Introduction to Isotopes Answer Page

1. Explain the following terms in your own words.

   Atomic number: **The number of protons in an atom of an element.**
   Atomic mass: **The amount of matter in an atom of the element in atomic mass units (u).**
   Mass number: **The total number of protons and neutrons in an atomic nucleus.**
   Isotope: **Isotopes of an element have the same number of protons but different numbers of neutrons in their atomic nuclei.**

2. Calculate the number of neutrons in the two stable isotopes of chlorine.

Chlorine-35 (Atomic number 17)	mass number = **35** # protons = **17** # neutrons = **18** Calculation for neutrons: **35 - 17 = 18**
Chlorine-37 (Atomic number 17)	mass number = **37** # protons = **17** # neutrons = **20** Calculation for neutrons: **37 - 17 = 20**

3. If the mass of each proton is 1 unit and the mass of each neutron is 1 unit, why do all of the atomic masses on the periodic table include decimal points instead of just whole numbers?
   Answers will vary.

4. In any given sample of chlorine there will be roughly 75% of chlorine atoms that are chlorine-35 and only 25% of chlorine atoms that are chlorine-37 (these are the only two stable isotopes of chlorine). What would be the weighted average atomic mass for chlorine? Show your work:

G – What are the **g**ivens?	**Atomic mass and relative abundance of each isotope:** **Cl-35, 75%, Cl-37, 25%** **Convert % to fraction of isotope.** **75% = 0.75, 25% = 0.25**
U – What are the **u**nknowns?	**Average atomic mass**
E – Write the **e**quation.	**Average atomic mass = (mass Cl-35 x fraction$_1$) + (mass Cl-37 x fraction$_2$)**
S – **S**ubstitute the givens.	**= (35 x 0.75) + (37 x 0.25)**
S – **S**olve.	**= 26.25 + 9.25** **= 35.5**

   The average atomic mass is 35.5 u.