NAME: _____

ATOMIC STRUCTURE, ATOMIC NUMBER, MASS NUMBER, ISOTOPES, & ATOMIC MASS/WEIGHT:

ⓘ ***Atomic Number*** = *The* ***number of protons*** *in the nucleus of the atom.*

ⓘ ***Mass Number*** = *The sum of the masses of the particles in an individual isotopic variant of an atom. (Since electrons are so small, it is basically the sum of* ***the number of protons + the number of neutrons****)*

ⓘ ***Atomic Mass*** = ***Weighted Average of Isotopic Masses****. (The atomic mass of an element equals the sum of the masses of each isotope times the natural abundance of that isotope). Also referred to as an element's* ***Atomic Weight****.*

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1. Circle the right answer

   a. A proton / neutron / electron has the smallest mass of the atom's three elementary particles.

   b. A proton / neutron / electron carries no charge.

   c. A proton / neutron / electron has a mass about the same as a proton's.

2. Complete the following table for the 3 main subatomic particles:

Name	***Symbol***	***Mass (amu)***	***Charge***	***Location in Atom***
_____	__ **p**__	_____	_____	_____
_____	_____	_____	___**0**___	_____
____**electron**___	_____	_____	_____	_____

3. Identify the group number and the period number for the following elements (remember groups are named 1A through 8A while periods are named 1 through 7)

   a. Potassium

   b. Sodium

4. How does the neutron affect the overall charge or neutrality of an atom?

5. Circle either True or False. **<u>If true, EXPLAIN why, and, if false, correct the statement & EXPLAIN your correction</u>**.

   a. T or F: The nucleus of an atom <u>always</u> carries a positive charge.

   b. T or F: Experiments show that atoms can be broken up into still smaller particles such as protons, neutrons and electrons through nuclear not chemical reactions. If a scientist were given a proton, a neutron or an electron of an atom that was broken apart, the scientist would be able to determine what element the atom belongs to. This is possible because subatomic particles of atoms have the same unique properties and characteristics of the atom they make up.

6. Neutral atoms have **<u>no</u>** **<u>NET</u>** charge. This means that the sum of positive and negative charges add up to 0. The positive charges are cancelled out by the exact same number of negative charges.

   a. An atom has 16 protons and 18 electrons. Is this atom neutral or charged? Why? *Write out the simple arithmetic calculation you used in order to show why you are making the claim about this atom that you are making. So basically, show your work.*

   b. An atom has a net charge of +1. It has 19 protons. How many electrons does this charged atom have? Why? *(Always show the mathematics you used to determine your answer when applicable).*

   c. A neutral atom of Iodine (I) has 53 electrons, how many protons does this atom contain? Why? *(Back up your explanation with mathematics)*

7. Refer to the Periodic Table of Elements posted for you in Archie. Write the names, symbols & number of protons in an atom of the element with the following atomic number:

   a. 17

   b. 26

8. Using the Periodic Table, state the atomic number, number of protons, and number of electrons for the following neutral atoms of elements. *(Show your calculations and/or logic used to get the answer)*

    a. Carbon

    a. Lithium

    b. Lead

9. What elements are in the following substances?

    a. Antacid $CaCO_3$

    b. Ammonia NH_3

    c. Acetic Acid CH_3COOH

10. Which element has a neutral atom with 80 electrons? Why?

11. What would happen to the element O if it gained 2 protons?

12. A neutral atom of phosphorus has a mass number of 32. Determine the following for this isotopic variant of phosphorus. *Explain why you concluded the answer you did and show off any arithmetic done to derive an answer.*

    a. The number of protons.

    b. The number of neutrons.

    c. The number of electrons.

13. An unknown neutral isotope has a mass number of 136. It is known that this atom has 80 neutrons.

    a. How many protons and electrons does this neutral atom contain? *(Show your calculations and logic)*

    b. Write the name and symbol of this element.

14. What is the chemical notation (the isotopic symbol) for the following isotopes? (Show any calculations).

    a. The atom with 16 electrons, 16 protons, and 16 neutrons?

    b. The atom with 16 electrons, 16 protons, and 18 neutrons?

15. If two neutral isotopes of Ra have mass numbers 224 and 228. How many protons, neutrons, and electrons does each isotope have? *(Show all calculations)*.

16. What is the atomic mass of the following elements?

    a. Carbon

    b. Fluorine

    c. Mn

    d. Li

17. Circle either True or False. **If true, EXPLAIN why, and, if false, correct the statement & EXPLAIN your correction**.

    a. T or F: An atom is considered neutral if it has no charged particles.

    b. T or F: Isotopes of the same element have the same mass number, but different atomic numbers.

c. T or F: Isotopes of the same element share the same chemical properties.

d. T or F: Isotopes that are stable are called radioisotopes and are radioactive.

e. T or F: Alpha and Beta emitters result in a new isotope of the element.

f. T or F: Gamma emitters result in an entirely new element being formed after radioactive decay.

g. T or F: All isotopes of Carbon undergo radioactive decay over time.

h. T or F: Atomic Mass, like Mass Number & Atomic Number, is always a whole number for every element.