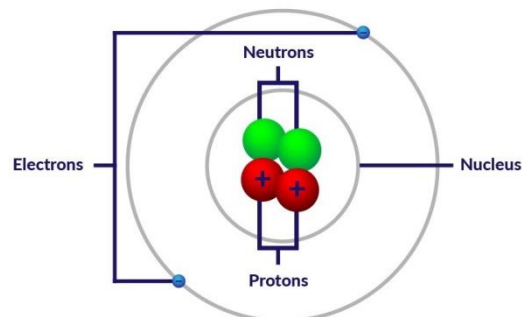


# Atomic Structure Guided Notes – Student Edition

## The Basic Structure of the Atom

All atoms consist of a \_\_\_\_\_ which contains two types of subatomic particles - \_\_\_\_\_ and \_\_\_\_\_. The nucleus is surrounded by a cloud of \_\_\_\_\_ at varying energy levels. These subatomic particles are composed of even smaller particles known as quarks which came together after the Big Bang around 13.7 million years ago.



## The Nucleus

The nucleus is held together by the " \_\_\_\_\_," which binds the quarks together. This force found in the nucleus has sufficient strength to overcome the repulsive \_\_\_\_\_ which aims to push like charges apart. Because this binding force varies from atom to atom, sometimes the nucleus decays into other elements as it breaks apart.

## Charged Subatomic Particles

Protons and electrons are \_\_\_\_\_ charged giving the atom an overall ( \_\_\_\_\_ ) charge of zero. The table below shows the charge and relative mass of each of the three particles found in the atom (the neutron is used as a point of comparison to find the relative mass of protons and electrons).

	Charge	Relative Mass
Proton	Positive	_____
Neutron	_____	1
Electron	Negative	0.0005439

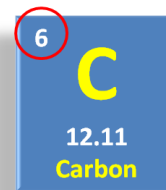
## The Mass of an Atom

The majority of an atoms mass is found in its \_\_\_\_\_. The protons and neutrons are approximately the same mass (with the proton being is slightly less), known as one atomic mass unit (AMU) or one \_\_\_\_\_. Electrons are much smaller than protons and neutrons, so much so, that they do not contribute much to the mass of an atom.

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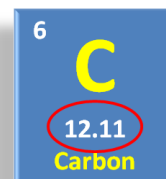
## Atomic Number:

The atomic number tells us how many \_\_\_\_\_ it has. It is denoted by the letter '\_\_\_\_'. This number can be found under the entry for each element on the periodic table.



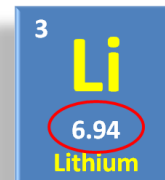
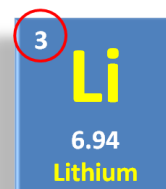
## Mass Number:

The mass number provides information about the number of \_\_\_\_\_ and \_\_\_\_\_ contained in the atoms nucleus. It is denoted by the letter '\_\_\_\_'. To find the number of neutrons in any given element, the atomic number (or number of protons) is \_\_\_\_\_ from the mass number.



*An example:*

A lithium atom has the atomic number (Z) of 3, and the atomic mass (A) of 6.94 (round it up to 7!). Therefore lithium contains three protons (found from Z), and three electrons (as the number of protons must be equal to the number of electrons in order for the atom to be neutral). Lithium also contains four neutrons ( $7 - 3 = 4$ ).



## Practice:

Use the periodic table from your guided notes (page 3) to complete the table below:

	Number of protons	Number of electrons	Number of neutrons
Hydrogen		1	
Fluorine	9		10
Calcium		20	20
Iodine	53		
Gold	79	79	

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

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## Periodic Table of the Elements

1 <b>H</b> Hydrogen 1.008																	2 <b>He</b> Helium 4.003
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012											5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.007	8 <b>O</b> Oxygen 15.999	9 <b>F</b> Fluorine 18.998	10 <b>Ne</b> Neon 20.180
11 <b>Na</b> Sodium 22.990	12 <b>Mg</b> Magnesium 24.305											13 <b>Al</b> Aluminum 26.982	14 <b>Si</b> Silicon 28.086	15 <b>P</b> Phosphorus 30.974	16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.453	18 <b>Ar</b> Argon 39.948
19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.078	21 <b>Sc</b> Scandium 44.956	22 <b>Ti</b> Titanium 47.867	23 <b>V</b> Vanadium 50.942	24 <b>Cr</b> Chromium 51.996	25 <b>Mn</b> Manganese 54.938	26 <b>Fe</b> Iron 55.845	27 <b>Co</b> Cobalt 58.933	28 <b>Ni</b> Nickel 58.693	29 <b>Cu</b> Copper 63.546	30 <b>Zn</b> Zinc 65.38	31 <b>Ga</b> Gallium 69.723	32 <b>Ge</b> Germanium 72.631	33 <b>As</b> Arsenic 74.922	34 <b>Se</b> Selenium 78.972	35 <b>Br</b> Bromine 79.904	36 <b>Kr</b> Krypton 84.798
37 <b>Rb</b> Rubidium 85.468	38 <b>Sr</b> Strontium 87.62	39 <b>Y</b> Yttrium 88.906	40 <b>Zr</b> Zirconium 91.224	41 <b>Nb</b> Niobium 92.906	42 <b>Mo</b> Molybdenum 95.95	43 <b>Tc</b> Technetium 98.907	44 <b>Ru</b> Ruthenium 101.07	45 <b>Rh</b> Rhodium 102.906	46 <b>Pd</b> Palladium 106.42	47 <b>Ag</b> Silver 107.868	48 <b>Cd</b> Cadmium 112.411	49 <b>In</b> Indium 114.818	50 <b>Sn</b> Tin 118.710	51 <b>Sb</b> Antimony 121.760	52 <b>Te</b> Tellurium 127.6	53 <b>I</b> Iodine 126.904	54 <b>Xe</b> Xenon 131.294
55 <b>Cs</b> Cesium 132.905	56 <b>Ba</b> Barium 137.328	57-71 Lanthanide Series	72 <b>Hf</b> Hafnium 178.49	73 <b>Ta</b> Tantalum 180.948	74 <b>W</b> Tungsten 183.84	75 <b>Re</b> Rhenium 186.207	76 <b>Os</b> Osmium 190.23	77 <b>Ir</b> Iridium 192.217	78 <b>Pt</b> Platinum 195.085	79 <b>Au</b> Gold 196.967	80 <b>Hg</b> Mercury 200.592	81 <b>Tl</b> Thallium 204.383	82 <b>Pb</b> Lead 207.2	83 <b>Bi</b> Bismuth 208.980	84 <b>Po</b> Polonium [208.982]	85 <b>At</b> Astatine 209.987	86 <b>Rn</b> Radon 222.018
87 <b>Fr</b> Francium 223.020	88 <b>Ra</b> Radium 226.025	89-103 Actinide Series	104 <b>Rf</b> Rutherfordium [261]	105 <b>Db</b> Dubnium [262]	106 <b>Sg</b> Seaborgium [266]	107 <b>Bh</b> Bohrium [264]	108 <b>Hs</b> Hassium [269]	109 <b>Mt</b> Meitnerium [268]	110 <b>Ds</b> Darmstadtium [269]	111 <b>Rg</b> Roentgenium [272]	112 <b>Cn</b> Copernicium [277]	113 <b>Nh</b> Nihonium unknown	114 <b>Fl</b> Flerovium [289]	115 <b>Mc</b> Moscovium unknown	116 <b>Lv</b> Livermorium [298]	117 <b>Ts</b> Tennessine unknown	118 <b>Og</b> Oganesson unknown
		57 <b>La</b> Lanthanum 138.905	58 <b>Ce</b> Cerium 140.116	59 <b>Pr</b> Praseodymium 140.908	60 <b>Nd</b> Neodymium 144.242	61 <b>Pm</b> Promethium 144.913	62 <b>Sm</b> Samarium 150.36	63 <b>Eu</b> Europium 151.964	64 <b>Gd</b> Gadolinium 157.25	65 <b>Tb</b> Terbium 158.925	66 <b>Dy</b> Dysprosium 162.500	67 <b>Ho</b> Holmium 164.930	68 <b>Er</b> Erbium 167.259	69 <b>Tm</b> Thulium 168.934	70 <b>Yb</b> Ytterbium 173.055	71 <b>Lu</b> Lutetium 174.967	
		89 <b>Ac</b> Actinium 227.028	90 <b>Th</b> Thorium 232.038	91 <b>Pa</b> Protactinium 231.036	92 <b>U</b> Uranium 238.029	93 <b>Np</b> Neptunium 237.048	94 <b>Pu</b> Plutonium 244.064	95 <b>Am</b> Americium 243.061	96 <b>Cm</b> Curium 247.070	97 <b>Bk</b> Berkelium 247.070	98 <b>Cf</b> Californium 251.080	99 <b>Es</b> Einsteinium [254]	100 <b>Fm</b> Fermium 257.095	101 <b>Md</b> Mendelevium 258.1	102 <b>No</b> Nobelium 259.101	103 <b>Lr</b> Lawrencium [262]	
		Alkali Metal	Alkaline Metal	Transition Metal	Basic Metal	Semimetal	Nonmetal	Halogen	Noble Gas	Lanthanide	Actinide						