

Review – The Atom Answer Key

- Calculate the number of protons and neutrons in the nuclei of each of the following atoms:
 a. **iodine-127 53p 74n** b. **neon-22 10p 12n** c. **magnesium-26 12p 14n** d. **boron-10 5p 5n**
 e. **aluminum-27 13p 14n**
- Define the following terms:
 - atomic number → **the number of protons in the nucleus**
 - mass number → **# protons + # neutrons**
 - atomic mass → **the relative mass of an atom on a scale on which the mass of one atom of carbon-12 is exactly 12u**
 - average atomic mass → **weighted average of atomic mass of all the isotopes of that element**
- Why does the nucleus have a charge? **The nucleus has a charge because the protons are positively charged.**
- Why does the nucleus of a carbon atom have a greater charge than the nucleus of a helium atom? **The nucleus of a carbon atom has a greater charge than the nucleus of a helium atom because it has more protons.**
- In what respect is the nucleus of the lightest isotope of hydrogen unique among atomic nuclei? **The lightest isotope of hydrogen has no neutrons.**
- Two atoms are characterized by Z=15, A=30 and Z=14, A=30. Are they isotopes of the same element? Explain. **These two atoms are not isotopes because they have the same mass number and different atomic number. Isotopes have the same atomic number but different mass numbers.**
- Argon, potassium, and calcium all have mass numbers of 40. How many protons and neutrons are there in each of the three nuclei?
Ar 18p 22n K 19p 21n Ca 20p 20n

- Copy the chart below into your notes and fill in accordingly:

	Z	# p	#n	#e	A
a. ${}^{34}_{16}\text{S}$	16	16	18	16	34
b. ${}^{34}_{16}\text{S}^{2-}$	16	16	18	18	34
c. ${}^{54}_{26}\text{Fe}^{2+}$	26	26	28	24	54
d. ${}^{231}_{90}\text{Th}^{2+}$	90	90	141	88	231
e. ${}^{65}_{29}\text{Cu}^{2+}$	29	29	36	27	65
f. ${}^{127}_{53}\text{I}^{-}$	53	53	74	54	127

- N average atomic mass = **14.00676 u**
 Ag average atomic mass = **108.4564 u**
 Mg average atomic mass = **24.3050 u**

- Complete the following table:

Isotope Name	Z (atomic #)	A (mass #)	Symbol	# Protons	# Neutrons
a. carbon-14	6	14	C-14	6	8
b. oxygen	8	16	O	8	8
c. polonium-212	84	212	Po-212	84	128
d. uranium	92	238	U	92	146
e. hydrogen-2	1	2	H-2	1	1
f. helium	2	4	He	2	2
g. thorium	90	232	Th	90	142
h. carbon	6	12	C	6	6
i. lawrencium-257	103	257	Lr-257	103	154
j. hydrogen	1	1	H	1	0

- How is hydrogen-1 different from hydrogen-2? **Hydrogen-1 has no neutrons and hydrogen-2 has one neutron.**
- How do different isotopes of the same element differ? **Different isotopes of the same element have a different mass number due to the different number of neutrons.**