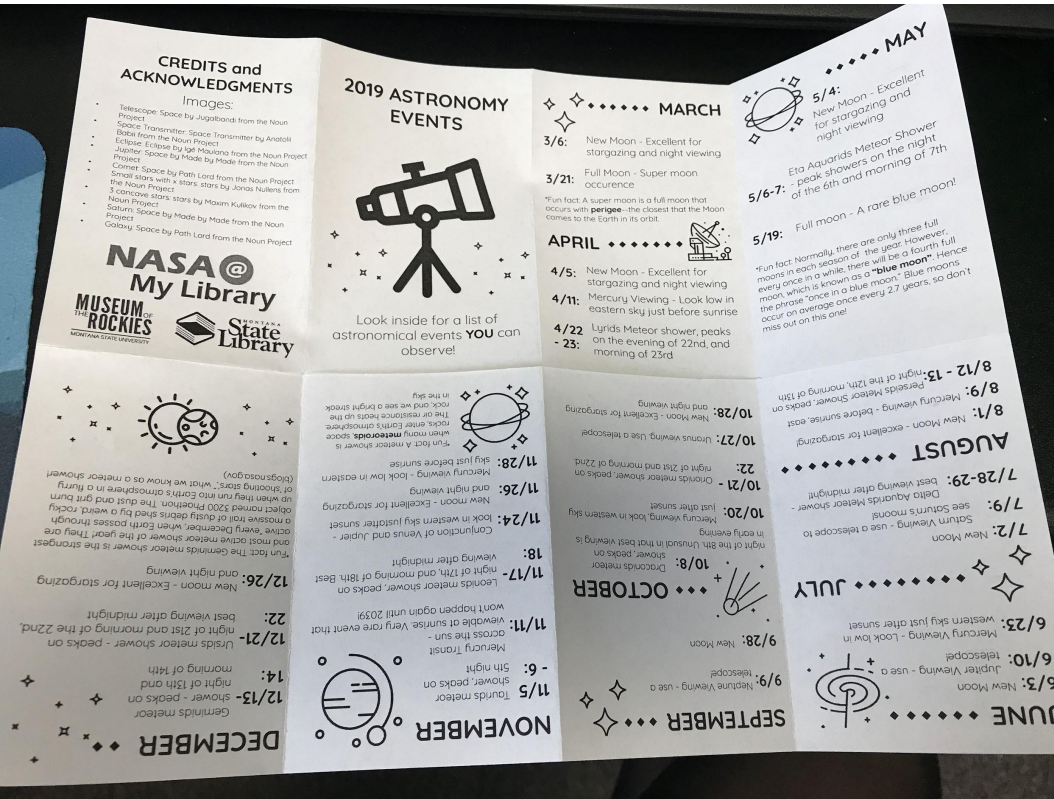




Added Materials

NASA @ My Library

Added Materials: Astronomy Events Zine



NASA Astrobiology Institute

NASA's Astrobiology Program supports scientists across the country through a variety of research programs. For more information and resources visit <http://astrobiology.nasa.gov>. The NASA Astrobiology Institute (NAI) is comprised of the following 14 interdisciplinary teams at universities and science centers. Visit <http://astrobiology.nasa.gov/na/teams> to learn more about each one.

- Arizona State University
- Carnegie Institution of Washington
- Georgia Institute of Technology
- Jet Propulsion Laboratory–Icy Worlds
- Jet Propulsion Laboratory–Titan
- Massachusetts Institute of Technology
- Montana State University
- NASA Ames Research Center
- NASA Goddard Space Flight Center
- Pennsylvania State University
- Rensselaer Polytechnic Institute
- University of Hawaii
- University of Washington
- University of Wisconsin

The NAI also has six international partners. Visit <http://astrobiology.nasa.gov/na/international-partners> for more information.

- Australian Centre for Astrobiology (ACA)
- Centro de Astrobiología (CAB)
- Astrobiology Society of Britain (ASB)
- Société Française d'Exobiologie (SFE)
- The European Exo/Astrobiology Network Association (ENANA)
- Russian Astrobiology Center (RAC)

If you were unable to "unlock" the QR codes in this pamphlet, here are the web links they open.

Astrobiology at Montana State University [video]
www.youtube.com/watch?v=n1UJCdk9tc

Yellowstone's Extreme Environments [slideshow]
www.youtube.com/watch?v=sBBSKcvhARA

Studying the Origins of Life [video]
www.youtube.com/watch?v=n3-S3tbJPp8

SCIENCE OF THE SPRINGS

Astrobiology in Yellowstone National Park

battery acid	pH 0	
	pH 1	Amethyst Geyser, Norris
	pH 2	Black Dragon's Caldron Mud Volcano
	pH 3	
	pH 4	Emerald Spring, Norris
black coffee	pH 5	
	pH 6	
water	pH 7	
	pH 8	Arrowhead Spring, Upper Geyser Basin
	pH 9	
	pH 10	Heart Lake Geyser Basin
	pH 11	
bleach	pH 12	
	pH 13	
liquid drain cleaner	pH 14	

MONTANA STATE UNIVERSITY
Astrobiology Biogeocatalysis Research Center

Q: What's the connection?

YELLOWSTONE HOT SPRINGS & Extraterrestrial Life

Not too long ago, scientists discovered organisms that can thrive in the harshest of environments: below freezing, exceedingly hot, very acidic, as well as deep underground and at the bottom of the ocean.

These organisms are called **extremophiles**, and the environments they live in—what we consider extreme on Earth—might be similar to what is normal on other planets or moons. Many scientists think that if we find life elsewhere in the universe, it may resemble these organisms living in Earth's most extreme environments, not the little green men often shown in cartoons and movies.

Extremophiles are microbes: tiny single-celled organisms that you usually need a microscope to see. Yellowstone National Park is one of the best places on Earth to study extremophiles because the Park has such an amazing diversity of them. Yellowstone was established in 1872

Chloroflexis is a modern ancestor of the first photosynthetic organism. These interesting microbes use sunlight as an energy source, but do not produce oxygen like plants and algae. Instead, they thrive on carbon dioxide and sulfur compounds.

What we consider extreme on Earth might be similar to what is normal on other planets or moons.

as the world's first national park, and it contains half (more than 10,000) of the world's hydrothermal features, including mudpots, hot springs, fumaroles, and geysers. Each thermal feature has its own unique characteristics and hosts a wide array of extremophiles.

Scientists at Montana State University and other institutions examine these life forms and their habitats because it gives them insights into not only what our early Earth might have been like and how life may have formed on this planet, but also because it helps us better consider how life might form and exist on other planets.

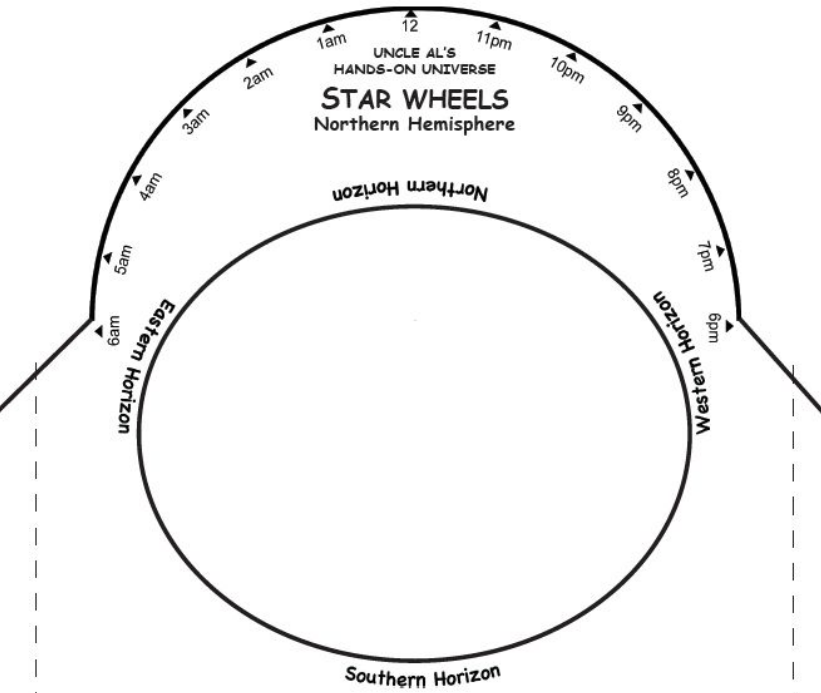
Enjoy your journey to Yellowstone's extreme environments!

View extra content using your smart phone.

Throughout this booklet you will see **QR codes** that "unlock" extra videos and content from the Internet. You need a Web-enabled phone with a camera and QR Reader software, which is installed on many phones or free to download. Search online for your phone model and "QR reader." Web links are also listed on the back.

Added Materials: Star Wheel Activity Template

Star Wheel Holder

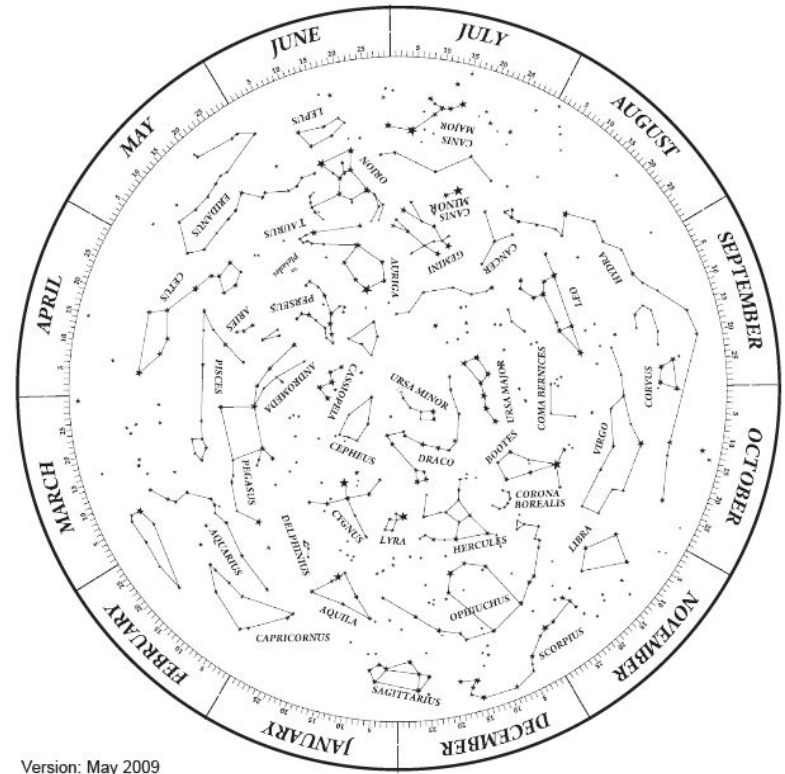


Version: May 2009

1. Align your date and time, and then look up at the sky.
 2. Locate the constellation you want to find on the map.
 3. Turn your map so the horizon it is closest to is at the bottom.
 4. The star positions in the sky should match those on the wheel.

© 2006, 2009 by the Regents of the University of California
 Uncle Al's Star Wheels are based on LHS Sky Challengers created by Budd Wentz and available through the LHS Museum Store
[http://www.lhs.berkeley.edu/pass/AST110&11&1&1.html](http://www.lhs.berkeley.edu/pass/AST110&11&1&1&1.html)
 510-642-1016
 Download Uncle Al's Sky Wheels from <http://lhs.berkeley.edu/hou/mng/uncleal/>

Instructions for Using Uncle Al's Star Wheels



Version: May 2009

INSTRUCTIONS FOR ASSEMBLING UNCLE AL'S STAR WHEELS

- Step 1: Print out all pages either on heavy cardstock or paste them onto a file folder or any other sturdy piece of cardboard.
- Step 2: Cut along the black outer circle of the Star Wheel and along the solid lines on the Star Wheel Holder. Remove the interior oval shape on the Star Wheel Holder.
- Step 3: On the Star Wheel Holder, fold the cardboard along the dashed lines.
- Step 4: Tape or staple along the edges of the Star Wheel Holder forming a pocket.
- Step 5: Place the Star Wheel in the Star Wheel Holder.

© 2006, 2009 by the Regents of the University of California
 Uncle Al's HOU Star Wheels are based on LHS Sky Challengers created by Budd Wentz and available through the LHS Discovery Corner Store 510-642-1016
<http://lhs.berkeley.edu/pass/AST110&11&1&1&1.html>
 Download Uncle Al's Sky Wheels from <http://lhs.berkeley.edu/starlock/skywheel.html>

NASA@ My Library

Added Materials: Women in STEM Display

WOMEN IN STEM

We celebrate women in STEM, (Science, Technology, Engineering and Math) both acknowledged and unknown, for their role in the exploration of the world and Universe around us.

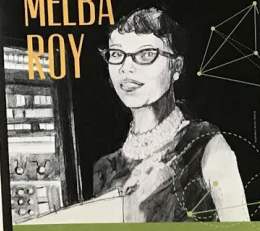
The history of women's contributions to the fields of science, technology, engineering, and math (STEM) is long and varied, but it has often been underappreciated. This series highlights the lives and work of women who have made important discoveries and have had a crucial impact on STEM fields. We celebrate their STEM disciplines in every type of job, and respect the rich range of backgrounds and experiences.

It wasn't until I went to college and Sally Ride came on television, opening up the possibility of what could be! That's when I knew I was going to do it.

Cady Coleman
Astrophysics Research Center, Ames, California
NASA astronaut

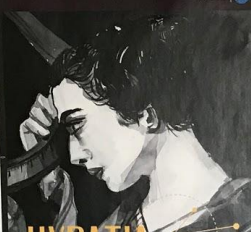
MELBA ROY

Melba Roy Houston (c. 1902) was a mathematician and computer programmer at NASA. Houston was a Civilian Research Service worker on the Astrotech Civilian Research Program. Houston worked at NASA's Goddard Space Flight Center during various assignments, including the Space Shuttle Challenger program.



HYPATIA

Hypatia Born in 350 was known as a great student in her age. She was one of the first women to be a great astronomer, mathematician and philosopher in ancient Greece and Egypt, and was also the first of an important school in Alexandria, Egypt, founded in 490. Her work was lost in the streets by a mob during a time of religious unrest.



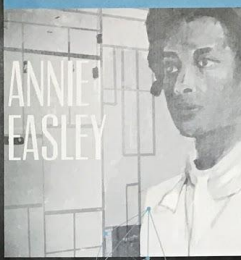
ADA LOVELACE

Augusta Ada Byron, Countess of Lovelace, usually referred to as Ada Lovelace, was born on December 10, 1815, and was the first computer programmer. She was the daughter of the poet Lord Byron and the scientist and philosopher Mary Shelley. She is credited with writing the first computer program for Charles Babbage's Analytical Engine, a mechanical general-purpose computer that became known as the first computer. She was the first to recognize the full potential of Babbage's computer.



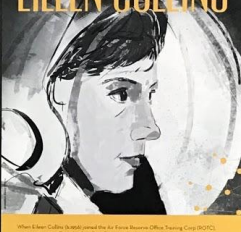
ANNIE EASLEY

Communication Systems Analyst (1961-1968) was the first African American woman to work for NASA. She was the first African American woman to be a NASA scientist. She was the first African American woman to be a NASA scientist. She was the first African American woman to be a NASA scientist.




EILEEN COLLINS

Eileen Collins (1938-2012) was the first woman to command a NASA Space Shuttle mission. She was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut.



CADY COLEMAN

Cady Coleman (1938-2012) was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut.



GRACE HOPPER

Grace Hopper (1906-1992) was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut.



KATHERINE JOHNSON

Katherine Johnson (1918-2020) was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut. She was the first woman to be a NASA astronaut.



MONTANA SKIES Crow Astronomy

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MONTANA SKIES Blackfeet Astronomy

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- OCLC Number: 1080202558
- Does not have any of the “Added Materials” cataloged in record

URL:

[https://www.worldcat.org/title/nasa-stem-facilitation-kit-1-sun-earth-moon-connections/oclc/1080202558&referer=brief results](https://www.worldcat.org/title/nasa-stem-facilitation-kit-1-sun-earth-moon-connections/oclc/1080202558&referer=brief%20results)

**Application Deadline:
Friday, March 1, 2019**

1. Go to Museum of the Rockies Libraries webpage:
<https://museumoftherockies.org/education/libraries>
2. Fill out application form
3. You will be notified by March 8
4. Options to receive your kit:
 - MLA conference April 10-13, 2019
 - Use the Library Courier
 - Have it delivered to your physical address*

*We are hoping to avoid shipping cost and provide as many kits as possible



Other Resources



STARnet Website

1. *A Universe of Stories* Resources
 - ★ *Summer of Space*
2. STEM Activity Clearinghouse
 - ★ *Sorting Tool*
3. Webinars



Science-Technology Activities &
Resources For Libraries



SPOT

Space Public Outreach Team

<https://spacegrant.montana.edu/spot.html>

- Provides FREE presentations about current NASA missions and research
- Located in MSU Bozeman and UM Missoula
- Can travel, but attendance requirements for farther locations
- Limited availability, so ask early about scheduling

A service of the Montana Space Grant Consortium





SSA: Lynn Powers

Solar System Ambassador: Lynn Powers

Email: l.powers@smasweb.org

- Provides space-related programming, outreach, and resources
- Scheduling more flexible in the summer, but limited availability
- No presenter fee, but gas reimbursement charged
- Topics: Apollo landing 50th anniversary, “Ask an Astronomer”, Moon Geology, and much more!



Big Sky Astronomy

Night Sky Network: Big Sky Astronomy

Mark Paulson, mhpaulson@gmail.com

<http://www.bigskyastroclub.org/>

- Local astronomy club in Kalispell
- Available for presentations and astronomy programming
- Free to book, but limited to Western Montana
- Limited availability
- List of presentation topics:
<http://docs.msl.mt.gov/librariesweb/documents/NASA/BigSkyAstronomyPresentationList.pdf>



Stellarium

Free Open Source Planetarium

<http://stellarium.org/>

- Shows a realistic sky on your computer
- Easy to use, no special requirements, FREE
- Lessons on MSL webpage that you can use:
<http://libraries.msl.mt.gov/lifelonglearning/NAML>



MOR Outreach

Museum of the Rockies STARLab and Outreach Kits

Bring Museum of the Rockies to your library!

Real fossils and artifacts, unique hands-on activities and lesson plans.

Resources support STEM education, Montana Content Standards and Indian Education for All.

Help your students learn MORE without being at MOR.

RESERVE THE PORTABLE PLANETARIUM TODAY!

A UNIVERSE of Stories



JPL Infographics

MIND-MELTING FACTS ABOUT THE SUN

National Aeronautics and Space Administration



Temperature vs. Heat

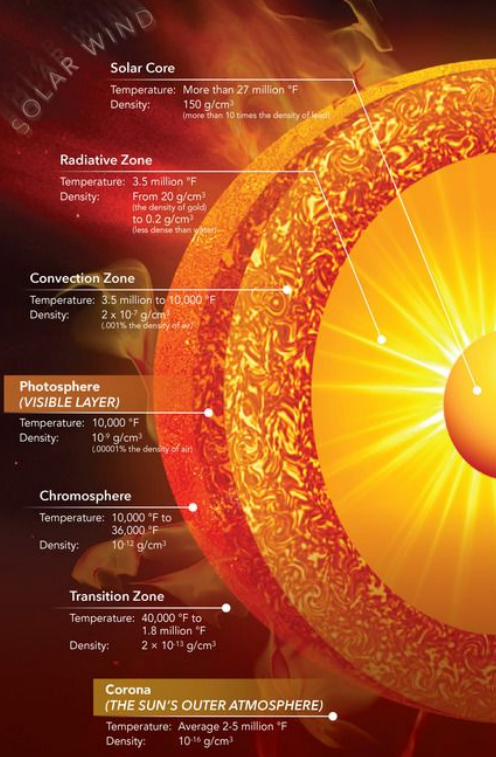
In space, the temperature can be thousands of degrees without "feeling hot." Why? Temperature measures how fast particles are moving, whereas heat measures the total amount of energy that they transfer. Since space is mostly empty, there are very few particles to transfer energy to your hand. Particles may be moving fast (high temperature), but if there are very few of them, they won't transfer much energy (low heat).

The Solar "Surface"

The Sun does not have a solid "surface". The layer you can see, called the **photosphere**, is just the layer that emits the most light in the visible part of the electromagnetic spectrum. In fact, there are three layers on top of it, but the visible light they emit is too faint to see. Except during a total solar eclipse, when the corona can be seen by the naked eye!

The Puzzle of Coronal Heating

As you walk away from a fire, you expect the temperature to go down. The Sun is quite different: the **corona**, the outermost layer of the Sun, is hotter than the layers immediately below it! Exactly how the corona gets so hot is a major unsolved puzzle in heliophysics.



THICKNESS OF EACH LAYER OF THE SUN



For more information, please visit: nasa.gov/sunearth

www.nasa.gov

National Aeronautics and Space Administration



What is a Dwarf Planet?

Dwarf planets are round in shape and orbit the Sun just like the eight major planets. But unlike planets, dwarf planets are not able to clear their orbital path so there are no similar objects at roughly the same distance from the Sun. A dwarf planet is much smaller than a planet (smaller even than Earth's moon), but it is not a moon. The first five recognized dwarf planets are Ceres, Pluto, Eris, Makemake and Haumea and they are all uniquely mysterious.

CERES



Scientists describe Ceres as an "embryonic planet." Gravitational perturbations from Jupiter billions of years ago prevented it from becoming a full-fledged planet. Ceres ended up among the leftover debris of planetary formation in the main asteroid belt between Mars and Jupiter.

How Ceres Got Its Name: Ceres is named for the ancient Roman goddess of corn and harvests.
Discovered: 1801 **Location:** Asteroid Belt

PLUTO



Pluto was long considered our solar system's ninth planet. But after the discovery of similar intriguing worlds deeper in the distant Kuiper Belt, icy Pluto was reclassified as a dwarf planet.

How Pluto Got Its Name: Pluto is named for the Roman god of the underworld.
Discovered: 1930 **Location:** Kuiper belt

ERIS



The dwarf planet Eris is often so far from the sun that its atmosphere collapses and freezes on the surface in an icy glaze. The coating gleams brightly, reflecting as much sunlight as freshly fallen snow.

How Eris Got Its Name: Eris is named for the ancient Greek goddess of discord and strife.
Discovered: 2003 **Location:** Kuiper Belt

MAKEMAKE



Makemake holds an important place in the solar system because it – along with Eris – was one of the objects whose discovery prompted the International Astronomical Union to reconsider the definition of a planet and to create the new group of dwarf planets.

How Ceres Got Its Name: Makemake is named after the god of fertility in Rapanui mythology.
Discovered: 2005 **Location:** Kuiper Belt

HAUHEA



Oddly-shaped Haumea is one of the fastest rotating large objects in our solar system. The quick spin elongated the dwarf planet into the unique shape. It is roughly the same size as Pluto.

How Haumea got its name: Haumea is named for the Hawaiian goddess of childbirth and fertility.
Discovered: 2003 **Location:** Kuiper Belt



IT'S EXCLUSIVE!

GANYMEDE'S MAGNETOSPHERE

THE SOLAR SYSTEM'S WEIRDEST MAGNETIC ENVIRONMENT

Magnetospheres are regions around planets dominated by their magnetic fields. They protect the planets from harmful radiation from the Sun and interstellar space.

The only moon with a magnetosphere, Ganymede, is uniquely embedded in Jupiter's protective bubble.

Plasma from Jupiter rings with the planet, pushing Ganymede's magnetosphere like a tailwind and sculpting its distinctive shape, as shown by the yellow lines.

NASA's Galileo spacecraft was the first to fly by in 1995, discovering the magnetosphere.

Magnetospheres are important to study as they may be essential for the development of life, since they cocoon planets from harmful radiation.

www.nasa.gov

dawn.jpl.nasa.gov



JPL Posters

Exoplanet Travel Bureau



Kepler-186f

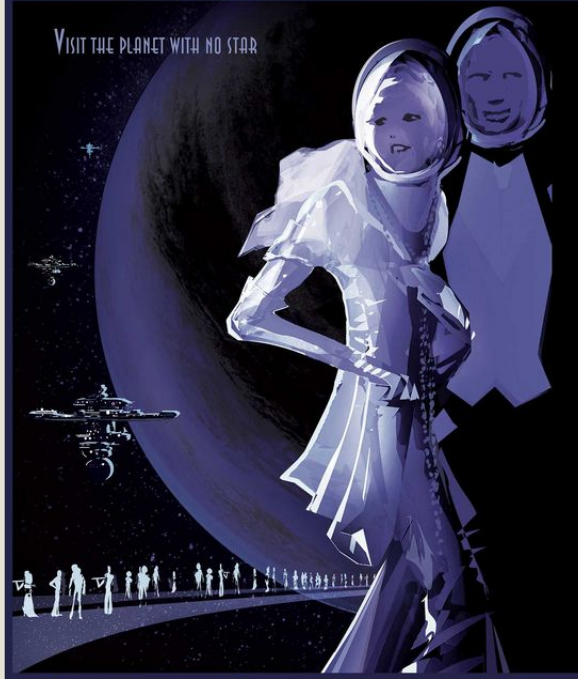
WHERE THE GRASS IS ALWAYS REDDER ON THE OTHER SIDE

Kepler-186f is the first Earth-size planet discovered in the potentially "habitable zone" around another star, where liquid water could exist on the planet's surface. Its size is much cooler and redder than our Sun. If placed like Kepler-186f, its photosynthesis could have been influenced by the star's red-wavelength photons, making for a color palette that's very different than the greens on Earth. This discovery was made by Kepler, NASA's planet-hunting space telescope.

NASA's Exoplanet Explorer Program, Jet Propulsion Laboratory, Pasadena, CA
www.jpl.nasa.gov

www.nasa.gov

Exoplanet Travel Bureau



PSO J318.5-22

WHERE THE NIGHTLIFE NEVER ENDS!

Discovered in October 2013 using direct imaging, PSO J318.5-22 belongs to a special class of planets called rogue, or free-floating, planets. Wandering alone in the galaxy, they do not orbit a parent star. Not much is known about how these planets come to exist, but scientists theorize that they may be either failed stars or planets ejected from very young systems after an encounter with another planet. These rogue planets glow faintly from the heat of their formation. Once they cool down, they will be dancing in the dark. Confirmed and candidate exoplanets and all available data are listed in the NASA Exoplanet Archive.

NASA's Exoplanet Explorer Program, Jet Propulsion Laboratory, Pasadena, CA
www.jpl.nasa.gov

www.nasa.gov

Exoplanet Travel Bureau



HD 40307g

A SUPER EARTH

Twice as big in volume as the Earth, HD 40307g straddles the line between "Super-Earth" and "mini-Neptune" and scientists aren't sure if it has a rocky surface or one that's buried beneath thick layers of gas and ice. One thing is certain, though: at eight times the Earth's mass, its gravitational pull is much, much stronger.

NASA's Exoplanet Explorer Program, Jet Propulsion Laboratory, Pasadena, CA
www.jpl.nasa.gov

www.nasa.gov




NASA @ My Library Kit 2

NASA @ My Library Kit 2: *Be a NASA Detective - Expanding Your Senses*

<http://libraries.msl.mt.gov/lifelonglearning/NASASTemKit>

- Similar set up to Kit 1, different activities you can do
- Has a telescope, and binoculars
- Will be an MSL-hosted collection - tour model
- More details forthcoming on how to host it after MLA



QUESTIONS? FEEDBACK?

Amelea Kim

Lifelong Learning Librarian

Montana State Library

406.444.0224

akim@mt.gov



Jaime Augst

Outreach Program Manager

Museum of the Rockies

406.994.5257

MORoutreach@montana.edu

