

FACILITATOR GUIDE

Space Guess Quest

Learning objectives

Learners engaged in this activity will explore these main ideas:

- Humans are exploring a wide variety of objects, like nebulae, galaxies, stars, and worlds throughout the universe (and now the universe even includes human-made spacecraft!)
- Scientists often use visual clues to identify objects in space.
- Scientists rely on a variety of tools as they explore our universe.

Materials

- Deck of object playing cards (50)
- Two game mats with objects
- Neon dry-erase markers
- Microfiber cloth
- Sand timer (optional)
- Sign, sign stand, information sheets, and activity and facilitator guides
- “Objects in Our Universe” poster
- “Tips for Leading Hands-on Activities” sheet

The Explore Science toolkit comes complete with all necessary materials for this activity. Materials are also readily available to create or restock activity kits. Most of the materials in this activity can be purchased through craft stores or ordered online. All graphic files can be downloaded from www.nisenet.org. If you print your own boards, we suggest laminating them so you can use the dry-erase markers to mark off objects during gameplay.

Advance preparation

We suggest playing this game a bit and getting to know the rules before using the materials with participants.

Before you begin: Place the mats on a table facing away from each other. Each participant or team gets one marker. Shuffle the deck of cards and place it between the mats.

Notes to the presenter

Setup: Each player/team has a mat and a marker. Each player/team draws one card and looks at it without showing it to the opposing player/team. (Players on the same team can all see their own team's card.)

Game overview: The game is designed to work well for two players or two teams. Each player/team asks one question per turn. **All questions should be phrased so that they can be answered with a “yes” or a “no.”** Encourage participants to mark off objects that do not fit their opponent's answer with their marker. For example, if a player asks, “Is your card either a planet or a moon?” and their opponent answers “Yes,” you can put an “X” over every non-planet and non-moon picture on the mat. Keep asking questions, taking turns, until someone feels ready to make a guess.

After players eliminate possibilities, they can choose to take a guess instead of asking a yes/no question. If the guess is incorrect, they lose the game! So if a player is not 100% certain that their guess is correct, they should probably ask another question rather than taking a guess. The first team to guess the other side's object correctly wins!

NOTE: This game plays a lot like the Guess Who™ board game. Many participants will be familiar with that game (or similar versions) and its rules. Use their familiarity as an entry point and to provide some context for gameplay.

Some additional important elements to gameplay:

- Only one “Yes/No” question or guess per turn per team.
- Players cannot ask questions about the object's position on the mat.
- Players may not lie!
- Players only get one final object guess per game!

If you're playing with a young visitor or visitors, then you may grant them multiple guesses. If the visitors are too young to play (visitors under 6, for example), you can play a simple game of “match.” Take the top card off the deck and ask them to find it on the mat. You can set a time limit if they're especially adept.

As the facilitator, you may choose to play against the visitor or visitor groups to set up a fun competition. Remember to be gracious and helpful!

Try suggesting that younger visitors play on a team with an adult or older child. Young children are still developing their literacy skills and may not have knowledge of different types of space objects, encourage them to focus on physical features that are familiar to them, such as shape and color. You can also play a different game using the same boards and cards. Similar to I-Spy, invite a child to pick an object directly off the board and then have you or a partner guess the object by asking a series of “yes/no” questions. Help the child think about how to answer the question and group the objects.

Try switching roles. Or invite a participant to pick a card from the deck and then try to find the object on the board. The 2-minute sand timer makes this even more fun. See how many pairs you can each get in 2 minutes!

Conversational prompts

If the player doesn't know the answer to the question, you should help the player answer the question to the best of their abilities. Many times, you may need to point to several examples and ask, "Would you say yes/no to this one?" And if you disagree with their answer, this may be an opportunity to converse about the object's properties and how we make observations.

There are many ways to engage in conversations while you play the game. It's best to start out with a very brief explanation of the five main categories. Human-made space objects (probes and space telescopes), worlds (like planets and moons), stars, nebulae, and galaxies. Ask the visitor if they understand each category. Provide a quick overview of these types of objects, but don't spend too much time explaining each one. Use the game itself as a starting point to converse about the objects as you go along.

Human-made space objects: These are tools scientists use to examine our universe. There are two main categories of human-made space objects in this game. Probes most often travel to a destination to examine it up close. Space-based telescopes orbit closer to Earth and look outward to the universe.

Worlds, like planets and moons: Objects in this category can include rocky planets like Earth, gas giants like Jupiter, moons like Earth's own moon, dwarf planets like Pluto, and exoplanets that orbit other stars. Some planets and moons have atmospheres, while others do not. Ask your visitors if they can identify the differences between the planets and moons—this will help them ask good questions. Worlds can be found in our galaxy and in other galaxies.

Stars: These are enormous orbs of *plasma*, a super-hot gas-like mix of charged particles that fuse atoms to create energy and light. For example, our Sun fuses hydrogen into helium, creating light and other energy as byproducts. Not all stars are the same color, some stars orbit other stars, and some stars can be found in groups. Stars can be found in our galaxy and other galaxies.

Nebulae: Nebulae are big clouds of gases and dust. Some nebulae are the birthplaces of stars, while others, especially those that have a defined shape, are what are left over after a star has shed its outer layers of gas. Many nebulae get their common name based on how closely their shape resembles something on Earth (e.g., the Dumbbell Nebula, or the Cat's Eye Nebula). Nebulae are found in our galaxy and other galaxies.

Galaxies: Galaxies are collections of stars—usually millions or billions of them. Some have defined shapes, like a spiral, and some have irregular shapes, while others have no discernible shape. Bright, giant galaxies are some of the furthest objects that we can see with telescopes.

Difficult concepts

Scale and distance might be challenging for participants. You will likely have a conversation with your visitors on how the space object categories are different in this respect. Even though the images are the same size, all of the objects vary greatly in scale. Galaxies are the largest, while spacecraft and telescopes are the smallest.

Visitors may struggle to recognize the basic structure of the universe. Earth is a planet in our solar system. Our solar system has one star at its center, the Sun. There are billions of other stars in our galaxy, the Milky Way. Many of these stars also have orbiting planets, which we call exoplanets or exoplanet systems. The universe has hundreds of billions of galaxies.

We cannot see or take a picture of the entire Milky Way galaxy “from the outside.” This is because we are always inside the Milky Way and have not designed a spacecraft capable of travelling far enough away to send us a wide-angle shot of our own galaxy.

Some of the images in this activity do not show the true colors that we would see with our eyes. Some images use “representational color,” with colors that have been assigned by scientists to different energies of invisible light collected by telescopes. And some of the images are illustrations or artist concepts of what those objects would look like based on scientific data.

Staff training resources

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

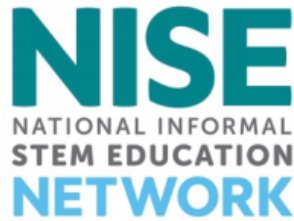
- An activity training video is available at vimeo.com/304240965
- A content training video is available at vimeo.com/304240890
- Additional training videos on misconceptions and facilitation can be found at vimeo.com/album/4249834
- The NISE Network has a curated list of programs, media, and professional development resources that directly relate to the toolkit. These resources can be viewed and downloaded from www.nisenet.org/earthspacekitextensions.

Credits and rights

This activity was developed for the NISE Network by the Lawrence Hall of Science, the Children's Creativity Museum, and the Sciencenter.

Image of Pillars of Creation courtesy NASA, ESA and the Hubble Heritage Team (STScI/AURA)

Artist's impression of TESS courtesy NASA Goddard, credit: Chris Meaney



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