

# MISSION TO EUROPA

✦ **Grade Level: K-8**

✦ **Focus Area: Science, Technology, Social Studies**

✦ **Time: 60-90 Minutes**

## ACTIVITY INTRODUCTION

Jupiter's moon Europa, characterized by its icy surface and subsurface ocean, has captured the attention of scientists due to its potential to host life. Beneath its frozen exterior lies a vast ocean, warmed by tidal forces from Jupiter, offering conditions that might support life forms. This moon's intriguing features, such as its active geology and possible habitable environment, make it a compelling target for future exploration missions to uncover clues about the possibility of extraterrestrial life and the origins of our solar system.

## BACKGROUND INFORMATION

Jupiter's moon Europa, characterized by its icy surface and subsurface ocean, has captured the attention of scientists due to its potential to host life. Beneath its frozen exterior lies a vast ocean, warmed by tidal forces from Jupiter, offering conditions that might support life forms. This moon's intriguing features, such as its active geology and possible habitable environment, make it a compelling target for future exploration missions to uncover clues about the possibility of extraterrestrial life and the origins of our solar system.

## STUDENT REAL-LIFE CONNECTIONS

- ✦ What roles are involved in a space mission, and how do they contribute to the success of the mission?
- ✦ How does the concept of searching for signs of life on Europa relate to the broader quest for understanding extraterrestrial life?
- ✦ What skills and knowledge would a biologist need to identify the basic building blocks of life in an alien environment?
- ✦ How might the challenges faced by an aquanaut in underwater habitats mirror those encountered by astronauts in isolated space environments?

## ACTIVITY OBJECTIVES

- ✦ Explore the idea of searching for signs of extraterrestrial life on Jupiter's moon Europa.
- ✦ Engage in interactive activities to simulate the roles of an aquanaut, a biologist, and a communications officer.
- ✦ Identify similarities between underwater environments and space exploration conditions.

## MATERIALS

- ✦ Design materials for creating new habitats (paper, cardboard, craft supplies)
- ✦ Microscope or magnifying glass for examining samples (1 per child)
- ✦ Model underwater toy or drone for simulated operation (optional)

## ACTIVITY DIRECTIONS

1. Begin by selecting one role to play (aquanaut, biologist, or communications officer) in the solo role-play adventure.
  - a. **Aquanaut:** An aquanaut is an underwater explorer and scientist who specializes in studying and researching the deep ocean and its ecosystems. They typically live in underwater habitats for extended periods, conducting experiments and collecting data on marine life, geology, and oceanography. Aquanauts use advanced technology and equipment to study and document the unique and often mysterious aspects of the deep-sea environment. Their work is crucial for understanding our planet's oceans and the diverse life forms that inhabit them, as well as for environmental conservation efforts.
  - b. **Biologist:** Biologists are scientists who study living organisms and their interactions with their environment. They can specialize in various fields, such as marine biology, microbiology, ecology, genetics, or zoology, among others. Biologists conduct experiments, fieldwork, and laboratory research to better understand the biology, behavior, and conservation of different species. Their work contributes to advancements in medicine, agriculture, environmental conservation, and our understanding of the natural world.
  - c. **Communications Officer:** A communications officer is responsible for managing and facilitating effective communication within an organization or between organizations and the public. They work in various industries, including business, government, non-profits, and more. Communications officers create and implement communication strategies, which may involve writing press releases, managing social media accounts, preparing speeches, and coordinating public relations campaigns. Their goal is to ensure that accurate and timely information is shared with the intended audience and that the organization's image and reputation are maintained or improved.
2. Research the responsibilities and goals associated with the chosen role. Understand the specific tasks and skills required.
3. Create a small-scale model of a human habitat using available design materials. Imagine how it would function on Europa's icy surface.
4. If possible, examine samples (e.g., leaves, soil) under a microscope or magnifying glass to simulate a biologist's work. The goal is to simply explore and observe what things look like through a magnifying glass.
5. If available, simulate underwater exploration using a model underwater drone or toy in a bathtub or sink.
6. Engage in a role-playing exercise where they assume the role of either a communications officer, aquanaut or biologist in a simulated space mission. This could be done individually or in teams, and they can use real or simulated communication devices such as walkie-talkies or even smartphones to exchange information. The scenario could include various mission-related events, emergencies, or decisions that require clear and accurate communication between team members and mission control. Students must convey information, make decisions, and respond to the challenges presented in the scenario. (See the scenario below.)
7. Reflect on your experiences in each role. Consider what you learned, how the roles contributed to the mission, and how space exploration can be interconnected with everyday life.

# MISSION TO EUROPA: SCENARIO SHEET

## The Search for Extraterrestrial Life Example Scenario

### Setting

The year is 2050, and you are part of an international space mission to Europa, one of Jupiter's icy moons. Your team of scientists and experts has embarked on this historic mission to search for signs of extraterrestrial life beneath Europa's frozen surface. The mission is conducted from a state-of-the-art underwater research station that has been deployed beneath the icy crust of Europa.

### Roles

Each student assumes one of the following roles: Communications Officer, Aquanaut, or Biologist.

### Scenario Events

- ✦ **Initial Deployment:** The team has successfully landed the research station on the ocean floor of Europa, several miles beneath the ice. The aquanauts are preparing for their first dive to explore the alien ocean environment.
- ✦ **Exploration and Discovery:** As the aquanauts explore the depths, the biologists discover unusual microbial life forms living around hydrothermal vents. They must communicate their findings to mission control and decide whether to collect samples.
- ✦ **Communication Glitch:** A sudden communication glitch occurs between the underwater research station and mission control on Earth. The communications officer must troubleshoot and re-establish contact with Earth.
- ✦ **Emergency:** An unexpected technical issue endangers the safety of the aquanauts. They must use their communication devices to report the problem and await instructions from mission control on how to resolve the emergency.
- ✦ **Sample Collection Decision:** The biologists have found what appears to be a promising sample of potential extraterrestrial life. They must decide whether to collect it or continue exploring. Clear communication of the options and rationale is essential.
- ✦ **Navigation Challenge:** The aquanauts encounter a complex underwater cave system that could lead to a major discovery. They need to communicate their navigational challenges and receive guidance on how to proceed safely.
- ✦ **Mission Conclusion:** After days of exploration, the team prepares to return to the research station and eventually to Earth. The Communications Officer must ensure all data, samples, and team members are safely accounted for during the return.

Throughout the simulation, students will need to exchange information, make decisions, and respond to challenges while embodying the roles of communications officer, aquanaut, or biologist. The success of the mission and the safety of the team will depend on their ability to communicate effectively and collaborate under extreme conditions on Europa.