Unit 2 – Atoms: The Building Blocks of Matter   Exam Review

<u>Learning Target 1</u> Explain how the idea of the atom has changed over time.

1. Name the scientist associated with each discover.

   a. _____ Discovered the positively charged nucleus.

   b. _____ Described the world as made of "tiny particles".

   c. _____ Discovered the negatively charged electron.

   d. _____ Created the Law of Multiple Proportions.

   e. _____ Discredited Democritus saying there is no such thing as "atoms".

2. State the *Law of Conservation of Mass*. Give an example supporting your statement.

3. Which Law states that different compounds containing the same elements, the ratio of atoms in those compounds will be in small, whole number ratios?

4. Consider this reaction: $A + BC \rightarrow AC + B$. If 17 g (**A**) combines with 23 g (**BC**) to form (**AC**) and 13 g (**B**), how many grams of (**AC**) are formed?

5. List the five parts of Dalton's Atomic Theory.

   a.

   b.

   c.

   d.

   e.

6. If 14.01 g of nitrogen (N) combines with 16.00 g oxygen (O) to form nitrogen monoxide (NO), how many grams of nitrogen will be needed to combine with the same amount of oxygen to form dinitrogen monoxide (N_2O)?

7. Which experiment or device was used to discover the nucleus?

8. Which experiment or device was used to discover the electron?

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<u>Learning Target 2</u> Describe the atom having a positive nucleus surrounded by electrons.

9. Fill in the following table concerning subatomic particles.

	Charge	Mass (amu)	Location
Protons			
Neutrons			
Electrons			

10. What subatomic particle is the smallest in size by mass?

11. Describe an isotope and give a specific example.

12. What is the average atomic mass of an element?

13. If you only know the number of neutrons in an atom, can you name that element?

14. If you only know the number of protons in an atom, can you name that element?

15. An element is determined by the number of (**protons**, **neutrons** or **electrons**).

16. Label the location of the protons, neutrons and electrons in an atom.
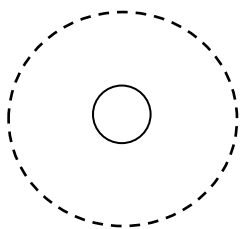
17. Element "E" has three isotopes. Calculate the average atomic mass of this unknown element.

    E – 51 (51.05 amu) is 15.75%.

    E – 53 (53.20 amu) is 75.25%.

    E – 52 (52.05 amu) is 9.00%.

18. Element "X" has three isotopes, 29.4% has a mass of 33.275 amu, 33.5% has a mass of 34.101 amu and 37.1% has a mass of 34.993 amu. Calculate the average atomic mass for Element "X".

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<u>Learning Target 3</u> Determine the number of protons, neutrons and electrons in an atom.

19. What information do you get from the ATOMIC NUMBER?

20. What information do you get from the ATOMIC MASS?

21. How do you calculate the number of protons in an atom?

22. How do you calculate the number of neutrons in an atom?

23. If an element has 59 protons with a mass number of 143, calculate the number of neutrons and electrons. Identify this unknown element.

24. Calculate the subatomic particles for isotopes of mercury (Hg).
    a. Protons: Hg-200 _____ Hg-201 _____ Hg-202 _____
    b. Electron: Hg-200 _____ Hg-201 _____ Hg-202 _____
    c. Neutrons: Hg-200 _____ Hg-201 _____ Hg-202 _____

25. Fill in the following table.

	# protons	# neutrons	# electrons	Mass Number	Atomic Number
a. Lithium				7	
b.				12	6
c. Chlorine		18			
d.	47			108	
e. Lead		126			
f.		21			20
g.			73	181	
h. Radium		140			
i. Tin				119	
j.				239	92

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<u>Learning Target 4</u> Relate sample mass to the number of atoms and moles in a sample.

26. What is Avogadro's Number? Give the numeric value.

27. What is a mole?

28. Calculate how many grams of Yttrium (Y) are in a 1.50 moles sample.

29. Calculate how many moles of Chromium (Cr) in a 43.78 g sample.

30. Calculate the number of moles of Vanadium (V) in 2.64×10^{25} atoms.

31. How many atoms are in 108.62 g Beryllium (Be)?

32. Calculate the mass of Tungsten (W) are in 1.95×10^{21} atoms?