Week 3 Packet – Honors Chem

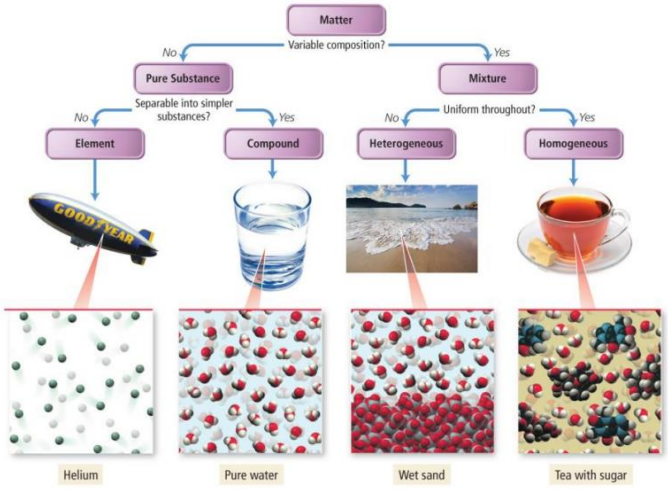
This is *hopefully* all the handouts we will use this week in Honors Chem. Due to the challenging logistics of this year, please offer grace if I miss a handout or if things change during the week. **Please note** – You do not *have* to print. I am just providing the option to make things easier for those who want to print. All of these pages are on the class website, always! www.mychemistryclass.net

***I will put the glue ins for the notes on the front and/or back of the packet cover page like this – since you don't need the cover page for anything you can always just cut these out and glue them in. Trying to save some paper for those of you who are printing! ☺**

N-3

Nonzero Integers	ALWAYS COUNT as SIGNIFICANT	
Leading Zeros	NEVER COUNT as SIGNIFICANT	
Captive Zeros	ALWAYS COUNT as SIGNIFICANT	
Trailing Zeros	AFTER A DECIMAL ALWAYS COUNT as SIGNIFICANT	
SOMETIMES COUNT as SIGNIFICANT	NO DECIMAL NEVER COUNT as SIGNIFICANT	
Exact Numbers	INFINITE NUMBER of sig figs	
Multiplication & Division	Answer based on LEAST number of SIG FIGS in the problem	
Addition & Subtraction	Answer based on LEAST number of DECIMAL PLACES in the problem	

N-4



N-5

Dalton's Atomic Theory (1808)		
#	Postulate	✓ or X
1	All matter composed of extremely small particles called atoms	
2	Atoms of a given element are identical in size, mass, and other properties	
3	Atoms of different elements differ in size, mass, and other properties	
4	Atoms cannot be subdivided, created, or destroyed	
5	Atoms of different elements combine in simple whole-number ratios to form chemical compounds	
6	In chemical reactions, atoms are combined, separated, or rearranged	

N-5

Conclusions from the Study of the Electron
Cathode rays have identical properties regardless of element used
Atoms are neutral
Electrons have very little mass compared to the atom's mass

N-5

Conclusions from the Gold Foil Experiment
Most of the particles passed right through A few particles were greatly deflected. Very few were GREATLY deflected

Dougherty Valley HS Chemistry
Dimensional Analysis Practice 2

Worksheet #4

Name: **Period:** **Seat#:**

Instructions: Show your work. Put a box around your final answer so that it can be found easily. You must use Dimensional Analysis to solve. Some answers are provided at the end of the questions. They are underlined.

1) Jules Verne wrote a book called Twenty Thousand Leagues Under the Sea. Using the conversion factors given, convert 20,000 leagues into inches: *4.38×10^9*

12 in = 1 ft	3 ft = 1 yd	1 fathom = 2 yds
1 statute mile = 5280 ft	1 nautical mile = 6080 ft	1 league = 3 nautical miles

2) Convert 73 mi/hr into in/min. *77088*

3) Some owls maintain a territory of up to 3 acres. How many owls could live in a large wooded area of 20 hectacres? *16*

1 hectare = 1 square decameter = 100 square meters = 2.47 acres

4) One 1.6 oz. Package of cinnamon and spice instant oatmeal contains 34 g of carbohydrates. If you had instant oatmeal 6 days a week, how many ounces of carbohydrates would you consume in one week?
16 oz = 1 lb = 454 g = 256 Drams = 7000 grains *7.19*

Dougherty Valley HS Chemistry
Dimensional Analysis Practice 2

5) Many candy gazelle's have 9 grams of fat per bar. If during a "chocolate attack" you ate one 6-pack of bars (0.6 Decabars), how many ounces of fat would you have eaten? If there are approximately 9 calories per gram of fat, how many Calories is this? *1.90, 486*

6) You are riding home from a party and the driver has been drinking. The car is traveling 60 mi/hr. Suddenly a child steps out into the road ahead. Because the driver has been drinking, his reaction time has been slowed by one second. How many feet toward the impeding accident will the car travel before the drive begins to stop? (This is equal to the extra distance it will take to stop the car because the driver has been drinking) *88*

7) In an old episode of the TV program McGyver; a planeload of gold was being transported from the Soviet Union to the United States during WWII. The place crashed in the Arctic region. To prevent the "bad guys" from getting the gold, the pilot and copilot transferred the gold into a cave by stacking it on a door of the crashed plane and dragging the "sled" into the cave. You were led to believe in the episode that they accomplished the move in one trip. The gold was stacked neatly in the shape of a cube, measuring about 1 meter on a side. Calculate the weight, in tons, of one cubic meter of gold. The density of gold is 19.4 g/cc. Would it have been possible for the two pilots to accomplish this feat? Would a plane of WWII vintage be able to carry this much gold? (cc = cubic centimeter, $1cm^3 = 1mL$) *21.4, nope!*

Dougherty Valley HS Chemistry
Significant Figures Practice 1

Worksheet #5

Name: **Period:** **Seat#:**

Give the number of significant figures in each of the following:

1) 402 m	**2)** 34.20 lbs	**3)** 0.03 sec	**4)** 0.00420 g
5) 3200 liters	**6)** 0.0300 ft.	**7)** 5.1×10^4 kg	**8)** 0.48 m
9) 1400.0 m	**10)** 78323.01 g	**11)** 1.10 torr	**12)** 760 mm Hg

Multiply each of the following, observing significant figure rules:

13) 17 m x 324 m =	**14)** 1.7 mm x 4294 mm =
15) 0.005 in x 8888 in =	**16)** 0.050 m x 102 m =
17) 0.424 in x .090 in =	**18)** 324000 cm x 12.00 cm =

Divide each of the following, observing significant figure rules:

19) 23.4 m ÷ 0.50 sec =	**20)** 12 miles ÷ 3.20 hours =
21) 0.960 g ÷ 1.51 moles =	**22)** 1200 m ÷ 12.12 sec =

Add or subtract each of the following, observing significant figure rules:

23) 3.40 m + 0.022 m + 0.5 m	**24)** 102.45 g + 2.44 g + 1.9999 g	**25)** 102. cm + 3.14 cm + 5.9 cm
26) 42.306 m - 1.22 m	**27)** 14.33 g - 3.468 g	**28)** 234.1 cm – 62.04 cm

Dougherty Valley HS Chemistry
Significant Figures Practice 1

Work each of the following problems, observing significant figure rules:

29) Three determinations were made of the percentage of oxygen in mercuric oxide. The results were 7.40%, 7.43%, and 7.35%. What was the average percentage?

30) A rectangular solid measures 13.4 cm x 11.0 cm x 2.2 cm. Calculate the volume of the solid.

31) If the density of mercury is 13.6 g/ml, what is the mass in grams of 3426 ml of the liquid?

32) A copper cylinder is 12.0 cm in radius and has a height of 44.0 cm. If the density of copper is 8.90 g/cm^3, calculate the mass in grams of the cylinder. Remember that the equation for volume is $v = \pi r^2 h$ (assume pi = 3.14)

Dougherty Valley HS Chemistry
Significant Figure Practice 2

Worksheet #6

Name: **Period:** **Seat#:**

State the number of significant digits in each measurement.

1) 2804 m	**2)** 2.84 km	**3)** 5.029 m	**4)** 0.003068 m
5) 4.6×10^{5} m	**6)** 4.06×10^{-5} m	**7)** 75,000 m	**8)** 750 m
9) 75 m	**10)** 75.00 m	**11)** 75,000.0 m	**12)** 10 cm

Round the following numbers as indicated:

To four figures:

13) 3.682417	**14)** 21.860051	**15)** 375.6523	**16)** 112.511	**17)** 45.4673

To one decimal place:

18) 1.3511	**19)** 2.473	**20)** 5.687524	**21)** 7.555	**22)** 8.235

To two decimal places:

23) 22.494	**24)** 79.2588	**25)** 0.03062	**26)** 3.4125	**27)** 41.86632

Solve the following problems and report answers with appropriate number of significant digits.

28) 6.201 cm + 7.4 cm + 0.68 cm +12.0 cm =	**29)** 1.6 km + 1.62 m +1200 cm =
30) 8.264 g - 7.8 g =	**31)** 10.4168 m - 6.0 m =
32) 1.31 cm x 2.3 cm =	**33)** 5.7621 m x 6.201 m =
34) 20.2 cm / 7.41 s =	**35)** 12.00 kg + 15.001 kg =

Dougherty Valley HS Chemistry
Significant Figure Practice 2

Express the following numbers in scientific notational form:

36) 123,876.3	**37)** 1,236,840	**38)** 422000
39) 0.000000000000211	**40)** 0.000238	**41)** 0.0000205

Solve the sums or differences of the following with correct sig figs:

42) $(8.41 \times 10^4) + (9.71 \times 10^4) =$	**43)** $(5.11 \times 10^2) - (4.2 \times 10^2) =$
44) $(8.2 \times 10^3) + (4.0 \times 10^3) =$	**45)** $(6.3 \times 10^{-2}) - (2.1 \times 10^{-2}) =$

Solve the product and the quotients of the following with correct sig figs:

46) $(3.56 \times 10^5)\ (4.21 \times 10^6) =$	**47)** $(2 \times 10^7)\ (8 \times 10^{-9}) =$
48) $(4.11 \times 10^{-6})\ (7.51 \times 10^{-4}) =$	**49)** $8.45 \times 10^7 / 6.74 \times 10^3 =$
50) $9.7 \times 10^8 / 8.6 \times 10^{-2} =$	**51)** $4.7 \times 10^{-2} / 5.7 \times 10^{-6} =$

Dougherty Valley HS Chemistry
Extra Practice

Worksheet #7*

Name: **Period:** **Seat#:**

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

Perform the following conversions.

1) 70 cm to m	**2)** 49 cm to mm	**3)** 8 m to mm	**4)** 14.76 m to cm	**5)** 8500 cm to m	**6)** 20 mm to m
7) 6 L to cl	**8)** 4.1 L to ml	**9)** 8.7 L to ml	**10)** 12.5 cl to L	**11)** 925 mg to Kg	**12)** 412. 6 Kg to g
13) 8 cm x 7 cm x 6 m = ? cm^3		**14)** 4 cm x 9 cm x 12 cm = ? mL		**15)** 15 m x 12 cm x 5 cm = ? mL	

Convert: using Dimensional Analysis method (show your work in Dimensional Analysis format)

16) 8000 g to Kg	**17)** 25,000 g to Kg	**18)** 2 mm to Km	**19)** 12.42 Kg to g	**20)** 4.2 g to mg
21) One nickel weighs 5 grams. How many nickels are in 1 Kg of nickels?				

What is the mass of each item in kg, mg, and g? (You will do multiple conversions for each question)

22) Potatoes 5Kg	**23)** Flour 11Kg	**24)** Turkey 8000g	**25)** Cereal 250g	**26)** Candy 340g	**27)** Medicine 550 mg

Answer the following questions:

28) What is the fundamental unit used to measure mass?	**29)** What does the prefix "centi" mean?	**30)** What does the prefix "kilo" mean?

Perform the following dimensional analysis conversions of "double units"

31) 37 in/sec to miles/year	**32)** 25m/hr to km/day	**33)** $1.75x10^{13}$mm/min to ft/hour

SIGNIFICANT DIGIT REVIEW

Significant figures are the digits in any measurement that are known with certainty plus one digit that is uncertain.

Rule 1: All non-zero digits are significant 3.1425 [5] 3.14 [3] 469 [3]	**Rule 2**: All zeros between significant digits are significant 7.503 [4] 7053 [4] 302 [3]	**Rule 3**: In a number with digits to the right of a decimal place, zeros to the right of the last non-zero digit are significant 43 [2] 0.00200 [3] 43.0 [3] 0.40050 [5] 43.00 [4]	**Rule 4**: Zeros to the left of the first non-zero digit that act, as placeholders are NOT significant. 0.0056 [2] 0.0789 [3] 0.000001 [1]
Rule 5: In a number that has no decimal point, and that ends in zeros (such as 3600), the zeros at the end may or may not be significant (it is ambiguous). To avoid ambiguity express the number in scientific notation showing in the coefficient the number of significant digits. Example: 3.6×10^3 contains two significant digits			

How many significant digits are in each of the following numbers?

34) 1837	**35)** 205.8	**36)** 3.14145E4	**37)** 1900.5	**38)** 6005	**39)** 1200.43
40) 0.08206	**41)** 6000.00	**42)** 0.000014	**43)** 632.0000	**44)** 149356.1	**45)** 14.163000
46) 8.7300	**47)** 14	**48)** 0.00743	**49)** 302400.00	**50)** 302400	**51)** 0.0019872
52) 8.732	**53)** 20000	**54)** 14.000	**55)** 426.1	**56)** 19.7342	**57)** 60

Convert the following number into or out of scientific notation:

58) 142.63	**59)** 1,500,000.00	**60)** 0.00336	**61)** 1.63E7	**62)** 3.11E-4	**63)** 0.00125
64) 86,400.00	**65)** 1.01E6	**66)** 9.81E1	**67)** 0.000000000000144	**68)** 4,633,310.56	

Dougherty Valley HS Chemistry
Extra Practice

Round each of the following numbers to four significant digits:

ROUNDING **GENERAL RULES FOR ROUNDING:** XY → X When Y ≥ 5, increase X by 1 When Y < 5, don't change X	**69)** 6.19648	**70)** 0.0019872	**71)** 3.14145E4
	72) 213.25	**73)** 14.163000	**74)** 90210
	75) 234.4	**76)** 1200.43	**77)** 0.0022475
	78) 14.16300	**79)** 0.02315	**80)** 13.462
	81) 135.69	**82)** 152.00	**83)** 395.55

Add or subtract as indicated and state the answer with the correct number of significant digits

84) 85.26 cm + 4.6 cm	**85)** 1.07 m + 0.607 m	**86)** 186.4 g - 57.83 g
87) 60.08 s - 12.2 s	**88)** 4,285.75 - 520.1 - 386.255	**89)** 72.60 m + 0.0950 m

Multiply or divide as indicated and state that answer with the correct number of significant digits

90) (5.5 m) (4.22 m)	**91)** (0.0167 km) (8.525 km)	**92)** 2.6 kg / 9.42 m^3
93) 0.632 m /3.8 s	**94)** (8.95)(9.162) **/** (4.25)(6.3)	**95)** 0.0045 mm^2 / 0.90 mm

Evaluate the following with answers expressed to proper number of significant digits.

96) 4.22E5 + 3.11E7 + 6.003E6	**97)** (9.11E-28)(6.02E23)	**98)** 2.160E3 + 6.2000E4 + 5.2E1	**99)** (8.4E7)/(2.1E4)
100) (8.4E-7)/(2.1E4)	**101)** (8.4E7)/(2.1E-4)	**102)** (8.4E-7)/(2.1E-4)	**103)** (6.02E23)/(9.11E28)

Given the following numbers (a-e), solve the following problems, expressing the answer to the proper number of significant digits.

(a) 1.72 cm
(b) 0.15 cm
(c) 627.1 cm
(d) 0.007 cm
(e) 704.050 cm

104) a + b + c + d + e	**105)** a + c + e	**106)** c - a	**107)** e - b
108) (a + c) - (b + d)	**109)** (a) (e)	**110)** (c) (d)	**111)** (a + b) (b + e)
112) c / b	**113)** e / d	**114)** (b + c) / (e - c)	**115)** $(b)^3$

Dougherty Valley HS Chemistry
Changes, Properties, and Types of Matter

Worksheet #8

Name: **Period:** **Seat#:**

Fill in the following definitions

	Vocab Word	Definition
1)	Physical Property	
2)	Physical Change	*Change in which the identity of the substance does NOT change*
3)	Chemical Property	
4)	Chemical Change	

Identify each as either a chemical or a physical PROPERTY. Use C for chemical, P for physical.

Statement	C or P	Statement	C or P
5) Blue color		**6)** Density	
7) Flammability		**8)** Solubility	
9) Supports combustion		**10)** Sour taste	
11) Melting point		**12)** Odor	
13) Luster		**14)** Neutralize an acid	
15) Boiling point		**16)** Hardness	
17) Reacts with acid to form H_2		**18)** Reacts with water to form a gas	

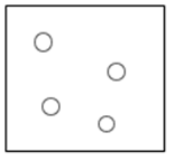
Identify each as either a chemical change or a physical CHANGE. Use C for chemical, P for physical.

Statement	C or P	Statement	C or P
19) Glass breaking		**20)** Hammering wood together	
21) A rusting bicycle		**22)** Melting butter	
23) Separating sand from gravel		**24)** Bleaching your hair	
25) Frying an egg		**26)** Squeeze oranges for juice	
27) Melting ice		**28)** Mixing salt and water	
29) Mixing oil and water		**30)** Water evaporating	
31) Cutting grass		**32)** Burning leaves	
33) Fireworks exploding		**34)** Cutting your hair	
35) Crushing a can		**36)** Boiling water	
37) Combustion		**38)** Melting	
39) Dissolving		**40)** Metabolizing	
41) Filtering		**42)** Fermenting	
43) Decomposing		**44)** Distilling	
45) A pellet of sodium is sliced into two pieces		**46)** HCl reacts with NaOH to produce a salt, water, and heat	
47) Potassium chlorate decomposes to potassium chloride and oxygen gas		**48)** Acid on lime stone produces carbon dioxide gas	
49) Ice melts		**50)** Iron rusts	
51) Crack an egg		**52)** Bake a cake	

Dougherty Valley HS Chemistry
Changes, Properties, and Types of Matter

Directions: Identify each lettered box with as many of the following terms that makes sense: atom, molecule, compound, solid, liquid, gas, pure substance, mixture, homogeneous mixture, heterogeneous mixture.

A



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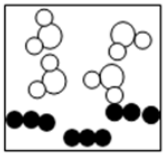

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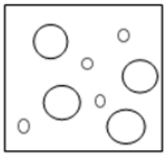

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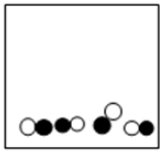
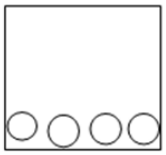


E

F



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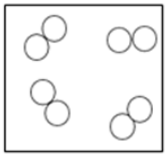

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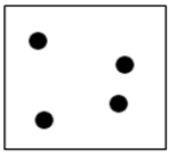

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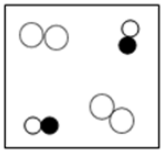

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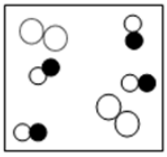

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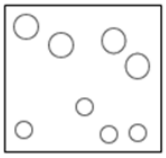

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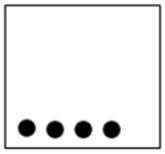

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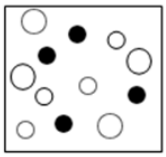

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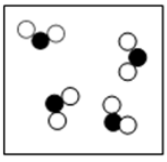

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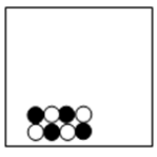

Dougherty Valley HS Chemistry
Atomic Web Quest – *Links checked 7/23/2020*

Worksheet #9

Name: **Period:** **Seat#:**

Section 1: Dalton's Theories

- **Site:** https://drive.google.com/file/d/1VBYfxYSn2KZ9Yi_yfT8BDuaVj_FKc491/view?usp=sharing
- **Site:** https://drive.google.com/file/d/1VAylmVN_M1edTrRmbvGG7AUP3aFJnfQt/view?usp=sharing

1) Summarize (in your own words) the five parts to Dalton's Atomic Theory.

2) What are two problems with Dalton's Atomic Theory that we know with todays knowledge?

Section 2: First Subatomic Particle of the Atom

- **Site:** https://drive.google.com/file/d/1V48kxBnzey-ExwajSQQ2qd4DymFb94qf/view?usp=sharing
- **Site:** https://drive.google.com/file/d/1UtzkBmJBVFP_8EOW_sCFPanhcK5vyRv/view?usp=sharing (scroll way down to look for Thomson)

3) "Atoms are small, indivisible particles. There is nothing smaller than an atom." Why would Thomson disagree with this statement?

4) What subatomic particle did Thomson discover and what was its charge?

5) Describe how Thomson found the subatomic particle?

6) If the positive side of a magnet was placed near the cathode ray would the ray bend towards or away from the magnet? Explain.

7) What is the name of the main piece of equipment used by Thomson? After doing some internet search what is it used for today?

Section 3: Finding the Mass of the Atom

- **Site:** https://drive.google.com/file/d/1Ut8r5N0ICkvZKnSjzwmiMNH8g8kV-qIK/view?usp=sharing

8) What was the name of Rutherford's most famous experiment?

9) Describe and/or illustrate what Rutherford's experiments looked like.

10) What did Rutherford conclude was in the middle of the atom?

11) Use what you know about matter to explain why Rutherford concluded that it was a positive charge in the center of the atom.

12) Why did most of the alpha particle go through the gold foil?

13) J.J. Thomson said the atom is filled with "positive sea"with small, negative particles called electrons. Would Rutherford agree or disagree with this statement? Why?

Section 4: Bohr Atom

- **Site: https://drive.google.com/file/d/1Uiz8gmqcqvotXwZzwvi4PdLJeHlZL3zz/view?usp=sharing**
- **Site: https://drive.google.com/file/d/1Ueu8N5L9-oIweh-0vT1ugCLJYJrXL3r3/view?usp=sharing**

14) What happens to an electron's location when it absorbs energy? What happens when it radiates energy? (3rd paragraph)

15) What problems are found with the Bohr model?

16) Draw and label the parts of the atom for a Bohr Model atom

Dougherty Valley HS Chemistry
Atomic Numbers and Isotopes

Worksheet #10

Name: **Period:** **Seat#:**

Complete the following chart and answer the questions below:

Element Name	Atomic Number	Number of Protons	Number of Neutrons	Number of Electrons	Mass Number
carbon					12
	8		8		
hydrogen					1
		6			14
hydrogen			2		
nitrogen					14
			1		2
	92		146		
cesium			82		
	11		12		
		47			108
tungsten			110		
			45		80
		24			52
			89		152
silver					107
	76		114		

Answer the following questions in full sentences.

1) How are the atomic number and the number of protons related to each other? Support.

2) How do the number of protons, number of neutrons, and the mass number relate to each other? Explain.

3) What is the one thing that determines the identity of an atom (that is, whether it is an oxygen atom or a carbon atom, etc.)? Support.