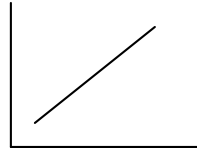


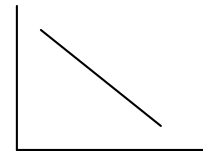
# THINGS YOU NEED TO KNOW FOR THE REGENTS

## CHAPTER 1

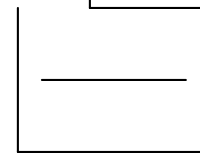
- 1) An observation uses your senses, an instrument extends your senses; an inference (prediction) is a conclusion based on observations.
- 2) Classification – grouping by observable properties.
- 3) Graphing a direct relationship, as X-axis (independent variable) increases, Y-axis (dependent variable) increases.



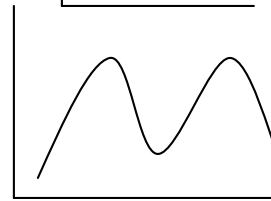
- 4) Graphing an indirect relationship, as X-axis increases, Y-axis decreases.



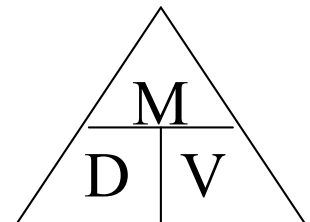
- 5) Graphing a static relationship, as X-axis increases, Y-axis stays the same.



- 6) Most changes are cyclic.  
Most changes in the environment are cyclic.

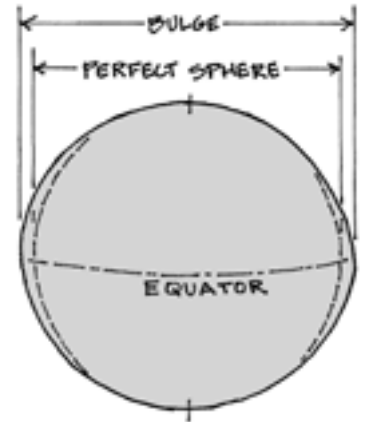


- 7) Dynamic equilibrium means balance.
- 8) Percent Error = (difference/correct value) X 100 (see cover of ref. tables)
- 9) The accepted or real value is the correct answer. The measured value is the guess.
- 10) The same substance always has the same density at the same temperature, no matter how many pieces you break it in to.
- 11) As pressure increases, density increases.
- 12) As temperature increases, density decreases.
- 13) Volume of a regular object – **Length X Width X Height**.  
Volume of irregular object – Displacement of water.
- 14) MAGIC TRIANGLE  $D = M/V$ ;  $M = D \times V$ ;  $V = M/D$ .
- 15) Water expands when it freezes (other substances contract).
- 16) Water is most dense at 4°C, when it is a liquid. (see cover of ref. tables)
- 17) Anything with a density >1 will sink in water.
- 18) An interface is a boundary across which energy is exchanged.

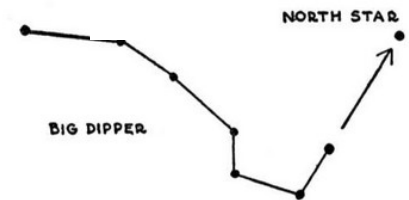


## CHAPTER 2

1. The true shape of the Earth is an oblate spheroid (slightly flattened at the poles and slightly wider at the equator).
2. The best model of the Earth is a billiard ball – a perfectly smooth sphere.
3. Evidences that the Earth is round are: 1) “sinking ship” observation; 2) photographs from space; 3) Earth’s shadow on the Moon; 4) stars shift relative to the horizon as you move North and South 5) Eratosthenes’s measurements and 6) sunrise and sunset (sun hits tops of mountains first.).



4. A good map should have both scale and direction.
5. Latitude lines (parallels) measure distances North or South of the equator. (see p.4 of reference tables)
6. Latitude is expressed as  $0^{\circ}$  -  $90^{\circ}$  North or South.
7. The altitude of Polaris (the North Star) equals your latitude in the Northern Hemisphere. (Use the Big Dipper (part of the constellation Ursa Major) to find Polaris ( at the end of the handle of the little dipper in the constellation Ursa Minor).)



8. Longitude lines (meridians) measure distances East or West. (see p.4 of reference tables)

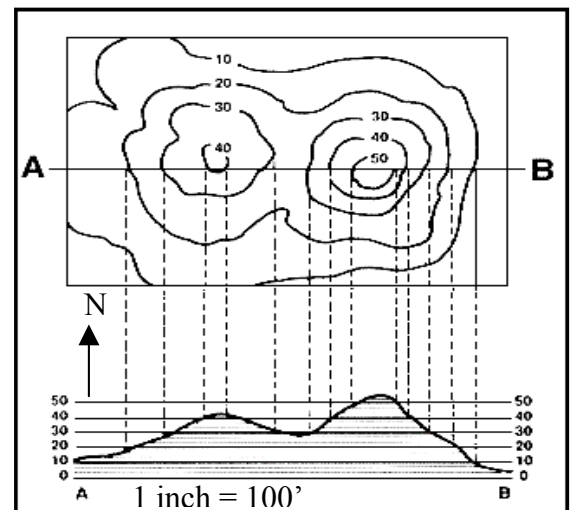
9. □ Longitude is expressed as  $0^{\circ}$  -  $180^{\circ}$  East or West of the Prime Meridian ( $0^{\circ}$ ). ( $180^{\circ}$  = the International Dateline).

10. Longitude is based on observations of the sun (position & time).
11. The earth rotates on its axis from west to east (1 full rotation,  $360^{\circ}$  = 24 hours).

12. Each  $15^{\circ}$  (of Longitude) = 1 hour.
13. As you go East Time does Increase, As you go West Time does get Less.

14. Isolines never cross and must either connect back to itself or run off of the map.

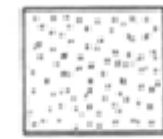
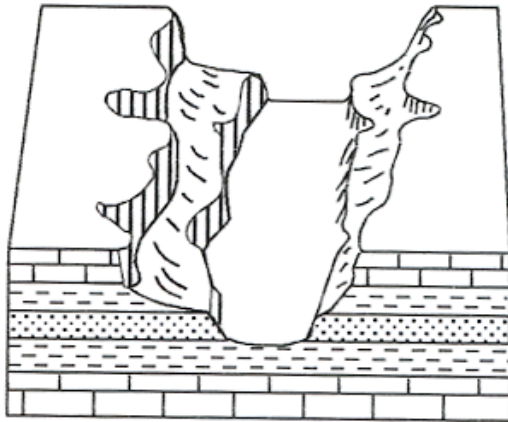
15. The closer the isolines (contour lines, isobars, isotherms) the steeper the slope or gradient. (Steepest slope on diagram is in the East)



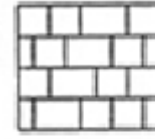
16. Contour lines point in the opposite direction of the stream flowing across them. (V's point upstream.)
17. The maximum elevation is higher than the highest contour line but less than the height of the next would be line. The minimum elevation is less than the lowest but more than the next expected line. (Maximum elevation on diagram is 59', Lowest is 1')
18. The Profile is the vertical cutaway section or side view of the map (See bottom of above diagram.).
19. Gradient =  $\frac{\text{Change in Field Value}}{\text{Distance}}$

## CHAPTER 3

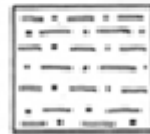
1. Sedimentary rocks may have flat layers - most likely to have fossils. (see p. 7 of reference tables)



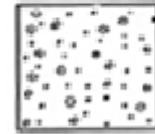
Sandstone



Limestone

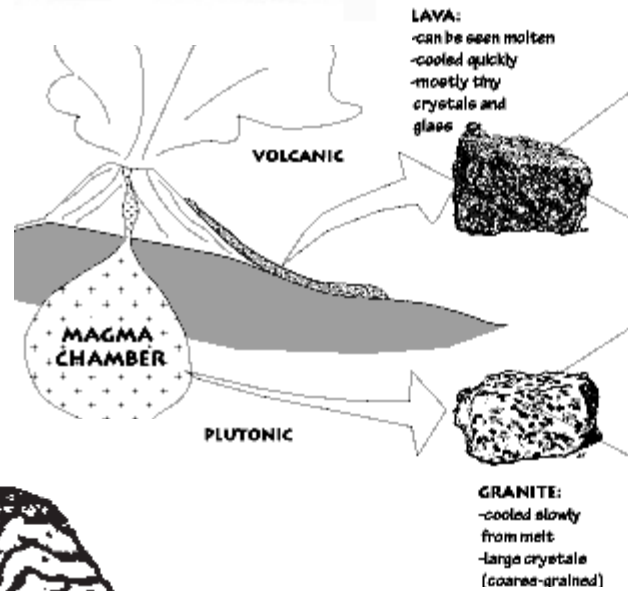


Shale



Conglomerate

2. Igneous rock: cools very fast - glassy texture (no crystals); cools fast (usually extrusive) - small crystals; cools slowly (usually intrusive) - large crystals. (see p. 6 of reference tables)



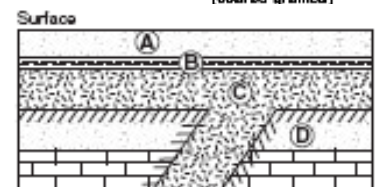
3. Metamorphic: banded-distorted structure, recrystallization. (see p.7 of ref. tables)



Contact Metamorphism is caused by an igneous intrusion.

4. Mineral properties depend on internal arrangement of the atoms (color, streak, hardness, luster, cleavage & fracture). (see p.16 of ref. tables)

5. Calcite fizzes with acid. (Rocks made of calcite (marble, limestone & dolostone) also fizz. (see p. 16 of the reference tables)

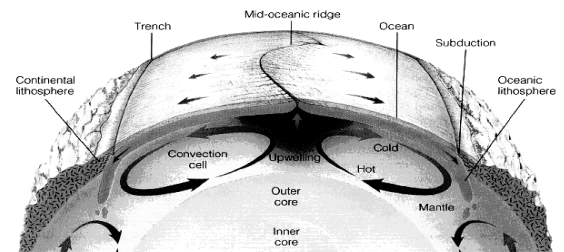


Key			
	Limestone		Shale
	Sandstone		Igneous rock
	Contact metamorphism		

## CHAPTER 4

1. There are 3 basic types of crustal plate boundaries: Divergent; Convergent; & Transform. (see p. 5 of the reference tables)
2. Evidence of plate tectonic theory is: 1) the fit of the continents; 2) the rock, mineral and fossil correlation; 3) evidence of ancient glaciers and tropical forests; and 4) alignment of the North Pole with the magnetism of different ages of rock.
3. Earthquakes and volcanoes usually occur along crustal plate boundaries.
4. Mid-ocean ridge - new crust being created-sea floor spreading.
5. Evidence of sea floor spreading is: 1) the reversal of magnetic polarity; and 2) the farther from the mid-ocean ridge, the older the rock (basalt).
6. Convection – movement due to differences in densities – works best in liquids & gas.

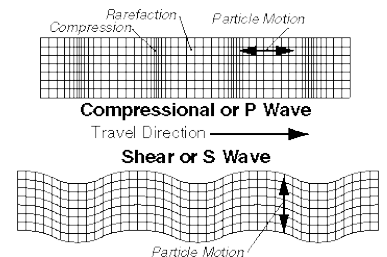
7. Convection currents in the mantle move plates.
8. Ridges create crust – area of divergence.
9. Trenches destroy crust – subduction zone.
10. Uplift causes mountains.
11. Hot spots are not at plate boundaries.



12. Ocean crust is thin and made of basalt. (see p.10 of ref. tables)
13. Continental crust is thick and made of granite.
14. Mountains form by uplift, folding and faulting.

P-waves (compression waves) are faster than S-waves (shear waves). (see p.11 of ref. tables)

15. P-waves - can pass through solids & liquids -- S-waves can pass through solids only.

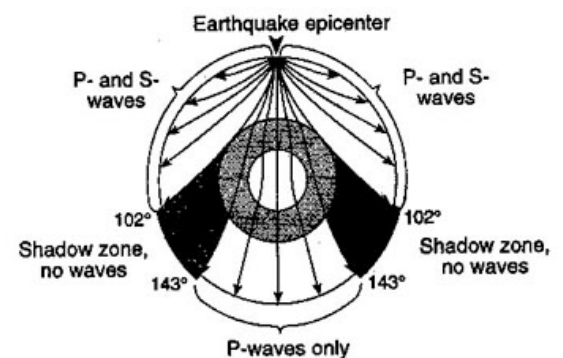


16. You need at least 3 seismometer stations to plot earthquake.

17. The focus is the underground position of the earthquake; the epicenter is the point on the surface directly above the focus.

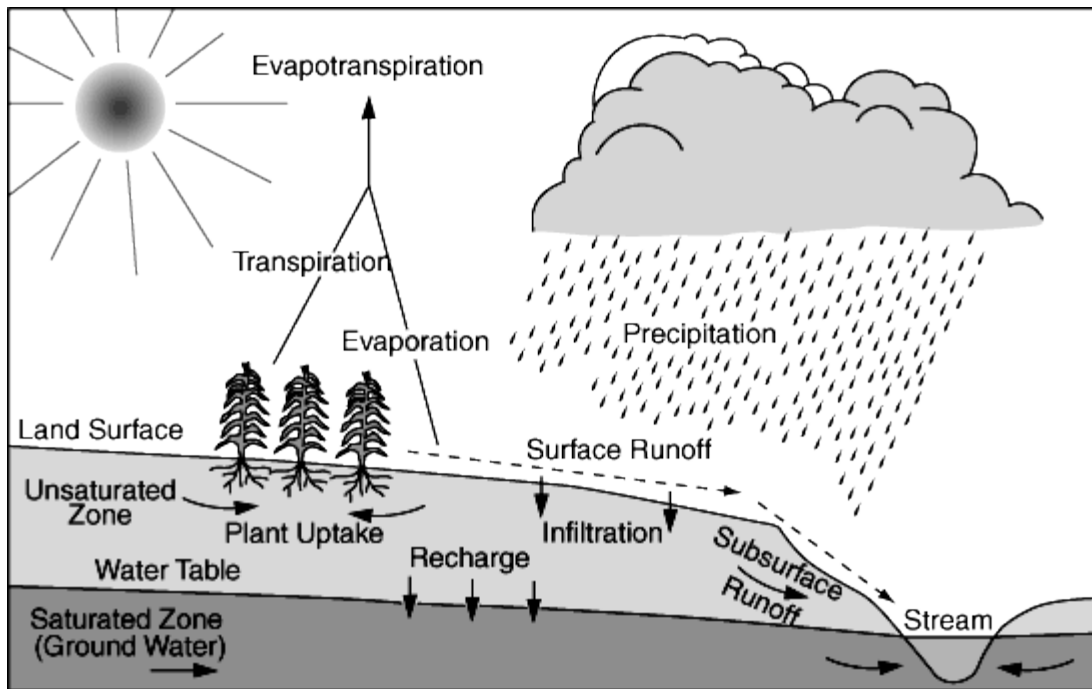
18. Scientists infer earth's properties from earthquakes (seismic data) and meteorites.

19. A shadow zone is caused by S waves not passing through the liquid outer core and P waves being bent as they go through the earth.



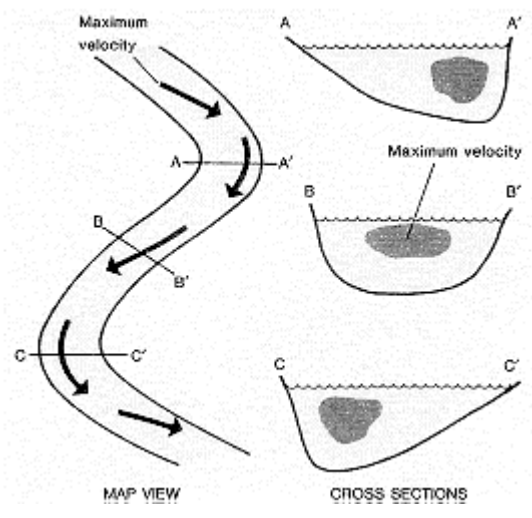
## CHAPTER 5

1. Porosity (the amount of empty space) does not depend on particle size (if you have the same shape & sorted – porosity is the same).
2. Permeability (the ability of a liquid to pass through) increases as particle size increases (rate increases as time decreases). If soil is highly permeable, water passes through very quickly.
3. Capillarity (the movement of a liquid upward against gravity) increases when particle size decreases.
4. Water Cycle

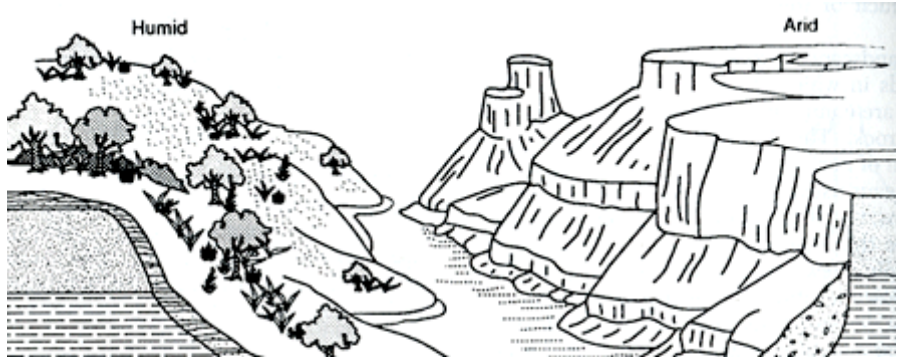


5. Weathering is breaking things down, Erosion is moving them and Deposition is dropping them.
6. Physical weathering occurs mostly in cold, humid climates (good for frost wedging).
7. Chemical weathering occurs mostly in warm, humid climates.
8. When a rock is broken into smaller pieces, surface area increases and weathering rate increases.
9. Gravity is the force behind all erosion.
10. Running water is the number one agent of erosion.
11. Stream velocity depends on slope and discharge.
12. Stream velocity is fastest on the outside of meander bend (curve) and causes erosion, slower at inside edge and has deposition occurring.

- 13. If a stream is straight the stream is fastest in the center near the surface.
- 14. Size, density & shape effect deposition.
- 15. Heavy, round, and dense particles settle out first (horizontal sorting). (see p.6 of ref. tables)
- 16. Horizontal sorting occurs as the stream slows down and deposits sediments.
- 17. Graded bedding (vertical sorting) occurs in quiet water as a stream enters a deep lake: biggest, densest and roundest sediments are on bottom. (like a settling tube.)

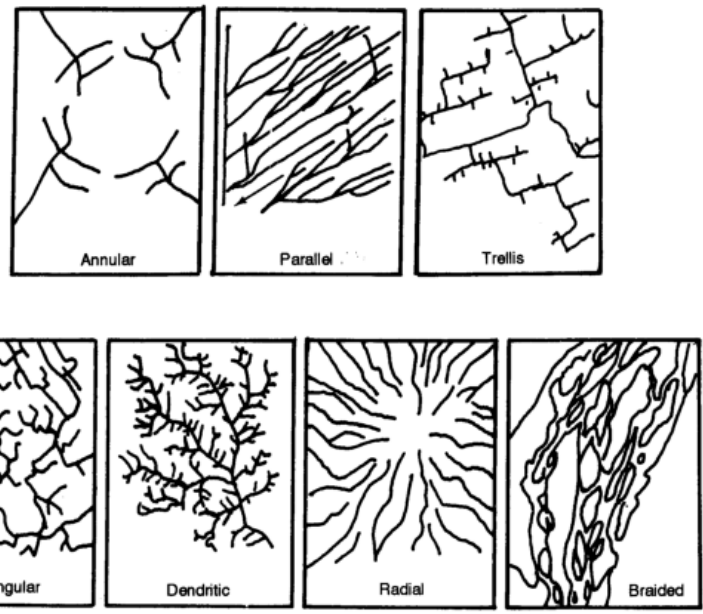


- 18. Water and Wind deposited sediments are Sorted. Gravity and Glacier deposited sediments are Unsorted.
- 19. Stream deposits are sorted, round and smooth and form V-shaped valleys.
- 20. Glacial sediments are unsorted with scratches and form U-shaped valleys.



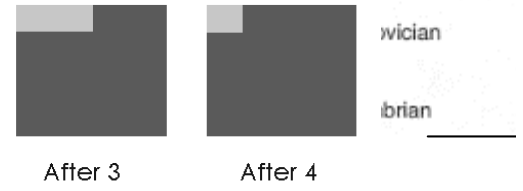
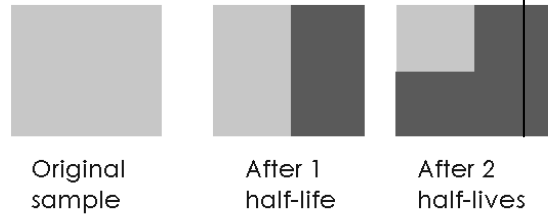
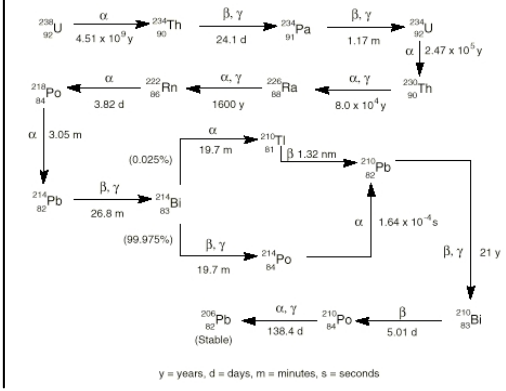
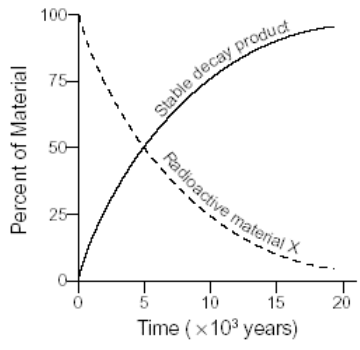
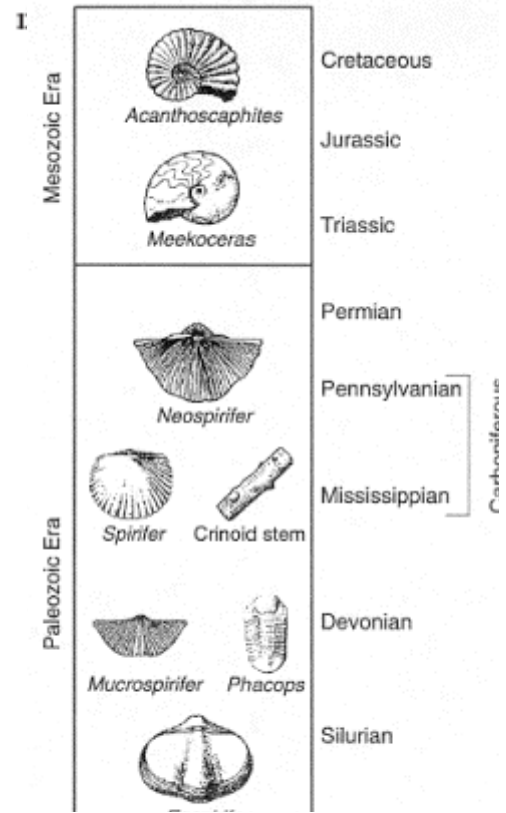
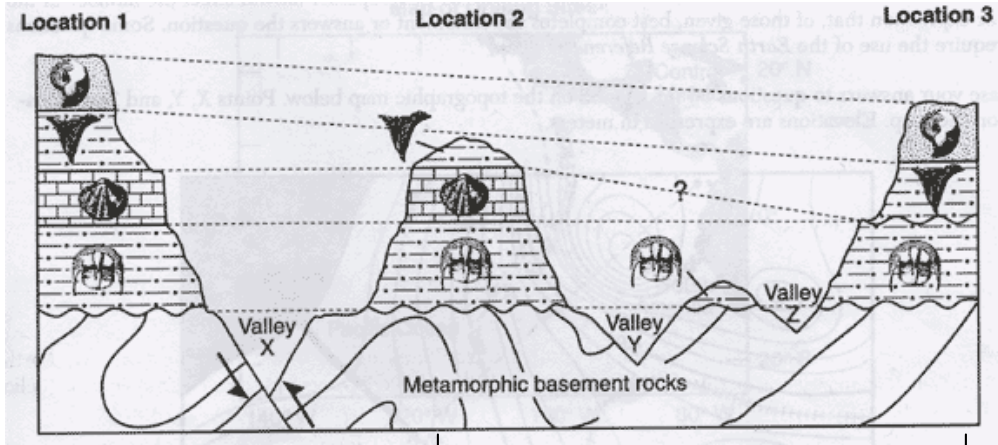
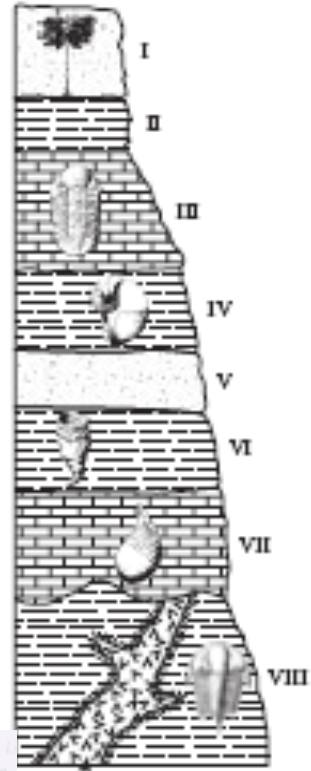
- 21. Humid landscape: smooth with rounded slopes.
- 22. Arid landscape: steep slopes with sharp angles.
- 23. The Catskills is a dissected plateau, not mountains.

24. Stream Drainage Patterns are dependant on bedrock structure.



# CHAPTER 6

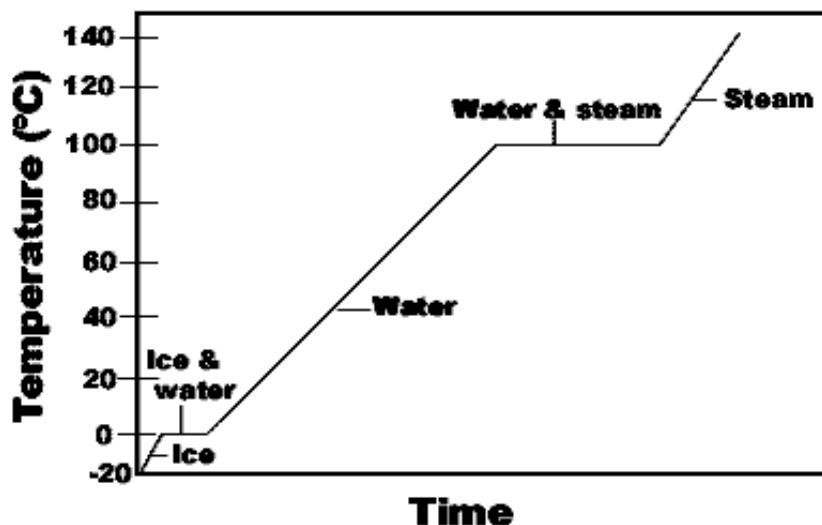
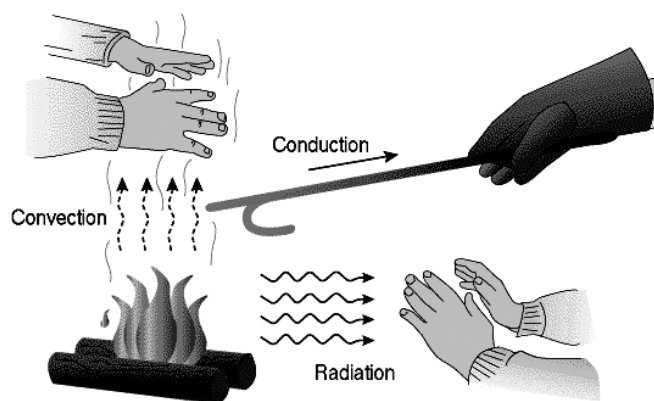
1. Uranium  $^{235}$  dates old rocks.
2. Carbon  $^{14}$  dates recent living objects.
3. The half-life of a radioactive element can't be changed.
4. Sedimentary rock forms in layers – non-horizontal layers shows evidence of crustal movement.
5. Undisturbed layers – bottom layer is the oldest.
6. Unconformity means erosion (time gap in layers).
7. Intrusions and faults are younger than the rock they are in.
8. Index fossils are good time markers.
9. Marine fossils on a mountaintop indicate uplifted land.





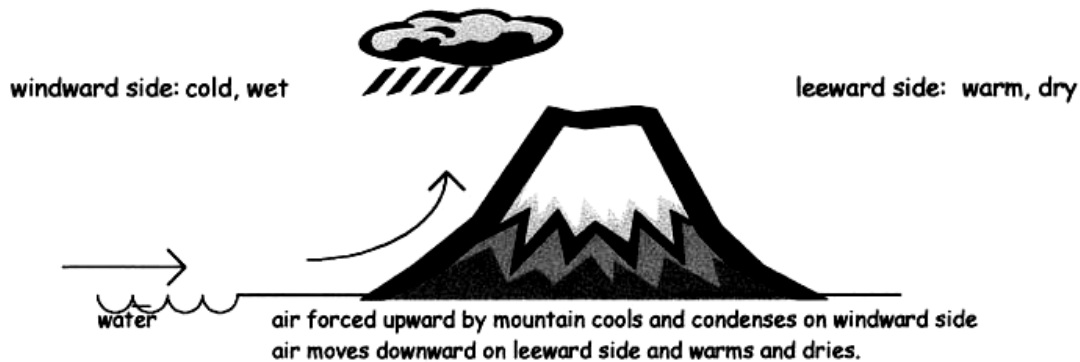
## CHAPTER 7 & 8

1. Infrared has a long wavelength; Visible light has a short wavelength (more intense).
2. Carbon dioxide (CO<sub>2</sub>) and water vapor absorb infrared radiation.
3. Energy moves from source to sink: high to low.
4. Potential Energy – stored energy.
5. Kinetic Energy – energy of motion.
6. Black and rough surfaces are the best absorbers and radiates.
7. Good absorbers of radiation are good radiators.
8. Land heats up faster than water, also cools faster.
9. Water bodies moderate temperature (smaller temperature range).
10. Boiling: liquid water changing to water vapor (steam) – add heat.
11. Condensation: water vapor changing to liquid water – remove heat.
12. Conduction – molecule to molecule - works best in solids.
13. Radiation – movement by waves – no medium necessary.
14. Convection – movement due to differences in densities – works best in liquids & gas.
15. There is NO temperature change at a phase change.
16. As temperature increases, air pressure decreases.
17. As moisture increases, pressure decreases.
18. Air pressure decreases with altitude.
19. Air cools and expands as it rises, warms as it falls.



20. Orographic Effect (adiabatic changes).

68. Expansional cooling:



21. Hottest part of the year is the end of July.

22. Hottest part of the day is after 1:00p.m.

23. Wind is due to air pressure differences.

24. Wind blows from high to low pressure.

25. Wind is named from the direction that it is coming from.

26. High Pressure – winds blow clockwise out from center (divergent) – anticyclones (in Northern Hemisphere).

27. Highs are cool and dry.

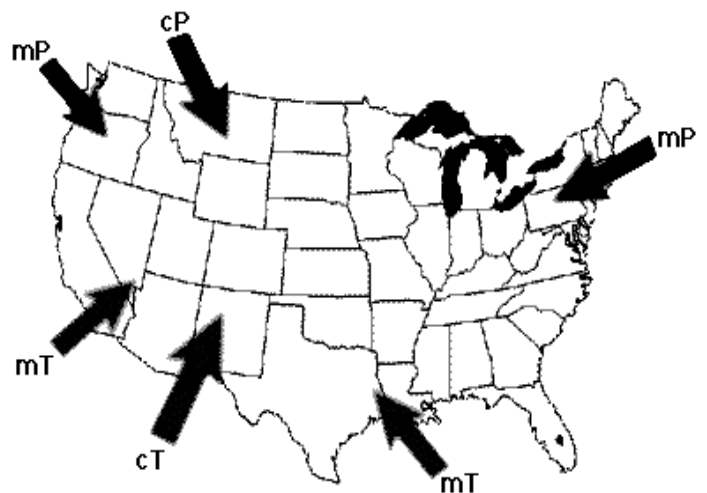
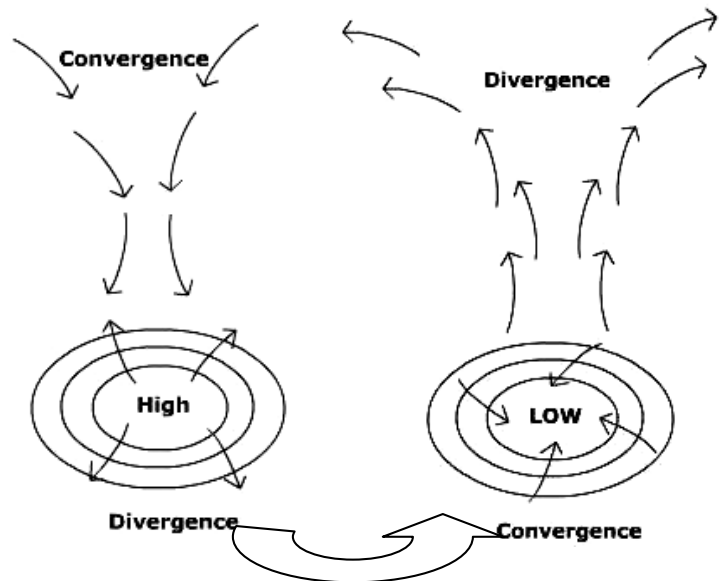
28. Low Pressure – winds blow counterclockwise toward center (convergent) – cyclones (in Northern Hemisphere).

29. Lows are warm and wet.

30. The closer the air temperature is to the dew point the greater the chance for precipitation.

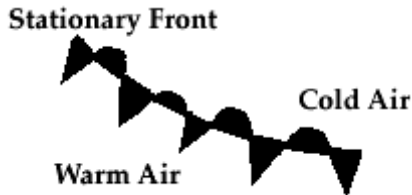
31. Weather moves from west to east in the United States.

32. Air Masses

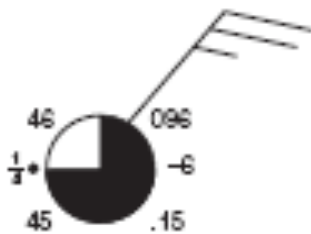


33. FRONTS

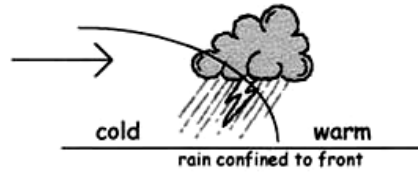
34. Cold fronts move fastest.  
 35. Stationary Front – a front that does not move or barely moves, behaves like a warm front. Side view looks like a warm front.



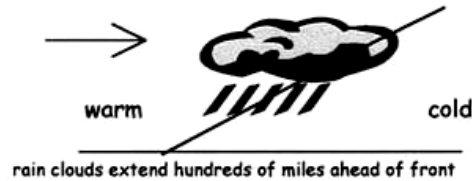
36. Station Model.



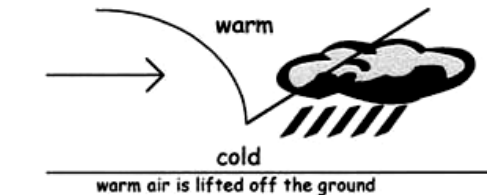
Cold Front:



Warm Front

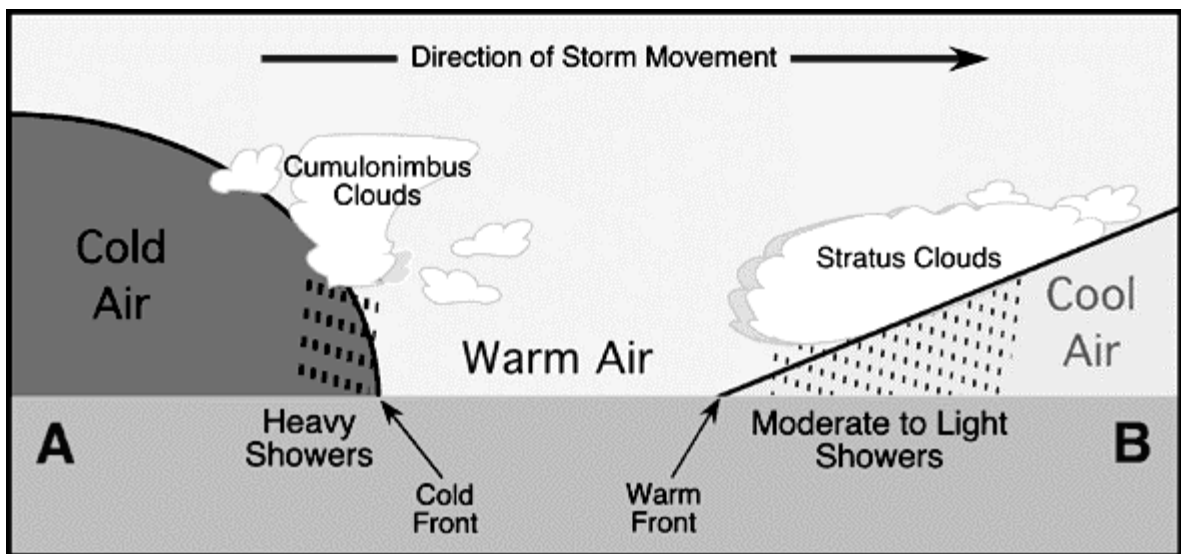
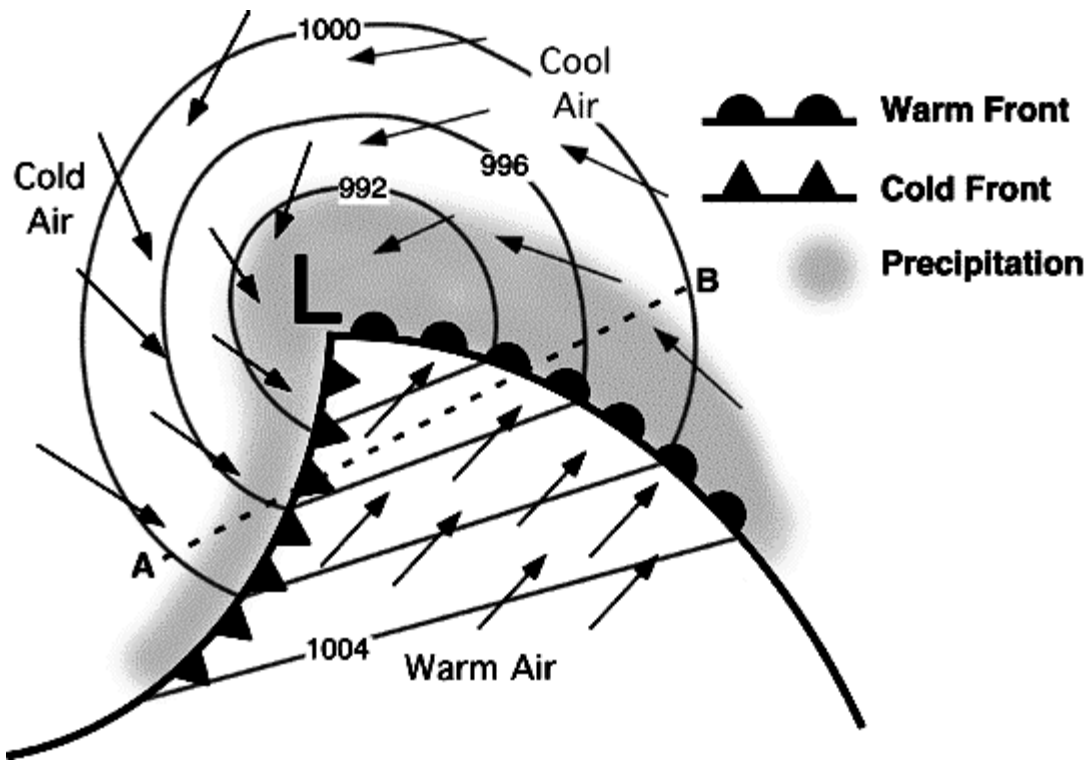


Occluded Front



37. A mid-latitude cyclone is an area of low pressure located between 30 degrees and 60 degrees latitude. Since the continental United States is located in this latitude belt, these cyclones impact the weather in the U.S. Pressure gradient force, from high- to low-pressure regions, causes high winds around these regions. Wind flow around a large cyclone is almost invariably counter-clockwise, in the northern hemisphere, due to the Coriolis effect

### Mid-Latitude Cyclone



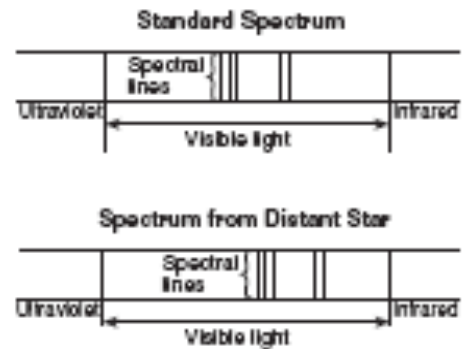
## CHAPTER 9

1. The universe began with a big explosion--"The Big Bang".

2. Our solar system is located on one of the outer arms of our Milky Way Galaxy.

3. All celestial objects appear to rise in the east and move west. (apparent motion)

4. An object speeding away from us will shift the light waves to the longer wavelength – red shift. Objects coming towards us, the light waves shifted to the shorter wavelength – blue shift due to the Doppler Effect.



5. Geocentric – Earth at center

Heliocentric – Sun at center.

6. Proof of Heliocentric Theory – Coriolis Effect and Foucault Pendulum (appearance of change in swing direction).

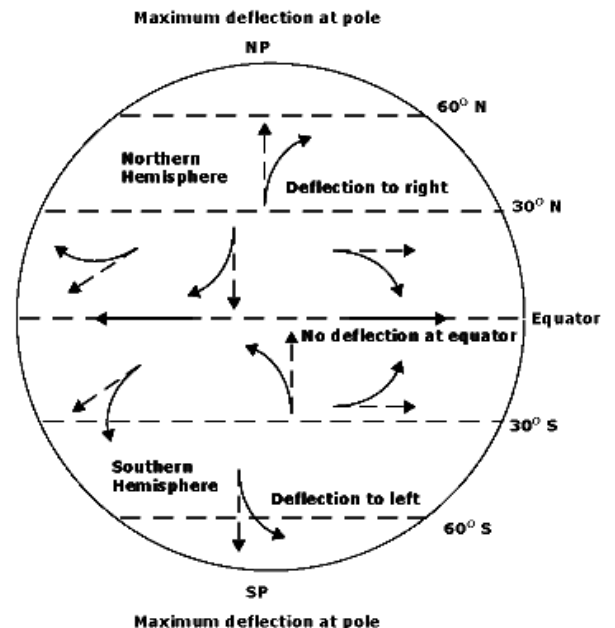
7. Coriolis Effect deflects things to the right in the Northern Hemisphere

8. Moon orbits Earth in  $27 \frac{1}{3}$  days but we see a full moon every  $29 \frac{1}{2}$  days.

9. Moon phases – new, crescent, quarter, gibbous, full (waxing then waning).

10. Light Right Returning – Waxing Moon;  
Light Left Leaving – Waning Moon

11. The moon has phases because it revolves around the earth (remember though that half is always lit).

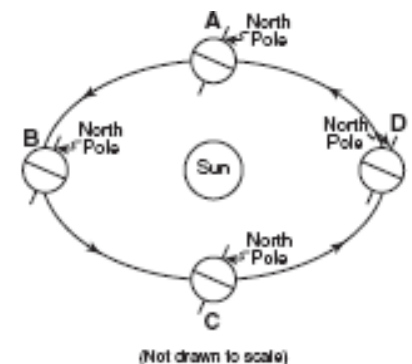


12. The Moon rises later each day and sets later each day by 49 minutes –  $12^\circ$  per day. ( $360^\circ/29.5$ )

13. Planets appear to go backwards (retrograde) as the earth passes them in space.

14. The closer something is the bigger it looks and the faster it appears to move.

15. The seasons are due to the tilt of the Earth's axis ( $23 \frac{1}{2}^\circ$ ) in relation to the Sun.

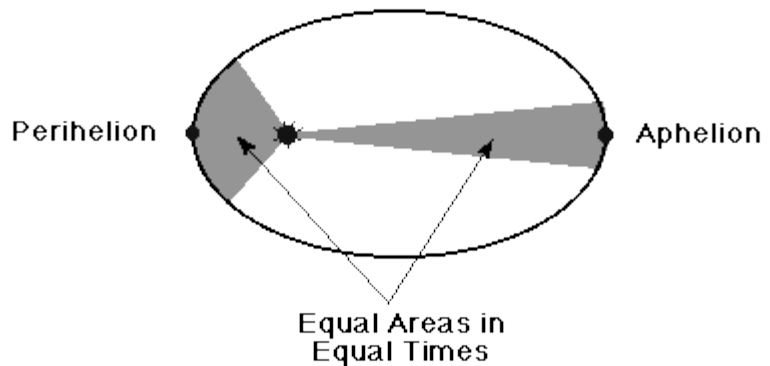
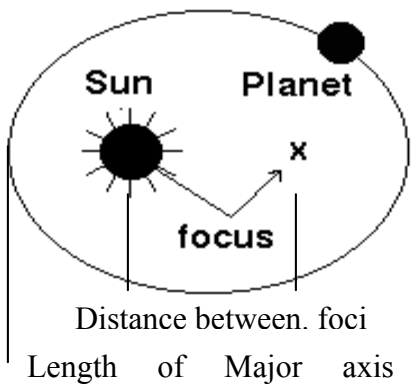


(Not drawn to scale)

16. Summer solstice is June 21<sup>st</sup>. The Sun rises  $23\frac{1}{2}^{\circ}$  North of East and sets  $23\frac{1}{2}^{\circ}$  North of West and is the longest day in New York State.
17. Winter solstice is December 21<sup>st</sup>. The Sun rises  $23\frac{1}{2}^{\circ}$  South of East and sets  $23\frac{1}{2}^{\circ}$  South of West and is the shortest day in New York State.
18. Equinoxes: March 21<sup>st</sup>; September 23<sup>rd</sup>. The sun rise due East and sets due West and has 12 hours of daylight everywhere.
19. Equator always has 12 hours of daylight.
20. The lower the altitude of the Sun the longer the shadow.
21. Aphelion - the point on an orbit farthest from the sun (A – away).  
Perihelion - the point on an orbit closest to the sun.
22. Eccentricity =  $\frac{\text{distance between foci}}{\text{Length of major axis}}$  (a perfect circle = 0, a line = 1)  
(see cover of ref. tables)

23. Ellipse

(The closer the foci, the closer to a perfect circle (both foci in same spot).)



24. Earth is closest to the sun in January and farthest in July.
25. The earth revolves counterclockwise around the sun (365 1/4 days).
26. The closer a planet is to the sun the higher its velocity (the faster it orbits).
27. Vertical rays (overhead sun) can only occur between  $23\frac{1}{2}^{\circ}$  N and  $23\frac{1}{2}^{\circ}$  S.

