

## Topic: Radiation Exposure

### Student Data Log

#### Background Information

Every day you are exposed to radiation: ultraviolet light from the Sun, X-rays, and a vast spectrum of other electromagnetic waves. Radiation is the process of emitting energy in the form of particles or waves. The difference between waves is the frequency (or amount of energy) of each wave. Some of these are very high energy and potentially dangerous. Exposure to these should be limited. Some radiation exposure is unavoidable, such as the cosmic radiation from space.

The basic unit for measuring radiation received is the roentgen absorbed dose (rad). One rad equals the absorption of 100 ergs (an erg is a small but measurable amount of energy) in every gram of tissue exposed to radiation. Rads are converted to roentgen equivalent man (rem) to show the biological risk. The commonly used unit of exposure is the millirem (mrem).  $1 \text{ rem} = 1,000 \text{ millirem}$ . Most scientists estimate that the average person in the United States receives a dose of about 360 millirems of radiation per year.

#### Procedure

1. Calculate your exposure to radiation for the past year by reading through the information in the table below.
2. Keep a running total of your annual exposure in the column on the right.
3. Answer the questions at the end of the table on the back of this page.

<b>Source</b>	<b>Type of radiation</b>	<b>Amount of radiation (mrem)</b>
	<b>START HERE</b>	<b>0</b>
<b>From space</b>	Cosmic radiation at sea level, add 26.	
	Air (radon), add 200.	
	If your luggage was X-rayed, add .002.	
	Elevation of where you live: ⇒ 1,000 feet, add 2 ⇒ 2,000 feet, add 5 ⇒ 3,000 feet, add 9 ⇒ 4,000 feet, add 15	
<b>From the ground</b>	If you live in the Atlantic Gulf Coastal Plain, add 23.	
	If you live on the Gulf Coast, add 23.	
	If you live in the Colorado Plateau, add 90.	
	If you live elsewhere in the United States, add 46.	
<b>From food and water</b>	If you eat food prepared on a stove or in an oven, add 24.	
<b>From building materials</b>	If you live in a wooden structure, add 5.	
	If you live in a brick structure, add 7.	
	If you live in a concrete structure, add 7.	
<b>From jet plane travel</b>	For each 2,500 miles, add 1.	
<b>From nuclear fuel plants</b>	If you live within 50 miles of a nuclear power plant, add .009.	

<p><b>From radioactive waste disposal</b></p>	<p>Average U.S. dose is 1, so add 1.</p>	
<p><b>From medical diagnosis</b></p>	<p>If you have had X-rays of the chest, add 6.</p> <p>If you have had X-rays of the pelvis and hips, add 65.</p> <p>If you have had X-rays of the arms, hands, legs, or feet, add 1.</p> <p>If you have had X-rays of the skull, head, or neck, add 20.</p> <p>If any of your teeth have porcelain crowns add, add .07.</p>	
<p><b>Lifestyle</b></p>	<p>If you watch TV, add 1.</p> <p>If you use a computer, add .1.</p> <p>If you wear a luminous (LCD) wristwatch, add .06.</p> <p>If you use gas lantern mantles when camping, add .003.</p>	
<p><b>TOTAL</b></p>		

**Questions**

- 1 What are some natural sources of radiation to which people are commonly exposed?
- 2 Are people exposed to larger amounts of naturally occurring radiation or to man-made sources of radiation?
- 3 What are some benefits of man-made radiation?
- 4 What are pros and cons of food irradiation?
- 5 Review your total score. How could you reduce your amount of radiation exposure?