Nuclear Physics Review

Terms to Know:

- Atomic number
- Mass number
- Isotopic notation
- Nucleon
- Mass deficit
- Binding energy
- Pion
- Strong nuclear force
- Radioactive
- Stable nuclei
- Alpha particle, alpha decay
- Beta particle, beta decay
- Gamma ray, gamma decay
- Electron capture
- Positron emission
- Antimatter
- Half-life
- Rad
- Rem
- Fission
- Fusion
- Critical mass
- Chain reaction
- Isotopic enrichment
- Meltdown

Be able to calculate mass deficit and binding energy
Know the most stable nucleus in creation
Understand how a nucleus holds together
Understand what makes a nucleus unstable
Know other names for an alpha particle, a beta particle, and a gamma ray
Be able to write equations for alpha and beta decay
Be able to calculate the half-life of a substance
Understand why radiation is harmful to living organisms
Know several uses for radiation
Know how electricity is made in a nuclear power plant
Be able write a fission reaction equation
Be able to write a fusion reaction equation

Practice Problems:

1. Which element has 38 electrons and 42 neutrons? Write your answer in isotopic notation.

2. How many electrons, protons, and neutrons does an element with an atomic number of 16 and a mass number of 31 have?

3. The mass of a ^{9}B is 8.9167 amu. What is the mass deficit? What is the binding energy?

4. Write an equation for the alpha decay of ^{150}Ta.

5. Write an equation for the beta decay of ^{12}B.

6. You have 500-gram radioactive sample with a half-life of 10 minutes. How much will be left after 1 hour?

7. You have a 1200-gram radioactive sample with a half-life of 58 years. How much will be left after 20 years?

8. Curium-259 is split by a neutron and undergoes a fission reaction. Two neutrons are given off. What is the other product? Assume that the remaining particles divide equally.

9. ^{9}Be and ^{4}He undergo a fusion reaction. One neutron is produced. What is the other product?