

Curriculum Guide / Lesson Plan

Exploring the Universe: Imagining Life

In this activity, learners imagine extreme environments that may exist beyond Earth and create living things that could thrive there.



Subject areas / Grade levels / App tie-in / Learning standards

Nebula Spin Art covers Earth & Space Science and Life Sciences, for grades 3 and up. It is connected to the following NGSS standards: DCI.LS4.D.K-2 and DCI.LS4.D.3-5. The Visceral Science app allows learners to investigate the formation of protoplanets and the birth of planetary systems.

Learners will imagine possible surface conditions and potential lifeforms of these digital creations using the Imagining Life activity. Through discovering strange and unique extremophiles of Earth, and participating in conversation about their drawings of extraterrestrial life, learners will be inspired to consider the diversity of life on and off our home world.

Access

Access the Visceral Science app via student's personal internet-connected devices iPhone x or iPad X or higher: verizon.com/learning.

Overview

- In this activity, participants imagine and draw an extreme environment beyond Earth, then invent a living thing that could thrive in it. They learn that NASA scientists study extremophiles on Earth to imagine the variety of life that might exist elsewhere, and make predictions about where to look for it.

Objectives

- If life exists elsewhere in the universe, it could look very different from life on Earth.
- Life on Earth comes in an amazing variety of forms.
- Astrobiologists use our knowledge about life on Earth to make predictions about what life might be like elsewhere in the universe.

Materials and preparation

- Drawing sheets
- Extremophile cards
- Markers
- Please note, Visceral Science can be accessed before or after the hands-on activity, with the aim of using the activity to imagine and discuss the possibility of life on planets outside our solar system.

Vocabulary

- **Extremophiles**

Extremophiles are organisms that live in places on Earth that we would consider extreme. Hot spring pools, glaciers, the bottom of the ocean – these are all environments that we might have a hard time living in, but the organisms featured on these cards feel right at home there. Astrobiologists are interested in extremophiles here on Earth because they study similar environments on other planets and moons that may have extremophiles, too.

- **Exoplanet**

An exoplanet is any planet beyond our solar system. NASA scientists are currently using a powerful ground and space telescope to find evidence for exoplanets. As of 2022, over 5,000 exoplanets outside our solar system have been confirmed. A current count and more information on the NASA exoplanet mission can be found at: exoplanets.nasa.gov.

- **Astrobiology**

Astrobiology is the study of the origin, evolution, and distribution of life in the universe.

Background

If life exists elsewhere in the universe, it could look very different from life on Earth.

Life on Earth comes in an amazing variety of forms.

Some living organisms, called extremophiles, thrive in environments far too harsh for humans. Some extremophiles are relatively familiar animals and plants that are well suited to their extreme environments. Others are as strange as bacteria that thrive inside rocks, or microbes that can withstand tremendous heat, cold, and radiation. All living things on Earth reached their present form through evolution, the process by which organisms develop from earlier forms. Every once in a while, a random genetic variation makes an organism better adapted to its environment. Through natural selection, favorable variations are passed down to the next generations.

Astrobiologists use what we know about life on Earth to make predictions about what life might be like elsewhere in the universe. Some NASA scientists study extremophiles to better understand the environmental conditions that sustain life and to predict what kind of life they might find on different planets. Astrobiologists expect that alien life forms – if they're out there – will be specially adapted to their environment. Most of the alien worlds we've explored so far are very different from Earth, so any living things we find beyond Earth will probably be very different, too. When you imagine life on another planet, you're doing a little bit of astrobiology! Scientific breakthroughs involve creativity as well as data collection and experimentation. When we use our imagination, it helps us understand what a habitable extraterrestrial planet might be like, and what kind of life might survive there.



artist's concept of the surface of exoplanet TRAPPIST-1f

(image credit: NASA/JPL-Caltech/T. Pyle)

Step-by-step classroom guide



Step #1: Take a look at the cards. They show living things that thrive in extreme environments—places where humans cannot live.



Step #2: Imagine a planet or moon with an environment too harsh for people. Is it too hot? Too cold? Too acidic? Color in your landscape and make it look like the environment you imagine.



Step #3: Now draw a life form that could survive in your imaginary environment. It can be one you see on the cards or one you invent!

Think about the planets you created in Visceral Science. Could any of these planets host lifeforms? What features of these planets could lead to strange and unique forms of life different from what we find on Earth?

Activity components

Activity Guide (English & Spanish)	Student-facing
Imagining Life Cards (English & Spanish)	
Drawing Sheet (English & Spanish)	
Activity Standup Sign (English & Spanish)	
Facilitator Guide (English only)	Educator-facing
Tips for Leading Hands-On Activities (English only)	

