



ANSWER KEY

Student Worksheet 1

1. Most people will have very low doses. Possible exceptions include people who have experienced unusually high number of medical procedures, but even then the levels would be expected to be well below serious health concerns.

Student Worksheet 3

1. Sample answers: Radon in the air and water, food, cosmic radiation from space, some medical procedures.

2. Most people are exposed to much more natural radiation than man-made. An exception could be students that have had exceptionally intensive medical treatments.

3. Sample answers: Electricity produced by power plants (radiation is a side effect). Safer food and medical equipment, ability to diagnose medical problems inside our bodies, radiation treatments slowing down (or eliminating) diseases.

4. Sample answers: Pros – safer food, longer shelf life of food products. Cons – may give false sense of security that there is no bacteria in the food, even though unsafe handling after irradiation may introduce new bacteria; irradiation kills bacteria but leaves their remnants in the food; may enable food packagers to use less fresh meat which is then irradiated to make it safe for consuming even if it wouldn't have been so otherwise. (Note that irradiation does not make food radioactive! That would be a wrong answer.)

5. Sample answers: Find ways to be exposed to less radon (e.g., adequate ventilation); move closer to the sea level; travel less; have no need for medical treatments; watch less TV. Most reasonable reductions would have little effect on the total effective dose.





Student Worksheet 4

The current 11-year solar activity cycle (Cycle 23) began in 1997 and reached its maximum in 2000. Cycle 24 is therefore expected to begin in around 2008 and reach its maximum in about 2011. Note that since the prediction of the Sun activity cycle to the future is just that—prediction based on past experience—the actual times of the various phases will be known only when they have occurred. MESSENGER will travel to Mercury mostly during decreasing solar activity and begin its orbit right around the time of the solar activity maximum. During orbit, the solar activity, and therefore solar radiation in the form of solar energetic particles, will be at its highest. Therefore, MESSENGER will experience large changes in the radiation environment during its operation, and this had to be taken into account while designing the spacecraft.

