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NASA STEM Facilitation Kit

Our Place in Space

NASA@ My Library

STAR net

Science-Technology Activities & Resources For Libraries

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Section 1:

Getting Started

Inventory Checklist

Activity Materials

Exploring the Universe: Filtered Light
- 54 color paddles (3 bags)
- 2 boxes of colored pencils
- Astronomical object sheets (in binder)

Pinwheel Galaxy Activity
- 3 paper punchers
- Chenille sticks
- Chop sticks
- Pinwheel galaxy printouts

STEM Tools

- 1 4.5" AstroBlast FunScope
  - Instruction manual
  - 20mm eyepiece and covers
  - 6mm eyepiece and covers
  - Red-dot finder scope
- 1 Celestron Cometron 7x50mm Binoculars
  - Instruction manual
  - 2 eyepiece caps
  - 2 optical lens caps
  - Lens cloth
  - Carrying bag with neck strap
- 1 Moon Filter
- 1 Planisphere

Books

- *Understanding Small Worlds in the Solar System* (NASA)
- *All My Friends are Planets* (Alisha Vimawala)
- *Starry Skies* (Samantha Chagollan)
- *They Dance in the Sky* (Jean Guard Monroe and Ray A. Williamson)

NASA Mission Spotlight: Apollo 11

Credit: NASA

"The Eagle has landed…" The primary objective of **Apollo 11** was to complete a national goal set by President John F. Kennedy on May 25, 1961: perform a crewed lunar landing and return to Earth. Additional flight object ives included scientific exploration by the lunar module crew; deployment of a television camera to transmit signals to Earth; and deployment of a solar wind composition experiment, seismic experiment package and a Laser Ranging Retroreflector. During the exploration, the two astronauts gathered samples of lunar-surface materials for return to Earth. They also extensively photograph the lunar terrain, the deployed scientific equipment, the LM spacecraft, and each other, both with still and motion picture cameras.

Mission Website: https://goo.gl/Q6XBLp

On Jan. 9, 1969, NASA announced the prime crew of the Apollo 11 lunar landing mission. Later that year in July 1969, the crew launched to the Moon and into history. From left to right are lunar module pilot Buzz Aldrin; commander Neil Armstrong; and command module pilot Michael Collins. They were photographed in front of a lunar module mockup beside Building 1 at what is now Johnson Space Center.
Credit: NASA

Forty-nine years ago on July 20, 1969, humanity stepped foot on another celestial body. Mission Commander Neil Armstrong documented the lunar mission and snapped this image of Lunar Module Pilot Buzz Aldrin, as he carried the Passive Seismic Experiments Package (in his left hand) and the Laser Ranging Retroreflector (in his right) to the deployment area. These two experiments made up the Early Apollo Scientific Experiment Package. This photograph was taken at Tranquility Base in our Moon's Sea of Tranquility.
Credit: NASA

NASA Mission Spotlight: Juno

Credit: NASA

Juno is a NASA space probe orbiting the planet Jupiter. It was built by Lockheed Martin and is operated by NASA's Jet Propulsion Laboratory. The spacecraft was launched from Cape Canaveral Air Force Station on August 5, 2011, as part of the New Frontiers program, and entered a polar orbit of Jupiter on July 5, 2016, to begin a scientific investigation of the planet. After completing its mission, Juno will be intentionally deorbited into Jupiter's atmosphere.

Juno's mission is to measure Jupiter's composition, gravity field, magnetic field, and polar magnetosphere. It will also search for clues about how the planet formed, including whether it has a rocky core, the amount of water present within the deep atmosphere, mass distribution, and its deep winds, which can reach speeds up to 618 kilometers per hour (384 mph).

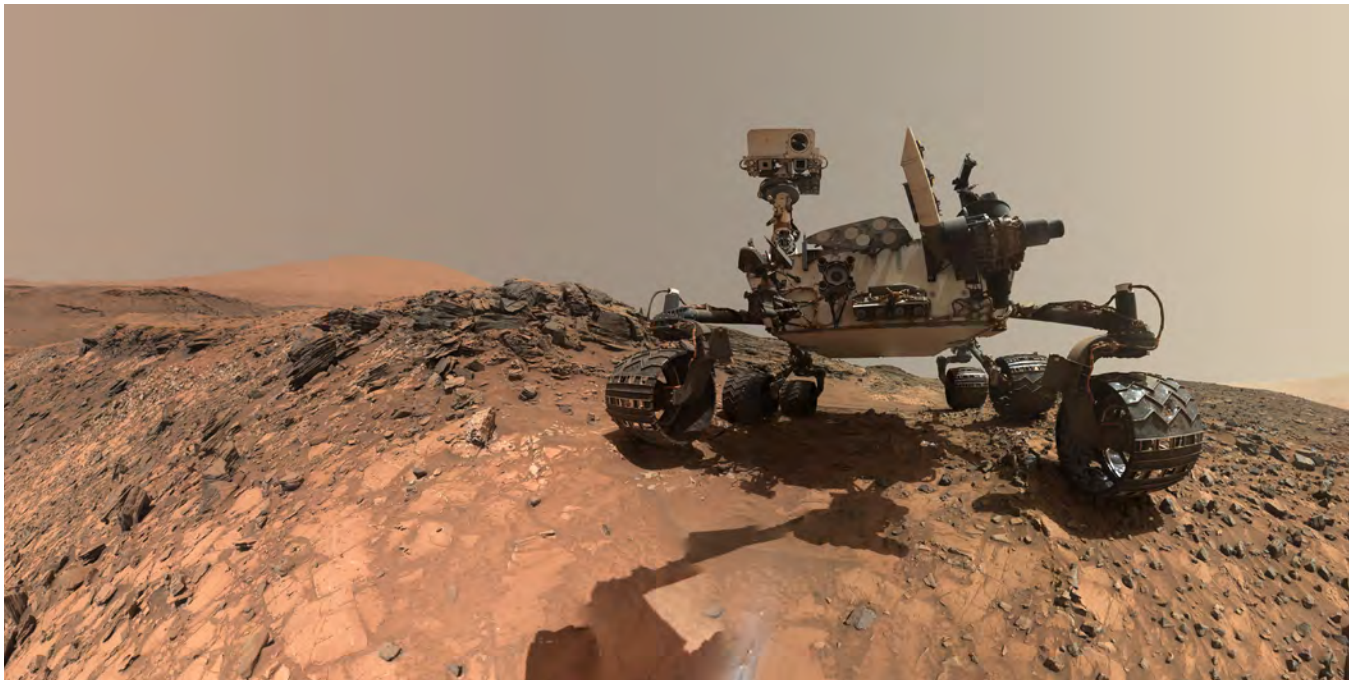
Mission Website: https://goo.gl/1vnLLp

Stormy Jupiter. This image captures the intensity of the jets and vortices in Jupiter's North North Temperate Belt.

NASA's Juno spacecraft took this color-enhanced image on May 23, 2018, as Juno performed its 13th close flyby of Jupiter. At the time, the spacecraft was about 4,900 miles (7,900 kilometers) from the tops of the clouds of the gas giant planet. Scientists think the large-scale dark regions are places where the clouds are deeper, based on infrared observations. Citizen scientist, Kevin M. Gill, created this image using data from the spacecraft's JunoCam imager.

Credit: NASA and Kevin M. Gill.

NASA Mission Spotlight: Curiosity Rover

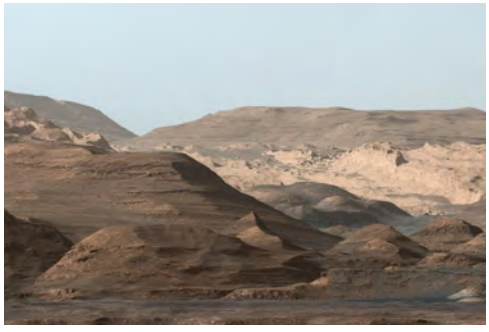


Credit: NASA

Curiosity is a car-sized rover designed to explore Gale Crater on Mars as part of NASA's Mars Science Laboratory mission (MSL). Curiosity was launched from Cape Canaveral on November 26, 2011 aboard the MSL spacecraft and landed on Gale Crater on Mars on August 6, 2012. The Bradbury Landing site was less than 2.4 kilometers (1.5 miles) from the center of the rover's touchdown target after a 560 million kilometers (350 million miles) journey. The rover's goals include an investigation of the Martian climate and geology; assessment of whether the selected field site inside Gale Crater has ever offered environmental conditions favorable for microbial life, including investigation of the role of water; and planetary habitability studies in preparation for human exploration.

Curiosity's design will serve as the basis for the planned Mars 2020 rover.

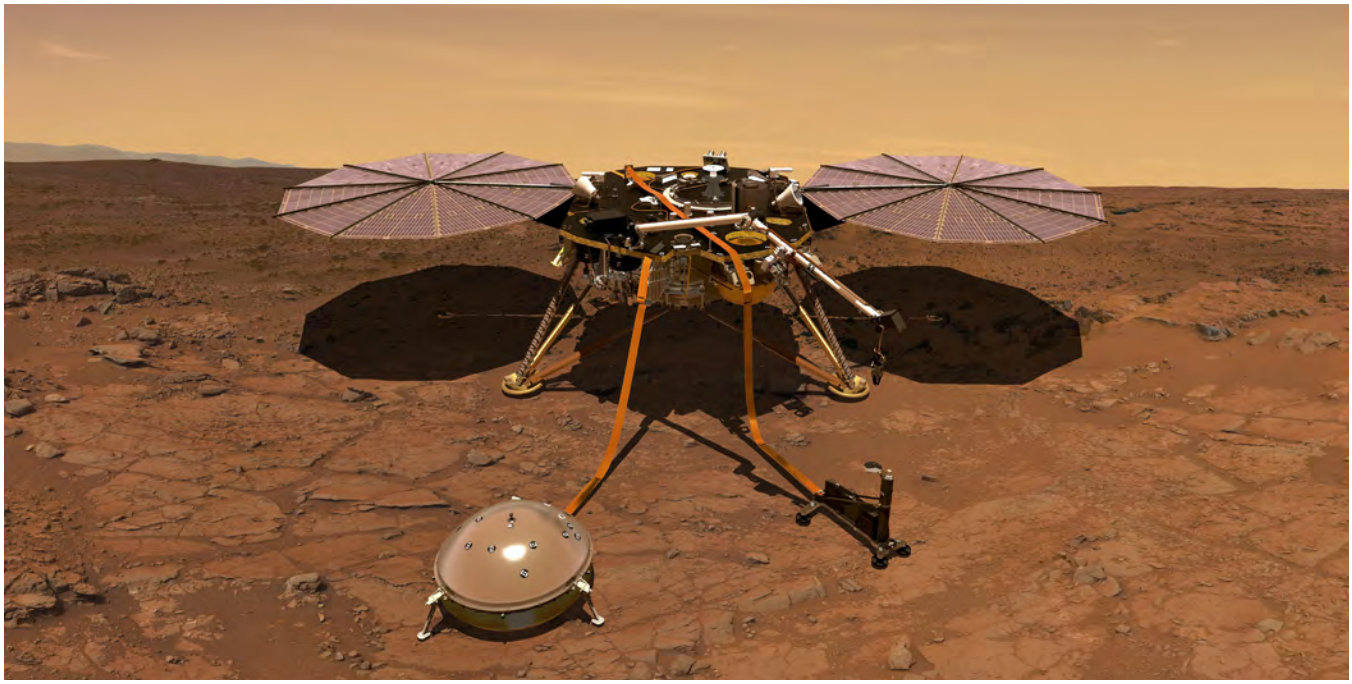
Mission Website: https://goo.gl/2x26M3



This composite image looking toward the higher regions of Mount Sharp was taken on September 9, 2015, by NASA's Curiosity rover. In the foreground – about 3 kilometers (2 miles) from the rover – is a long ridge teeming with hematite, an iron oxide. Just beyond is an undulating plain rich in clay minerals. And just beyond that are a multitude of rounded buttes, all high in sulfate minerals. The changing mineralogy in these layers of Mount Sharp suggests a changing environment in early Mars, though all involve exposure to water billions of years ago. The Curiosity team hopes to be able to explore these diverse areas in the months and years ahead. Further back in the image are striking, light-toned cliffs in rock that may have formed in drier times and now is heavily eroded by winds.

Credit: NASA/JPL-CALTECH

NASA Mission Spotlight: Mars InSight



Credit: NASA

InSight is a robotic lander designed to study the interior of the planet Mars. It was manufactured by Lockheed Martin Space Systems. The name is a backronym for Interior Exploration using Seismic Investigations, Geodesy and Heat Transport. The mission launched from Vandenberg Air Force Base on California's Pacific coast aboard a two-stage Atlas V launch vehicle on 5 May 2018 and is expected to land on the surface of Mars at Elysium Planitia on 26 November 2018, where it will deploy a seismometer and burrow a heat probe. It will also perform a radio science experiment to study the internal structure of Mars. InSight includes scientists from institutions in the U.S., France, Germany, Austria, Belgium, Canada, Japan, Switzerland, Spain and the United Kingdom.

InSight's objective is to place a stationary lander equipped with a seismometer and heat transfer probe on the surface of Mars to study the planet's early geological evolution. This could bring new understanding of the Solar System's terrestrial planets — Mercury, Venus, Earth, Mars — and Earth's Moon.

Mission Website: https://goo.gl/A2dXV5

The solar arrays on NASA's InSight lander are deployed in this test inside a clean room at Lockheed Martin Space Systems, Denver. This configuration is how the spacecraft will look on the surface of Mars. The image was taken on April 30, 2015.

Credit: NASA/JPL-CALTECH

NASA Science Resources for Public Libraries

Eclipse Resources

Between March 2016 and December 2020, four total solar eclipses occur in the world – one in the southwestern pacific, one in the U.S. and two in South America. These sequential eclipse events provide an unprecedented opportunity to build and scaffold public engagement in science. *Navigating the Path of Totality* is a public education program produced by the Exploratorium scientists, educators and media production staff that make use of these total solar eclipses as platforms for sparking public engagement and learning about the Sun, heliophysics, and the STEM content related to both.

http://bit.ly/2XEiYCi

Girl Scout Resources

The Girl Scouts: Reach for the Stars aims to enhance STEM experiences for Girl Scouts in grades K-12 through the national Girl Scout Leadership Experience. SETI Institute leads the experienced space science educators at Astronomical Society of the Pacific, University of Arizona, and ARIES Scientific. Girl Scouts of the USA leads dissemination of Girl Scout Stars to Councils with support of Girl Scouts of Northern California. New space science badges are being created for every Girl Scout level. The Girl Scout Volunteer Tool Kit taps into the wealth of online materials provided by NASA for the new space science badges.

http://bit.ly/31R8iy7

Digital Resources

Arizona State University strives to develop next-generation, digital, adaptive learning experiences that are compelling to learners of all ages and use NASA science, visualizations, and stories. *Infiniscope* is not only creating activities, but training a community of educators to create their own adaptive learning experiences that provide feedback and pathways to meet the needs of their individual learners and communities. Not just another internet portal, Infiniscope is a digital platform that empowers a community of educators to connect, collaborate, and create, next-generation exploratory activities.

http://bit.ly/2NoDlvU

Earth Resources

The NASA Earth Science Education Collaborative (NESEC) builds pathways between NASA's Earth STEM assets to large, diverse audiences in order to enhance K-12 teaching and learning, and opportunities for lifelong learners. STEM assets include subject matter experts, science and engineering content, and authentic STEM experiences. NESEC is a partnership between the Institute for Global Environmental Strategies (IGES) and NASA Earth science divisions at three NASA Centers: Goddard Space Flight Center, Jet Propulsion Laboratory, and Langley Research Center.

http://bit.ly/2PpHsdZ

Planetary Surface Resources

NASA's Solar System Treks project produces a suite of online, web-based, interactive visualization and analysis portals. These tools enable mission planners, planetary scientists, students, and the public to explore the surfaces of a growing number of planetary bodies as seen through the eyes of many different instruments aboard a variety of spacecraft. Views can be stacked and blended. Users can interactively fly over peaks and down into valleys in 3D mode; measure distances, heights, and depths of landforms; and mark areas for output to 3D printers. The project is managed by NASA's Solar System Exploration Research Virtual Institute and developed at NASA's Jet Propulsion Laboratory.

https://go.nasa.gov/2PwRkCR

NASA Science Resources for Public Libraries

NASA Space Place

NASA Space Place was created in 1998 as a premier science communications website. It was the first NASA website designed almost exclusively for a younger audience. This award-winning website engages upper-elementary-aged children in space and Earth science through interactive games, hands-on activities, fun articles, and short videos. NASA Space Place has numerous resources for parents and teachers, and produces materials in both English and Spanish.

https://go.nasa.gov/2oqDhUb

Digital Space Exploration Resources

Experience Earth and our Solar System, the universe and the spacecraft exploring them, with immersive apps for Mac, PC and mobile devices. This resource is produced by NASA's Jet Propulsion Laboratory.

https://go.nasa.gov/2po96x8

Museum Alliance

It was created to be the "front door" to NASA for the world of informal education. Likewise, for NASA programs, the Alliance is the "front door" to access the world of informal education. The Alliance is meant to be the starting point for all informal educators who are seeking free NASA educational resources and services. On the other side, the Alliance is also the place where NASA experts can find a ready-made audience who can engage the worldwide public about their work, their information, and their educational products and services. This program is managed by NASA's Jet Propulsion Laboratory.

https://go.nasa.gov/2JoiO9N

Universe of Learning Resources

NASA's Universe of Learning provides resources and experiences that enable educators to engage their audiences in the science, the story, and the adventure of NASA's scientific explorations of the Universe. There integrated team of scientists, educators, and communications professionals work together and with the education community to strengthen science education and scientific literacy, and to enable youth, families and lifelong learners to discover the Universe for themselves.

http://bit.ly/345Tld9

Informal Learning Resources

Arizona State University - National Informal STEM Education Network (NISE Net) is a community of informal educators and scientists dedicated to supporting learning about STEM in communities across the United States. NISE Net is utilizing NASA subject matter experts, SMD assets and data, and existing educational products and online portals to create compelling learning experiences that will be widely used to share the story, science, and adventure of NASA's scientific explorations of planet Earth, the solar system, and the universe beyond.

http://bit.ly/2pjQ4rT

Section 2:

Activity Guides

Exploring the Universe: Filtered Light

In this activity patrons will learn more about the roles that filters play in observational astronomy, while also learning about some of the phenomena that become "invisible" without the appropriate filter. This activity can be easily adapted and modified into a station activity.

Credit: NASA, ESA, J. Hester, A. Loll (ASU)

Key Concepts

- Astronomers use different filters to aid in their study of objects in the sky

Build a Program with Related Resources

Combine this activity along with *Make a Pinwheel Galaxy*. Have patrons use different colored paddles to view their Pinwheel Galaxy creations!

This activity pairs well with a night sky viewing. It will help patrons understand that the tools that astronomers use to view the sky are quite different!

Some additional STEM Activity Clearinghouse activities that could be used in conjunction with this activity are *Art and the Cosmic Connection*, *A Matter of Perspective*, *Strange New Planet*, *Coloring the Universe*, and *Hide and Seek Moon*

Need more ideas? Visit our *STEM Activity Clearinghouse* (http://clearinghouse.starnetlibraries.org)

Add Your Review of This Activity

There are many STEM educational resources available to use in programs. We hope that you will give this activity a try! Then, **help others find the "best of the best" by writing a review** on the STEM Activity Clearinghouse. Email your favorite activities directly to a colleague!

Content Area – Astronomy and Space, Physics

Ages – Family, Pre-K, Early Elementary, Upper Elementary, Tweens, Teens

Activity Time – 10-20 minutes

Prep Time – 10-20 minutes

Difficulty Level – Medium

Mess Level – Low

Originating Source:
Exploring the Universe: Filtered Light was provided by the Science Museum of Minnesota with support from NASA

Exploring the Universe: Filtered Light

Credit: NASA, ESA, J. Hester, A. Loll (ASU)

Astronomers use telescopes and other instruments to capture and filter different types of light – including those we can't see with our eyes, like x-rays and UV (ultraviolet) light. Begin exploring different types of light with young learners using the color paddles, puzzle, and Astronomical objects sheets provided in your kit. Use colored pencils to create a "hidden message" on a background and use the colored paddles to filter out certain colors and reveal others.

For further background information and an activity using alternative colored filters, as well as Spanish-language handouts, download Exploring the Universe: Filtered Light from https://goo.gl/Q353YX

Ages – Family, Pre-K, Early Elementary, Upper Elementary, Tweens, Teens

Activity Time – 10-20 minutes

Type of Program – Stations, Stand-alone activity, facilitated activity

Materials List – Astronomical objects sheets, colored paddles, colored pencils, white paper

Originating Source – The Science Museum of Minnesota with support from NASA

Key Concepts

- Astronomers use different filters to aid in their study of objects in the sky

Simple Instructions

1) Start the conversation with patrons by introducing the term "filter."
   a. "Where have you heard that word before?"
      i. Likely answers will include water filtration – i.e., the water filter that they use at home!
   b. Guide patrons, using examples that they are familiar with, to the idea that "filters help us block out things that we don't want."
   c. Filters are often used for removing impurities from water and air. Filters can also be used for the things you see!
      i. "Have you ever worn sunglasses? You were using a filter to block out certain light. That filter on your eyes makes seeing other things easier."

Simple Instructions

2) Introduce the idea that astronomers use filters on their telescopes to help them see certain objects better.
   a. Astronomical images collected with different filters sometimes reveal surprising results!
      i. (For older patrons)
         1. Some filters lessen the light, such as Sun and Moon filters
         2. Some filters select certain wavelengths of light or emissions from certain atoms
         3. Others "hide" certain parts of the object you're observing, so you can see other features
   b. Show patrons the images from the Astronomical object sheets.
   c. Invite patrons to make observations about the images
      i. "What do you think this image is?"
      ii. "What colors do you see?"
   d. Invite patrons to experiment by placing different colored paddles over the images.
      i. "What part of the image changes?"
      ii. "What parts of the image are easier to see? What parts are harder to see?"
      iii. "Which colored paddles make the biggest changes?"

3) Invite the patrons to use colored pencils to make their own secret messages, which they will then uncover using the colored paddles!
   a. Patrons can start their experimentation by creating a "rainbow" of pencil streaks on a white sheet of paper. They can then use different colored paddles to see which colors the paddles highlight and which colors they block.
      i. "Which paddle blocks red? Which paddle blocks blue?"
   b. To create a secret message:
      i. Pick out a colored paddle
      ii. Pick out a colored pencil that can be seen through that specific paddle. Write your secret message with that pencil.
      iii. Pick out a colored pencil that was blocked by that paddle. Scribble/shade all over your secret message with that colored pencil. Don't fill it in completely solid, but try to make it as hard for someone to read as possible!
      iv. Pass your secret message around to other patrons – let them experiment and discover which paddle reveals your message!

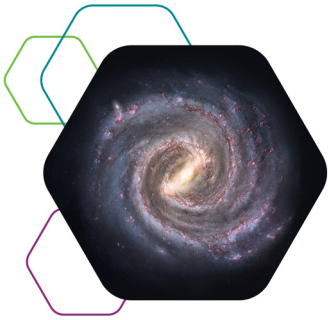
Connections to Other Kit Materials

Try using the colored paddles with any other astronomical images in Kit C, including the template from *Make a Pinwheel Galaxy*.

This activity is a great lead-in to a star party/night sky viewing. It will help patrons understand that astronomers use different types of filters on their telescopes!

Connections to Other *STAR Net* Activities

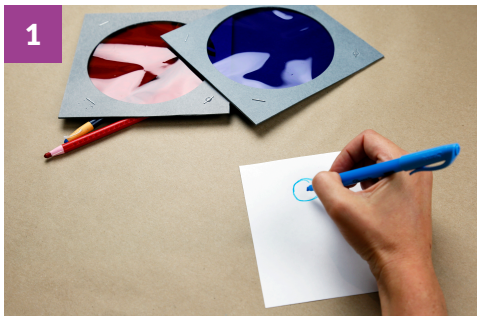
Please visit the *STEM Activity Clearinghouse* at www.clearinghouse.starnetlibraries.org and check out the "Space Science" collection to find great activities on constellations and other stellar objects!

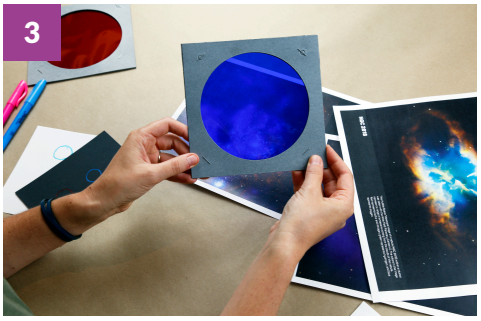


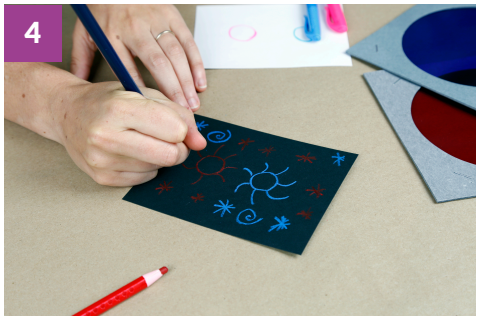
EXPLORING THE UNIVERSE

Filtered Light

Try this!







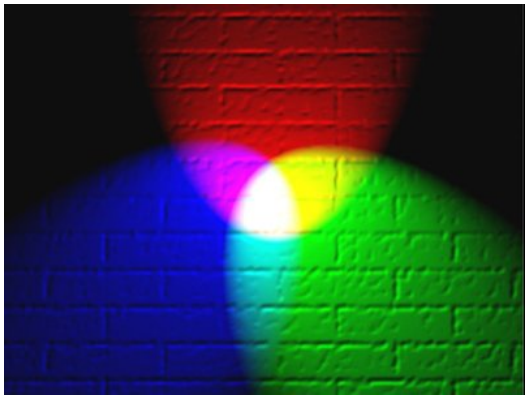
Draw two small circles on the white piece of paper—one with the blue marker and one with the pink marker. Then draw similar circles on the black paper using the red and blue pencils.

Try using the blue and red colored filters to look at your circles. What happens when you look through one of the filters but not the other? Do any of the circles disappear? Do any appear brighter?

Use both filters, one at a time, to investigate the space image. Do some features stand out more if you look through the blue or red filter? Which filter shows you a clearer image? How could this tool be useful to space scientists?

Now try this! Draw your own picture on the white or black paper! Observe your drawings with the filters. What changes do you notice? Tip: Use the markers on the white paper and the pencils on the black paper!

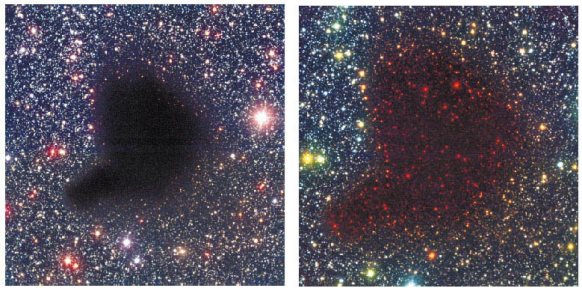
Astronomers use light from distant objects to make observations about the universe.



Red, green, and blue visible light combine to make white light.

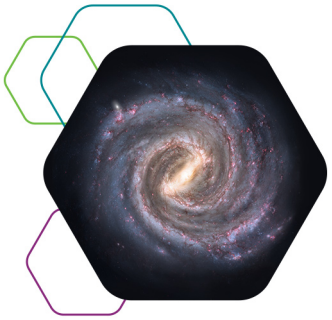
Filters block certain energy levels of light while allowing others to pass through. Different colors of visible light have different levels of energy, running from lower-energy red to higher-energy purple. In this activity, the red and blue colored filters changed how those colors appeared on the white paper versus the black paper, and highlighted different elements in the space pictures. When you hold up the red filter to your eye, only red light makes it through. Red light reflects off both the pink colored marker (pink is a lighter shade of red) and the white paper, because white contains all colors. The pink color disappears because it blends in with the red light from the white paper. But background color matters! Looking at the red pencil color against the black paper actually enhances the red color, because the filter blocks all the other energy levels of light (colors) reflected off the paper and improves the visibility of the red color.

NASA scientists use telescopes and other instruments to capture and filter different energies of light. Objects in the universe radiate light across all these different energies—the full *electromagnetic spectrum*. We use a combination of tools, like telescopes and spectrometers, to make observations of radio, microwave, infrared, ultraviolet, X-ray, gamma ray, and visible light.



This dusty cloud appears dark in visible light, but looking in infrared light reveals stars shining through.

Astronomical images collected with different tools sometimes reveal surprising results. Scientists capture and filter light to study planets, moons, stars, galaxies, nebulas, and black holes, and even to learn more about the mysterious dark energy that makes up so much of space.



FACILITATOR GUIDE

Filtered Light

Learning objectives

- Astronomers use light from distant objects to make observations about the universe.
- Filters block certain energy levels of light while allowing others to pass through.
- NASA scientists use telescopes and other instruments to capture and filter different energies of light.

Materials

- Blue filters in cardboard holders
- Red filters in cardboard holders
- Pink and blue highlighters (Sharpie™ brand)
- Red and blue grease pencils (wax writing tools)
- White paper
- Black paper
- Space images
- Activity and facilitator guides
- Information sheets
- *Tips for Leading Hands-on Activities*

The Explore Science toolkit comes complete with all necessary materials for this activity. Materials are also readily available to create or restock activity kits. The red and blue Roscolux™ brand lighting gels work well as filters in this activity. To purchase or replace the filters, look for #80 Primary Blue and #26 Light Red. Graphic files can be downloaded from www.nisenet.org.

Notes to the presenter

The pink and blue circles on the white paper should mostly seem to disappear when covered by the red and blue filters because the colors of the circles are blending in with the same wavelengths of light reflecting off the white paper. On the black paper, the red pencil should actually appear to be enhanced by the red filter, and the blue pencil by the blue filter, because all the other wavelengths of light are blocked by the filter.

Because the word “light” has been used to describe light that our eyes can see (visible light), some scientists do not feel that it is accurate to use “light” for electromagnetic waves outside of the visible part of the spectrum. However, it can be useful to describe the rest of the electromagnetic spectrum in terms of light, or “light energy,” because it is a concept the public has experience with, so we use this term throughout this activity and related resources.

In addition to filters (filter wheels) many NASA telescopes use spectrometers and other instruments for breaking up and analyzing light.

Visitors love drawing their own pictures and exploring them with the filters. In fact, once they've started doing this they may not want to stop! If you find it difficult to bring this activity to an end, you might suggest that the participant add "one last piece" to their drawing, and then let someone else have a turn.

Young children, especially, may prefer to create a picture more elaborate than a simple circle even in the first step. After some drawing time, model how to look through the filters, and encourage the children to describe what they see by asking open-ended questions such as, "What changes when you look at your drawing through the red filter?" As appropriate, introduce the space images for viewing through the filters, but also allow children to focus on their own drawings if that is where they show the most interest.

Conversational prompts

You may find yourself with plenty of time to chat while the visitors draw and color. Try prompting some of these conversations:

- "Many types of light are invisible to our eyes. Can you think of anything from your life that's invisible? Tell me about it. Do you think it might produce light we can't see?"
- "Filtering light helps scientists focus on just one thing at a time when they are studying planets, galaxies, and other things in space. How do you help yourself focus on one thing? Do you have any tricks or tools that you use? (e.g., turning off the TV to do homework, meditation, counting sheep to fall asleep)"

Difficult concepts

Objects in space emit light from the full *electromagnetic spectrum*—not just the colors we can see with our eyes (visible light). Often, images of space include types of light outside the visible, such as X-ray, infrared, and ultraviolet light, that have been translated into visible colors by researchers so that we can see them and to make the images more useful. The real space images in this activity are good examples of this. Many of the colors that we see in these images represent other wavelengths of light. These representational-color images help scientists highlight and pay attention to certain features. We all need ways to focus! In this activity, we're exploring just the visible wavelengths of light with the filters and craft supplies because we can do this without specialized tools.

One way to talk about light is by wavelength, but another way to describe it is by its energy. Visible light ranges from red to blue (or purple/violet) and red light has lower energy than blue light. Given that hot water is often indicated with red writing and cold water is often indicated with blue writing, you might expect red light to have more energy than blue light. However, the opposite is true! Bluer stars are hotter than redder stars.

Staff training resources

Refer to the *Tips for Leading Hands-on Activities* sheet in your activity materials.

- An activity training video is available at vimeo.com/245834788
- A content training video is available at vimeo.com/245835335
- The NISE Network has a curated list of programs, media, and professional development resources in the NASA Wavelength Digital Library that directly relate to the toolkit. These resources can be viewed and downloaded from nasawavelength.org/users/nisenet.

Credits and rights

This is a classic activity and was adapted from several sources including the educator guide, Rose-Colored Glasses, developed by NASA eClips. Retrieved from: https://solarsystem.nasa.gov/moon/docs/Rose_Colored_Glasses_Guide_Lites.pdf

Visible vs infrared light courtesy ESO / M. Kornmesser.

Image of NGC604 courtesy X-ray: NASA/CXC/CfA/R. Tuellmann et al.; Optical: NASA/AURA/STScI.

Image of Phoenix Glalaxy Cluster courtesy X-ray: NASA/CXC/MIT/M.McDonald et al; Optical: NASA/STScI; Radio: TIFR/GMRT.

Image of NGC 2818 courtesy NASA, ESA, and the Hubble Heritage Team (STScI/AURA).

Image of Hubble Space Telescope courtesy NASA's Goddard Space Flight Center.

Image of NGC 1512 courtesy NASA, ESA, and D. Maoz (Tel-Aviv University and Columbia University).

Electromagnetic spectrum graphic courtesy High Energy Astrophysics Science Archive Research Center (HEASARC) at NASA's Goddard Space Flight Center.

Pencil in infrared graphic courtesy NASA/ JPL-Caltech.

Image of *red, green, and blue light mixing* courtesy licensed under Creative Commons Attribution-Share Alike 3.0 Unported http://en.wikipedia.org/wiki/Image:RGB_illumination.jpg

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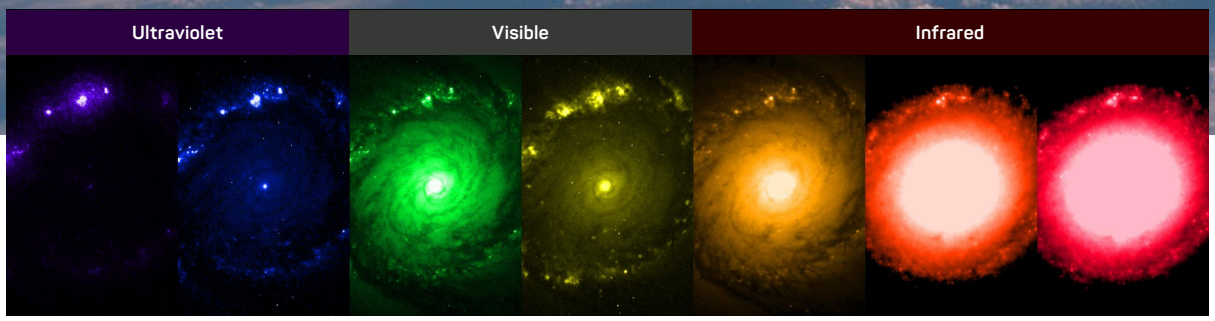
Hubble Space Telescope Images

This Earth-orbiting telescope returns detailed images of the universe in more colors than the human eye has ever seen!

The Hubble Space Telescope collects images in ultraviolet, visible, and infrared light.

LEARN MORE:
hubblesite.org/images/gallery



This galaxy, called NGC 1512, looks different depending on which wavelength of light is used to observe it.

The Hubble Space Telescope has a variety of filters and other specialized instruments that allow scientists to make images of objects by collecting light and energy in different wavelengths. Different wavelengths reveal different information. Heat emitted by dust and certain stars glows infrared, hotter stars glow in light our eyes can see (visible light), and the hottest stars glow in ultraviolet. Scientists can combine images of multiple wavelengths to make more detailed representations of stars, galaxies, or particular regions of space.

NGC604

This image combines data from the Chandra X-ray Observatory (colored blue) with optical light data from the Hubble Space Telescope (in red and green) to show a region of star formation in the nearby M33 galaxy.

Phoenix Galaxy Cluster

Composite observations, like this image of the Phoenix Galaxy Cluster in X-ray, ultraviolet, and optical wavelengths of light energy, help astronomers learn more about this massive cosmic structure. Scientists created this image with data from NASA's Chandra X-ray Observatory, the Hubble Space Telescope, and the Magellan II telescope located in Chile.

NGC 2818

This Hubble Space Telescope image of a nebula (NGC 2818) within a cluster was taken with the Wide Field Planetary Camera 2. The colors in the image represent a range of emissions coming from the clouds of the nebula. Red represents sulfur and nitrogen, green represents hydrogen, and blue represents oxygen.

Planet Party

Patrons view planets, the Moon, and stars in the sky with the naked eye and binoculars or telescopes. Planning resources and tips for partnering with a local astronomical society are provided.

Credit: Wiki Commons

Key Concepts

- Observing the Moon, planets and stars can show change and inspire wonder.
- Many planets in our solar system are easy to see in the night sky.
- Looking at a planet through a telescope will magnify the appearance, so we can see features.
- Telescopes are scientific tools.

Build a Program with Related Resources

Audiences will be amazed at what they can see with a telescope and binoculars, which magnify small objects, especially once they learn about how to view the night sky. Start with a planisphere or use the Night Sky Planner (https://goo.gl/wxBikQ) to come up with a viewing plan before going outside with a telescope or binoculars at night. A viewing plan will help participants easily locate objects in the sky so that they can then use these scientific instruments to view them. Also, know in which direction you are looking or bring a compass to the Planet Party.

Get to know the telescope and binoculars you are going to use before going out at night too. See the Quick Facilitation Guides on the telescope, binoculars, and planisphere in this guide.

Loony Lunar Phases, *Pocket Solar System*, and *Art and the Cosmic Connection* are the other hands-on space science activities included in this kit that can help audiences gain a better understanding of our Moon and Solar System. Science models and art help hone observation skills.

Some additional STEM Activity Clearinghouse activities that use tools to help us expand our senses are *Blind Mice Go To Pluto*, *What Do You See in Today's Moon?*, and *Constellation Detective*.

Need more ideas? Visit our *STEM Activity Clearinghouse* (http://clearinghouse.starnetlibraries.org)

Add Your Review of This Activity

There are many STEM educational resources available to use in programs. We hope that you will give this activity a try! Then, **help others find the "best of the best" by writing a review** on the STEM Activity Clearinghouse. Email your favorite activities directly to a colleague!

Content Area – Astronomy and Space, Physics and Engineering

Ages – Family, Tweens, Teens and Adults

Activity Time – 20-40 minutes

Prep Time – 20-40 minutes

Difficulty Level – Medium

Mess Level – Low

Materials List – Binoculars, telescope, flashlight, night sky map or moon map

Originating Source:
Planet Party was developed by the Lunar and Planetary Institute and is part of the *STAR Net* portfolio of field-tested activities developed for public library programs.

Hands-on

STAR★net

Tested & Approved STEM Activities

Planet Party

Activity Guide

STAR★net

Science-Technology Activities & Resources For Libraries

A product of the Science-Technology Activities and Resources for Libraries (STAR_Net) program.
Visit our website at www.starnetlibraries.org for more information on our educational programs.
Developed by the Lunar and Planetary Institute/Universities Space Research Association
May 2016

This material is based upon work supported by the National Science Foundation under Grant No. DRL-1421427.
Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Planet Party

Credit: Halfblue/Wikipedia

Overview

Visitors view planets, the Moon, and stars in the sky with the naked eye and binoculars or telescopes. Planning resources and tips for partnering with a local astronomical society are provided.

Activity Time

30 minutes or more

Intended Audience

Families or other mixed-age groups, including children as young as 5 years old *with assistance from an older child, teen, or adult*
School-aged children
Tweens
Teens
Adults

Type of Program

- ☑ **Facilitated hands-on experience**
- ☑ **Station, presented in combination with related activities**
- ☐ Passive program (if instructions are provided at the start of the course)
- ☐ Demonstration by facilitator

What's The Point?

- **Observing the Moon, planets, and stars can show change and inspire wonder.**
- **Many planets in our solar system are easy to see in the night sky.**
- **Looking at a planet through a telescope will magnify the appearance, so we can see features. The Moon's familiar face offers impact craters, dark, flat plains (maria), and mountains for closer inspection through binoculars or a telescope.**
- **Telescopes are scientific tools; they offered our first glimpses of other worlds when Galileo first used his telescope to study Venus, the Moon, Saturn, and Jupiter and its moons 400 years ago. Telescope optics have improved over time, allowing scientists to make more detailed observations of objects in the night sky.**

Materials

Facility needs:

- ☐ An outdoor viewing area, preferably away from bright lights and traffic
- ☐ Optional: Access to electricity and a well-marked extension cord, secured so it won't be a hazard in the dark
- ☐ Glow sticks to mark cords
- ☐ Access to drinking water
- ☐ Access to bathrooms

For each group of approximately 20 visitors:

- ☐ 1 telescope operated by an amateur astronomer
- ☐ 1 small step-stool for children to stand on to reach tall telescope eyepieces

Even from urban locations, telescopes can reveal surprising views of the planets:

- Venus often looks like the Moon — a crescent, quarter, or gibbous phase. Since Venus lies between us and the Sun, we are able to view both its day (sunlit) and night (dark) sides. Our perspective of Venus changes as the Earth carries us in its orbit around the Sun, revealing different angles of Venus. At different angles, Venus appears in different phases.
- Jupiter has faint bands of different colors, and sometimes a centuries-old storm, called the Great Red Spot, or some of its moons can be seen. Jupiter's four largest moons, Io, Europa, Ganymede, and Callisto, appear as bright dots on the sides of Jupiter, and disappear from view occasionally as they pass in front of or behind the planet.
- Saturn's rings are easily seen.
- Mars has a reddish appearance due to its rusty soil.

Telescopes are not necessary to enjoy the Moon. The basalt-filled impact basins and plains — maria — and ancient lunar highlands are easily seen with the naked eye. Binoculars reveal the Apennine Mountains, Copernicus Crater, and Tycho Crater.

A view through a telescope reveals Jupiter's banded atmosphere. You might also spot several or all of Jupiter's four largest moons. Callisto, Ganymede, and Europa appear here as small "dots" from far left to far right. Io is often also visible as a fourth "dot."
– Credit: Modified from NASA/JPL/Malin Space Science Systems.

For each facilitator:

- ☐ Flashlights for staff, preferably with red plastic wrap or red paper taped over the light
- ☐ 1 set of Our Solar System lithographs (NASA educational product number LS-2013-07-003-HQ)

Materials (continued)

For each visitor:

- ☐ Sky map for the current night
- ☐ Optional: An Earth-based Tour of the Moon and/or Skywatcher's Guide to the Moon.

Monthly sky charts or simple sky wheels are available free from a variety of websites, including the links offered here; note that the sky wheels require assembly but work year-round.

Supporting Resources

Consider setting up a digital device (such as a computer or tablet), speakers, and access to the Internet to display websites or multimedia before or after the activity.

Books:

Becker, Helaine, and Brendan Mullan. *Everything Space.* Washington, D.C.: National Geographic Children's Books, 2015. (ISBN-13: 978-1426320743)

Driscoll, Michael and Meredith Hamilton. *A Child's Introduction to the Night Sky: The Story of the Stars, Planets, and Constellations--and How You Can Find Them in the Sky.* New York: Black Dog & Leventhal Publishers, 2004. (ISBN-13: 978-1579123666) Grade 3 - 7

Yasuda, A. (2015). Astronomy: *Cool women in space.* White River Junction, VT: Nomad Press. (Hardcover ISBN 978-1-6193-0326-3, Paperback ISBN 978-1-6193-0330-0) Grade 4 – 6

Podcasts:

365 Days of Astronomy podcasts: Launched in 2009 as part of the International Year of Astronomy, this community podcast continues to produce day after day of content across the years. In 2013, they evolved to add video, and in 2015 they join the International Year of Light: http://cosmoquest.org/x/365daysofastronomy/

Solar System Exploration What's Up Podcast: What spacecraft and celestial events are happening each month are described in this video podcast http://solarsystem.nasa.gov/news/category/whatsup

Interactive Websites:

NASA's Eyes on the Solar System: Learn about our home planet, our solar system, the universe beyond, and the spacecraft exploring them with this downloadable application: http://eyes.jpl.nasa.gov

Moon Mappers (Planet Mappers, Moon Edition): Citizen science project mapping craters on the Moon: http://cosmoquest.org/?application=simply_craters

Supporting Resources (continued)

Handouts:

- Our Solar System lithographs (NASA educational product number LS-2013-07-003-HQ)
- Monthly sky charts or simple sky wheels
- An Earth-based Tour of the Moon
- Skywatcher's Guide to the Moon

Images:

Hubble Site (NASA/STScI)
http://hubblesite.org/gallery

NASA Solar System Exploration
http://solarsystem.nasa.gov

Planetary PhotoJournal (NASA/JPL)
http://photojournal.jpl.nasa.gov

Spitzer Space Telescope (NASA/JPL-Caltech)
http://www.spitzer.caltech.edu

Astronomy Picture of the Day
http://apod.nasa.gov

Preparation

Advanced Planning Tips:

- If possible, incorporate additional science, technology, engineering, art, and mathematics (STEAM) activities into the event. See the STAR_Net resources listed at www.starnetlibraries.org for ideas.
- Prepare and distribute publicity materials for programs based on this event.
- Pull supporting resources out of circulation to feature during the program.
- Determine an appropriate date and time for the event:
  - Use online resources to determine a date at which one or more bright objects will be high in the evening sky.
  - Identify a start and end time for your program on your intended date. Best viewing times will begin about an hour after sunset. SunriseSunset and Stellarium provide sun set times for your location far in advance.
  - Optional: Contact your local astronomy club or other amateur astronomers. The Astronomical League, Sky and Telescope, and NASA Night Sky Network offer search tools to find a club near you. Let them know which planets or other objects you would most like for the public to see.
- Have a back-up plan in place before the announcement for inclement weather: Will the event be cancelled, postponed, or moved inside with different activities? If the event is cancelled or postponed, at what time or point will the decision be made to do so, and how will the audience hear about it?
- Identify ways to help persons with all abilities to enjoy the night sky. Tips are provided in the book: Grice, Noreen (2011). Everyone's Universe: A Guide to Accessible Astronomy Places, New Britain: Connecticut: You Can Do Astronomy, LLC. ISBN: 978-0-9833567-1-4.

Preparation (continued)

- If appropriate, arrange to have the viewing area sprayed for mosquitoes or treated for fire ants in advance of the observing session.
- If possible, arrange for nearby bright overhead lights and sprinkler systems to be turned off during the period of the observing session.
- Become familiar with information about the objects that are in view, as well as current and future missions to explore them using the Our Solar System lithographs and reputable websites.
- Set out the step-stool(s) where needed.
- Set up the tables and pencils or crayons in a well-lit area nearby.

There are many objects in the sky that can engage and inspire your visitors when viewed through a telescope or binoculars, including:

- **Planets:** Select a date when planets will be visible in the early evening sky. Venus and Jupiter are almost always bright when visible, Mars is often bright, and Saturn and Mercury are always a bit faint. Uranus and Neptune are too faint to see without telescopes or binoculars. Try to avoid dates when the Moon is full or nearly full (see below), as its light will wash out other nighttime objects. StarDate, Stellarium, the Planet Finder applet, or other planetarium programs are useful planning tools.
- **The Moon:** Select a date when the Moon is a crescent or in first quarter. SunriseSunset and Stellarium provide Moon phases far in advance. Observing the Moon while its near side is only partially lit, as in the crescent and first quarter phases, causes the terrain to cast longer shadows. The shadows make the features much easier to see! A full Moon is unpleasantly dazzling to view through a telescope — even the crescent Moon is bright.
- **Constellations:** While constellations are best viewed with the naked eye, these star patterns provide a map to finding nebulae, star clusters, and galaxies. A brief tour of the month's constellations, deep-sky objects, planets, and events is available through Tonight's Sky.
- **International Space Station (ISS):** Use "Spot the Station" (https://spotthestation.nasa.gov), a NASA service, to determine whether or not the ISS will be visible during the observation period or not. Visible to the naked eye, the ISS looks like a fast-moving plane (only it is much higher and traveling thousands of miles an hour faster).

Make sure that the objects you intend to view will be visible from your viewing location in the early evening. Over the course of the event, the objects will appear to move toward the west as the Earth rotates.

Activity

1. Share ideas and knowledge.

- Introduce yourself. Help the participants learn each other's names (if they don't already know each other).
- Frame the activity with the main message: Observing the Moon, planets, and stars can show change and inspire wonder.
- Invite the visitors to talk about what they already know about the Moon, planets, and stars. Use open-ended questions about how the Moon, planets, and stars appear in the sky. Invite visitors to recollect how those objects appear to change over time (e.g. setting in the west each night, planets are only sometimes visible, the Moon changes phase). Invite the visitors to talk with you and each other.
- Provide information about the objects that are in view, as well as current and future missions to explore them.

2. Facilitate equitable access to telescopes and/or binoculars.

- Invite visitors to form lines behind each telescope or pair of binoculars. Caution them to avoid the tripod legs and any cords.
- Ask each child to put her hands behind her back when it's her turn to look through the telescope (which will reduce the chances of moving the telescope.)

Facilitator's Notes:

- Stars appear to twinkle, but planets do not. The twinkling is caused by Earth's atmosphere. Light from a star passes through pockets of air that have different temperature and bend the light. Planets are much closer and appear as disks in the sky, rather than pinpoints. Even without the magnification of a telescope, the disk of a planet is larger than the air pockets. Starlight comes from a single point and is more readily distorted as it passes through air pockets.
- The Sun is the only star in our solar system; the others we see at night are much more distant than even Pluto.
- Planets don't make their own light. They appear bright because they are reflecting sunlight.
- Ancient civilizations studied the skies and noted the strange motions of "wanderers" ("planets" in Greek), which seemed to move against the background of familiar constellations.
- Jupiter is the biggest planet and Mercury is the smallest. Venus is the brightest planet because it is close to us, and so seems larger than Jupiter.

Activity (continued)

- Uranus is barely visible in very dark locations to observers who know where to look!
- The existence of Neptune was deduced mathematically and then confirmed by telescopic observations. It can be viewed through binoculars from a very dark location.
- Pluto is a tiny, distant dwarf planet and can be viewed through a small telescope from a very dark location.
- Galileo first used his telescope to study the Moon, Venus, Jupiter, and Saturn 400 years ago; his observations of depressions and mountains on the Moon, moons orbiting Jupiter, and the phases of Venus revolutionized our understanding of the solar system and Earth's place in it. Telescope optics have improved over time, allowing scientists to make more detailed observations of objects in the night sky.
- Telescopes allowed astronomers to view the surfaces of planets. Now, scientists can learn about planets and moons by sending spacecraft to fly by or orbit them. Spacecraft instruments now allow us to infer information about the interiors of planets.
- The Moon may appear "flipped" — as in a mirror image — through some kinds of telescopes.

3. Conclusion

Engage the participants in conversation about what they observed. What color was planet or star? Did they see any moons around other planets? If so, how were they arranged? Did the appearance of the planets surprise them? Which object was their favorite, and why?

Correlations to the Next Generation Science Standards

Disciplinary Core Ideas

ESS1.A The Universe and Its Stars

- Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted.

ESS1.B: Earth and the Solar System

- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.

PS4.B Electromagnetic Radiation

- Object can be seen when light reflected from their surface enters our eyes.

The Nature of Science

Scientific Investigations Use a Variety of Methods

- Science investigations use a variety of methods and tools to make measurements and observations.

Scientific Knowledge is Based on Empirical Evidence

- Scientists use tools and technologies to make accurate measurements and observations.

Science is a Human Endeavor

- Science affects everyday life.
- Advances in technology influence the progress of science and science has influenced advances in technology.

Planet Party

Brief Facilitation Guide

Download the full activity guide at www.starnetlibraries.org

1. Share ideas and knowledge.

- Introduce yourself. Help the visitors learn each other's names (if they don't already).
- Frame the activity with the main message: Observing the Moon, planets, and stars can show change and inspire wonder.
- Invite the visitors to talk about what they already know about the Moon, planets, and stars. Use open-ended questions about how the Moon, planets, and stars appear in the sky. Invite visitors to recollect how those objects appear to change over time (e.g. setting in the west each night, planets are only sometimes visible, the Moon changes phase). Invite the visitors to talk with you and each other.
- Provide information about the objects that are in view, as well as current and future missions to explore them.

2. Facilitate equitable access to the telescopes and/or binoculars.

- Invite visitors to form lines behind each telescope or pair of binoculars. Caution them to avoid the tripod legs and any cords.
- Ask each child to put her hands behind her back when it's her turn to look through the telescope (which will reduce the chances of moving the telescope.)

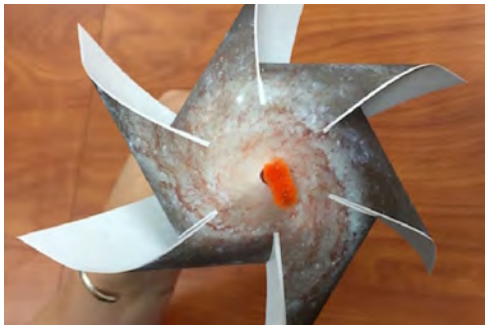
3. Conclusion.

Engage the participants in conversation about what they observed. What color was planet or star? Did they see any moons around other planets? If so, how were they arranged? Did the appearance of the planets surprise them? Which object was their favorite, and why?

Activity Guide

Pinwheel Galaxy

In this fun STEAM activity, patrons will create their own pinwheel using an image of the Pinwheel Galaxy, a real galaxy in our universe! This activity works great as a station activity, or a quick stand alone activity.



Credit: NASA Space Place

Key Concepts

- Constellations (and other sky pictures called asterisms) are the building blocks of astronomy across many cultures
- Scientists use models to explore objects and processes in our Solar System and beyond

Build a Program with Related Resources

This quick and easy craft can be done in conjunction with a Night Sky Viewing! Utilize the *STAR Net* Partnerships page (https://goo.gl/UBcqK9) to learn how you can bring a local astronomy club to your library.

Alternatively, you can use an online sky finder application (such as Sky Map or Star Walk 2) to look for galaxies in a virtual night sky! Use the color paddles and concepts from *Exploring the Universe: Filtered Light* to view the Pinwheel Galaxy Pinwheel Blueprint – how does it look different?

Looking for other fun, space-science crafts? Search the STEM Activity Clearinghouse for the following activities: *Make a CD Saturn*, *Make a Sundial*, *Make a Star Finder*, and *Big Dipper Star Clock*.

Need more ideas? Visit our *STEM Activity Clearinghouse* (http://clearinghouse.starnetlibraries.org)

Add Your Review of This Activity

There are many STEM educational resources available to use in programs. We hope that you will give this activity a try! Then, **help others find the "best of the best" by writing a review** on the STEM Activity Clearinghouse. Email your favorite activities directly to a colleague!

Content Area – Astronomy and Space

Ages – Family, Early Elementary, Upper Elementary

Activity Time – 10-20 minutes

Prep Time – Under 5 minutes

Difficulty Level – Easy

Mess Level – Low

Materials List – Pinwheel Galaxy printout, Chenille stems, chopstick or popsicle stick, scissors, single hole puncher

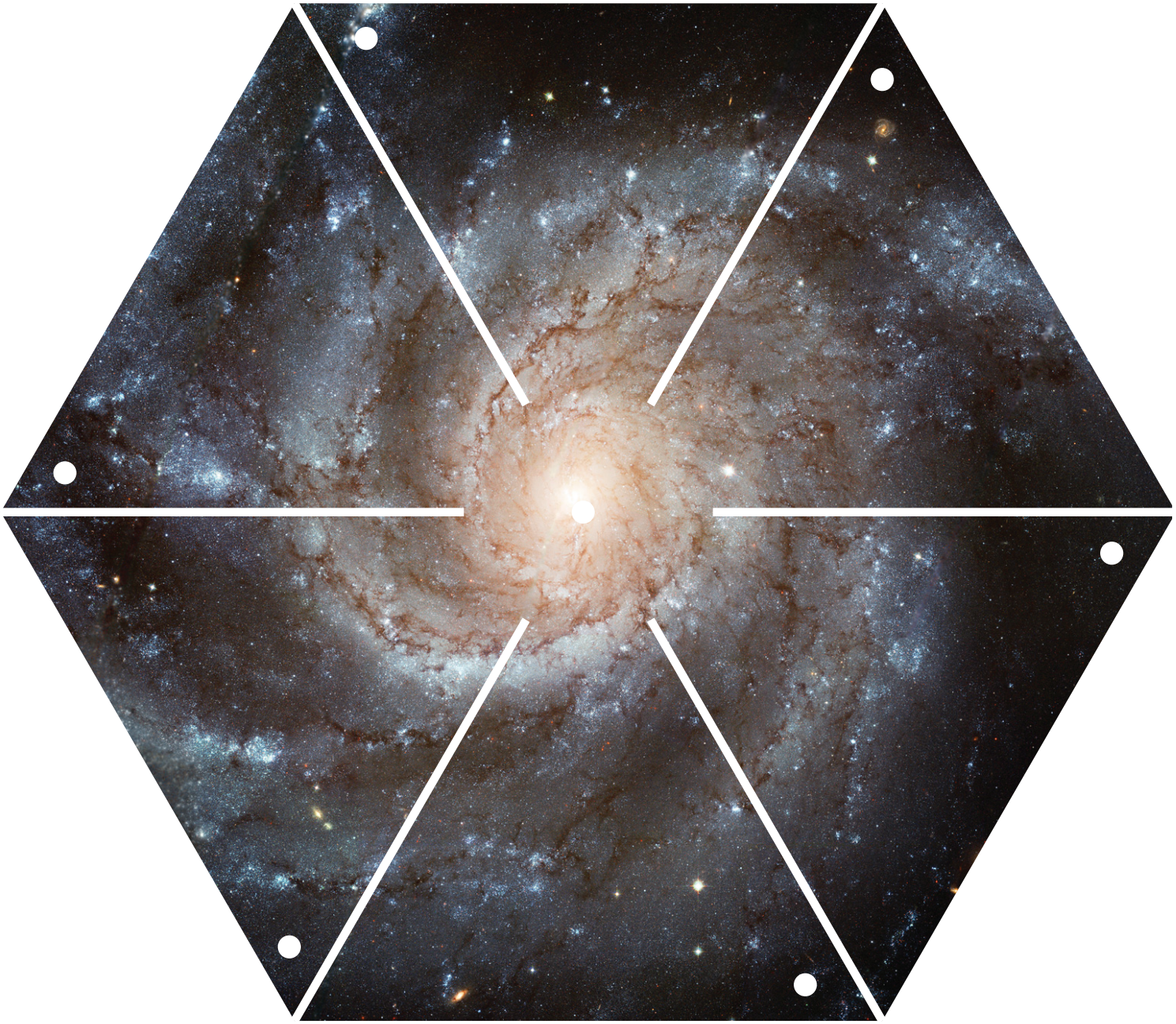
Originating Source:
Pinxheel Galaxy was adapted by American Girl from an existing NASA activity.

Pinwheel Galaxy Pinwheel

Full directions: spaceplace.nasa.gov/pinwheel-galaxy

Directions:

1. Cut out the hexagonal shape for your galaxy pinwheel.
2. Make cuts down the white lines.
3. Punch holes in the white dots: six around the edges and one in the center.
4. Turn the paper so it's face-down.
5. Thread a pipe cleaner through the center hole.
6. Going around the circle, fold each flap so the pipe cleaner goes through the hole.
7. Tie a knot in the pipe cleaner to secure the front of the pinwheel.
8. Wrap the other side of the pipe cleaner around a popsicle stick.



"A Universe of Stories" Collection

The following list contains activities in the STEM Activity Clearinghouse that are relevant to the 2019 Summer Learning theme "A Universe of Stories". These activities are of course timeless, and can be conducted whenever the desire strikes, but they were added to the binder to provide an idea of the great breadth and depth of material available to support your Summer Learning programs. Enjoy!

Blind Mice Go to Pluto
Students view a strange new planet in our Milky Way Galaxy to determine what it is like.
https://goo.gl/yDzPSJ

Improv with the Stars!
After learning about four stellar classifications and the characteristics of stars, groups of students act out an improvisation of a personification of the four stars while the audience has to guess which star type is which.
https://goo.gl/jCC2Qt

Playdough Planets
Patrons create rocky planets out of play dough, and then learn about distances in our Solar System by placing them the correct distance apart.
https://goo.gl/Zw4NEd

Mars Match Game
Patrons view images of Earth and Mars to compare features, just like a scientist (planetary geologist) would. After matching pairs of Earth features with Mars analogues, they discuss why they matched the pairs together.
https://goo.gl/6bgD6H

Planet Party
Visitors view planets, the Moon, and stars in the sky with the naked eye and binoculars or telescopes. Planning resources and tips for partnering with a local astronomical society are provided.
https://goo.gl/XTHGdy

Recipe for a Comet
Create a "comet" using dry ice and household ingredients and use (optional) tools to observe how it models the features of a real comet.
https://goo.gl/BCvum3

Build a Space Colony
Participants design technology to provide air to breathe, plentiful food, shielding from ultraviolet light, power, and more for space explorers.
https://goo.gl/Jgepbj

Jump to Jupiter
Participants jump through a course from the grapefruit-sized "Sun," past poppy-seed-sized "Earth," and on to marble-sized "Jupiter" — and beyond!
https://goo.gl/Y5K2vZ

Strange New Planet
In this simulation of space exploration, participants plan and carry out five missions to a "planet" and communicate their discoveries to their family or a friend.
https://goo.gl/WiXUod

Trip to Mars
Participants play a game that steps through a human mission to Mars, to learn about the variety of people on the ground supporting missions, and the factors that can affect a mission outcome.
https://goo.gl/3iLDx5

Find Micrometeorites
To introduce meteorites and reinforce the composition of the solar system; to encourage student interest in space.
https://goo.gl/SFWMbE

Kinesthetic Astronomy
Modern everyday association with time involves watches, clocks, and calendars instead of the astronomical motions that were the original bases for time keeping.
https://goo.gl/5o88LQ

Big Sun, Small Moon?
If you've ever seen a picture of a solar eclipse, you may have noticed that the Moon comes very close to covering the entire Sun.
https://goo.gl/quWeP8

Scale Model of Sun and Earth
In this activity, participants use scaled cut-out models of the Sun and Earth to learn about the difference in size and distance between the two celestial bodies.
https://goo.gl/XuRCvE

How Can the Little Moon Hide the Giant Sun?
This is an activity exploring the concept that distance affects how we perceive an object's size, specifically pertaining to the size of the Sun and the Moon as seen from Earth.
https://goo.gl/EM8Pgf

Sorting Games: How Big? How Far? How Hot?
This NASA@ My Library Activity Guide will help library staff facilitate these sorting activities in large or small groups, with patrons from Pre-K to adult.
https://goo.gl/kJjPN8

Moon Mythbusters
This is an activity about the Moon's influence on Earth.
https://goo.gl/Qoshgb

Penny Moon
This is an activity about the rotation of the Moon. Learners use a penny and a quarter to model that the Moon does indeed spin on its axis as it orbits the Earth.
https://goo.gl/AYHQWU

Teen Moon: Moon Ooze!
Learners model how the Moon's volcanic period reshaped its earlier features.
https://goo.gl/1z4Ktq

Lunar Phases: A Dance Under the Sun
Learners use a Styrofoam ball, sunlight, and the motions of their bodies to model the Moon's phases outdoors.
https://goo.gl/D2mScz

Loony Lunar Phases
Learners hear a story, song, or (silly or serious) poem that celebrates the Moon's different phases.
https://goo.gl/9LXD6G

Growing Up Moon
Learners will visit a sequence of stations to discover how the dark and light areas and craters we see on the Moon's face today record major events of its lifetime.
https://goo.gl/CmonpF

What Do You See in Today's Moon
Learners read or listen to a cultural story describing a shape identified in the Moon's surface features.
https://goo.gl/mCVSFr

Moon in Action
Learners go outside on a clear evening and view the sky to see the Moon for themselves.
https://goo.gl/xfCeiU

Moon Over My Town
In this activity, community members of all ages are invited to contribute photographs — taken with cell phones, film cameras, or more sophisticated equipment — of the Moon.
https://goo.gl/Ny6YWx

Dance of the Moon and Oceans
This is an activity about the tides. Learners discover how the Moon's gravitational pull causes the level of the ocean to rise and fall twice a day along most coastlines.
https://goo.gl/z47PF3

Crater Creations
This is an activity about impact craters. Learners will experiment to create impact craters and examine the associated features.
https://goo.gl/VvdaRA

Lunar Surface
In this activity, learners will make a model of the Moon's surface and to consider the geologic processes and rocks of each area.
https://goo.gl/YQxTRD

Future Moon: The Footsteps of Explorers
Learners model how impacts throughout the Moon's history have broken rocks down into a mixture of dust, rocks, and boulders that covers the lunar surface.
https://goo.gl/X3UXqk

Build a Moon Habitat
Astronauts on the Moon must have homes that protect them like no home on Earth would ever need to do. Teams of participants roll sheets of newspaper to create "logs," which are stapled together to frame a "habitat" and "airlock." The structure is covered with a bedsheet and decorated with the NASA logo.
https://goo.gl/ZAsjHW

Coloring the Universe
Participants use pencilcode.net to undertake a series of simple programming exercises, including recoloring images of scenes, everday objects, and finally, a supernova and a region where stars are forming.
https://goo.gl/qFwuPL

Nuclear Fusion in Stars
This simple and engaging activity explains nuclear fusion and how radiation is generated by stars, using marshmallows as a model.
https://goo.gl/NtZBHM

How Do We Find Planets Around Other Stars?
Discover the techniques scientists use to find planets orbiting distant stars: use a foam ball, a toothpick, and a small ball of clay.
https://goo.gl/9qVxpq

How to Build a Galaxy
Use craft materials -- and 3D printed models of astronomical models -- to model our Milky Way galaxy.
https://goo.gl/zbTLw6

Why Do Eclipses Happen?
Using simple materials, participants explore the vast distance between the Earth and Moon and model how solar and lunar eclipses happen.
https://goo.gl/ZcZVvM

Art and the Cosmic Connection
Using NASA imagery, participants use images as inspiration for artwork while learning about geology of planetary bodies and moons.
https://goo.gl/YNNHQb

Dunking the Planets
Participants place scale models of the planets, represented by fruit and other foods, in water to determine their density.
https://goo.gl/ugNwTX

Eclipse Chalk Art
Use a circular template and chalk to create your very own eclipse art!
https://goo.gl/sCNkcs

Solar System Bead Activity
Participants calculate and construct a scale model of the solar system using beads and string.
https://goo.gl/DNSPHh

Make a CD Saturn
Everyone loves Saturn! This craft uses unwanted CDs or DVDs and a styrofoam ball to make a model of the planet.
https://goo.gl/S5RZD2

Neato-Magneto Planets
Participants study magnetic fields at four separate stations: examining magnetic fields generated by everyday items, mapping out a magnetic field using a compass, creating models of Earth's and Jupiter's magnetic fields, and observing aurora produced by magnetic fields on both planets.
https://goo.gl/kcxaHo

See the Light
Explore light and color in Earth's atmosphere with a simple hands-on investigation using a prism, glue stick, and pen light.
https://goo.gl/wSfts8

Recipe for a Moon
Patrons use common food items to model the interiors of the Moon and Earth.
https://goo.gl/4njDkd

Recipe for a Planet
Patrons build edible models of Earth and Mars to compare their sizes, internal layers, and surface features.
https://goo.gl/FmoXGv

Space Place Loopy Legends
Patrons author their very own story about a zany space adventure!
https://goo.gl/N4D4Py

UV Kid
In this activity, children use common craft materials and ultraviolet (UV)-sensitive beads to construct a person (or dog or imaginary creature).
https://goo.gl/w5MXzH

UV Bead Bracelet Experiments
Participants make bracelets using UV beads to learn about ultraviolet light.
https://goo.gl/9e9cnw

Investigating the Insides
Investigate the composition of unseen materials, using a variety of tools, as an analogy to how scientists discover clues about the interiors of planets using spacecraft.
https://goo.gl/BsknMS

Mars Engineering
Mars is a good candidate for finding past and/or present life beyond Earth. Groups of participants design Mars rovers that could search for the building blocks of life in martian rocks and build model rovers out of everyday materials.
https://goo.gl/WHZU94

Gaining Traction on Mars
Groups of participants create and test various wheel designs and materials on a test vehicle to determine which are most effective on a simulated Martian surface.
https://goo.gl/ovTpFu

Life on Mars? Nurturing Life
A garden can be a reminder of life's needs and our connection to the planet we call home. Children consider the requirements of living things and compare the surface conditions on Mars to those found on Earth as they plant gardens. Gardening tips and options for indoors and outdoors are provided.
https://goo.gl/AAEDDZ

Tour the Moon or Mars with Google Earth
Patrons use Google Earth computer software to observe the geography of their own area. They then virtually-visit the same lattitude and longitude on the Moon and Mars!
https://goo.gl/88XcXt

Mars Skits: How's the Weather on Mars?
Literacy and space science - together at last! Participants write and act out a brief (30-60 second) skit about the weather at a fictitious settlement on Mars. Use a green filming backdrop and Space Stage app to capture videos of the skits—using real images of Mars as a backdrop!
https://goo.gl/PFNRyA

Mars Skits: Mars Adventure Travel Corporation
Literacy and space science - together at last! Participants write a script and act out a 30-60 second commercial convincing tourists to come to Mars for a visit. Use a green filming backdrop and Space Stage app to capture videos of the skits – using real images of Mars as the backdrop!
https://goo.gl/6BsXMp

Balloon Rockets
Children are "rocket scientists" as they test their ideas relating to physical forces and launch simple balloon-powered straw "rockets."
https://goo.gl/1P1aRv

Balloon Rockets
Patrons use balloons, fishing line, and straws to learn about thrust and aerodynamics! You don't need to be a "rocket scientist" to facilitate this activity, but your patrons will sure feel like one!
https://goo.gl/XE7VmX

Binary Bead Craft: Pin Version
Write your initials in binary code to created beaded pins.
https://goo.gl/fggsFs

Binary Bead Craft: Bracelet Version
Write your own name or nickname in binary code using beads on a bracelet.
https://goo.gl/SdTjZ4

Mars Rovers
Players acting as "Mission Control" and a "Rover" must work together to navigate a large obstacle course.
https://goo.gl/FwTctZ

Filtered Light
Use colored filters with art supplies like astromers use filters to study the universe.
https://goo.gl/pNvX9g

Hide and Seek Moon
Binoculars and a hidden object Moon poster let young participants discover how some tools can make distant objects appear closer and brighter. They also learn about how cultures around the world have viewed the Moon through books (and online pre-recorded cultural stories).
https://goo.gl/njckRE

Objects in Motion
Participants in this activity use "orbiting" clay balls to make simple, functioning models of interacting objects in space.
https://goo.gl/Fb5wnj

Ice Orbs
Participants investigate a frozen sphere, trying to learn about objects hidden inside and comparing that process to how planetary scientists at NASA investigate "icy worlds."
https://goo.gl/T9TYFb

Make Your Own Planetarium
In this activity, patrons will learn how ancient people related to constellations and asterisms, then use their imagination to create a star pattern and accompanying story. Library staff can have patrons draw their designs on paper or make an inflatable planetarium, in which patrons will poke out their star constellations.
https://goo.gl/BVQJVB

Solar System in My Neighborhood
Patrons shrink the scale of the vast solar system to the size of their neighborhood. They then compare the relative sizes of scale models of the planets, two dwarf planets, and a comet as represented by fruits and other foods.
https://goo.gl/9xqe58

Constellation Detectives
This simple paper-based activity guides learners in identifying constellations such as Orion, the Big Dipper, and more.
https://goo.gl/mTQh5w

SciGirls Star Power
In this maker activity, participants use a showbox, constellation template, and flashlight to shine a star pattern on a wall. An additional maker project demonstrates the importance of reducing light pollution.
https://goo.gl/9BMZcH

Big Dipper Star Clock
Participants create a "star clock" that they can take home and use to tell the time from the posisiton of the Big Dipper in the night sky.
https://goo.gl/Ad7VQd

Train Like an Astronaut
In this suite of physical activities, patrons utilize the same body parts/systems as astronauts do in training and on missions in space. The activities may be used by individual students or delivered to an audience of students by educators
https://goo.gl/bfvigz

Let's Make a Supernova!
Participants imagine themselves inside a large star at the end of its life, just as it is about to go supernova. Learn what happens in the core of a star when it runs out of fuel. This is a very active, engaging activity that your audience will remember.
https://goo.gl/4gGNQk

Soda Straw Rockets
Patrons practice the engineering design process by creating paper rockets that can be launched from a soda straw. They then test, redesign, and do it again!
https://goo.gl/s4EPSA

Make a Sundial
Participants explore the relationship between the size and position of shadows and the position of the sun. They make sundials to use outdoors. (Sundial handouts can be found on page 35 and 36 of the PDF.)
https://goo.gl/UzYzHa

Soft Landing Challenge
Patrons use craft sticks, balloons, and rubber bands to design an airbag system that can safely land a dropped egg.
https://goo.gl/mrhtXM

Roving on the Moon
Patrons use the engineering design process to build rubber-band-powered rovers out of cardboard.
https://goo.gl/jBkT8h

Make a Star Finder
Patrons make an origami "fortune teller" from a template that helps them learn their way around the night sky by finding constellations
https://goo.gl/tUym3C

Eggstronaut Drop
In this classic activity, patrons engineer a space capsule that will protect an egg that is dropped from a specific height.
https://goo.gl/eVXJnq

Make a Pinwheel Galaxy
Patrons design, cut-out, and assemble their own Pinwheel Galaxy
https://goo.gl/piyHaz

Jumping on Other Planets
Participants use math to figure out how high (or low) they could jump on another planet!
https://goo.gl/v8mUoH

Building and Launching a Rocket
Patrons use the engineering design process to make paper rockets. They then modify the rocket's fins to see how it affects their flight!
https://goo.gl/V4A1Ad

Section 3:

Quick Facilitation Guides

Using Your Telescope

The 4.5 inch AstroBlast Telescope by Orion is a engaging tool that provides a great introduction to the world of astronomy and magnification. Used as part of an indoor activity during the day or for a nighttime viewing event, this telescope is powerful enough to magnify objects that are very far away and provides hours of fun for all age levels and interests (not for solar viewing). The telescope is ready to use with only a few minutes of set-up.

Credit: Space Science Institute

Key Concepts

- Our Solar System is home to many unique objects that orbit the Sun
- Constellations are the building blocks of astronomy across many cultures
- Astronomers use different filters to aid in their study of objects in the sky

Ages – Families, Youth with adult supervision, Teens, Adults

Activity Time – 20-60 minutes

Type of Program – Stations, stand –alone activity, facilitated program, outdoor activity

Materials List – Astroblast 4.5 inch Reflector Telescope, 20mm Kellner eyepiece 1.25" in a container, 6mm Kellner eyepiece 1.25" in a container, Moon filter, Red-dot Finder reflex sight, Instruction Manual, optical tube dust cover, and focuser dust cover

Setup Hints

NOTE: THIS TELESCOPE IS NOT SET UP FOR SOLAR VIEWING AND NO SOLAR FILTER IS PROVIDED! DO NOT LOOK AT THE SUN.

- Review included Instruction Manual before set-up and use.
- Unpack the telescope and accessories to make sure all the parts are available (notice how they are packed so that they can be easily repacked for shipping). See the Materials List to the right.
- Always set-up and use the telescope on a sturdy surface such as a table, picnic table, chair, stool, ground, etc. Using the telescope on an unstable or wobbly surface will cause unsatisfactory results and limited success in finding objects.
- Remove the front dust cover from the optical tube and the dust cap from the focuser when you are ready to use the telescope. Keep these dust covers on when the telescope is not in use and when it is stored or packed.
- The Red-dot Finder scope may or may not be attached to the telescope when you receive it. If needed, attach it to the telescope by sliding the Red-dot Finder scope into the Finder scope base located on the telescope. See Figure 2 and 5 in the Instruction Manual of the telescope for correct orientation of the Red-dot Finder scope. NOTE: This is not a laser. It is just a red LED light projecting in the small tube of the sight. The Red-dot Finder scope should not need to be

Setup Hints (continued)

realigned often. If you are having trouble finding an object in the eyepiece once you have oriented the red-dot on a distant object then you may need to follow the instructions for Aligning the Red-dot finder in the Instruction Manual to have the best success at viewing objects in the telescope.

- Start with the 20mm eyepiece (low-power or low magnification) and the 6mm eye-piece (high-power or high magnification) if viewing conditions are optimal. NOTE: Higher magnification does not always lead to a better image (See the *Using Your Telescope* section of the Fun Scope Instruction Manual). Insert the chrome part of the 20mm eye piece into the focuser and secure the small thumbscrew. You may need loosen the thumbscrew and remove a dust cap on the focuser first.

Directions and Usage Hints

WARNING: THE TELESCOPE IS NOT SET UP FOR SOLAR VIEWING! DO NOT LOOK AT THE SUN.

- Review the Telescope Instruction Manual before using the telescope.
- Set-up the telescope as described above and choose an observation site. If indoors during the day, choose an area where you can see things in the distance, or if outdoors at night, choose a large open area preferably with no or low light pollution.
- Next, follow the instructions for Operating the Red-dot Finder Reflex Finder in the Instruction Manual. Remember to turn off the Red-dot Finder when done with your viewing session.
- Once you have decided an object to observe and have set the red-dot on that object using the Red-dot Finder, tighten the telescope tube(optical tube) using the altitude adjustment knob to keep the tube from moving up and down.
- Next, look through the 20mm eyepiece and slowly move the focuser wheel (located near the eyepiece) to get the object in focus. NOTE: If the object is not in the eyepiece then the telescope may have moved left or right (azimuth) or up or down (altitude). The 20mm eyepiece gives you a wide field of view and a magnification of 15x magnification and the 6mm give a narrow field of view and 50x.
- Viewing daytime terrestrial objects are seen through the eyepiece as upside down and flipped. Reflector telescopes cause this type of image, but allow for a much more compact optical tube than refractor telescopes. When viewing round objects in the sky at night, this factor will not be a problem.
- What to Observe? The moon, planets, stars, and deep sky objects are fun to locate and observe. Do not look at the Sun with this telescope since this kit does not include a solar filter. Make a viewing plan before going out at night by choosing a couple of items to locate and observe that night. Use the planisphere to help with this plan or another night sky chart (see Objects to observe in the Instruction Manual). Use the red-light flashlight (provided with this kit) when you need light at night to look at the Instruction Manual or planisphere. White-light flashlights or other lights will impede your eyes sensitivity or ability to dark-adapt.
- Have a fun "observing party" in the library during the day by posting up images of the planets around the library at a distance. Use the binoculars and the telescope. What details do you see?
- Observe a night sky object with your eyes, then with the binoculars, and then with the telescope. Notice the differences. Is one better than the other? Does the telescope always give you the clearest image?

Setup Hints (continued)

- Learning about what is up in the night sky and knowing where things are located will help you be successful at finding them with the telescope! Remember: the night sky changes throughout the night and with the seasons.

- Here are some frequently asked questions.
  - "What is the magnification of this telescope?"
    The 20mm eyepiece gives you a wide field of view and a magnification of 15x magnification and the 6mm give a narrow field of view and 50x.
  - "A few minutes ago, I saw the object in the eyepiece, but now it is gone. Why?" The earth is moving so you will need to adjust the telescope's position on an object every few minutes or so if you are observing that object for an extended period. (See Tracking Celestial Objects in the Instruction Manual)
  - "Why can't I see the objects in the telescope as I see them in pictures?"
    You will be able to see many cool things with your own eyes using this telescope, but they will be in black and white. The colorful images in magazines and online of celestial objects are from high-powered sensitive tools with lots of filters that can "see" the many things in deep space that we cannot see with our own eyes.

Advanced Activities

- Use the planisphere to identify objects you want look at in the evening and track them across the sky over time
- Learn the moon phases
- Use the moon filter. To use this filter, simply remove the eyepiece and screw the filter onto the bottom (the part that attaches to the telescope). This will significantly lessen the amount of light you're getting, to allow for prolonged moon observing!
- Get to know when there are good "seeing" and transparency conditions

Connections to Other Kit Materials

This activity works well with:
- Planet Party
- Pocket Solar System
- Looney Lunar Phases
- Planisphere
- Binoculars

Connections to Other *STAR Net* Activities

Blind Mice Go To Pluto
https://goo.gl/FEBHXJ

What Do You See in Today's Moon?
https://goo.gl/Ma6Qq5

Constellation Detective
https://goo.gl/w2fyAR

Using Your Binoculars

The Celestron Cometron 7x50mm lens binoculars provided in this kit are lightweight and have a wide field of view that allows for good night sky viewing. By letting in a good amount of light, offering a wide area to see through the eyepieces, and great magnification of small objects, these binoculars help users successfully view the Moon, planets, and other astronomical objects at night.

Credit: Space Science Institute

Key Concepts

- NASA scientists use tools to observe everything from Earth to the farthest reaches of the Universe.
  - Different tools are used to observe objects of different sizes and types (e.g., telescopes and binoculars can magnify small objects)
  - Different tools used to observe the same object can provide us with a more detailed understanding of the object

Ages – Families, Elementary ages with adult supervision, Tween, Teens, Adults

Activity Time – 10 mins. - 1 hour

Type of Program – Indoor practice, outdoor night sky viewing

Materials List – Celestron Cometron 7x50 binoculars, two eyepiece caps, two optical lens caps, neck strap, bag, lens cloth, planisphere, red light flashlight, Moon map

Simple Instructions

WARNING: THESE BINOCULARS ARE NOT FOR SOLAR VIEWING!

- Review the Celestron Cometron Binoculars Guide provided with the binoculars and get familiar with the parts of the binoculars on page 2.

- First, adjust the binoculars for the distance between your eyes, and then use the focuser knobs to bring the object into focus, this will be different for different patrons.

  Follow these steps:
  1) Adjusting the binoculars to your eyes: Using both hands, hold the two barrels of the binoculars and bring it up to your eyes. Adjust the distance of the eyepieces by pulling the barrels closer together or farther apart depending on how far apart your eyes are. You have set them correctly when you see a single clear image.

  2) Focusing the image: After you have adjusted the binoculars to your eyes, while looking through the binoculars, cover the front right lens with your hand or lens cap and slightly rotate the Focus Wheel (round wheel located in the middle of the binoculars) to get a clear image. Remove your hand or cap from the right lens, and then cover the left lens with your hand or lens cap and slightly move the right eyepiece adjustment (Diopter Adjustment) to achieve a clear crisp image.

Guiding Questions

3) Once the binoculars are adjusted and focused then you will only need to use the Focus Wheel to make small adjustments for focusing on objects.

4) Each person using the binoculars will need to go through steps 1-3 for adjusting and focusing the binoculars for their face and eyes.

- Practice outside during the day or indoors with the binoculars by looking at things at a distance before using them outside at night. Point on an object at a distance with your eyes first and then bring the binoculars to your eyes.

- Here are some frequently asked questions.
  - How magnified is the object in the binoculars?
    The object you are seeing through the binoculars is seven times magnified than what you would see with your regular eyes. They are 7x50 binoculars, which mean they have seven times the magnification with a 50mm aperture.
  - How far away is the moon from Earth?
    On average, the distance from Earth to the Moon is about 238,855 miles (384,400 km). According to NASA, "That means 30 Earth-sized planets could fit in between Earth and the Moon."
    https://www.space.com/18145-how-far-is-the-moon.html
  - Should I remove my glasses to use the binoculars?
    No! Keep your glasses on and just fold back the rubber cups on the eyepieces. These eyepiece cups are for both eyeglass and non-eyeglass wearers. Users with astigmatism may find using the binoculars harder, and may be better off removing their glasses.

Advanced Activities

- Use the Moon Map 260 and the binoculars to identify places on the Moon.
- Use the planisphere to identify objects you want look at in the evening and track them across the sky over time
- Learn about Moon phases

Connections to Other Kit Materials

This activity works well with:
- Planet Party
- Planisphere
- Looney Lunar Phases
- Telescope

Connections to Other *STAR Net* Activities

What Do You See in Today's Moon?
https://goo.gl/seoEjV

Constellation Detective
https://goo.gl/SGVW1Y

Using Your Planisphere to Explore the Night Sky

In conjunction with your Orion telescope, this *NASA@ My library* Facilitation Guide provides tips on using the Planisphere, and provides suggestions for engaging activities.

Credit: Space Science Institute

Key Concepts

- Science models help us understand how space objects behave and make predictions about what we can't yet observe.

Ages – Families, Elementary-aged children, Tweens, Teens, Adults

Activity Time – 5-30 minutes

Type of Program – stations, stand-alone activity, facilitated activity

Materials List – Planisphere

Simple Instructions

How to use the planisphere

- The Planisphere is useful in helping you identify planets, stars, constellations, and even the Milky Way in the night sky.
- To begin using your Planisphere, you'll first need to find your approximate bearings. You'll need to know which direction is North, and which is South. Once you've identified North, try to find the North Star (Polaris) in the night sky. A neat trick to finding the North Star, is that it's at the same height in the sky as your latitude. So if you live in Hawaii, it's around 19 degrees from the horizon. In the Midwest, it might be closer to 40 or 50 degrees from the horizon! The North Star is indicated by the hole on your Planisphere.

Credit: Space Science Institute

- Once you've gotten yourself pointed the right way, you'll want to make sure your date is correct. Spin the white part of the planisphere, until the date and time matches yours. This one is showing August 15th at 9pm (see white circle above.)
- The line running across the planisphere is your Northern horizon (see white "x" in above figure). So the constellations you see along that line, should match the ones near the horizon where you are!
- The front of the planisphere shows you the night sky from the Northern horizon to a little past straight over-head.
- When you turn the Planisphere over and face South, you're seeing the objects in the sky from the southern horizon to almost straight overhead.

Simple Instructions (continued)

Objects listed on the planisphere

- You'll note that the planisphere can help you find quite a few objects in the night sky.
- The easiest objects to locate are the constellations that change with the seasons. Try to find the pictures in the sky you already know, and identify more from there.
- The planisphere can also help you find telescope objects, like Globular Clusters, Nebulas, Galaxies and Open Star Clusters. Use the key on the back side to figure out which object you're looking at!

Credit: Space Science Institute

- You can easily find the Milky Way using this tool. On the planisphere, you'll see a blue cloudy area, once you know what you're looking for, it may be easier to see in the sky for you! Unfortunately, many parts of the country have too much light pollution to see the Milky Way or other dimmer objects. Start with planets and Globular Clusters as the brightest objects.
- You can identify planets with this tool. Although they don't appear on the Planisphere itself (because the planets move independently of the stars), you can use the dotted line labeled "ecliptic" on the planisphere to try to find planets! How do you tell the difference between a planet and a star? First, if you see a bright star that doesn't belong to a constellation on your planisphere, that might be a planet! Another clue is whether or not it twinkles. Stars almost always twinkle, because they're so far away so we receive very little light from them, and the light we get is distorted by the atmosphere. In comparison, planets only twinkle if you have an extremely disturbed atmosphere (e.g., right before a storm. We get more light from them, so the atmosphere doesn't affect them as greatly!

Connections to Other Kit Materials

- We recommend the planisphere be used in conjunction with the telescope or binoculars, but it also works great by itself to better learn the constellations!

Connections to Other *STAR Net* Activities

- Please visit the *STEM Activity Clearinghouse* at www.clearinghouse.starnetlibraries.org and check out the "Space Science" collection to find great activities on constellations and other stellar objects!

Section 4:

Science Books and Related Resources

Science Books

1) Understanding Small Worlds in the Solar System (NASA)

Suitable for individual use by any age, or in a group or station setting

This hands-on book allows users to explore the shape and texture of comets, asteroids, the Kuiper Belt, Oort Cloud, and even Pluto!

2) All My Friends are Planets (Alisha Vimawala)

Suitable for use during story time for pre-k to grade 3 audiences

This book tells the story of Pluto's discovery, the evolution of what it means to be a planet, and that it's ok to be different and make new friends along life's way.

Consider using this resource with the "Blind Mice Go to Pluto", "Playdough Planets", "Strange New Planets" or other planetary science activities found in the "Universe of Stories" collection in the STEM Activity Clearinghouse.

3) Starry Skies (Samantha Chagollan)

Suitable for use during story time for pre-k to grade 3 audiences

This sturdy hardcover book includes easy to see illustrations of the constellations in our night sky, and simple descriptions of how they were named.

4) Journey to Constellation Station (Lindsay C. Barry)

Suitable for use during story time for pre-k to grade 3 audiences

This book was recommended by our pilot libraries for story time. *Constellation Station* is an imaginary place in the sky where the constellations meet and share their stories.

5) They Dance in the Sky (Jean Guard Monroe and Ray A. Williamson)

Suitable for circulation for teen and adult audiences

This book includes the stories behind constellations and asterisms from multiple cultures and time periods.

For background information and audio files related to this content, please visit:

https://lunarscience.arc.nasa.gov/books/small-worlds.html

Web Links to Kit Materials

Below you will find a list of web links to resources for your kit.

Activities

4.5" Orion StarBlast Telescope
https://goo.gl/afvfpH

Moon Filter
https://goo.gl/Jf3mEs

Celestron 71198 Cometron 7x50 Binoculars
https://goo.gl/9jP82u

Planisphere (remember to use your correct latitude!)
https://goo.gl/7MUAtP

Color Paddles
https://goo.gl/UnNwpv

Bulk Colored Pencils
https://goo.gl/VriJSG

Books

All My Friends Are Planets
https://goo.gl/1XacW5

They Dance in the Sky
https://goo.gl/r4h1Z9

Starry Skies
https://goo.gl/M4MoGY

Stories of the Aurora
https://goo.gl/iSQVup

Journey to Constellation Station
https://goo.gl/nhLVvL