**Special Relativity Review**

1. **Define:** Inertial Frame
2. State the two postulates of special relativity
3. Michelson and Morley revolutionized physics in 1887 when they published their findings for their experiment. What assumptions can we draw based on their findings?
4. Use the concept for a light-clock to describe how two observers in different inertial frames will see things differently.
5. Two observers are in the middle between two trees, one observer is at rest, the other is moving towards one of the trees. Both trees are struck by lightning. Describe how the observers may disagree on how events occurred. What is the name of the concept they are experiencing?

**Nuclear Physics Review**

1. **Define**
   1. Nucleon
   2. Binding Energy
   3. Fission
   4. Fusion
2. Isotopes are different atoms of a single element that have different masses. In terms of sub-atomic particles (protons, electrons and neutrons) what do the isotopes have in common? What do the isotopes not have in common?
3. Determine the mass defect and binding energy of the following isotopes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Isotope | # of protons | # of neutrons | Mass Defect | Binding Energy |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
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|  |  |  |  |  |

1. What is a helpful gauge to finding the relative stability of a nucleus? Use this to for three of the above isotopes. Which is the most stable?
2. Complete the following nuclear equations. State if the reaction is an alpha decay, beta decay, gamma decay, fission or fusion.

a) 

b) 

c) 

d) 

1. Find the energy released in the following nuclear reactions.

**Data Table:**

|  |  |
| --- | --- |
| Particle | Mass (amu) |
|  | 1.007276 |
|  | 1.008665 |
|  | 1.007825 |
|  | 2.014101 |
|  | 3.016049 |
|  | 4.002603 |
|  | 7.016004 |
|  | 89.919516 |
|  | 142.920626 |
|  | 235.043929 |

**Conversions:**

1amu = 1.6605×10-27kg

1amu = 931.49MeV

1MeV = 1.60×10-13 J