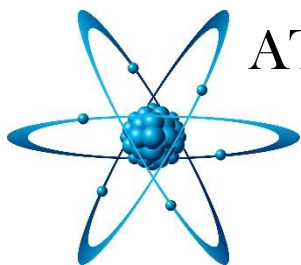
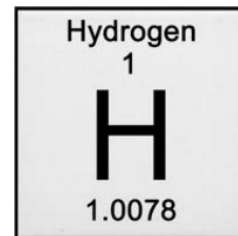


BRING COMPLETED REVIEW PACKET COMPLETE TO THE EXAM, THE DAY OF EXAM - RECEIVE 1 **BONUS PT** ON EXAM  
 Check your work, find answer key on website



# ATOMS and THE PERIODIC TABLE

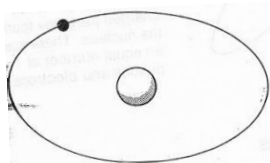


## Matching

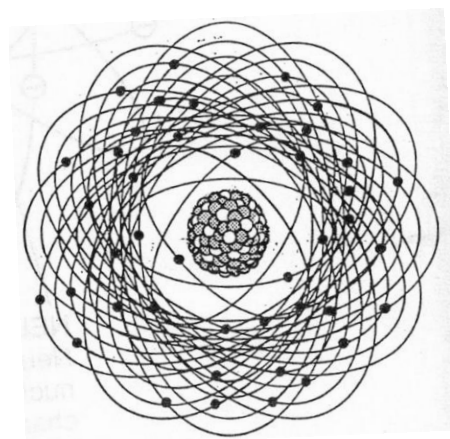
- \_\_\_ ATOM
- \_\_\_ ATOMIC MASS
- \_\_\_ NUCLEUS
- \_\_\_ ISOTOPES
- \_\_\_ AMU
- \_\_\_ PROTONS
- \_\_\_ NEUTRONS
- \_\_\_ URANIUM
- \_\_\_ ELECTRONS
- \_\_\_ HYDROGEN

1. A unit of mass used to express atomic and molecular weights. One proton or neutron equals one mass unit.
2. This is the center of atom. Most of the mass of the atom is here.
3. These are positively charged particles. They define an atom's identity.
4. These are negatively charged particles. They define an atom's reactivity.
5. These particles add to an atom's mass.
6. The basic unit of a chemical element.
7. The mass of an atom of a chemical element expressed in atomic mass units. It is approximately equivalent to the number of protons and neutrons in the atom (the mass number) or to the average number. This why it is typically expressed with a decimal.
8. Each of two or more forms of the same element that contain equal numbers of protons but different numbers of neutrons in their nuclei, and hence differ in relative atomic mass; in particular, a radioactive form of an element.

9.



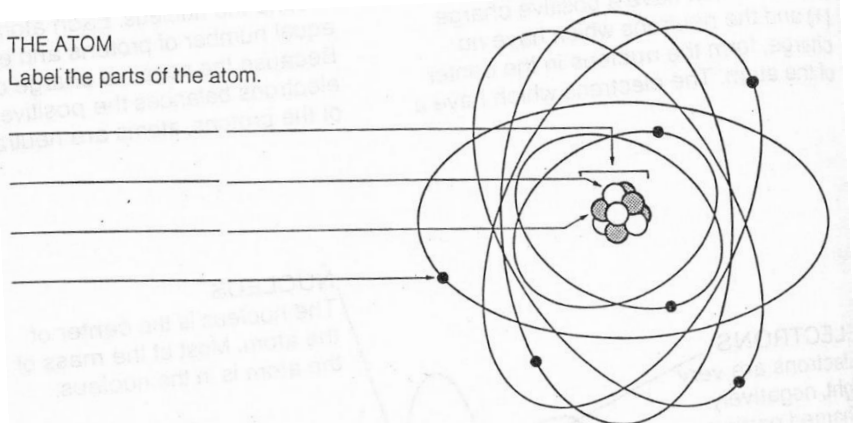
10.



Read:

An atom is made of three basic particles; neutrons, protons and electrons. These are building blocks of atoms are comprised of particles even smaller still such as quarks, leptons and neutrinos. Protons have a positive charge and neutrons a neutral charge while together they make up the nucleus of an atom. Varying numbers of protons (atomic number) give us the 94 or so naturally occurring elements on earth. Varying numbers of neutrons simply effect atomic mass and give rise to different isotopes of the same element. Atomic mass is the combined mass of both neutrons and protons. The electrons which have a negative charge spin in orbits around the nucleus. Each atom has an equal number of protons and electrons. Because, the negative charge of the electrons balances the positive charge of the protons, making atoms typically neutral. Can you the parts of this atom here? →

THE ATOM  
Label the parts of the atom.



## Isotopes or Different Elements?

In each of the following statements, you are given a pair of elements and important information about each. Use this information to determine if the pair of elements are isotopes or different elements. Indicate your answer in the space provided.

1. Element D has 6 protons and 7 neutrons.  
Element F has 7 protons and 7 neutrons.

\_\_\_\_\_

2. Element J has 27 protons and 32 neutrons.  
Element L has 27 protons and 33 neutrons.

\_\_\_\_\_

3. Element X has 17 protons and 18 neutrons.  
Element Y has 18 protons and 17 neutrons.

\_\_\_\_\_

4. Element Q has 56 protons and 81 neutrons.  
Element R has 56 protons and 82 neutrons.

\_\_\_\_\_

5. Element T has an atomic number of 20 and an atomic mass of 40.  
Element Z has an atomic number of 20 and an atomic mass of 41.

\_\_\_\_\_

6. Element W has 8 protons and 8 neutrons.  
Element V has 7 protons and 8 neutrons.

\_\_\_\_\_

## Atomic Theorems ← commit to memory, commit to memory

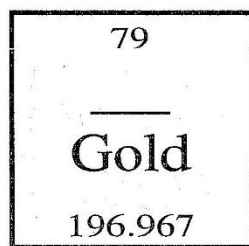
1. atomic number = proton count
  2. proton count = electron count
  3. atomic mass (**minus**) atomic number = neutron count
  4. atomic mass = protons + neutrons
  5. neutrons **do not equal** atomic mass
  6. neutrons **do not** = electron count
- 

7. Periods **equal** number of electron shells around nucleus
8. Groups **equal** number of valence electrons

7 & 8 Apply only to → (Alkali, Alkaline, BCNO Family, Nonmetals, Halogens and Noble Gases (not Transition Metals))

Using the Atomic Theorems and a Periodic Table these should be easy

→ Fill in blank →



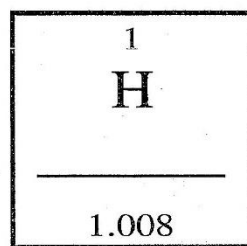
Atomic # = \_\_\_\_\_

Atomic Mass = \_\_\_\_\_

# of Protons = \_\_\_\_\_

# of Neutrons = \_\_\_\_\_

# of Electrons = \_\_\_\_\_



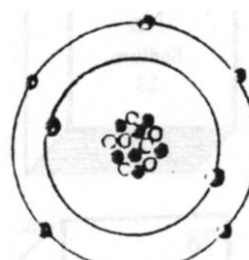
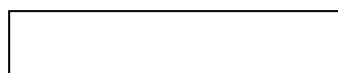
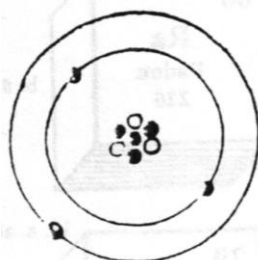
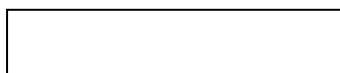
Atomic # = \_\_\_\_\_

Atomic Mass = \_\_\_\_\_

# of Protons = \_\_\_\_\_

# of Neutrons = \_\_\_\_\_

# of Electrons = \_\_\_\_\_



Using a Periodic Table ID these atoms

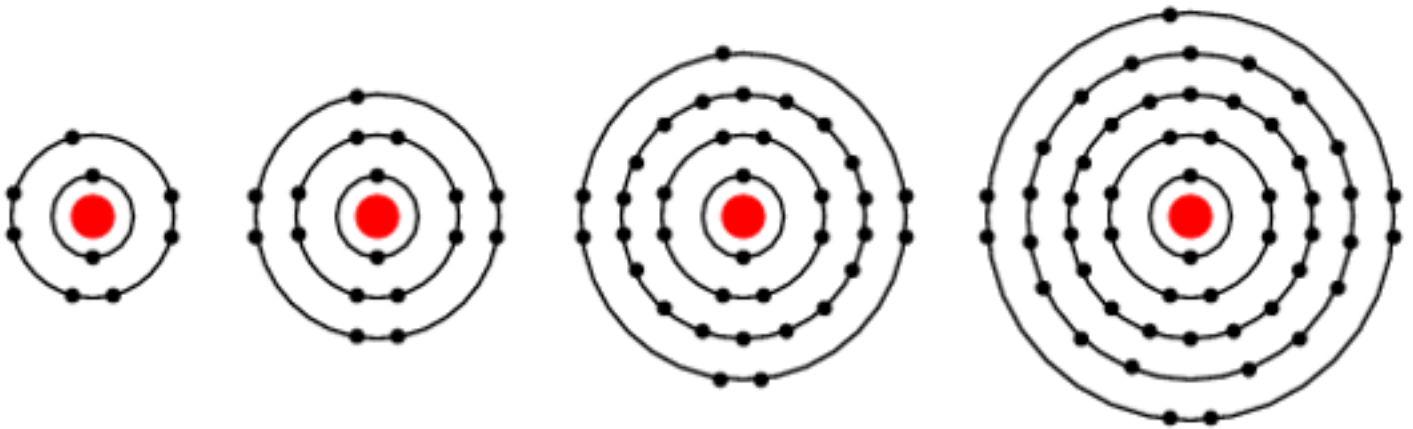
→ Label →

Directions: Draw a Bohr Model of the elements below. Show all your work

Magnesium 12 <b>Mg</b> 24.305	Bohr Model
Protons:	
Neutrons:	
Electrons:	
Atomic #:	
Atomic Mass:	

sulfur 16 <b>S</b> 32.065	Bohr Model
Protons:	
Neutrons:	
Electrons:	
Atomic #:	
Atomic Mass:	

Identify each of the following. Which is which?  
**Iodine - Chlorine - Bromine – Florine**  
 If you're stuck count the shells &/or count valence electrons.

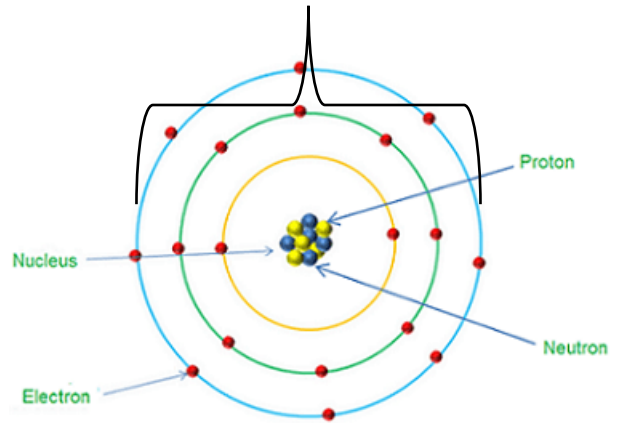


SCALE of ATOMS : 1mm = 1000 micrometers (um)  
 1 micrometer = 1000 nanometers (nm)      no ruler? call it →→ **40 mm**

**Measure the atom's electron shell diameter.**

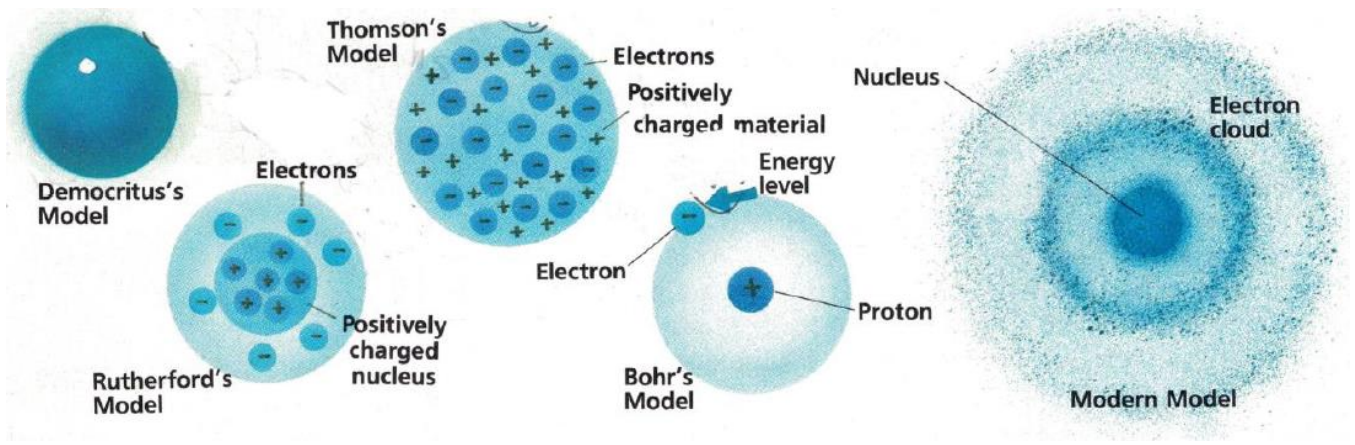
What is the scale of this model if this atom's valence electron shell is 0.2 **nanometers** in diameter.

1. Measure the atom's diameter, WRITE here→ \_\_\_\_\_mm = 0.2nm
2. Set up a proportion & report what 1mm equals to scale in the box.



Think about it.... I telling you the whole atom equals 0.2nanometers but what about the nuclues in this model or the distance between on electron shel and another???

MODELS OF THE ATOM THROUGHOUT HISTORY



**Fill in the physicists' name for each of the below passages. (Hint see scientist names above)**

\_\_\_\_\_ was able to arrive at his model of the atom through careful observations using a cathode ray tube. He called it plum pudding; positive pudding with negative electrons scattered throughout.

- A. Dalton    B. Thomson    C. Rutherford    D. Bohr

\_\_\_\_\_ utilized radioactive decaying material to fire alpha particles at a sheet of gold to arrive at his model. Most of the alpha particles went right through. A few smashed into a densely packed positive nucleus.

- A. Dalton    B. Thomson    C. Rutherford    D. Bohr

\_\_\_\_\_ model paved the way for the present day Modern Model of the atom. He and others proposed electron energy levels or *quanta* to explain the structure of the atom.

- A. Dalton    B. Thomson    C. Rutherford    D. Bohr

**The Atomic Models - What were the major discoveries that each of the following atomic models represented in its day?**

**MATCHING**

**WRITE LETTERS A-E ON THE LINES BELOW**

**Refer back to classwork, lab and notes for help.**

\_\_\_\_\_ The nucleus is discovered. The atom is found to be mostly empty space. The nucleus is discovered to be an extremely small dense and positively charged region.

\_\_\_\_\_ The atom is found to be divisible, not indivisible as had long been thought. The electron is identified as a discrete part of the atom with a negative charge. The model is described as "plum pudding".

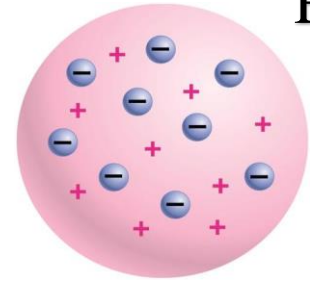
\_\_\_\_\_ The remaining unexplained mass of the atom is explained with the discovery of the neutron.

\_\_\_\_\_ For the first time, specific elements are identified by atomic mass - hydrogen, oxygen, nitrogen, sulfur, phosphorus and carbon. Atomic structure still however unknown.

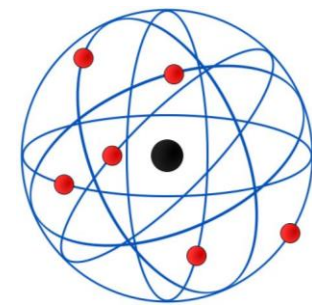
\_\_\_\_\_ Quantum theory is adopted to explain electron levels and the structure of the atom. The proton also becomes a well-defined particle during this time period.



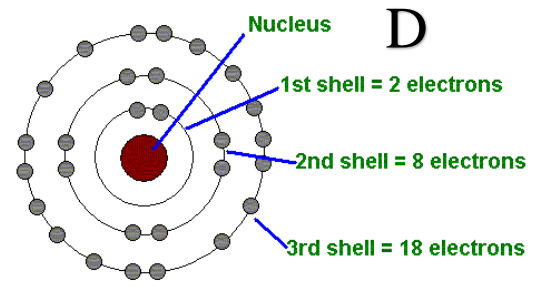
**A**



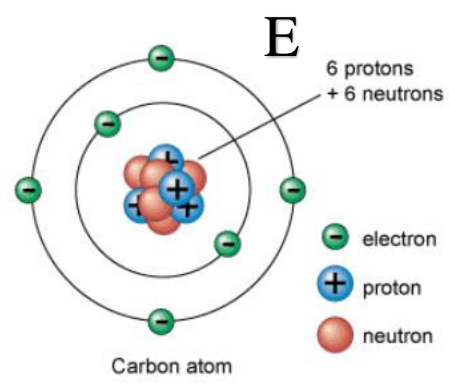
**B**



**C**



**D**



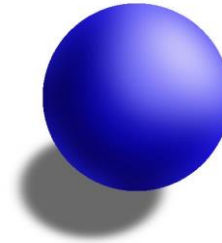
**E**

John Dalton ..... 1766 -1844  
 J.J. Thomson ..... Late 1800s  
 Ernest Rutherford ..... 1871-1937  
 Niels Bohr ..... Early 1900s  
 James Chadwick ..... 1921-1935

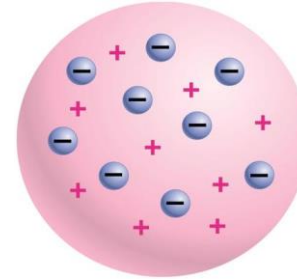
**The Atomic Models - What were the major discoveries that each of the following atomic models represented in its day?**

**Can you label 2-3 keys features in each diagram.**

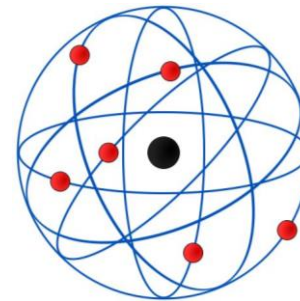
Dalton identifies for the first time specific elements by atomic mass - hydrogen, oxygen, nitrogen, sulfur, phosphorus and carbon. Atomic structure still however unknown.



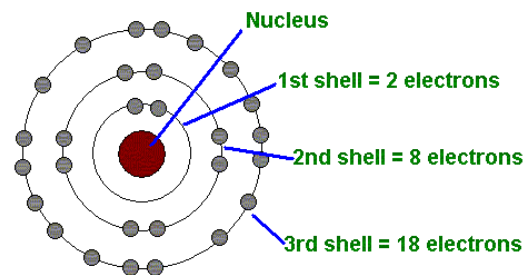
The atom is found to be divisible, not indivisible as had long been thought. Thomson "Father of the Atom" identifies the electron as a discrete part of the atom with a negative charge.



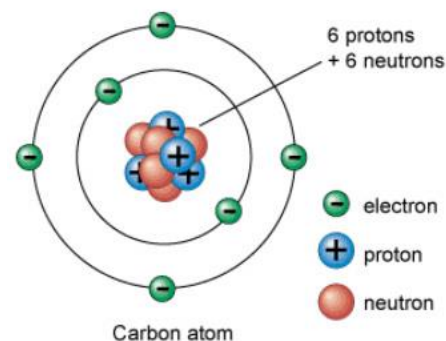
The nucleus is discovered. The atom is found to be mostly empty space. The nucleus is discovered to be an extremely small dense and positively charged region. Rutherford



Quantum theory is adopted to explain electron levels and the structure of the atom. Niels Bohr provides experimental evidence. The proton also becomes a well-defined particle.



The remaining unexplained mass of the atom is explained with the discovery of the neutron by Chadwick.



John Dalton ..... J.J. Thomson ..... Ernest Rutherford ..... Niels Bohr ..... James Chadwick  
1766 -1844 ..... Late 1800s ..... 1871-1937 ..... Early 1900s ..... 1921-1935

## Periodic Table Group Names

### Alkali metals

Group 1: very reactive metals which do not occur freely in nature. 1 electron in outer shell

### Alkaline Earth Metals

Group 2: next reactive metals, found in earths crust but not in elemental form. 2 electrons in outer shell

### Transition Elements

Group 3-12: metals with varying reactivities. Greater density than Group 1 or 2 elements. 1-2 electrons in outer shell

### Lanthanides and Actinides

These elements are also transition elements but have been taken out to prevent the periodic table being so wide.

### Boron Group

Group 13: reactive, contains metal and metalloid. 3 electrons in outer shell

### Carbon Group

Group 14: contains metalloids, metals and non metals. 4 electrons in outer shell

### Nitrogen Group

Group 15: contains metalloids, metals and non metals. 5 electrons in outer shell

### Oxygen Group

Group 16: contains contains metalloids, metals and non metals. Reactive 6 electrons in outer shell

### Halogens

Group 17: non-metals, very reactive. 7 electrons in outer shell

### Nobel gas

Group 18: non-metals, non reactive. 8 electrons in outer shell



What are the names of each the following groups: 1-8

Groups																						
1																	8					
2																	3	4	5	6	7	
H																	B	C	N	O	F	Ne
Li	Be															Al	Si	P	S	Cl	Ar	
Na	Mg															Ga	Ge	As	Se	Br	Kr	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	In	Sn	Sb	Te	I	Xe					
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Tl	Pb	Bi	Po	At	Rn					
Cs	Ba	*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg											
Fr	Ra	**	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn											

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_

Read over Groups and their descriptions previous page.

**Directions:** Answer the following questions in **COMPLETE** sentences.

20. Explain the difference between malleable and ductile.

21. Why are noble gases so stable?

22. How are periods and groups arranged on the periodic table?

- \_\_\_\_\_1. A substance that conducts an electric current only under certain conditions are MOST likely to be \_\_\_\_\_.
- a. metals
  - b. nonmetals
  - c. noble gases
  - d. halogens
- \_\_\_\_\_2. The elements in Groups 3- 12 of the periodic table are the \_\_\_\_\_.
- a. actinides
  - b. alkaline earth metals
  - c. transition metals
  - d. halogens
- \_\_\_\_\_3. A family of elements that have two electrons in its outer energy level is known as \_\_\_\_\_.
- a. actinides
  - b. alkaline earth metals
  - c. alkali metals
  - d. halogens
- \_\_\_\_\_ 4. The noble gases are found in \_\_\_\_\_.
- a. Group 18
  - b. Group 2
  - c. Group 17
  - d. Group 13
- \_\_\_\_\_ 5. Elements that lie along the stair – step line of the periodic table are \_\_\_\_\_.
- a. liquids
  - b. metals
  - c. metalloids
  - d. radioactive
- \_\_\_\_\_6. Three transition elements in Group 12 of the periodic table \_\_\_\_\_.
- a. copper, silver, and gold
  - b. iron, nickel, and cobalt
  - c. mercury, zinc, and cadmium
  - d. neon, helium, and xenon
- \_\_\_\_\_7. A family of elements that contain the reactive metals is the \_\_\_\_\_.
- a. noble gases
  - b. alkaline earth metals
  - c. metalloids
  - d. halogen
- \_\_\_\_\_8. Nitrogen has how many valence electrons in it's outer energy level \_\_\_\_\_.
- a. 8
  - b. 10
  - c. 5
  - d. 6
- \_\_\_\_\_9. The elements in the Actinoid series are all \_\_\_\_\_.
- a. metals
  - b. nonmetals
  - c. radioactive
  - d. not radioactive

- \_\_\_\_\_10. An alloy is described as having a mixture of \_\_\_\_\_ to get the best quality of each element.
- a. metals
  - b. nonmetals
  - c. gold
  - d. silver
- \_\_\_\_\_11. Noble gases are known to have \_\_\_\_\_ electrons and it is not necessary to share \_\_\_\_\_.
- a. 5, neutrons
  - b. 8, electrons
  - c. 6, atoms
  - d. 8, element
- \_\_\_\_\_12.  $O_2$ , and  $H_2$  are examples of \_\_\_\_\_.
- a. elements
  - b. noble gases
  - c. diatomic molecules
  - d. metalloids
- \_\_\_\_\_13. Both nonmetals and metals have the properties of being able to be rolled into sheets of metal, this is called \_\_\_\_\_:
- a. ductile
  - b. malleable
  - c. magnetic
  - d. flexible
- \_\_\_\_\_14. Which group contains metals, nonmetals, and metalloids \_\_\_\_\_.
- a. Group 12
  - b. Group 14
  - c. Group 17
  - d. Group 16
- \_\_\_\_\_15. According to the periodic table, Hydrogen is considered to be \_\_\_\_\_.
- a. gas
  - b. nonmetal
  - c. metal
  - d. transition metal
- \_\_\_\_\_16. Ce, Dy, and Lu all belong in which series \_\_\_\_\_.
- a. actinide
  - b. halogen
  - c. lanthanide
  - d. noble gases
- \_\_\_\_\_17. All metals are solid at room temperature except \_\_\_\_\_.
- a. carbon
  - b. alkali metals
  - c. neon
  - d. mercury