

Characteristics of the Atmosphere

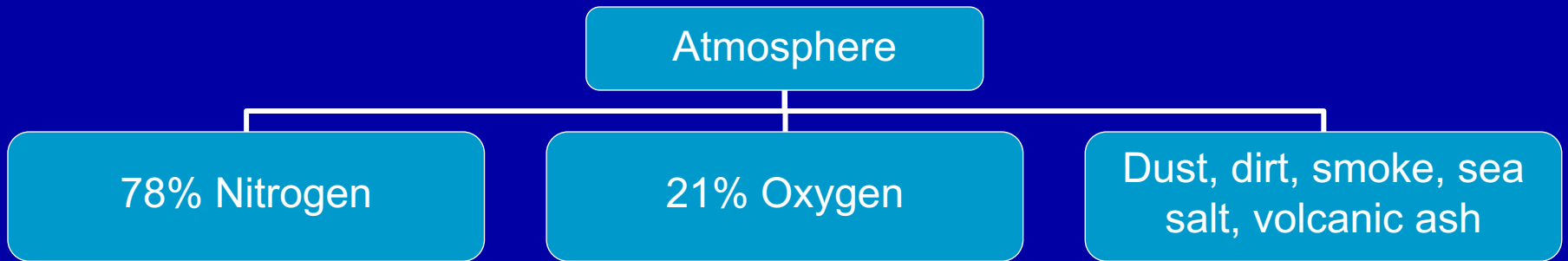
- Chapter 1
- 7th Grade Science

Atmosphere

- 1. Atmosphere- mixture of gases that surrounds the earth
 - A. Contains the oxygen we need
 - B. Protects us from the sun's uv rays
 - C. Is always changing
 - D. Held around the earth by gravity

What is in the atmosphere?

The Composition of the atmosphere



What is in the atmosphere?

- 1. Water
 - A. Liquid water (droplets)
 - B. Solid water (snow and ice)
 - C. Water vapor
- 2. When conditions of the atmosphere change
 - A. Water vapor can change into snow or liquid water and.....
 - B. Rain or snow might fall from the sky

Atmospheric Pressure and Temperature

- 1. Gravity pulls gas molecules towards the Earth's surface causing air pressure
- 2. Air pressure- the measure of force with which air molecules push on a surface
- 3. Think of air pressure as a human pyramid-
the people at the bottom can feel the weight and pressure of the people on top



Atmospheric Composition (Make up) Affects Air Temperature

- 1. Air temperature changes as altitude (height) increases
- 2. Temperatures changes as different gases absorb solar energy more than others

Bell Work

- What is the composition of the atmosphere?

True or False

2. _____ Air pressure increases closer to the Earth's surface.
3. _____ Atmosphere is a mixture of gases that surrounds a planet or moon.

Layers of the Atmosphere

- Troposphere, Stratosphere, Mesosphere, Thermosphere, Ionosphere, Exosphere
- Vocabulary (Make index cards)
 - Sphere = ball
 - Tropo = turning or change
 - Strato = layer
 - Meso = middle
 - Thermo = heat
 - Exo = outside or exit

Layers of the Atmosphere

Exosphere

Thermosphere

Mesosphere

Stratosphere

Troposphere



Troposphere

- 1. Lowest layer of the atmosphere, closest to Earth
- 2. More dense
- 3. Contains almost all of the CO₂, water vapor, clouds, air pollution, weather and life forms
- 4. Different air temperatures and density causes gases to mix continuously

Stratosphere

- 1. Layer above the troposphere
- 2. Gases are layered and do not mix very much
- 3. Air is very thin and contains little moisture
- 4. Cold temperatures in the lower stratosphere
- 5. Temperatures rise as the altitude increases because the ozone absorbs uv radiation from the sun

Mesosphere

- 1. Middle Layer
- 2. Coldest Layer
- 3. Temperatures decrease as altitude increases

Thermosphere

- 1. Upper layer
- 2. Temperatures increase as altitude increases
- 3. Less dense
- 4. Particles do not often collide and do not transfer much energy
- 5. Includes the Ionosphere

Ionosphere

- 1. Part of the Thermosphere
- 2. Contains electrically charged ions
- 3. In polar regions, these ions radiate energy as shimmering lights called, auroras (known as northern or southern lights)



Exosphere

- 1. Very thin layer
- 2. Layer where atoms and molecules “escape or exit” into space

Bell Work

Write the meaning of each word

– Sphere =

– Tropo =

– Strato =

– Meso =

– Thermo =

– Exo =

Project

1. Draw a model of the layers of the atmosphere.
2. Include the 5 layers. **Label** them: Troposphere, Stratosphere, Mesosphere, Thermosphere (Ionosphere), and Exosphere. **Label** the altitude. (Shown on page 6 in your book)
3. Include what each layer contains and the characteristics of each layer. Use your **books** and **notes**, include such things as ozone layer, space ships, air planes, satellites, northern lights

Bell Work

- Which layer of the atmosphere is the coldest?
- Where is there more air pressure? On top of the building or in the basement.
- Which layer of the atmosphere is the most dense?
- Which layer of the atmosphere contains the northern lights?

Bell work

- 1. What are the two main gases in Earth's atmosphere?
- 2. What is atmospheric pressure?
- 3. Name the layers of the atmosphere, starting with the one closest to Earth
- 4. What is the ozone layer, and why is it important to Earth?
- 5. Explain how density affects energy transfer in the air.

Conduction

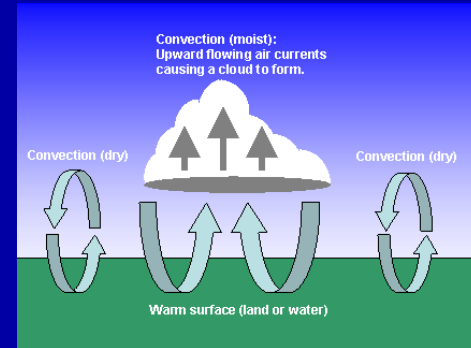
Energy Transfer by Contact

- 1. Thermal Conduction- transfer of energy through a material
- 2. Thermal energy is always transferred from a warm to a cold area
- 3. Making popcorn the “old-fashion” way in a pan on the stove
 - Heat is transferred from the pan to the oil, to the popcorn kernels
 - Just like the air by the Earth’s surface is heated

Convection

Energy Transfer by Circulation

- 1. Convection- transfer of thermal energy by the circulation or movement of a liquid or a gas
 - Cool air is more dense and it sinks
 - Warm air is less dense and it rises
- 2. The rising and falling of air causes a circular movement and is called a convection current
- 3. Making popcorn in a popcorn popper
 - the warm air makes the kernels expand and pop
 - Just like radiation from the sun heats the air in the atmosphere
 - The warm air rises, allowing cool air to move underneath it



Radiation

Energy Transfer by Waves

- 1. Earth receives energy from the sun by radiation
- 2. Radiation-transfer of energy as electromagnetic waves
 - Earth receives about two-billionths of the sun's energy
 - This is enough to drive the weather cycle and make the Earth habitable
- 3. Making popcorn in the microwave
 - The kernels are heated by radiation from the microwave
 - Causing them to pop and give off heat

Bell Work

1. What layer of the atmosphere is the most dense?
2. In what layer of the atmosphere would you find the ozone layer?
3. What is the definition of thermal conduction?
4. What is the definition of convection?
5. How does Earth receive energy from the sun?



Greenhouse Effect

- 1. Greenhouse effect- when gases (CO_2 and H_2O vapor)in the atmosphere absorb thermal energy and radiate it back to Earth
- 2. These gases function like glass walls on top of a greenhouse
 - A. They allow solar energy to enter Earth's atmosphere
 - B. But they prevent thermal energy from escaping
- Radiation Balance-balance between the incoming energy from the sun and the energy that is allowed to leave Earth's atmosphere

What happens when there is not radiation balance?

- 1. Global warming-increase in global temperatures
- 2. Scientists believe
 - A. An increase in greenhouse gases in the atmosphere
 - Absorb more thermal energy, causing temperatures to rise
 - B. Human activity like burning fossil fuels and deforestation
 - Have increased levels of these greenhouse gases

Bell Work

- Which layer of the atmosphere is the coldest?
- What is the transfer of energy from electromagnetic waves?
- What happens when gases (CO_2 and H_2O vapor)in the atmosphere absorb thermal energy and radiate it back to Earth?

Bell Work

- Why do they call the warming of global temperatures the greenhouse effect?

Answer: The earth's temperatures are warming because the atmosphere is acting like a greenhouse. The sun's energy is being let in and not being allowed to escape. This is causing temperatures to rise.

2. What is the definition of air pollution?

Bell Work

- 1. Define radiation balance.
- 2. Name the layers of the atmosphere in order.
- 3. Define and give an example of convection.

Air Pollution

- London, December 1952
- “pea soup” fog that contain coal smoke and air pollution
- People could not see their hands in front of their faces
- Burned people’s lungs
- Killed thousands of people



Air Pollution

- 1. Air pollution- contamination of the environment from pollutants caused by humans and natural sources



Primary Pollutants

- 1. Primary pollutants-pollutants put directly into the air by humans or natural sources
 - Examples: dust, sea salt, volcanic gases, ash, smoke from forest fires, and pollen



Secondary Pollutants

- 1. Secondary Pollutants-happens when primary pollutants react with other primary pollutants or other naturally occurring substances (water vapor)
- Examples-ozone and smog



Ozone

- 1. In the stratosphere –ozone protects Earth from harmful uv rays

- This ozone is good



- 2. Near the Earth's surface- ozone is formed when sunlight reacts with vehicle exhaust

- This ozone is dangerous

Smog

- 1. Smog
 - Forms when ozone and vehicle exhaust react with sunlight
 - Problem for Los Angeles and other big cities



Classifying Pollutants

smog, house dust, acid rain, pollen, soot,
ground-level ozone, volcanic ash

Primary Pollutant Secondary Pollutant

Sources of Human-Caused Air Pollution

- 1. Car exhaust
- 2. Industries
 - Dry cleaning
 - Furniture refinishers
 - Auto body shops
- 3. Cleaning supplies



Cleaning Up Air Pollution

- 1. The Clean Air Act
 - A. Allows the Environmental Protection Agency (EPA) to control the amount of air pollution that can be released from any source, such as cars and factories
 - B. EPA also checks air quality
 - C. Requires many industries to use scrubbers
 - Scrubbers are in smokestacks and remove particles such as ash from smoke

Review of Radiation, Conduction, and Convection Energy Transfer

- Radiation-transfer of energy as electromagnetic waves
- Convection- transfer of thermal energy by the circulation or movement of a liquid or a gas
- Thermal Conduction- transfer of energy through a material

Review

Classify the following examples

Conduction

Radiation

Convection

- campfire ,a candle, an egg frying on a hot sidewalk, the sun, hot air rising, cooling and falling, a toaster, ice melting in your hand, microwave, a light bulb, making grilled cheese, popcorn popper

Review

Classify the following examples

Conduction Radiation Convection