

SNOOPYTM IN SPACE

THE SEARCH FOR LIFE

Dear Educator,

If you ask your students to imagine gazing up at the stars in the night sky, how do you think they would answer these questions: Is there life on other planets? If so, what does it look like?

In season 2 of *Snoopy in Space*, streaming now on Apple TV+, Snoopy and the Peanuts Gang set out to answer that very question. Along the way, they learn about the thrilling work NASA astrobiologists are doing to search for life in our solar system and beyond.

In this free program, developed by Peanuts Worldwide and the curriculum specialists at Young Minds Inspired, your students will travel with Snoopy, Woodstock, and the Peanuts Gang to learn that it will take teamwork, imagination, and perseverance to find the first life form in space. Inspired by Snoopy's adventurous spirit and the dedication behind NASA's ongoing commitment to space exploration, each easy-to-implement, standards-based activity includes extensions the whole family can enjoy.

Please share this program with other grades 3-6 teachers at your school. And let us know your opinion of the program by visiting ymiclassroom.com/feedback-peanuts-space. We look forward to your comments and suggestions.

Sincerely,



Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired

Target Audience

Students in grades 3-6 and their families

Program Objectives

- Explore NASA's efforts to search for life within and beyond our solar system
- Raise awareness of the role of scientific inquiry in advancing future knowledge
- Engage student interest in space and scientific concepts that support critical thinking
- Support STEM and language arts skills

How to Use This Program

Download, copy, and distribute the three reproducible activity sheets. Students will need pencils, crayons, or markers to complete the activities. Have students share their completed sheets with their families so that they can do the activities at the bottom of each sheet together. Visit ymiclassroom.com/peanuts-space for standards alignment.

Activity 1 Life As We Know It

In this activity, students will learn about astrobiology and the search for life beyond Earth. They will learn that scientists base their search on finding the same four components needed for life on Earth.

Ask students to brainstorm things on Earth that are alive, and what they need to survive. Explain that these are all forms of life "as we know it" here on Earth, which means they all need water, organics (molecules that contain carbon), energy, and time. But what about life beyond Earth? What

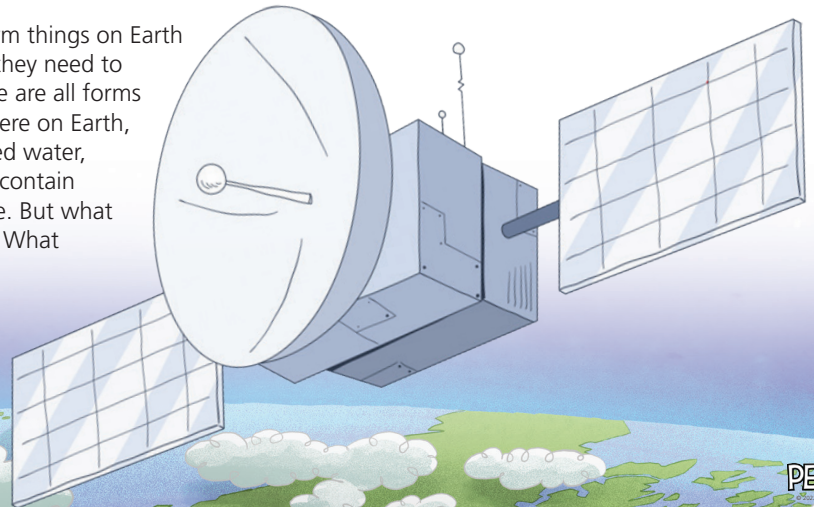
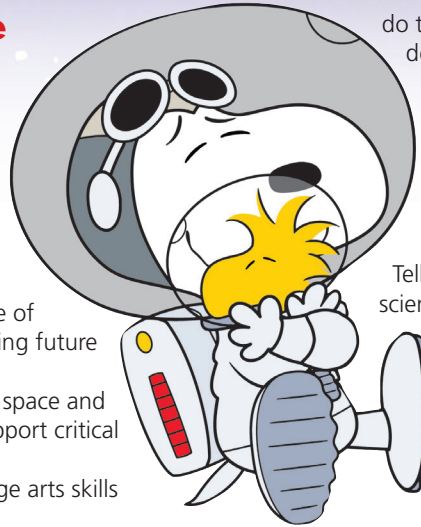
do they think such life would need to develop and grow? In season 2 of *Snoopy in Space*, Lucy imagines life on another planet looking like a big green blob. But science tells us that when life is found beyond Earth, it probably won't look like what you might find in a science fiction movie.

Tell students that *astrobiologists* are scientists who search for life beyond Earth, on planets, moons, and even asteroids. They believe that life beyond Earth will probably still need the four basic components found on Earth, and the easiest of these to search for is water. So, they look for evidence of water on

other planets and moons, such as canyons carved by now dried-up rivers, or sheets of ice at the north and south poles.

Distribute the activity sheet and review the instructions. Invite students to share their answers. Answers will vary.

Extension: Water on Earth is teeming with life! Have students look at pond or puddle water under a microscope or a hand-held magnifying lens to see the "invisible" life in that water. As an alternative, as a class, visit <http://www.microscopy-uk.org.uk/ponddip/index.html> to learn about tiny life forms found in water on Earth. Ask students: *Do you think that NASA scientists might find something similar on Mars or Europa?* Encourage them to speculate what they think might be found.



Questions? Contact YMI toll-free at 1-800-859-8005 or by email at feedback@ymiclassroom.com.

Activity 2

Life in Our Solar System

In this activity, students will learn that the search for life on other planets is well underway on Mars, where rovers can take samples from the planet's surface and store them for transport later back to Earth.

Tip: Before you begin this activity, ask parents to donate materials such as craft sticks, rubber bands, small paper cups, cardboard tubes, cotton balls, and other similar items for students to use in creating their rover's arm.

Ask students to think about where scientists are looking for life beyond Earth...and how. What tools might they need? If they guess Mars, they are correct. In fact, NASA is already looking there. They haven't sent people to Mars (or Snoopy, even though he visits Mars in *Snoopy in Space*), but NASA has sent rovers. The most recent rover, Perseverance, is the first rover designed to look for microbial life on Mars. Share pictures of the rover found at <https://mars.nasa.gov/mars2020/>. What is one important thing life needs that Perseverance could be looking for on Mars? (**Answer:** water)

How do scientists control robots on Mars so far away from Earth? Show students the "Mars in a Minute: How Do Rovers Drive on Mars?" video about how programming a rover works: <https://www.jpl.nasa.gov/videos/mars-in-a-minute-how-do-rovers-drive-on-mars>.

Driving the rovers is difficult enough, but imagine trying to control a huge robotic arm! Distribute the activity sheet and tell students that they are going to learn more about Perseverance's giant "arm" by working as a team to create their own robotic arm. As you review the directions, remind students that it will take teamwork and perseverance to succeed...just like Snoopy and the Peanuts Gang find out when they try to work together in *Snoopy in Space*.

Extension: Have students imagine how the world might react if NASA does find life on Mars. Ask students: *What do you think people would expect to find? Water,*

plants, animals, or a "blobby green alien" as Lucy imagines it might be? How could the findings affect our attitudes toward life as we've always known it if the results were quite unexpected?

Activity 3

Life in Deep Space

In this activity, students will learn that the search for life extends to exoplanets — planets that orbit a star beyond our solar system — and that interstellar "visitors" might even carry information about life in other solar systems.

Explain that NASA astrobiologists aren't just looking for life in our solar system — they are looking beyond it. But how? One way is to look for exoplanets, planets that orbit other stars. In our solar system, the planets orbit the Sun, but there are millions of other suns, or stars, in our universe, each with possible planets orbiting them. And some of those planets might even support life, just as Earth does.

Since the stars are so far away, it's not easy to find planets that orbit them. How do students think NASA does it? Prompt students to brainstorm what they think scientists might look for when exploring exoplanets and how they learn about them. Then, explain that astrobiologists look for planets that are similar in size to Earth and the same distance from their star, or sun, to sustain life the way our Sun does for us. They estimate that the distance would make the temperature suitable for water to exist. They use tools like the James Webb telescope to see if certain stars show a "blip" when a planet passes in front of them.

Divide students into small groups, and give each group a small but powerful flashlight and a marble. Turn off or dim the lights and ask groups to figure out how to demonstrate how a star might show a "blip" when a planet passes in front of it.

When the groups are done, explain that scientists can also learn about life on exoplanets outside the solar system from objects that visit our solar system from

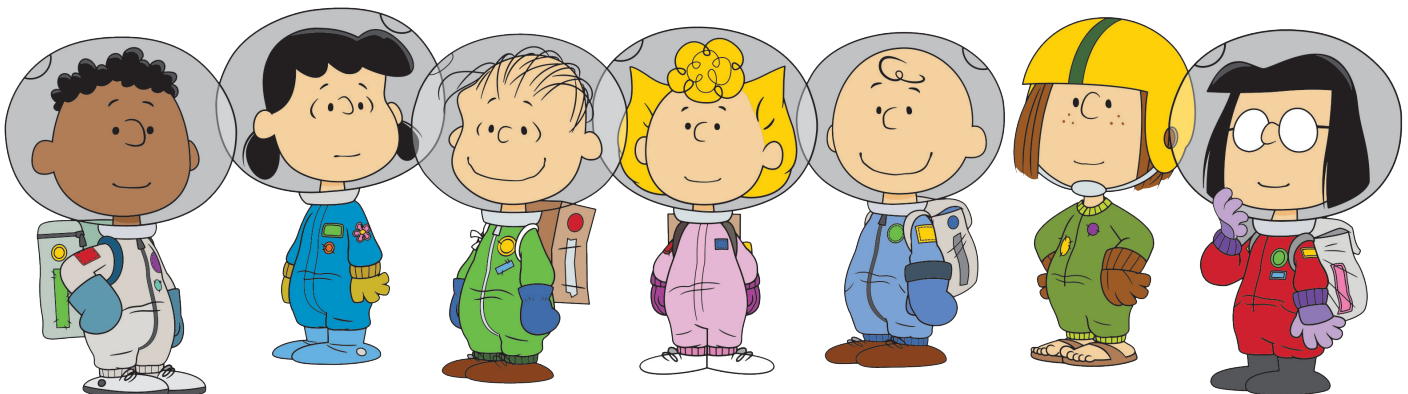
afar — like the asteroid that Charlie Brown discovers in *Snoopy in Space*.

Distribute the activity sheet and review the instructions. Have students share their answers once done. Answers will vary.

Extension: Have students imagine that they discover an exoplanet. Ask students: *What will you call it? What does it look like? Are there signs of life on your exoplanet?*

Resources

- More about what life as we know it on Earth needs: The Air We Breathe (a printable picture book): https://www.nasa.gov/pdf/62452main_The_Air_We_Breathe.pdf
- Why do we care about water on Mars? <https://spaceplace.nasa.gov/water-on-mars/en/>
- Astrobiology classroom lessons from NASA: <https://astrobiology.nasa.gov/classroom-materials/>
- James Webb Space Telescope STEM Toolkit: <https://www.nasa.gov/stem/nextgenstem/webb-toolkit.html>
- The Mars Rovers from NASA's Space Place: <https://spaceplace.nasa.gov/mars-rovers/en/>
- Making a robotic arm: https://pbskids.org/designsquad/pdf/parentseducators/DSN_NASA_MissionSolarSystem_RoboArm.pdf
- All about exoplanets: <https://spaceplace.nasa.gov/all-about-exoplanets/en/>
- Searching for other planets like ours: <https://spaceplace.nasa.gov/exoplanet-snap/en/>
- How many solar systems are in our galaxy? <https://spaceplace.nasa.gov/other-solar-systems/en/>
- Peanuts: peanuts.com
- YMI program site: ymiclassroom.com/peanuts-space



Life As We Know It

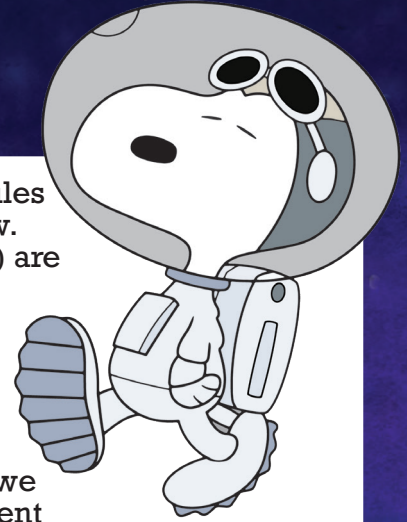
Life as we know it on Earth needs four things to survive — organics (molecules that contain carbon), energy, water, and time to develop and evolve or grow. The scientists at NASA who search for life beyond Earth (even on asteroids!) are called *astrobiologists*. They have begun their search by looking for water on other planets and moons. They know that Mars has water and ice and that on Europa, a moon circling Jupiter, there exists the possibility of oceans beneath the surface ice.

Although most astrobiologists believe that “life as we know it” may exist elsewhere in the universe, they also acknowledge that we may find “life as we don’t know it” — the possibility that life found in space might be quite different from life here on Earth.

In *Snoopy in Space*, Snoopy searches for “life as we don’t know it” on Venus. Imagine that you are a NASA astrobiologist who travels to Venus, just like Snoopy does, and you find “life as we don’t know it” in a cave. Write about your discovery in the form of a news article — complete with an attention-grabbing headline. Use the back of the sheet if you need more room. Then, make a drawing to accompany your article.

My Headline: _____

My Article: _____



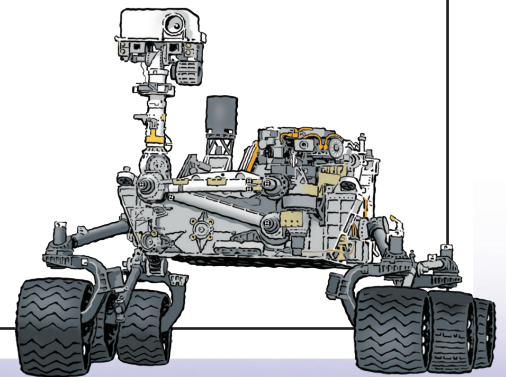
FAMILIES! Learn more about NASA’s thrilling search for life on other planets by joining Snoopy and the Peanuts Gang’s adventures in season 2 of *Snoopy in Space*, now streaming on Apple TV+.

Life in Our Solar System



NASA is already experienced at examining the possibilities of finding some form of life on Mars. Its most recent rover, Perseverance, has a 7-foot-long robotic arm with a shoulder, elbow, and wrist joints — and it even has a “hand” at the end! The arm is designed to collect and analyze samples, drill small holes, take photos, and even store samples that can later be retrieved for study back on Earth. When a sample is collected, it is moved to inspection and sealing stations located in the rover’s belly. Once sealed, it is stored until the rover’s team of scientists can decide where to leave it on the planet’s surface.

Can you engineer a “robotic arm”? Work with your team to first view Perseverance’s arm at <https://mars.nasa.gov/mars2020/spacecraft/rover/arm>. Then plan, sketch, and build an arm using “tools” your teacher gives you. The arm must be able to bend in at least one place and “scoop up” a cotton ball. Sketch your idea, try it and, if needed, try again by noting what didn’t work and how your team could improve it. Then sketch and write about your final design. Remember: It takes **perseverance** for the Peanuts Gang to learn how to work together in *Snoopy in Space*. So persevere in your group until you succeed!



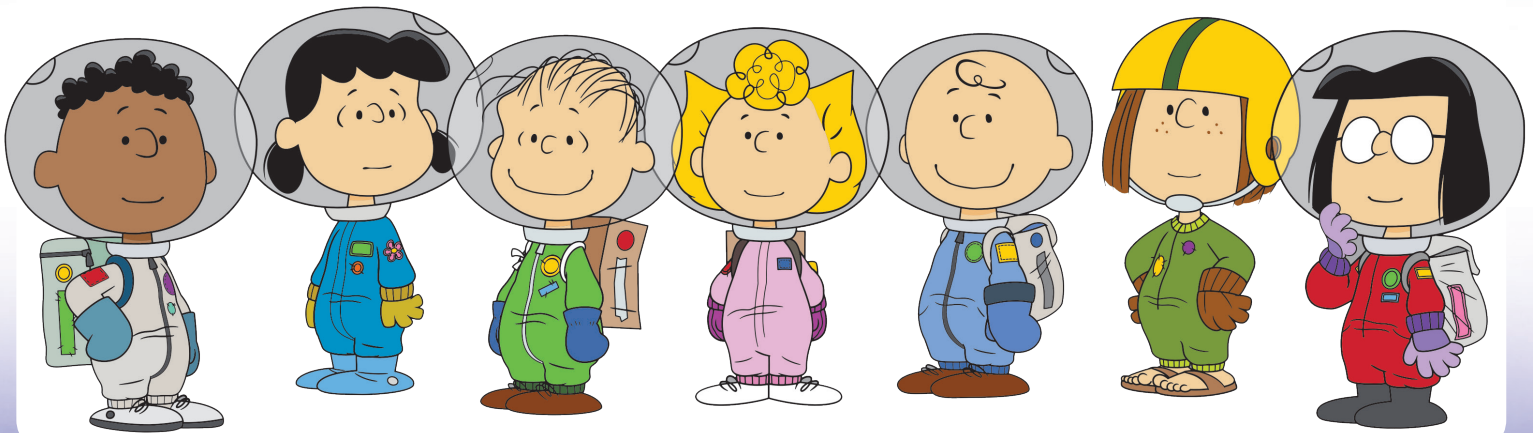
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Life in Deep Space

The universe is vaster than we can imagine. Scientists say it is continually expanding, and there are billions of galaxies, each with billions of stars — and each one of those stars could have planets orbiting it. In fact, scientists have already discovered more than 4,000 *exoplanets* (planets that orbit a star beyond our solar system), as the Peanuts Gang learns in *Snoopy in Space*.

Looking at these numbers, you can see why many people believe that life exists on other planets in the universe. What are the odds, they ask, that Earth is the *only* planet with life? What do you think? Use this space to write about whether you think life exists on other planets, and include your reasons.



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