

# Earth's Atmosphere

1-1 |

Objectives:

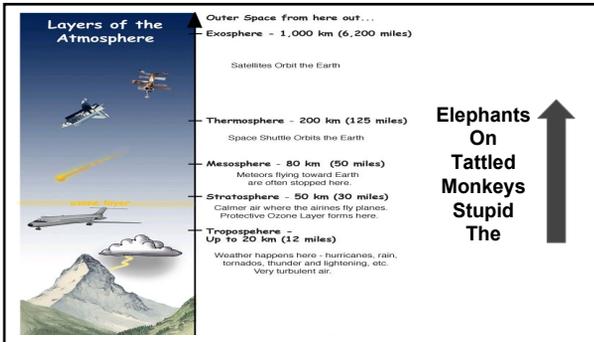
Identify the gases in Earth's atmosphere

Describe the structures of Earth's atmosphere.

Explain what causes air pressure.

# Atmospheric Gases

Earth's Atmosphere extends from earth's surface to outer space. It is made up of a mixture of gases with some solids and liquids.



**Troposphere  
Stratosphere  
Mesosphere  
Thermosphere,  
Thermosphere  
divided to  
ionosphere and  
exosphere**

The atmosphere is why there's life  
Because the raging Sun's a fire in the sky  
Thanks to the ozone, rays are absorbed of the Sun

Now Stratosphere is the next location  
The ozone layer helps civilization, hey  
The temperatures climb as one will rise  
And jet aircraft, well they will fly, hey  
Now the next one is the Mesosphere  
I'm afraid that this is the coldest layer  
Most meteoroids from space will burn  
And they will leave us without any concern

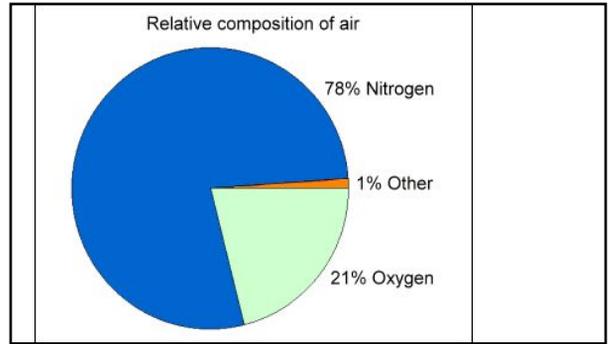
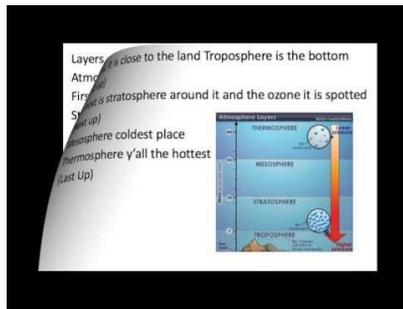
But tell me, does the mesosphere have shooting stars?  
Did you ever get the chance  
To see them in the light of day  
Coldest layer by the Milky Way

And tell me, does the Thermosphere blow your mind?  
Ionosphere, Exosphere combined  
The hottest layer  
And it dissipates to space out there.

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### Other Gases

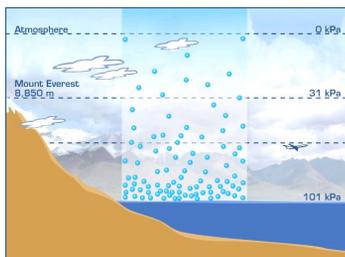
Water Vapor in the atmosphere varies from 0-4%. The higher the water vapor, the lower the other gases are.

### Solids in the Atmosphere

Dust, salt, ice and pollen are four common solids in the atmosphere.  
 Dust-picked up by the wind  
 Ice-Hail and snow  
 Salt- sea spray  
 Pollen- plants

### Pressure from the Atmosphere

Earth's gravity pulls the gases from the atmosphere toward Earth creating pressure.



The higher you go...the less particles there are, which means less pressure.

Air also thins, making it harder to breathe





## Ozone

Ozone is a natural gas that forms in the stratosphere. It is not normally found in the lower atmosphere and if it is considered a pollutant.

Hole in the Ozone Layer?



## Ozone Layer

The ozone layer is an atmospheric layer with a high concentration of ozone gas. It is located in the stratosphere and it helps shield us from the harmful energy of the sun.

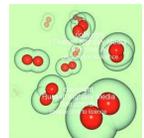


## Ozone

Ozone is three oxygen molecules bonded together. (O<sub>3</sub>)



The oxygen that we breathe is two oxygen molecules. (O<sub>2</sub>)



## Ultraviolet Radiation

Ultraviolet radiation is one of the types of energy that comes from the sun. Too many UV rays can damage the skin, cause cancer and other health problems for plants and animals.



## Chlorofluorocarbons

Chemicals called CFC's break down the ozone into regular oxygen molecules. These molecules can not absorb the radiation.





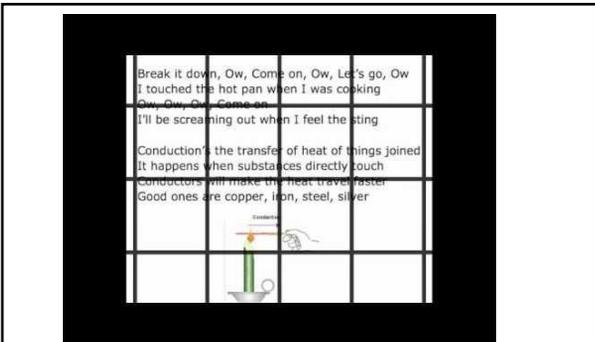
## Energy Transfer in the Atmosphere

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Describe what happens to the energy Earth receives from the sun.

Compare and contrast radiation, conduction, and convection.

Explain the water cycle and its effect on weather patterns and climate.

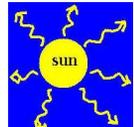


## Radiation

Energy from the sun reaches our planet in the form of radiant energy or **radiation**.

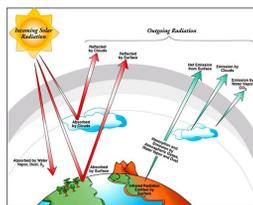
**We experience radiation in the form of heat and light.**

Radiation is the transfer of energy by electromagnetic waves.



## The Sun's Energy

The sun gives off different types of radiation. Some of the waves get reflected back into space. Most of the energy get absorbed by the atmosphere, land and water.



## Conduction

The direct transfer of heat from one substance to another is called conduction.

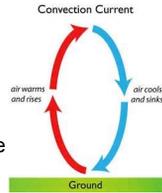
When the sun's radiation is absorbed by an object like asphalt and we walk on it we feel the heat because of conduction.



## Convection

The transfer of heat through liquid or gas is called convection.

When air is warmed, the particles rise, move apart and create less pressure. New particles take their place and become heated too. As the particles rise they cool and lower toward the surface creating a cycle or a convection current.



Oh Radiation, Convection, and then there's Conduction

Today we'll talk about waves of heating  
I wanna get it into your head  
Radiation, Convection, or it might be Conduction  
Cause Heat Transfers from hot things to cold things

Oh what happens to the heat in air?  
Rising hot air is less dense  
Goes up, up, up, up, up, up, up, up

When Heat Transfers through Fluids  
It's what we call Convection Currents  
Yeah, yeah, yeah, yeah, yeah, yeah



No matter how the heat  
Different temperatures meet  
No matter where heat's from  
Hot to cold how it's done

Radiation heat  
It goes through the skies  
Convection fluids rise  
It's where the heat's applied  
Don't get too close  
You touch the fire  
Conduction heat goes by  
Three ways heat is supplied



## Earth's Water

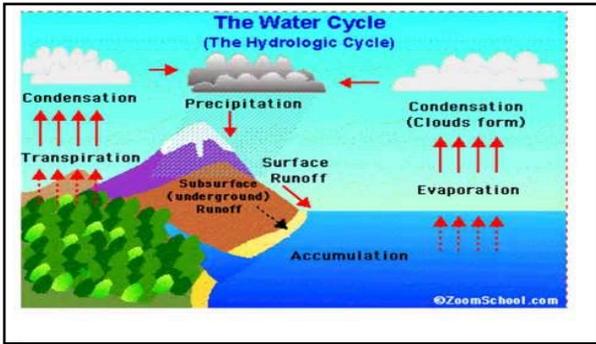
All of the water in Earth's surface is called the hydrosphere.

97% salt water

3% fresh water -  $\frac{2}{3}$  is frozen in the ice caps.

The percentage of water in the atmosphere is low, but important to life here on Earth.





## Water Cycle

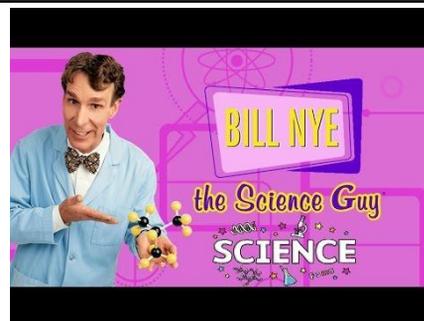
The sun's energy cause water to change from a liquid to a gas by a process called **evaporation**.

When the water vapor cools, it changes back into liquid through a process called **condensation**. Clouds form and then the water returns to earth in a process called **precipitation**. The water then **runs -off** the land and back into collection areas such as a lake or ocean starting the process all over again.

That's right water droplets are in flight  
 Water droplets are in flight  
 It's H<sub>2</sub>O, from the sky back to the Earth below  
 Water's in flight

Evaporation  
 Then Condensation  
 Precipitation  
 And Surface Runoff  
 Cycle of Water, Cycle of Water,  
 Cycle of Water,

Grab somebody you know and tell them Hey!  
 Water droplets are in flight  
 Water droplets are in flight  
 Water droplets are in flight  
 Water droplets are in flight





## Air Movement

1-3 |

Explain why different latitudes and Earth receives different amounts of solar energy.

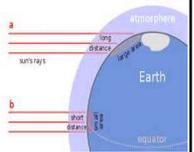
Describe the Coriolis effect

Explain how land and water surfaces affect the overlying air.



## Wind Formation

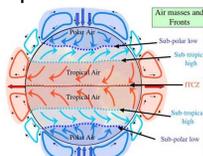
Temperature differences on Earth's surface are caused by Earth's tilt in its orbit around the sun, and by the Earth's curved surface.

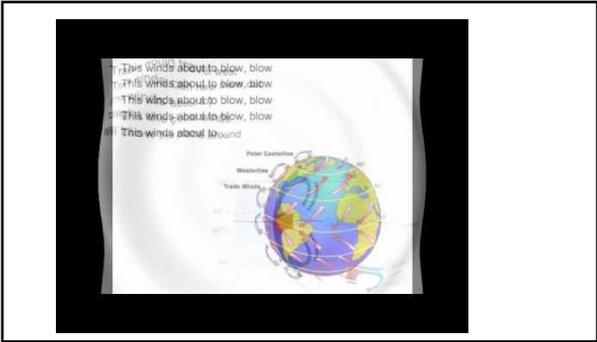


Areas of Earth receive different amounts of solar radiation because some areas receive direct rays and in other areas the rays are spread out.

## Wind

Wind is caused by the uneven heating of Earth and its atmosphere. It is the movement of air from high pressure areas into low pressure areas. This causes circulation.



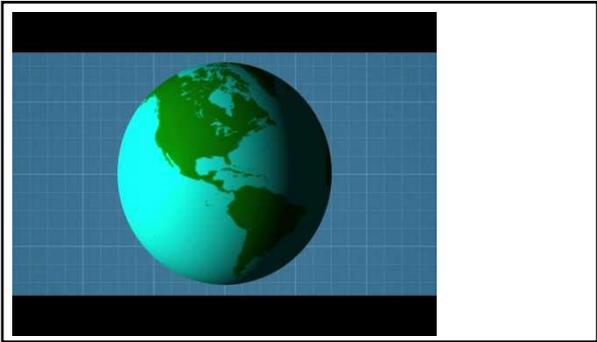


### Coriolis Effect

If the earth did not rotate, winds would blow in a straight line from the poles to the equator. However, because the earth turns it makes the wind curve. This curve is called the Coriolis Effect.

 A diagram titled 'Coriolis Effect' showing a globe. A legend indicates:
 

- Direction of Air
- Earth's Rotation
- Direction of Earth's Rotation

 The diagram shows wind blowing from the poles towards the equator, but being deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere due to Earth's rotation.


### Doldrums

Air currents also leave an area of Earth unaffected by wind. This area is called the doldrums.

 A cartoon illustration of a man on a small boat in the doldrums. The man is looking bored or frustrated. The background shows a bright sun and a calm sea, representing the lack of wind in this region.


A graphic for 'CURRENT EVENTS'. It features a globe with arrows pointing to different regions. The text 'EPISODE 341' is in a red box. The title 'CURRENT EVENTS' is in large white letters. There is a 'KIDS' logo in the bottom right corner.

## Trades Winds

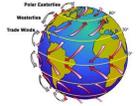


For hundreds of years sailors depended on the winds to move ships carrying cargo to different points on the globe.

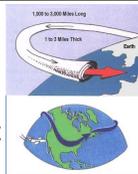
A constant convection current is located between the equator and 30 degrees latitude north and south of the equator.

## Polar Easterlies

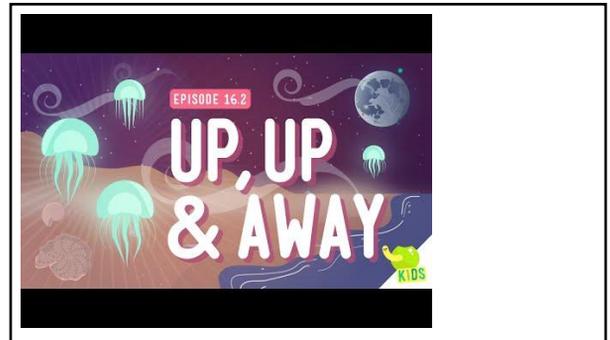
Cold air near the poles sink and flow back toward the lower latitudes. This occurs between 60 degrees and 90 degrees latitude. They flow from east to west.



## Jet Stream



Winds also blow at higher altitudes. Narrow belts of strong winds called jet streams blow at speeds of 200-400 mph. Just as the sailors used the trade winds to push them along, pilots use jet streams to save fuel and time.



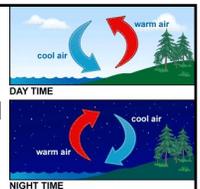
## Daily and Seasonal Winds

Smaller wind systems determine the local weather.

[Sea Breezes](#) and [Land Breezes](#) are named from where they blow from.

## Sea Breezes

During the day, both the land and water absorb radiation from the sun. The land warms up faster than the water. The warm air over the land rises and the cool air from the water moves in causing a sea breeze.



## Land Breeze

At night the land cools faster than the water. The air over the water rises, and the cool air from the land blows over the water causing a land breeze.

