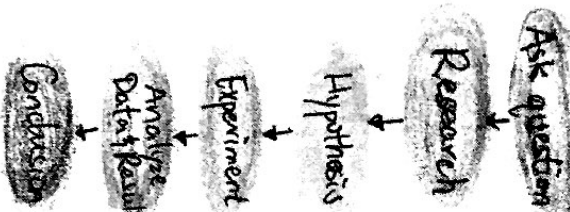


Unit 1 Part 1

Scientific Method Steps



Growth



Exponential growth

- J curve
- increases by a fixed percentage of whole
- linear growth line
- increases by a constant amount

Doubling Time

- how long it takes to double something.
- Rule of 70

Doubling Time = $\frac{70}{\% \text{ growth rate}}$

Developed vs. Developing

- Economically

Developed

- highly industrialised
- high living per capita GDP
- generates about 15% of world's pollution & waste
- commands about 85% of world's wealth
- 21% of world's population

Developing

- low to moderate industrialisation and per capita GDPs
- 79% of world's population
- 15% of world's wealth
- use 12% of world's natural resources.

Sustainability

solar capital

- energy from the sun

earth capital

- energy from planet's air, water, soil, wildlife.

- recycling, & pest control processes.

Renewable/Nonrenewable

Potentially renewable resource

- Renewable: resource is essentially inexhaustible on a human time scale. ex) solar energy

- Nonrenewable: resource exists in a fixed quantity that can be completely used. ex) coal

- Potentially renewable: resource can be replenished fairly rapidly through natural processes. ex) trees, fish

Tragedy of the Commons

- degradation of common property resources

- common property resource: owned by no one but are available to all users free of charge

Ex. Overfishing



- Sustainable yield: highest rate potentially renewable resource can be used indefinitely without reducing its available supply

Chapters 1 & 2

Population Growth

Carrying capacity

- the number of individuals of a given species that can be sustained indefinitely in a given area.

Population size determined by:

- interplay between its biotic potential and environmental resistance

- Normally population growth fluctuates around carrying capacity.



- can also be the maximum population size that the environment can sustain.

* is not a fixed quantity determined & altered by

- competition
- natural & human-caused catastrophic events
- seasonal fluctuations in supply of food, water, hiding places etc.

Pollution

- Pollutant: a particular chemical or form of energy that threatens health, survival, or environment.

Point source: Pollutant

- come from single identifiable source.

ex) smelting at powerplant, exhaust pipe of automobile.

- Non-point source: Pollutants dispersed, sources difficult to identify.

ex) runoff of pesticides, mulch, fertilizers (don't identify exact source).

* Bacteria & viruses for water pollution from point sources, from nonpoint.

Pollutant Persistence

- Complex chemical pollutants broken down (metabolized) into simpler chemicals by living organisms (bacteria) - biodegradable

ex) human sewage

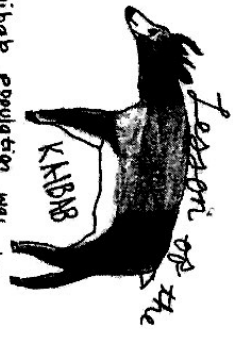
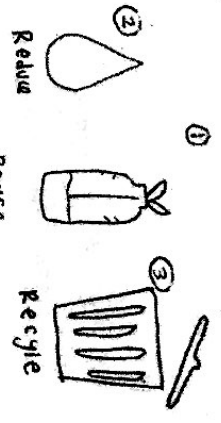
- Substances that take decades or longer to degrade - slowly degradable/persistent

ex) DDT & most plastics

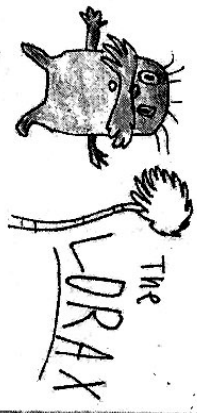
- Nondegradable pollutants cannot be broken down by natural process

ex) lead & mercury - best way to deal w/ nondegradable & slowly degradable - not to release them reuse/recycle

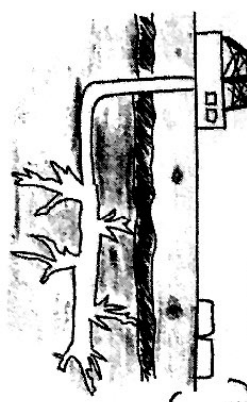
PPM / PPb / PPt
 1 part per million
 1 part per billion
 1 part per trillion
 Means 1 part of POLLUTANT per 1,000,000 parts of liquid, gas etc.



Lesson on the KARBAB
 Kaibab population was low due to overgrazing. Forest service banned hunting & killed predators. Population shifted up then crashed.
 Solution: controlled hunting, built corral, more predators → keep some to go



flourishing tree population
 trees were cut down
 fast rate for consumption & forced animal to leave habitat



HYDRAULIC FRACKING
 can contaminate ground water
 expensive
 labor intensive

#2

Alexandra
 Sluiter, Bahh



PLANET EARTH
 Management
 - there is always more
 - economic growth
 - we manage the earth

EARTH
 Wisdom
 - earth for animals & us
 - we will be sustainable
 - we must cooperate

WASTE USE VS PRESERVATION
 US sources for greatest gain for our people
 GARFORD PINCHETT
 TEDDY ROOSEVELT

Wilderness nature protected
 JOHN MUIR
 RACHEL CARSON
 ALDO LEOPOLD



1500 - thriving population
 1865 - Settlers hunted for sport + food
 1892 - only 500 left living

AGRICULTURAL REVOLUTION
 shift from nomads to settled farming
 domestic animals, population, excess & urbanization

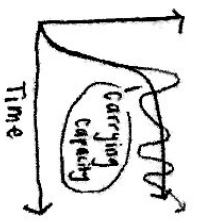
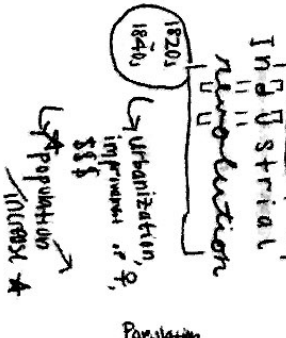
SLASH BURN
 1 Burn & clear vegetation
 2 Plant
 3 Harvest
 4 Allow soil to regenerate (fallow)

$P \times A \times T = I$
 P = people
 A = # of activities
 T = time
 I = impact

SUBSISTENCE
 farming
 self-sustainable
 no external
 ex) 1 pig for 1 pig

Ageebush
 1970-80s rebellion
 wanted MORE state control of land
 privatization of federal government lands

HUNTER GATHERERS
 nomads
 gather plants
 hunt wildlife
 never had "excess"



Final Test Review - #2

1/14/21 2 1
Katie Spear
Per 6

Conservation Mindsets:

1) Pragmatic resource conservation → conserve nature for as long as possible so all can continue to use it

2) Moral/Aesthetic nature preservation → conserve nature for beauty

Values:

- 1) The preservation ethic → unspoiled nature should be protected for its own inherent value
- 2) The conservation ethic → use natural resources wisely for the greatest good for people



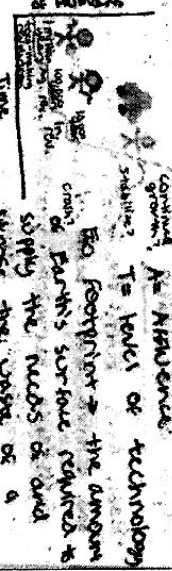
Reduce, Reuse, Recycle!
Lower usage in the consumption cycle or a return to original form



Ecological Footprint

$$I = P \times A \times T$$

I = Total Impact
P = Population size
A = Affluence
T = levels of technology



Hunter - Gatherer Societies

- survive by collecting, hunting, scavenging
- sustainability - resource use
- social

Agricultural Revolution

- development of new farming technology and techniques
- more food → more people
- began 10,000-12,000 years ago

Industrial Revolution

- England in 1700s, USA in 1800s
- energy shift to nonrenewable fossil fuels
- large-scale factory production
- life expectancy increases
- began 275 years ago

Wild Use vs. Preservation

- wide use → humans should utilize nature for whatever they please
- preservation → want to protect nature from human use



max

Important Environmental Figures

- 1) Rachel Carson: author of *Silent Spring*, which documented the effects of pesticides on the environment
- 2) Gifford Pinchot: pioneered scientific management of forest resources as public lands
- 3) Aldo Leopold: said idea of wilderness should be to protect nature
- 4) Teddy Roosevelt: term known as 'Golden Age of Conservation', used forest reserves and refuges
- 5) John Muir: preservationist, wanted to use nature for experiencing beauty of nature

Lesson of the Kaibab

- 1) Kaibab National declared Federal Wildlife game refuge
- 2) Hunters killed off predators like wolves and coyotes
- 3) Population of mule deer crashed due to overgrazing

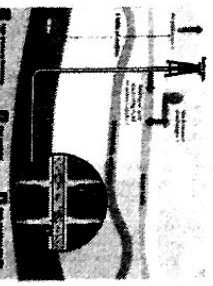
Types of Farming

- slash and burn: vegetation is cut down and burned before being planted with crops
- subsistence farming: provides enough food for one family's survival

What is the Sagebrush Rebellion?

movement during the 1970s-80s that sought major changes to federal land control, use, and disposal in the West

Hydraulic Fracturing



rock is fractured by pressurized liquid
- results in some gas leakage
- could contaminate drinking water
- disturb geology

History of the Bion



population crash from hunting/harvest from development

The Leavis: advocated putting aside economic growth and possessions for the good of resource longevity

resources hoarded for thread production and the environment was severely polluted
- life left region
- course can't change UNLESS humans address conservation

History/Effects of DDT

- fat-soluble chemical that bioaccumulates in the fatty tissues of animals
- can be biomagnified
- toxic AND persistent
- sprayed in borers to kill insects, biomagnified in tissue

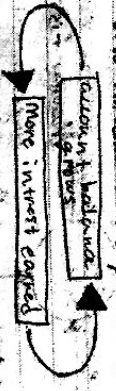


#3

Signaling - the interaction or cooperation of two or more organisms, suborganisms, or other agents to produce a combined effect greater than the sum of their separate effects.

$$1 + 1 = 2$$

of an effect by its own influence on the process that gives rise to it.



negative feedback - return of part of the output signal to the input, which is out of phase with it, so that another gain is reduced and the output is improved.

the delay or a delay used to separate the occurrence of two events, especially in a mechanical or electronic device.

Evolutionary Science - branch of biology focused on the study of the relationships of the natural world and the relationships of between organisms and their environments.

Ch. 4 - the quality of an organism or concentrated for a form used word.

Low quality energy - is disorganized and dispersed and has little utility in work. principle that matter cannot be created or destroyed.



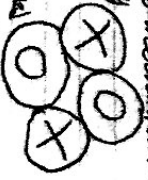
1st law of thermodynamics - branch of physical science that deals with the relations between heat and other forms of energy.



Second law of thermodynamics - this states that as energy is transferred or transformed, more and more energy ends up as waste.

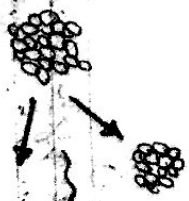
Entropy - thermodynamic quantity representing the unavailability of a system's thermal energy for conversion into mechanical work.

Alpha - positively charged particle consisting of two protons and two neutrons, emitted in radioactive decay or nuclear fission.



Beta - high-speed electron or positron, usually emitted by an atomic nucleus undergoing radioactive decay.

gamma rays are emitted in the decay of certain radioactive nuclei and in fusion.



Neutrons with the release of energy.

Nuclear fission - nucleus splits spontaneously or in impact with another particle, with the release of energy.

Open system - a material system in which mass or energy can be lost to or gained from the environment.

closed system - system that doesn't exchange any matter with its surroundings, and that's subject to any force or change.

Water cycle - any mobility water vapor living things need is called a nutrient.

Carbon and nitrogen are examples of nutrients.

waste sanitization - designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.



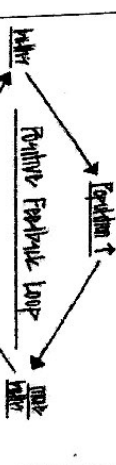
products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.

Chapter 3

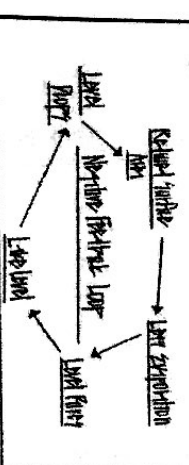
Thermodynamics
 Study when two or more processes interact so that the combined effect is greater than the sum of their separate effects

Positive & Negative Feedback

Positive - a feedback loop in which output of one type sets up input that moves the system in the same direction, therefore the output drives the system further toward only extreme or another.



Negative - feedback loop in which output of one type sets up input that moves the system in the opposite direction, the net is output steadily restores each other, thereby stabilizing the system.



Time Delay

Amount of time in a feedback loop between the input of a stimulus and the response to it.

Open / Closed System

Open system - matter and energy are exchanged with surroundings; most of earth's systems are open.

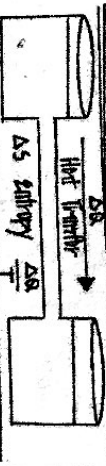
Closed system - no exchange of matter, no energy quality.



Second Law of Thermodynamics

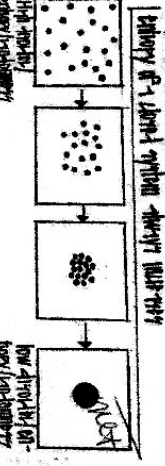
The second law of thermodynamics is about the quality of energy; as energy is transferred or transformed, a more and more of it is wasted.

How does this have to do with the tendency of any isolated system to approach its most disordered state (entropy)?



Entropy

Measure of the disorder that exists in a defined system; the more entropy the more disorder.



Alpha, Beta, Gamma (Radioactive Decay)

Alpha Decay - when nucleus of an atom is too big to be stable and gets rid of 2 protons & 2 neutrons (helium atom).

Beta Decay - when nucleus of an atom has too many neutrons to be stable and nuclear lamproy to 1 proton - neutron pair and the electron (beta particle) is sent out.

Gamma - Decay - when nucleus of an atom has too much energy to be stable energy is released up by sending out a photon (high energy gamma particle).

Number, Reaction (Fission and Fusion)

Number Equation - a reaction that involves splitting or joining together the nuclei of atoms.

Number of Fission - splitting of one element into two or three different elements.

Number of Fusion - combination of two or more atoms into one type - different element.

Chapter 4

High Quality / Low Quality Energy

High Quality - organized and concentrated; can perform useful work (fossil fuel and nuclear).

Low Quality Energy - disorganized, dispersed (heat in our world, sound, etc. energy).

Environmental Science

The branch of science concerned with the physical, chemical, and biological conditions of the environment & their effect on humanity.

Law of Conservation of Matter

In any physical or chemical change matter is neither created nor destroyed, but may be rearranged but matter is conserved. From one form to another in physical & chemical changes, existing atoms are rearranged and different particles (physical changes) or different (chemical), different combinations.

First Law of Thermodynamics

Energy is neither created nor destroyed, but may be converted from one form to another. (Law of Conservation of Energy)

$$\Delta U = Q - W$$

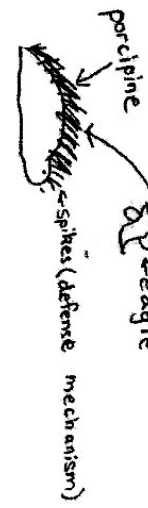
Change in internal energy = heat added to system - work done by the system

occurs indirectly through a common resource which acts as an intermediate
 The cessation or successional restraint of a behavioral process, a desire, or an impulse.
 describes species interactions that benefit at least one of the participants and cause harm to neither.
 ability of an organism to endure unfavorable environmental conditions.
 occurs in essentially lifeless areas—regions in which the soil is incapable of sustaining life as a result of such factors as lava
 flows, newly formed sand dunes, or rocks left from a retreating glacier.
 Secondary Succession—takes place following a major disturbance, such as a fire or flood.

Refers to the delay or advances in the response of an ecosystem to certain factors of change.
 the capacity of an ecosystem to respond to a perturbation or disturbance by resisting damage and recovering quickly.
 the first to return after a disturbance, they are the first stage of succession, and their presence increases the diversity in a region.
 an organism whose presence, absence or abundance reflects a specific environmental condition.
 plants, animals, or other organisms that did not historically develop in the area and hurt native species.
 indigenous to a given region or ecosystem if its presence in that region is the result of only natural process, with no human
 intervention.

A species whose presence and role within an ecosystem has a disproportionate effect on other organisms within the system.
 can drive only in a narrow range of environmental conditions or has a limited diet.
 able to thrive in a wide variety of environmental conditions and can make use of a variety of different resources.
 the entire set of conditions under which an animal (population, species) can survive and reproduce itself.
 the set of conditions actually used by given animal (pop. species), after interactions with other species (predation and especially
 competition) have been taken into account.
 A symbiotic relationship in which one organism (the parasite) benefits and the other (the host) is generally harmed. + -
 relationship between two organisms where one is helped and the other is unaffected. + 0
 the way two organisms of different species exist in a relationship in which each individual benefits from the activity of the other. + +
 is an adaptation that allows animals to blend in with certain aspects of their environment.
 a field within biogeography that examines the factors that affect the species richness of isolated natural
 communities.

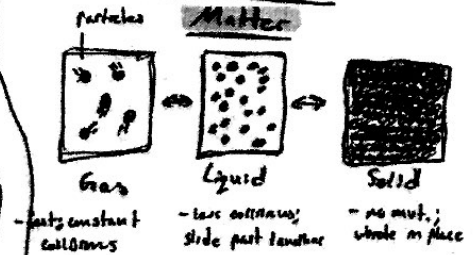
Predator and prey adapt to each other in an evolutionary arms race, coexisting under natural selection to
 develop antipredator adaptations in the prey and adaptations such as stealth and aggressive mimicry that improve hunting efficiency in the
 predator.



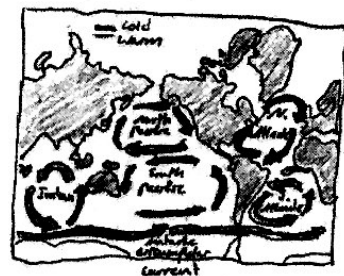
Zeleb Calderon
 APES 1.6

4

3 Phases of

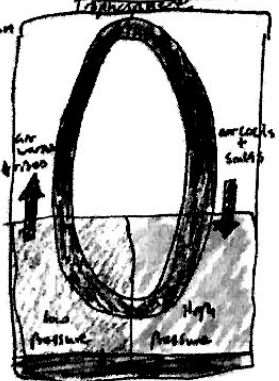


- average occurring weather
 in particular region; years

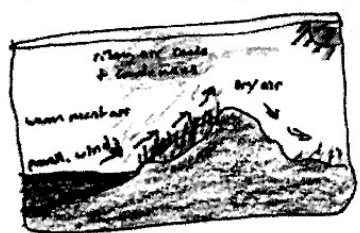


- Tundras
- Taigas
- deserts
- Tropical Rain Forests etc...

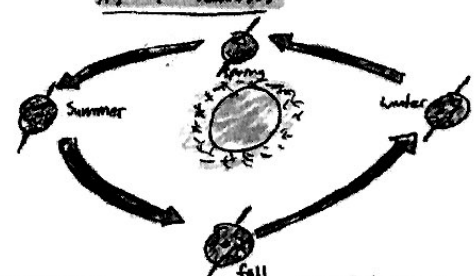
Mechanics of
 Convection Cell
 Troposphere



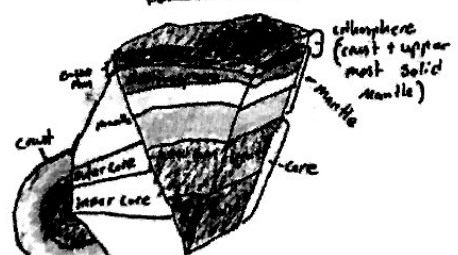
- one side is heating with moisture w/ hot sun
- sun + no moisture creates desert



Axis of the Earth and
 its 4 Seasons

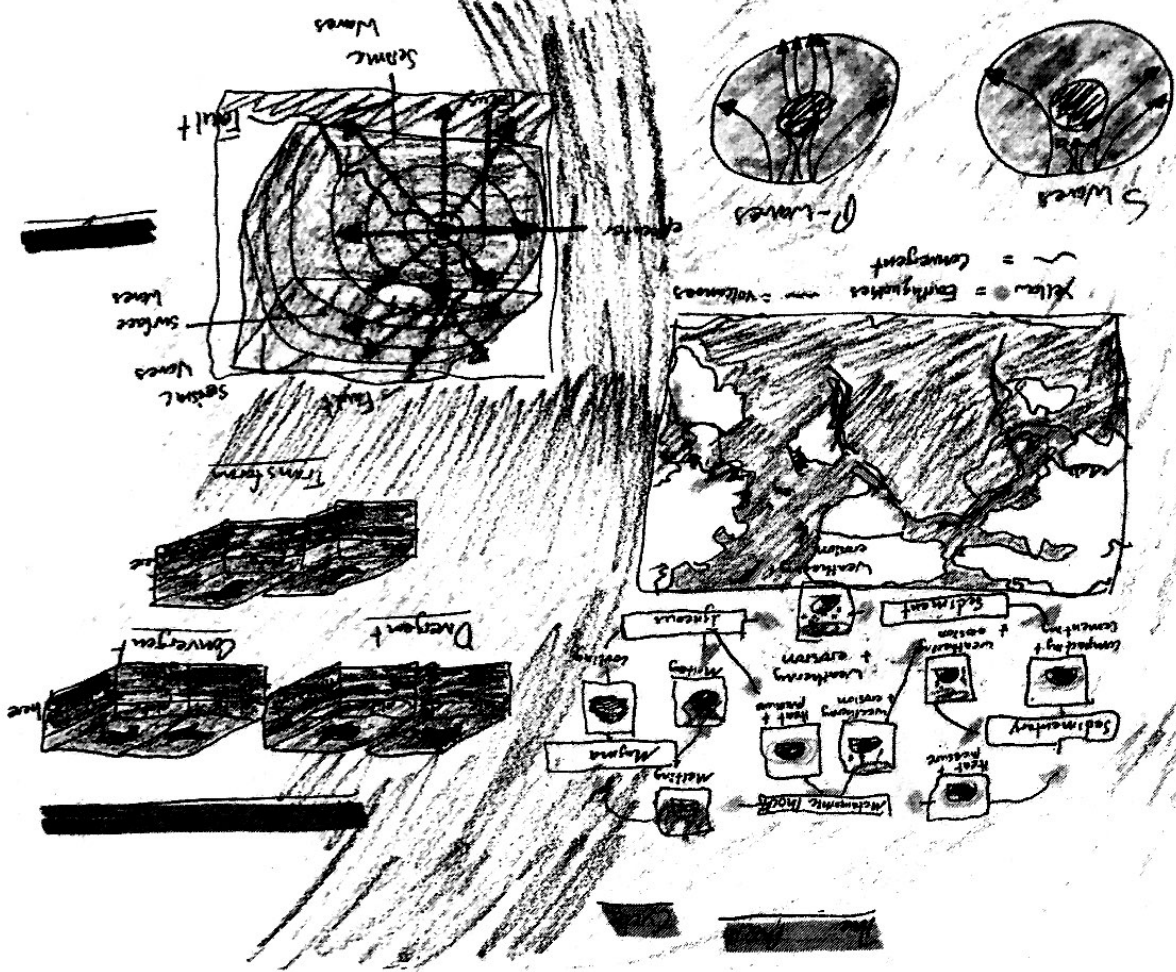


Earth's Crust



S - waves
 - transverse
 - slow moving
 - travel through solids only





The three plates of water consist of liquid, sea, and soil. In a soil, the part of the molecules or chains bond to one another by molecular forces, so that they are better ordered and rigid than in a liquid.

Weather is the state of the atmosphere, which is the degree to which it is hot, cold, wet, or dry. Climate is the weather conditions prevailing in an area in general over a long period of time. A region that receives more rain is called a wet climate.

The greenhouse effect is an area where the sun's rays are absorbed by the earth's surface, which then radiates heat back to the atmosphere, warming it. This process is similar to how a blanket traps heat on a person's body.



The sun's rays are the source of the energy that warms the earth. As the sun's rays hit the earth's surface, they are absorbed and re-radiated as heat. This heat is then trapped by the atmosphere, which acts like a blanket, keeping the earth warm.

