Unit 8: The Atom

(Links go to review videos.)

1) **History of the Atomic Theory - (U8N1)**
    a) I understand that scientists throughout history have done experiments and collected data.
    b) I can summarize the major experiments and evidence that led to the development of various atomic models, from ancient times up to current day.
    c) I understand that each subsequent atomic model has been a refinement/improvement of the previous one, and that the old models were important steps toward our current level of understanding.
2) **Scientific Progress and the Modern Atomic Theory - (U8N1)**
    a) I understand that scientific theories and beliefs:
        i) Come from experimentation and data evaluation.
        ii) Are changed and modified when new evidence comes to light
        iii) Are developed over time with each generation building on the discoveries of the previous one.
    b) I understand that the atomic models we use have limitations-- there are both pros and cons to using a model to think about how atoms work.
    c) I know the postulates of the modern atomic theory, and how the differ slightly from Dalton's original postulates.
3) **Subatomic particles (Essential) - (U8N2)**
    a) I can identify the three subatomic particles (proton, neutron, electron).
    b) I understand how these particles differ in location, mass, and charge.
    c) I understand that the number of protons in the nucleus (atomic number) is what distinguishes the atoms of one element from another.
4) **Atomic Structure: Nuclear symbols & Isotopes (Essential) - (U8N2)**
    a) I can find the proton number for any element using a periodic table.
    b) I can use a nuclear symbol or isotope-name to determine the number of protons, neutrons and electrons for any isotope.
    c) I can use number of particles to determine nuclear symbols and isotope-names.
    d) I understand what similarities and differences cause to atoms to be isotopes of each other.
5) **Light Energy: Quantum changes - (U8N3)**
    a) I understand that electrons can move from one orbital to another.
        i) I understand that electrons must absorb energy in order to move from a low energy orbital to a higher energy orbital.
        ii) I understand that electrons must emit energy in order to move from a high energy orbital to a lower energy orbital, and they emit that energy in the form of light (electromagnetic radiation).
    b) I understand that electron orbitals in a given element are only allowed to exist at specific (quantized) energies, and therefore the colors of light emitted when an

electron moves between excited and ground state also are allowed only at specific (quantized) energies.

i) This gives each element a unique emission spectrum which can be used to identify it.
ii) The characteristic emission color for an element can be seen when it is energized in a light tube, fireworks, etc. Those colors can be separated into their components with a prism or diffraction grating.

c) I understand that light is a wave and:
   i) the wavelength and frequency of light are inversely proportional.
   ii) the frequency of light is directly proportional to its energy, and the wavelength of light is inversely proportional to its energy.
   iii) I can identify the various types of electromagnetic radiation (light) and put them in order them from least energy to greatest energy.

6) Light Energy: Calculations - (U8N3)

a) I can use the speed of light to calculate either the wavelength or the frequency of a light wave, if I am given the other value.
b) I can use Planck's constant to calculate the energy of a photon of light if I am given its wavelength or frequency (or vice-versa).