-Concepts Tested on PS100 Final

Unit 1

1. Types of force interactions (electromagnetic, gravitational, etc.)
2. Six basic assumptions in science
3. Acceleration, unbalanced vs. balanced forces (you accelerate when you have a unbalanced force. Change in speed OR direction)
4. Newton’s third law and action/reaction pairs…forces vs. accelerations
5. Acceleration of objects vs. force on objects due to gravity
6. Speed and acceleration. When is accel
7. Types of mechanical energy (kinetic, grav. potential, etc.)
8. Centripetal motion – what is going on? When is acceleration happening? There is a force in the center…
9. Transfer of charge between objects – what is moving?
10. Electrostatic force vs. electrical potential energy between objects getting closer/farther apart (2 like charges electric potential force increases force (bc distance is less)and potential energy increases bc they want to fly apart. 2 opposite (Electrical potential energy goes down, forces increase)
11. Transfer of internal energy (conduction, convection, etc.)
12. Changes in energy and conservation of total energy
13. Buoyant force and buoyancy- buoyant force = weight of the fluid that’s displaced by the partially submerged obj. When do obj float vs sink?? (3 Q)
14. Pressure as a function of depth
15. Time, length, mass of an object moving at relativistic speeds. Mass increases, length contracts (shorter), clock runs slow
16. Invariance of speed of light
17. Laws of motion in inertial ref. frames (they are the same – can’t determine absolute motion)
18. Conservation of momentum
19. Conservation of mass

Unit 2

1. Properties of solids, liquids, gases, plasmas (e.g., melting and boiling points, filling container, response to shear, etc.) hat is there sequence from low to high temp? What state of matter fills a container but preserves its volume? Liquid. Melting and boiling point graph.
2. Relationship between temp or pressure of gas and KE of molecules
3. Temperature, potential energy, and phase changes
4. Using periodic table to determine information about atomic volume, ionization energies, electrons in outermost shells, similarity between diff. elements
5. Understanding different models of atom and key experiments that helped establish them
6. Emission spectra: what causes them? Valence electrons in an atom absorb energy and jump up inthen when the jump down the energy is released. What influences the color of photon is how much they jump. The more the energy the color/freq goes up and is more energetic/bluerer.
7. Heisenberg uncertainty principle: can’t know position vs momentum
8. Similarities/differences of electrons/photons. Dif is mass (one doesn’t have mass) similar is that they both can behave like a particle and/or wave
9. Wave vs. particle nature – dual slit diffraction experiment. Fire few photon vs many. Speckles begin to form an interference pattern.
10. Behavior of electrons in quantum model of atom and meaning of orbital
11. electron energy vs. shell
12. Electron shells in atoms: know how many in a given type of orbital
13. Photoelectric effect outcome and significance. Result: only photons (light of certain colors) could knock electrons off which told us that light had a particle like nature and energy was proportional to freq/ color of light
14. Electromagnetic spectrum: frequency vs. wavelength. Draw chart of which wave has longest wavelength/ highest freq chart
15. Definitions of wave properties (amplitude, freq. etc.)
16. Wave phenomena (diffraction, reflection, interference, etc.)

Unit 3

1. Properties of fatty acids – good for you?, melting point, saturated vs unsaturated
2. Covalent bond properties vs. melting/boiling points (double/triple, polar/ nonpolar, hydrogen bonding, dispersion forces)

-metals have stronger bonds than alloys

1. Metals vs. semiconductors and band gap. What causes red vs blue photon emission? You have to provide enough energy to jump over bandgap. Red vs Blue LED, blue needs larger bandgap (needs more energy).
2. Metallic vs. ionic vs. covalent bonds (properties, valence electrons, etc.)
3. Atomic vs. molecular vs. network matter
4. Number of valence electrons for a given atom
5. Balancing of reactions
6. Chemical formulas of molecules
7. Chemical properties of molecules
8. Metals vs alloys
9. Effect of a catalyst. Lowers AE
10. Identifying which reaction gives off vs absorbs energy from surroundings?
11. Mass number and radioactive decay. Plutonian splits into 2 things 240 and 2 makes the other 238
12. Fission vs. fusion, conservation of mass or mass-energy? Nike swoosh graph, the bottom is iron which has lowest mass and energy. Hydrogen to iron is fusion. Iron up is fission. Both release energy from mass, so the product will have lower mass than what we started with.
13. Entropy increases / decreases
14. 2nd law of thermodynamics (law of increasing disorder). A fridge decreases entrory in one location to make it colder but increases it everywhere else, increases entropy in the universe.
15. Electronegativity (where electrons likely to be found) look at graph and see which has biggest electronegativity. Li has low F has high why? It wants to attract an electron to it bc it only needs one to fill its shell

Unit IV

1. Formation of surface features – tectonics, hydrologic cycle, etc.
2. Measuring distances to astronomical objects – distance ladder
3. Origins and properties of basic types of rocks
4. Principles of relative dating (superposition, cross cutting, etc.)
5. Absolute dating – what does a half life mean? ½, ¼, 1/8 – how many ½ lives?

Half life 1000 years. After 1000 years half of that will be left. 1000 years later half of that will be left aka ¼ then after 1000 years half of that will be left 1/8 and after that half of that will be left 1/16. IF half life is at ¼ its 3 half lifes and 3000 years?

1. Different stages in life of a star, Protostar fusion is not occurrings
2. Effect of mass on eventual end of star
3. Color of star vs. age vs. brightness vs. temperature blue hot and bright. Red cool and dim
4. Significance of red shift: everything shifts towards red end of spectrum which means everything is getting further away and seems to be accelerating
5. Evidences for big bang
6. Locations and characteristics of Jovian vs Terrestrial planets
7. Effect of hydrologic and plate tectonic (having one vs. not) why does mars have craters and the earth does not?
8. Evidence, **causes**, and properties of continental drift
9. Ocean vs continental crust
10. Common examples of continental drift and happenings at plate boundaries
11. Rock changes with pressure, temperature, and water addition
12. Wave propagation in the Earth – s and p
13. Layers of Earth – properties, consequences of, evidences of
14. Greenhouse gases and wavelengths they absorb
15. Effect of humans on climate
16. Present climate trends

-don’t need to know feedback (+ and -)