EARTH SCIENCE CONTENT FACTS

The following is a list of facts related to the course of Earth Science. A deep foundation of factual knowledge is important; however, students need to understand facts and ideas in the context of the conceptual framework. This list is not intended to provide a comprehensive review for State and National Assessments. Its purpose is to provide a highlight of the factual material covered in Earth Science. This list is not all inclusive, be sure to check Nevada State Standards and your district syllabi.

METEOROLOGY

Energy Transfer

- A good absorber of electromagnetic energy (EM) is also a good radiator of EM energy
- Dark-colored objects absorb, Light-colored objects reflect EM energy
- Rough surfaces absorb, smooth surfaces reflect EM energy
- Black and rough surfaces are the best absorbers and radiators of EM energy
- Earth absorbs short waves (visible light) and radiates long waves (infrared energy)
- Temperature is a measure of the average kinetic energy of the molecules in a substance
- Energy moves from the source (higher temperature) to the sink (lower temperature)
- Conduction: energy transfer through molecular collisions (solids in contact)
- Convection: energy transfer in fluids through differences in density (circulating currents of gasses and liquids occurring in the atmosphere and asthenosphere)
- Radiation: energy transfer through space (how light energy travels here from the sun and other stars)
- There is **NO** temperature change during a phase change
    - Condensation = phase change from gas to liquid – remove heat energy
    - Freezing = phase change from liquid to solid - remove heat energy
    - Boiling (vaporization) = phase change from liquid to gas – add heat energy
- Water is densest at 4°C, when it is a liquid
- Water expands when it freezes

Weather

- As pressure increases, density increases
- As temperature increases, density decreases
- As altitude increases, air pressure decreases
- As humidity (moisture content of the air) increases, air pressure decreases
- Weather moves from west to east (northeast trend) in the United States
- The dew point is the point at which water vapor condenses
- The closer the dew point temperature gets to the air temperature, the greater the chance for precipitation

- When the dew point temperature equals the air temperature, relative humidity equals 100%
- Precipitation occurs when: warm, moist air rises, cools adiabatically (due to expansion), reaches the dew point temperature, condensation occurs (on condensation nuclei), the droplets collect in masses (cloud formation) and when the drops are large enough, precipitation results
- Air cools adiabatically as it rises due to expansion from the higher atmospheric pressure at low elevations to the lower atmospheric pressures at higher elevations
- Air warms adiabatically as it sinks due to compression by the heavier atmospheric pressure at lower elevations
- Low Pressure = lousy, cloudy (increased cloud development), humid weather, rising air currents, counterclockwise and convergent circulation
- High Pressure = happy, little to no clouds, dry conditions, sinking air currents, clockwise and divergent circulation
- In general, highs are cool and dry; lows are warm and wet
- Wind is due to air pressure differences (a result of unequal heating of Earth's surface)
- Wind blows from high pressure to low pressure
- Wind is named by the direction that it comes from
- Air masses are characterized by their **temperature** and **moisture** characteristics
- Fronts are boundaries between air masses

Climate

- Increase in latitude and altitude have the same affect on climate
- As altitude/elevation increases, air temperature decreases
- Large bodies of water moderate coastal climates (warmer winters, cooler summers)
- The tilt of the earth's axis (23½°) causes Earth's seasons by varying the intensity of solar energy (insolation)
- Vertical rays (overhead sun) can only occur between 23½° N and 23½° S latitudes
- Mountains force air up the windward (cool/moist) side and down the leeward (warm/dry) side (known as the Orographic Effect)
- Carbon Dioxide (CO_2), methane (CH_4), and water vapor are good absorbers of infrared energy (contributing to the Greenhouse Effect)
- Hottest time of any 24-hour period is usually 1-2 hours after noon (maximum insolation), known as the "daily temperature lag"
- Hottest days of the year are usually **1-month after** the day of maximum insolation (which is the summer solstice - June 21st in the Northern hemisphere), known as the "seasonal temperature lag"