

Final Test Review

Unit 1

4-27

~~From an observation~~ - Make an observation
~~From a hypothesis~~ - From a hypothesis

Conduct an experiment - Analyze Data + Draw conclusions
or indirect (wind power, hydrogen and biomass)

~~Services required to support life~~ : environmental stock or resources
of Earth that provide goods flows and ecological

~~Sustainability~~ : the ability to be maintained
at a certain rate or level; avoidance of the

depletion of natural resources in order to maintain
an ecological balance

~~Limit growth~~ : it grows by the same amount in
each time step

~~ever more rapid in proportion to the growing
total number or size~~ : growth whose rate becomes

~~number of years it takes for a certain
variable to double~~ ; # of yrs. = $\frac{1}{\text{growth rate}}$

~~Renewable Sources~~ Solar, wind, water, biomass and
geothermal energy sources

~~will not be replenished in our lifetime; fossil fuels~~
will not be replenished in our lifetime; fossil fuels

~~Renewable Sources~~ can be replenished fairly
rapidly through natural processes

~~Sustainability~~ the ecological yield that can
be extracted without reducing the base of the
capital itself

~~the number or quantity of people
or things that can be conveyed or held by a
vehicle or container~~ ; support w/o environmental degat

~~Bycatch~~ : the unwanted fish and other marine
creatures caught during commercial fishing for
a different species

~~It is equivalent to sustainable~~ Aquaculture should
not create significant disruption to the
ecosystem, or cause the loss of biodiversity.

~~Developing countries~~ that are more
industrialized and have higher per capita income

~~Developing countries~~ : poor agricultural countries
that are seeing to become more advanced
economically and socially

~~Common Property Resources~~ : to designate a type of
good has been criticized, because common-poor
resources are not necessarily governed by common
property protocols

~~Willingness to pay~~ : a situation in a shared-
resource system where individual users by
depleting that resource through their collective
action

Final Test Review

Unit 1 and 2 continued...

423-1

~~Point Source Pollution~~ any single identifiable source of pollution from which pollutants are discharged, such as pipe, ditch, ship or factory. ~~Nonpoint Source Pollution~~ caused by rainfall or snowmelt moving over and through the ground or ~~Point Source Pollution~~ pollutants which can be broken down into simpler, harmless substances in nature in due course of time.

~~Point Source Pollution~~: Hazardous chemical compound that is resistant to biodegradation and thus remains in the environment.

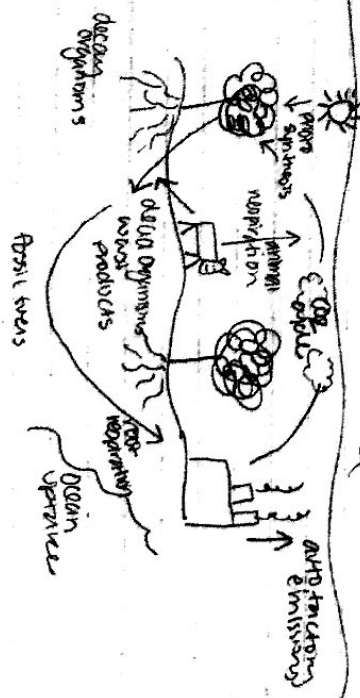
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Biogeochemical Cycles

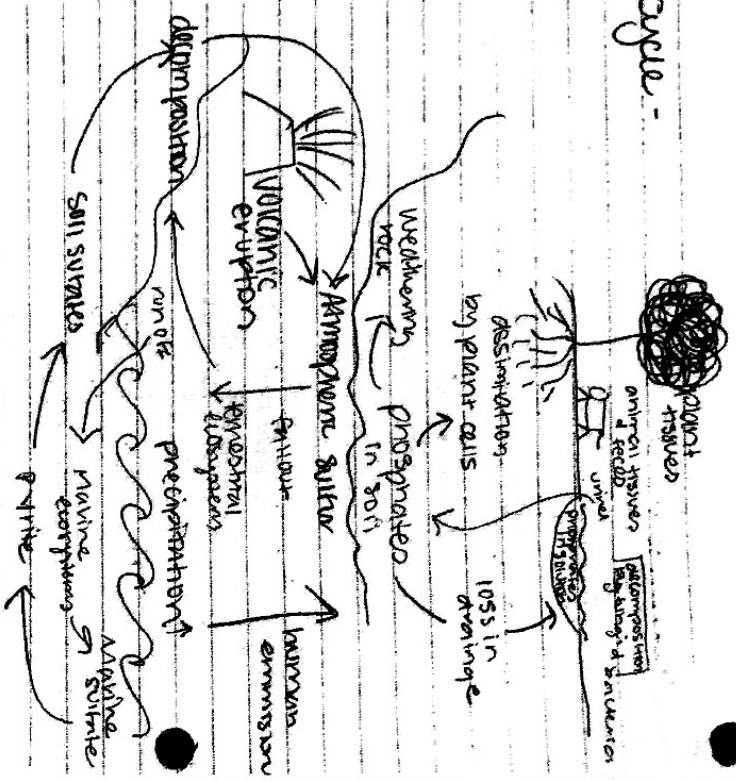
Nitrogen



CO₂/O₂



phosphorus cycle -



Sulfur -

Nitrogen cycle

- nitrogen fixation - atmospheric nitrogen is assimilated into organic compounds, especially by certain microorganisms as part of the nitrogen cycle
- nitrification - process by which bacteria in soil & water oxidize ammonia & ammonium ions & form nitrites & nitrates
- assimilation - the absorption & diversion of food or nutrients by the body or any biological system
- ammonification - decomposition w/ production of ammonia or ammonium compounds especially from by materials in which ammonia is contained

denitrification - loss or removal of nitrogen compounds specifically reduction of nitrates commonly by bacteria

- Legumes - forms nodules on their roots to fix nitrogen into a form usable by plants
- trophic levels - primary producers → primary consumers → secondary consumers → tertiary consumers
- energy decreases as it moves up the trophic levels
- food chains - linear network of links in a food web starting from producer organisms & ending at predator species
- food web - natural interconnection of food chains
- what eats what in an ecological community
- primary producer - produce biomass from inorganic compound
- primary consumer - animal that gets energy from vegetation (aka herbivore)
- secondary consumer - feeds on primary consumers (carnivores)
- tertiary consumer - animals that feed on secondary consumers
- population - group of same many groups of animals of same species → community of different species → ecosystem - w/ abiotic things
- net primary production - gross primary production - respiration
- ecotone - region of transition between
- tolerance ranges - range of abiotic conditions within which organisms can survive & reproduce
- limiting factors - factors that can determine how many of a species survive
- niche - role of different organisms/species
- photosynthesis uses sunlight

Types of competition

- **Inter specific** - competition of individuals from different species
- **Intra specific** - members of the same species compete for resources
- **competitive exclusion** - species that occupy a similar niche in the same location cannot coexist stably for long periods of time.
 - Resource partitioning - similar species exploit the limited resources w/out one species driving the other to extinction
- **interference** - organism actively interferes w/ another's ability to obtain its resources
 - Exploitation - organism indirectly compete w/ other organisms for resources by exploiting resources to limit the availability
- **Succession concepts**
 - **inhibition** - species have equal opportunities to establish populations after a disturbance
 - **facilitation** - spent resource availability that can be exploited by organisms under conditions of low niche competition
 - **tolerance** - equally capable of establishing themselves in a venting disturbance site
 - **primary** - gradual process of an ecosystem over a long period
 - occurs in an environment which has substrate devoid of vegetation w/ rich soil, lava flows / weathered glacial
 - **secondary** - process started by event that reduces an already existing ecosystem
 - **inertia** - ability of a system to resist change
 - **resiliency** - the threshold of an ecosystem
 - **pioneer species** - first to colonize a previously disturbed or damaged ecosystem
 - **indicator species** - defines a trait characteristic of the ongoing nonnative species - a species living outside its native distribution range, arrived by human activity
 - **invasive species** - organism indigenous to a given area in geological time, naturally occurring
 - **keystone species** - species that play a critical role in maintaining structure of a community. Impact is greater than

Opportunists - able to thrive in a wide variety of environmental conditions & can make use of a variety of different resources

- **Specialist** - can only thrive in a narrow range of environmental conditions / limited diet
- **fundamental niche** - theoretical role / place / function that a species has within its ecosystem
- **realized niche** - describes where a species actually lives & how it survives
 - Example: it survives
- **parasitism** - parasite feeds on part of host, promotes biodiversity & controls population by keeping one species from being too plentiful
- **commensalism** - interaction that benefits one species but not the other | no effect on the other
- **mutualism** - when 2 species interact in a way that they both benefit
 - **camouflage** - hide or disguise the presence of an organism used to hide from predators
 - **theory of island biogeography** - number of species on an island is determined by 2 factors: 1) rate at which new species immigrate to the island. 2) the rate that existing species become extinction on the island.
- **predator strategies** - Sharp claws / jaws, acute vision hearing, a sense of smell
- **prey strategies** - Camouflage, fast running / swimming / flying, morphological / behavioral adaptations, poison, mimicry.

Quick Study Cards Chapters 1 & 2

The Scientific method:

1. Question
2. Hypothesis
3. Experiment
4. Analysis
5. Conclusion

Solar Capital
Earth Capital

- : energy from the sun, direct or indirect
- : is the environmental stock or resources of Earth that provides goods, flows, and ecological goods are required to support life.

Sustainability : the ability to be maintained at a certain rate or level. Avoidance of the depletion of natural resources in order to maintain an ecological balance.

Tragedy of the Commons : the situation in which individuals use a common resource for their personal gain and degradation of resources, leading to decrease in yield for both group & individual.

Linear Growth : a quantity increasing in line with another variable in a relationship w/ a consistent line on a graph.

Exponential Growth : a growth whose rate becomes ever more rapid in proportion to the growing # or total size.

Doubling time | Rule of 70 : the period of time required for a quantity to double in size.

of years to double = $\frac{70}{\text{annual \% growth rate}}$

Biodegradable : pollutants which can be broken down into simpler, harmless substances.
Persistent : organic compounds resistant to environmental ~~break~~

Renewable Resources : refers to the provision of energy resources such as solar, wind, which are naturally replenished fast enough as being used.

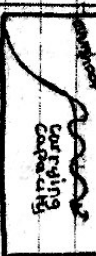
Nonrenewable Resources : a resource that cannot be readily replaced ex. gasoline, coal, natural gas by natural means on a level to its equal consumption.

Potentially Renewable : A resource that can be replenished fairly rapidly through natural processes

Resources ex. trees, grasses, soil

Sustainable Yield : is the ecological yield that can be extracted w/o reducing the base of capital itself.

Carrying Capacity : the maximum # of individuals of a given species that a particular environment can support for an indefinite period.



Bugsath : the species of creatures that were not purposefully caught and are thrown overboard dead or dying

Is aquaculture : Yes, it can be replenished but it's overfished in certain areas it is not.

Developed vs : developed nations are generally categorized as countries that are more industrialized & have higher per capita incomes. Developing is opposite

Common Property : (environmental) natural resources owned & managed collectively by a community rather than an individual.

Point source : any single identifiable source of pollution
pollutant ex. discharge from wastewater treatment plants)
nonpoint source : caused by runoff - carries away natural pollutants into lakes, rivers, wetlands.

CHAPTER 2

INDUSTRIAL REVOLUTION

multiplied per capita energy consumption
 = power of humans to shape earth & fuel economic growth

Planetary vs Earth

WISDOM LOCAL VIEW vs WISDOM WORLDVIEW

- 1) Humans are planet's most important species & are in charge of nature
- 2) there is always more.
- 3) Economic Growth!
- 4) Manage earth's supply for our benefit = SUCCESS!

- 1) Nature exists for ALL earth's species
- 2) there is NOT always more.
- 3) Economic growth is good, but NOT those harmful for environment
- 4) how to work WITH, not of nature w/lt. rest = SUCCESS!

HISTORY of the BISON



Using Americans feed enough from bison meat - killed more for trade (skin for steel knives / firearms)

By 1840s, railroad companies hired bison hunters to supply construction workers with meat for food during westward expansion

Passengers gunned down bison as a sport.

Commercial killed bison for their hide & tongues.

Farmers killed them because they damaged crops & destroyed their fertility

By 1908, only 85 bison were left out of 60-125 million back in 1500s.

Since then, Yellowstone & 1905 law protected them

Today, 300 000 bison & 91% on privately owned lands.

Reduce: limit using a certain object

Reuse: using a resource over over under same form

Recycle: collecting & process one substance into a new of use

ppm - parts per million
 ppb - parts per billion
 ppt - parts per trillion

PRESERVATIONS

Protect environment in its **PAST STATE** state because it promotes human happiness / well-being.

- Tom Mair, Rachel Carson (Silent Spring) Aldo Leopold (A Sand County Almanac)

WISDOM - USE

Use natural resources wisely for greatest use for most **PEOPLE**

- Gifford Pinchot, Teddy Roosevelt

HUNTERS - GATHERERS:
 survived by collecting edible wild plants, hunting, fishing, scavenging meat from animals killed by other predators

Agricultural Revolution

gradual move from a nomadic hunting/gathering lifestyle to one centered on settled agricultural communities, where people domesticated animals & cultivated wild plants.

SUBSISTENCE FARMING

family grow enough food for itself

LEON in KAIBAB

Before 1905, 4000 deer in Kaibab National Park (hunting capacity) (max population) = 30 000 deer

To protect deer, Roosevelt banned hunting, killed predators

= deer population sky rocketed!

Minimum viable populations = stabilized population

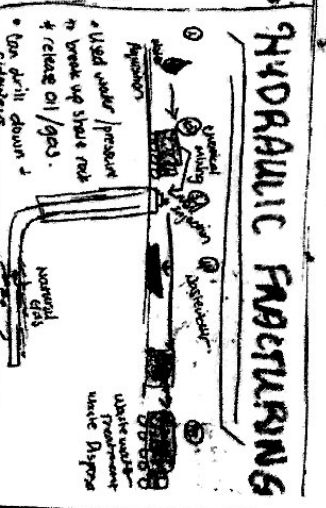
AGRICULTURE

Slash & Burn Agriculture = Impact environmental impact

Clear small patches of tropical forests by cutting down trees & burning underbrush = asher fertilized nutrient - poor soil

(disease - dipping) - trichlorurene
 - HINDRY: to combat MALARIA, TYPHUS as an insecticide.
 = Yanking, Yanking, sucking, sucking.

HYDRAULIC FRACTURING



Sanjiansu Revolution

1940-1950 movement that sought major changes to federal land control, use & disposal policy in American West

THE LORAX

Extensive use of trees to manufacture "thneed"
 trees disappeared, nature extinction
 how the impact on environment under capitalism

SYNERGY
 - or more agents
 - greater effect than sum of individuals
 - "team work"



High Quality / Low Quality Energy

- High Quality**
- organized
 - concentrated
 - easy to work with
- Low Quality**
- dispersed
 - disorganized
 - little ability to do work

Second Law of Thermodynamics
 total entropy of isolated system
 ↑ over time

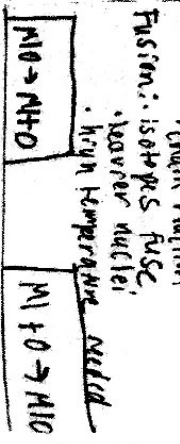
- entropy = chaos
- disorder of the universe is increasing
- fraction of entropy is lost to the universe as heat

$\Delta S \uparrow$ $T \uparrow$

Alpha, Beta, Gamma

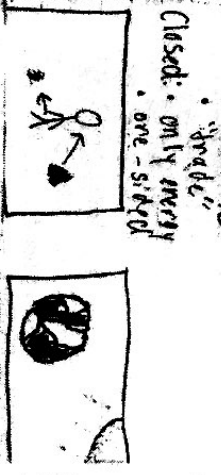
- A: fast, positive
 - B: high-speed, negative
 - G: high-energy, radiation
- paper wood cement

Nuclear Fusion / Fission
 Fission: splitting of isotopes
 - lighter nuclei
 - chain reaction
 - isotopes fuse
 - heavier nuclei
 - high temperature needed

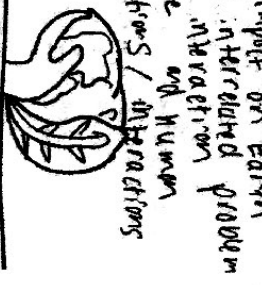


Open System / Closed System
 Open: matter and energy
 - exchange
 - "trade"

Closed: only energy
 - one-sided

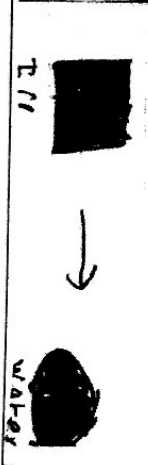


Environmental Science
 human impact on Earth
 - complex, interrelated problem
 - species interaction
 - nature and human
 - connections / interactions

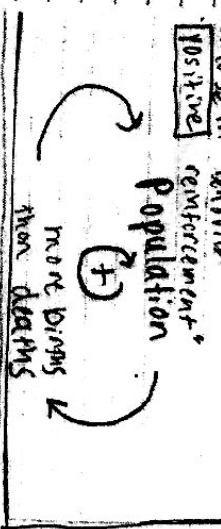


Entropy

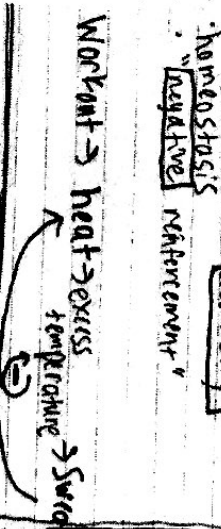
- chaos
- decline to chaos
- lack of order
- "butterfly effect"



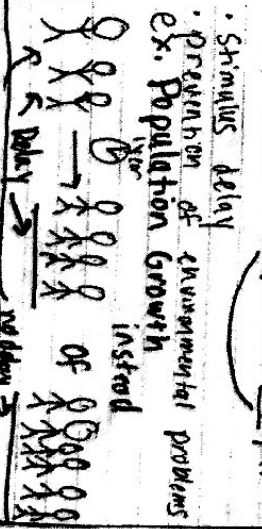
Positive Feedback
 amplification of an effect by its own influence
 - on process
 - increase in behavior
 - "positive reinforcement"



Negative Feedback
 change leads to decreasing
 - homeostasis
 - "negative reinforcement"



Time Delay
 delay between input and output



High Waste, Recycling, Low Waste Sacrifices

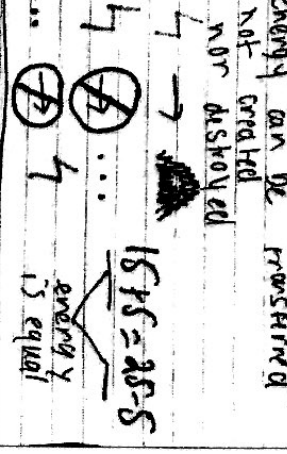
- High Waste**
- consumption
 - high profile
 - recycled material
 - pollution
 - we are at
 - resources
- Low Waste**
- recycling
 - less pollution
 - less profit
 - safer energy
 - less
 - more resources
 - equilibrium
 - environmentally friendly
 - pollute
 - energy cost
 - friendly
 - energy
- China's TOM

Law of Conservation of Matter
 matter cannot be created or destroyed
 - system is always at equilibrium
 - "scale"

$4 + 4 = 8$
 $2.4 + 2.4 = 4.8$

Balanced

First Law of Thermodynamics
 energy can be transferred
 - not created
 - not destroyed



High Waste / Low Waste
 High Waste: examples
 industrial revolution
 modern U.S.

Low Waste: examples
 ancient civilizations

Recycling

- Recycling:**
- greatest for environment
 - least pollution
 - least waste



Unit 3-4

Chapter 4

- High quality energy: energy that is concentrated and has greater ability to do work. Ex. electricity, coal, etc.
- Low quality energy: energy that is dispersed and has little ability to do useful work. Ex. low temperature.
- Law of Conservation of Matter: in any physical or chemical change, matter is neither created or destroyed (usually changed into another form).
- First Law of Thermodynamics: no detectable amount of energy is created or destroyed.
- Second Law of Thermodynamics: in any conversion of heat energy to useful work, it is always lower than the initial energy used.



Positive Feedback Loop
Negative Feedback Loop

Time Delay

Environment
Science

~~next~~

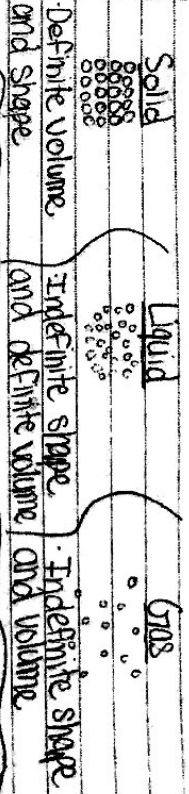
Entropy: thermodynamic quantity representing the amount of energy that is no longer available for work.

- Planck's constant: h
- Bohr's model of atoms: radiating & passing energy
- Normal incidence: perpendicular radiation with a refractive index constant defined by refractive indices.
- Nuclear fission: 2 isotopes of light elements fused together to form a heavier nucleus.
- Nuclear fusion: nuclei of isotopes w/ large mass are fused into lighter isotopes.
- Open systems: matter & energy is lost & exchanged.
- Consolid systems: all matter & energy remains.

Section 4

3 Process of Matter

FIVE STAR. ★★★★★

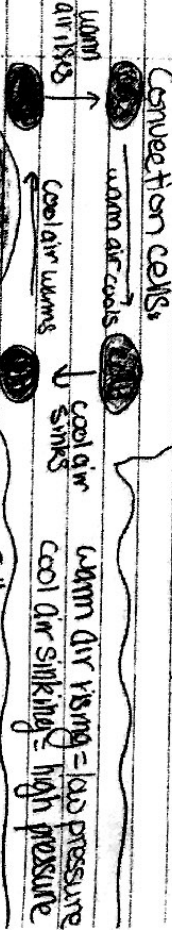


FIVE STAR. ★★★★★

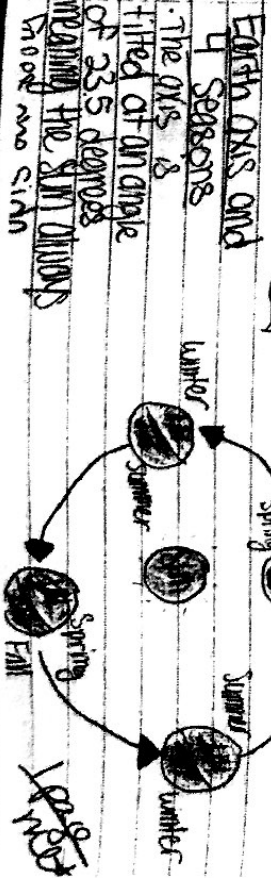
Weather vs Climate
 weather: day to day variations of the condition of the atmosphere.
 climate: an established pattern of weather over a long period of time.
 Ray Shadow Effect: moisture from water on the windward side cools and condenses at the top and goes over to the leeward side as dry air forming the rain shadow effect.



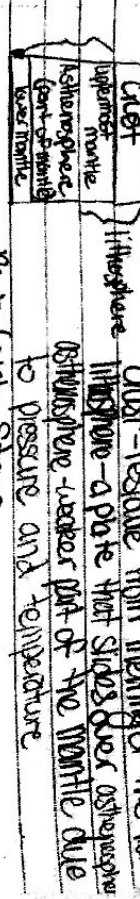
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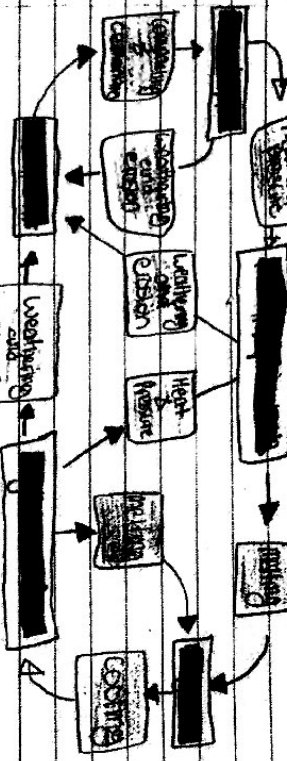
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Lithosphere, Asthenosphere, Crust



Rock Cycle Steps



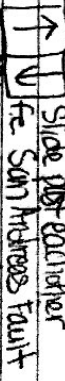
Divergent Boundary - pulls away from each other



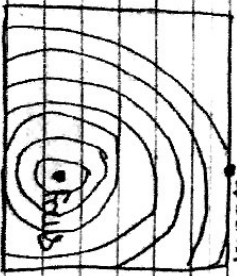
Convergent boundary - one plate dives under the other



Transform Boundary - plates slide past each other

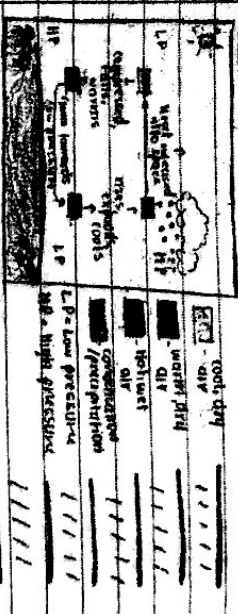


Location of Volcanoes: Subduction zones (Ring of Fire)
Location of Earthquakes: Along two different plates
 epicenter = point on Earth's surface

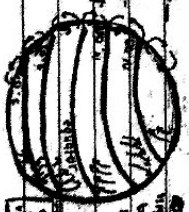


Magnitude = size of the earthquake scale goes to 0-9+
P waves - first waves to arrive first push and pull rocks
S waves - move the rocks up and down and side to side
Surface waves - make the surface flex and bend side to side or up and down

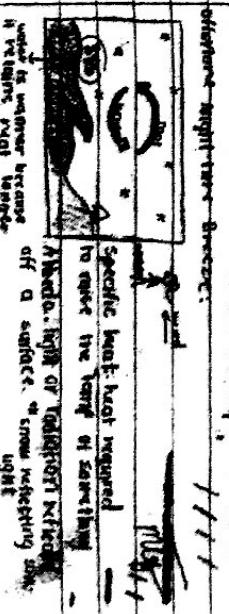
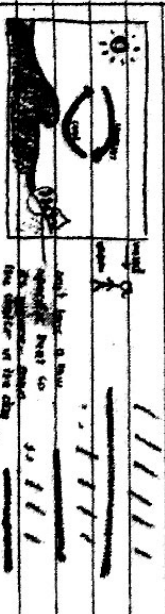
Atmosphere:
 High and low pressure: low pressure areas
 Low pressure - movement - wind - depends on temperature
 less dense and less // high pressure - more dense
 warmer the water warmer that had more heat
 density and sink.



convection cells: a convection cells, caused by the earth's rotation spinning faster than the air masses at the equator and slower towards the poles, deflecting air masses resulting in wind and storms. The cells interior each other from the equator and outer cells and sea. Hadley, Ferrel, and polar cells - Coriolis effect - moves air masses in the northern hemisphere to the right and the southern hemisphere to the left



Desertive Degrive Breeze:



BIOREM:
 Plants are located in various places - due to differences in climate temperature and precipitation caused by global air circulation

biome: terrestrial, aquatic, with characteristic types of natural inhabitants from communities adapted to the climate of an area
 - average annual precipitation, temperature and soil type are the most important factors in producing terrestrial biomes
TEMPERATE: SOLAR DEGREE'S, WINDS, and DIVERSITY
 Deciduous
 desiccation and water temperature affects precipitation (over 50% of earth's land)
 mainly in the temperate of continental away from small sea air and winds or on the downwind side of mountains

Tropical desert - southern latitudes, high wind, little rain (low rainfall & high winds)
 Temperate desert - mid-latitude, low rainfall, high wind, little rain (low rainfall & high winds)
 Cold desert - Great Desert, China (temperatures - high winds and cold)
 Humid forest
 air - reaching over growing over dryland vegetation and underground water
 migration of crops in the desert can cause salinization and is disrupted by the extraction of minerals used for storage of toxic and radioactive wastes

Specific heat: heat required to raise the temp of something
 Albedo: high or reflectivity
 water is warmer because it reflects heat longer

Climate records

General: has erratic precipitation, droughts and fires in winter only grasses and a few trees that survive in

- seasonal drought, generally by large herbivores, and fires prevent trees and animals from getting established

Tropical grassland-high average temp. low to moderate precipitation, prolonged dry season (near the borders of tropical rain forests)

Savanna - winter all year could have alternating wet & dry seasons, abundant rains

Temperate grassland - plain, rolling hills, winter, very cold, summers hot & dry (maize - fertile soil)

Polar / Arctic tundra - long, dark, cold winters, most precipitation is snow, low permafrost

Chaparral (temperate woodlands) - winter, dry, hot & slightly wet, summers very hot, hot & dry, fires easily spread and cause floods

Human Impact

live clock temperate over grasses, carbon dioxide that has been trapped in water and soil, forest fires is widespread, water spread or plowed topsoil can be trampled and create a desert

Forests

Tropical rain forest - broadleaf evergreen forest near the equator where hot, moisture-laden air rises and drops its moisture (layers from top to bottom: emergent, canopy, understorey, shrub, and ground layer)

Tropical deciduous - in between rain forests and savannas, winter year round with a winter season and dry season (lots of deciduous & evergreen)

Temperate deciduous - in areas with moderate average temp. that change significantly in the season

Boreal / taiga / boreal forest - sub-arctic climate w/ long, dry, cold winters (spruce and cold)

Oceans

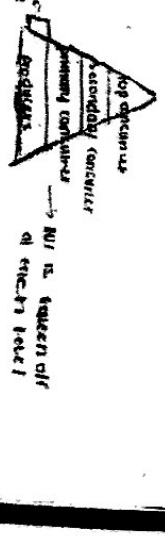
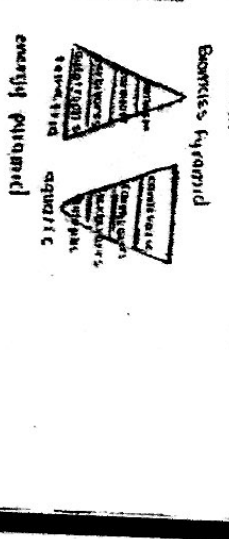
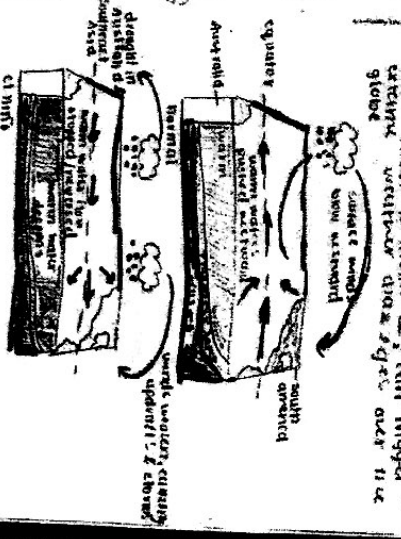
- ocean currents redistribute heat received from the sun, cold currents carry flow from the polar areas to the equator and warm currents are pushed away from it by wind and the earth's rotation

- water sinks when it gets to the Arctic because it becomes denser in the cold

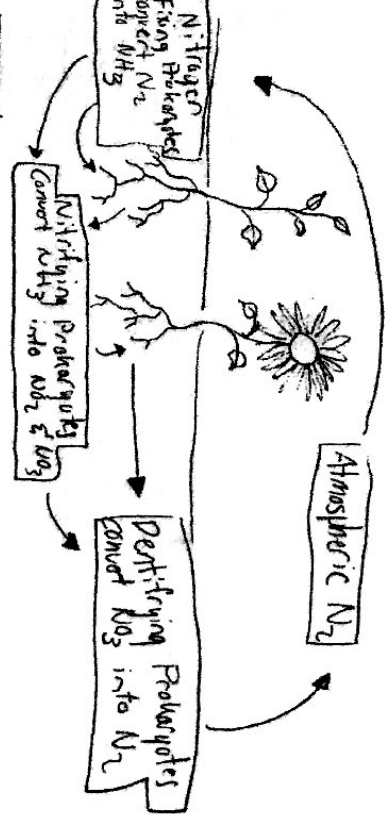
- there are five gyres, ocean currents circulate in the ocean basin: North Pacific gyre, South Pacific gyre, North Atlantic gyre, South Atlantic gyre, & Indian ocean gyre

- the difference in gradual temperature change between warm and cold water

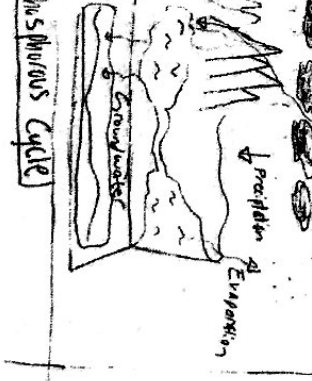
Climate - west coast surface, winds westerly, depositing coastal upwelling & fog, usually last from several months to a year & can disrupt populations of plankton, fish, and seabirds (El Niño) but's warm, then to result in a wetter, stronger weather down over the globe



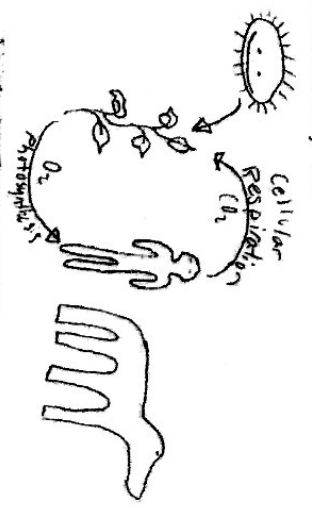
Nitrogen Cycle



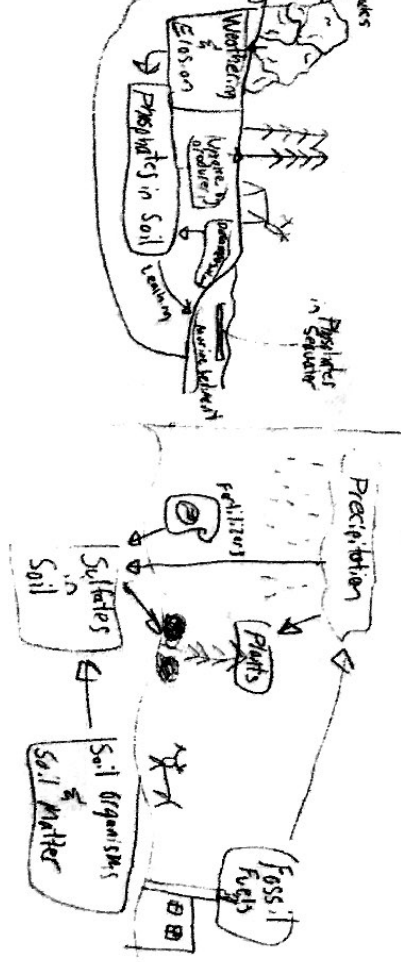
H2O Cycle



CO2 - O2 Cycle



Sulfur Cycle



Risks

