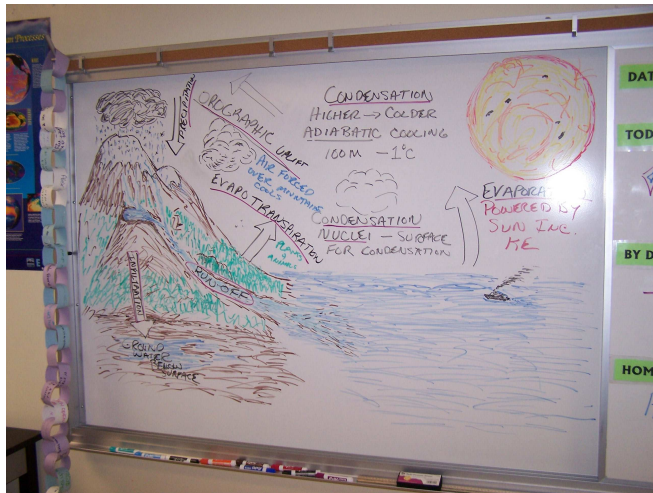


## Honors Second Semester Study Guide:

Remember that this is a final (end of course exam) and about 20% of the questions will be from the first semester work. So let's think about what was most important from the first half of the year. Two things come to mind right away:

1. The water cycle --- think about how that is related to weather and climate, areas that we are studying now.
2. Plate tectonics --- earthquakes happening daily around the world are a constant reminder of the importance of this area.



**The water cycle** : precipitation, runoff, infiltration, accumulation, evaporation, condensation, and all the rest that goes with it. Remember how we have an excess of evaporation over the oceans and an excess of precipitation over the land, returning to the oceans in runoff (rivers) and infiltration through the ground (ground water area of saturation) and of course also as precipitation.

Also included in our study of the water cycle were **rivers and streams**. Since we have an excess of precipitation over the continents this water seeks the lowest level due to gravity,

flowing from higher elevations through tributaries to rivers to the oceans and also infiltrating the ground forming the major storage (accumulation area) of fresh water for human use.

In rivers we looked at the effects of stream gradient (slope, change in elevation divided by distance) on the shape of rivers (velocity, channel width and depth). River slope decreases as you travel from head waters towards the mouth while discharge increases (more water). The width and depth also increase. Near the mouth stream channels meander and form large flood plains. Major floods in these areas are often caused by rapid spring snow melts in higher elevations, while in Florida flooding is more often caused by severe storms. Levees are frequently built to protect areas from flooding but sometimes fail as in Katrina.

Streams are a major force in erosion of land carrying material along in solution, suspension and scooting along the bottom. Decreasing the base level (lowest point of the stream bed) would increase the potential and kinetic energy thereby increasing the amount of erosion. The force of moving water tends to cause stream rocks to tumble and become smaller and more rounded or spherical (go to Lowes and look at river rock).

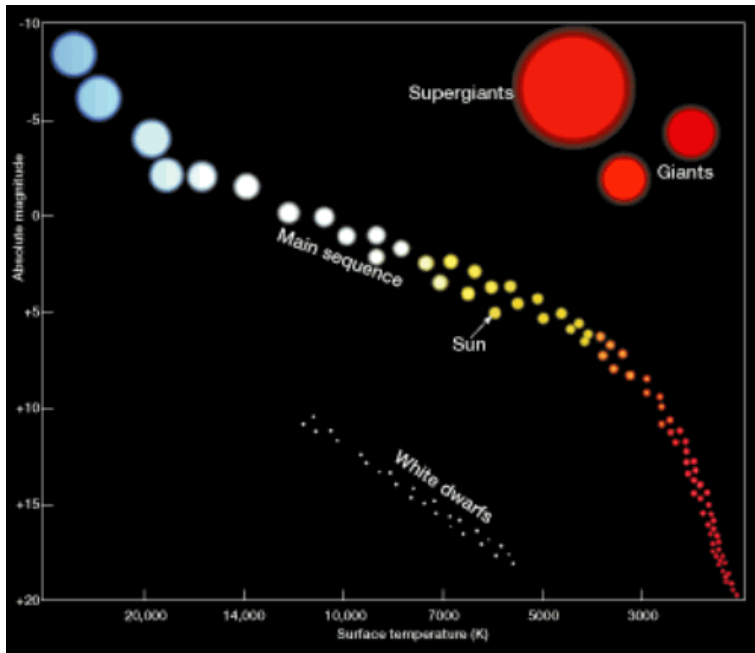
Within the water cycle we also discussed the importance of ocean circulation in the transport of heat from the low latitudes to the higher latitudes; for example the Gulf Current warms Europe (the other method of heat transport being atmospheric circulation). Ocean currents are driven by wind and density (colder water more dense than warmer and saltier water more dense than less salty water).

Another important area to review is **plate tectonics**. Three major types of plate boundaries: convergent (moving together), divergent (moving apart) and transform (moving side by side). Plate boundaries can also be related to formation or destruction of crust (divergent – seafloor spreading – creates oceanic crust, while subduction zones in convergent boundaries destroy crust). Volcanoes can form along both convergent and divergent boundaries.

Earthquakes most often occur along plate boundaries (ring of fire) and create waves that travel through the Earth. P waves – primary, arrive first, push/pull; S waves – secondary, arrive second, side to side, do not travel through liquid outer core; Surface waves --- travel only along the surface, cause the most damage.

The first semester ended in the middle of our astronomy section, so we'll pick up where that one left off,

but you might want to go back to the first semester study guide and read through the astronomy section there as well.



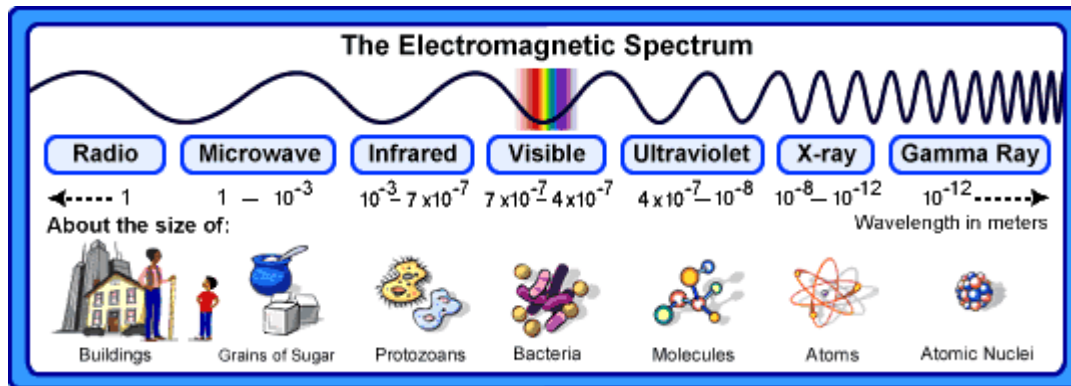
Dennis Tasa

**ASTRONOMY:** Start with the beginning -- the big bang – the theory of the formation of the universe some 14 billion years ago. As our knowledge of the solar system developed theories about its organization changed from a geocentric view (Earth at the center) to Heliocentric (sun at center). We know that the universe is filled with billions of galaxies each with billions of stars. Our Milky Way galaxy is a spiral shaped galaxy, others have different shapes. However space, like all matter, is made

up of mainly empty space.

Review the Earth – Sun – Moon relationships. Know the positions for eclipses and phases of the moon and review spring and neap tides. The reason for the season is Earth's axial tilt which results in different amounts of energy reaching the Earth's surface.

Our sun is an average main sequence star with an absolute magnitude of about +5 and is located near the middle of the HR Diagram. As our star ages and uses up its hydrogen fuel it will become a red giant (it will not become a super nova only very massive stars do that, also more massive stars have shorter lives). Remember as you look at the HR Diagram that it shows the relationship between temperature and brightness (either absolute or apparent). Color also tells us about the temperature of stars.

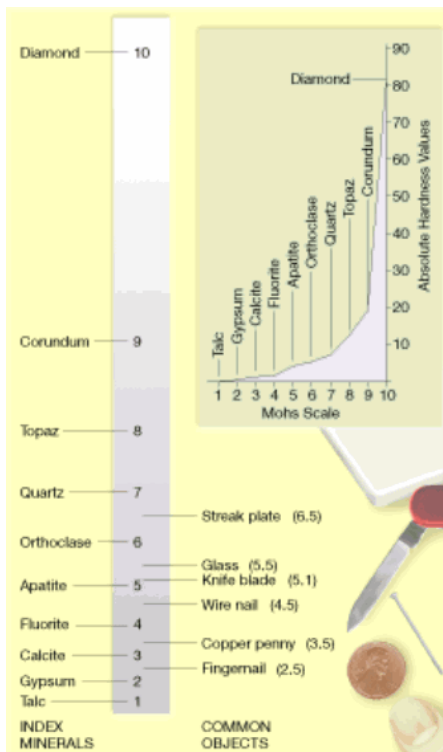


Know the electromagnetic spectrum, understand that as you increase wavelength you decrease the energy of the waves and the frequency. High energy, high frequency waves have short wave lengths and are the most dangerous. Also recognize that these waves are around us all the time but we can't observe them because their wave lengths are either too short or too long (we can only see visible light).

### ROCKS AND MINERALS

Rocks are made of minerals and mineral like substances. Minerals are naturally occurring solids with a orderly crystalline structure and a definite chemical composition. Minerals form through crystallization, precipitation from solution, under pressure and heat, and in hydrothermal solutions. Minerals are classified by their composition: silicates, carbonates, oxide, sulfates, halides and native elements.

Minerals have specific properties. Streak; while samples of the same mineral may have different colors to the naked eye when rubbed on a scratch plate the powder residue has a specific color. Luster refers to how light reflects from the surface. Crystal form refers to the shape of the crystals. Fracture or cleavage refers to how a mineral will break. Hardness is a mineral's resistance to scratching, usually measured on the Mohs scale which rates hardness to common objects such as glass, a wire nail, or your fingernails. Density, the ratio of mass to volume.



Rocks are naturally formed solid mass of minerals or mineral like substances, and often are comprised of more than 1 mineral. Focus on rock cycle not individual rocks. Any rock can become any other rock. The rock cycle is powered by both the energy from the sun (weathering, compaction and cementing forming sedimentary rocks) and the Earth's interior (heat & pressure forming metamorphic rocks, melting & cooling forming igneous rocks: intrusive cooled inside, extrusive cooled outside).

Fossils form only in sedimentary rocks. Fossils and rocks provide a visual history of Earth. Lower layers of undisturbed rocks formed further back into the past than layers nearer to the surface; this is known as superposition.

### **Energy Resources:**

Renewable Vs non-renewable. Fossil fuels: petroleum formed from plants (algae) under the oceans; coal formed from plants on land/swamps. Main source of electrical energy in FI is coal. Primary pollutants, CO<sub>2</sub> and SO form acid rain. Clean air act set limits for the amount of certain air pollutants.

### **Weather:**

Our weather takes place in the layer of the atmosphere called the troposphere. Atmospheric circulation in the troposphere is about moving heat energy around the globe. Major transport mechanisms are convection and radiation. Uneven heating causes differences in temperature which causes differences in pressure which causes winds. Primary wind belts are a result of these forces and the coriolis effect.

Review the weather test: air masses map (CT, MT, CP, MP). Be able to recognize warm or cold fronts. Understand an isobar map. Solstices and equinoxes.

### **Climate:**

The climate in any area is affected by a number of factors including latitude (lower warmer, higher cooler), proximity to bodies of water (water moderates climate), elevation (higher cooler), and windward or leeward sides of a mountain. Climates can be presented on a graph showing months of the year on the x axis and average temperatures and precipitation on the y axis.

Natural cycles which modify the orbit of Earth, its axial tilt and the activity on the sun also create cyclical changes to Earth's climate including ice ages.

Evidence of global warming: actual temperature readings showing increased temperatures, comparisons to paleoclimates and predicted current average global temperatures. Major greenhouse gasses (atmospheric gasses which absorb and emit heat energy causing the atmosphere to become warmer) such as H<sub>2</sub>O, CH<sub>4</sub>, and CO<sub>2</sub>. CO<sub>2</sub> enters the atmosphere through respiration, combustion, burning fossil fuels, weathering of rocks, decay and volcanism. Carbon footprint refers to all the activities of an individual that add additional carbon to the atmosphere. Human activities have caused a significant increase in the amount of CO<sub>2</sub> in the atmosphere within the past 50yrs.

A couple of last points: Understand conduction, radiation and convection. There will also be general "nature of science" questions which focus on valid experimentation and the scientific method.

Last point, this is just an overview guide of areas I think to be likely focus of questions. It is not designed to teach you everything you need to know. I hope you've learned something along the way and this will serve to stimulate your memory.