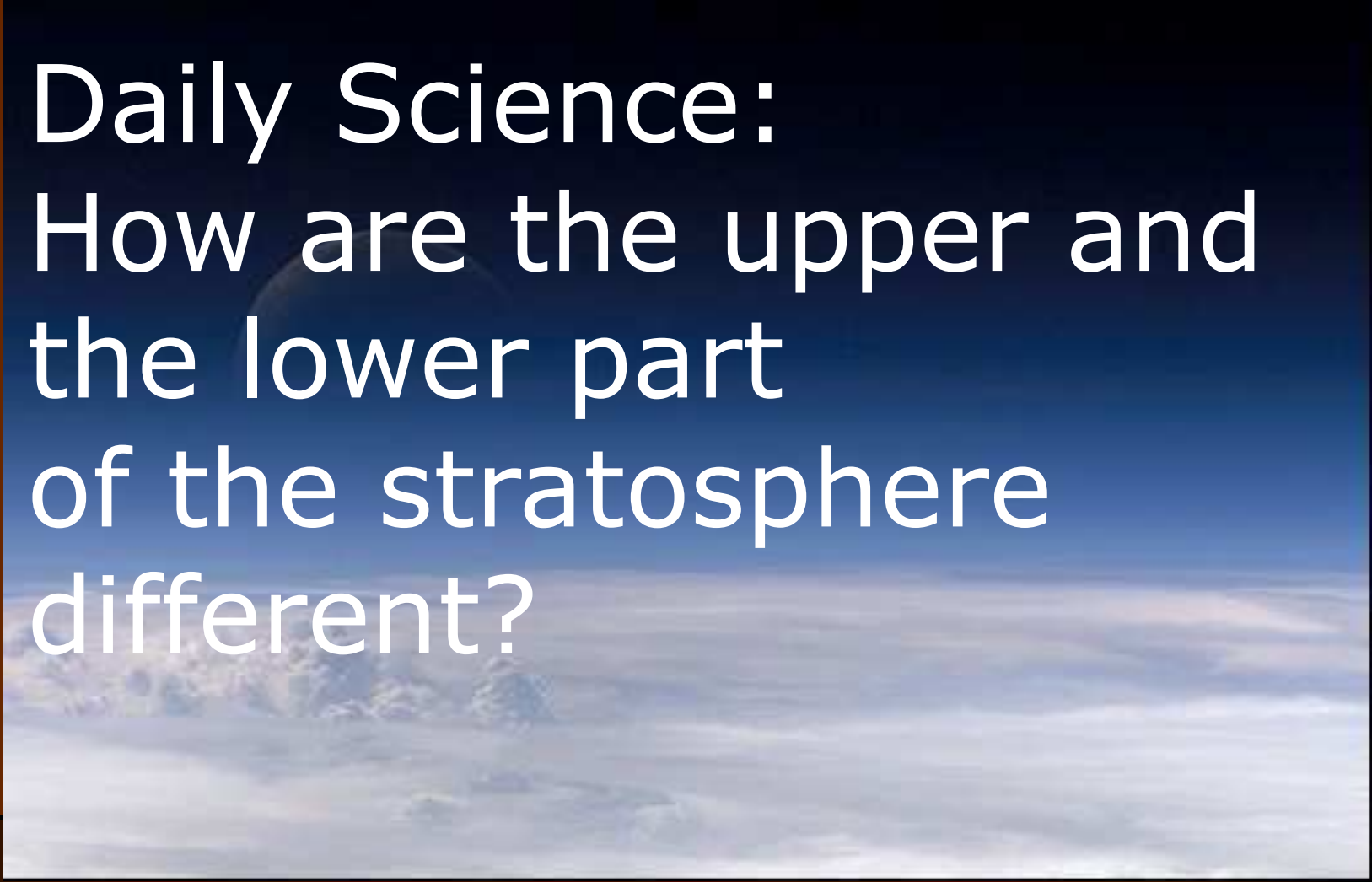


Wednesday February 1<sup>st</sup>, 2017

Daily Science:

How are the upper and  
the lower part  
of the stratosphere  
different?

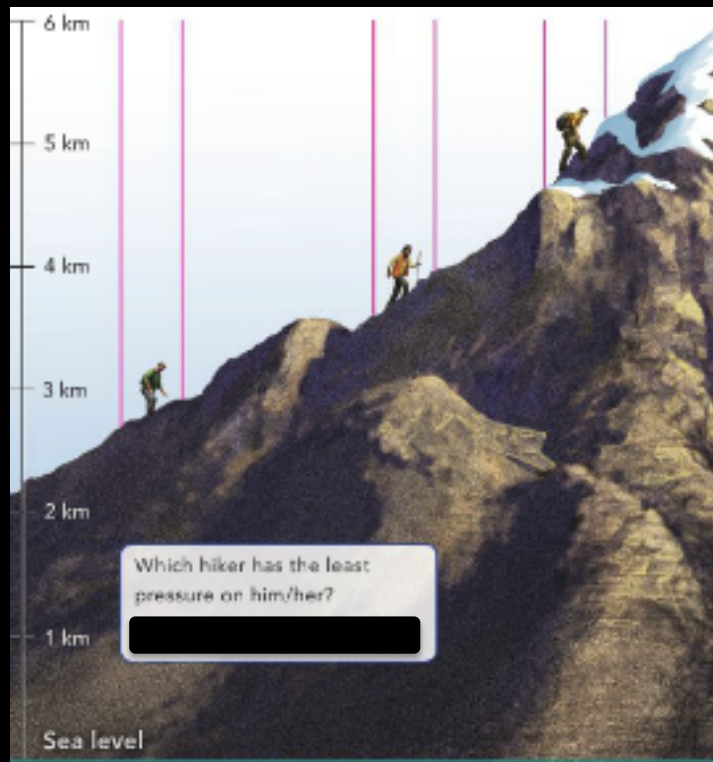


# Properties of Air

- Because air has mass, it also has other properties, including density and pressure.

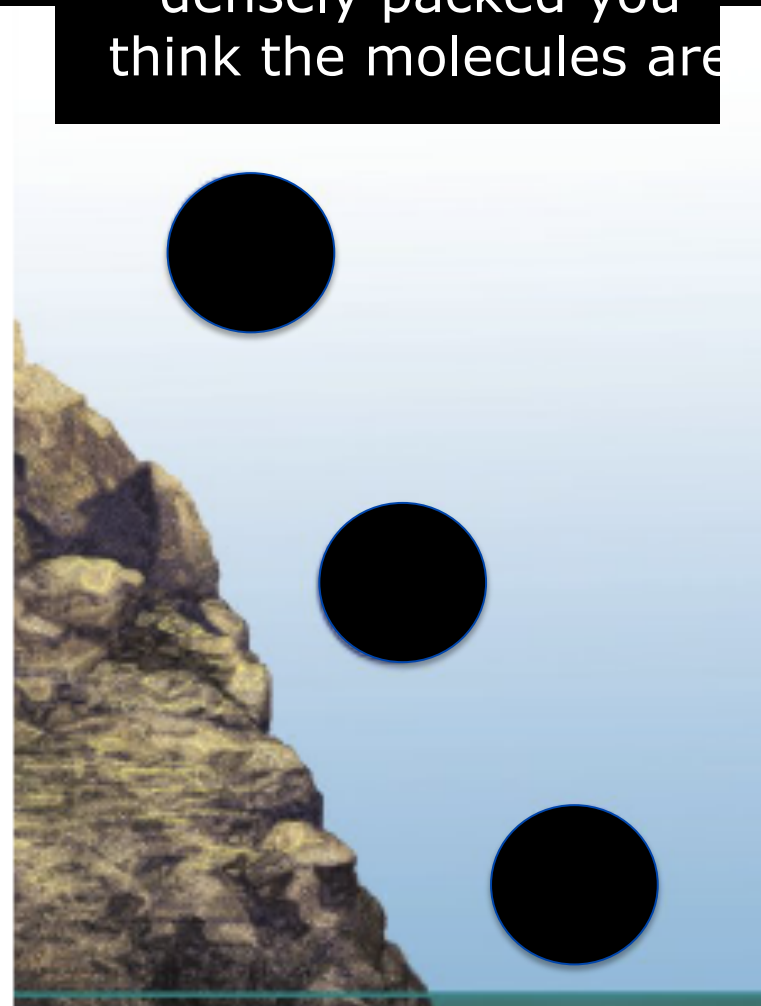
# Altitude Affects Air Pressure

See page 424 in your textbook.  
Which hiker has the least pressure on him/her?



# Altitude Affects Air Density

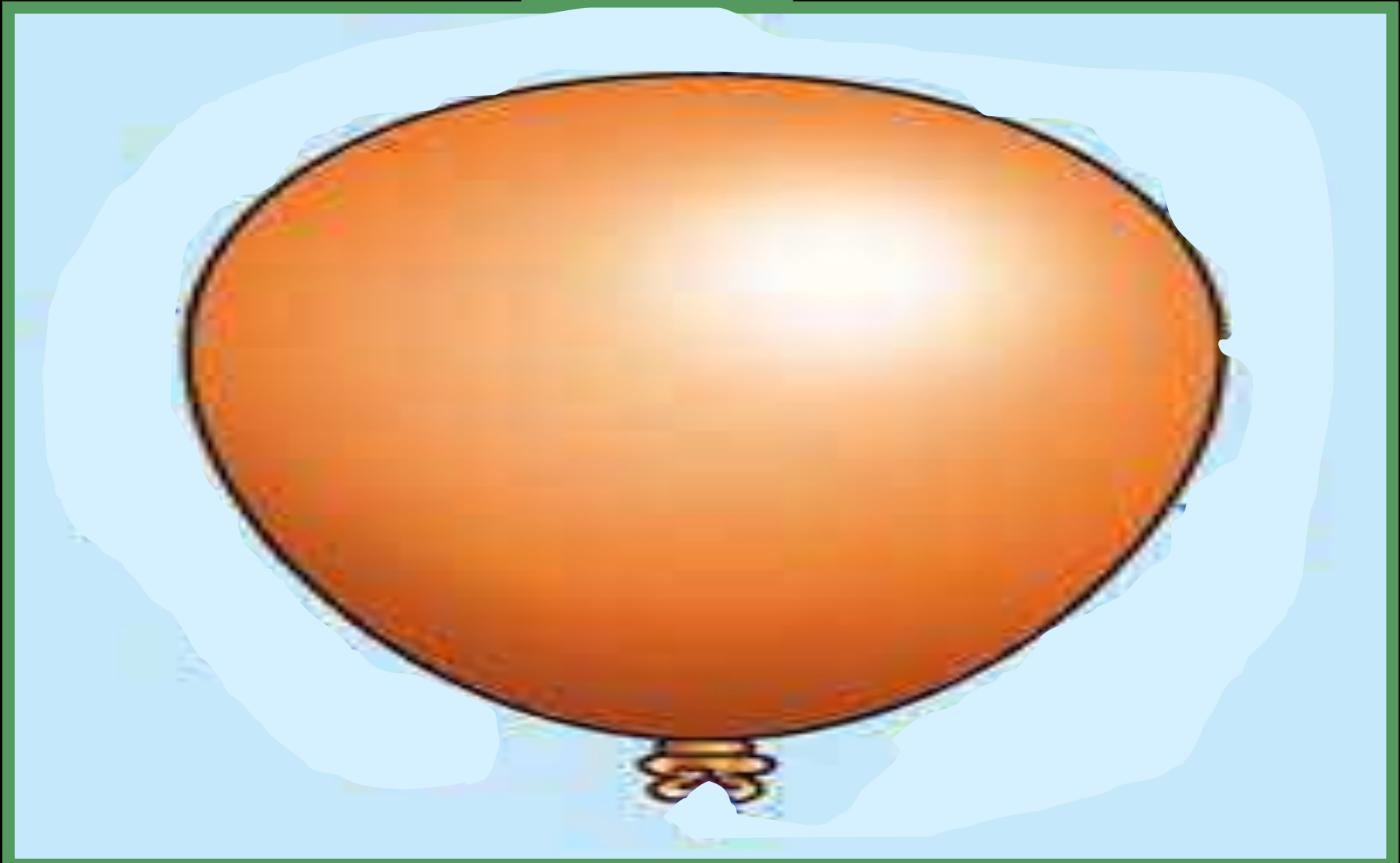
In your book draw how densely packed you think the molecules are



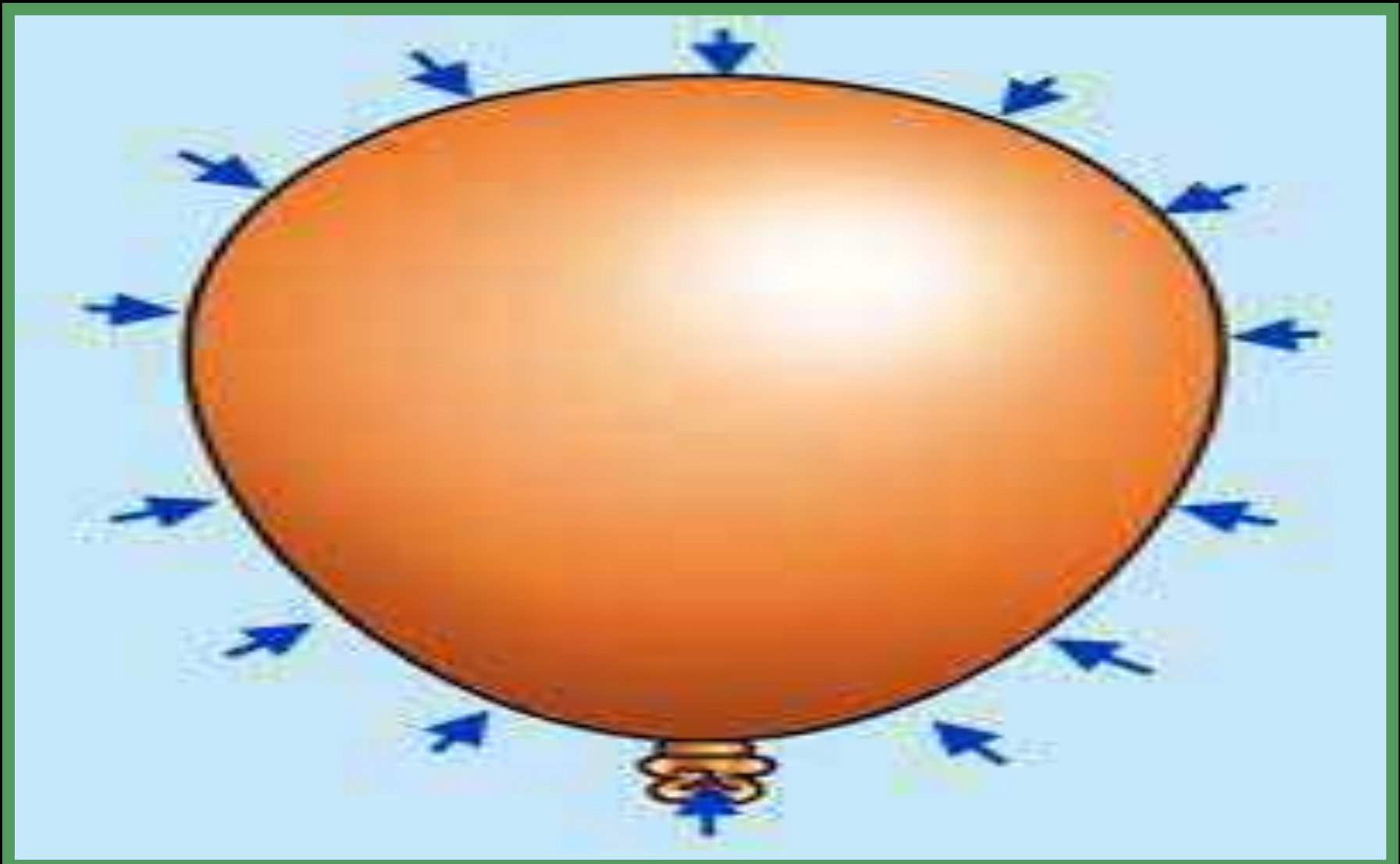
- Air Pressure: The pressure caused by the weight of the atmosphere.



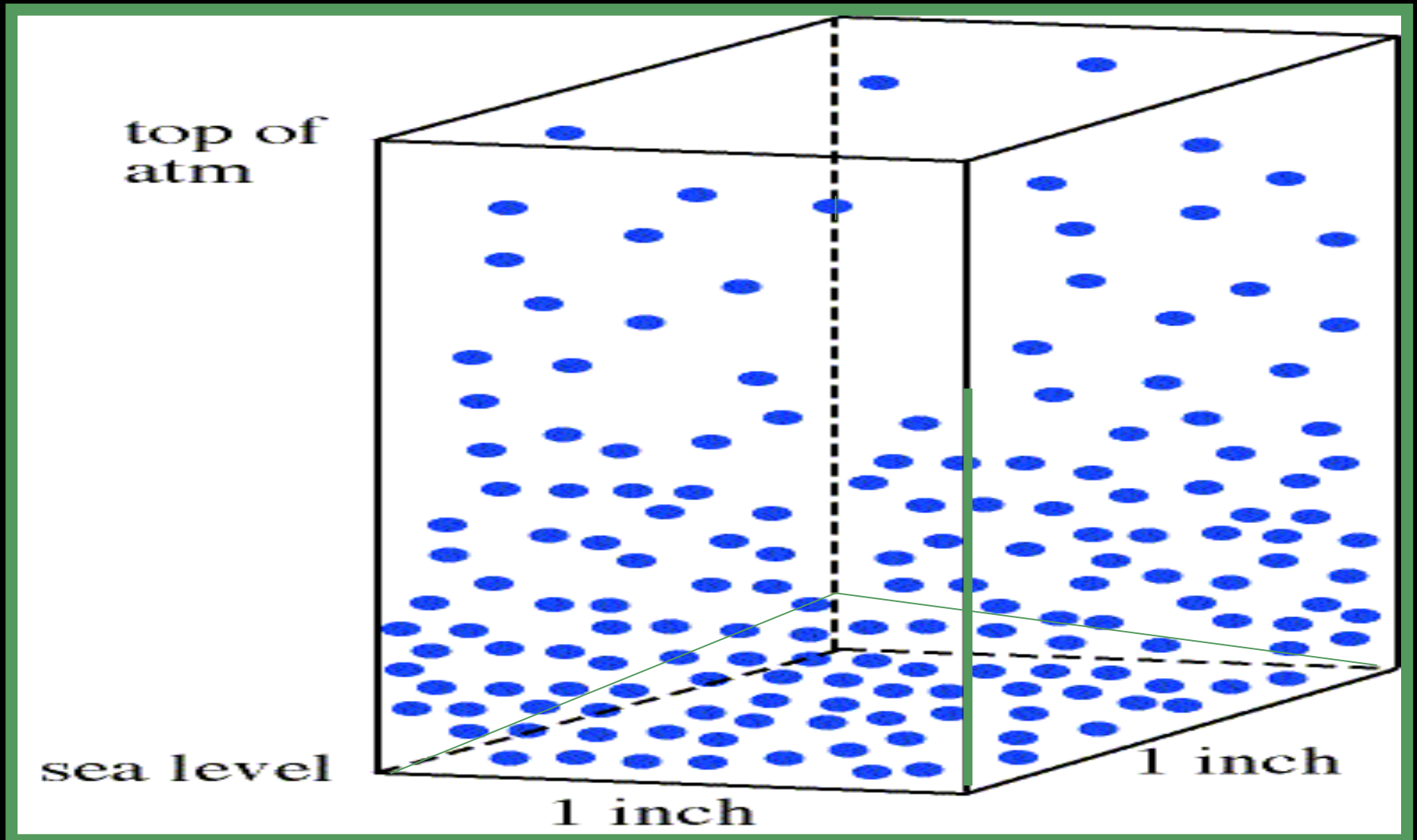
- Air pressure applies a force equal in all directions.

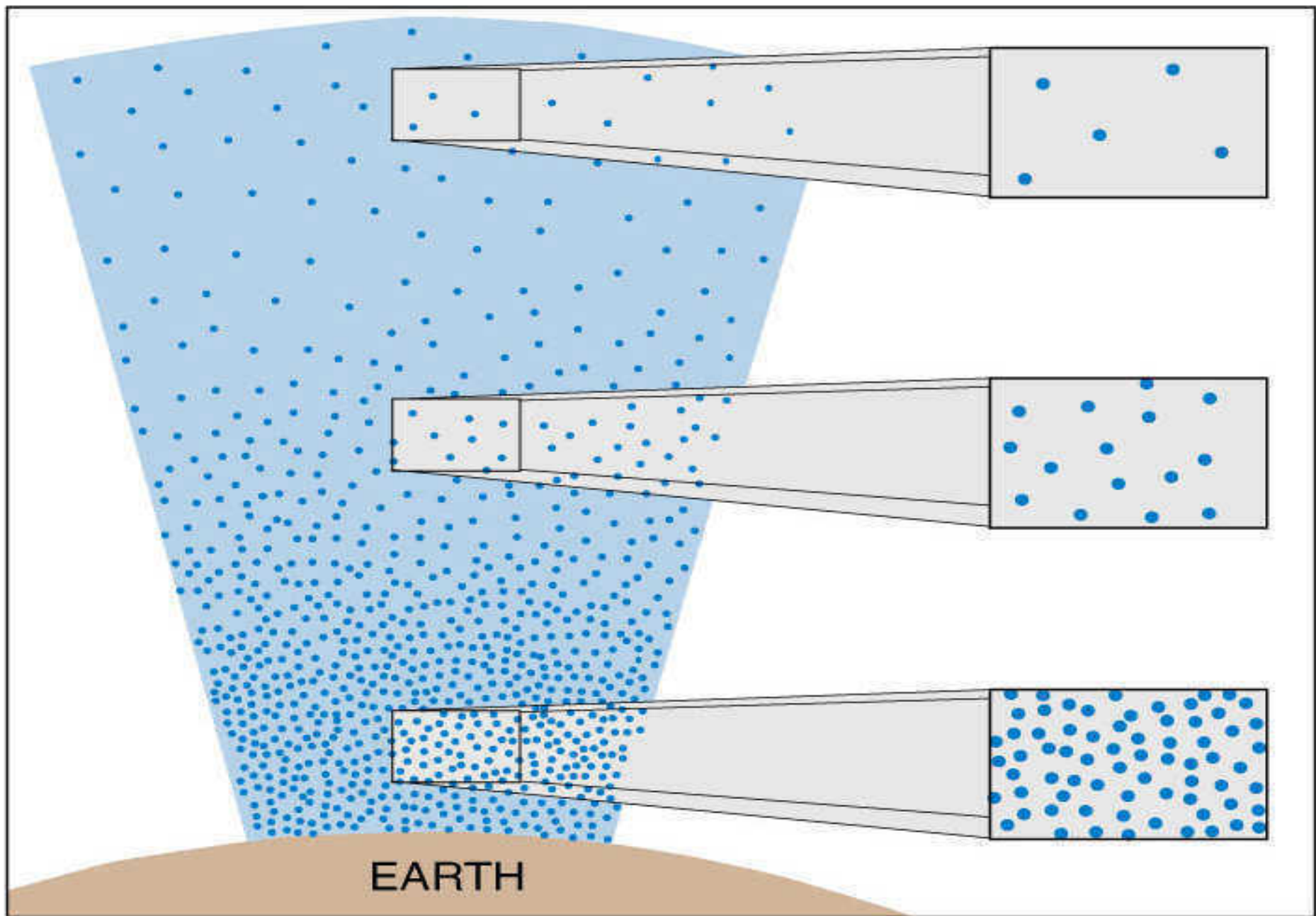


- Air pressure applies a force equal in all directions.



- As elevation increases, air pressure decreases.

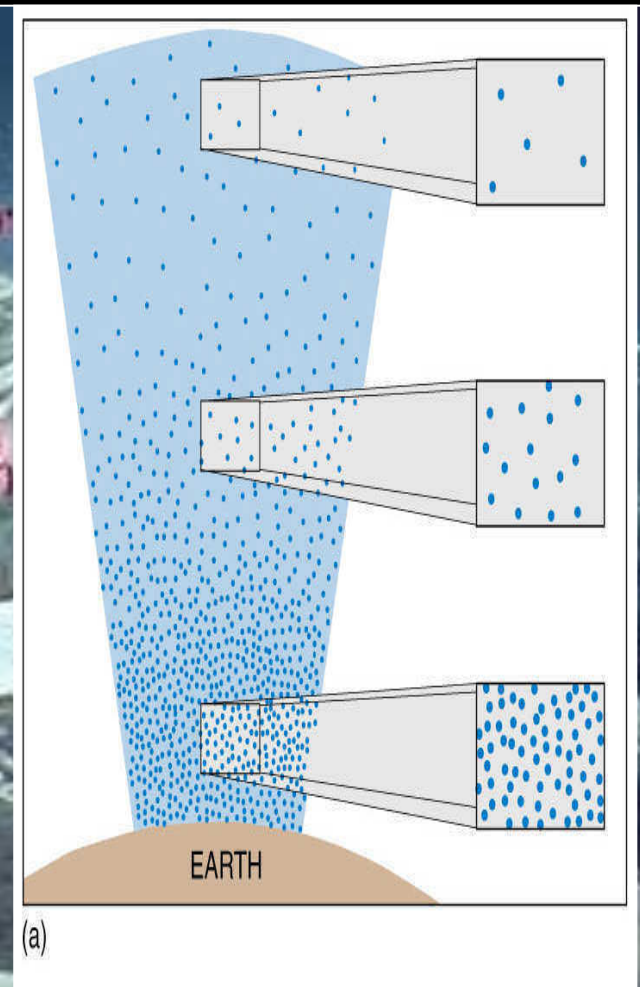




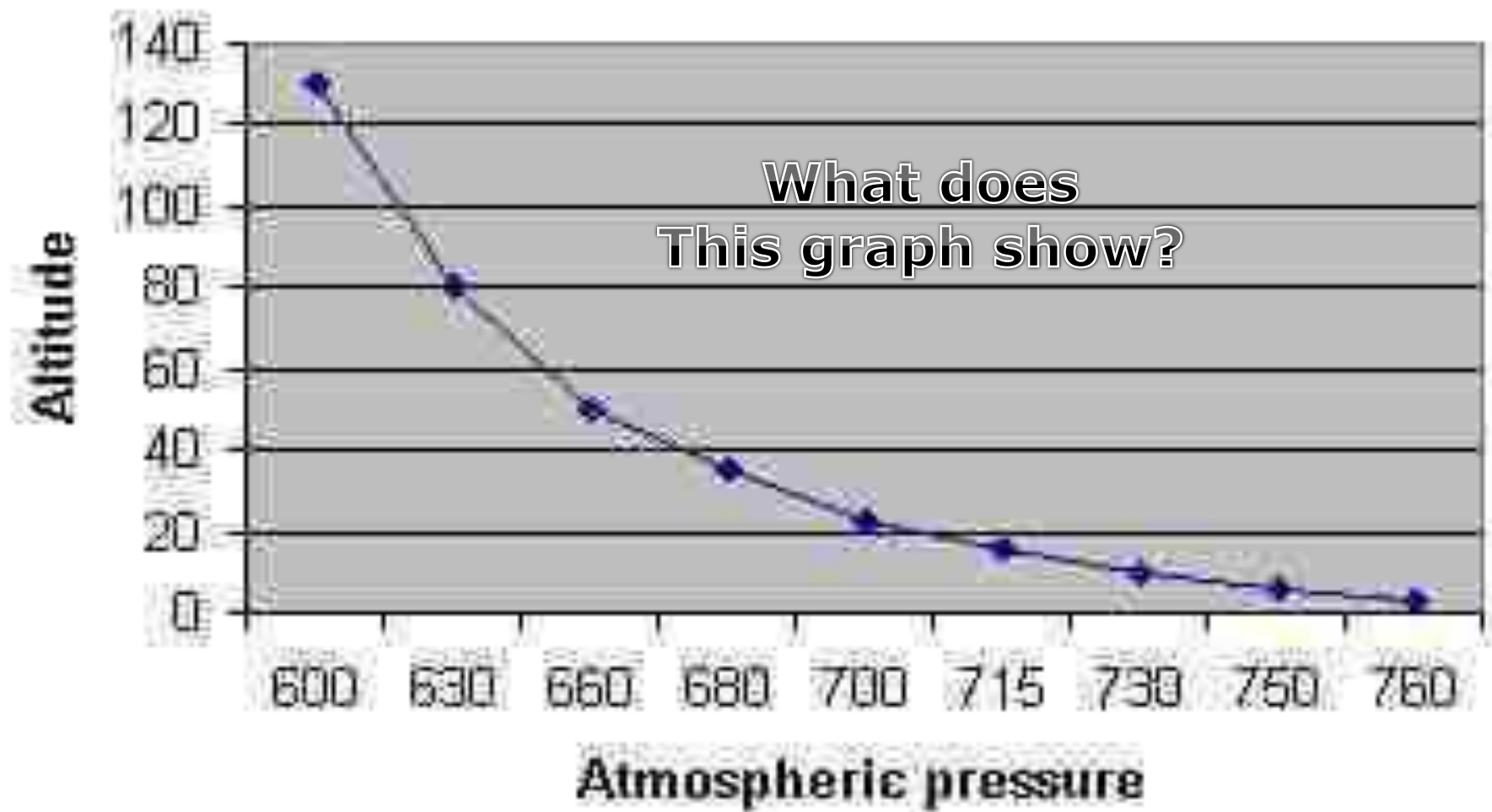
(a)



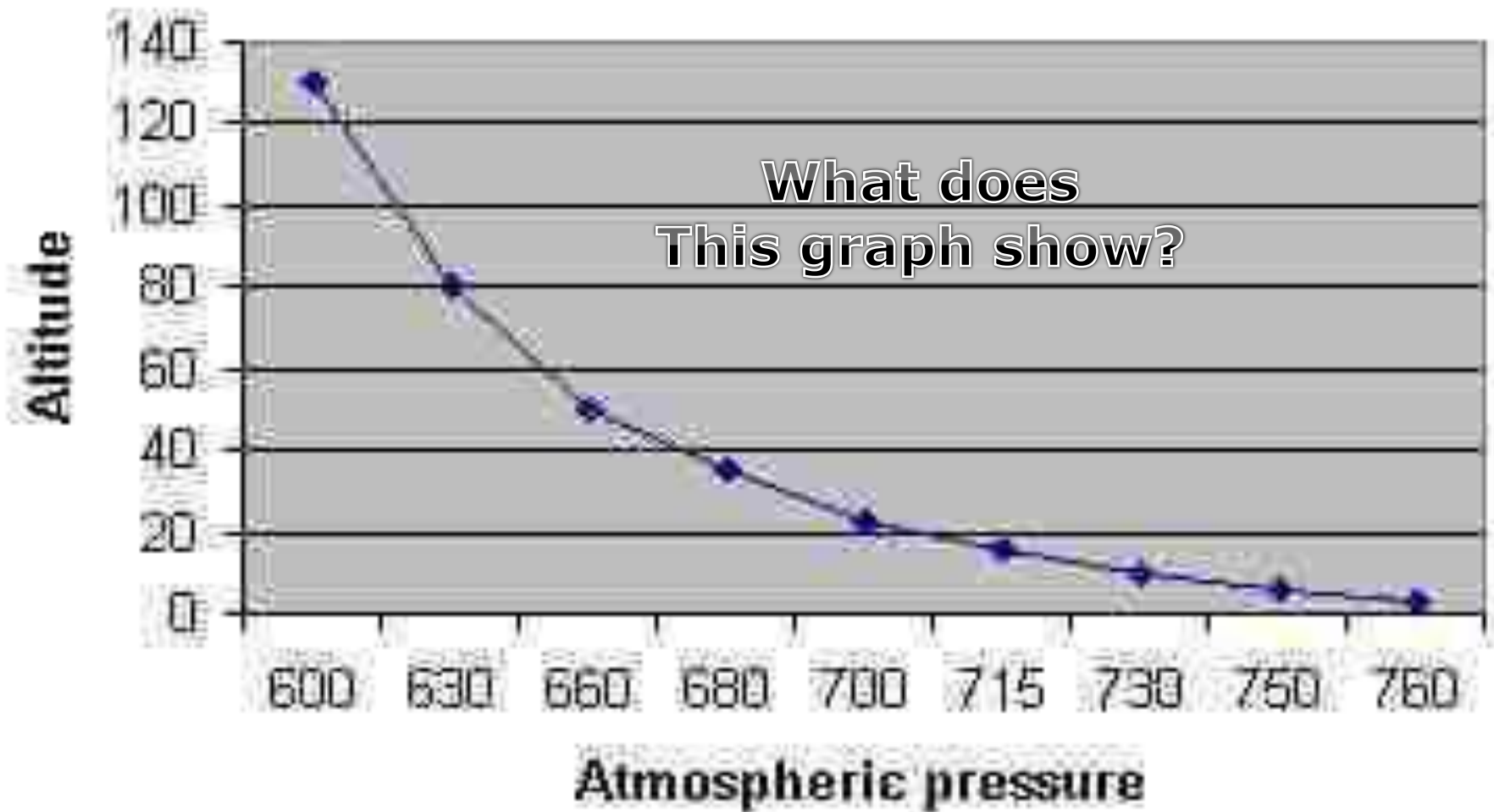
- Mt. Everest – Death Zone past camp IV because there are very few air molecules.
  - Including oxygen



What does  
This graph show?



# Atmospheric pressure decreases with increasing altitude



- As you increase in elevation

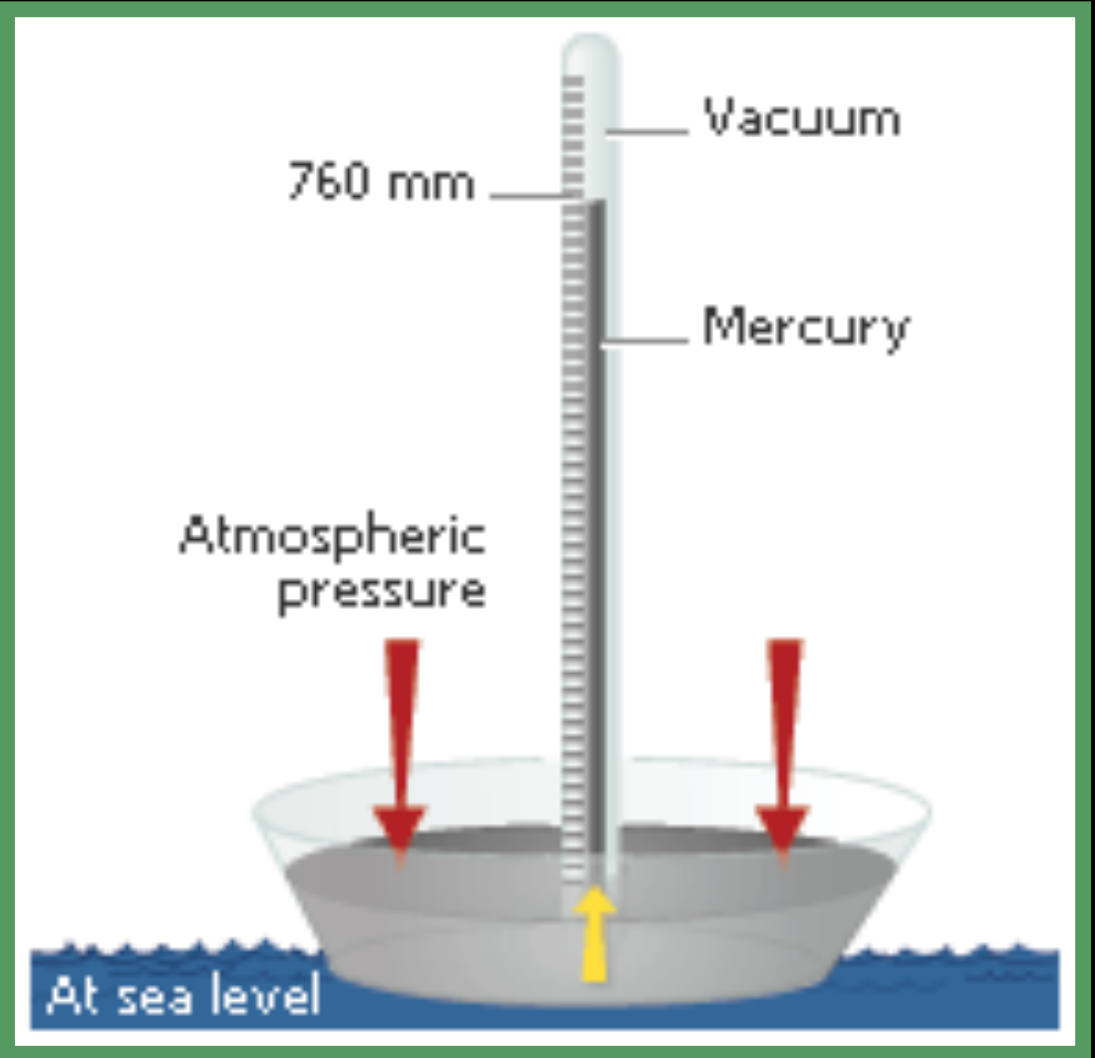
- As you increase in elevation air pressure decreases.



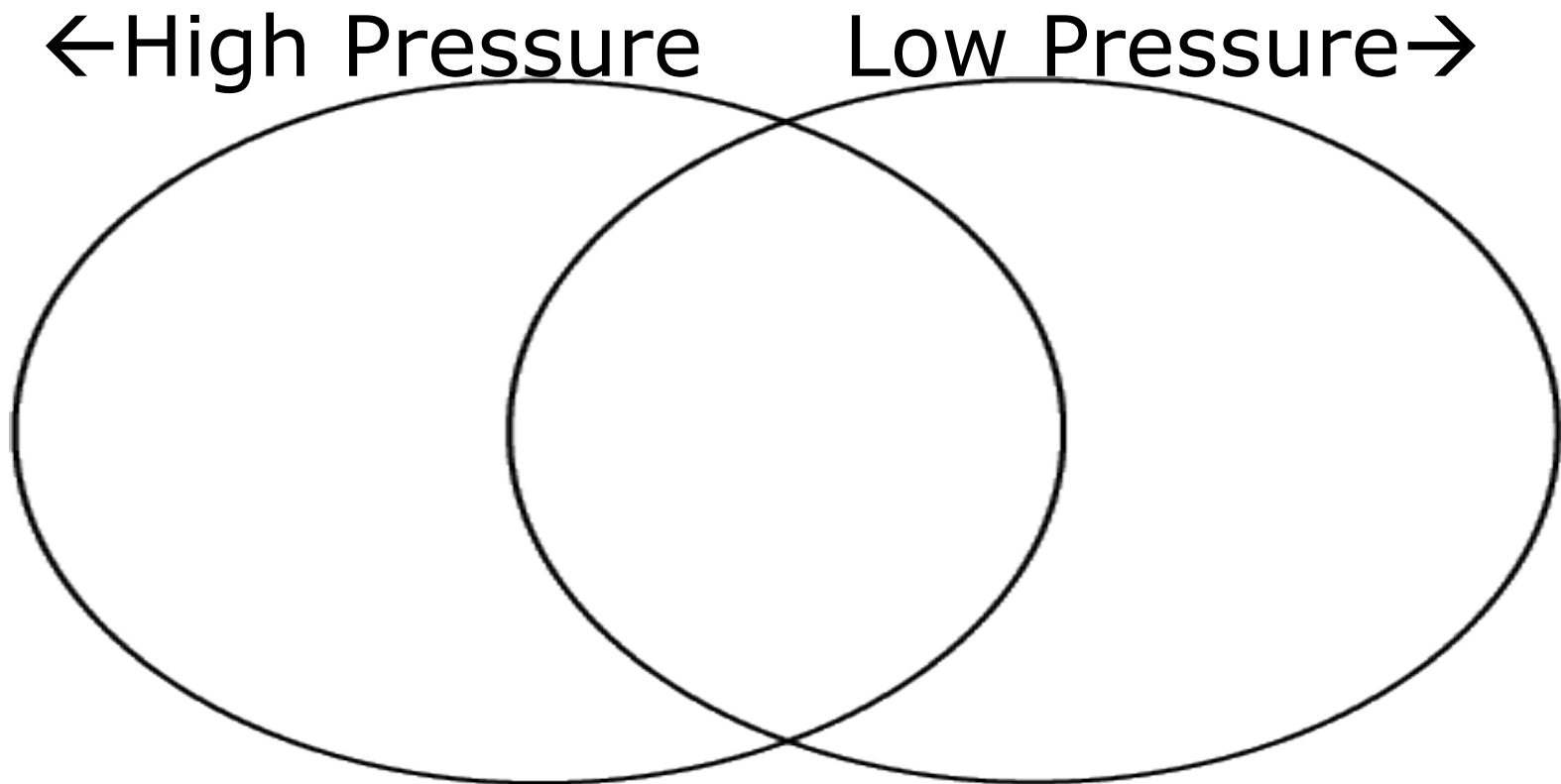
- As you increase in elevation air pressure decreases. As you decrease in elevation pressure increases.



- Barometer: Instrument that measures air pressure.

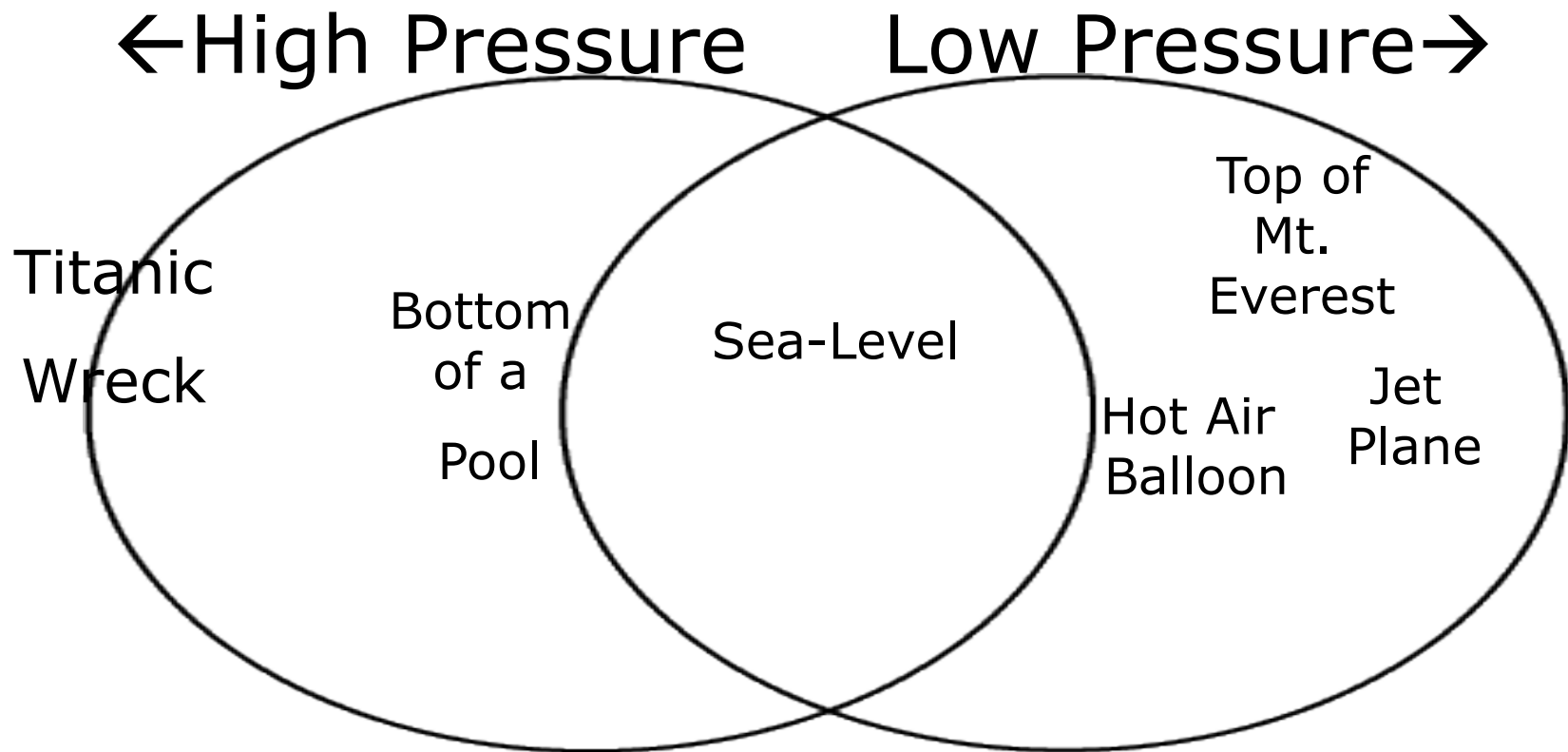


- Word Bank: **Titanic wreck**, Top of Mt. Everest, sea-level, jet plane, bottom of your pool, hot air balloon.





- **Word Bank:** Titanic wreck, Top of Mt. Everest, sea-level, jet plane, bottom of your pool, hot air balloon.



- Air Pressure drives the **wind** and creates the **weather**.



What is the primary source of energy for Earth's atmosphere?

What is the primary source of energy for Earth's atmosphere?

**All energy to Earth's atmosphere comes from the Sun.**

# Our goal is....

- State in what form energy travels from the sun to Earth.
- Explain what happens to the sun's energy in the atmosphere and at Earth's surface.
- We will use this knowledge to describe how unequal heating of Earth's surface affects movement of air masses and water in the atmosphere and hydrosphere.

# Why do we care?

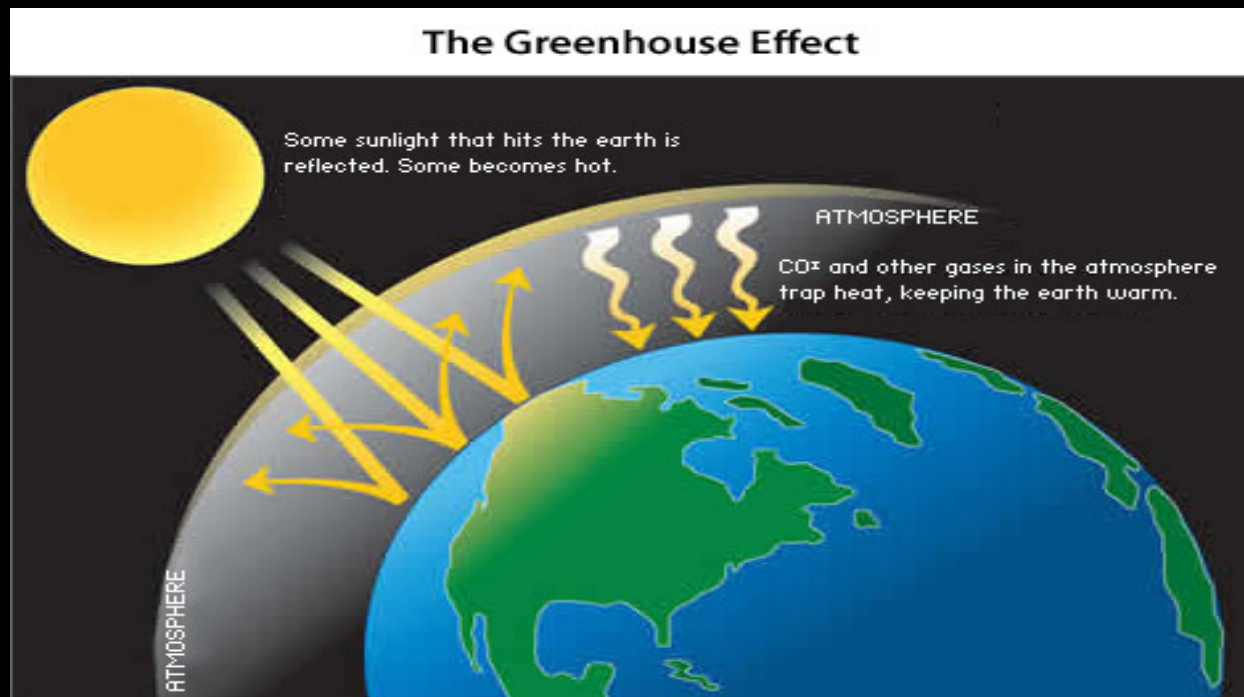
- Our planet's temperature is a result of the atmosphere surrounding us.
- The moon does not have atmosphere and therefore no life.

# How does the energy from the sun reach the Earth?

- Most energy from the sun travels to Earth as electromagnetic waves (radiation)

# Radiation

- The transfer of energy in waves
- Can travel through the vacuum of space
- Energy without direct contact

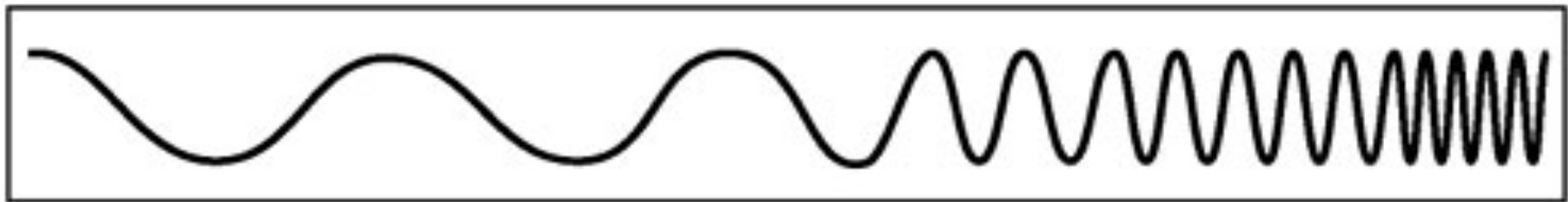
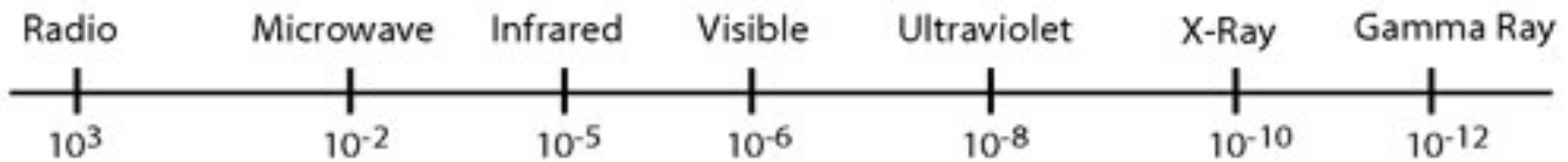




Electromagnetic Waves can move through the vacuum of space (unlike sound waves)

### THE ELECTRO MAGNETIC SPECTRUM

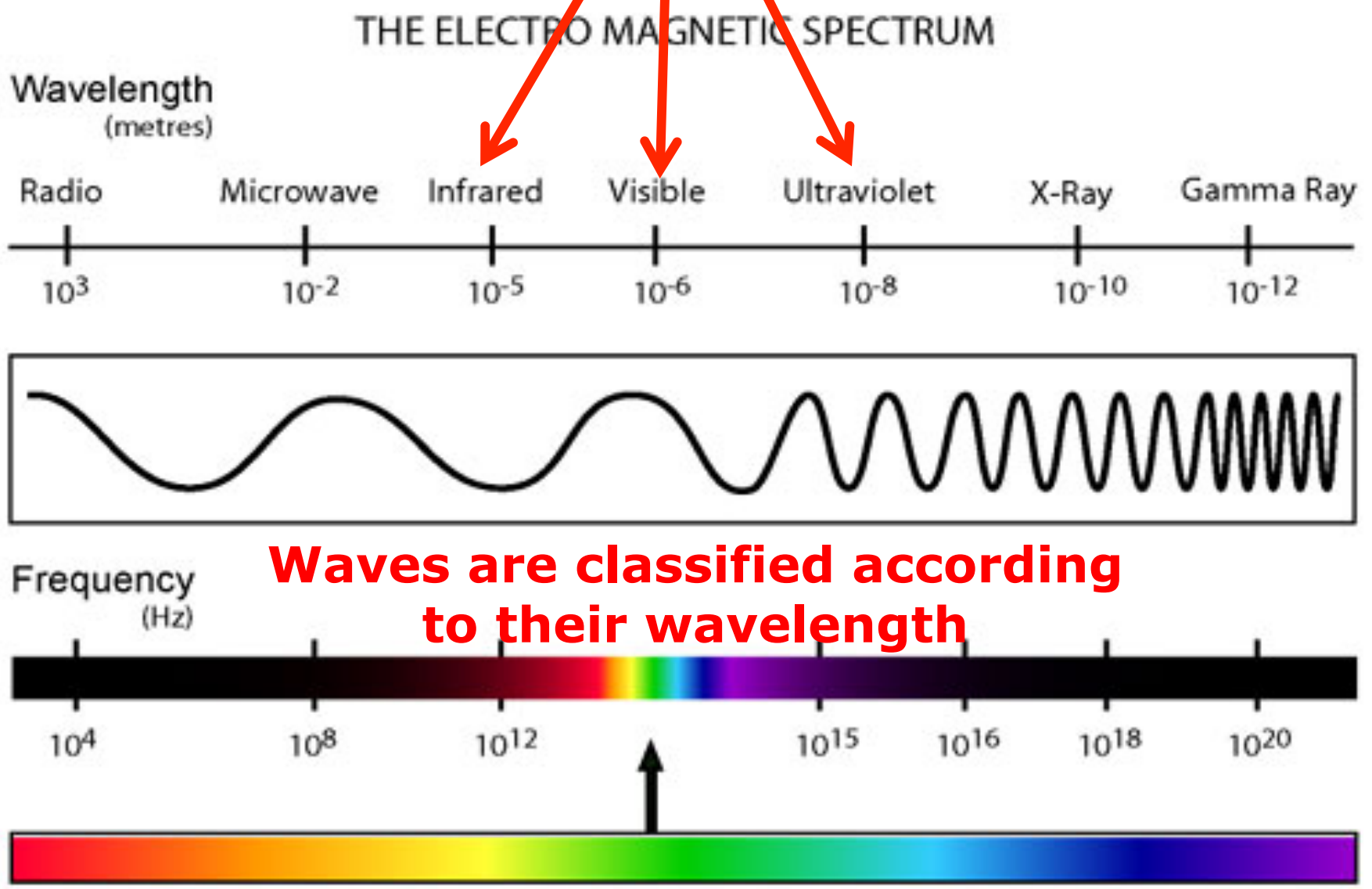
Wavelength  
(metres)



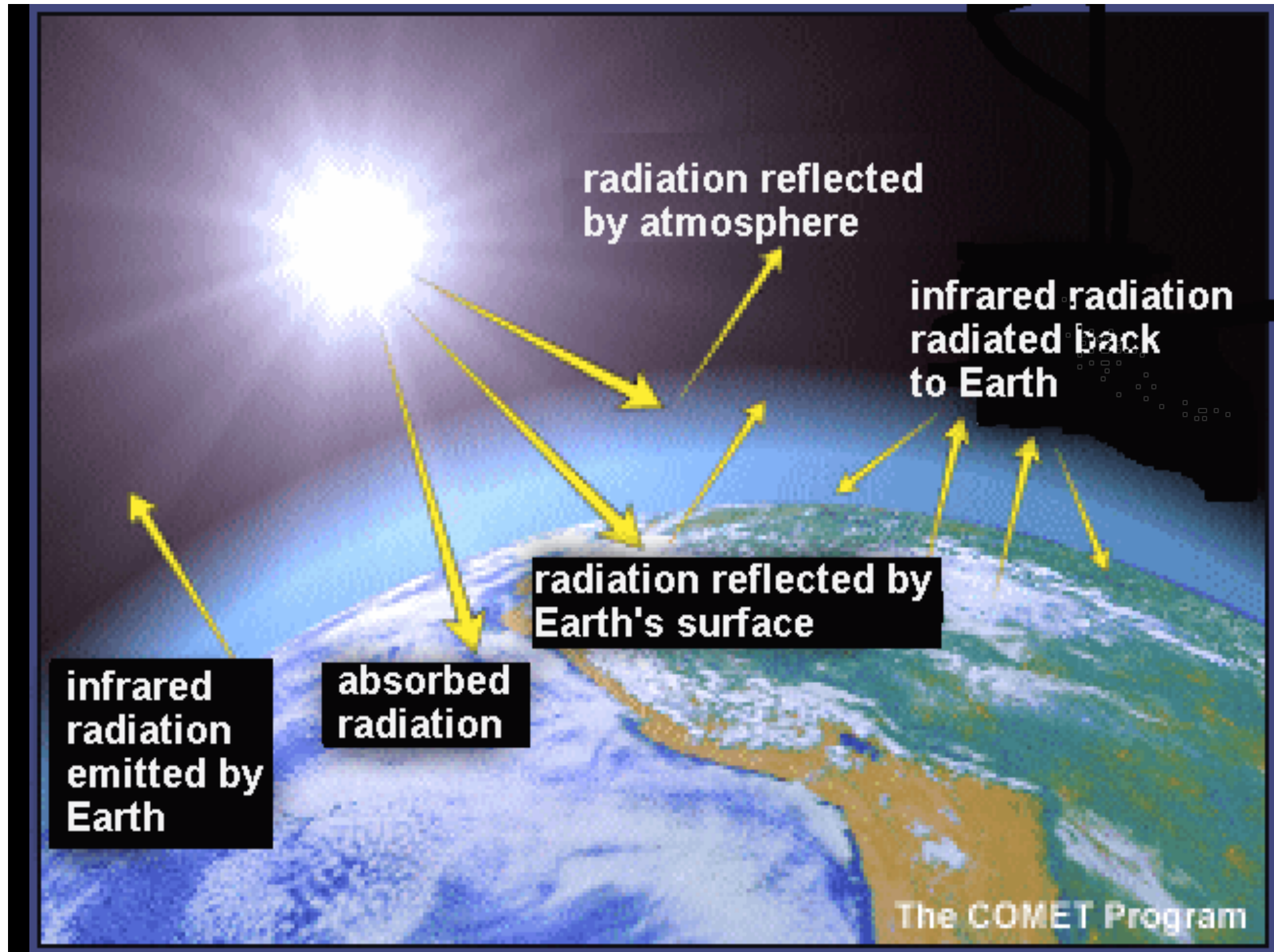
Frequency  
(Hz)



# 3 types of waves



Identify the 3 types of waves pg 433

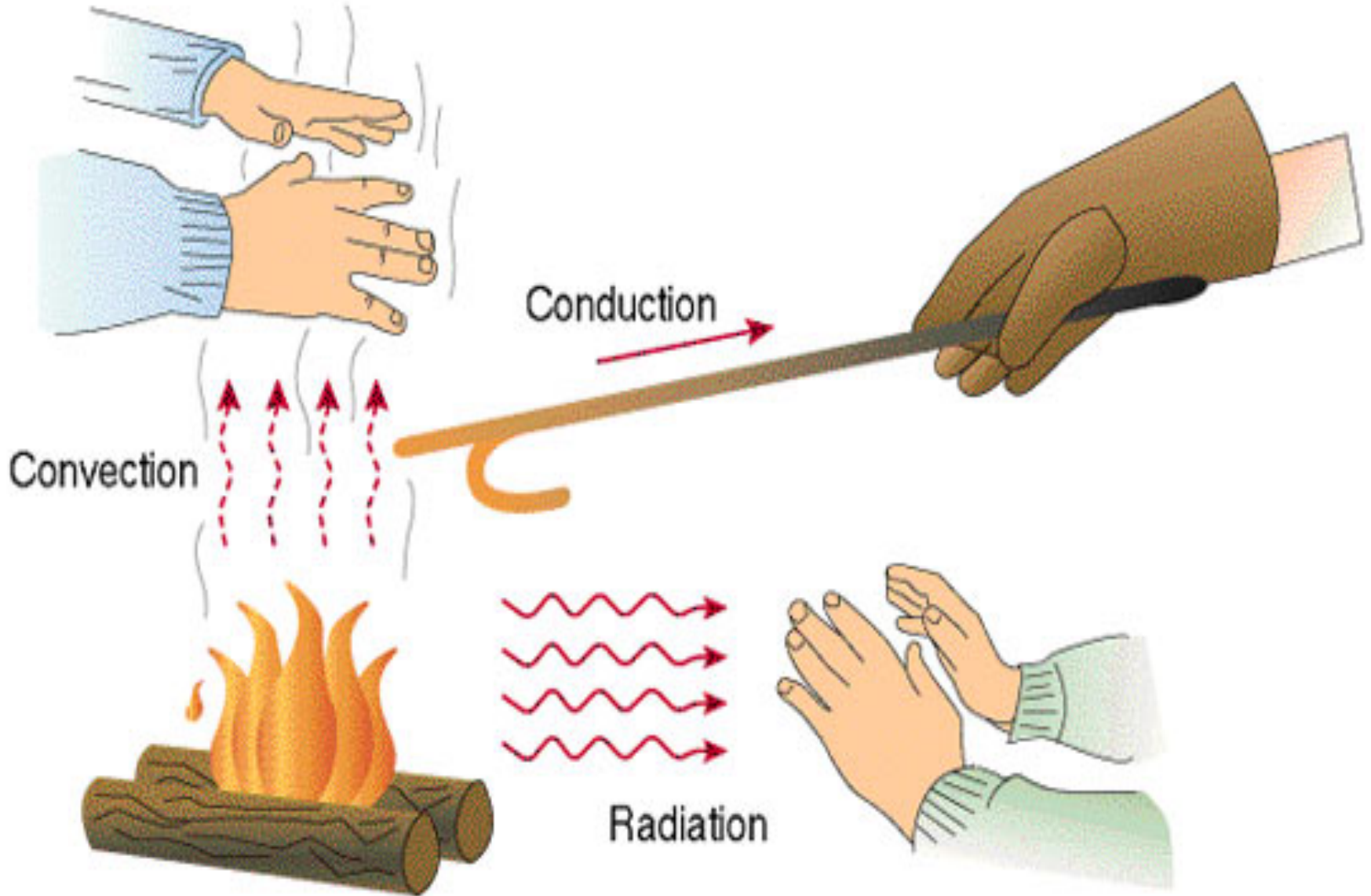


Summarize in brief sentences (pg 433-437)  
groups of 4 (5min)

What happens to the sun's energy when it reaches  
Earth's :

1. Upper atmosphere
2. Troposphere
3. Earth's surface
4. Greenhouse effect

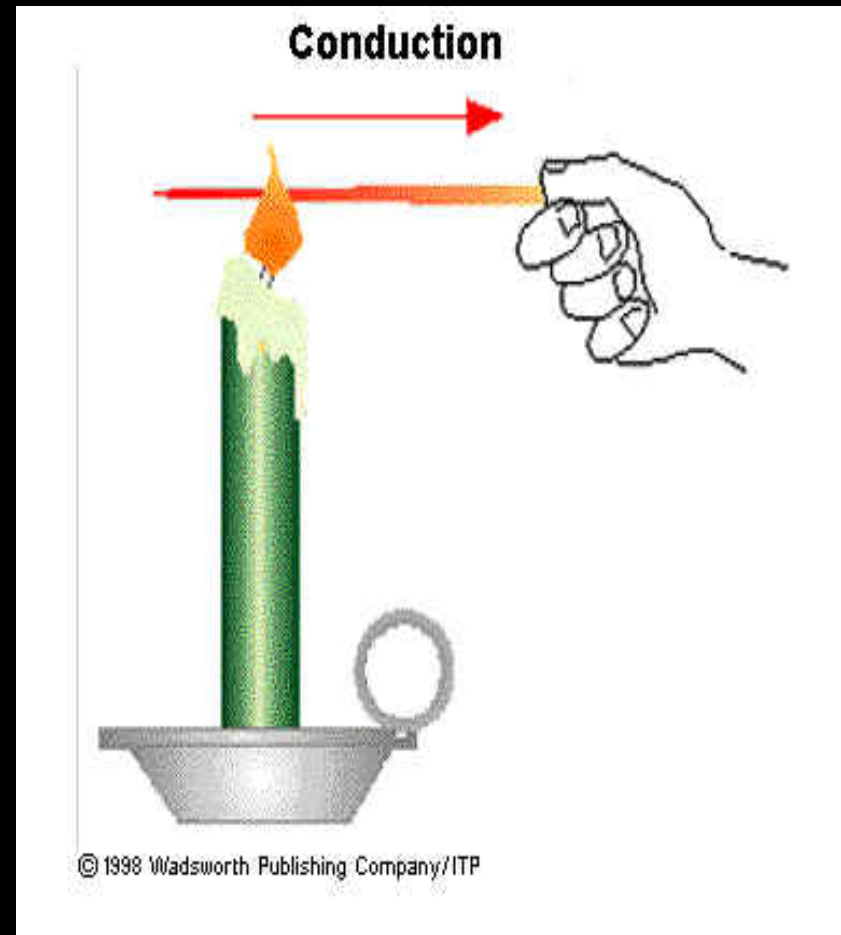
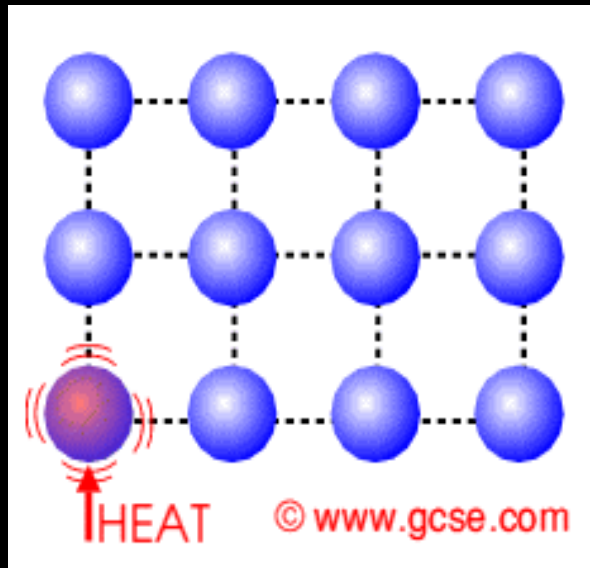
**How is heat transferred in  
Earth's atmosphere?**



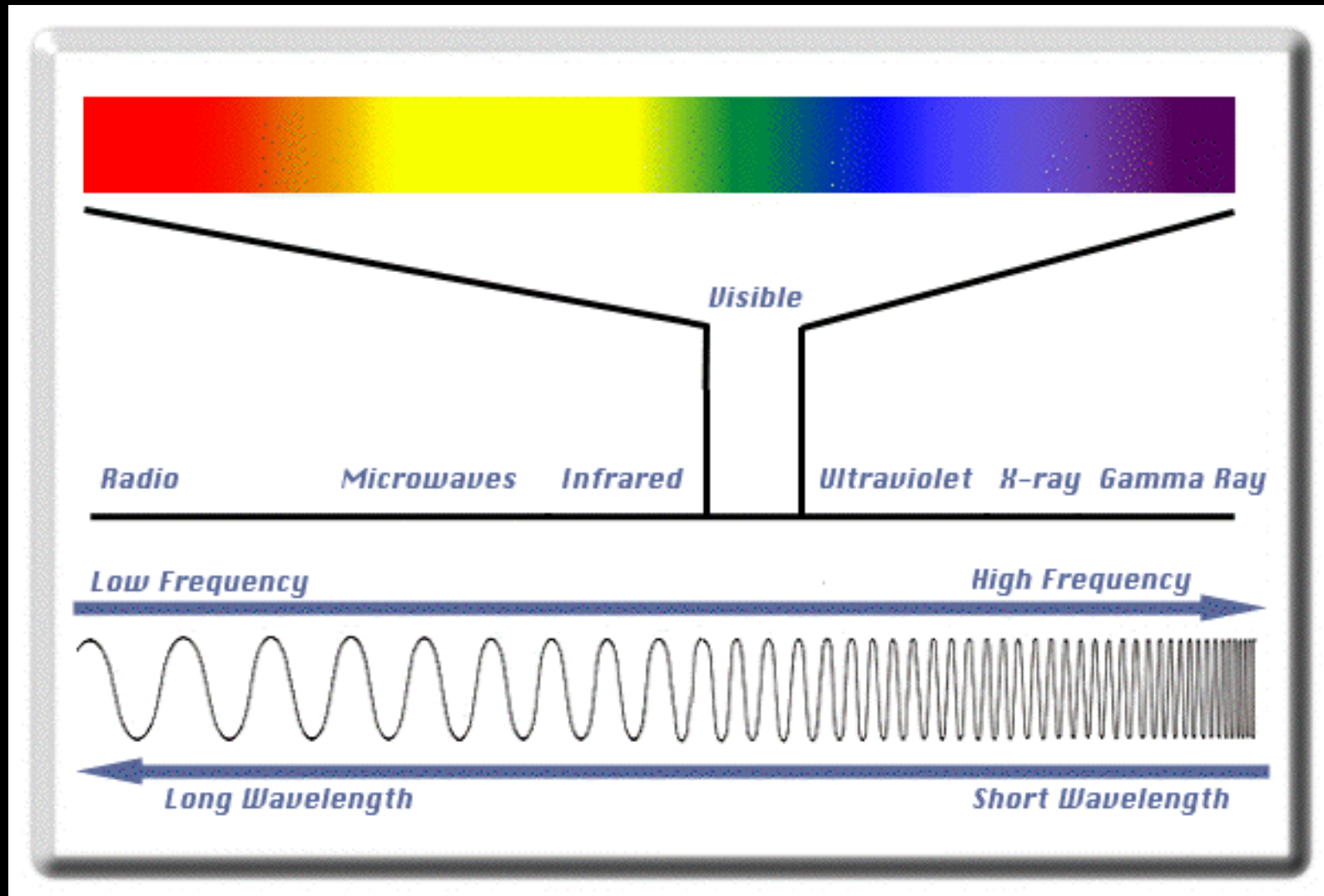
# 1. Conduction

- Transfer of energy through direct contact.
- Some objects are good conductors (metals)
- Some are called “super conductors”.
- Earth’s land can heat the air above it in this way
- Gliders use this energy



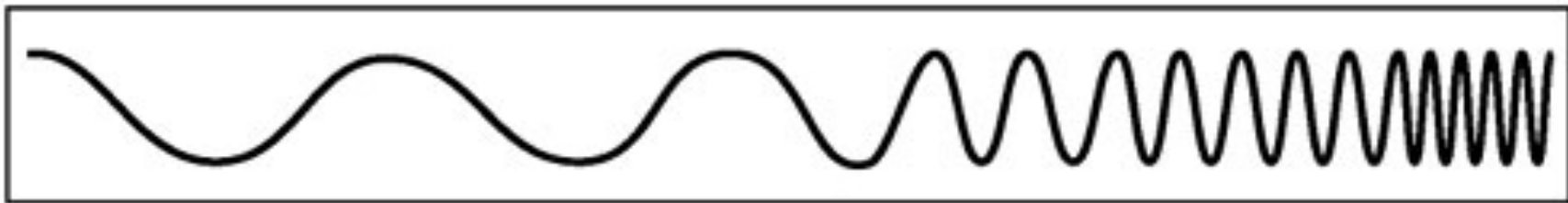
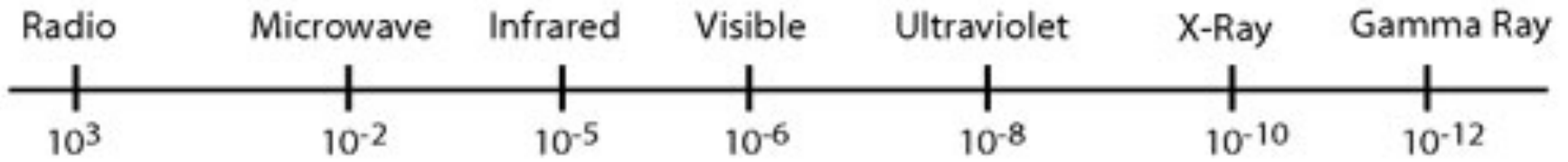


# 2. Radiation



# THE ELECTRO MAGNETIC SPECTRUM

Wavelength  
(metres)

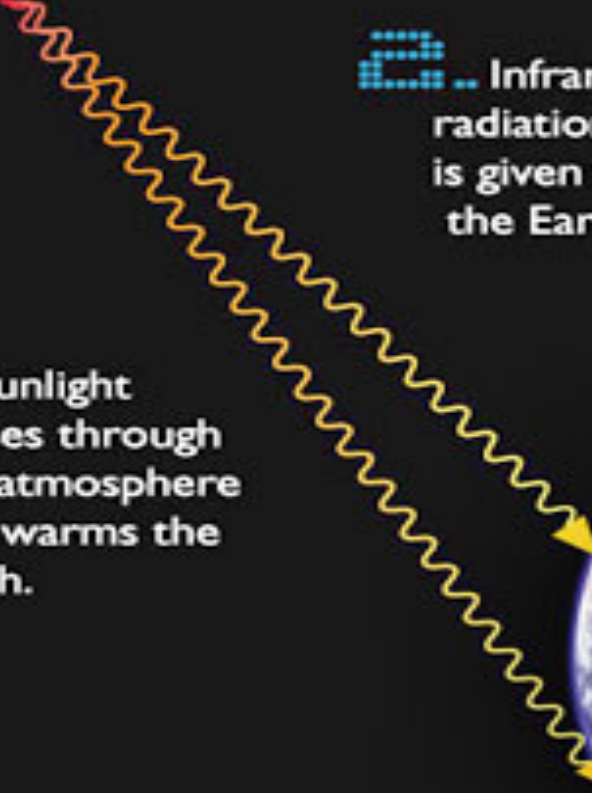


Frequency  
(Hz)

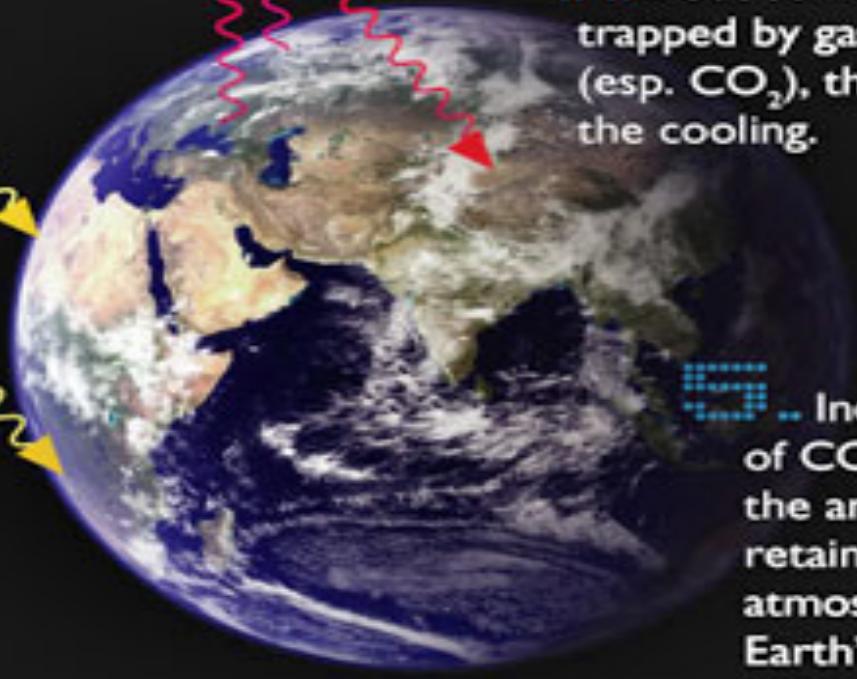




1.. Sunlight passes through the atmosphere and warms the earth.



2.. Infrared radiation (IR) is given off by the Earth...



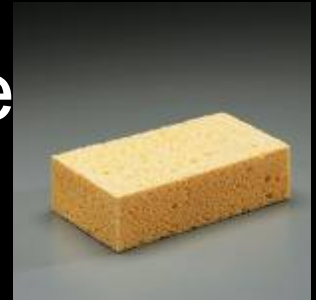
3... most escapes to outer space, allowing the Earth to cool...

4.... but some IR is trapped by gases in the air (esp. CO<sub>2</sub>), thus reducing the cooling.

5.. Increasing levels of CO<sub>2</sub> increases the amount of heat retained, causing the atmosphere and Earth's surface to heat up.

# Where does radiation end up?

- 50% is absorbed by Earth's surface
- 20% is absorbed by Earth's clouds
- 25% is reflected by Earth's clouds
- 5 % is reflected by Earth's surface
- = 100 %



# 3. Convection

- This happens with materials that flow
- (liquids, gases)
- Hot things are less dense
- Cold things are more dense
- Hot things rise, cool things sink

# *ATMOSPHERIC "CONVECTION"*

*COOLER AIR*

*WARM AIR*







- Radiation, conduction, and convection all work together on Earth.
- Radiation from the sun reaches Earth in about 8.3 minutes on average.

# Identify in the following images:

- Conduction
- Convection
- Radiation

