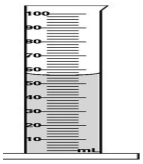
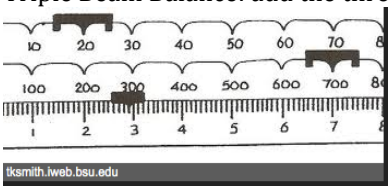
6th Grade 2nd Nine Week CSA Study Guide ~~2015 - 16~~

SOL 6.1b: Make precise and consistent measurements and estimations.

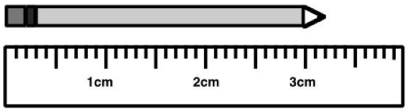
Graduated Cylinder: read from the lowest part of the water line curve. Reading: 56ml (milliliters) Metric base unit for volume is **liter.**



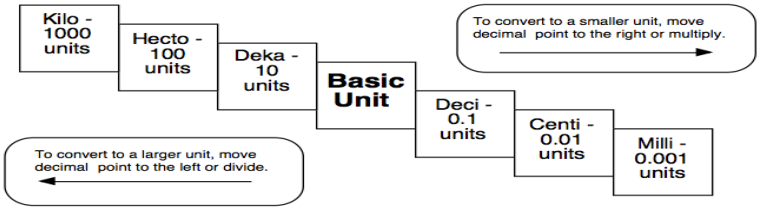
Triple Beam Balance: add the three together: 700g + 20g + 2.9g = 722.9g Metric base unit for mass is **gram**.



Metric Ruler: Metric base unit for length is **meter**. This pencil measures 3.2 cm (centimeter)



Metric Conversions:



33cm = 330mm

Look at the stair step: milli is one step to the right of centi so when converting you would move the decimal one place to the right. If there is no decimal in the number you are converting, then you place one at the right end of the number and move it the correct number of places.

6.1d: Differentiate between independent and dependent variables in a hypothesis. In a hypothesis the independent variable follows the word if and the dependent variable follows the word then.

- Example: If the temperature drops then the leaves will change color. Independent Variable: temperature Dependent Variable: the color of the leaves

6.1f Design an experiment in which one variable is manipulated over many trials.

What is the independent variable in this experiment?

The independent variable in this experiment is the substances being poured on the plants.

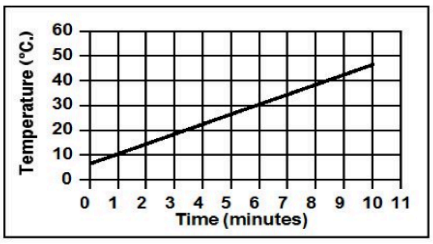
6.1g: Collect, record, analyze and report data using metric terminology and tools. Refer to the measurement tools and how to read them as well as metric conversion.

6.1h: Analyze, communicate data using graphs, charts and diagrams.

Example 1:

What was the temperature after 6 minutes of heating? Answer: 30^0C

The graph below shows how the temperature of water changed while being heated.



Example 2:

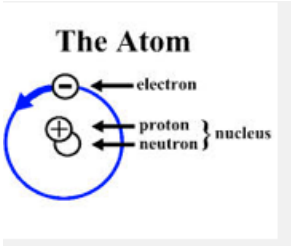
Record Temperatures in Five States

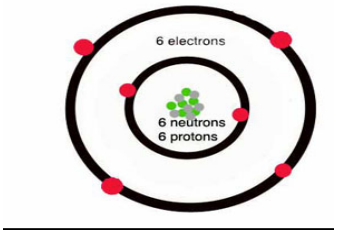
State	Highest Temperature (°F)	Date
Delaware	109	June 25, 1935
Hawaii	102	April 28, 1930
California	132	July 9, 1912
Florida	110	June 27, 1931
Nebraska	120	July 29, 1938

According to the chart, which state had the lowest high temperature?

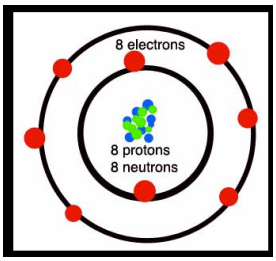
Answer: Hawaii

SOL 6.4 Investigating Atoms, Elements and Compounds





Carbon atom (6 protons)



Oxygen atom (8 protons)

6.4b: Compare/contrast atomic structure of 2 different atoms.

Electron Shells of the atom:

Shell 1 can hold up to 2 electrons

Shell 2 can hold up to 8 electrons

Shell 3 can hold up to 18 electrons

- Nucleus contains the protons and neutrons.
- Atoms of the same element are alike but are different from other elements
- the number of protons determines the type of element – Carbon has 6 protons and Oxygen has 8 ****know this****

6.4g: A limited number of elements comprise (make up) the largest portion of the solid Earth, living matter, the oceans and the atmosphere.

* Earth's Crust: ICOMPASS- Iron, Calcium, Oxygen, Magnesium, Potassium, Aluminum, Sodium, Silicon
* Living Matter: CHON – carbon, hydrogen, oxygen, nitrogen
* Oceans: NaCL and H_2O: Na is sodium, Cl is chlorine, H is hydrogen, O is oxygen
*Atmosphere: NO - Nitrogen (78%), Oxygen (21%)

Investigating Energy:

SOL 6.2a: potential and kinetic energy

- Potential energy: stored energy (chemical potential, gravitational potential, elastic potential (compression)
- Kinetic Energy: energy in motion

Examples: Potential: <u>Chemical potential</u> – energy stored in coal

<u>Gravitational potential</u> – energy due to position (higher object has more potential, more massive object would have more potential energy)

<u>Elastic potential</u>: pressing a spring, stretching a rubber band

Kinetic: moving for example: moving water and wind, a motor, running

SOL 6.2e: Energy Transformations: Law of Conservation of Energy – energy is neither created nor destroyed it is transformed from one form to another.

Examples: chemical energy in a battery is transformed into electrical energy
a hair dryer: electrical to mechanical to thermal and sound
Radiant (light) and thermal can be converted into mechanical energy, chemical energy and electrical energy
States of Energy; potential and kinetic
Forms of Energy: mechanical, electrical, sound, radiant (light, electromagnetic), chemical, nuclear, thermal,

- Primary Sources of Energy: coal, oil, natural gas etc..
- Secondary Sources of Energy: electricity, hydrogen (also called an energy carrier)

6.2b: The Role of the Sun in the formation of most Energy Sources on Earth

- Solar energy from the ancient past is stored in fossil fuels, such as coal, petroleum and natural gas. (ancient plants buried deep in the ground form fossil fuels – those plants created energy from the sun through photosynthesis. That solar energy is stored in the plant and the fossil fuel)
- Earth gets most of its energy from the SUN.

6.2c: Non-Renewable Resources

- Fossil fuels contain carbon and hydrogen. Fossil fuels take a long time to form so are considered non-renewable resources. Non-renewable: coal, oil, natural gas and nuclear power.

6.2d: Renewable Resources

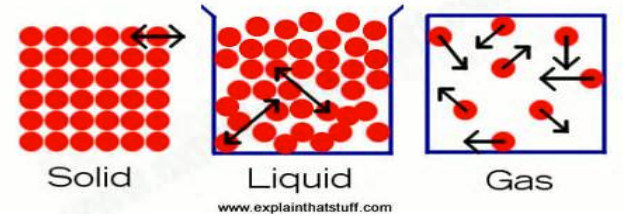
- Many of Earth's energy resources are available on a perpetual (ongoing) basis.
- Renewable Resources include: solar (sun), wind, water (hydropower, tidal and waves), biofuels and geothermal, wood and biomass.

6.9b: Management of nonrenewable resources

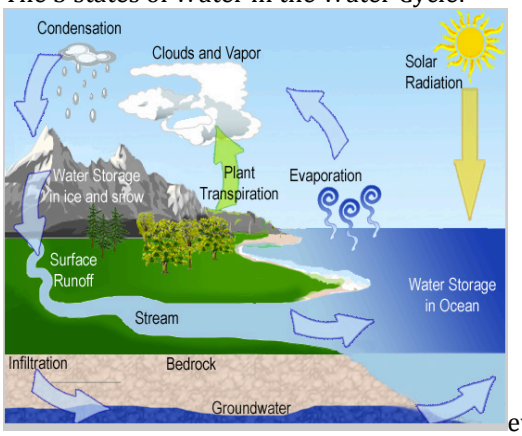
- We have a limited amount of nonrenewable resources such as coal, oil, natural gas, and nuclear power, so we must try to conserve these resources.
- We are dependent upon coal, oil, and natural gas (we use a lot of it)
- Renewable Resources should be managed so they produce continuously (don't use them so fast that they can't be replenished in a reasonable amount of time) If we use them too quickly then we could run out of them.

Investigating the Unique Properties of Water
6.5a: Water as the Universal Solvent; water is a polar molecule – Hydrogen end is positive, Oxygen end is negative – for this reason water can dissolve many substances – this is why it is called the Universal Solvent. (see below)

6.5b: Water is the only compound that commonly exists in all 3 states: Solid, liquid, and gas
Solid: water molecules and close together, vibrate in place, form a crystal lattice so ice is less dense than liquid water
Liquid: water molecules more loosely packed, can flow past each other (more energy than solid but less than gas)
Gas: high energy, molecules move freely



The 3 states of Water in the Water Cycle:

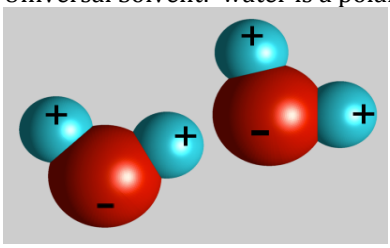


evaporation, condensation, precipitation, transpiration, groundwater, runoff

melting: solid to liquid
freezing: liquid to solid
condensation: gas to liquid
evaporation (vaporization): liquid to gas
Sublimation: solid to gas (dry ice)

Properties of Water: Adhesion, cohesion, capillary action, universal solvent, specific heat, surface tension.

- Adhesion: water molecules sticking to other polar substances example: water sticking to the side of a glass
- Cohesion: water molecules sticking to other water molecules example: water creating large droplets
- Capillary action: adhesion and cohesion working together – ex. Water rising up a straw so the level in the straw is higher than the level in the glass, water rising up the stem of a plant.
- Surface Tension: cohesion on the surface (remember we balanced the paperclip on the cup of water)
- Specific Heat: the amount of heat needed to raise the temperature of a substance by 1^0 C. Water has a high specific heat so it can absorb more heat before the temperature increases. (SOL 6.5d) This property of water can help regulate our climate – in the summer water absorbs heat so it is cooler near the water – in the winter this heat is released slowly so it is warmer near the water. Cities like Hampton are cooler in summer and warmer in winter than inland cities like Richmond.
- Universal Solvent: water is a polar substance so it is able to dissolve many substances.



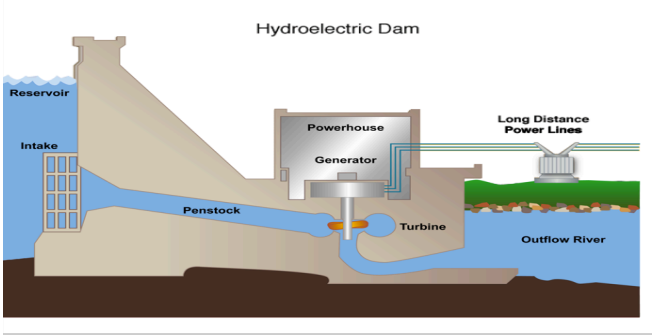
Hydrogen end is positive (+); Oxygen end is negative (-)
Opposite charges attract to each other so when water comes into contact with another polar substance it will attract those substances. (remember the blue and white spoons and the dissolving lab)

6.5c: The action of water in physical (mechanical) and chemical weathering: weathering is the process that breaks down rock and other substances at Earth's surface

- Mechanical Weathering (physical): rock is physically broken into smaller pieces. The smaller pieces have the same characteristic as the larger rock. Mechanical weathering breaks rock into pieces by Freezing and thawing, Release of pressure, Actions of animals, Growth or plants, and Abrasion. (FRAGA)
- Chemical Weathering – break down of rocks through chemical changes. Agents of chemical weather (COWAL): Carbon dioxide, Oxygen, Water, Acid Rain, Living organisms.

6.5e: Role of Water in Power Generation

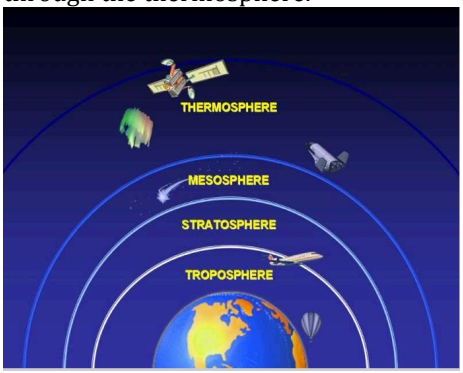
- Dams store water behind it then allow water to flow. The flowing water turns a turbine that turns a generator, which creates electricity. Electricity is carried along transmission lines to be used by homes and business.

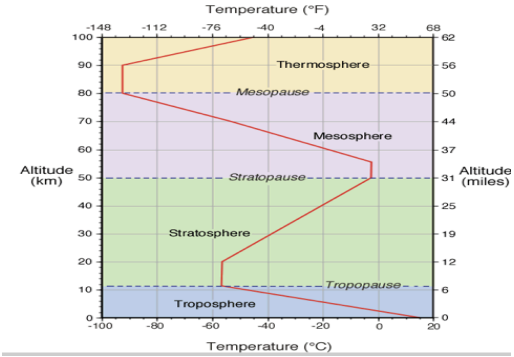


Investigating the Unique Properties of Earth's Atmosphere
SOL 6.6a: Air is a mixture of gaseous elements and compounds. Nitrogen – 78%, Oxygen – 21%, Argon and Carbon Dioxide.

SOL 6.6b: Air pressure, temperature and humidity: air exerts pressure, <u>air pressure decreases with altitude</u> (as you go up away from Earth – air pressure goes down), <u>Humidity</u> is the amount of moisture in the air.
SOL 6.6c: Atmospheric changes with atmosphere, layers of the atmosphere: troposphere, stratosphere, mesosphere, thermosphere.

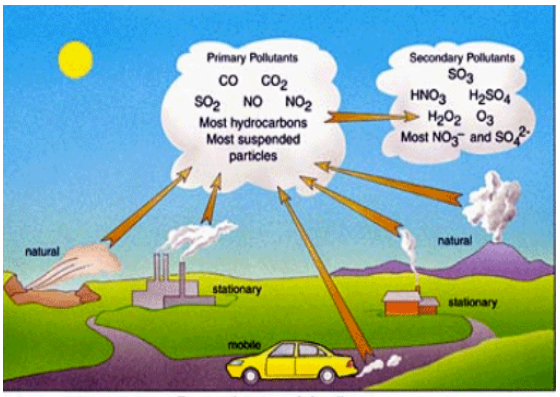
- Lowest layer is the troposphere – weather occurs here, in this layer temperature goes down as altitude increases (further away from Earth)
- 2nd Layer from Earth is the stratosphere – Ozone layer is in the stratosphere. The naturally occurring Ozone in the stratosphere is good but when ozone forms near the surface it is pollution and can cause health problems. Ozone in the stratosphere helps protect/shield Earth from ultraviolet radiation. Most jets fly in the stratosphere. Temperature increases as you go up in the stratosphere.
- Mesosphere: Meteors usually burn up in this layer. Temperature goes down as you move up through the mesosphere.
- Thermosphere: where the Space Shuttle and International Space Station orbit. Temperature goes up as you move up through the thermosphere.



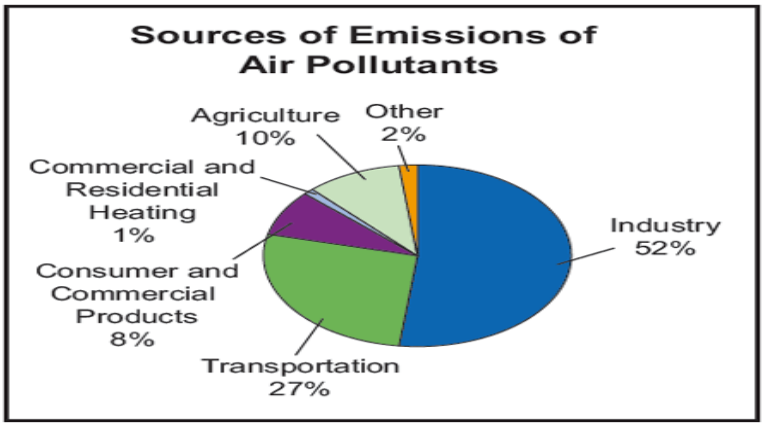


SOL 6.6d: Natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality.

- Ozone that is formed near the surface of Earth is created when exhaust pollutants react with sunlight. How can we reduce the amount of exhaust pollutants – walk or ride a bike when possible, car pool.
- Forest Fires and volcanic eruptions are two natural processes that affect the Earth's atmosphere. Many gaseous compounds and particles are released into the atmosphere by human activity. Factories and burning fossil fuels release carbon dioxide, which can increase the greenhouse effect making our atmosphere too warm.



Types and sources of air pollutants



Good Ozone in Stratosphere, Bad Ozone at Earth's surface.