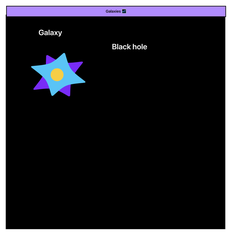
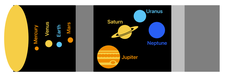
This chart is still under work...





El Niño: warmer water eastern pacific
La Niña: cooler water
southern oscillation (SO) is the pattern of the two

Energy Types

Kinetic | **Potential / Stored**

0th: hahuhdrdrd

1st: Energy is neither created nor destroyed. Only changing forms
2nd: Entropy is
3rd: Entropy is

Thermal · Radiant · Elastic · Sound · Chemical · Nuclear · Electrostatic · Mechanical · Gravitational

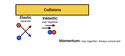
Proton is positive +
Electron is negative -

Motion / Mechanics

Newton's Motion Laws

1) Moving things will keep moving unless acted on by a force
2) Force = Mass x Acceleration
3) For every action, there is an equal opposite reaction

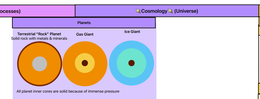
Universal Gravitation Law | Momentum = Mass x Velocity
Momentum, inertial reference frame

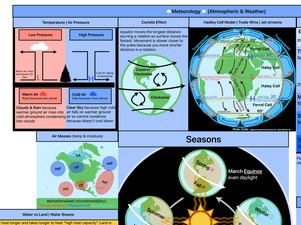


Antimatter // flip charge

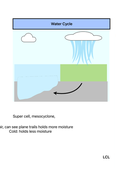
🌍Geology🌋 (Planet Processes)

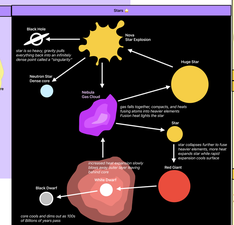
🌌Cosmology 🌌 (Universe)

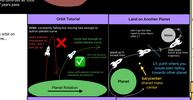


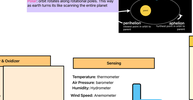


There's no wind on ground level under the subtropical jet because it's so high up that it's not affected by friction. Wind stays perpendicular to the pressure gradient force. Clouds dropped hundreds of miles downwind from the ocean to lose weight. Lines are not straight but turbulent called "Rossby waves"









⚛Physics⚛

4 Fundamental Forces

Gravity	Electro-Magnetism	Strong Force	Weak Force
everything with mass attracts	opposites attract, same repel electrons (-) attracted to protons(+)	protons and neutrons held together	

Atoms | Building Blocks of Everything

The Atom: Proton, Neutron, Fuzzy Electron Cloud

Atoms are neutral because each proton(+) attracts an electron(-) to balance out. Atoms atoms have same number of protons and electrons.

Isotopes attract, same repel. Protons don't fly apart because the "strong force" overpowers it. Electrons don't crash into protons.

electrons orbit at 1% the speed of light because they don't fly apart because the "strong force" overpowers it. Electrons don't crash into protons.

∴ Thermodynamics ∴

States of Matter (Temperature changes the state) ∴

Solid	Liquid	Gas	Plasma
atoms pulsed in place	atoms unbound	atoms scattered, electrons on off	electrons on off

How to temperature changes ∴

Heat is how fast atoms vibrate (Kinetic energy)
Heating opposite ❄ Cooling decrease ❄ atoms slow down

Heating heats ❄ separating bonds ❄ atoms slow down

Phase 1 ❄ Phase Transition ❄ Phase 2

Coldest Temp: atoms completely stop vibrating
Hottest Temp: atoms shatter, "Plasma Energy"

Heat Transfer Types ∴

radiation To light
conduction To hot
convection To fluid, gas

Fahrenheit ******** Kelvin ******
Crafahrenheit freezes/Celsiusbrate 0
Mkilovis temp "same as Celsius but shifted

Celsius ********
Crafahrenheit freezes/Celsiusbrate 0
Mkilovis temp

Light "Electromagnetism"

∴ Light Spectrum | Colors ∴

visible light | infrared | microwave | radio

Photon is the Light Wave Particle
Photon is light in a wave, it can change the same space because it's a wave instead of matter

Shorter the wave, the more energy is packed into it and the more it can penetrate objects. Visible light is strong enough to penetrate glass, where weaker light like Radio & Wifi can't. Stronger light can penetrate more objects like X-Ray and Gama which is why your see through it in X-Rays.

Visible light penetrates through water way more than any other light. Blue travels the further!

Photon waves are released when electrons move

Black Body Radiation: EVERYTHING hotter than absolute Zero emits light. Hotter things glow in higher light.
Planet Paint: all objects will glow red hot around 500C

Cosmic Background Child rotates same rate as Earth, so it's always in the same place. Takes 24 hrs only for to remote space with clear rotation.

Orbital rotation along rotational poles. This was an earth turns its like scanning the entire planet

Doppler Effect

Light & Sound changes intensity when moving.
Scientific: Light waves compress, increasing light wavelength

Sound: Light waves spread, lowering light wavelength

Magnet

Paramagnetic
Diamagnetic
Ferromagnetic

Periscope | **Color ∴**

Rules near waves can by big atoms are negligible but small atoms are big

visible light reflects making the leaf green, infrared reflects off snow

Deflect
Electron vibrates with light wave releasing same light back
Not Shiny: Microscopic surface is even reflecting light back in same direction
Shiny: Microscopic Surface is even reflecting light back in same direction

Absorb
electron absorbs photon if photon has higher energy

Kanamits
higher level photon if photon has higher energy

Absorb: Electron absorbs photon, gains energy, jumps to higher orbital
Scatter: Photon changes direction, loses energy
Reflect: Photon changes direction, no change in energy

energy gap

Polarization

Waves

Double slit experiment

constructive: waves adding

destructive: waves subtracting

Spectroscopy

Combustion Engines | Heat Air & Outdoor

low bypass engine: Compressor, Combustion Chamber add fuel, Nozzle, Turbine, Fan, Exhaust, Mixer

Back Turbine spins Front Fan Blades, Mixer mixes cold air with hot air

Sensing

Temperature: thermometer
Air Pressure: barometer
Humidity: hygrometer
Wind Speed: Anemometer
Acceleration: Odometer
Orientation: Odometer

Universal Space Engines

negative | magnet | positive

VERY EFFECTIVE, little fuel for lots of thrust. Use nuclear fusion for power

Mechanical Advantage ⚙

Engineering (Mechanics) ⚒

Joints ⚙: ball

Gears ⚙

Spin Direction: gears in contact spin opposite, belt spins same direction

Ratio ⚙: Ratio 1/2 rotations ⚙

Pulley

planetary

Laser

Spin electrons n neutrons

A Maxwell equations

Energy-Harvest

burning · Fission · Fusion · antimatter

drive (chain, belt...)

Trust types: chemical, land(hall, ton)

Fluid Mechanics

Aerodynamics · geostrophic flow

turbulence to laminar

Hydraulic press

compression

Sensors

touch: texture
vision: texture
sound: texture
smell/taste: chemical detector
nociception: pain, damage detection
interoception: vocal cords, hunger, bladder
thermoception: temperature detection

Communication (Use Light)

FM Frequency modulation · AM amplitude modulation

Toca dos versos para introducir texto

Pulse: turn on & off (binary)
Amplitude: wave changed
Frequency
Modulation

Distance

Plank length

Antenna Designs

dipole

Life Requirements

Homeostasis: Release
Response: "Reacting" sac of
Reproduction:
Develop:
Hereditary:
Reproduce:
anomalistic:

Personality

Sociabiss
introvert · extrovert

Loneliness is wanting more socialization/connection than you have now

Psychiatric

Cognitive | NDD, Neurodevelopmental disorders
ADHD:
Autism:
Bipolar: frequent mood/motivation swings
OCD: Obsession, like doing an unnecessary ritual to stop anxiety
Panic Attacks:
Phobias:
Down Syndrome:
Fragile X Syndrome:
Anemia:
Asperger's:
Diabetes:
Can develop...
Dementia:

Movement Parkinson's Catatonia

Sleep

Health Conditions

Joints | Movement
Carpal Tunnel Compression in paint
Carpal Tunnel CTS median nerve numbed

Skin
Dermatitis: skin rashes

Breath
Asthma
Lungtumor
Typhoid

Bonds

Valence Electrons: electrons in outermost shell.
Octet Rule: 8 valence electrons is most stable

Lithium atom
Valence shell
electron

Neonatomic atoms have more shells since more protons (+) attract more electrons (-)

Metals

free moving electrons metal to metal

Metallic Bond

Doed Electricity Conductor: since electrons free to move
Good Heat Conductor: since the moving electrons carry heat, metal feels cold because it's quickly absorbing heat from your hand. Ductile: ...

Covalent Bond
2 nonmetals share electrons

Bond Length
Bond Energy

Bond Angle

Bond Polarity

Bond Order

Both atoms are stable but nonmetals keep attracting each other

Ionic Bond
metal and nonmetal share electron

Both atoms are stable but metal keeps attracting nonmetal

Properties

Physical

If most elements are metals:
Why are are some soft? (Li, K, Ca...)

Melting Point: temperature that's hot enough to melt "bonds broken" Metal bonds are the strongest so they have the highest melting point
Hardness: resistance to deforming/scratching
Density:

Since free electrons bond metals, Why don't metals Fuse together when you touch them?

Material Properties:
Cohesion:
Adhesion:
Ductility: how bendy
Capacitance:
Elastic:

Solubility: how much stuff dissolves

Luster: reflective
Malleable: Permanently Bend
Ductile:
Brittle: Shatter
Tough:
Density:
Tensile Strength:
Viscosity:
Buoyancy:

Chemistry ... (how atoms react/bond)

All Atoms "Elements"

Columns: "groups" num of valence electrons
Rows: "periods" num of electron shells in the outermost shell

Atomic Number: Number of protons in the nucleus

Number of protons determines the element
there are 9x missing elements because part of the nucleus is unstable
An element cannot have half a proton...

Hydrogen

alkali metals · alkaline metals · transition metals · Other metals · metalloids · non metals · halogens · noble gases

Lanthanoids · Actinoids

Building Blocks

Fermions (spin 1/2) "Matter Building Blocks"

Quarks · Leptons

Bosons (spin 1) "Messenger Particles"

Gluon · photon · z boson · w boson · scalar boson

Quarks

Proton: u u d
Neutron: u d d

Radiation Types ∴

In bigger elements (84+) there's too many protons in the nucleus, so it's unstable. Some of the atoms will break apart. Dangerous because the radiation can mutate or kill an average DNA

Alpha: helium breaks off

Beta: electron breaks off

Beta: electron breaks off

γ Gamma

γ Neutron

Gas many protons repelling/ Strong Force is weaker (protons) Weak Force (neutrons) Strong Force is stronger than Weak Force (protons) Strong Force is stronger than Weak Force (neutrons) Strong Force is stronger than Weak Force (protons and neutrons) Strong Force is stronger than Weak Force (protons and neutrons) doesn't

Neutron Capture

Isotope: neutron amount changed
Ion: charged atom

Atom Variants (Ions / Isotopes)

cation(+): loses electron becoming positive
anion(-): gains electron becoming positive
zwitterion(ion or -): ...

Structure

Crystal, Lattice,
Crystalline, Glass
Cleavage: breaks into patterns

Best Composite Materials

carbon fiber:
Fibergloss:
aramid:
kevlar:
graphene: electronics

Best Alloys (Metals Melted Together)

Steel: Iron(96%) + Carbon(2%) Interstitial

Packing Factor: FCC, BCC, HCP
Point defects

C is much smaller than Fe

Substitutional
Brass: Cu + Zn

More Drains Valved
Faster cooling speeds up nucleation and crystallization grains
Add "Inoculates"

grain: smaller grains, makes stronger material

Organelles

Combustion

CO_2 (it is needed for atoms to form bonds)

Oxidizer
O, O2, F2

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

1) Heat
atoms vibrate so much that the bonds break into fundamental components

2) Atoms combine/form bonds together releasing heat

Heat solution substance until it breaks

Only Hydro-Carbon Ring burn?
Fuel + O2 → Heat + CO2
Fuel + O2 + Heat

Reactions

Acids/ Bases

Acid: donates proton, creates "sour" taste
Base: donates OH- "bitter" taste, slippery/soapy

Bonds/ Bases bonds when Bases/ Acids other molecules

Buffer: a chemical that maintains a certain pH.

Complete combustion
Incomplete
Spontaneous
Explosive
Slow
Rapid

Reducing agent
Oxidation

Smaller elements are more common since they're easier to make.
Extreme gravity in stars Fuse elements together, Heavier Elements
Elements higher than iron burns from neutrons converting to protons.
Stars can't combine the easier it is to add neutrons

Organic Chemistry (Carbon)

Building blocks "Monomers"
Monomer:
Polymer:

4 Main Biomolecules

Hydro-Carbons

Longest C chain name Hydrocarbon prefixes
1 meth-
2 eth-
3 prop-
4 but-
5 pent-
6 hex-
7 hept-
8 oct-
9 non-
10 dec-

Alkane: Alkane
Alkene: Alkyne

But are: Propane
Ethene, Propyne

1) Protein

Amino Acid Chain

Make cell walls, Enzymes, Hormones, Transmitters

Peptide: the bond holds amino acids

Polypeptide

2) Carbohydrate "carbs"

Sugar Chain

Chain of sugars

Mono-saccharine (1 Sugar) glucose

Di-saccharine (2 Sugars) Lactose: galactose + glucose Maltose: glucose + glucose Sucrose

Poly-saccharine (3+ sugars) Glycogen: glucose + glucose Cellulose: 3+ glucose + chain

also called "Complex sugars". They don't taste sweet because too big for taste receptors

3) Lipid "fats"

C, H, O, sometimes P, N, S

Fatty Acids

Glycerol

4) Nucleic Acid

C, H, O, N, P

Nucleotide

Enzyme: a protein that breaks down molecules
Antibody: make of proteins

Amylase: carbs (| Lipase: lipid(fats) | protease: proteins

Functional Groups

Alcohol "-ol"
R — OH

Alcohol: Ketones: Aldehydes: Aldehydes:
Chemical bases, carcinogenic, Formaldehyde, Common names H2O,...

Chemical Naming System

Mili prun
Tetra water
water vapor

Hydrocarbon

mono- 1 Carbon monoxide
di- 2 Nitrogen dioxide
tri- 3 Sulfur trioxide
tetra- 4 Dinitrogen tetroxide
penta- 5 Phosphorus pentachloride
hexa- 6 Sulfur hexafluoride
hepta- 7 Iodine hepta-fluoride
octa- 8 Iodine pentafluoride
nona- 9 Xenon tetroxide
deca- 10 XeO3 Xenon trioxide

Chemical Reaction Types

Synthesis · Decomposition · Single Replacement · Double Replacement · Combustion

Chemistry Diagrams (shared electrons create bonds)

Condensed · Lewis · Structural · Line

Water: H2O

Ethanol: C2H6O

Ethane: C2H6

Propane: C3H8

Butane: C4H10

Pentane: C5H12

Hexane: C6H12

Heptane: C7H14

Octane: C8H16

Nonane: C9H18

Decane: C10H20

Dichloromethane: CH2Cl2

Chloroform: CHCl3

Carbon Tetrachloride: CCl4

Methanol: CH3OH

Ethanol: C2H5OH

Propanol: C3H7OH

Butanol: C4H9OH

Pentanol: C5H11OH

Hexanol: C6H13OH

Heptanol: C7H15OH

Octanol: C8H17OH

Nonanol: C9H19OH

Decanol: C10H21OH

Methanoic acid: HCOOH

Ethanoic acid: CH3COOH

Propanoic acid: C2H5COOH

Butanoic acid: C3H7COOH

Pentanoic acid: C4H9COOH

Hexanoic acid: C5H11COOH

Heptanoic acid: C6H13COOH

Octanoic acid: C7H15COOH

Nonanoic acid: C8H17COOH

Decanoic acid: C9H19COOH

Organic Chemistry (Carbon)

Taxonomy / Life Categories

Animal: muscles, eats organic material

class

Mammal: ♀ milk, ♂ testicles, ♀ uterus, ♂ penis, ♀ vagina, ♂ testicles, ♀ ovaries