

# *The Human Body and Atmospheric Pressure*

## Lesson Plan

**Grade Level:** 6-8

**Curriculum Focus:** Physical Science

**Lesson Duration:** Two class periods

### ***Student Objectives***

- Research how extreme changes in air or water pressure can affect the human body.
- Create a survival guide for a destination with extremely high or low air or water pressure.

### ***Materials***

- Discovery School video on *unitedstreaming: Matter and Energy*  
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- Introduction to Pressure: A Look at the Human Body Under Pressure
  - Atmospheres of Pressure
  - Nitrogen and Diving: A Dangerous Combination
  - Altitude, Air Density, and the Effects on the Human Body
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- Computer with Internet access
  - Research materials
  - Art materials

### ***Procedures***

1. Review what students learned about pressure from the video. Ask students what happens to the human body in places with different pressure. Is there more or less pressure underwater than at sea level? Is there more or less pressure at high altitudes than at sea level?
2. What do students remember from the video about what happened to Sean, the deep-sea diver, after several days of diving 180 feet below sea level? What caused his paralysis and disorientation?
3. What do students remember about the physical and mental preparation required to climb to the summit of Mt. Everest? How long does this preparation typically take? What are the risks of being unprepared for such a climb?

4. As students learned in the video, the human body is not built to handle extreme changes in pressure. Traveling to a place with different pressure can present significant dangers. Ask students why they think people climb high mountains and go deep-sea diving. Given the chance, would the students participate in these activities? Ask for their reasons.
5. Have student groups imagine that they own a travel agency, and they must arrange an "extreme" trip for a client. They can choose whether the client will dive 185 feet below sea level to view the sunken ship, Andrea Doria, or climb more than five miles above sea level to the summit of Mt. Everest. The client has asked for details about the dangers of traveling to a destination with an extreme change in pressure. Your travel agency has decided to research and write a survival guide for the trip. The guide should include the information below.
  - The geographic location of the destination.
  - A summary of how the pressure here is different from the pressure at sea level.
  - Five ways that the extreme change in pressure can affect the human body.
  - Five things the client can do before the trip to prepare for the change in pressure.
  - Five things the client can do during the trip to adapt to these changes.
  - One related quote or recommendation from a person who has actually survived this trip. (Students may want to begin their search at [www.mnteverest.com](http://www.mnteverest.com) or [www.andreadoria.org](http://www.andreadoria.org).)
  - A sentence persuading the client to take the trip.
6. Have students present their survival guides to the class.

### **Assessment**

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students worked cooperatively in groups; included all seven required elements and thorough and accurate information in their survival guides; successfully presented survival guides.
- 2 points: Students worked cooperatively in groups; included four to six required elements and somewhat thorough and accurate information in their survival guides; presented survival guide.
- 1 point: Students worked somewhat cooperatively in groups; included fewer than four required elements and some inaccurate information in their survival guides; presented survival guide with some difficulty.

### **Vocabulary**

#### **acclimatize**

*Definition:* To adapt, especially to environmental or climatic changes

*Context:* As mountain climbers reach high altitudes, they acclimatize to the change in pressure.



**altitude**

*Definition:* The height of something above a reference level, especially above sea level or the Earth's surface

*Context:* Some doctors specialize in helping people prepare to climb at a high altitude.

**density**

*Definition:* The amount of matter in a certain space

*Context:* If air density decreases, that means fewer molecules are in the gases that make up the air.

**disoriented**

*Definition:* Being confused about time, place, or personal identity

*Context:* Without enough oxygen, a mountain climber may get disoriented.

**physiology**

*Definition:* The functions of a living organism or any of its parts

*Context:* Human physiology is not meant to withstand extremes in altitude or pressure.

**pressure**

*Definition:* Force applied to a surface

*Context:* The air 180 feet below sea level is under great pressure.

**Academic Standards**

**National Academy of Sciences**

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Unifying Concepts and Processes: Change, constancy, and measurement
- Physical Science: Properties of objects and materials; Properties and changes of properties in matter, Transfer of energy
- Life Science: Characteristics of organisms, Organisms and environments; Regulation and behavior, Diversity and adaptations of organisms
- Science in Personal and Social Perspectives: Personal health, Changes in environments; Natural hazards, Risks and benefits

**Mid-continent Research for Education and Learning (McREL)**

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.



This lesson plan addresses the following national standards:

- Physical Science: Properties and changes of properties in matter; transfer of energy
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## **Support Materials**

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>