

TLC Elementary School Lesson Plan Matter and Energy

Subject

Physical Science

Grade Level

3-5

Duration

One to two class periods

Objectives:

Students will

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

Materials

- 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.

6. Also in this scenario, 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 or www.andreadoria.org.)
 - A sentence persuading the client to take the trip.
7. Have students present their survival guides to the class.

Evaluation

Use this 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

This lesson plan addresses the following standards from the National Science Education Standards:

Grades K-4

Unifying Concepts and Processes: Change, constancy, and measurement

Physical Science: Properties of objects and materials

Life Science: Characteristics of organisms, Organisms and environments

Science in Personal and Social Perspectives: Personal health, Changes in environments

Grades 5-8

Unifying Concepts and Processes: Change, constancy and measurement

Physical Science: Properties and changes of properties in matter, Transfer of energy

Life Science: Regulation and behavior, Diversity and adaptations of organisms

Science in Personal and Social Perspectives: Personal health, Natural hazards, Risks and benefits

Credit

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