Guided Lesson Notes

Name:_____ **Date:**_____

Radioactivity

Directions: Complete this study guide as you move through the lesson. By taking notes, you are more likely to remember what you are learning. The completed study guide can be used for practice activities and to prepare for quizzes and exams. Be sure to save each study guide so you can access it when you need it.

Essential Vocabulary

As you encounter these scientific terms in the lesson, enter the meaning and an example (or two) for each. You can even draw a picture. If there are other unfamiliar words you find, enter them in the blank spaces provided.

radiation	*alpha decay*
beta decay	*gamma decay*
positron emission	*radioactive decay*

half-life	*radioactive*
parent nucleus	*daughter nucleus*
alpha particle	*positron*

Wilhelm Roentgen

1. **Why did Roentgen call his new rays X-rays?**

2. **What was one of the initially unique characteristics of X-rays?**

3. **What did Becquerel notice that uranium and other elements similar to uranium did that led to the idea of radioactivity?**

Alpha, Beta, and Gamma Rays

1. **Determine the charge on each of the following rays.**

Rays/Particles	Charge
alpha	
beta	
gamma	

2. Which particles make up alpha rays?	
3. Which particles make up beta rays?	

4. How did scientists determine the charge on alpha, beta, and gamma rays?

5. What is necessary to stop each of the three types of rays?

Rays/Particles	What Stops It
alpha	
beta	
gamma	

Radioactive Decay

1. As the number of protons in a nucleus increases, what happens to the number of neutrons required in order to maintain nuclear stability?

2. **Define *radioactive decay.***

3. **What value must the atomic number of an element exceed in order for it to experience radioactive decay?**

The Three Types

1. **Identify the parent nucleus, the daughter nucleus, and the decay particle in the following nuclear reaction.**

$$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}H$$

Parent nucleus	Daughter nucleus	Decay particle

2. **How does the parent nucleus change after experiencing alpha decay?**

3. **What are the two types of beta decay?**

4. **In standard beta-minus decay, what happens to the parent nucleus? Does it remain the same element?**

5. **In gamma decay the parent nucleus does not change. What is given off in gamma decay?**

Decay Review

Match the decay processes to their descriptions below.

Letter Match : Decay		Description
	alpha	**a.** Emits an electron.
	beta-plus	**b.** Often accompanies beta decay
	beta-minus	**c.** Emits a positron.
	gamma	**d.** Emits a helium nucleus.

Absolute Dating and Half-Life

1. **Define *half-life*.**

2. **Briefly explain how radioactive dating works, using the example of a newly formed rock.**

3. **Why do we say that the parent isotope never officially decays completely?**

Half-Life in Problem Solving

Write the equation for half-life. Define all variables.

Equation:	
$T =$	
$\lambda =$	