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SPACE STATION ALPHA

Lesson 7: Radiation Health I

Preparatory Readings

LP #	Unit 1: Mission Bfg/ App Process
Mission Briefing	
1	The Mission
1	We Need You
1	Space Station Alpha
opt	Verizon
How to Apply	
2	Apply Today
2,3	Personal Essay
2,3	Class Activity: Station Systems
opt	Mission Patch

LP #	Unit 2: Space Weather
4	Specialist Orientation
Chapter 1	
4	Here Comes the Sun
4	Inside the Atom
5	Sheer Magnetism (Hands On)
5	Dr. Z: Inside the Sun

LP #	Unit 3: Radiation Health
Chapter 2	
7	New Frontiers & New Dangers
8	Electromag Rad: Taming the Wild Energies
7	Do You Want the Recipe?
7	In the Kitchen with Poly
7	Measuring Exposure to Radiation
Enrichment Activities	
7	Ready, Aim, Mutate! (Hands On)
7	Sweet Dreams are Made of These (Hands On)
7	Are You Too Hot? (Hands On)

LP #	Unit 4: Power Systems
Chapter 3	
9	The Energy Supply Problem
9	Rechargeable Batteries
10	All About Power
10	Emergency Procedures
10	Practice Ex: Power on the SS (Hands On)
Enrichment Activities	
10	Electrical Current Mag Field (Hands On)
10	Electrical Circuit: Quick Guide (Hands On)
10	Nailing Down Energy (Hands On)
10	A Shocking Discovery (Hands On)
10	Electrolysis (Hands On)
10	It's Electric (Hands On)

LP #	Unit 5: Life Support
Chapter 4	
12	How I Discovered Air
12	A Weighty Discovery
12	Living in a Bubble
12	Breathing on the Space Station

LP #	Unit 6: Pre-Mission Prep
13	Overview of Teams
13	Mission Directives
13	Classroom Setup
Team Preparation Introductions	
13	STORM Team Overview
13	Radiation Team Overview
13	Power Team Overview
13	Life Support Team Overview
13	Communications Team Overview

Depending on which of the following hands-on explorations you choose, only one preparatory reading is absolutely necessary. However, all the readings will need to be completed for the next lesson.

Ready, Aim, Mutate! (hands-on)→ *Do You Want the Recipe?*
Sweet Dreams are Made of These (hands-onn)→ *In the Kitchen with Poly*
Are You Too Hot? (hands-on)→ *Measuring Exposure to Radiation*

Other Homework Due: (none)

Subject
The ALARA guidelines, radiation shielding, OR radiation absorption

Description of Student Activities
During this class the students will explore radiation using the *You Are Too Hot* OR *Sweet Dreams Are Made of These* OR *Ready, Aim, Mutate!* explorations.

Duration
45 min. Radiation exploration

Materials
Materials for chosen exploration

Main Topics:
1. Using the ALARA guidelines (limiting time of exposure to radiation, increasing distance from radiation, or using shielding), humans can protect their DNA or cells from dangerous radiation. (*Ready, Aim, Mutate*!)

Or

2. Shielding may be made of various materials and may be configured to minimize exposure to dangerous radiation. (*Sweet Dreams are Made of These*)

Or

3. Dangerous radiation is measured in rads and rems. Astronauts (humans) may receive radiation from terrestrial sources, workplace sources, and while in orbit. (*Are You Too Hot?)*

Outcomes
(*Ready, Aim, Mutate*!)
- Students will explain what ALARA means and summarize the shielding options available to the astronauts during a severe coronal mass ejection.
- Students will explain how radiation can affect human DNA and cells.

Or
(*Sweet Dreams are Made of These*)
- Students will explain the best materials to use for radiation shielding and explain how to arrange it to minimize radiation exposure

Or
(Are You Too Hot?)
- Students will explain the dangers of radiation on board Space Station Alpha using the terms "rad," "rem," and "dose."
- Students will calculate the amount of radiation exposure a human may receive over a lifetime

Special Comments:
These explorations were highly successful during field testing. They generated a lot of student excitement and creative thinking. Your choice of exploration may be based upon available materials.

During the field tests, the teacher's questions during the wrap-up of the exploration brought out a lot of new ideas. Ask questions such as, "What did you like about your solution?" "What would you do differently if you could do this exploration over again?"

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Procedure:

Exploration of choice (45 minutes). The students, in groups, perform their exploration and each group reports on its findings, successes, and what they would do differently a second time.

Ready, Aim, Mutate! Uses squirt guns. Please apply all necessary precautions. Suggestion: Assign only one student per group to handle the guns and a have students handle and squirt the guns in a test area to get over the novelty and excitement of it before the exploration. 20-30 min.

Sweet Dreams are Made of These: Uses $20 of materials and two hours of preparation for the teacher. 30-40 min.

Are You Too Hot?: Board game. Requires printing boards and taping together and preparation of game materials. 20-30 min.

Homework for Lesson 8

Read any remaining articles from this list

- New Frontiers & New Dangers
- Electromagnetic Radiation: Taming the Wild Energies
- Do You Want the Recipe?
- In the Kitchen with Poly
- Measuring Exposure to Radiation

Complete answers to *Closure* questions from today's hands-on exploration