

Topic: Radiation Exposure

Teacher Information

Time Allowance

50 minutes

Background

Ionizing radiation is produced when the nucleus of an unstable atom decays, releasing energy as ionizing radiation. Ionizing radiation can cause an atom to become charged. Ionizing radiation breaks apart atoms and molecules, causing many types of damage to living organisms, depending on the type of radiation, the target organ, and the intensity and duration of the exposure.

The amount of radiation exposure is usually expressed in a unit called **millirem (mrem)**. In the United States, the average person is exposed to an effective dose equivalent of approximately 360 mrem (whole-body exposure) per year from various sources.

Materials

glitter (a bright color works best)
student data logs
calculators (optional)

Preparation

- 1 As students enter the room, sprinkle glitter on both your hands.
- 2 When students are seated, pose this question: *“What is radiation?”*
- 3 As students are providing answers, walk around the room touching objects (student’s desks , books, etc...) with your hands. Touch some objects more than once.
- 4 Ask students, *“How does radiation move from one place to another?”*
- 5 When students start to notice the glitter, tell them that the glitter represents radiation.
- 6 Prompt the students to notice that the objects that were touched more than once and have more glitter on them than others.
- 7 Relate this to **exposure rate**. *Exposure rate is the amount of radiation energy that reaches an object’s surface in a given time period.*
- 8 Ask students to identify different sources of radiation. List answers on the board. (Possible answers: *sunlight, X-rays, food irradiation to eliminate bacteria, smoke alarms, television and computers screens, radio waves, microwaves, etc.*)
- 9 Ask students to list factors that would affect the exposure rate. (time of exposure, distance from the source of radiation, and source of radiation)
- 10 Distribute the data logs, and instruct them to complete the chart.

Discussion/Wrap-up:

- Review what ionizing radiation is and the sources that release it.
- Discuss how students can limit their exposure to radiation.
- Discuss what astronauts might do to reduce their exposure to cosmic radiation.

Extensions:

- Have students research the biological effects of radiation.
- Discuss how students can reduce the value they estimated for their yearly exposure rate.
- Divide students into two debate teams. Have a debate about the effects of building a nuclear power plant in their city.

Related NASA Programs:

- [Extravehicular Activity Radiation Monitoring \(EVARM\)](#)
- [Space Environments & Effects \(SEE\) Program](#)