NISE Network Online Workshop

Take A Voyage through the Solar System with the NISE Network!

Tuesday, May 9, 2023

NISE NATIONAL INFORMAL STEM EDUCATION NETWORK

Today's Presenters:

Patricia Moore, Outreach Strategist, Exploration Systems Development Mission Directorate, NASA

Ali Jackson, Sciencenter in Ithaca, NY

Peregrine Bratchi, Museum of Life and Science in Durham, NC

Darrell Porcello, Children's Creativity Museum in San Francisco, CA

Welcome! As we wait to get started with today's discussion, please:

Introduce yourself! Type your name, institution, and location into the Chat Box

Questions? Feel free to type your questions into the Chat Box at any time throughout the webinar or use the raise your hand function in the participants list and we'll unmute your microphone.

Today's discussion will be recorded and shared on nisenet.org at: nisenet.org/events/online-workshop

ARTEMIS

STEM & OUTREACH

RESOURCES


PATRICIA MOORE

OUTREACH & PUBLIC ENGAGEMENT LEAD, NASA HQ

EXPLORATION SYSTEMS DEVELOPMENT MISSION DIRECTORATE

PATRICIA.L.MOORE@NASA.GOV

281-636-2919

ARTEMIS I

TESTED. PROVEN. READY.

ARTEMIS II CREW

Artemis I: 2022

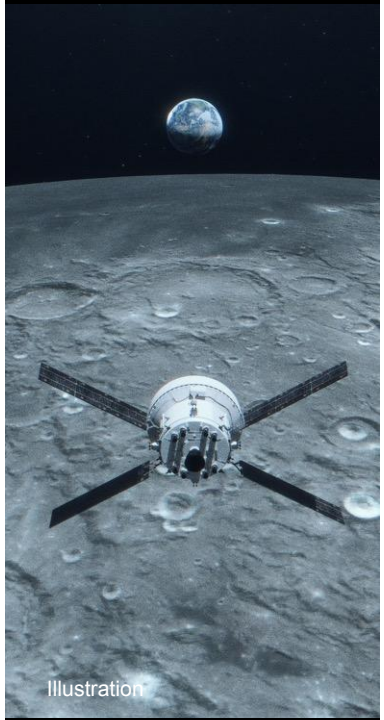
Uncrewed flight test

COMPLETE

SLS, Orion, EGS

Artemis II: 2024

Crewed flight test



SLS, Orion, EGS

Artemis III: 2025

Crewed surface expedition

SLS, Orion, EGS, HLS

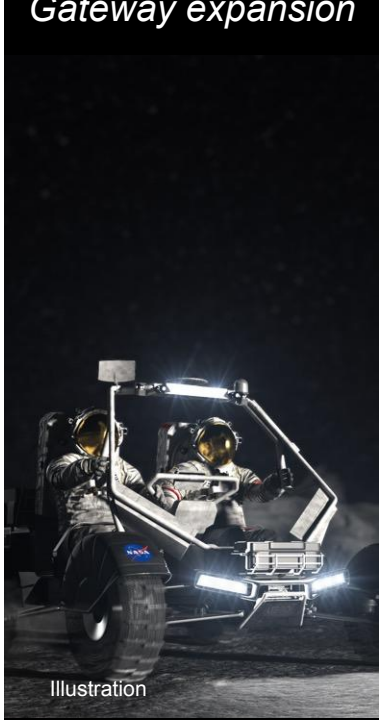
Artemis IV

Gateway assembly, crewed sustaining lander expedition

SLS, Orion, EGS, HLS, Gateway *(PPE/HALO, I-HAB)*

Artemis V

Crewed mobile surface exploration, Gateway expansion

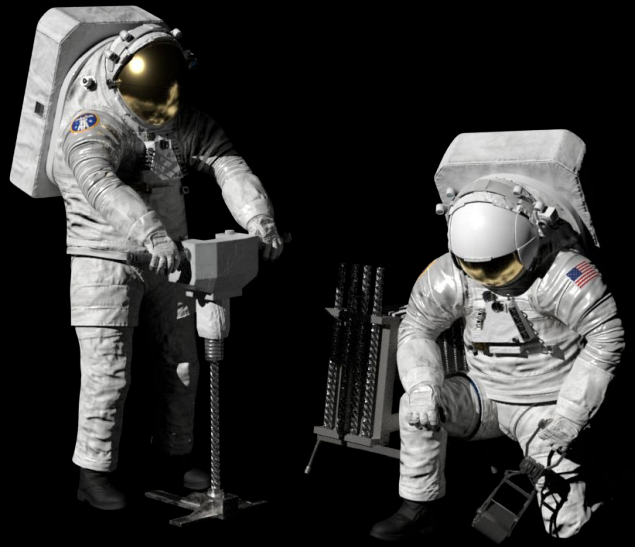


SLS, Orion, EGS, HLS, LTV, Gateway (*ESPRIT, Canadarm3*)

Artemis Focused Activities & Resources

ARTEMIS
OUTREACH RESOURCES

- GRAPHICS
- PHOTOS
- VIDEOS
- BASE LINE PRESENTATIONS
- EXHIBIT SIGNAGE
- PRINT PRODUCTS
- TALKING POINTS
- MISSION PATCH
- ACTIVITIES/LESSONS



Lunar Geology

Artemis Candidate Landing Regions

Landings Humans on the Moon

Moon Observation Journal

Edible Rocks

Sculpting Lunar Geology

Oreo Moon Phases

Crater Drop

Lava layering: Making & Mapping a Volcano

Deep Space Astronauts

Human Physiology Demos:

- Get A LEG UP
- HOW quick are your responses
- Bag of bones
- Brain in space

Ray Shielding Activity

Hazards of Deed Space Astronauts Educator Guide

Exploration Design Challenging (2014 Archived)

Lunar Robots

Roving on the Moon: Cardboard Rover

Safe Landing on the Lunar Surface

Touch Down

Roving on the Moon

Robotic Arm Challenge

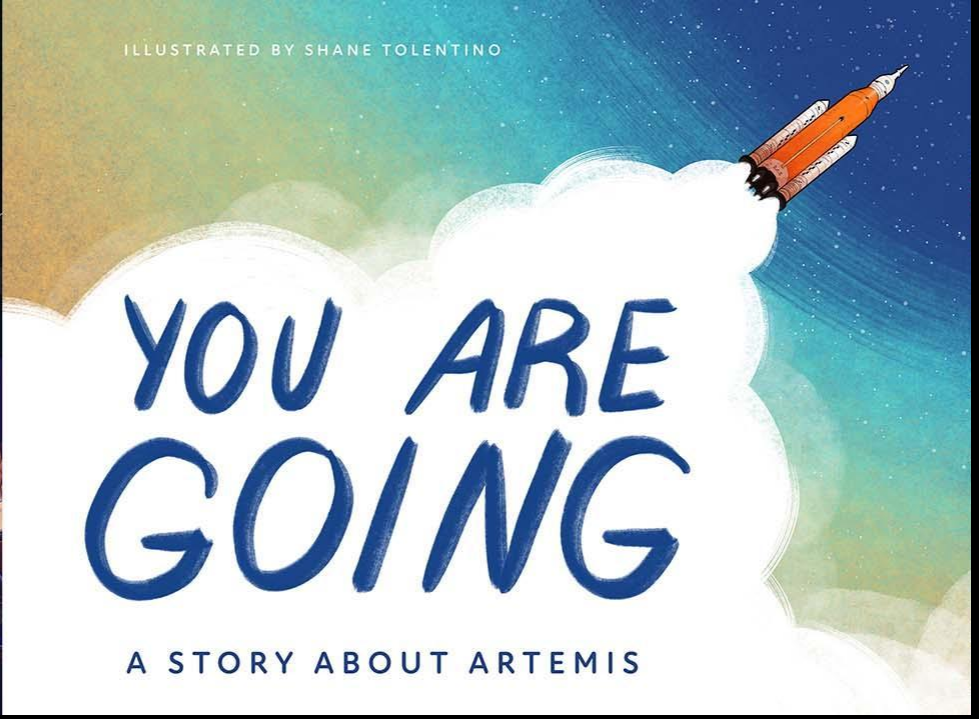
Suits

Cool Suits

Micrometeoroid & Space Debris

Bending Under Pressure

Artemis Generation Suit Educator Guide



Lunar Art

[Learn How to Draw Artemis]

[You Are Going- Digital Book]

[NASA Space Place Art Challenge]

[NASA Langley Student Art Contest]

[The Moon As Art]

Activity 1: Slowing Down in Space

Prep time: 20 min **Activity time:** 90 min

Summary: NASA is exploring the Moon, Mars, and beyond. One of the challenges for NASA is delivering heavier payloads, especially in atmospheres that are less dense than Earth. The low-Earth orbit flight test of an inflatable decelerator (LOFTID) demonstrated a crosscutting inflatable aeroshell—a type of heat shield for atmospheric re-entry. The inflatable decelerator will act as a giant brake for slowing down spacecraft.

Learning Objective: Participants will understand how a drag device system helps safely reduce the velocity of a spacecraft during re-entry.

Outcome: Participants will design a drag device system to slow the descent of a weighted spacecraft.

Activity 2: Deep Space Communications

Prep time: 20 min **Activity time:** 45 to 60 min

Summary: As NASA explores beyond the Moon, communication is critical. Scientists and engineers use the Deep Space Network (DSN) to send messages to spacecraft. The farther the signal has to travel, the more complex it becomes to send messages and data. The signal may be blocked by obstructions, and radiation from the Sun or other celestial bodies may interfere, causing the message to degrade, become garbled, or fail to reach its destination. Deep Space Optical Communications (DSOC) is NASA's first demonstration of optical communications beyond the Earth–Moon system. When launched, DSOC will take optical communications into deep space for the first time.

Learning Objective: Participants will practice problem-solving strategies to construct a protocol, or set of instructions, for minimizing the amount of data lost or damaged during transit.

Outcome: Participants will develop and present a protocol after modeling how data is transmitted across networks.

Activity 3: RoboTools

Prep Time: 20 min **Activity Time:** 45 min

Summary: Robots will be essential to aid in repairs and updates on the mission to the Moon and beyond. On-orbit Servicing, Assembly, and Manufacturing 1 (OSAM-1) is a robotic spacecraft equipped with tools, technologies, and techniques needed to extend satellites' lifespans even if they were not designed to be serviced in space. The servicing technologies on OSAM-1 will demonstrate that these technologies are ready for incorporation into other NASA missions.

Learning Objective: Participants will use the engineering design process to develop an interchangeable tool to aid a robot. Participants will also write instructions on how to operate the tool.

Outcome: Participants design and build a working tool that could be useful to robots working on or near the Moon.

Activity 4: Filling Up in Space

Prep time: 20 min **Activity time:** 90 min

Summary: Cryogenic propellants are gases chilled to extremely cold temperatures and condensed to form liquids at low temperatures. NASA's challenge is developing new solutions for in-space storage and transfer of cryogenic fluids—solutions that are energy, mass, and cost efficient. This is the goal of theNASA's Cryogenic Fluid Management Portfolio Project. Such solutions would benefiting a range of extended science and exploration missions throughout the solar system. This is the goal of the Cryogenic Fluid Management Portfolio Project.

Learning Objective: Participants will practice the steps of the engineering design process to create a solution to minimize the loss of cryogenic propellants in storage and transfer.

Outcome: Participants will design and model a cold-fluid transfer system.

Join our heroes on their Artemis adventure!

Meet Moonikin Campos

In the first part of Commander Moonikin Campos' journey, our trailblazing hero prepares for liftoff from NASA's spaceport at Kennedy Space Center in Florida, gets acquainted with the

Campos Flies to the Moon

In the second part of the trio's adventure, Campos, Helga, and Zohar blast out of the Earth's atmosphere with nearly 8.8 million pounds (4 million kg) of thrust powering their ascent.

Campos Returns to Earth

In the final chapter of the Artemis I mission, Campos and friends prepare for their return home, including the last and most dangerous part of their journey: reentering Earth's

INSPIRE - ENGAGE - EDUCATE - EMPLOY

The Next Generation of Explorers

Standards-aligned science activities help students learn about sending humans to the Moon.
--Crew Transportation With Orion
--Propulsion With the Space Launch System
--Habitation With Gateway
--Landing Humans on the Moon
--Hazards to Deep Space Astronauts
--Deep Space Communications

Landing Humans on the Moon Educator Guide

Watch Webchats With NASA Experts and Students

Connect Students to #CountdownToMars

Artemis Camp Experience

ADC Guide and Coding Components Available Now!


Crew Transportation with Orion
Educator Guide
Next Gen STEM
Propulsion with the Space Launch System
Habitation with Gateway
Hazards to Deep Space Astronauts
Deep Space Communications
Educator Guide
EARTH AND SPACE SCIENCE
Next Gen STEM – Moon to Mars
Landing Humans on the Moon
Educator Guide
EARTH AND SPACE SCIENCE
Next Gen STEM – Moon to Mars
to Mars

Requesting a NASA Speaker

NASA Speakers Bureau

Astronaut Appearance

Virtual Chats

Borrowing NASA Exhibits

- Lunar & Meteorite Samples
- Space Food
- Space Suits
- Models
- Pop Ups
- Panels
- Space Tools

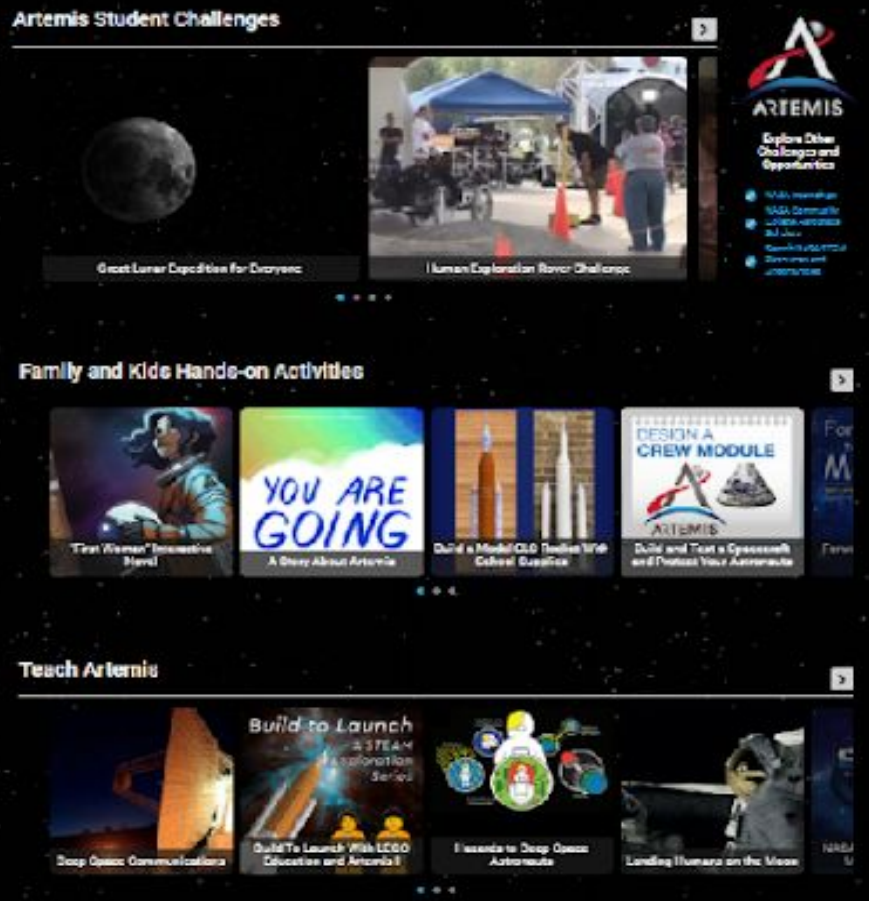
STAY UPDATED!

@NASAArtemis

@NASAArtemis

@nasaartemis

NASA Express
nasa.gov/stem/express



stem.nasa.gov/artemis

Explore Science:
Voyage through the Solar System

NISE
NATIONAL INFORMAL
STEM EDUCATION
NETWORK

EXPLORE SCIENCE
Voyage through
the Solar System

Project Overview

- *New* physical toolkit of hands-on STEM (science, technology, engineering, and math) activities based on NASA's continuing pursuit of human exploration **(application open until May 15th!)**
- Mobile DIY Sun Science & DIY Solar System Apps **(available for free download through the iTunes app store)**
- Disseminate resources to leverage NISE Network and local partnerships to engage diverse audiences and support at home STEM engagement—extending learning beyond museum walls.

SEISE Network Frameworks + Human Exploration

Earth & Space Learning Framework

The Earth & Space Learning Framework describes the intended actions of learners engaged with NISE Network hands-on activities and exhibition components based on the research, discoveries, and missions from NASA's Science Mission Directorate. The three principles of the Learning Framework—phenomena, process, and participation—support **six interrelated strands of learning** documented by the National Research Council. To further illustrate each principle and its supporting statements, the following pages show example connections to the Explore Science: Earth & Space toolkits and the *Sun, Earth, Universe* exhibition. The Learning Framework is a companion to the Earth & Space Content Framework, which describes six ideas that represent a basic understanding of Earth and space science.

NISE NETWORK

PRINCIPLES	Experience Earth and space **phenomena** and explore science findings	Use the scientific **process** and reflect on science as a way of knowing	**Participate** in the scientific community and identify as a science learner
SUPPORTING STATEMENTS WITH EXAMPLE CONNECTIONS	Experiencing the joy of active learning, including play, discovery, invention, and experimentation Experiencing real phenomena, celestial events, and compelling imagery Exploring our place in the universe Investigating the big questions that drive Earth and space research	Using an iterative design process similar to engineering and scientific research Using a variety of tools and approaches to make discoveries Experiencing the power and limitations of data sets Making and using models to communicate and further our understanding Using our imagination and ingenuity to explore the universe	Working together in groups to accomplish goals and tackle challenges Exploring the relevance of Earth and space science Considering the social dimensions of Earth and space science Identifying as someone who learns about and sometimes participates in current research
	 Exploring the Universe: Filtered Light	 Exploring the Universe: Star Formation	 Exploring the Solar System: Asteroid Mining
STRANDS OF LEARNING	**Developing interest in science:** Experience excitement, interest, and motivation to learn about science **Understanding science knowledge:** Generate, understand, and use explanations, arguments, models, and facts related to science	**Engaging in scientific reasoning:** Manipulate, predict, question, observe, and make sense of the natural and physical world **Reflecting on science:** Reflect on science as a way of knowing and as a personal process of learning about phenomena	**Engaging in scientific practice:** Participate in scientific activities and learning practices with others using scientific language and tools **Identifying with the scientific enterprise:** Develop an identity as someone who knows about, uses, and sometimes contributes to science

Developed by the NISE Network. Published in 2021.
National Research Council: Bell, P., Lewenstein, B., Shouse, A.W., & Feder, M.A., Eds. (2009). Learning Science in Informal Environments: People, Places and Pursuits. Washington, DC: National Academies Press.

This material is based upon work supported by NASA under cooperative agreement award numbers NNX16AC67A and 80NSSC18M0061. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Aeronautics and Space Administration (NASA).

Intended Audiences

The intended **public audiences** are **adults and children in museum settings and at home**

The project's intended **professional audiences** include **informal educators, subject matter experts, and volunteers**

Project Goals

- Youth and families will have access to high-quality, **authentic STEM** education resources with powerful connections to NASA that will inspire the next generation of explorers.
- Support **museums as strategic partners in their communities** and STEM ecosystems to increase the impact of NASA STEM engagement investments.
- **Engage groups historically underrepresented and underserved in STEM fields** through local partnerships, supported by a strong national network of informal education organizations.

2023 & 2024 Annular and Total Solar Eclipses

Saturday, October 14, 2023, and **Monday, April 8, 2024**

https://www.nisenet.org/solareclipse

EXPLORE SCIENC
Voyage throu
the Solar Syst

Build a Moon Base Camp

EXPLORE SCIENCE

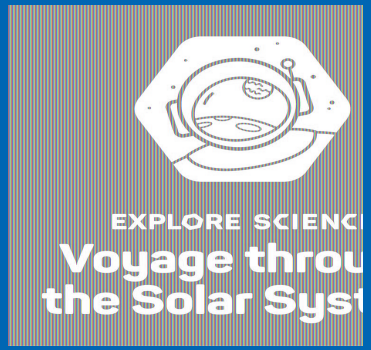
Voyage through the Solar Syst

Breath of Fresh Air

EXPLORE SCIENC
Voyage throu
the Solar Syst

Space Souvenir

LIVE DEMO!



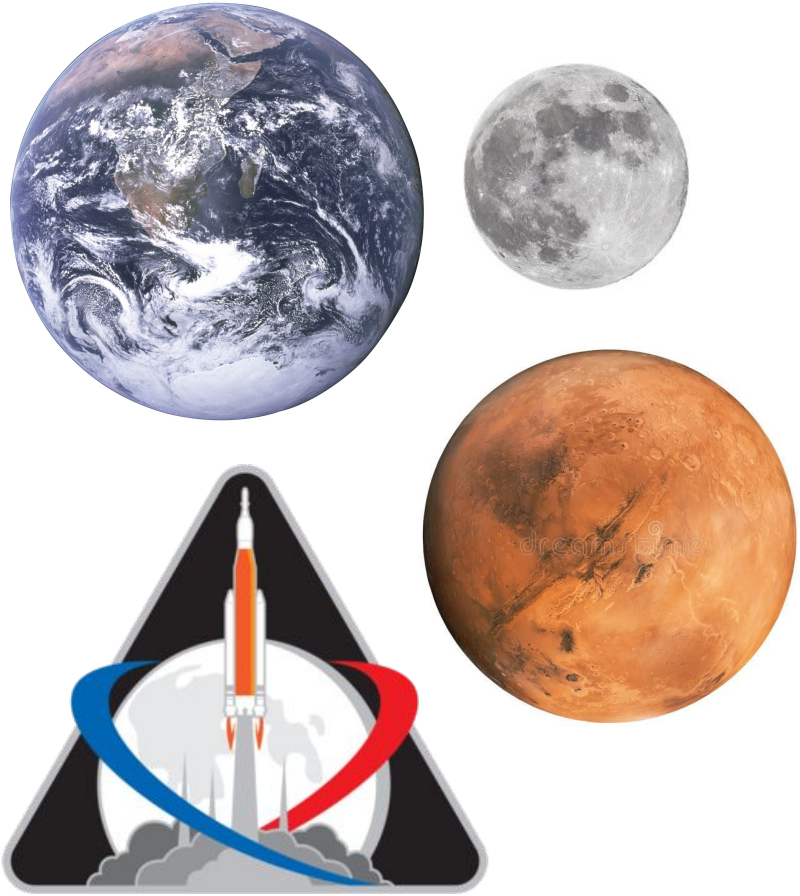
Breath of Fresh Air

DIY Sun Science

- Over **500,000 downloads** since its launch
- We recently added two new activities
  - **Shadows on the Moon**
  - **Color Your Own Aurora**
- **Spanish version** now available

Available on the App Store

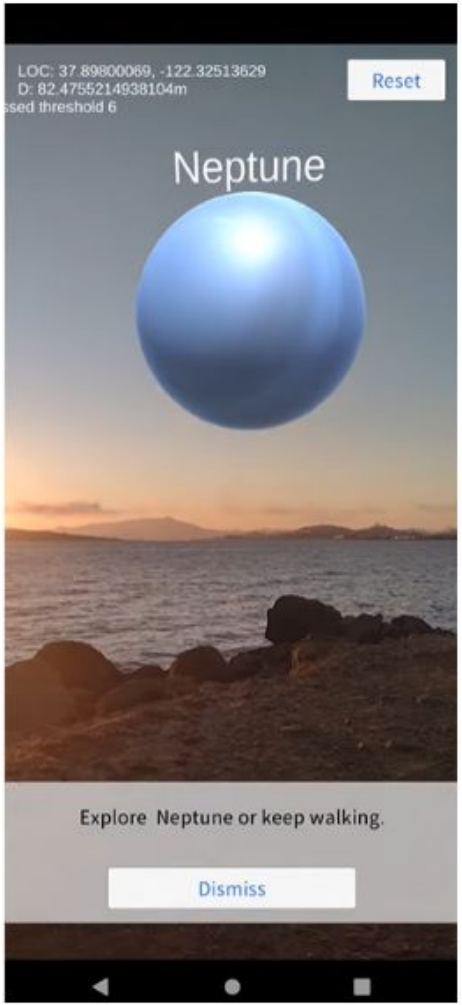
GET IT ON Google Play



DIY Solar System

- App will launch with 9 new hands-on activities to continue Solar System learning at-home
- New all-digital activities will also be included on rover control and spacesuit fittings
- Bridge toolkit experiences with learners before or after their museum visit with the app

Summer 2023 release



DIY Solar System

- New **augmented reality** experiences to explore the planets and other solar system destinations using NASA data

Q&A

Use the raise hand feature or type your question in the chat

Resources & Opportunities

Learn more and access the NISE Network's online digital resources:
nisenet.org/browse-topic

NISE NETWORK
NEWSLETTER

Read our monthly newsletter
nisenet.org/newsletter

Follow NISE Net on social networking
nisenet.org/social

2023 Online Workshops

Bubbling Up later this Year… 😸

Activating Outdoor Spaces - Pocket Parks, Pollinator Gardens, and More!

Tuesday, June 13, 2023
2pm-3pm Eastern / 11am-12pm Pacific

Stay tuned for more online workshops coming this summer

NISE NETWORK
ONLINE WORKSHOPS

nisenet.org/events

Apply for the Explore Science: Voyage Through the Solar System kit!

EXPLORE SCIENCE

Voyage through the Solar System

Application Deadline is Next Monday, May 15th!

nisenet.org/voyage-solar-system

Thank You

NISE NATIONAL INFORMAL STEM EDUCATION NETWORK

This material is based upon work supported by NASA under award number 80NSSC21M0082. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Aeronautics and Space Administration (NASA).