As you review answers to these questions and discuss the worksheet (Estimate Your Personal Radiation Dose), point out to students that:

- natural background radiation exists wherever you live
- the amount of natural background radiation varies from place to place (see the worksheet for examples)
- radiation comes from man-made sources, too (TV, false teeth, smoke detectors, etc.); most exposures from these sources are smaller than what people get from natural background radiation
- medical diagnostic procedures are the largest single source of man-made radiation to which most people are ever exposed

1. A family moves from a wood-frame home in Dallas to a brick home in Denver. **How will this change affect each person’s annual radiation dose?**

   - Dallas (cosmic 28, terrestrial 16, frame home 0 = 44)
   - Denver (cosmic 52, terrestrial 63, brick house 7 = 122)

   Moving to Denver results in an annual radiation dose increase of 78 mrem.

2. Lucinda moves from a wood-frame home in Chicago to a wood frame home in Dallas. **How does her annual radiation dose change?**

   - Chicago (cosmic 28, terrestrial 30 = 58)
   - Dallas (cosmic 28, terrestrial 16 = 44)

   Moving to Dallas reduces her annual radiation dose by 14 mrem.

3. John likes to watch TV and play video games on his computer. After realizing that these activities expose him to radiation, he gives up both. **How much has he reduced his annual radiation dose?**

   - (TV +1, video display terminal +1 = 2.0 mrem)

   **How does this compare to the average annual dose?**

   - (It is only a fraction of the average annual dose. Remember the average annual dose for most people in the U.S. is about 620 mrem, so this is about 2/620 = 1/360 th of the average annual dose OR less than 0.3 % of the average.)

4. Sam lives in a suburb of a large city. His house is 55 miles from a nuclear power plant and 20 miles from a coal-fired electrical plant. His family buys a new house in another suburb on the other side of the same city. It is 20 miles from a nuclear plant and 60 miles from a coal-fired electric plant. **What is the change in his annual radiation exposure?**

   - First house (coal plant +0.03)
   - Second house (nuclear plant +0.01)
   - His annual exposure is REDUCED by 0.02 mrem.

   **Do you think this is a significant amount?**

   - (Answers will vary. Remind students that the average annual dose for most people in the U.S. is about 620 mrem. The change is much less than 1 mrem, so the change is less than 1/620 th of the average. It is actually, 0.02 mrem/620 mrem = 0.003%)

5. Mary and her mother were in a serious automobile accident that resulted in broken bones and internal injuries. Mary’s mother had a cervical spine x-ray, a CAT scan of her head, and an x-ray of her pelvis. A week later doctors needed to conduct an x-ray of her upper GI tract. **How much radiation did Mary’s mother receive from medical tests, as a result of the accident?**

   - Cervical spine x-ray 20
   - CAT scan of head 200
   - pelvis x-ray 60
   - upper GI x-ray 600 = 880 mrem

   **How did this radiation compare to her average annual dose?**

   - (The radiation from medical exams accounted for more than the average annual dose, which is about 620 mrem.)

   **Why is this acceptable?**

   - (Answers may vary. Several points are worth noting: (1) the benefits obtained from the medical diagnostics may outweigh the perceived risk, (2) people who work with or around radioactive material are allowed up to 5,000 mrems per year according to accepted standards, (3) some people who have been seriously injured or ill have required many x-rays, been exposed to fairly large quantities of radiation, and still lived long lives.)