Critical Thinking Skills

Waste Management: The Global View

Skills For Critical Thinking		Reading								Hands-on Activities
		Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8	
LEVEL 1 Knowledge	• List Details/Facts	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Recall Information	✓	✓	✓	✓	✓	✓	✓	✓	
	• Match Vocab. to Definitions	✓				✓		✓		
	• Define Vocabulary	✓		✓	✓	✓	✓	✓	✓	
	• Recognize Validity (T/F)	✓			✓		✓			
LEVEL 2 Comprehension	• Demonstrate Understanding	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Explain Scientific Causation	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Rephrasing Vocab. Meaning	✓		✓	✓			✓	✓	
	• Describe	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Classify Objects Into Groups		✓		✓		✓			
LEVEL 3 Application	• Application to Own Life	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Model Scientific Process	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Organize & Classify Facts		✓	✓	✓		✓			
	• Use Alternative Research Tools	✓	✓	✓	✓	✓	✓	✓	✓	✓
LEVEL 4 Analysis	• Distinguish Meanings	✓			✓	✓		✓	✓	
	• Make Inferences	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Draw Conclusions Based on Facts Provided	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Classify Based on Facts Researched		✓	✓	✓		✓		✓	✓
	• Sequence Events		✓		✓	✓				
LEVEL 5 Synthesis	• Compile Research Information	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Design & Application						✓	✓	✓	✓
	• Create & Construct			✓		✓	✓			✓
	• Imagine Self in Scientific Role	✓	✓	✓	✓	✓	✓	✓	✓	✓
LEVEL 6 Evaluation	• State & Defend an Opinion	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Evaluate Best Practices	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Make Recommendations	✓	✓	✓	✓	✓	✓	✓	✓	✓
	• Influence Community	✓	✓	✓	✓	✓	✓	✓	✓	✓

Based on Bloom's Taxonomy

Before You Read

NAME: _____

Radioactive Waste

1. Have you ever heard the word **radioactive**? What do you think the meaning of this word might be?

_____

_____

_____

2. Use a dictionary to look up the word NUCLEAR. Write the definition on the lines below.
The definition of **nuclear** is:

_____

_____

_____

3. Fill in each blank with the correct term from the list below. You may use a dictionary to help you.

X-rays	**CAT-scan**	**syringe**	**fuel rod**
landfill	**barrier**	**uranium**	

a) A [ ] is a place where waste is buried.

b) [ ] are used to see if you have a broken bone.

c) A [ ] places medicine into the body.

d) Radioactive material used in a nuclear power plant is contained in a [ ].

e) A [ ] can make a picture of organs and tissues inside the body.

f) [ ] ore is used as a source of radioactive materials.

g) A [ ] stops things from going in or out.

NAME: _____

Reading Passage

Radioactive Waste

What are radioactive materials?

You may have learned that all matter is made from tiny particles called **atoms**. The center of an atom is called a **nucleus** (plural *nuclei*). The nucleus contains even tinier particles. In some **radioactive** substances, the nuclei break down and release particles. The particles contain large amounts of energy, and can harm the tissues of living things.

People use radioactive materials for many different purposes. In medicine, radioactive materials are used in equipment for seeing inside the body, such as X-rays and CAT-scans. Radioactive substances are also used to treat cancers. Radioactive substances are also used to produce large amounts of energy in nuclear power plants. This energy is used to make electricity to power cities and towns.

Describe the meaning of the term *radioactive*.

_____

_____

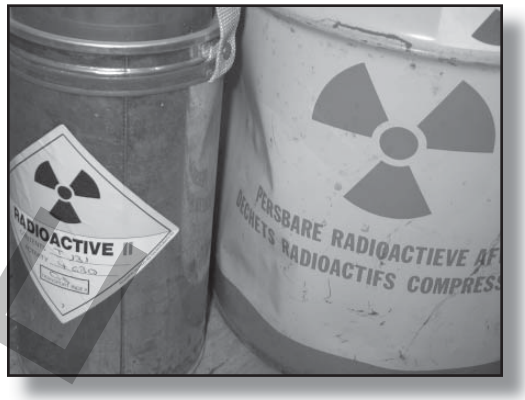
What is radioactive waste?

Radioactive waste comes from three main sources. First, radioactive minerals must be mined from the earth. These materials include ores such as **uranium**. Some of the leftover materials from the mining can be radioactive. Second, waste is made when radioactive substances are used in medicine and industry. The substances themselves can become waste after they are used. Materials that come into contact with radioactivity can also become radioactive. These materials are called *low-level* radioactive waste, and include things like hospital sheets, gloves, and syringes. The third source of radioactive waste is the radioactive **fuel rods** used in nuclear power plants. After a fuel rod is used for a period of time, it does not produce enough energy to make it useful for making electricity. However, the fuel rod is still very radioactive. Waste fuel rods are called *high-level* radioactive waste.

NAME: _____

Radioactive Waste

What happens to radioactive waste?



By their nature, radioactive substances break down. Some radioactive substances break down quickly; others can take millions of years or more. Radioactive waste must be kept away from people and wildlife during the time when it is still breaking down and releasing harmful radioactive energy.

Waste materials from uranium mines are usually left at the site of the mine. The mine operators contain the waste in barriers that keep the waste away from groundwater. The mine operators must test the air, soil, and water around the mine for many years to be sure that no radioactive wastes are seeping out.

Low-level radioactive wastes are either stored at the place where they were used, or they are brought to special radioactive waste facilities. Most low-level radioactive waste breaks down quickly. It is stored in special containers that do not allow radioactive energy to get out. After a few years, most of the radioactive energy has been released, and the waste material can be safely buried in a landfill.

Describe how low-level radioactive waste is handled.

_____

_____

High-level radioactive waste creates big problems. Waste fuel rods can release large amounts of harmful radiation for thousands of years. Finding safe places away from people to place these rods is extremely difficult. The places must not experience earthquakes, which can crack containers. They must not be near sources of drinking water. People do not want high level radioactive waste buried near their homes. There is always a risk that containers will leak over thousands of years.

High-level radioactive waste can contaminate huge areas in a nuclear accident or explosion. In 1986, the world's worst nuclear accident happened in a power plant in **Chernobyl**, in the former Soviet Union. An explosion sent high level radioactive materials twenty miles in each direction. Over 300,000 people had to move away from the area. High levels of certain cancers have been found in the area.