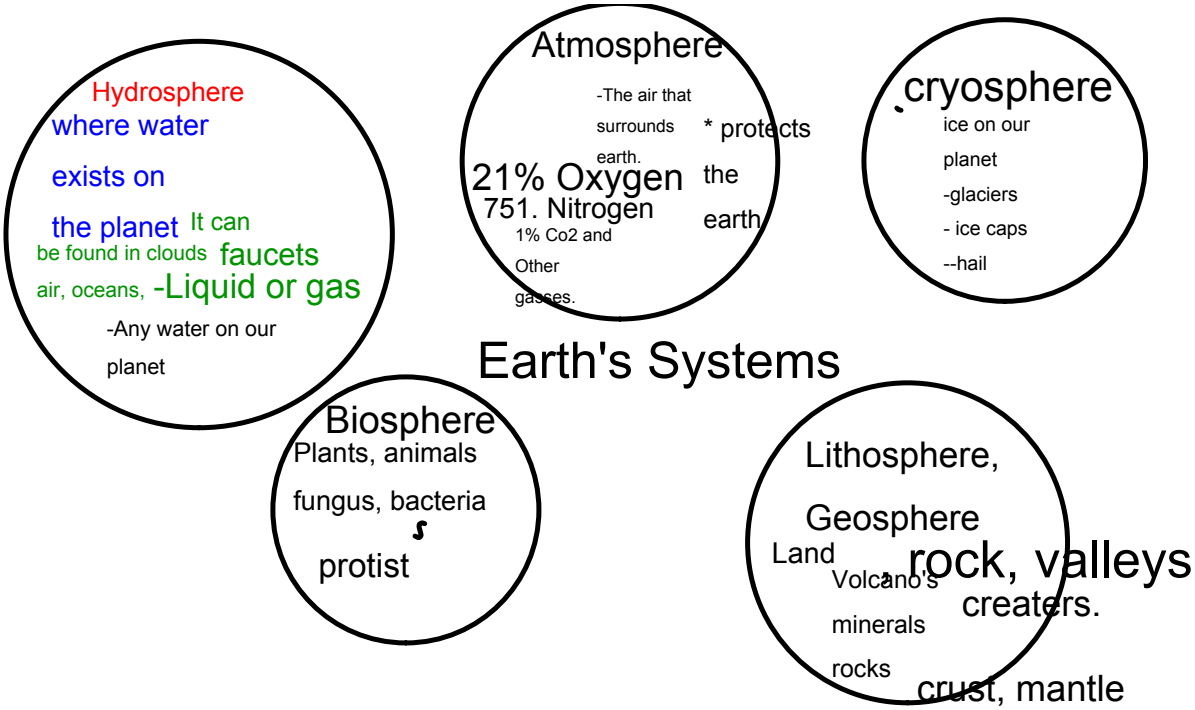
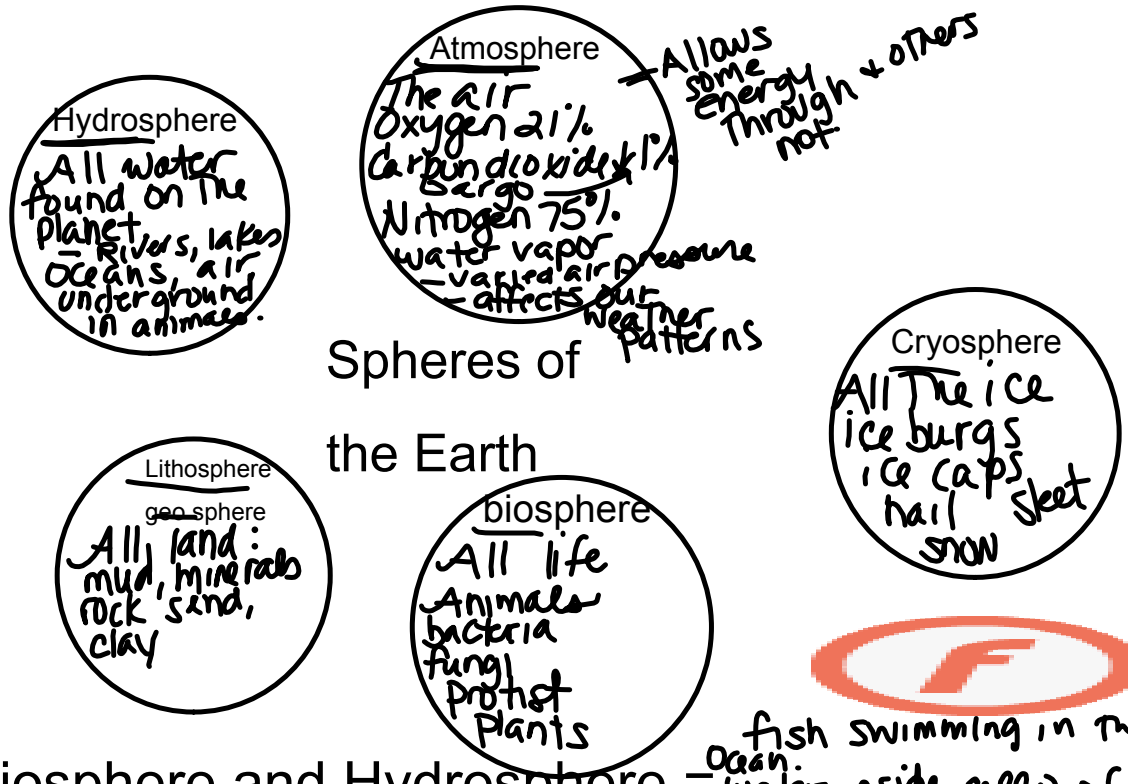
Atmosphere


Hydrosphere
where water
exists on
the planet
It can
be found in clouds
faucets
air, oceans,
-Liquid or gas
-Any water on our
planet
Atmosphere
-The air that
surrounds
earth.
* protects
the
earth.
21% Oxygen
751. Nitrogen
1% Co2 and
Other
gasses.
cryosphere
ice on our
planet
-glaciers
- ice caps
--hail
Earth's Systems
Biosphere
Plants, animals
fungus, bacteria
protist
Lithosphere,
Geosphere
Land
Volcano's
minerals
rocks
rock, valleys
creaters.
crust, mantle



1. Biosphere and Hydrosphere = fish swimming in the ocean. water inside cells of all living organisms

2. Biosphere and Atmosphere-- animals breathing O_2 plants breathe CO_2

3 Biosphere and Lithosphere fossil fuels

4. Atmosphere and Hydrosphere O_2 in water CO_2 in water

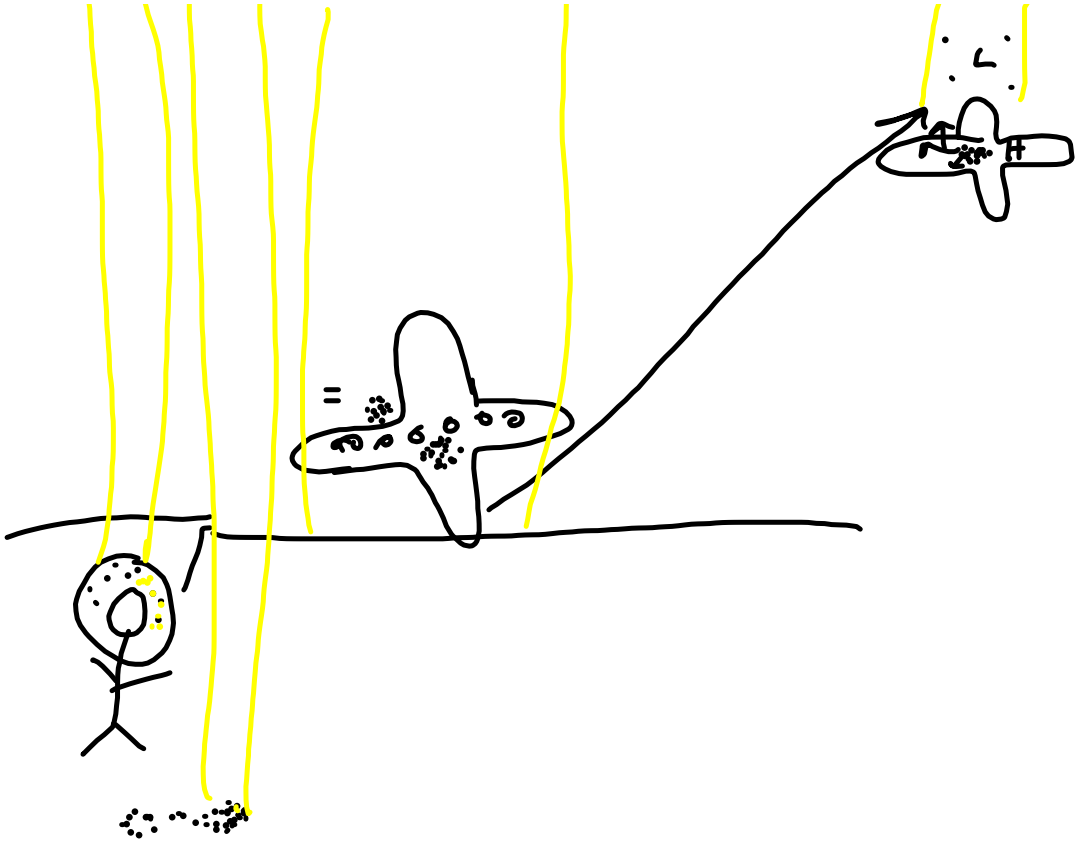
5. Atmosphere and Cryosphere water vapor turning to ice / ice cores

6-Atmosphere Geosphere drying mud

7. Cryosphere and Hydrosphere= Ice bergs in ocean ice cubes in a pepsi Kona ice

8. Biosphere and Cryosphere= fish frozen people frozen / wooly mammoth

9. Lithosphere and Cryosphere=_____



The Spheres of the Earth

Hydrosphere
-Water
-any water
on our planet
gas or liquid

Atmosphere
-The air that surrounds the earth
atmosphere pushes on Us with the mass of a school bus.
- water in it
protects us
- made up of layers

Nitrogen
oxygen
hydrogen
Carbon dioxide

Cryosphere
-ice On our planet
glaciers, icebergs &
our ice caps
snow, ice and hail

Lithosphere/ Geosphere
-Land on our planet.
-rocks, soil, Minerals,
crust
mantle

Biosphere
-All living organisms on our planet
-bacteria, monerans, fungi, protests, plants, a animal

Interactions amoung The spheres

spheres	Interactions
1. hydrospere and cryosphere	water vapor (water cycle) falls as hail snow, sleet during precipitation.
2 atmosphere and biosphere	all living organisms need air. Without the protection of the atmosphere the biosphere would not exist
3 atmosphere and lithosphere	Oxyen in the pores of soil.
4. atmosphere & hydrosphere	water has air in it for water organisms to breathe
5. biosphere hydrosphere	All living organism's cells contain water
6. hydrosphere and lithosphere	Soil is pounu s and water can fill The spaces, water table springs
7. biosphere cryosphere sphere	
8.	
9.	
10.	

spheres

I, Hydrosphere, and cryosphere

2. biosphere & atmosphere

3. lithosphere a biosphere

4. biosphere and hydrosphere)

atmosphere & hydrosphere

Interactions

1. Melting of ice turns back into liquid water.
2. Freezing of liquid water turns into ice
3. evaporation (part of water cycle) Which is Water in its gas for condense into a cloud & Then if temp are freezing water will turn into snow t ice.

All organisms need air to breathe

plants grow in the lithosphere minerals in soil brought into the plant through the roots then we eat it

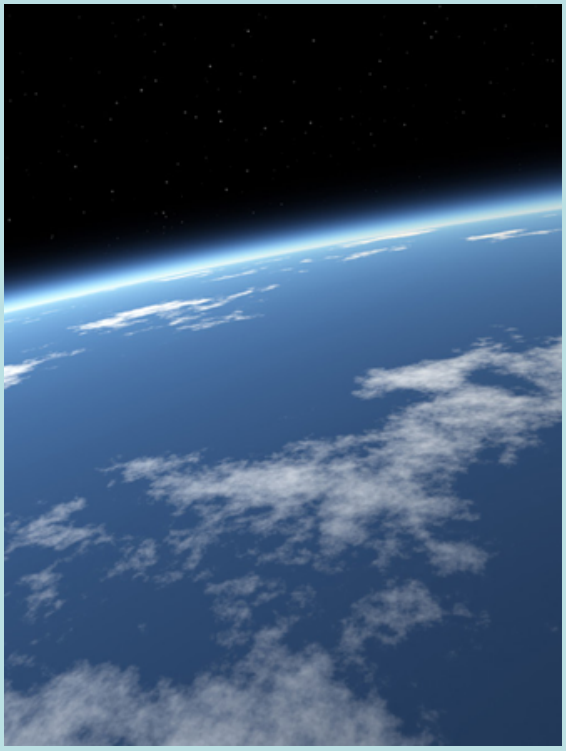
All living organisms need water for our cells.

Composition of the Atmosphere

- In the darkest regions of deep space, the temperature is a chilly -450° Fahrenheit. Closer to our Sun, temperatures reach thousands of degrees Fahrenheit. What makes Earth's climate so moderate? Separating Earth from the extreme and inhospitable climate of space is a 500-mile-thick cocoon of gases called the atmosphere.

- Some planets have an

atmosphere, a layer of gases that surrounds them. The Sun's atmosphere is made up of hydrogen, while Earth's is made up primarily of nitrogen and oxygen. Carbon dioxide, ozone, and other gases are also present. **These gases keep our planet warm and protect us from the direct effects of the Sun's radiation. Without this regulation, Earth could not sustain life.**



Lego man in the atmosphere

Composition of the Atmosphere

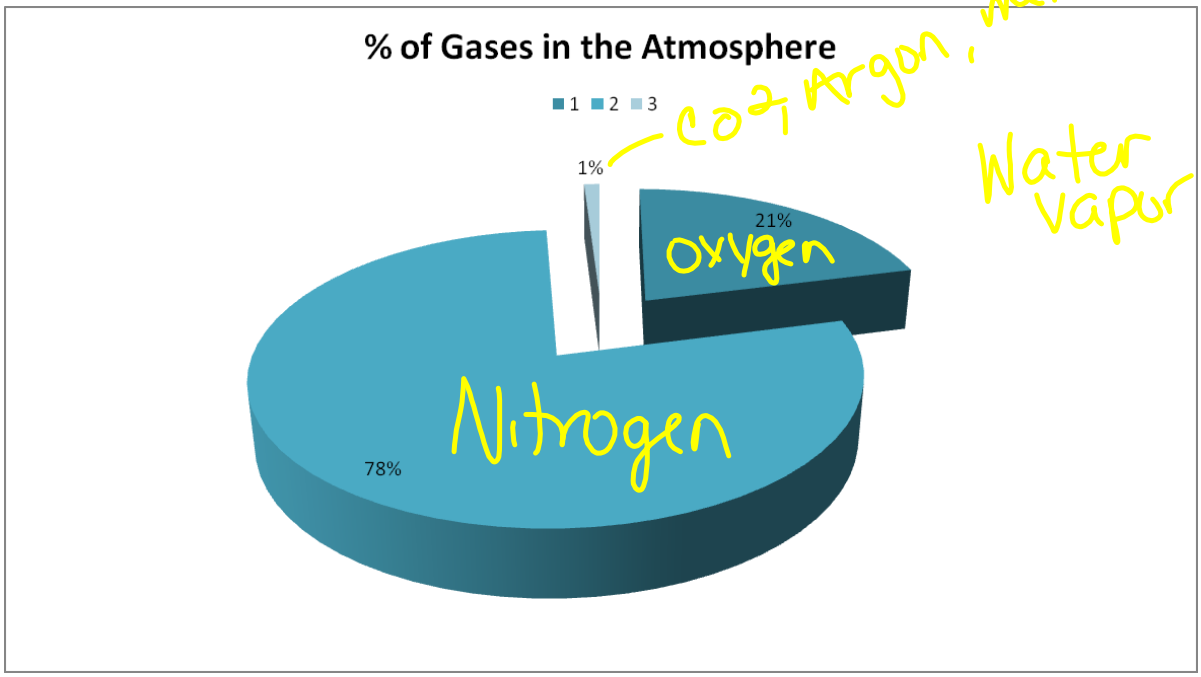
Nitrogen: The most abundant gas in the atmosphere. It makes up 78% of the gasses in the atmosphere. It is found in all living things on our planet! (N)

Oxygen: 21% of the Atmosphere is composed of oxygen. Plants and animals use oxygen to release the chemical energy in their food. Oxygen also enables fires to burn and it is also reacts with some metals on earth to form rust. (O_2)

Carbon Dioxide: 1% of the atmosphere is composed of Carbon Dioxide. (CO_2) + Other gases

Water Vapor: water in the form of gas is present in the atmosphere. The amount of water vapor varies greatly from place to place, and from season to season.

warm air holds more water


% of Gases in the Atmosphere
1 2 3
1%
21%
78%
oxygen
Nitrogen
co2, Argon, methane
Water vapor

Density: is the amount of "Stuff"/Matter in a given "Space"/Volume

Density= Mass divided by Volume

D=M/V ÷ /

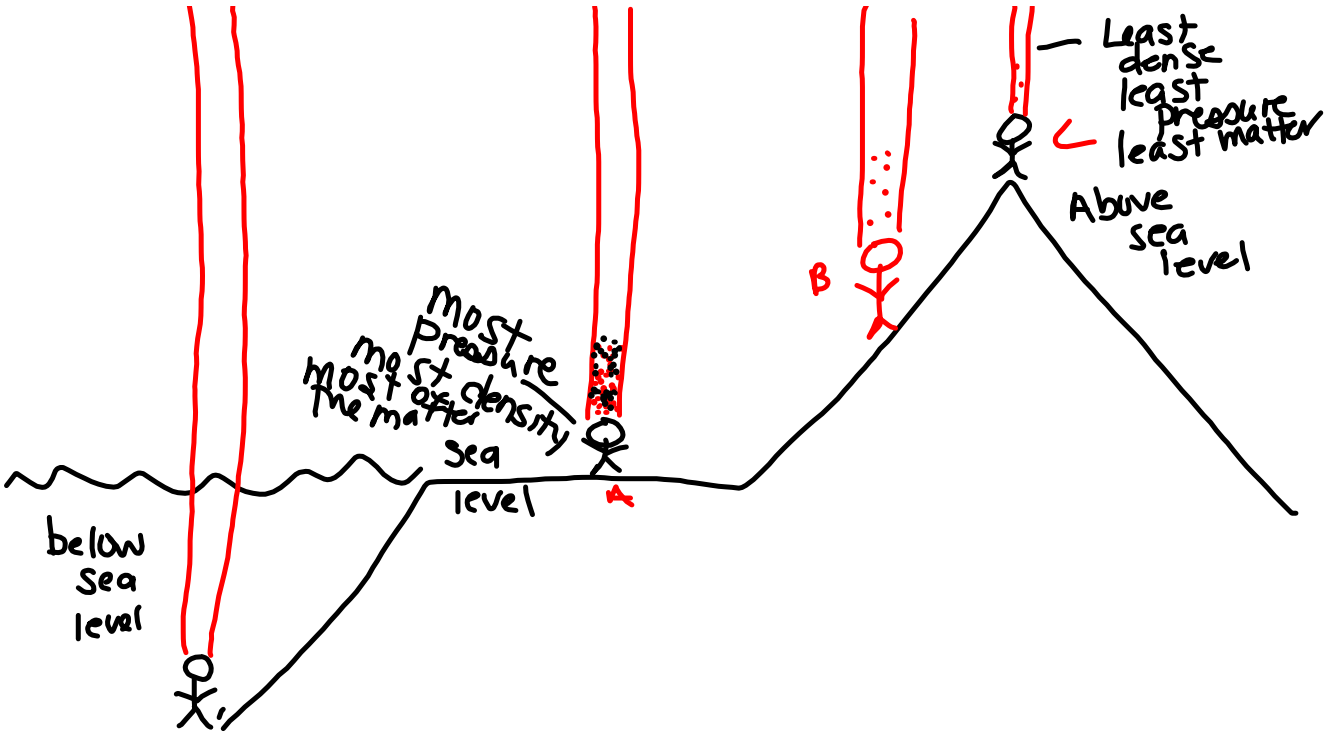
Unit of measurement for liquid density is g/mL

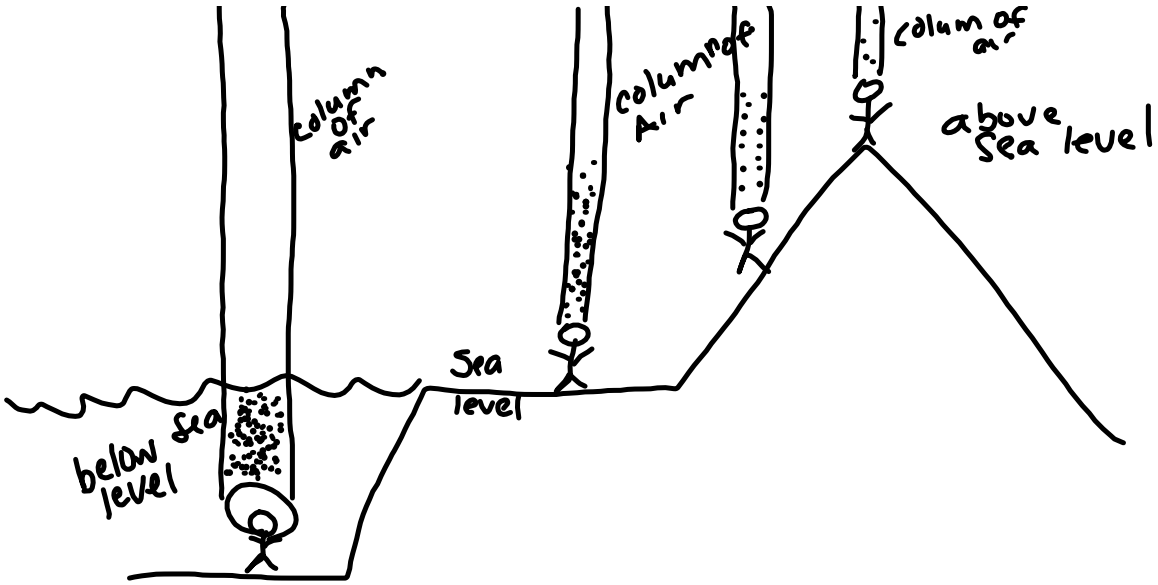
Liquid Density Lab 2012-2013.doc

pressure: it is the amount of force applied to an area

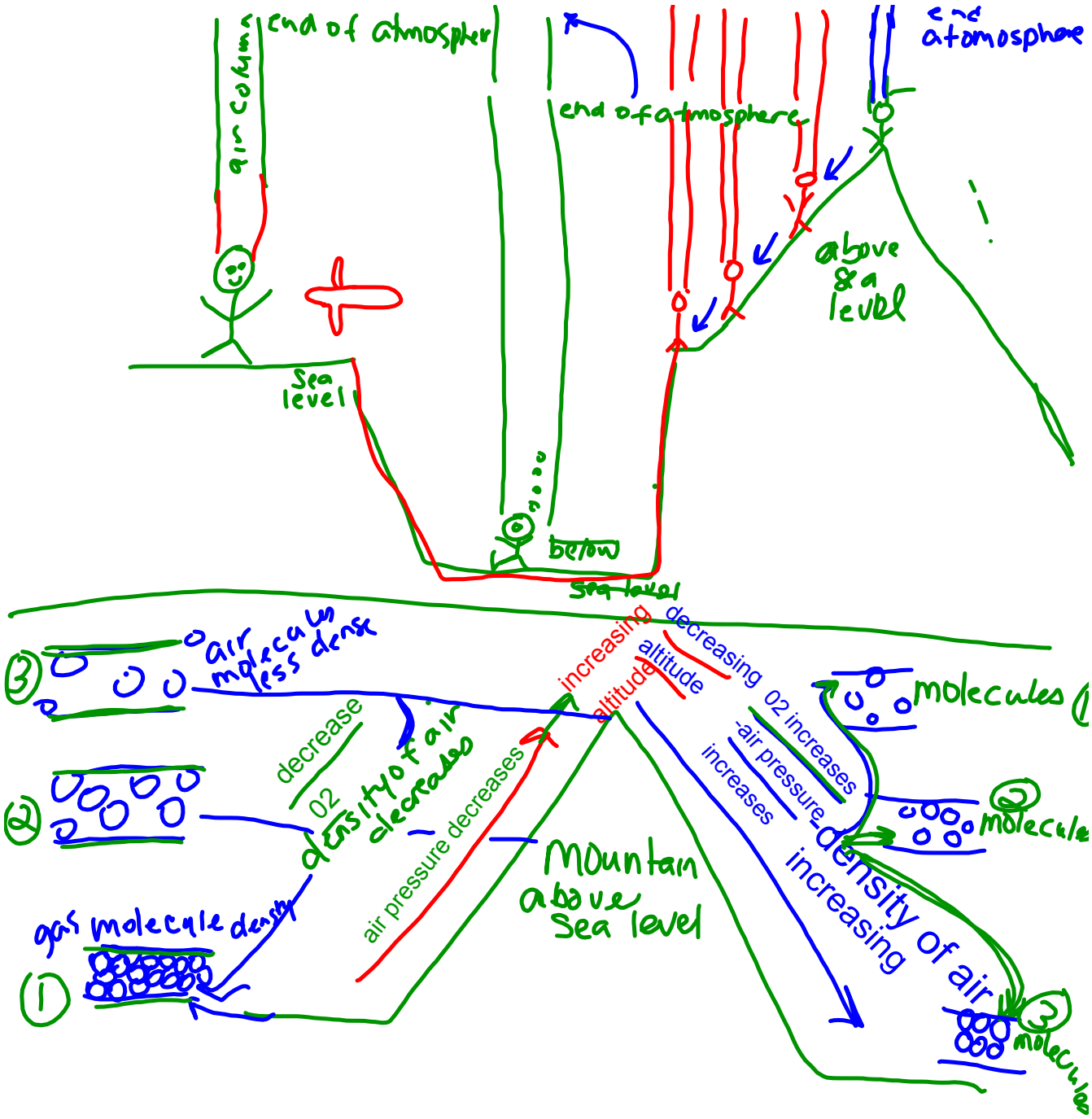
Air Pressure

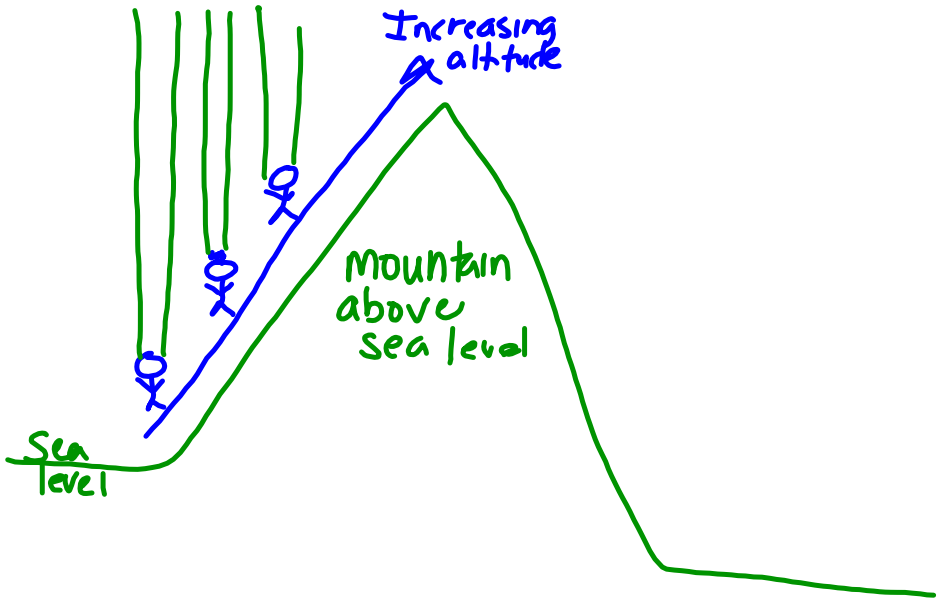
Properties of Air		Measuring Air pressure
Density: The amount of stuff (Matter) in a given volume Pressure: The atmosphere pushes a force on you. Air Pressure: is the result of the weight Of Column of air pushing down		List and explain the two methods used to measure air pressure. 1. aneroid barometer dry. Air pressure pushes on springs 2. Mercury barometer uses liquid mercury which gets pushed Up a tube by air pressure
Increasing Altitude	Air Pressure	Units of Air Pressure
Altitude affects air pressure: The higher in altitude the less atmospheric pressure Altitude affects air density: The higher in altitude the less dense the air is. The lower The altitude the greater the density because more The higher in altitude the less pressure from the air column is pushing on you		What units of measurement are used to measure air pressure? (33.86 mB aneroid uses millibars (mb) Mercury barometer Uses inches of mercury to convert inches of mercury you mulliply by 33.86 mb 29.88 inches of mercury 1013.8 mb
How does increasing the density of a gas affect its pressure: The greater the density of a gas the more pressure	Why is air at the top of the mountain hard to breathe? There is the higher in troposphere because most of the gasses are near the earth's surface	

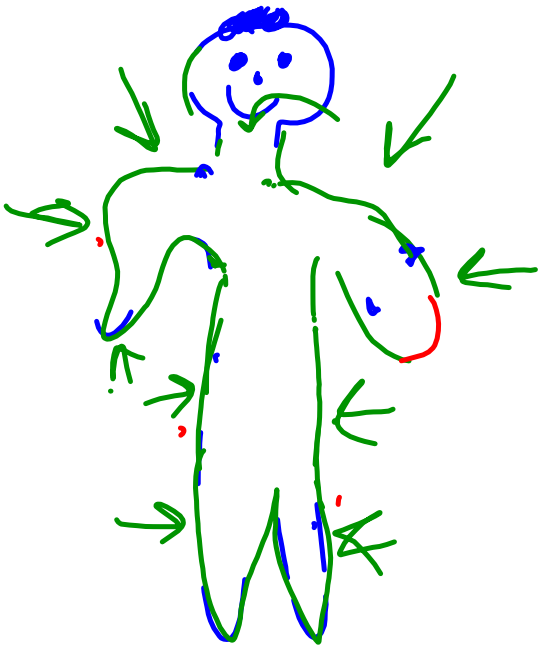

Least dense least pressure least matter
Above sea level
B
most pressure most density most matter
sea level
A
below sea level


column of air
column of Air
colum of air
above Sea level
Sea level
Sea
below level

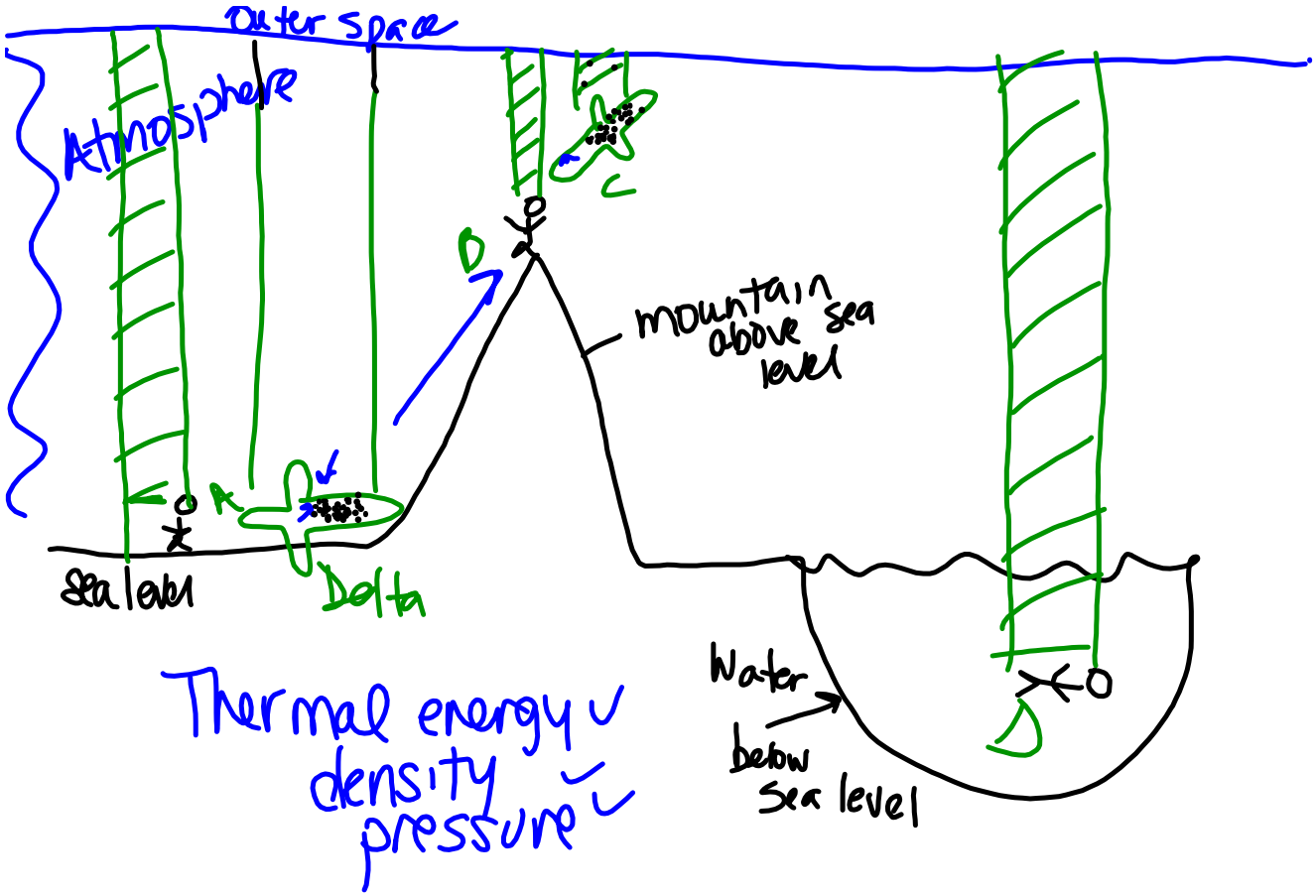

Air
Colum


air column
end of atmosphere
end of atmosphere
end of atmosphere
above sea level
sea level
below
sea level
increasing altitude
decreasing altitude
air molecules less dense
decrease 02 density of air decreases
air pressure decreases
gas molecule density
Mountain above sea level
02 increases
air pressure increases
molecules
molecules
density of air increasing
molecules


Increasing altitude
Mountain above sea level
Sea level



Atmosphere is pushing on you! Why are we not squished?


outer space
Atmosphere
C
D
mountain above sea level
A
B
sea level
Delta
Water below sea level
Thermal energy ↓
density ↑
pressure ↑

1. Using an egg, erlenmeyer flask, paper & fire
Observe & predict what will occur when
A fire Occurs in The flask and an egg
IS placed on top. Your answer
needs to discuss density of the air
inside and outside.

Prediction: { density, pressure } fire did what with The Air

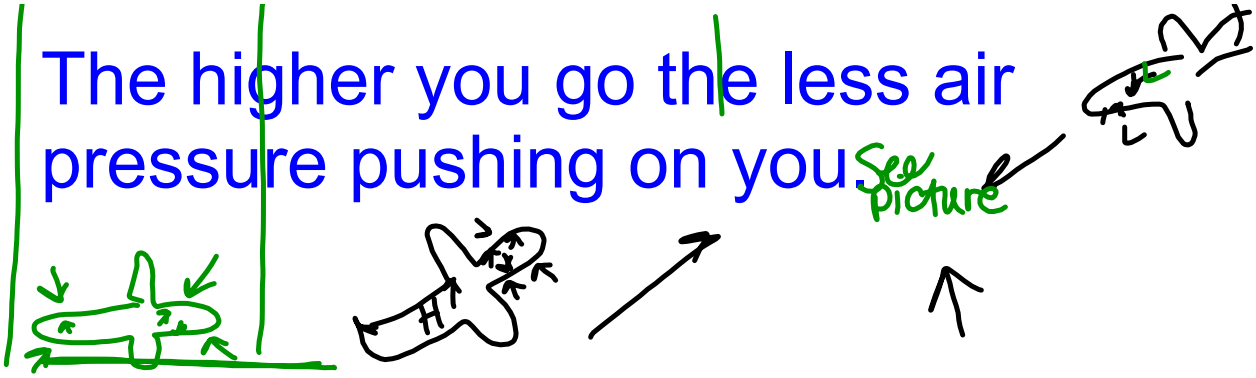
air pressure

The fire used The O2 in The flask which made The pressure inside The flask less dense. The pressure outside of The egg was more dense Therefore it wanted give density to The inside of The flask so it The more dense air pushed The egg inside the flask

Does Air pressure have:

pressure
force (push or pull)
mass density
volume

The higher you go the less air pressure pushing on you.



If you increase the denisty of an airmass you increase the pressure. Low pressures = L {High = H

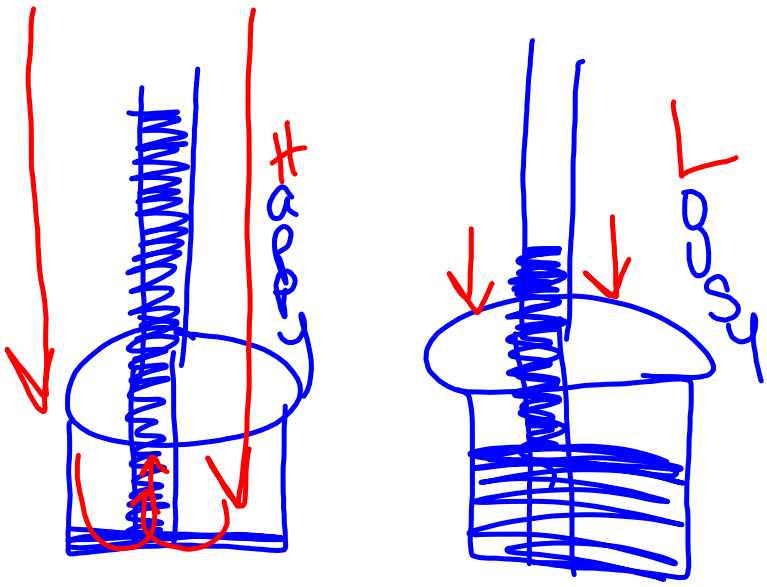
↳ Lousy Weather

Happy Weather

barometer: measures air pressure

1. Aneroid Barometer : millibars

2-Mercury barometer: inches of mercury



Mercury Barometer

1. air pressure: inches of Mercury

2. millibars

Weather: Atmosphere

Composition of the Atmosphere

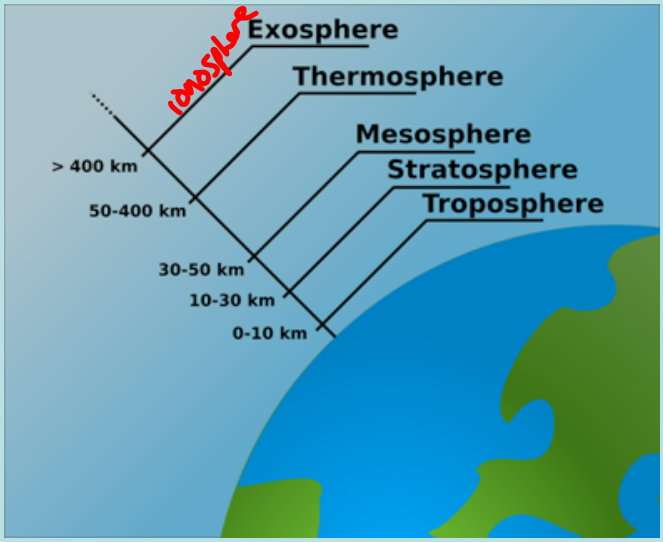
The atmosphere is made up of nitrogen, oxygen, carbon dioxide and other gases.

How much of the atmosphere do you think is OXYGEN?

Conduct the % of Oxygen Lab to test your prediction.

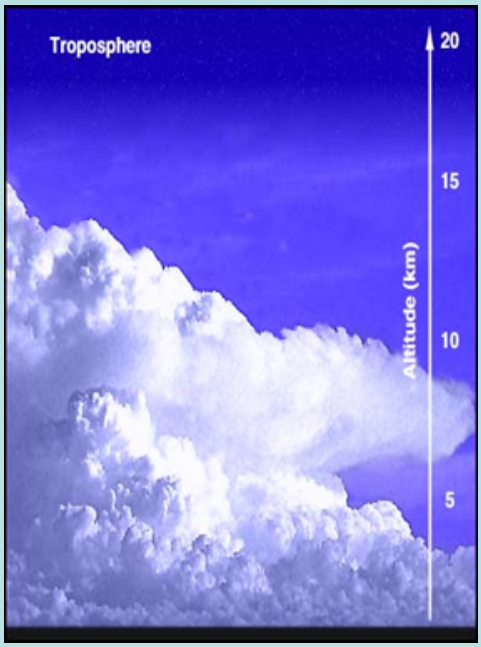
The Atmosphere

The atmosphere is made up of several layers: the troposphere, stratosphere, mesosphere, ionosphere, (aka thermosphere) and exosphere.

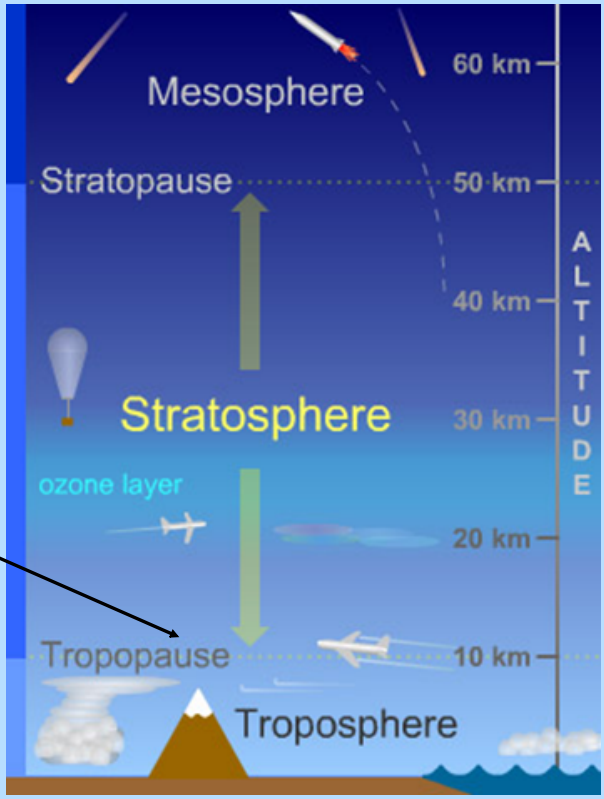


Closest to Earth is the **troposphere**.

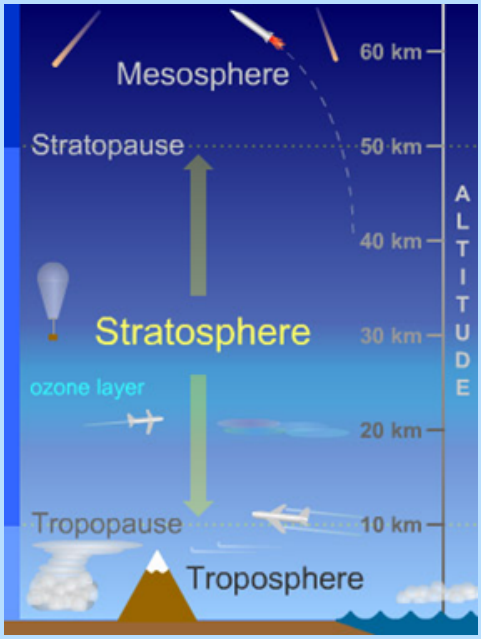
- Most of the clouds you see in the sky are found in the troposphere, and this is the layer of the atmosphere we associate with weather. Extending up to 10 miles above Earth's surface, the troposphere contains a variety of gases: water vapor, carbon dioxide, methane, nitrous oxide, and others. These gases help retain heat, a portion of which is then radiated back to warm the surface of Earth.



- Most of our weather occurs in the Troposphere, the closest layer. This is where the water vapor changes into clouds.



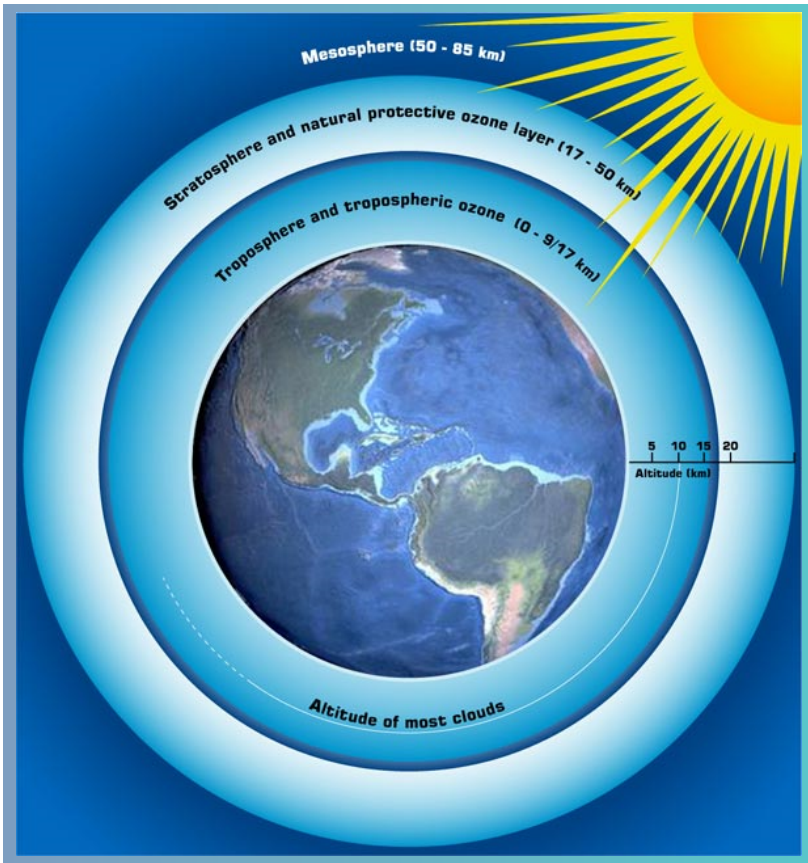
Stratosphere



- Above the troposphere is the **stratosphere**, which includes the **ozone layer**. The stratosphere extends from about 10 to 30 miles above the surface of Earth. In the ozone layer, ozone molecules (O_3) are concentrated and absorb ultraviolet radiation from the sun and protect us from its harmful effects.

Mesophere, Ionosphere, and Exosphere

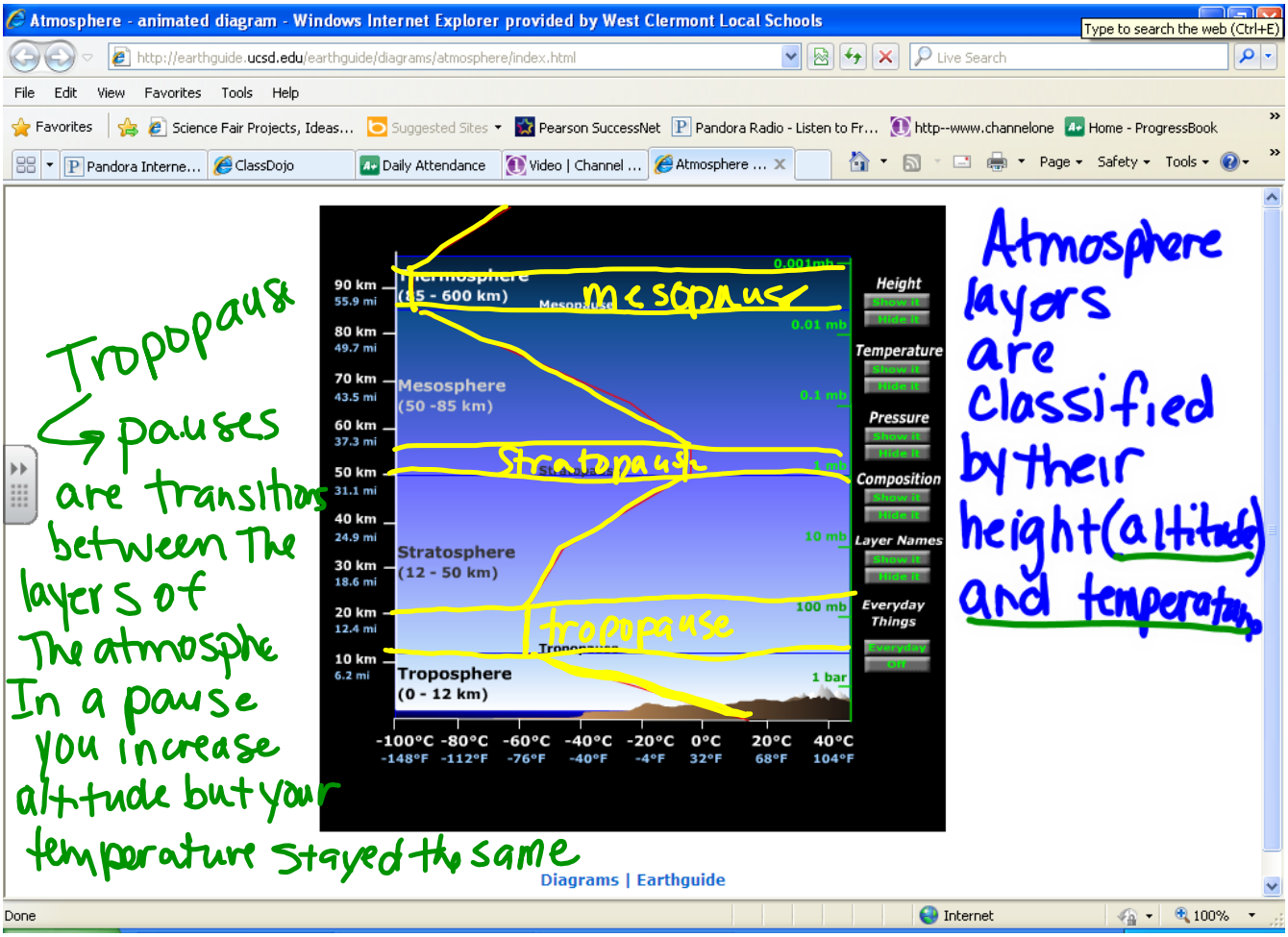
- Thirty to 50 miles above the surface is the **mesosphere**, the coldest part of the atmosphere. Above the mesosphere, in a layer called the **ionosphere** (aka…thermosphere), things start to heat up. Temperatures in the ionosphere, which extends about 50 to 180 miles from the surface of Earth, can reach up to several thousand degrees Fahrenheit. Beyond the ionosphere is the **exosphere**, which extends to roughly 500 miles above the surface of Earth. This is the outermost layer of the atmosphere, the transition zone into space.



Summing in all up:

Troposphere is where weather occurs.
Stratosphere contains the ozone layer. The ozone layer absorbs ultraviolet radiation.
Mesosphere is where most meteoroids burn up. (This is what we refer to as a shooting star)
Thermosphere layer is very hot. Why? Energy from the sun hits the thermosphere first and warms that layer up. There are two parts of the thermosphere- the **ionosphere** where the aurora borealis occurs and the **exosphere** where satellites orbit.

atmosphere


Atmosphere - animated diagram - Windows Internet Explorer provided by West Clermont Local Schools
Type to search the web (Ctrl+E)
http://earthguide.ucsd.edu/earthguide/diagrams/atmosphere/index.html
Live Search
File Edit View Favorites Tools Help
Favorites
Science Fair Projects, Ideas...
Suggested Sites
Pearson SuccessNet
Pandora Radio - Listen to Fr...
http--www.channelone
Home - ProgressBook
Pandora Interne...
ClassDojo
Daily Attendance
Video | Channel ...
Atmosphere ...
Page Safety Tools
Tropopause
↳ pauses are transitions between the layers of the atmosphere
In a pause you increase altitude but your temperature stayed the same
90 km 55.9 mi
80 km 49.7 mi
70 km 43.5 mi
60 km 37.3 mi
50 km 31.1 mi
40 km 24.9 mi
30 km 18.6 mi
20 km 12.4 mi
10 km 6.2 mi
(85 - 600 km)
Mesosphere
(50 -85 km)
Stratosphere
(12 - 50 km)
Troposphere
(0 - 12 km)
mesopause
stratopause
tropopause
0.001 mb
0.01 mb
0.1 mb
10 mb
100 mb
1 bar
Height
Temperature
Pressure
Composition
Layer Names
Everyday Things
-100°C -80°C -60°C -40°C -20°C 0°C 20°C 40°C
-148°F -112°F -76°F -40°F -4°F 32°F 68°F 104°F
Diagrams | Earthguide
Atmosphere layers are classified by their height (altitude) and temperature
Done
Internet
100%

1`

Vocabulary

- Weather
- Atmosphere
- Troposphere
- Stratosphere
- Ozone

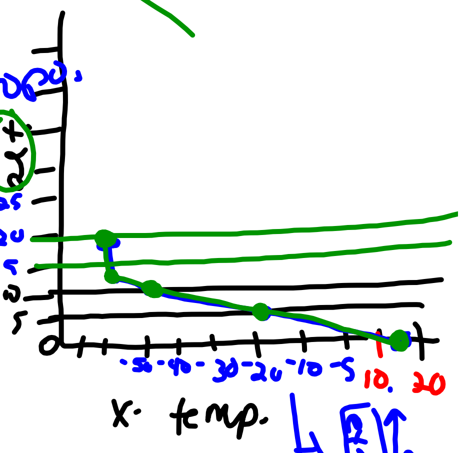
- -the layer of gases that surrounds and protects the earth
- -the closest layer of gases to the earth's surface
- -humidity, wind, temperature, and precipitation

Average Temperature Readings at Various Altitudes

1. Graph the following coordinates on the attached graph.

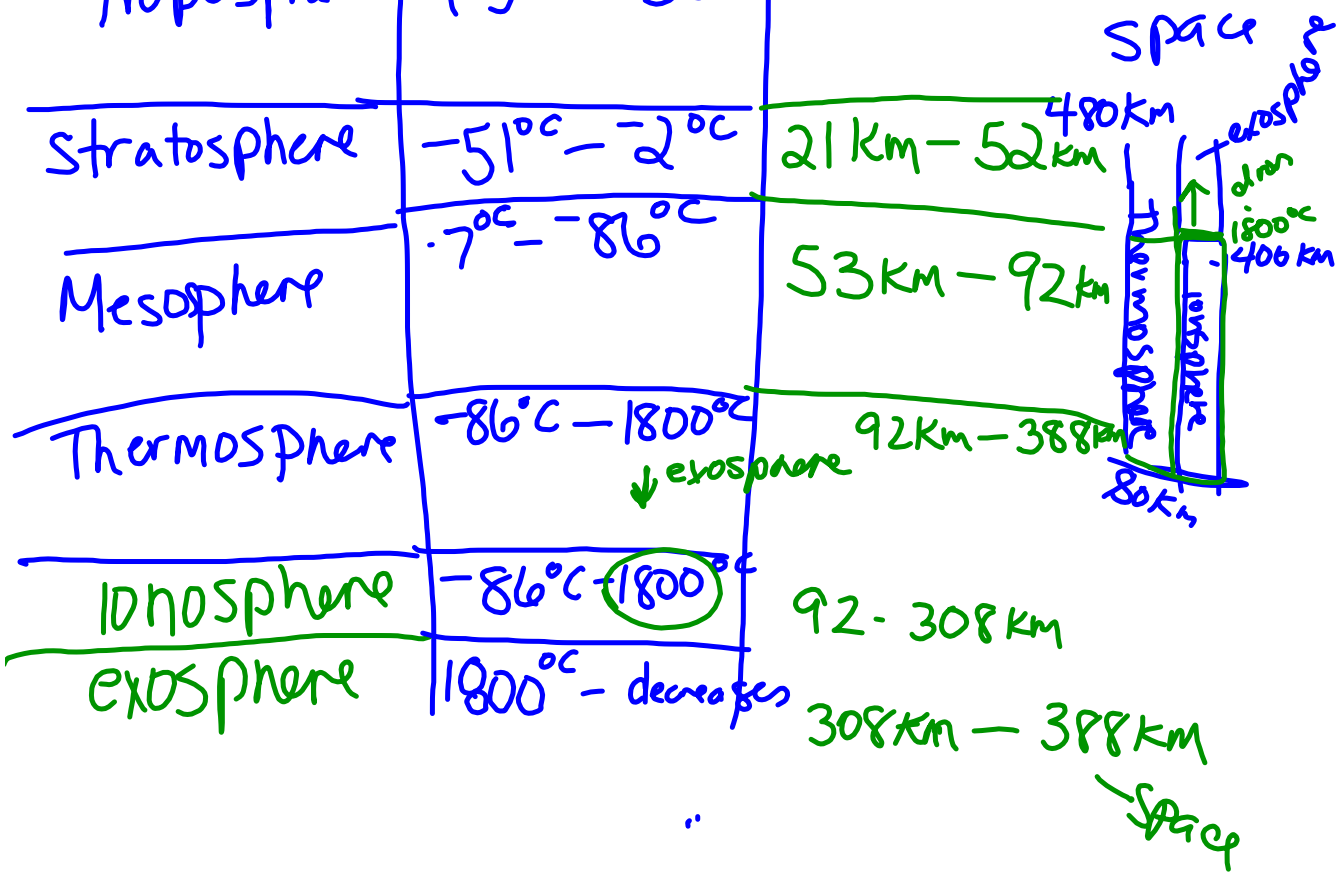
Altitude (km)	Temperature (°C)
0	15
5	-18
10	-49
12	-56
20	-56
25	-51
30	-46
35	-37
40	-22
45	-8
48	-2
52	-2
55	-7
60	-17
65	-33
70	-54
75	-65
80	-79
84	-86
92	-86
95	-81
100	-72

Tropopause
pauses: transition between the layers where altitude still increases but temperature stays the same



2. Draw three lines horizontally on the graph to separate the four layers of the atmosphere.
3. Use four colors to color in each section.
4. Label each section with the correct name of the atmospheric layer that it represents.
5. Mark the general location of the ozone layer.

layers		Height
troposphere	15°C – -56°C	0km - 20km
stratosphere	-51°C – -2°C	21km – 52km
Mesosphere	-7°C – -86°C	53km – 92km
Thermosphere	-86°C – 1800°C	92km – 388km
ionosphere	-86°C – 1800°C	92 - 308 km
exosphere	1800°C - decreases	308km – 388km



Troposphere

Facts
- We live in the troposphe
- Weather only occurs in troposphere
- The most pressure
- The most dens

Conclusion Questions:

1. What is the basis for dividing the atmosphere into four layers?

   Altitude and temperature

2. Does the temperature increase or decrease with altitude in the

   Troposphere: decrease Stratosphere: increase

   Mesosphere: decrease Thermosphere: increase

3. Based on the graph what is the approximate height and temperature range of the:

   Troposphere: ~~base~~ 8km −56°c

   Stratopause Stratosphere: 50 km −2°c

   Mesopause Mesosphere: 80 km −86°c

4. What causes the temperature to increase with height through the stratosphere, and decrease with height through the mesosphere?

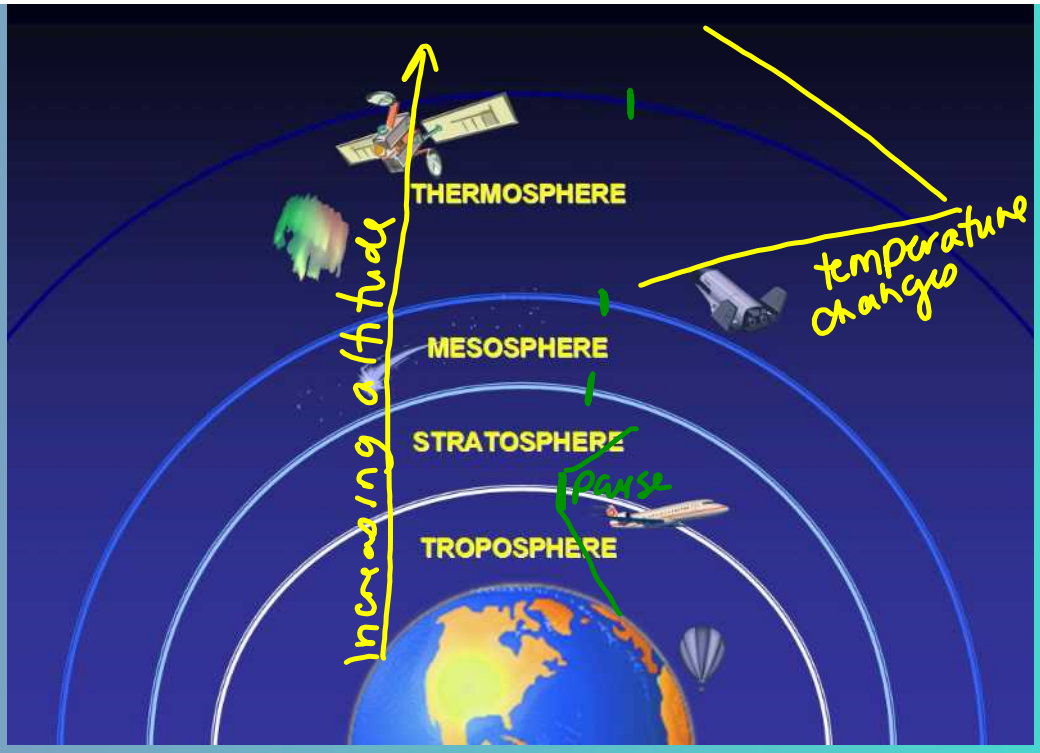
   ~~Some of~~ radiant energy is being absorbed

   more in the stratosphere than in the mesosphere

5. What causes the temperature to decrease with height in the troposphere?

there is no absorption of radiant energy in the troposphere until it hits the lithosphere (land).

Temperature and altitude. When in a pause your altitude increases,but temp. stays the same.


THERMOSPHERE
MESOSPHERE
STRATOSPHERE
TROPOSPHERE
Increasing altitude
temperature changes
pause

Layers of the Atmosphere Model

Objective: Make a model of the layers of the atmosphere. Indicate the change of temperature at each layer. Label the height of each layer and indicate activities within each layer.

Steps:
Include the following layers, be sure to label the layers:
Troposphere (Red)
Stratosphere (Yellow)
Ozone layer (Orange Marker Line)
Mesosphere (Green)
Thermosphere (Blue)

Each layer should be made to scale using 1mm=1km. Be sure to make a key for your scale on your model.

Label the height of each layer and the temperature of each layer.

Include the following symbols or pictures to indicate which layer each of the following would be located.

Flock of geese 1 km	Skylab (430 km)
Spacecraft orbiting (243 km)	weather balloon (45.7 km)
Jet airplane 20 Km-30Km	Satellite 243 Km
Inner Van Allen radiation belt (403 km)	Weather 0-20 Km
Altostratus clouds (1.8 km)	Meteors (65-100 km)
Mt. Everest (8888 m) 6 Km	Cumulonimbus clouds (18.3 km)
Aurora Borealis	Moon
Radio Waves	

Ozone 48 km

Aurora Borealis

Atmosphere layers are determined by their altitude and temperature

pg 84-89

Range

Troposphere $15 - -56 = 71^{\circ}$ bottom to top

$15 - -49 = 64^{\circ}$ bottom top

Stratosphere $-2 - -51 = 49^{\circ}$ difference from top to bottom

$-2 + +56 = 54^{\circ}$ difference from bottom to the top

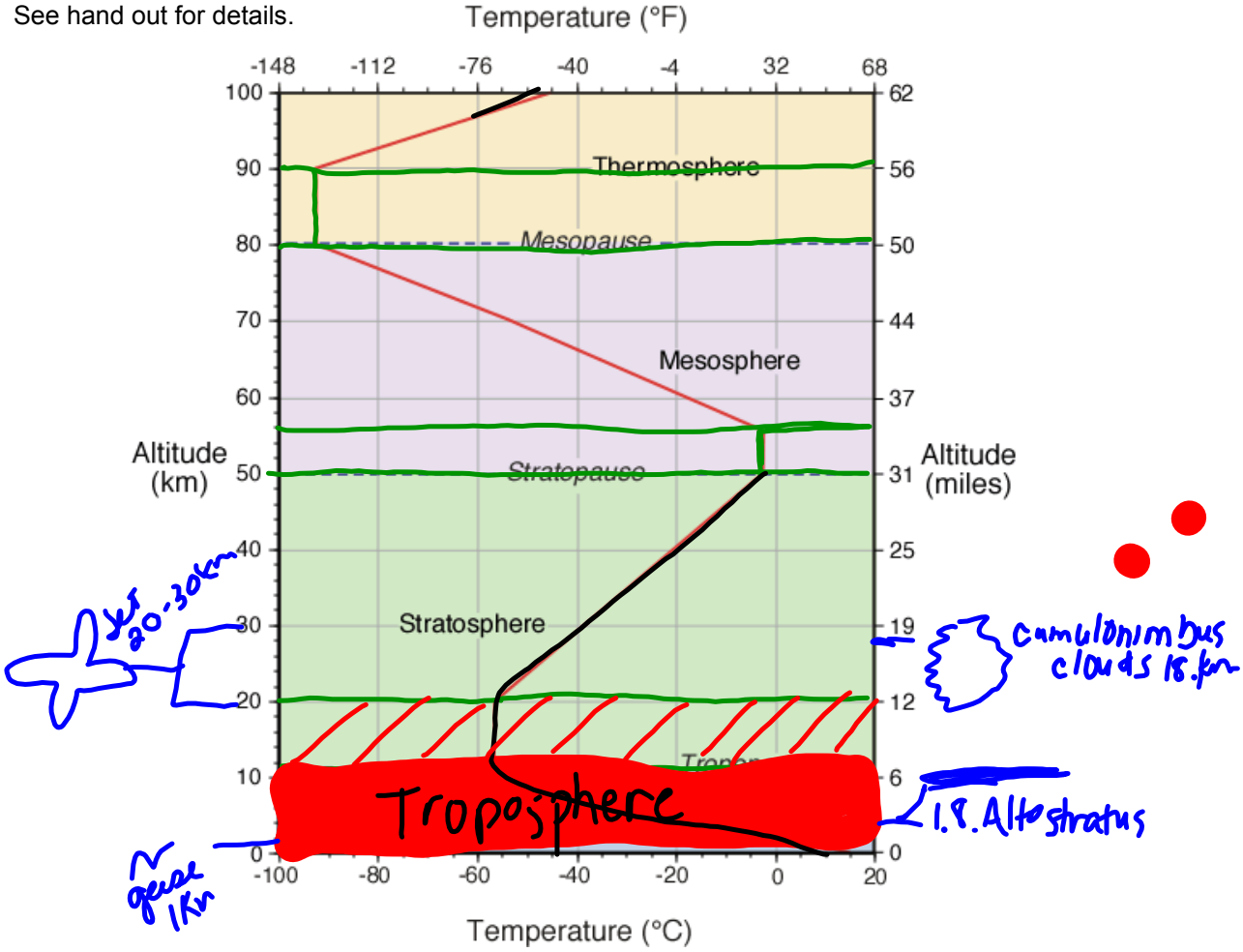
Mesosphere $-2 - -86 = 84^{\circ}$ difference from bottom to top.

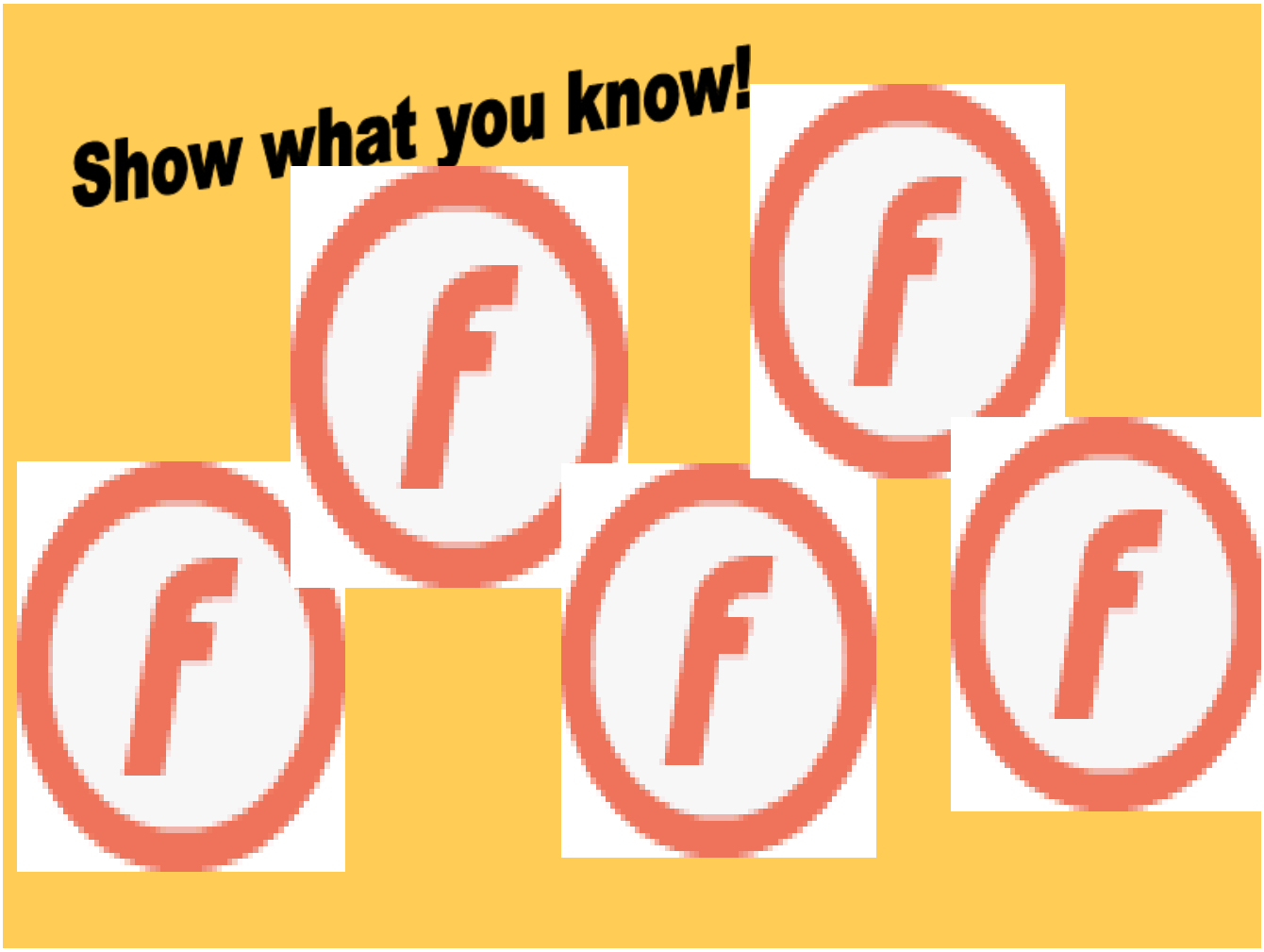
Thermosphere $1800^{\circ} - -81^{\circ} = 1881^{\circ}$ difference from bottom to the top

Let's apply some of this information
in an activity.

- First we will graph altitude and temperature data
- Then we will make a*scale model of the Layers in the Atmosphere*

See hand out for details.



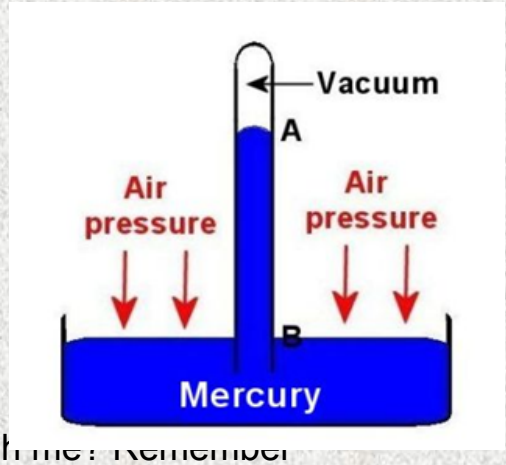

Show what you know!

Air Pressure

- The weight of the atmosphere over a particular point, also called barometric pressure. Average air exerts approximately 14.7 pounds (6.8 kg) of force on every square inch at sea level.

- Weather forecasters measure air pressure with a barometer. Barometers are used to measure the current air pressure at a particular location in "inches of mercury".

- How much pressure are you under? Earth's atmosphere is pressing against each square inch of you with a force of one kilogram per square centimeter (14.7 pounds per square inch). The force on 1,000 square centimeters (a little larger than a square foot) is about a ton!



- Why doesn't all that pressure squash me? Remember that you have air inside your body too, that air balances out the pressure outside so you stay nice and firm and not squishy. Air Pressure pushes in all directions.

Properties of the Atmosphere

Air has mass (air is matter)
Air has volume (takes up space)
Air has density (mass/volume)
Air has pressure (force pushing on an area)

Air Pressure is measured with a barometer in units of inches of mercury or millibars.

Air pressure is the result of a column of air pushing down on an area. The weight of the air above you is about the same as the weight of a school bus!

Density

The amount of matter in a given space.
Mass/Volume= Density
g/ml

Air has density. Air takes up space therefore, has volume and mass. If there are more molecules in a given volume of air, the density is greater. If the molecules decrease then the density decreases.

Air pressure is the result of the weight of a column of air pushing down on an area. A denser substance has more mass per unit volume than a less dense one. S**denser air exerts more pressure than less dense air**. What temperature is denser air? Colder or warmer?

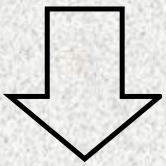
Air pressure can tell us about what kind of weather to expect. If a high pressure system is on its way, often you can expect cooler temperatures and clear skies. If a low pressure system is coming, then look for warmer weather, storms and rain.

Air Pressure moves from areas of HIGH pressure to areas of LOW pressure.
H L

On weather maps air pressure is shown using isobars.
Isobars connect like air pressure.

H- Happy

Cool Air Sinking



L- Lousy

Warm Air Rising

More Dense Air
More Air Pressure
(Cold air)
H

Less Dense Air
Less Air Pressure
(Warm Air)
L

Anticyclone
(counterclockwise)

Cyclone
(clockwise)

Isobars are increasing in Air Pressure toward the center.

Isobars are decreasing in Air Pressure toward the center.

Properties of Air Investigations

Book Demo

Crushing Can

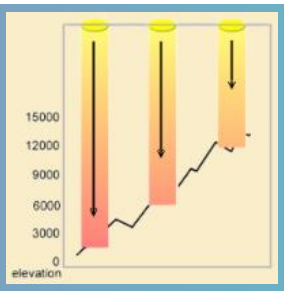
Ping Pong Ball

Bell Jar Demos

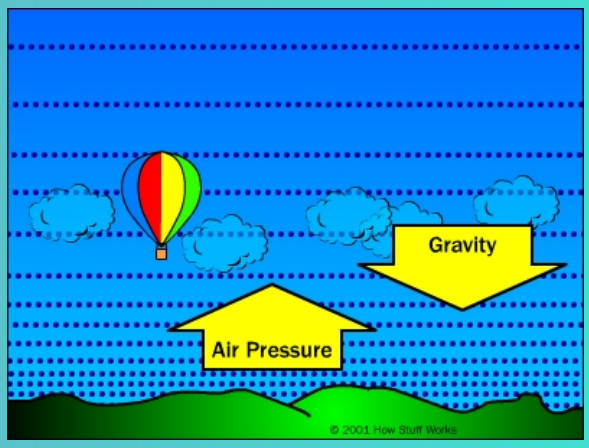
Air Pressure Mat

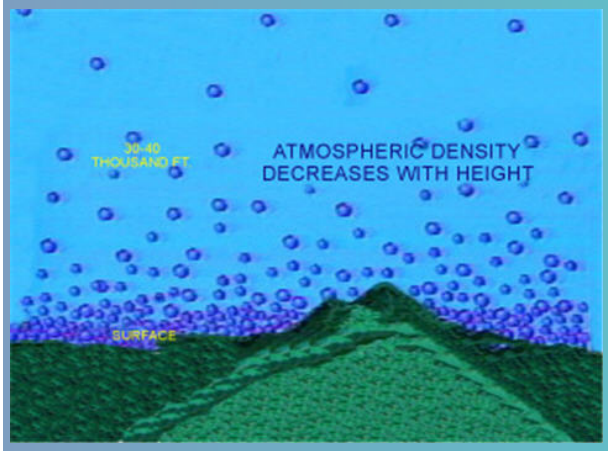
Balloon

Changes in Air Pressure



Altitude- elevation/height above sea level
Air pressure decreases as altitude increases.
Air pressure increases as altitude decreases.





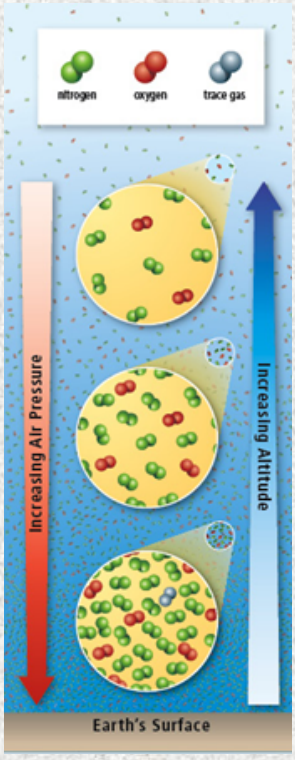
Density of air decreases as altitude increases.
There is still 21% oxygen but the molecules are spread out.

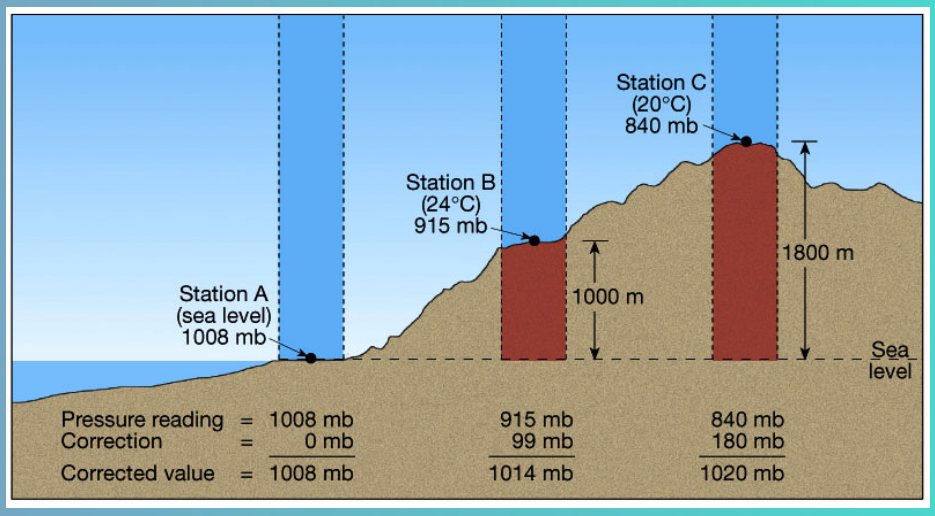
air pressure affects

What Happens if Air Pressure Changes?

- Why do my ears pop? If you've ever been to the top of a tall mountain, you may have noticed that your ears pop and you need to breathe more often than when you're at sea level. As the number of molecules of air around you decreases, the air pressure decreases. This causes your ears to pop in order to balance the pressure between the outside and inside of your ear. Since you are breathing fewer molecules of oxygen, you need to breathe faster to bring the few molecules there are into your lungs to make up for the deficit.

- As you climb higher, air temperature decreases. Typically, air temperatures decrease about 3.6° F per 1,000 feet of elevation.

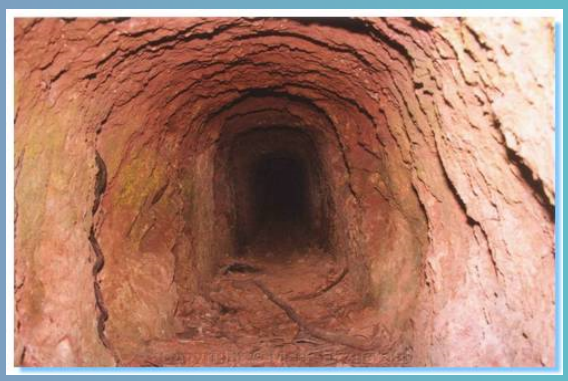




http://profhorn.meteor.wisc.edu/wxwise/baseball/homerun.html

air density/ altitude baseball

Where is the air pressure greater, at the top of the mountain or at the lake?



As you go down into a mine shaft what happens to the air pressure?

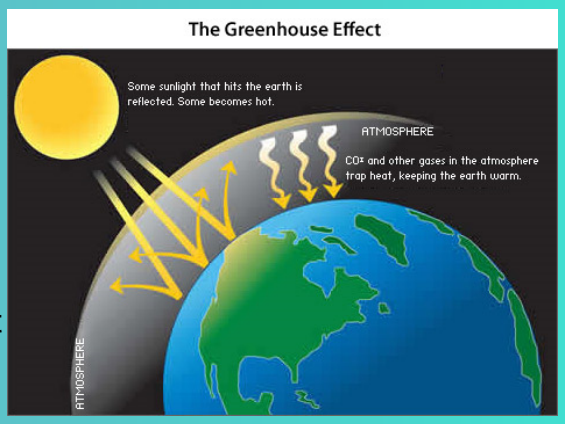
Vocabulary

- Air pressure
- Density
- Altitude
- Elevation

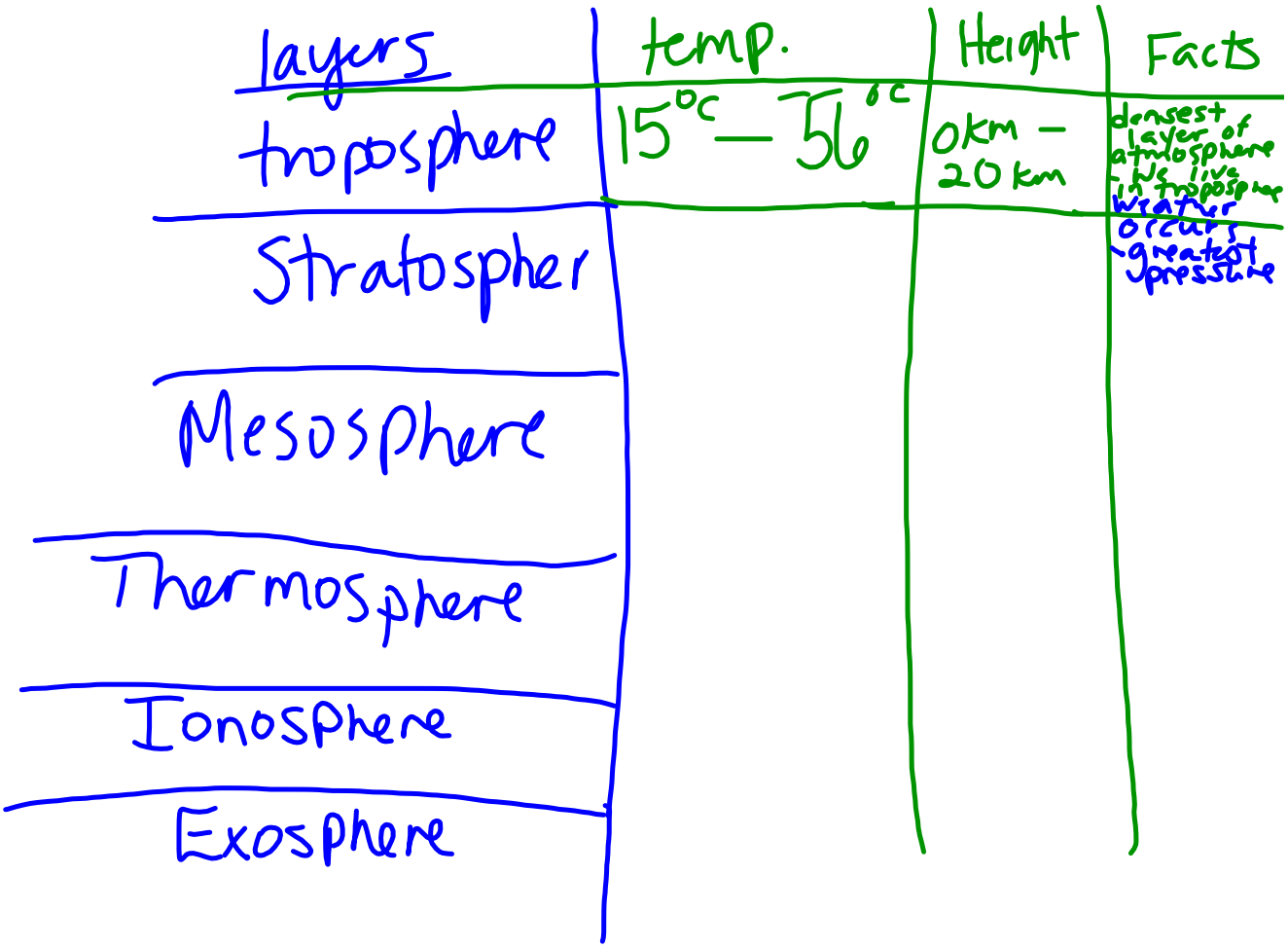
Show what you know!

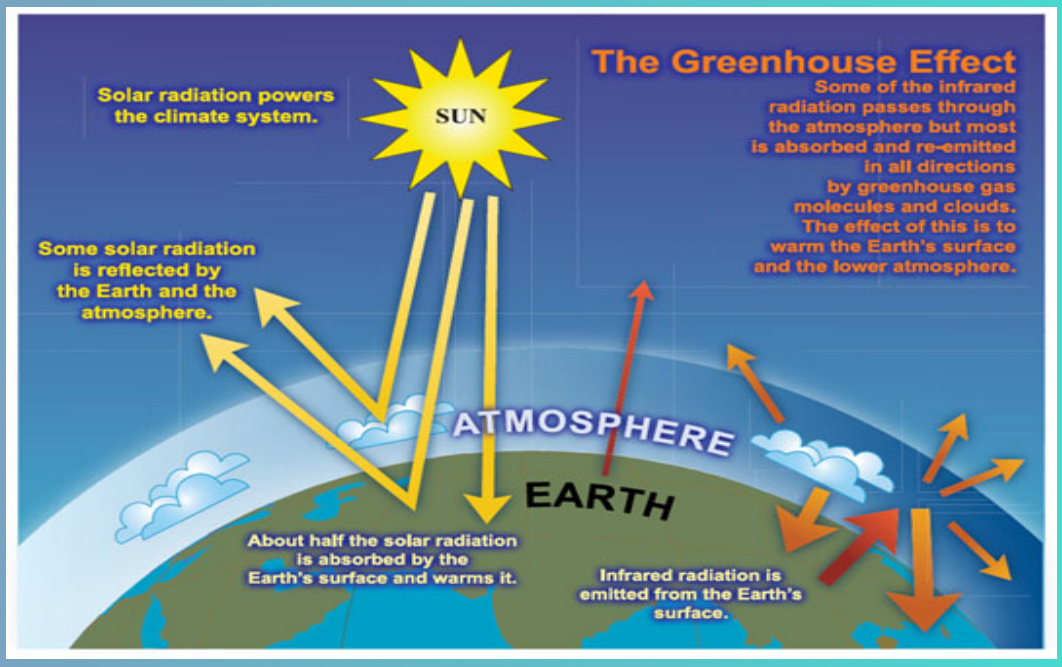
Energy in the Atmosphere

Before the sun's energy reaches the Earth's surface it passes through the atmosphere. Some of the energy is absorbed by water, carbon dioxide, clouds, dust and other gases in the atmosphere. The ozone layer absorbs most of the ultraviolet radiation. Some of the energy is absorbed by the Earth's surface (land and water) and heats the air above it creating a blanket around the Earth holding in the heat this is called the Greenhouse effect. This is what keeps our planet warm. Some of the radiant energy is reflected by clouds, dust and gas particles. The reflection of light in all directions is called scattering. Gas molecules scatter shorter light waves (blue and violet) that's why the sky is blue. When the sun is rising or setting the light is passed through a thicker atmosphere and scatters the longer light waves (red and orange) quicker.



http://earthguide.ucsd.edu/earthguide/diagrams/energybalance/index.html


layers
temp.
Height
Facts
troposphere
15°C — 56°C
0km – 20km
densest layer of atmosphere
life lives in troposphere
weather occurs
greatest pressure
Stratosphere
Mesosphere
Thermosphere
Ionosphere
Exosphere



http://earthguide.ucsd.edu/earthguide/diagrams/greenhouse/index.html

Green House Effect

Heat Transfer

heat rising from boiling water

feeling sun On your face

heat from a heater

heat from flame

Radiation - The direct transfer of heat through electromagnetic waves visible light, ultra-violet, infared radiation

Convection Heat transfer that occurs when warmer less dense air is pushed by colder denser air. (Winds)

warm air

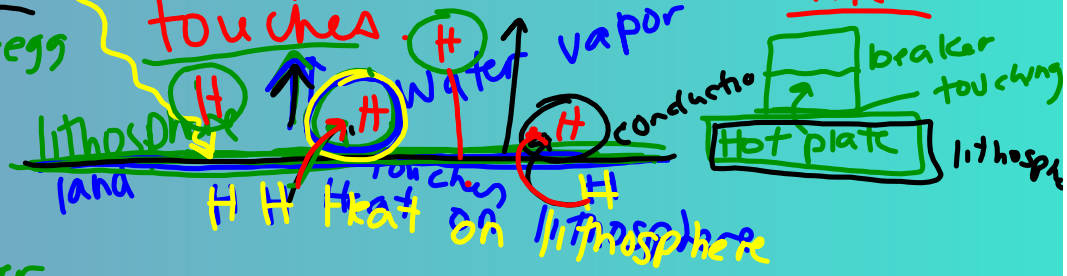
-Heat transfer That occurs The most on earth

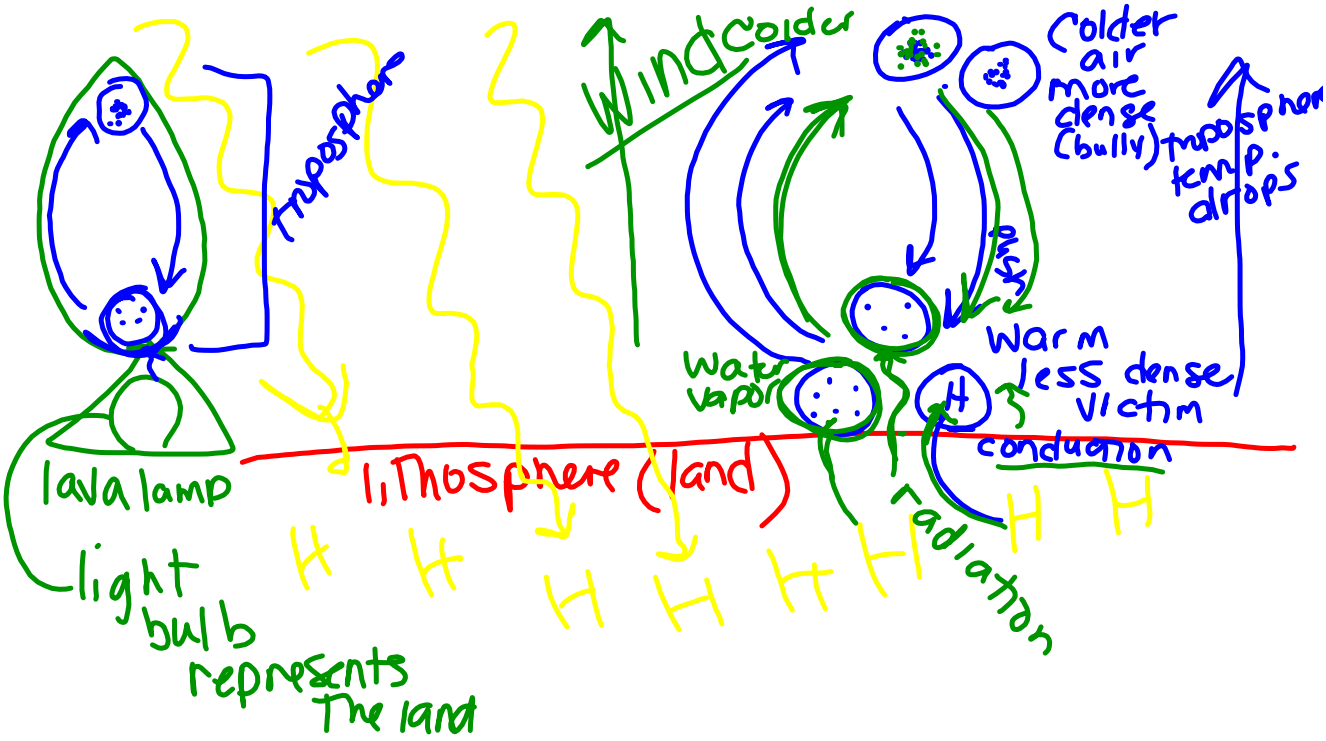
lava lamp

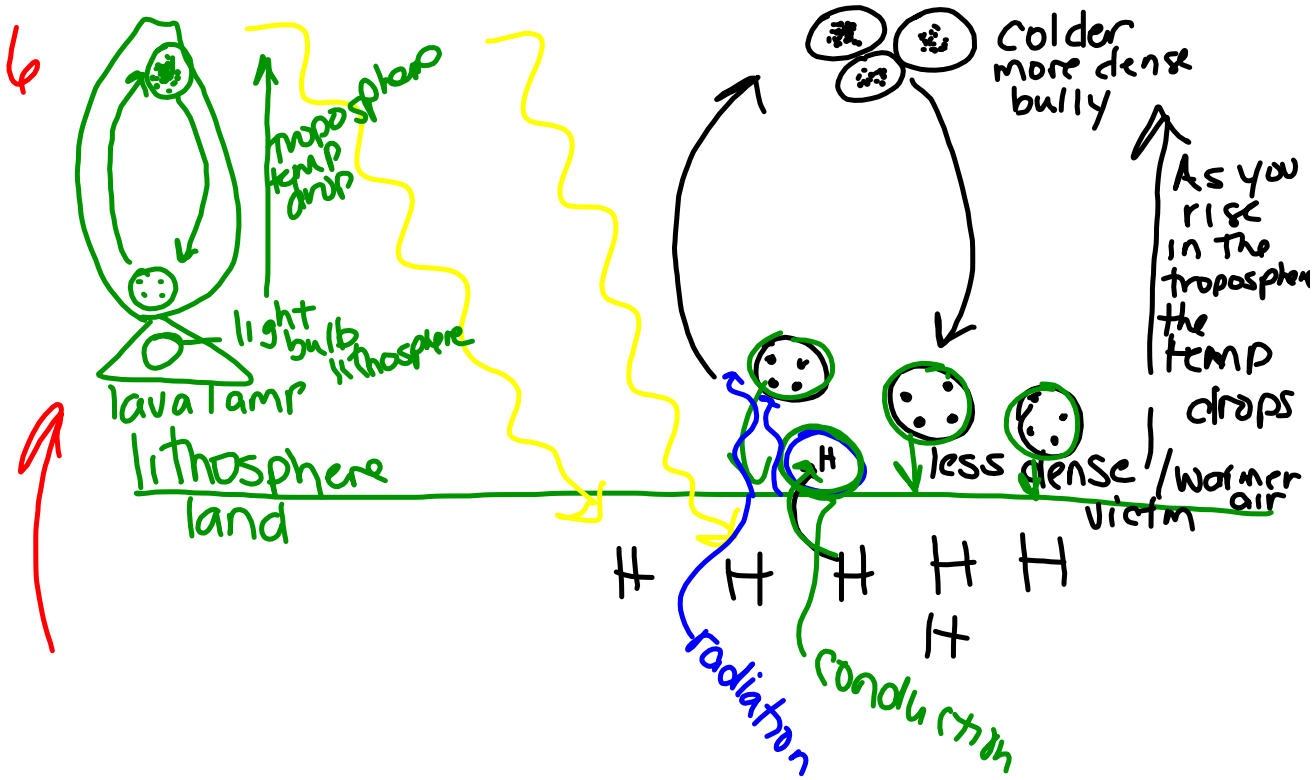
Conduction - Heat transfer when matter touches

boiling an egg pan/stove

Flat iron curling iron cold water dry ice skin knee / friction




troposphere
Wind
Colder
Colder air more dense (bully)
troposphere temp. drops
warm
less dense victim
water vapor
lava lamp
lithosphere (land)
conduction
radiation
light bulb represents the land


troposphere temp drops
light bulb
lithosphere
lava lamp
lithosphere
land
colder more dense bully
As you rise in the troposphere the temp drops
less dense / warmer air
victim
H
radiation
conduction

1. The warmer wax is rising because it less dense.

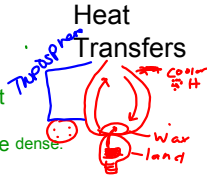
High → Low

2. light bulb.

3. at the bottom which represents the lithosphere (land)

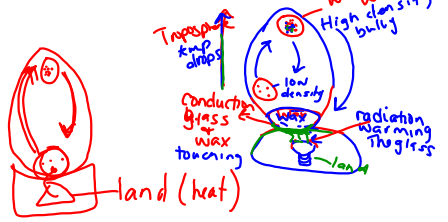
Pg 66
Heat Transfers

4. The wax gets less dense near light bulb but as it rises The temperature Cools and the wax becomes more dense and the falls.



5. Because the wax is dropping it Means That the molecules are huddled

6.



7. The beaker on the hot plate represents Water vapor touching the land which demonstrates conduction. The heat from the hotplate is transferring Into The beaker of water

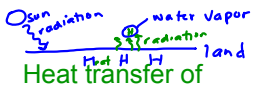
8. Without water vapor touching (conduction) the land and warming up the air (water vapor) the air's density would not become less dense. Therefore the more dense are more Colder air would not be able to push it.

Wax touching the glass

****High → Low

8A. Radiant energy radiates off of all matter! The hotter the temp The faster the molecules move. The colder the temp. The slower they move (air acts like liquid)

9. Radiation



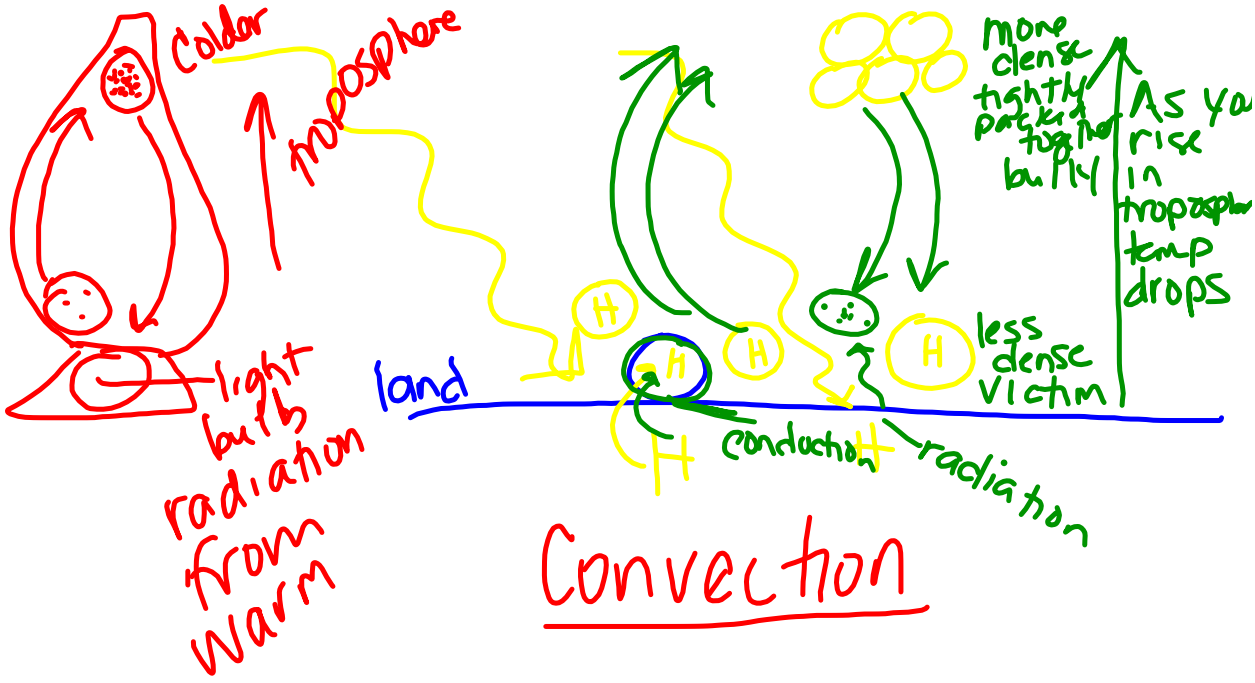
10. Radiation: Heat transfer of electromagnetic waves. (Infrared, ultraviolet, visible light)

11. body radiating, water radiates light sun, hand over ice cube

12. Sun is the most important. Source of energy.

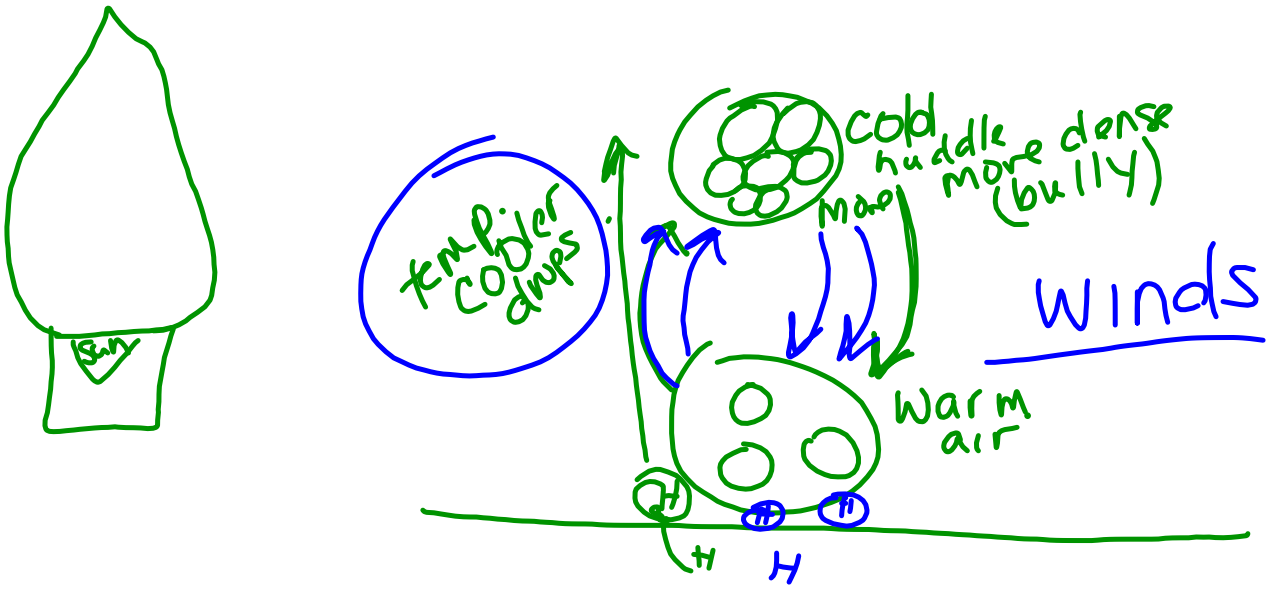
13. There is no atmosphere Outside of our planet and the sun

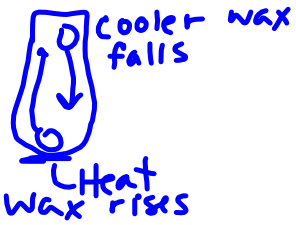
14. All radiation (infrared, ultraviolet, visible can all travel through a vacuum (no air)


Colder
troposphere
light bulb radiation from warm
land
H
H
H
H
H
conduction
radiation
more dense tightly packed together by
less dense victim
As ya rise in tropospl temp drops

Convection

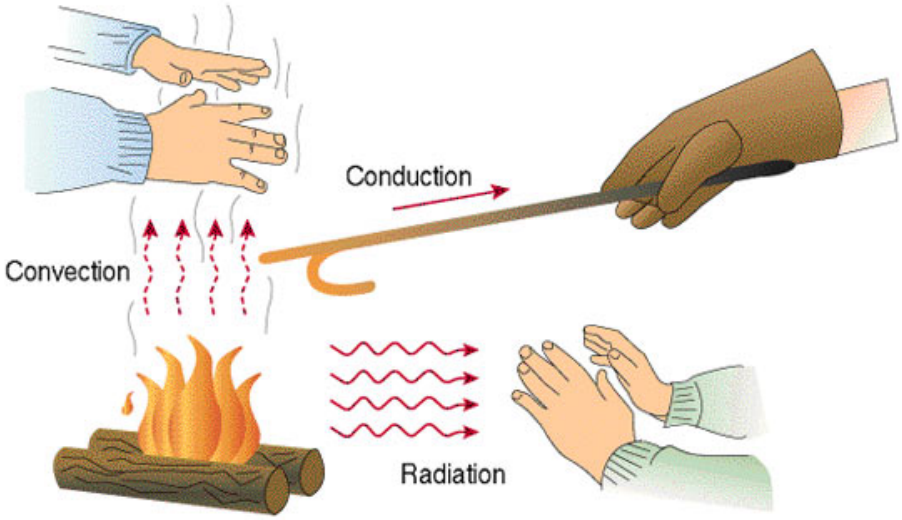
Convection


Sun
temp. cooler drops
cold
huddle more dense (bully)
more
Winds
warm air
H
H
H



2. lightbulb

3. At the bottom, on earth (land)


Conduction
Convection
Radiation

Vocabulary

- Green House Effect
- Heat transfer
- conduction
- convection
- radiation

ADD AN INTERACTIVE REVIEWING HEAT TRANSFERS

Attachments

Lego man in the atmosphere

Liquid Density Lab 2012-2013.doc