
ENERGY IN THE ATMOSPHERE

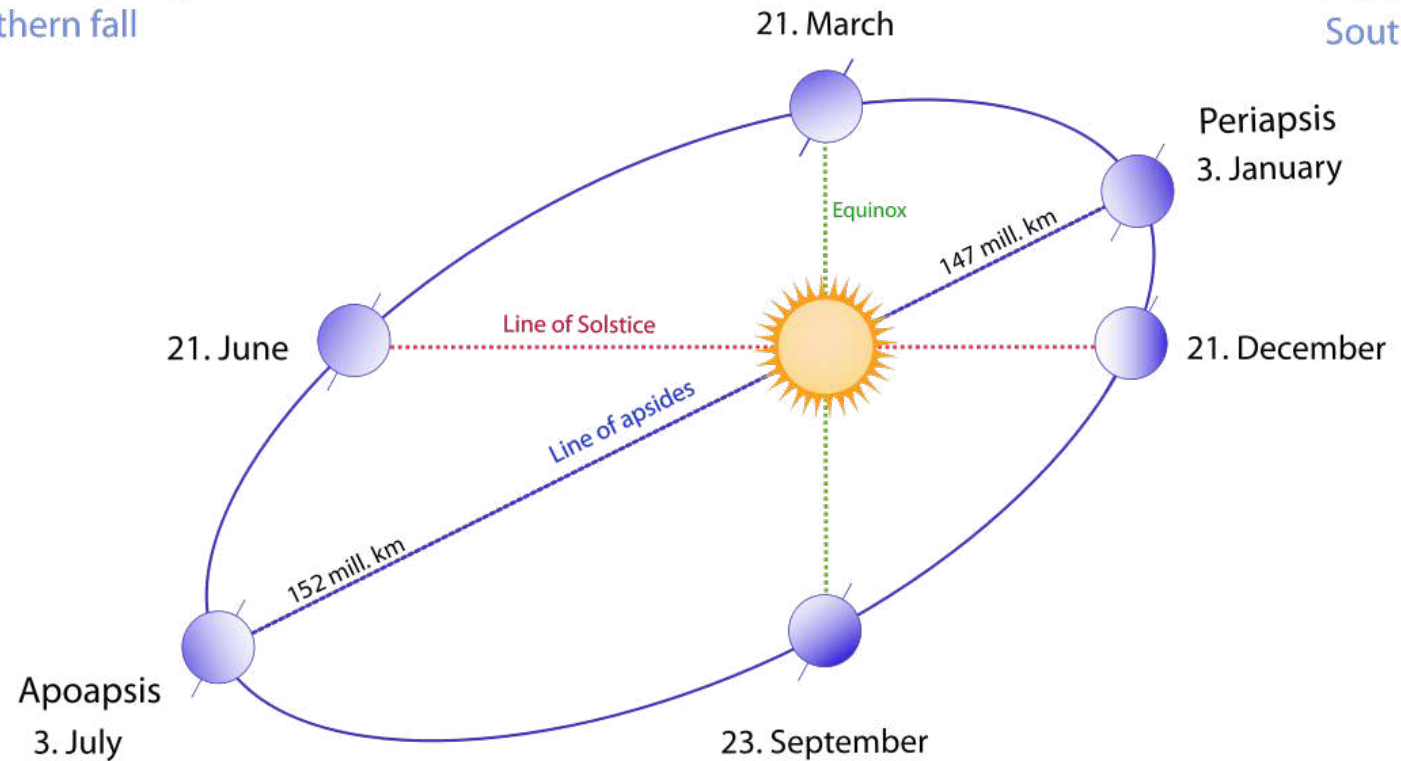


VOCAB ALERT!

- **Perihelion** – point where Earth is **closest** to the sun
- **Aphelion** – point where Earth is **farthest** from the sun.

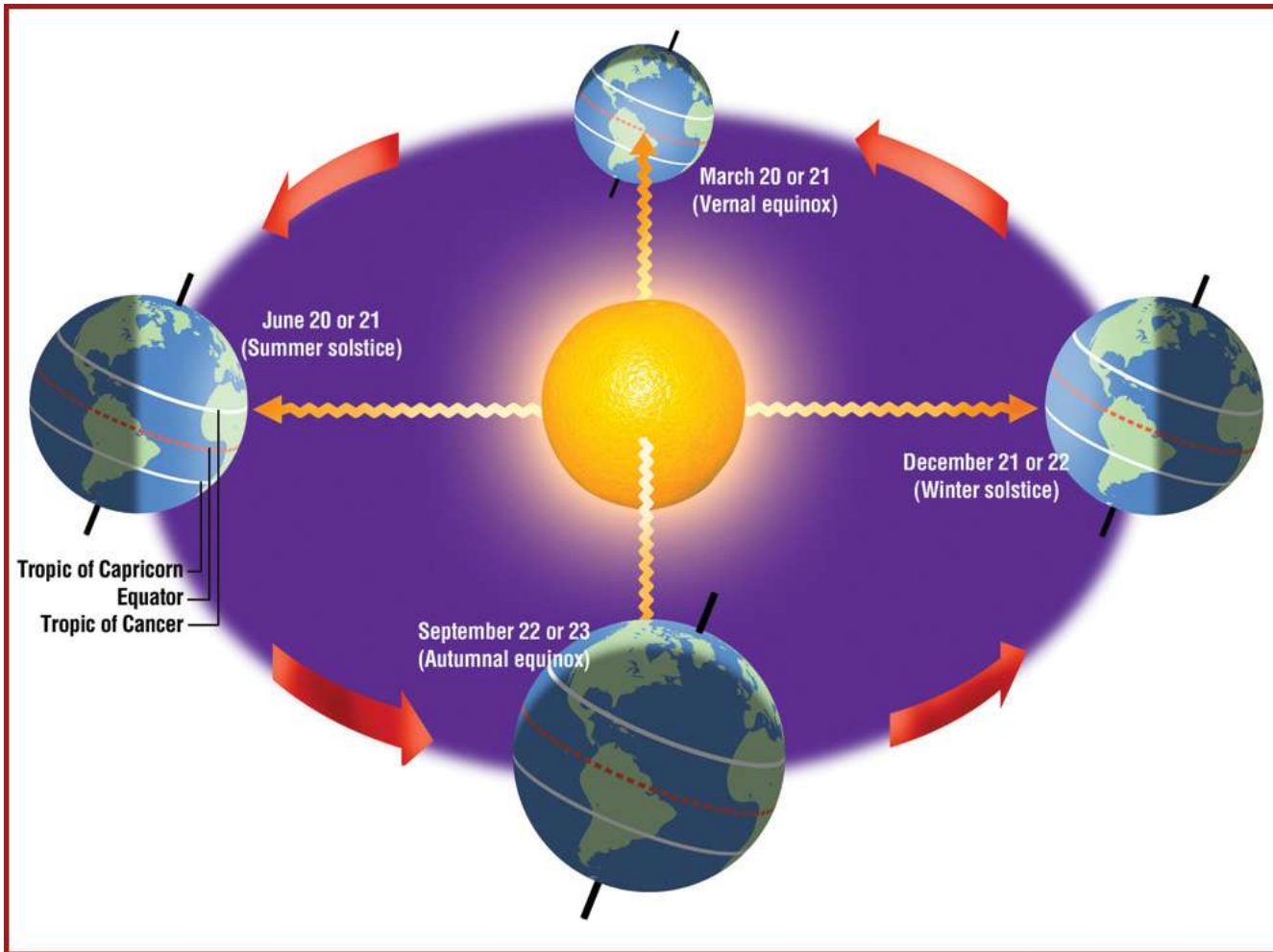
Northern spring/
Southern fall

Northern winter/
Southern summer



Northern summer/
Southern winter

Northern fall/
Southern spring



QUICK WRITE:

- What makes day and night?
- Use the word rotation
- What makes the seasons?
- Use the words revolve and tilt.

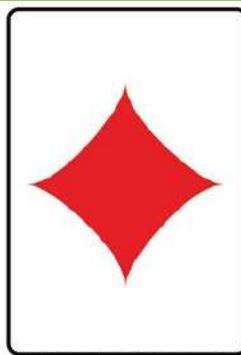
IN GROUPS, ON SMALL WHITEBOARD, CH 17.2 (7 MINUTES)



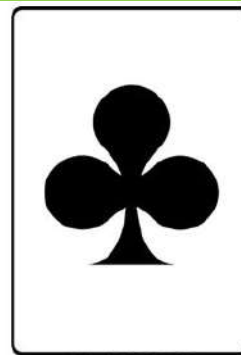
- 1) How are heat and temperature related?
- 2) What are the 3 major mechanisms of heat transfer?
- 3) How is the atmosphere affected by each of the heat transfer mechanisms?

ENERGY IN THE ATMOSPHERE READING GROUP ROLES

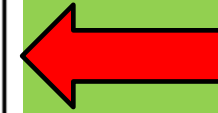
Reporter:
Shares out
answers with
class.



DIAMONDS

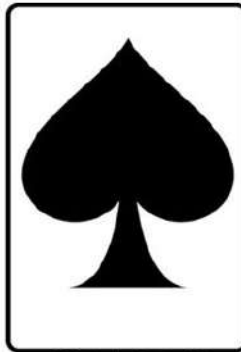


CLUBS

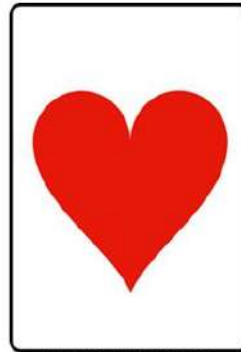


Resource Manager:
Grab whiteboards
and markers. Makes
sure group finds
specific evidence in
the text.

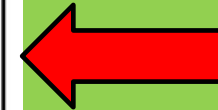
Facilitator:
Make sure
everyone's
ideas are
heard.



SPADES



HEARTS



Recorder
Writes answers on
whiteboards.

HEAT AND THE ATMOSPHERE

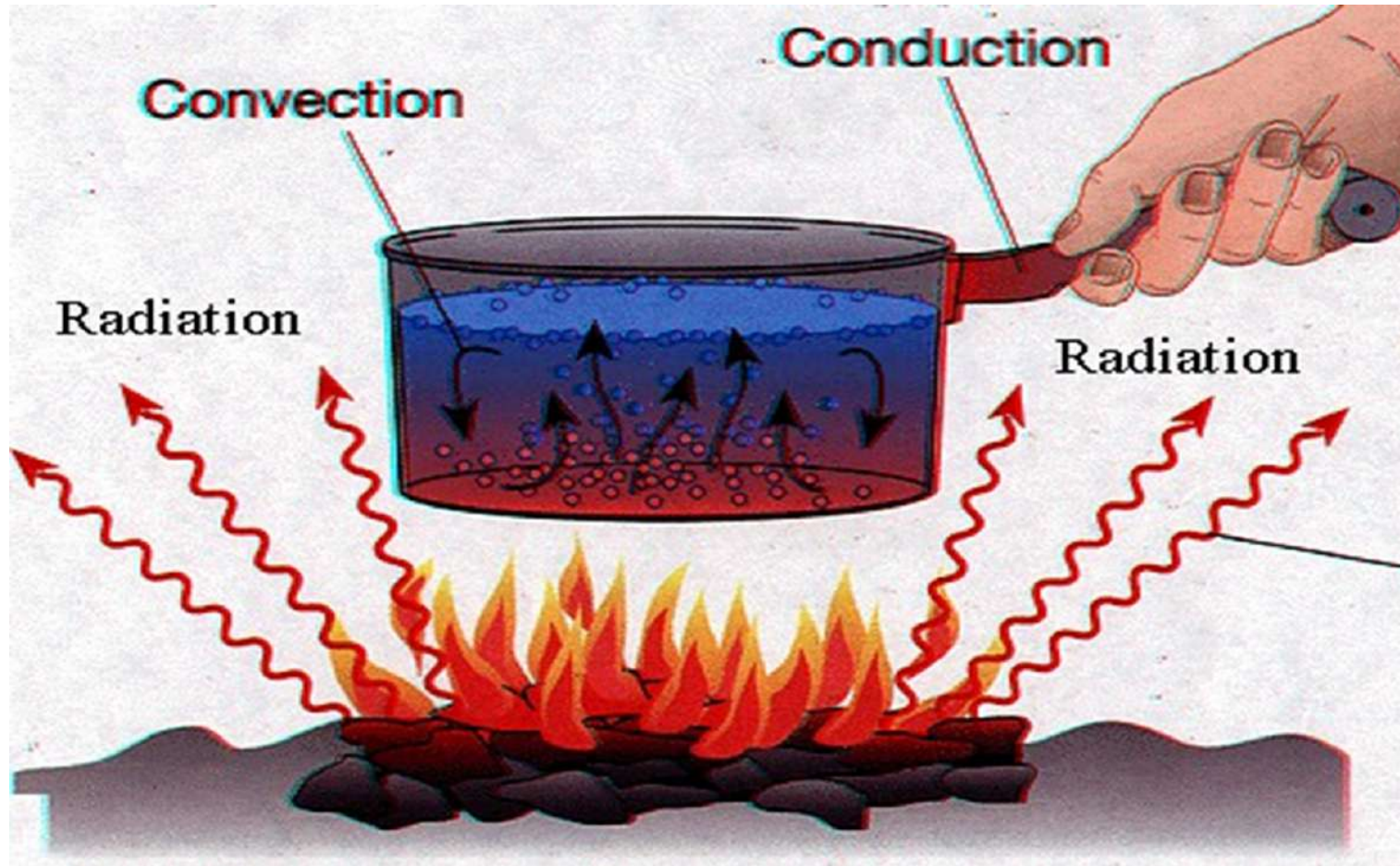
- **Heat:** measure of how fast the atoms or molecules of a substance are moving.
- **Temperature:** is the average kinetic energy (Energy of movement)
- The faster the movement the higher the heat energy and the higher the temperature



HEAT TRANSFER NOTES

- **Radiation** – the movement of energy through empty space
 - Light travels from a sun across the solar system to the earth
 - Heat from a fire warms your hand without touching the fire.
- **Conduction** – the movement of energy through a substance, on contact. Atoms or molecules collide with others to make them move
 - Heat moves through the handle of a hot pot to burn your hand
- **Convection** – the rising and falling of a substance due to its change in its temperature and density
 - Water in a pot boils, heat in a room rises, cold water sinks

HEAT TRANSFER MECHANISMS

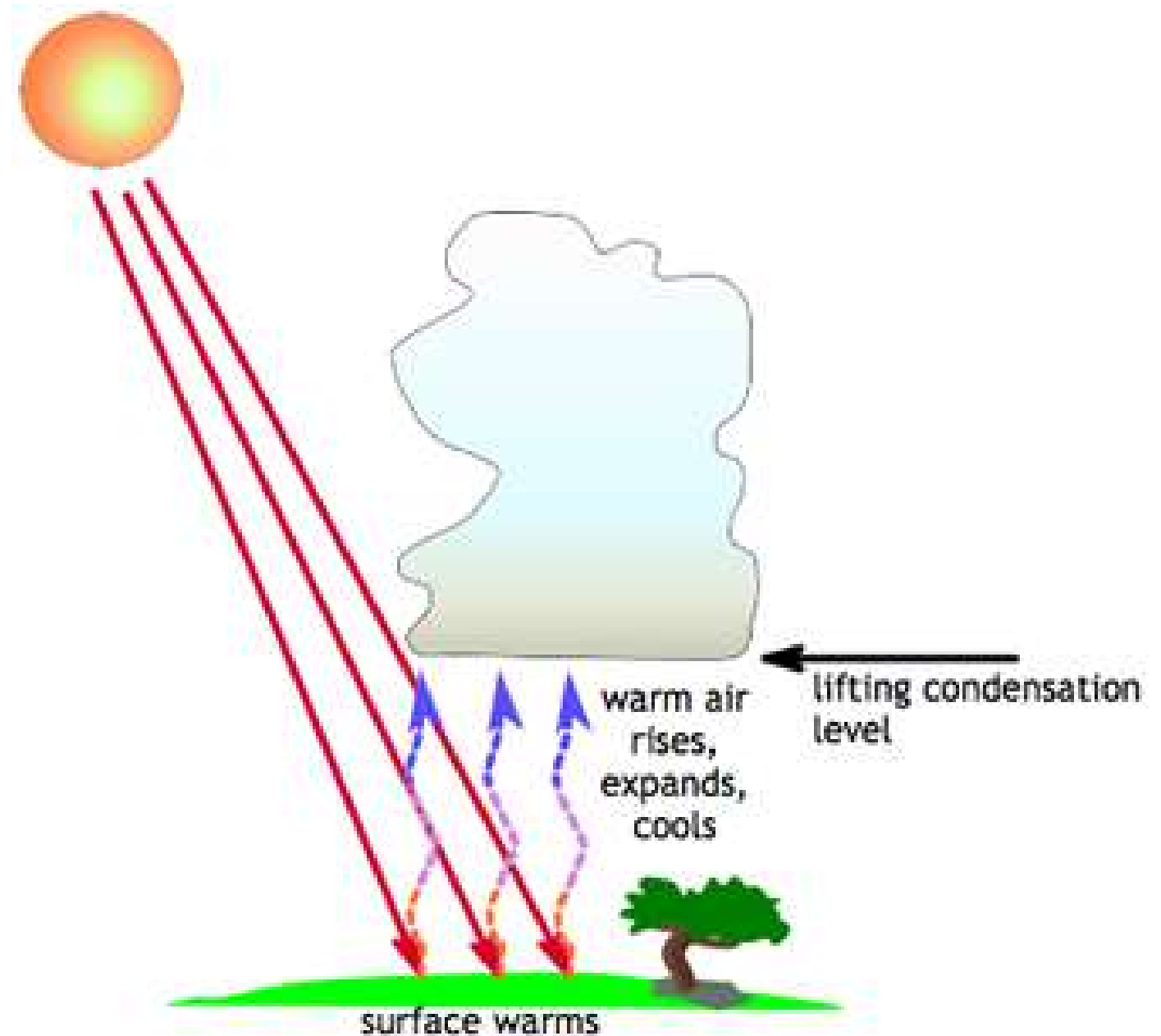


3) HOW IS THE ATMOSPHERE AFFECTED BY EACH OF THE HEAT TRANSFER MECHANISMS?

- Radiation is either absorbed or reflected by Earth's surface. Some of it is absorbed by plants for photosynthesis.
- Conduction happens between Earth's surface and the air directly in contact with Earth's surface because air is a poor conductor of heat.
- Convection affects the atmosphere because heat acquired by radiation and conduction is transferred through the atmosphere by convection currents.

ATMOSPHERIC HEATING AND ENERGY

- All energy comes from the sun
- About 50% absorbed by land and sea-the rest radiated back to space
- Sun heats ground, ground heats the air
- Warm air rises, expands and cools
 - Clouds!!



REVISIT
YESTERDAY'S
QUICK WRITE:

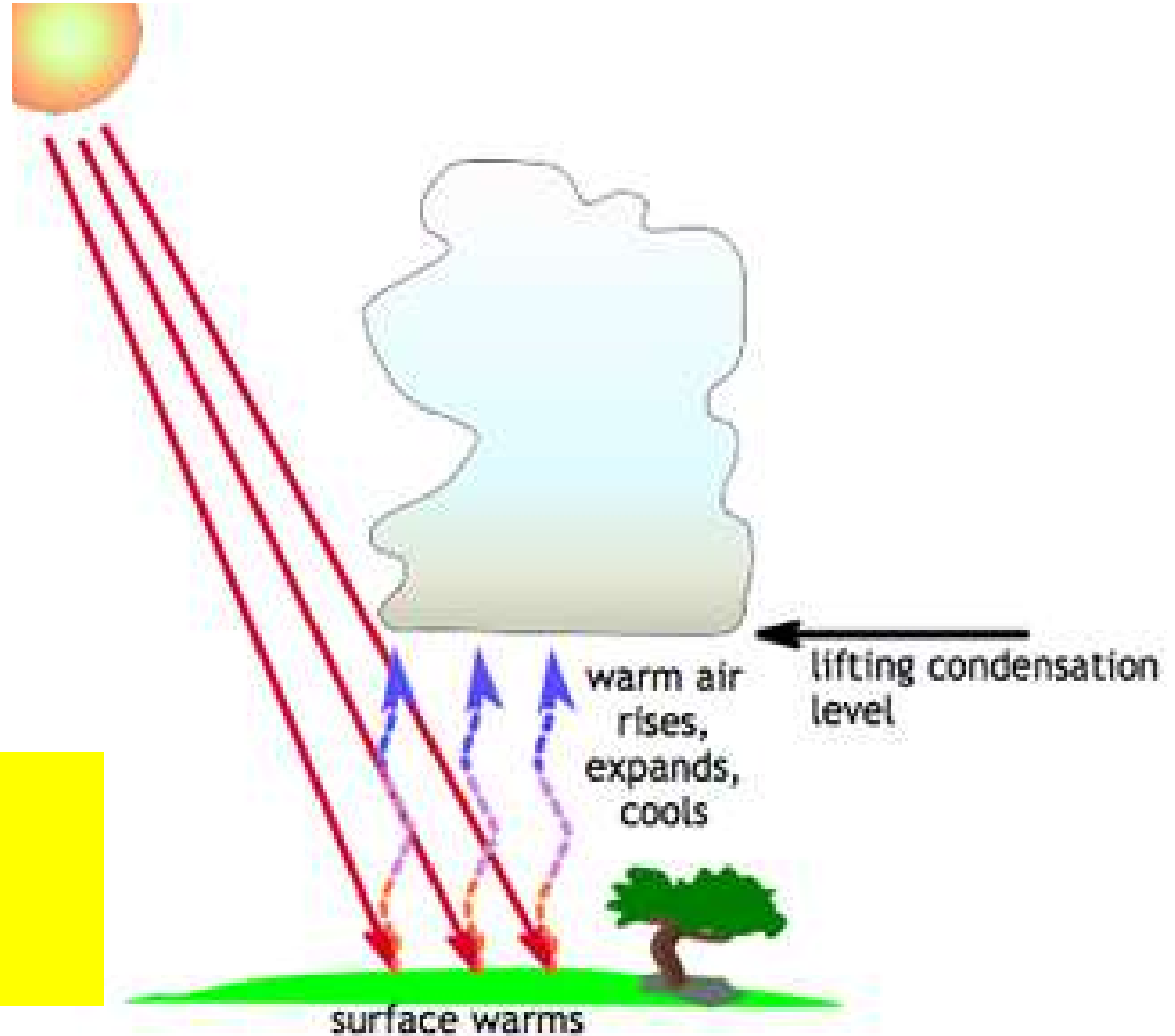
WHY DOES
TEMPERATURE
DECREASE AS YOU
GO HIGHER IN
THE TROPOSPHER
E?

The temperature decreases as you go higher in the troposphere because...

The sun warms the _____ by _____.

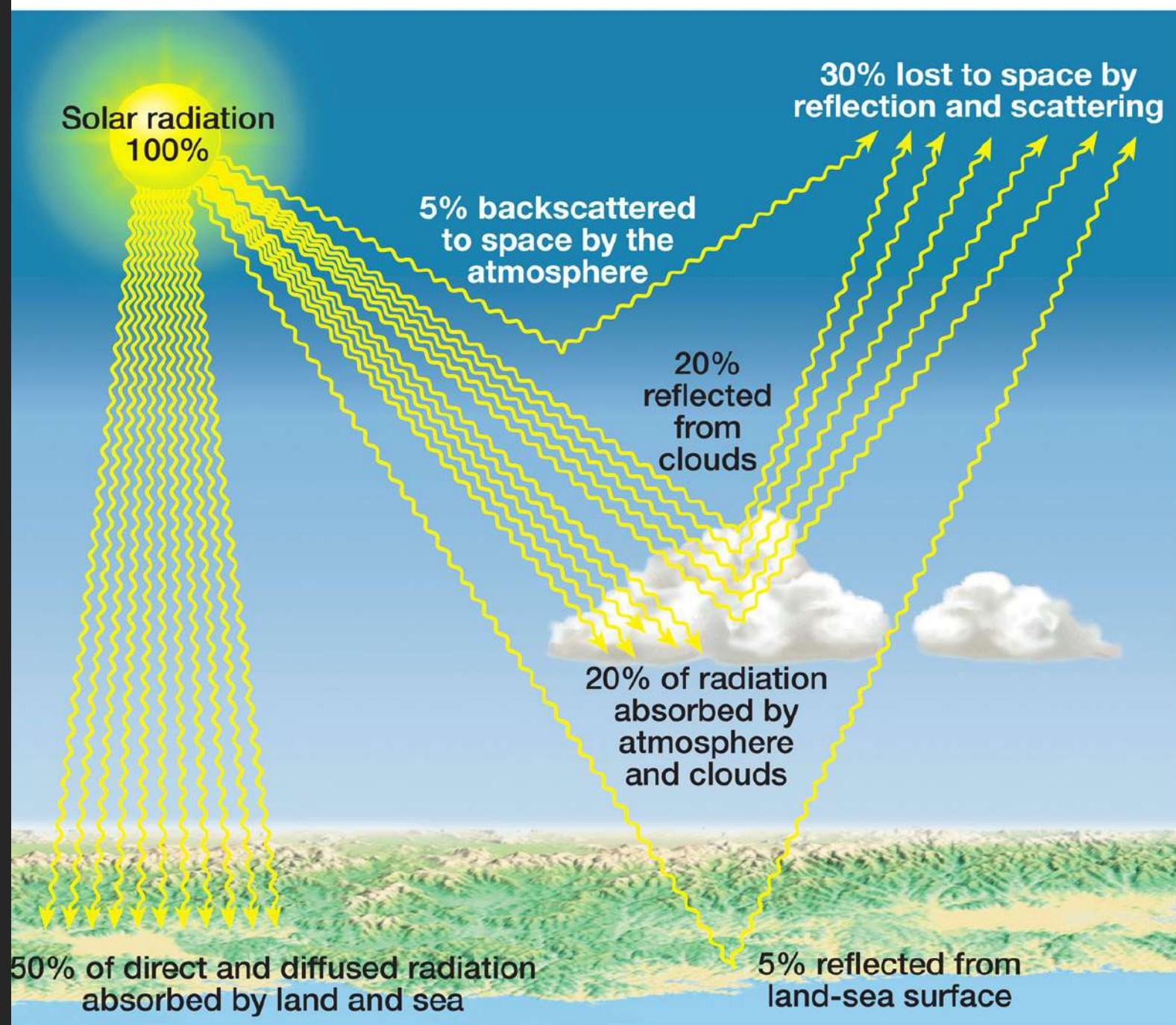
The surface warms the air right above it by _____.

And the warm air rises, expands and cools, by _____,
making the temperature decrease higher in the troposphere.



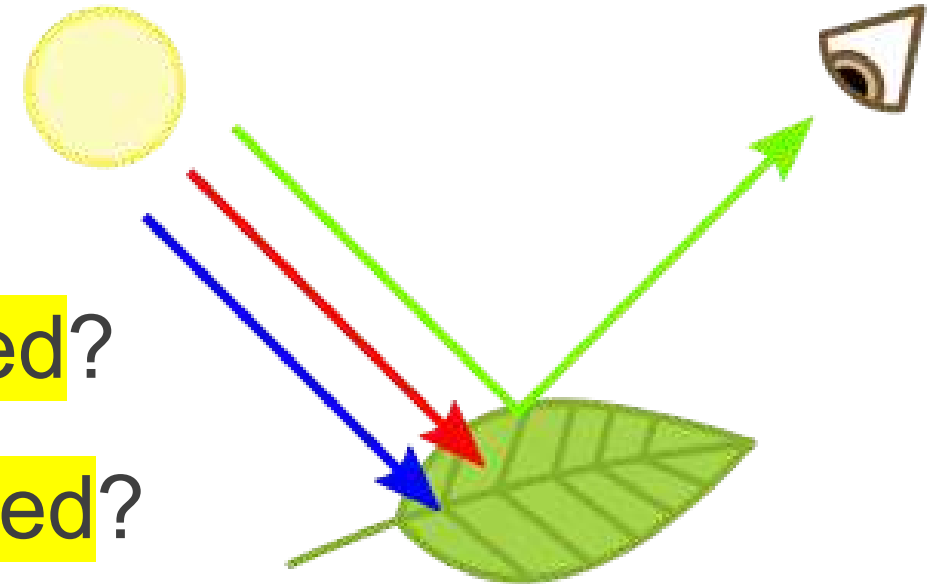
SURFACE HEATING AND RADIATION:

WHAT CAN
HAPPEN TO
RADIATION
THAT IS NOT
ABSORBED BY
THE
SURFACE?



VOCAB PRACTICE

- What does it mean if light is **reflected**?
- What does it mean if light is **absorbed**?



ALBEDO

Measure of a surfaces' reflectivity

- Very dark colors have an albedo close to zero (or close to 0%).
- Very light colors have an albedo close to 100%

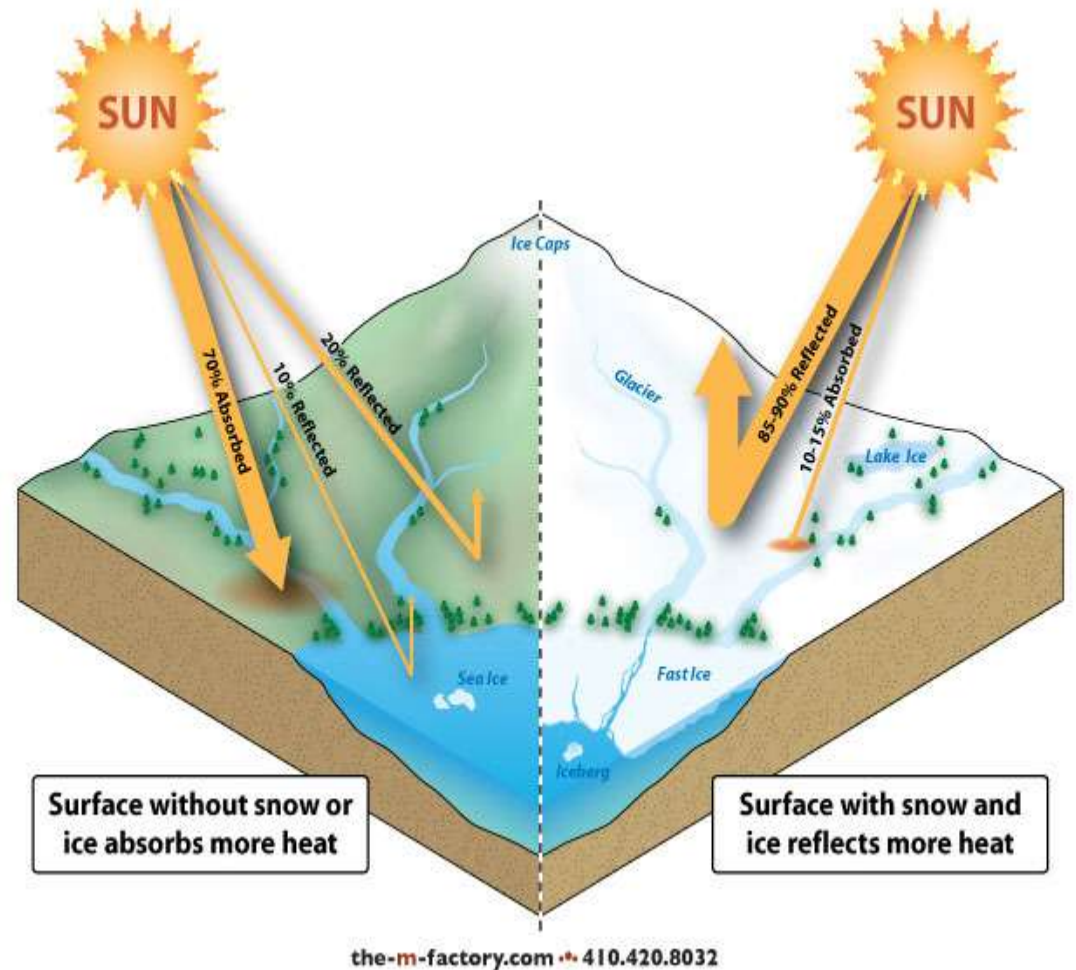


GROUND SURFACE HEATING

Albedo vs absorption

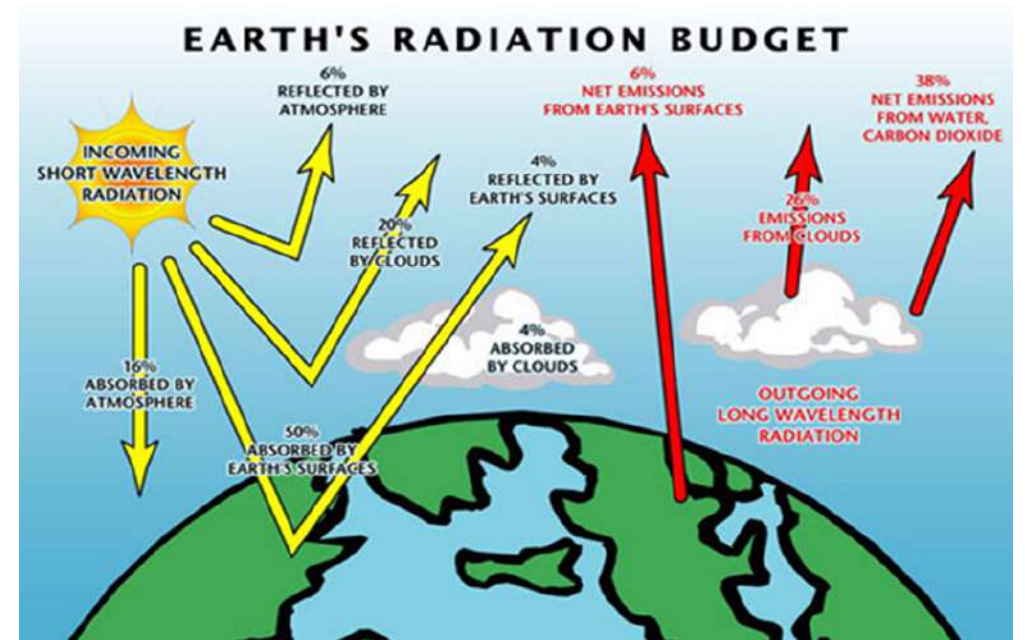
Albedo

- Solar energy reflected from Earth back into space
- Albedo-cool temps
- Absorption-warm temps



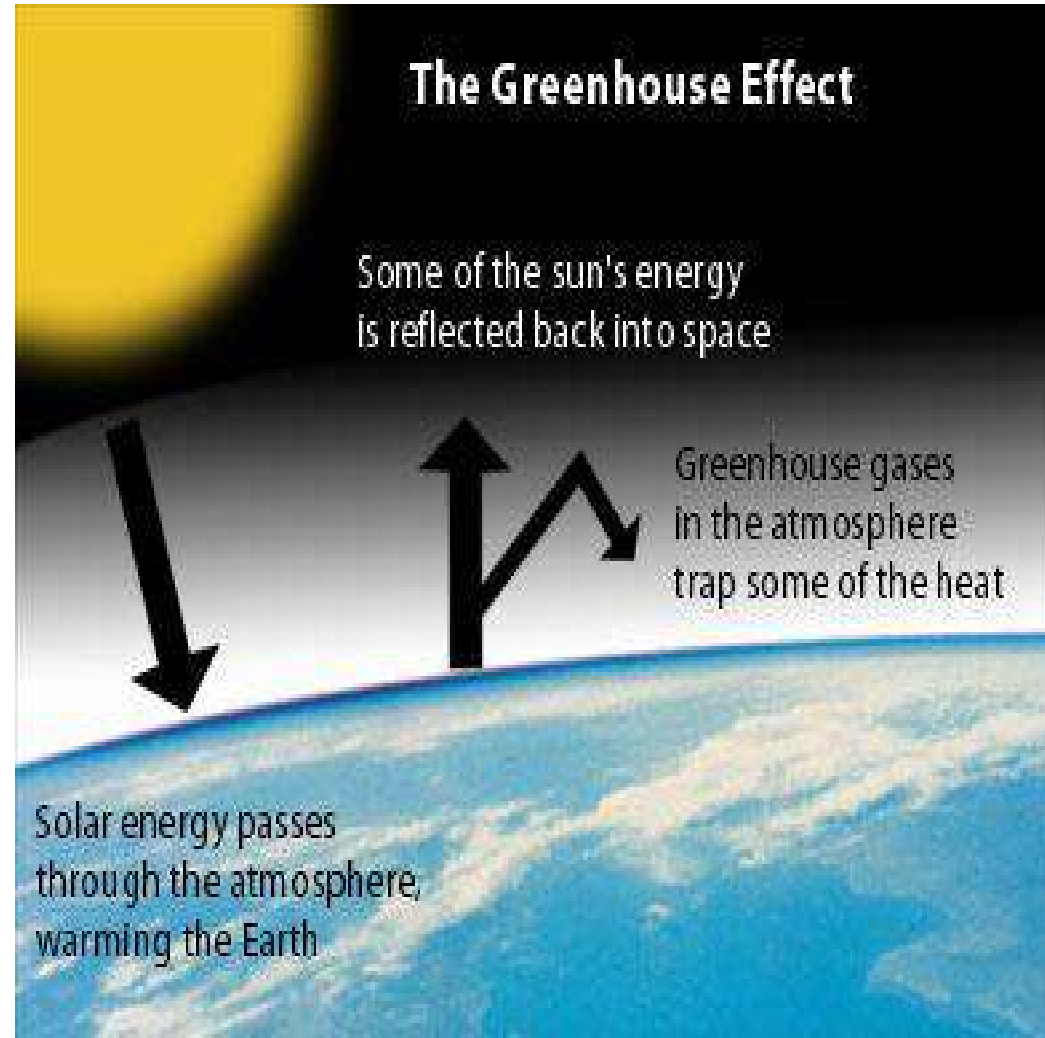
ALBEDO VS ABSORPTION CONTINUED

- Two surfaces-Land and Water
 - Dark materials (most land surfaces) absorb more heat
- Trees-low albedo, high absorption
- Snow-high albedo, low absorption
 - temperature feedback
 - Clouds



THE GREENHOUSE EFFECT

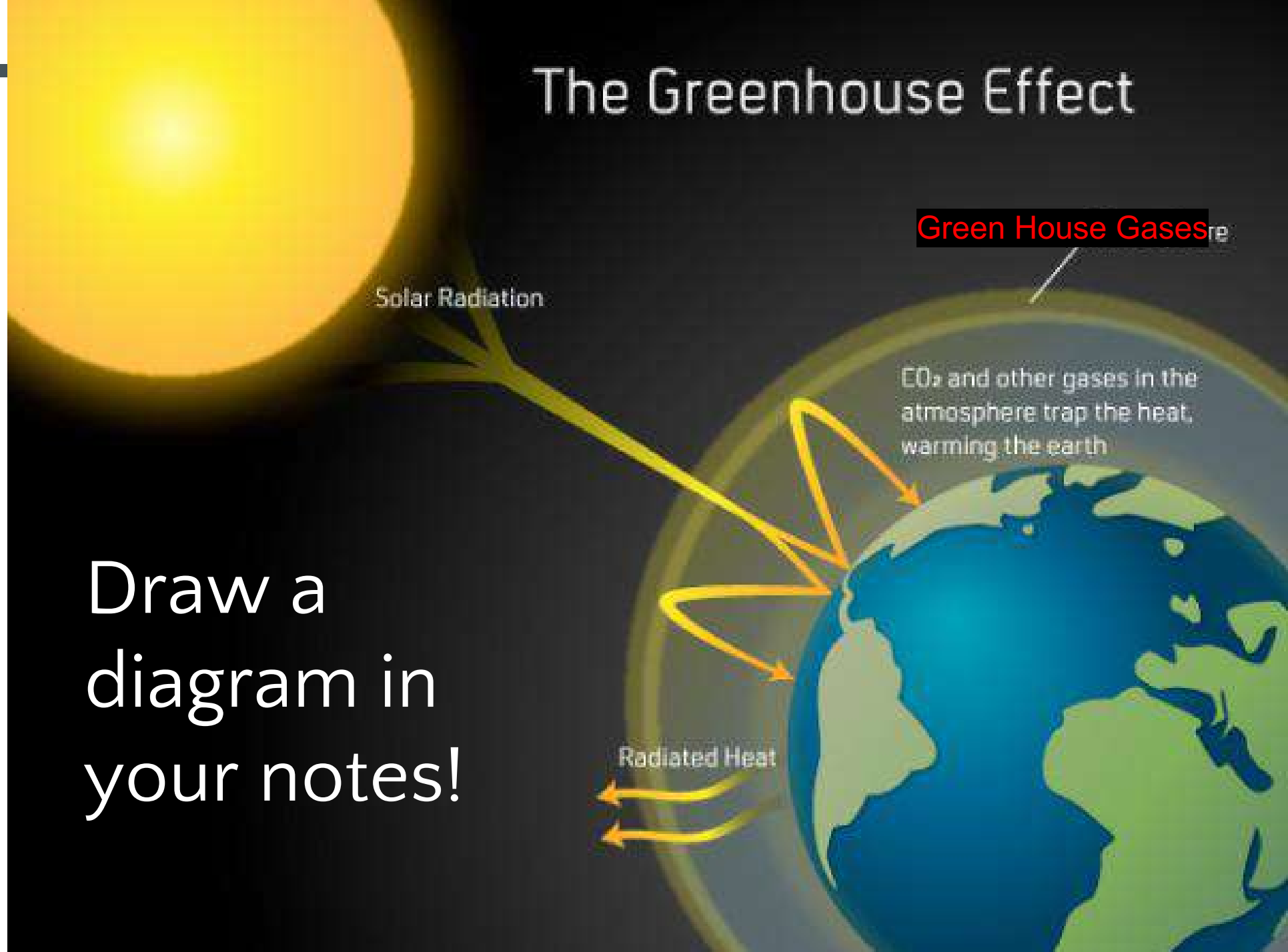
The earth's temperature is naturally regulated by a layer of gases in the atmosphere which act like the glass in a greenhouse. This layer of gases—**Greenhouse Gases (GHGs)**—such as carbon dioxide (CO_2), methane, and nitrous oxide, let in sunlight but tend to trap the heat reflected from the earth's surface. Thus, the earth is naturally warmed by the greenhouse effect.



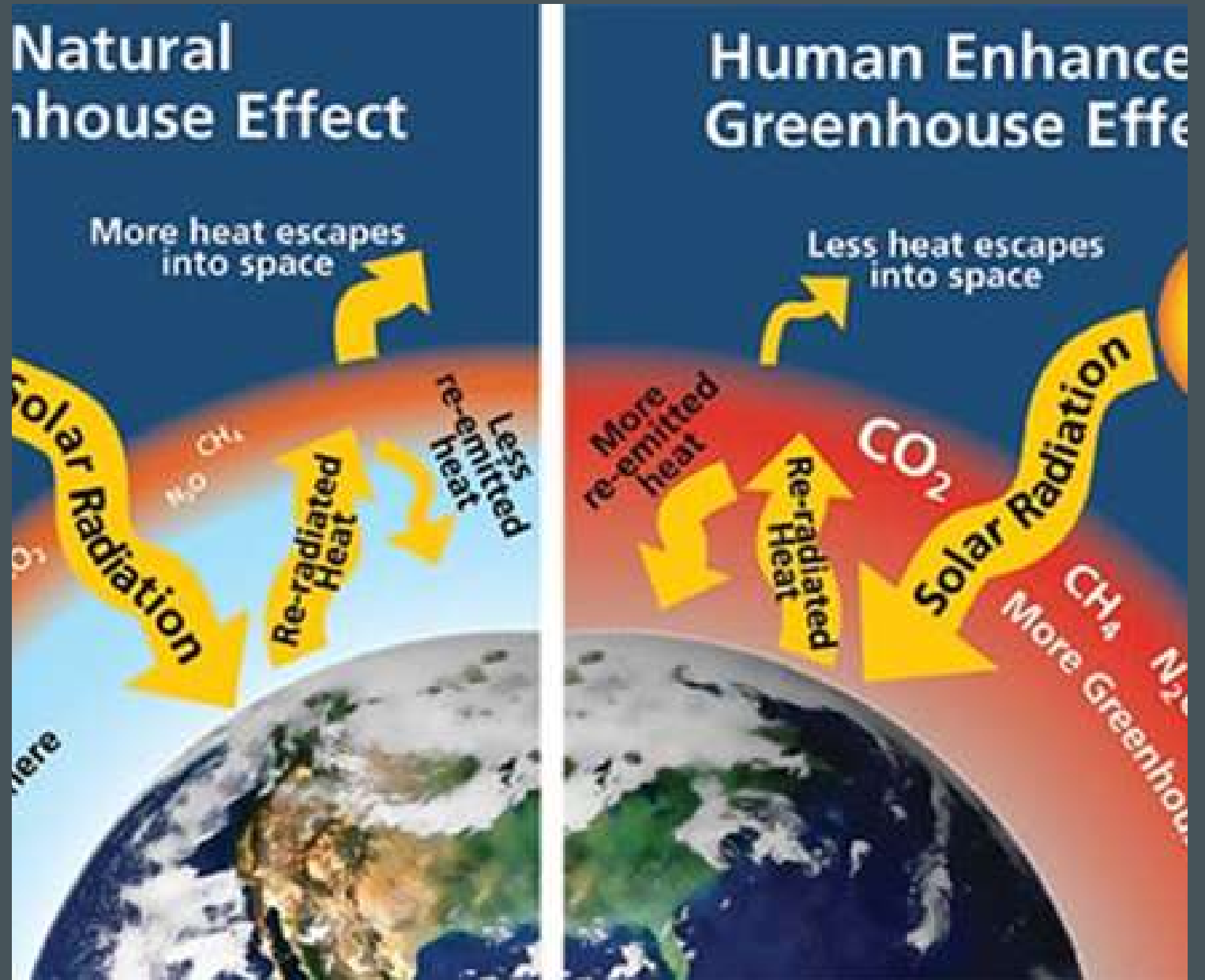
<https://www.youtube.com/watch?v=sTvqlijqvTg>

The Greenhouse Effect

Draw a
diagram in
your notes!



GREENHOUSE EFFECT ARTICLE



HOW DOES THE OZONE PROTECT US?

