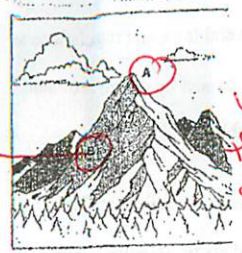
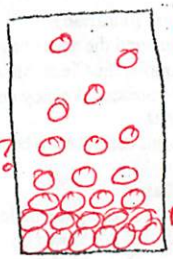
**How does air pressure change with altitude change?**
**Air pressure decreases as altitude increases. As air pressure decreases so does density.**




Where is the air denser?



less dense
less air pressure

more dense
more air pressure

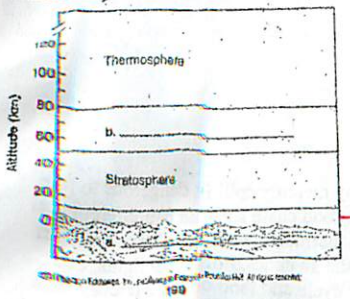
surface

**What are the layers of the Atmosphere:**? total of 5 each with its own properties)

Helpful prefixes: Trop = land, meso= middle therm= heat exo= out

| |
|---|
| **Exosphere** 500 km upward. This is the transition zone between atmosphere and outer space. Very few air molecules. Space shuttle and International Space Station (ISS) are in orbit here. |
| **Thermosphere**- 85- 500 km This is the hot layer (therm= heat). Ionosphere layer (electrically charged particles) found in the upper mesosphere and thermosphere. The Norther Lights (Aurora Borealis) are found here. |
| **Mesosphere**- 50-85 km, this is where meteors are seen coming to Earth. Most meteors burn up in this layer. |
| **Stratosphere**- layer above troposphere. **Ozone layer found here!!!** 10-50 km |
| **Troposphere**- lowest layer, layer we live in, contains 99% of water vapor and 75% of the gas molecules. Rain, snow, and clouds are in the troposphere: This is where weather occurs!!! This is where most of the mass occurs. 0 to 10 km above the surface |

We live in the troposphere!




Exosphere
Mesosphere
Stratosphere
Troposphere



**How does the Sun's energy react with the atmosphere?**

Most of the energy from the sun travels to Earth as electromagnetic waves in the form of visible light, infared radiation, and ultraviolet radiation.
**Electromagnetic waves** can travel through space.
**Visible light** is in the range of wavelengths that we can see with our eyes.
**Infared radiation** has longer wavelengths than visible light. We can not see it, but we feel it as heat.
**Ultraviolet radiation (UV)** has shorter wavelengths than visible light,. We can not see it, but it has stronger waves that cause sunburn.

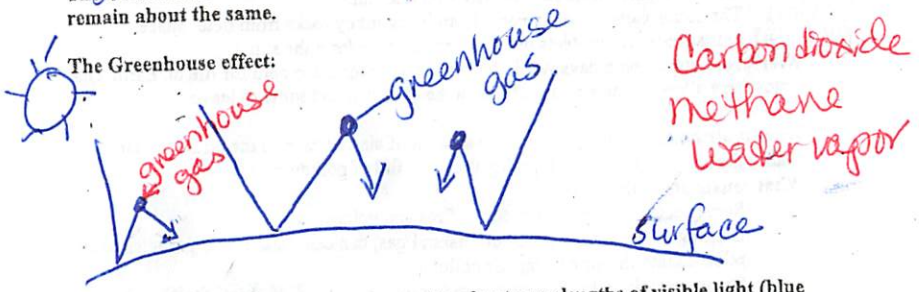
The Sun's energy in the atmosphere is either absorbed, reflected back into space, or scattered.
Water vapor and carbon dioxide absorb (take in) some of the sun's energy.
Clouds reflect (bounce back with out being absorbed) some of the sun's energy.
Dust particles and gases scatter (reflect light in all directions)
*******About ½ of all of the Sun's energy that travels to earth passes through the atmosphere to the surface where the land and water are heated up.**

**What happens to the energy when it hits the Earth? Study fig 15 pg 410**

1. Suns energy heats the surface.
2. Some of the heat radiates back into the atmosphere as infared radiation.
3. Some gases (carbon dioxide and water vapor) take in this heat.

***The processes by which gases hold heat in the air is called the greenhouse effect
The Greenhouse effect is natural and it allows Earth's average temperatures to remain about the same.

The Greenhouse effect:




Carbon dioxide
methane
water vapor

**Why is the sky blue? Gas molecules scatter short wavelengths of visible light (blue and violet) so the sky appears blue. As the sun sets and rises, the light passes through thickest parts of atmospshere and blue light is scattered and we see the remaining red and orange so the sunset clouds etc appear these colors. See page 410**

## Atmosphere Notes Chapter 12:

**Weather** is the condition of the Earth's atmosphere at a particular time and place. Weather describes conditions such as air pressure, air temperature, wind, amount of moisture in the air, and precipitation.

The Earth's atmosphere is the covering of gasses that surrounds our planet. The atmosphere layer is very thin compared to the Earth.
**The atmosphere is also called air.**

**What is our Atmosphere composed (made of)?** Nitrogen, oxygen, carbon dioxide, water vapor and other gases, solid and liquid particles.
***Gases
- Nitrogen 78%
- Oxygen 21% (2 oxygen molecules together)
- Carbon dioxide 0.038 %
- Other gases (Argon, 0.93%; neon, helium, methane, krypton, xenon, hydrogen, ozone) Ozone= 3 oxygen molecules together)

***Water vapor- gas state of water
***Solid particles (dust, smoke, salt, pollen, chemicals)

**Why is the atmosphere important for life on Earth?**
1. The atmosphere contains oxygen and other gases living things need.
2. The atmosphere traps heat energy from the sun.
3. The atmosphere prevents Earth from being hit by rocks from outer space.
4. Our atmosphere protects us from harmful rays form the sun. :

Without our atmosphere days would be too hot and nights too cold for life on Earth. Our atmosphere allows some amount of heat to be absorbed and some to leave.

**What is air quality?** Air quality is the amount of air pollution in the air. Good air quality the air is clean, poor air quality the air is full of pollution.
**What causes air pollution?**
1. Some occurs naturally from forest fires and volcanoes.
2. Burning of fossil fuels (coal, oil, natural gas) can cause gases and particles to be released into the air causing air pollution.
3. **Smog** = smoke + fog or smoky fog (caused by burning of fossil fuels)
4. **Photochemical smog** (brown haze over cities) caused by sunlight hitting particles of pollution in the air.
5. **Acid rain**- rain (all precipitation including snow) that is more acid than normal (lower pH) Acid rain Is harmful to water (aquatic) and land (terrestrial) animals and plants.

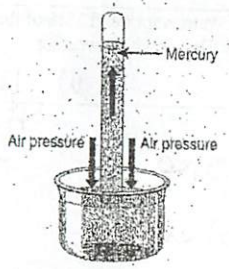
**How does Air pollution get into the water cycle?** Air pollutants get into the water cycle through precipitation as rain caries particles suspended in the air down to the ground.



**What is being done about air pollution?**
The United States government and the states have passed several laws and regulations to reduce air pollution; for example, the Clean Air Act of
The EPA = Environmental Protection Agency enforces laws passed by the government.
For example the Clean Air Act
Air pollution has improved, but continues to be a serious problem.

**What are the properties of air?**
Air has mass. If you put a balloon that is blown up on the scales it will have more mass than when it was not blown up.
Air has density. Because air has mass, it has density. **Density is the amount of mass in a certain volume.**
Because air has mass it has pressure. **Pressure** is the force pushing on an area or its surface. Air has pressure because air's mass has weight, and the weight of air presses down.
**Denser air has more pressure than less dense air has.**

**How do we measure air pressure?**
A **barometer** is an instrument that measures air pressure.
A mercury barometer is made of a glass tube that is open the bottom of a dish of mercury. Pressure causes the mercury to go up the tube.
An anaeroid barometer has a closed space surrounded by metal. The air pressure pushes the metal in and out, this causes a needle to move showing what the air pressure is.




Note: mercury is a poisonous substance and any mercury spill is dangerous to the environment. Some mercury even gets into the food chain such as fish. Mercury is released from coal burning and spills from old thermometers, barometers, used in industry (chlorine manufacturing etc), thermostat switches, florescent lights, etc.. Mercury cycles through the atmosphere, water cycle and food chain. Mercury is a threatening form of water and air pollution now. As stewards (care takers) of the planet, we have to be aware and be careful with harmful pollutants such as mercury.

E2 4