Date: _____ Name(s): _____

_____

_____

Follow-up Questions for *Teenage Mutant Ninja Nuclei*

1. Create a collision between two carbon-12 nuclei:
   (a) Draw a "before" and "after" picture:

   (b) Explain how the picture illustrates conservation of momentum:

   _____

   _____

   _____

   (c) Explain how energy/mass would be conserved during this process:

   _____

   _____

   _____

   (d) Explain how charge would be conserved during this process:

   _____

   _____

   _____

2. How many alpha particles are emitted when an atom of $^{238}_{92}\text{U}$ decays to an atom of $^{206}_{82}\text{Pb}$? [show your work.]

3. The nuclear equation $^{30}_{15}\text{P} \rightarrow {}^{30}_{14}\text{Si} + {}^{0}_{+1}\text{e}$ represents

   (a) alpha bombardment
   (b) electron capture
   (c) neutron emission
   (d) positron emission

4. Which nuclide has a mass number of 8?

   (a) $^{6}_{2}\mathrm{He}$ (c) $^{15}_{7}\mathrm{N}$

   (b) $^{8}_{4}\mathrm{Be}$ (d) $^{16}_{8}\mathrm{O}$

5. An atomic nucleus emits energy as it decays from an excited state to a more stable state without a change in its atomic number. This energy is emitted in the form of

   (a) an alpha particle
   (b) a gamma ray
   (c) an electron
   (d) a beta particle

6. How many nucleons are in a $^{206}_{82}\mathrm{Pb}$ nucleus? Explain your answer.

7. The particle $^{0}_{+1}\mathrm{e}$ is called a

   (a) positron
   (b) neutron
   (c) proton
   (d) photon

8. One isotope of uranium is $^{238}_{92}\mathrm{U}$. Any other isotope of uranium must have

   (a) 92 protons
   (b) 92 neutrons
   (c) 146 protons
   (d) 146 neutrons

9. The chart below lists the rest masses of two particles and a nucleus in atomic mass units. Based on the values in the chart, calculate the mass defect of a $^{6}_{3}\mathrm{Li}$ nucleus. Show your work.

proton	1.0073 u
neutron	1.0087 u
$^{6}_{3}$Li nucleus	6.0135 u

10. The energy required to separate the 3 protons and 4 neutrons in the nucleus of a lithium atom is 39.3 megaelectronvolts. Determine the mass equivalent of this energy, in universal mass units. Show your work.

11. Calculate the charge-to-mass ratio of an electron, in coulombs/kilogram [C/kg]. Show your work.