Subatomic Particles and Atomic Structure
Homework

Substance	Symbol	Atomic Number (Z)	Atomic Mass (A)	Protons	Neutrons	Electons
Helium	**He**	**2**	**4**	2	2	2
Magnesium	Mg	**12**	24	12	**12**	12
Zinc	An	**30**	**65**	30	35	30
Bromine	**Br**	35	**80**	35	45	**35**
Aluminum	Al	13	27	**13**	**14**	13
Uranium	**U**	92	238	92	**146**	**92**
Sodium	**Na**	**11**	23	11	**12**	11
Krypton	**Kr**	36	84	36	**48**	**36**
Calcium	Ca	20	**40**	**20**	20	20
Silver	Ag	47	108	**47**	**61**	47
Oxygen	O	**8**	16	8	8	8
Ytterbium	Yb	70	173	**70**	103	70
Cobalt	**Co**	27	59	27	32	27
Tin	Sn	50	119	50	69	50

1. Today in class you learned about the origin of all the elements on the period table. Important events and concepts included: the "Big Bang," expansion and cooling, hydrogen, stars, fusion, super nova and Uranium. Using these terms, describe the processes that led to the formation of all 92 naturally occurring elements.

As the matter created in the big bang expanded and cooled, the lightest element, hydrogen was formed. Due to gravity, these hydrogen atoms clumped together into stars. Within these stars, intense temperature and pressure caused the hydrogen atoms to fuse into heaving elements, up to element 26, iron. Once a star fuses the majority of its hydrogen into heavier elements, it begins to burn out and collapse on itself. This collapse causes the star to explode, creating a super nova. This explosion releases enough energy to cause even heavier elements to fuse, creating all the elements on the periodic table up to element 92, uranium.

2. Atoms are amazingly small and unusual particles. Today, we learned some surprising truths about atoms, using some strange analogies. For each of these analogies, explain their significance.

"There are as many atoms in a grapefruit as there are blueberries in the earth"

> Atoms are so incredibly small that there are as many small atoms in a grapefruit sized sphere as there would be blueberries necessary to fill the earth.

"The nucleus of an atom would be the size of a marble if the atom were the size of a football stadium"

> The nucleus of an atom is such a small part of the size of the overall atom that finding the nucleus in the middle of at atom is like finding a marble at the 50 yard line of Lavell Edward's stadium. This means at atoms are as much empty space as would be BYU stadium with a marble in it.

To create matter in a one cubic foot box as dense as a nucleus, 6,200,000,000 cars would need to be compressed into the box.

> The matter that makes up the nucleus of an atom is so compressed that if the nucleus was as big as a 1 cubic foot box it would be to contain 6.2 billions cars in order to be a dense as a nucleus. This gives us a sense of how strong the strong nuclear force is, which holds this amazingly dense nucleus together.