

## EARTH SCIENCE: NEED TO KNOW FACTS . . .

- ❖ Same substance = same density
  - ❖ As pressure increases, density increases & As temperature increases, density decreases (warm air rises)
  - ❖ Water expands when it freezes
  - ❖ A sphere is the best model of Earth's shape (Earth "appears" round)
  - ❖ Altitude of Polaris = your north latitude
  - ❖ Longitude (time) bases on sun
  - ❖ Close contour lines = steep slope/gradient; contour "bends" point upstream
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- ❖ Sedimentary rocks- horizontal layers, contain fossils
  - ❖ Igneous rocks: Extrusive-cools fast-small crystals (fine) no crystals (glassy)  
Intrusive-cools slow-large crystals (coarse to very coarse)
  - ❖ Metamorphic rocks: banding-distorted structure-more dense.
  - ❖ Mineral properties depend on internal arrangement of atoms.
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- ❖ Porosity (amount of holes) - size doesn't matter (when sorted)
  - ❖ Permeability (holes connected) – the bigger the particle size, the faster water goes through
  - ❖ Gravity is behind all erosion. (wind, running water, glaciers, ocean waves)
  - ❖ Capillarity (movement upward) – increases as particle size decreases
  - ❖ Streams are the number one agent of erosion.
  - ❖ Stream velocity depends on slope and discharge (amount of water in stream)
  - ❖ Velocity is faster on outside of meander bend-erosion occurs there and it is deepest.
  - ❖ Heavy-dense-round particles settle out first in water.
  - ❖ Graded bedding (vertical sorting) biggest sediments on the bottom.
  - ❖ Horizontal sorting - large particles settle out first (stream slows down when entering a larger body of water)
  - ❖ Glacial sediments are unsorted, scratched, U shaped valley and can carry boulders.
  - ❖ Stream deposits are sorted, round, smooth, V shaped valley. (abrasion)

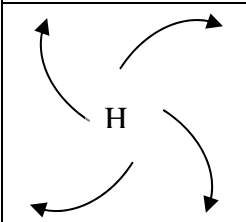
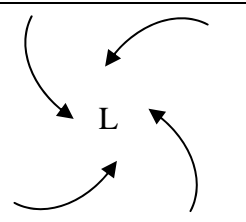
**Seasons:** tilt of Earth – N Pole toward Sun = summer

- ❖ Equator = no seasons = always has 12 hours of daylight
- ❖ Hottest month – July / August; Coldest month – January / February
- ❖ Hottest time of day - 3 PM / 4 PM; Coldest time of day – around sunrise

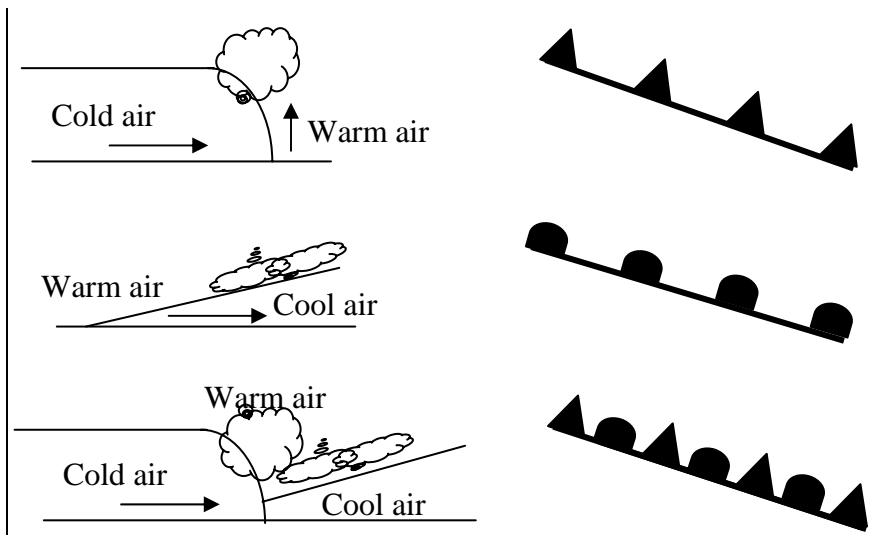
Day	Date	Vertical ray		Sun rise	Sun set	Day length
Summer solstice	June 21	Tropic of Cancer	23 1/2 °N	N or E	N of W	Longest
Autumn equinox	September 23	Equator	0	East	West	12 hours
Winter solstice	December 21	Tropic of Capricorn	23 1/2 °S	S of E	S of W	Shortest
Spring equinox	March 21	Equator	0	East	West	12 hours

**Weather:**

- ❖ Cloud formation: Warm, moist air rises, expands and cools to the dew point. Condensation occurs.
- ❖ Wind – horizontal movement of air - caused by uneven of Earth's surface

High Pressure	wind blows →	Low Pressure
		
DOWN		UP
OUT		IN
Clockwise		Counter -Clockwise
Cold		Warm
No clouds		Clouds
No precipitation / dry		Precipitation / wet

- ❖ Isobars close together = fast wind
- ❖ Air mass – region of atmosphere with uniform temperature and humidity
- ❖ Front – boundary between two air masses
- ❖ Passing of a front = precipitation and change in temperature and wind direction
- ❖ Cold fronts move fastest
- ❖ Weather moves NE in NY



- ❖ Black / rough - absorbs the most, White / smooth – reflects the most
- ❖ A good absorber of energy is a good radiator of energy
- ❖ Conduction – molecule to molecule (solids AND ground heats atmosphere)
- ❖ Radiation – through space (vacuum) – ex: light
- ❖ Convection – due to differences in density (atmosphere-weather, oceans, liquid mantle – plates move)
- ❖ Temperature does NOT change during a phase change (energy is either gained or lost)
  - Condensation: water vapor changing into liquid water (remove heat).
  - Boiling: liquid water changing to water vapor (add heat).
- ❖ Infrared radiation – reradiated from Earth – long wave radiation

### **Climate:**

- ❖ Latitude: Low latitude = small temperature range and warm temperatures
- ❖ Elevation: higher elevations = cooler temperatures
- ❖ Wind belts: from the south = warm, from water = moist
- ❖ Mountain barriers = windward = cool and moist / leeward = warm and dry
- ❖ Ocean currents: warm = warmer temps / cool = cooler temps
- ❖ Ultraviolet radiation – from Sun – short wave radiation
- ❖ Greenhouse gasses – absorb long wave radiation – carbon dioxide & water vapor
- ❖ Potential evaporation depends only on temperature.

- ❖ P waves are faster than S waves.
- ❖ P waves travel through solids and liquids while S waves only through solids.
- ❖ Need 3 seismometer stations to locate epicenter.
- ❖ Age - Bottom rock layer is oldest; Intrusions and faults are younger than the rock they are in.
- ❖ Unconformity: gap in geologic time - erosional surface
- ❖ Arid landscape: steep slopes; Humid landscapes: smooth round slopes.
- ❖ Carbon 14 dates recent, once living objects; Uranium 238 dates oldest rocks.
- ❖ Mid-ocean ridges: crust created; Trenches: crust destroyed.
- ❖ Marine (sea) fossils on mountain tops indicate that the land has been uplifted

- ❖ Earth rotates west to east, (1 day),  $15^\circ / \text{hr}$  ; All celestial objects appear to move from the east to the west
- ❖ Evidence of rotation:
  - Coriolis effect – deflects to the right (N Hem.)
  - Foucault Pendulum – changes direction of swing
- ❖ Earth revolves counterclockwise, (one year),  $1^\circ / \text{day}$
- ❖ Evidence of revolution - Changing constellations each season
- ❖ Earth is closer to the sun in winter; revolves fastest
- ❖ Geocentric – Earth center / Heliocentric – Sun center
- ❖ Red shift – moving away / blue shift – moving toward
- ❖ The lower the sun the longer the shadow; noon shadow in NY points North