Lesson 7: Radiation Health 1
Lesson 8: Radiation Health 2

Materials

Articles

Radiation Health:
- New Frontiers - New Dangers
- Radiation: Friend and Foe?
- Do You Want the Recipe?
- In the Kitchen with Poly
- Measuring Exposure to Radiation

Power Systems:
- The Space Station Energy Supply Problem
- Rechargeable Batteries: A Lifesaver
- All About Power

Materials for Hands-on activity selected for Lesson 8: "Are You Too Hot? Or "Sweet Dreams are Made of These (PDF)

Storyline

- The students familiarize themselves with the equipment (TEPC) used to measure exposure to radiation on board the space station.
- The students familiarize themselves with the measurement (doses) of both absorbed radiation (rad) and exposed radiation (rem).
- The students will be able to explain the principles used to protect the astronauts from dangerous radiation (ALARA) so that they can advise them during the e-Mission.

Main Topics

1. The astronauts are exposed to extremely high levels of ionizing radiation during a severe coronal mass ejection, or solar proton event.
2. Radiation and radioactivity are different, but both are dangerous to the astronauts.
3. Dangerous radiation can affect a human's DNA.
4. Dangerous radiation is measured in rads and rems. The TEPC on the space station records exposure to radiation in millirems.
5. The astronauts can take steps on board the space station to protect themselves from excessive amounts of radiation.

Outcomes

- The students will explain the dangers of radiation on board Space Station Alpha using the terms "rad," "rem," and "dose."
- The students will explain the three possible effects that dangerous forms of radiation may have upon human cells and DNA.
- The students will summarize the variety of energies on the electromagnetic spectrum and which of these are forms of ionizing radiation and which are forms of nonionizing radiation.
- The students will explain what ALARA means and summarize the shielding options available to the astronauts during a severe coronal mass ejection.

Materials Preparation

Copy all 7 student questions for Article Review activity on slips of paper, Lesson 7.

Copy all articles required for Units 4, 5, and 6.

Prepare for Radiation Health hands-on exploration (U 3, L 8: *Sweet Dreams are Made of These* or *Are You Too Hot?*

Organize materials for Power Systems hands-on explorations (see Power Systems enrichment activities for materials list.)

Vocabulary

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Teaching Approaches

Lesson 7 is an Article Review activity. The questions should be written out on slips of paper to be presented to student groups. When assigning the readings at the end of Lesson 6, stress that the students will not have much time to find the answers to the questions and prepare their reports.
During Lesson 8, the students should also be divided into groups. Each group will conduct the selected hands-on exploration.

Connections to Other Units

Radiation Health team is an important team during the e-Mission. Extreme solar weather engulfs the space station in ionizing radiation and radioactivity. The electromagnetic spectrum is a key topic. Actions taken by the astronauts, based upon the principles of ALARA, help protect them from overexposure to dangerous radiation.

Internet Resources:

Recommended search engines:
http://vivisimo.com
http://www.google.com
http://www.kartoo.com

Valuable Search Terms and Phrases: "ionizing radiation" "DNA" "Christmas bricks NASA" "ionization" (Quotes have been used here to delineate terms. Do not use quotes when typing in a search term or phrase.)

Looking Ahead:

Check with the teacher in charge of your computer laboratory or your Technology Coordinator and make sure that arrangements are well underway for the e-Mission.

Students who have not seen a video of a coronal mass ejection should be encouraged to do so. A brief video can be found in the article "New Frontiers-New Dangers."