

**RESOURCE LIBRARY**  
ACTIVITY : 3 HRS

## Exploring Extremes

Through videos, students hear astronauts and deep-sea explorers describe what life is like in the extreme environments of space and the deep sea. Students create a digital story comparing and contrasting life in these two extreme environments.

### GRADES

6 - 8

### SUBJECTS

*Arts and Music, Biology, Earth Science, Astronomy, Oceanography, English Language Arts, Photography*

### CONTENTS

3 Videos, 4 PDFs, 5 Links

## OVERVIEW

Through videos, students hear astronauts and deep-sea explorers describe what life is like in the extreme environments of space and the deep sea. Students create a digital story comparing and contrasting life in these two extreme environments.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/exploring-extremes/>

## Program



## DIRECTIONS

### **1. Engage students' interest by showing video clips of explorers describing what it is like to go into space and to go to the bottom of the ocean.**

Introduce the video clips by explaining that students will see an astronaut (Mike Mullane) and a deep-ocean explorer (James Cameron) describe what it is like to enter extreme environments. Show the provided videos "Descending into the Depths" and "Former Astronaut Mike Mullane Describes His Countdown to Teamwork." After viewing the videos, project a T-chart or draw one on the board. Label one column "Deep Ocean" and the other "Space." Discuss as a class how the experiences of the two individuals in the videos were similar and different. Model how to use a T-chart by noting students' responses in the appropriate columns as you compare and contrast the experiences.

### **2. Have students compare the experiences of scientists living in space and under the ocean using a T-chart.**

Distribute a T-chart to each student. Have students label one column "Deep Ocean" and the other column "Space." Show students the provided video "Seafloor to Space Station," which shows an astronaut on the International Space Station talking to a scientist aboard the *Alvin* submersible on the ocean floor. Have students use the T-chart to take notes as they watch on the similarities and differences the astronaut and scientist discuss.

### **3. Give an overview of the research and digital story project.**

Explain that students will research specific aspects of space and ocean exploration and then work in teams to create digital stories comparing the two. Ask them to share what they know about digital stories. Show examples of digital stories from the provided websites. After you view a few examples, ask students to consider what they have seen and identify the elements commonly included in a digital story. Elements could include text, images, sound, maps, and video. Have each group revisit one of the digital stories you viewed and summarize the information the digital story is trying to get across. Have students give their opinions about the effectiveness of the digital story. Ask students what makes it effective or ineffective and have them give their reasoning.

### **4. Identify topics of interest for research.**

As a class, brainstorm some topics of interest for comparing and contrasting deep-ocean exploration and space exploration. Brainstorming can start with topics students heard described in the video clips, but should expand to include additional topics. Interesting areas

of comparison could include: use of robotics and remote sensing, training, dangers of exposure to the environment, effects on the mind and body, importance of interdisciplinary teamwork, and the role of explorers in advancing scientific knowledge.

**5. Have student pairs research a topic from the brainstormed list.**

Divide students into pairs and assign each pair one topic from the brainstormed list. Be sure to assign each topic to two pairs, with one pair focusing on space exploration and the other on deep-ocean exploration. Have student pairs take thorough notes as they research their assigned topic using the provided web resources. Encourage students to use additional sources such as news articles and books.

**6. Have students form new groups with another pair and begin their digital stories.**

After students have completed their research, have each student pair join with the student pair that researched the same topic but for the other extreme environment. Explain that each new group of four students will work together to create a digital story that illustrates how their topic is experienced in both extreme environments.

**7. Have student groups review the digital story project guidelines.**

Distribute the Exploration Digital Story Rubric handout and Storyboard worksheet to students. Review the rubric with students and make sure they understand what is expected of them. Revisit one of the digital stories you viewed earlier and have students use the rubric to evaluate it. Review the storyboard worksheet with students. Point out that it may be easier for students to type the script in a separate document and include anchors that they can refer to on the storyboard. Allow time to answer any questions students might have about the rubric or the storyboarding process.

**8. Have students create their digital stories.**

Have students begin by searching for some initial key images, writing a draft of their script, and storyboarding their digital stories. Explain to students that they will likely go back and forth between the script and images as they develop their digital story. Once students have

storyboarded the core of their story, have them search for any additional images, audio files, and maps that they need. If desired, have students use available technology and tools to record their narration to piece together their stories.

### **9. Have students peer review another group's digital story.**

Distribute the Digital Story Peer Review Checklist handout to each group and review it with students. Emphasize that students are to give constructive feedback, which means they should give specific examples and suggestions that could be used to improve another group's digital story. Briefly revisit the digital story students initially assessed using the rubric. As a class, use the Digital Story Peer Review Checklist to provide feedback about the digital story and make sure that students understand how to give constructive criticism. Have each group exchange their digital story with another group's story. Have each group thoughtfully review the other group's digital story and use the Digital Story Peer Review Checklist to prepare feedback. Once the groups have finished their reviews, have them share their checklists and go over the feedback together.

### **10. Have students revise and present their digital stories.**

Have students make the necessary adjustments to their digital stories based on the feedback provided by their peers. Once students have completed their revisions, have each group present their digital story to the class. Allow time for students to ask questions following each presentation.

### **11. Discuss the guiding questions as a class.**

Have students reflect on what they have learned by discussing the guiding questions: How is deep-sea exploration similar to and different from space exploration? How are extreme environments related to each other?

## **Tip**

For step 8, make equipment and technology tools available to students for recording narration as needed and piecing together their stories. A number of tools for recording audio, editing photographs, and creating digital stories are listed in the Other Notes area of the Preparation section.

## Tip

In step 3, choose several brief digital stories so you can show students a variety of examples.

## Tip

In step 8, monitor to make certain that students have a solid framework on their storyboards before they move on to creating the story digitally.

## Tip

Step 8 can provide an excellent opportunity to discuss appropriate use of copyrighted materials and alternatives to using copyrighted materials. See the For Further Exploration section for resources relating to copyright in student-produced work.

# Alternative Assessment

Use the Exploration Digital Story Rubric to assess students' digital stories and presentations.

## OBJECTIVES

# Subjects & Disciplines

- Arts and Music
- **Biology**
- **Earth Science**
  - Astronomy
  - [Oceanography](#)
- English Language Arts
- **Storytelling**
  - Photography

# Learning Objectives

Students will:

- research a topic common to deep-sea exploration and space exploration

- compare and contrast deep-sea exploration and space exploration
- create a digital story comparing a topic in deep-sea exploration and space exploration

## Teaching Approach

- Learning-for-use

## Teaching Methods

- Brainstorming
- Cooperative learning
- Discussions
- Reflection
- Research
- Writing

## Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information, Communications, and Technology Literacy
    - Media Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
- Critical Thinking Skills
  - Analyzing
  - Applying
  - Creating
- Geographic Skills
  - Organizing Geographic Information

## National Standards, Principles, and Practices

## IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- **Standard 7:**

Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

## NATIONAL SCIENCE EDUCATION STANDARDS

- **(9-12) Standard G-1:**

Science as a human endeavor

## OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **Principle 7a:**

The ocean is the last and largest unexplored place on Earth—less than 5% of it has been explored. This is the great frontier for the next generation’s explorers and researchers, where they will find great opportunities for inquiry and investigation.

- **Principle 7f:**

Ocean exploration is truly interdisciplinary. It requires close collaboration among biologists, chemists, climatologists, computer programmers, engineers, geologists, meteorologists, and physicists, and new ways of thinking.

## ISTE STANDARDS FOR STUDENTS (ISTE STANDARDS\*S)

- **Standard 1:**

Creativity and Innovation

- **Standard 2:**

Communication and Collaboration

- **Standard 6:**

Technology Operations and Concepts

### **Preparation**

### **What You’ll Need**

### **REQUIRED TECHNOLOGY**

- Internet Access: Required
- Tech Setup: 1 computer per small group, Projector, Speakers

## PHYSICAL SPACE

- Classroom
- Computer lab

## GROUPING

- Large-group instruction

## OTHER NOTES

The following is a sampling of tools that could be useful for digital storytelling:

- Pinterest: [Web 2.0 Tools for Educators](#)
- Edudemic: [Best Web 2.0 Classroom Technology Tools](#)
- Edtech Teacher: [Best Technology Tools for iPads](#)
- [Windows Movie Maker](#) (for video recording and editing)
- [Audacity](#) (for sound recording and editing)
- [Gimp](#) (for image editing)

Consider copyright concerns when deciding whether or not to publish students' digital stories online. Some points to consider include the use of copyrighted audio and/or imagery downloaded from the Internet and permissions requirements for images and audio of students or community members. See the For Further Exploration section for resources relating to copyright in student-produced work.

## BACKGROUND & VOCABULARY

### Background Information

In March of 2012, National Geographic Explorer-in-Residence James Cameron made the first solo dive to the bottom of the Challenger Deep in the Mariana Trench, nearly 11 kilometers (7 miles) beneath the surface. Cameron described a strange combination of excitement and awe as he descended to the ocean floor in the deepest-known part of the ocean. Though he was headed in the opposite direction, astronaut Mike Mullane described a similar feeling as he left Earth aboard the space shuttle. The environments of the deep ocean and outer space are very



different, but they do have a number of similarities—from the use of remotely operated vehicles to customized safety gear, ever-present danger, and the challenge of living and working in isolation. Perhaps most importantly, the exploration of both extreme environments offers a unique opportunity to add to human knowledge.

## Prior Knowledge

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## Recommended Prior Activities

- None

## Vocabulary

Term	Part of Speech	Definition
digital story	<i>noun</i>	fictional or nonfictional narrative told through the use of media such as photos, maps, video, and audio recordings.

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### For Further Exploration

### Reference

- [ReadWriteThink: Students as Creators—Exploring Copyright](#)

## FUNDER

