FRIDAY Sep 30th

SIT IN YOUR GROUP AREA TODAY!

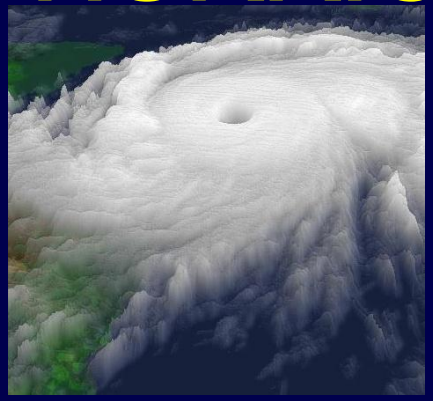
TODAY: Topic # 8 Wrap-Up,

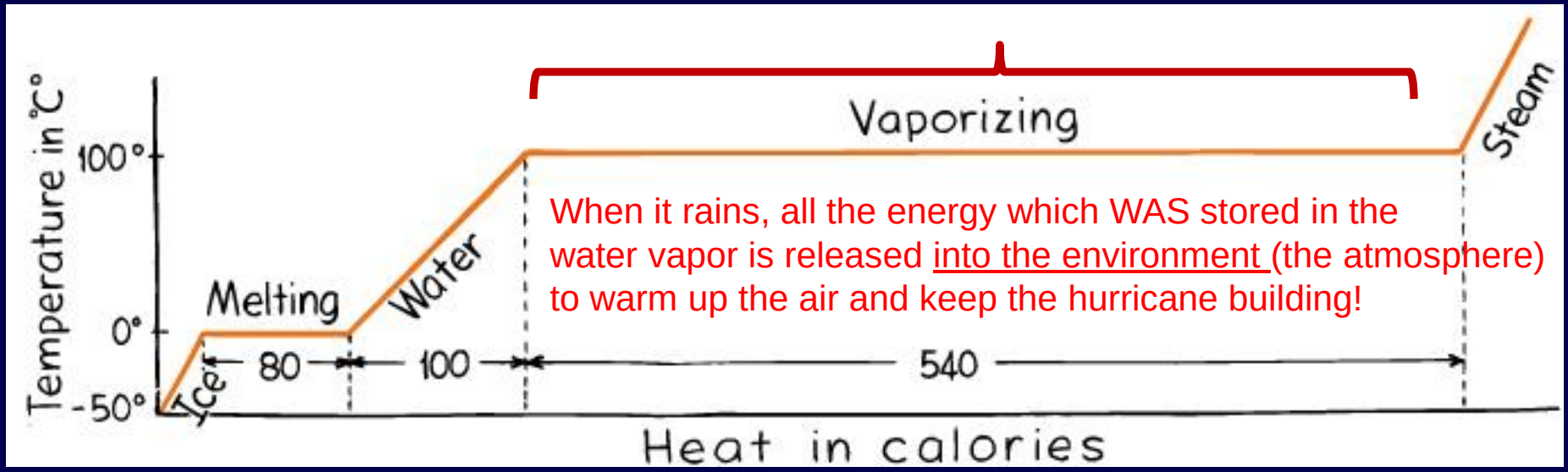
Brief Test #2 Review

&

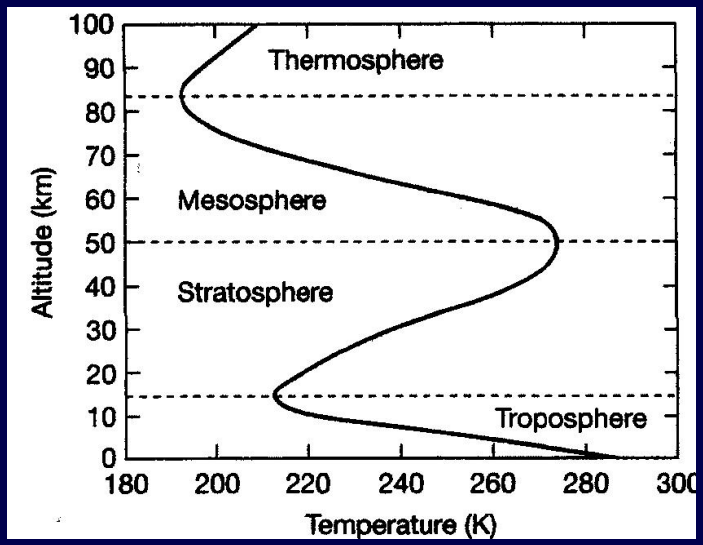
Group Activity G-2

TOPIC #8 Wrap up:
This is what drives tropical storms & HURRICANES!!





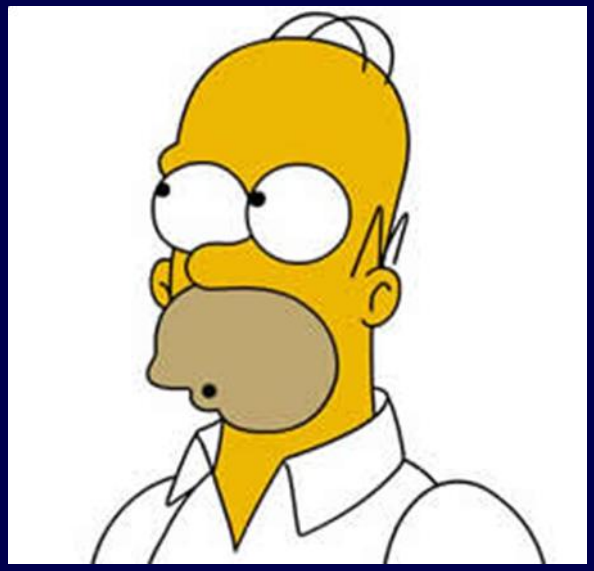
Just in time for your Test #2 Studying!



Trust **S**cientists' **M**inds & **Th**oughts

Courtesy of
an anonymous suggestion!

How about a few practice questions for TEST #2, Homer?



Q1 -The **"Goldilocks Problem"** refers to the question: "Why is Venus too hot, Mars too cold, and Earth's temperature just right!" Your SGC E-text explains that . . .

1. Earth's temperature is "just right" because Earth has a **greenhouse effect** and Venus and Mars do not.

2. Earth's temperature is "just right" due to: (a) **the inverse-square law** (the Earth being just the right distance from the Sun), (b) the **greenhouse effect,** and (c) **the Earth's reflectivity** – all working together

3. Earth's temperature is "just right" because the Earth radiates like a black body and is just the right distance from the Sun – Mars is too close & Venus too far.

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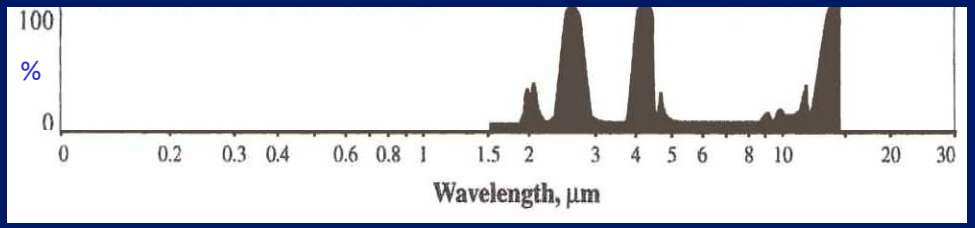
Q2 - Which of the following is a correct statement about this absorption curve:



1. the curve represents absorption by a gas that can absorb both **visible light** and **infrared radiation**

2. **t**he curve represent absorption by a gas that is likely to be a **Greenhouse Gas.**

3. **t**he curve represents absorption by a gas that protects the Earth from **ultraviolet (UV) radiation**

4. **t**he curve represents absorption by a gas that can absorb **ultraviolet, infrared,** & **visible** light wavelengths of radiation.

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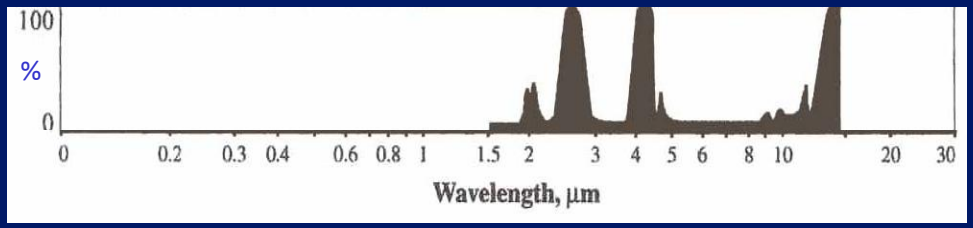

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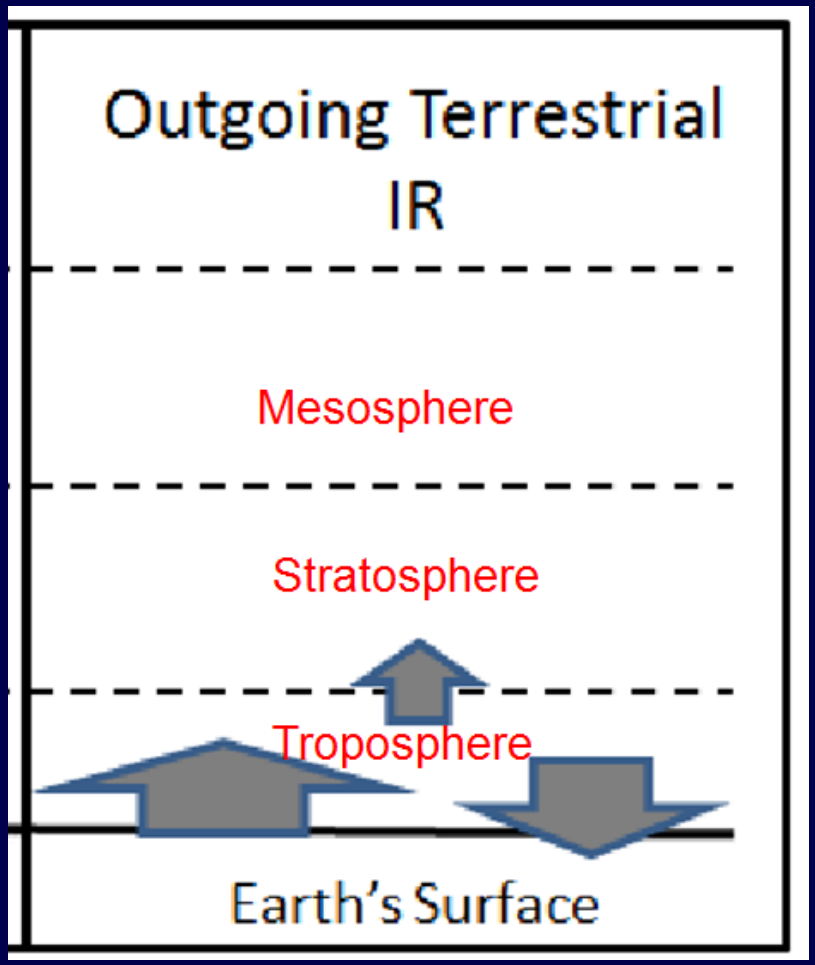
Q3. This figure explains the reason for a "Greenhouse Signature." The Greenhouse Signature is . . . .



1. warming in the Troposphere & cooling in the Stratosphere
2. cooling in the Troposphere & warming in the Stratosphere
3. warming in the Troposphere and the Stratosphere and cooling in the Mesosphere
4. none of the above because the Greenhouse Effect involves UV radiation, not IR and UV is not shown on the figure!!

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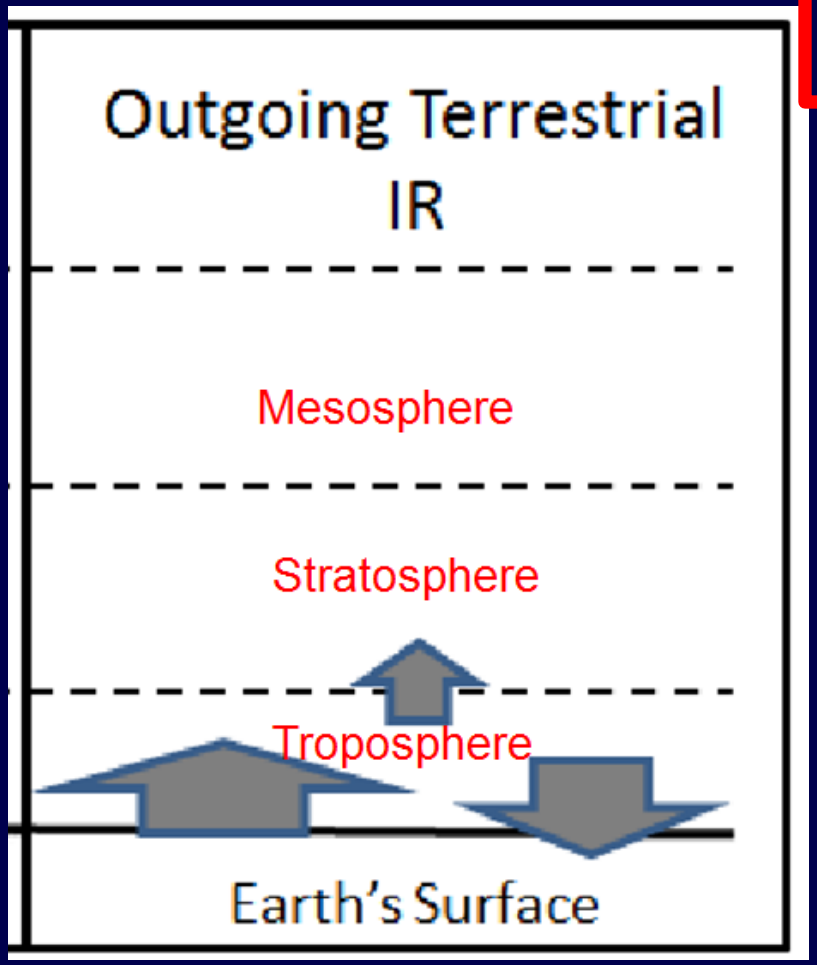

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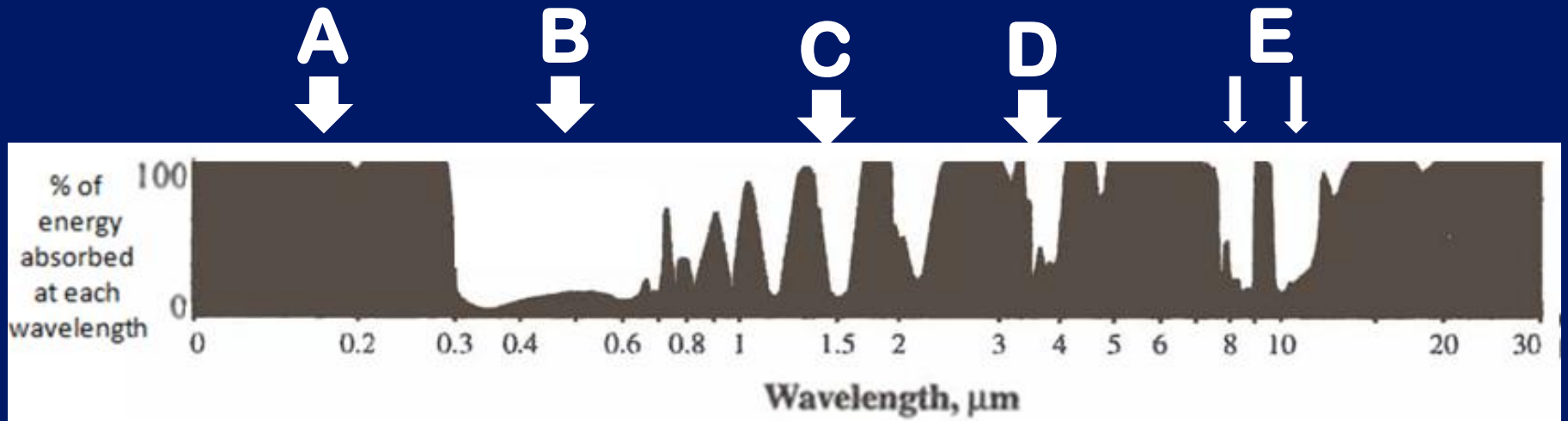
Q4 - Here's the absorption curve for ALL the gases in the atmosphere put together, i.e. curve for the **"Whole Atmosphere"**

Last class we talked about two **"windows"** in the curve that indicate at what wavelengths radiation easily comes **IN** to the surface of the Earth or escapes **OUT** to Space.

Where are these two windows?

1: A + B **2: B + D** **3: C & D** **4: B + E**



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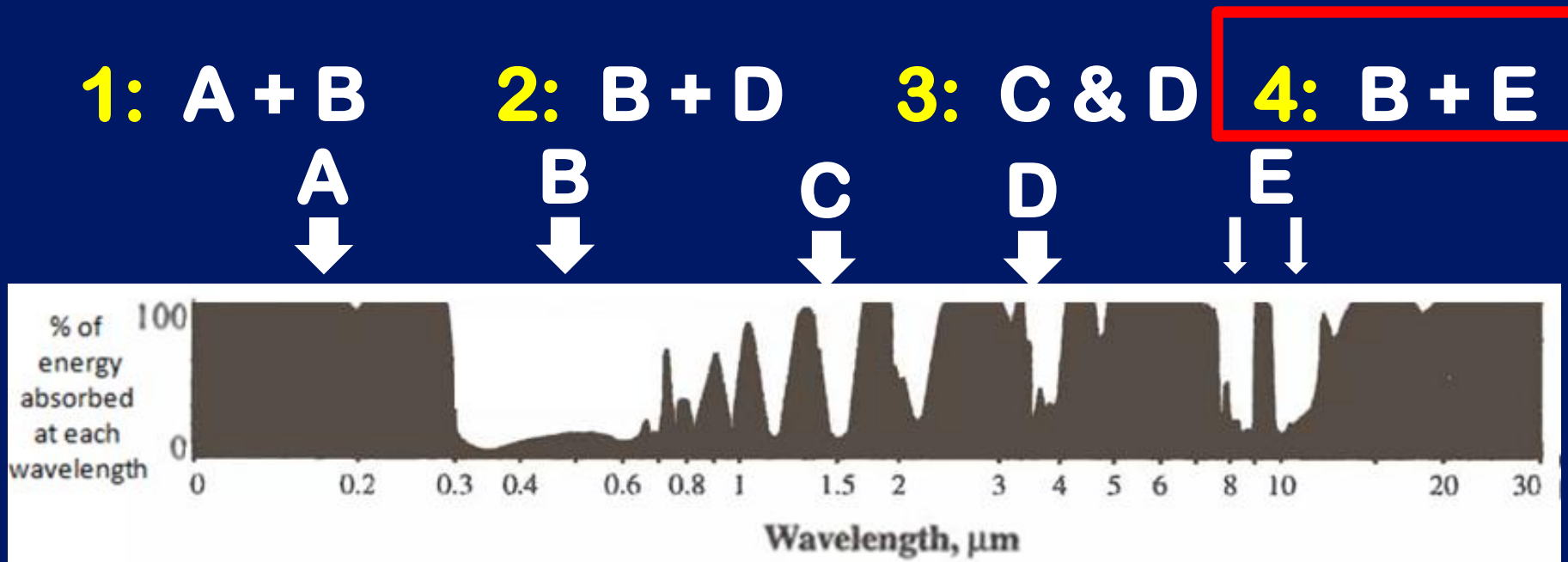
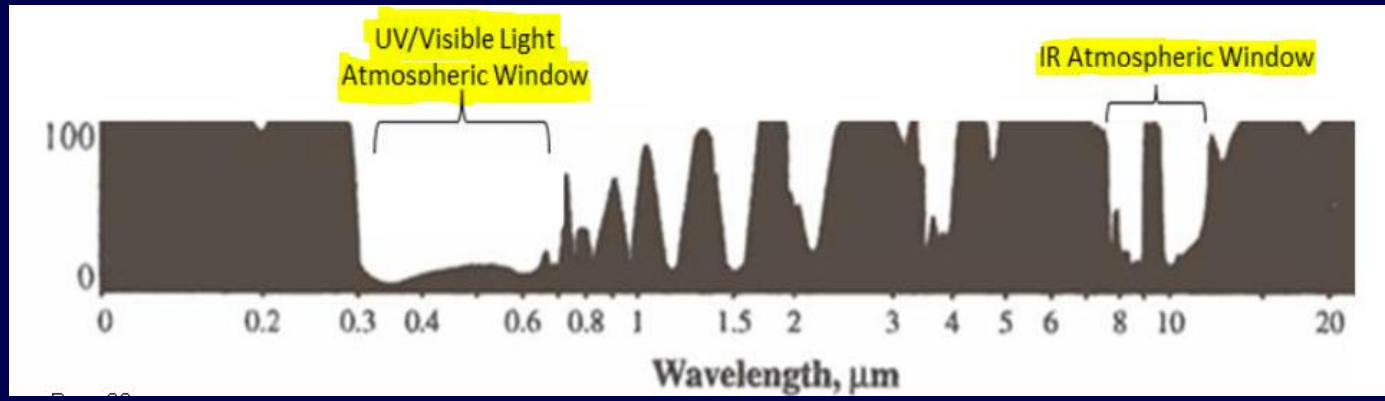


Q5 - OK, so HERE are the two windows. But WHY are they called WINDOWS??



1- Because – like a window -- they allow electromagnetic radiation to be TRANSMITTED through the atmosphere at the specified window wavelengths

2 - Because – like a window -- they allow electromagnetic radiation to be ABSORBED in the atmosphere at the specified window wavelengths

3 - Because – like a window – they REFLECT electromagnetic radiation through the atmosphere at the specified window wavelengths

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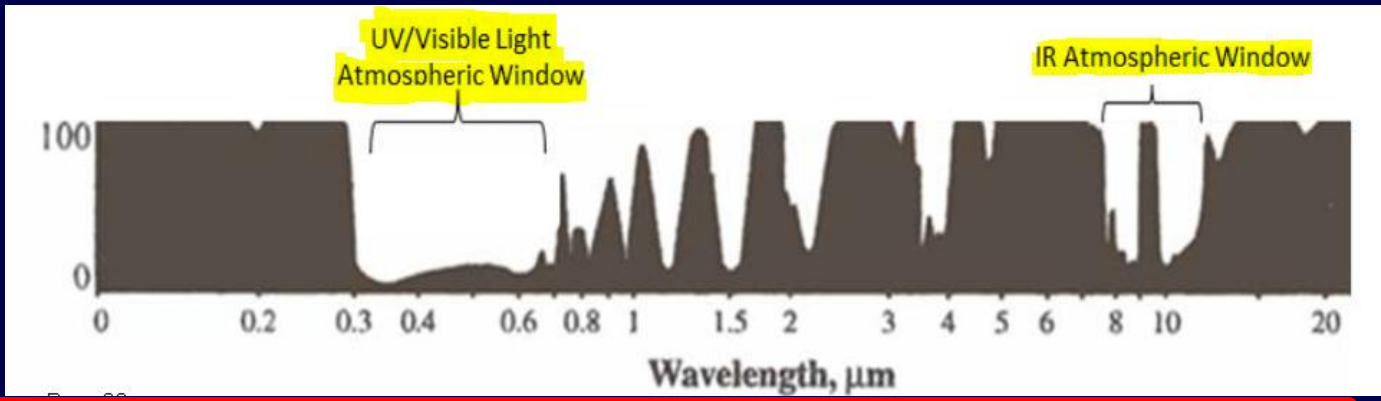

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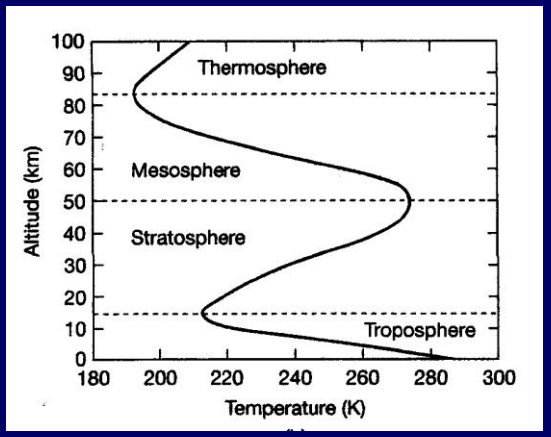
Q6 The atmospheric layer of **the troposphere** is important to global climate change because:



1. it is the layer that is heated up **primarily** by gases that can absorb high-energy **shortwave radiation** coming in directly from the Sun

2. it is the layer in which **temperature INCREASES with altitude** in the atmosphere

3. it is the layer with a high concentration of **ozone** that absorbs harmful **ultraviolet radiation**.

4. it is the layer in which most of the absorption by **greenhouse gases** occurs in the atmosphere

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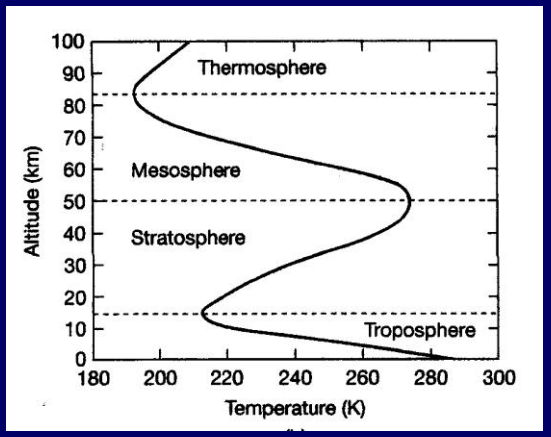

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Q7 - Which of these greenhouse gases has experienced a DECREASE in atmospheric concentration since the 1970s?

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2. Nitrous Oxide
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5. Oxygen
6. None of the above

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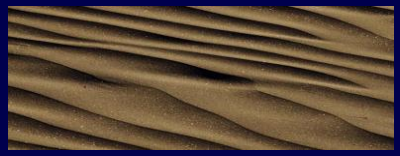
These are not even GHG's!!

Q8 - Assume you have an equal volume of WATER, AIR & SAND.

Which will HEAT UP THE FASTEST if the same amount of thermal energy is transferred into the substance?

1. AIR
2. WATER
3. SAND



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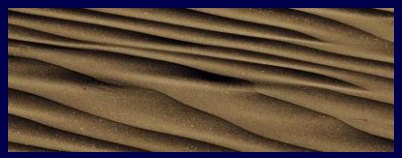

Explanation:

The lower the heat capacity, the quicker the response to a transfer of heat into the substance!

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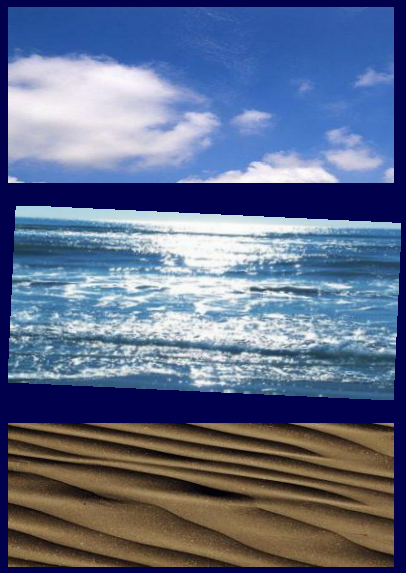

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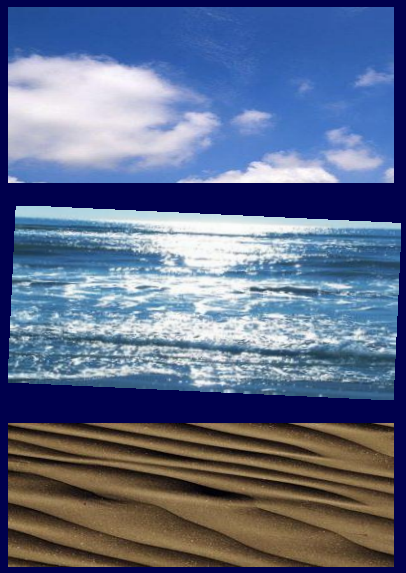
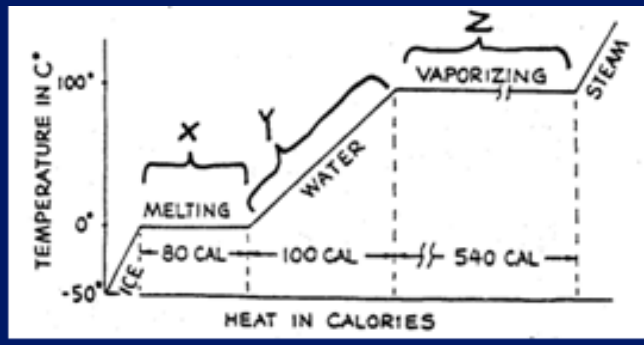


Q9 – Which choice best explains what the graph is illustrating about the energy involved in phase changes (changes of state) in H_2O.



1. **Portion X** of the graph indicates that it takes **much more energy** to create a **phase change from ice to liquid** than it does from liquid to vapor.

2. **Portion Y** of the graph indicates that 100 calories of energy are being added to one gram of H_2O **without changing the temperature** of the H_2O at all. This process produces a **phase change** from ice to vapor.

3. **Portions X and Z** of the graph indicate that **during phase changes**, the calories of energy being added to a gram of H_2O, **do not change the temperature of the H_2O .**

4. **Portion Z** of the graph indicates that as soon as the temperature of H_2O reaches 100 º C, it immediately starts cooling off and condenses into a liquid.

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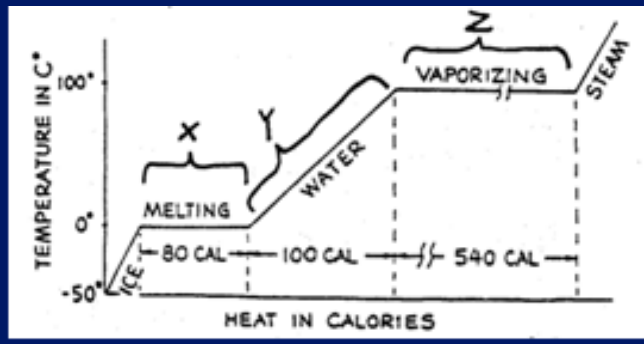

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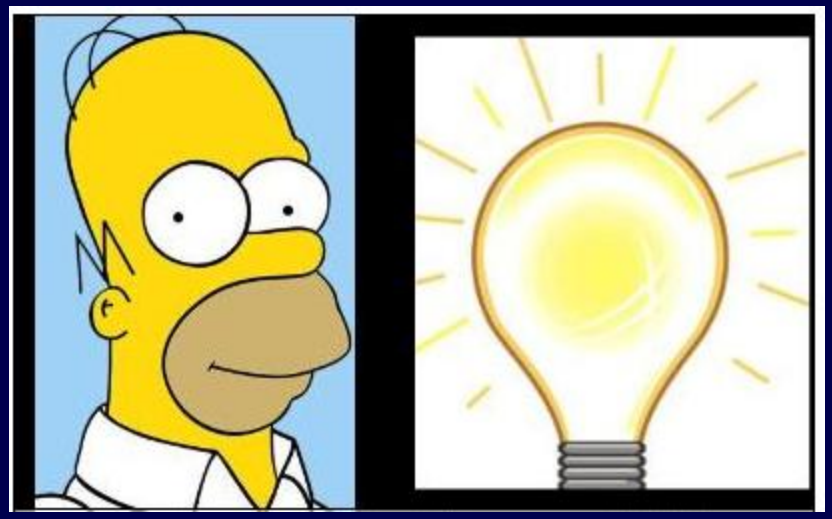
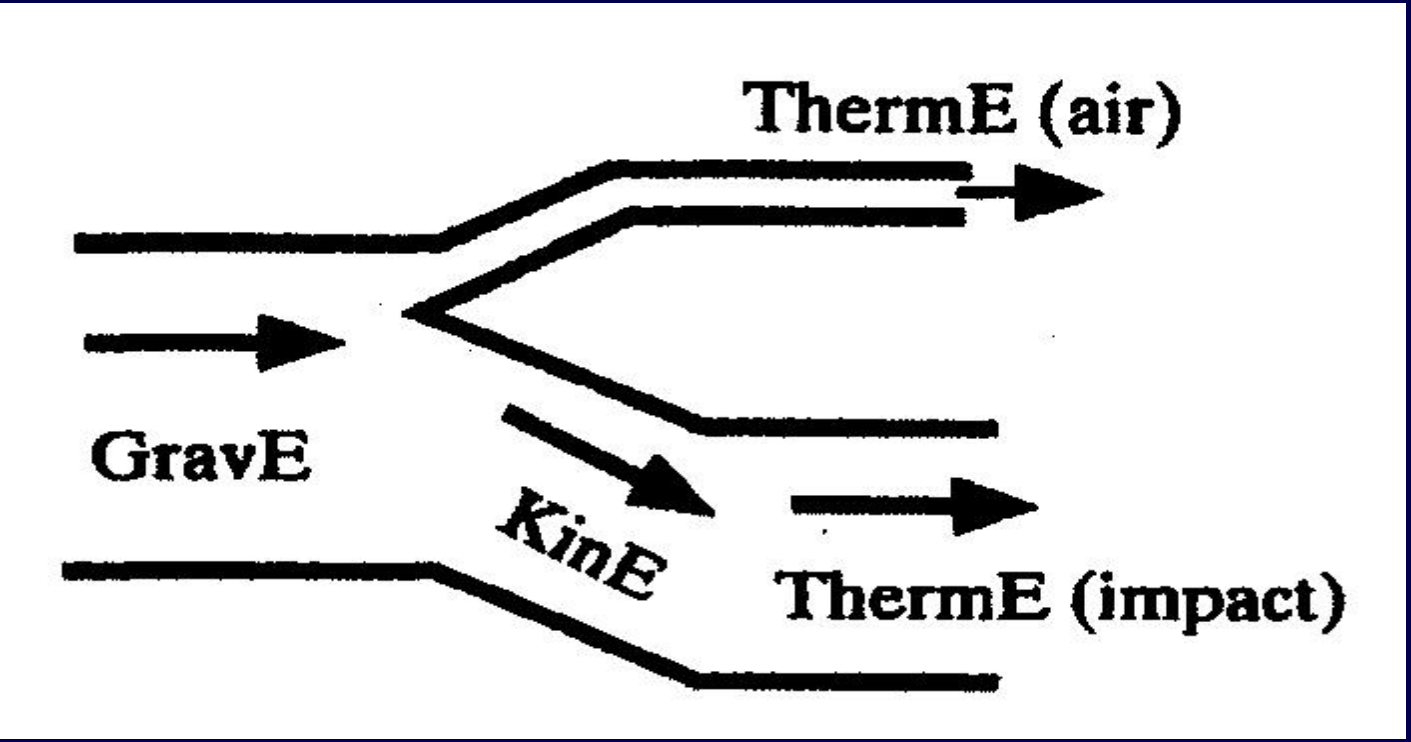
G-2 ENERGY EFFICIENCY EXPLORATION

Which type of light bulb should Homer buy???



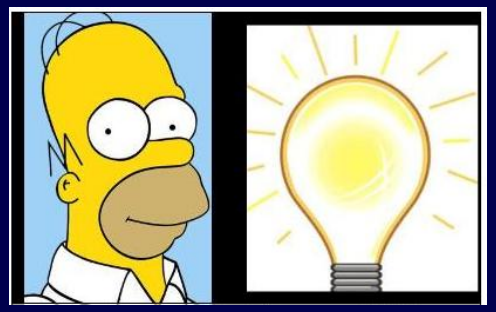
Remember "Energy Flow Diagrams" ?

Energy flow for a falling book, with air resistance.

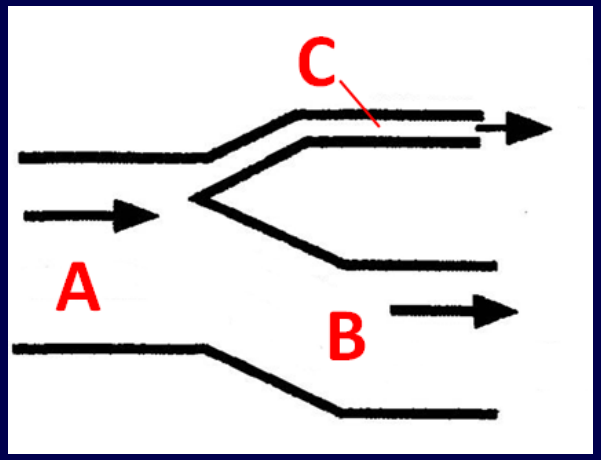


These diagrams nicely illustrate the
1st Law of Thermodynamics

Q10 – Below is an unlabeled ENERGY FLOW DIAGRAM for Homer's INCANDESCENT LIGHT BULB.



Which choice properly lists the correct ENERGY type for each FLOW:
A, B, & C . . .



1) A = Thermal Energy
   B = Electromagnetic Energy
   C = Light Energy

2) A = Electrical Energy
   B = Electromagnetic Energy
   C = Thermal Energy

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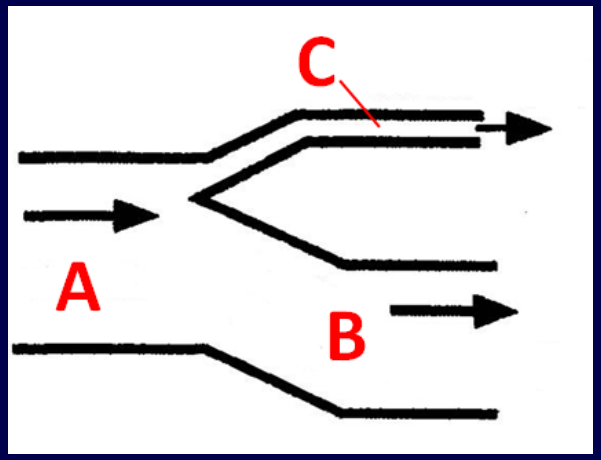

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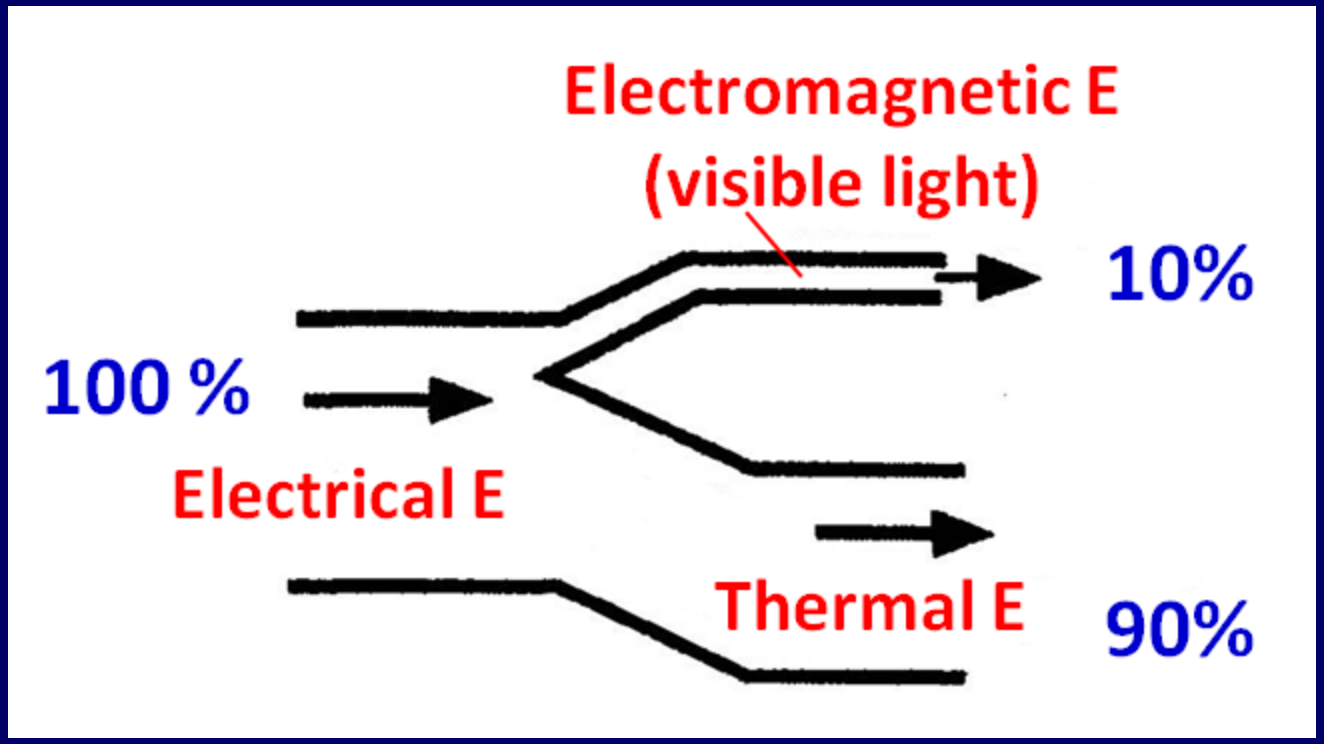
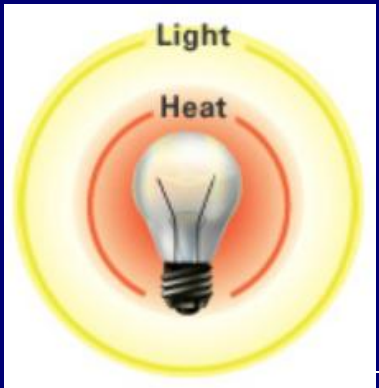
Energy Flow Diagram for a Typical Incandescent Light Bulb:



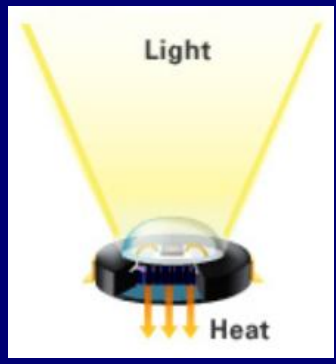


Incandescent bulbs create light by passing electricity through a metal filament until it becomes so hot that it glows.

Incandescent bulbs release 90% of their energy as heat.

In a Compact Fluorescent bulb (CFL), an electric current is driven through a tube containing gases. This reaction produces ultraviolet light that gets transformed into visible light by the fluorescent coating (called phosphor) on the inside of the tube.

A CFL releases about 80% of its energy as heat.



LED bulbs use light emitting diodes to produce light. The movement of electrons through a semiconductor material illuminates the tiny LED light sources. **A small amount of heat is released backwards, into a heat sink.**

When designed properly, an LED circuit will approach 80% efficiency, which means 80% of the electrical energy is converted to light energy.

Source: http://www.energystar.gov/index.cfm?c=lighting.pr_what_are#what_are

Some estimates say that:

Replacing a single incandescent bulb with a CFL will keep a half-ton of CO2 out of the atmosphere over the life of the bulb!

If everyone in the U.S. used energy-efficient lighting, we could retire 90 average size power plants!

Are WATTS the most important variable?

Beginning in 2012, labels on the front of light bulb packages will emphasize a bulb's brightness in lumens, instead of the bulb's energy usage in watts.

WHAT IS A LUMEN?

Lumen = a unit of standard measurement that is used to describe the amount of light contained in an area as perceived by the human eye. The more lumens, the brighter the light.

You can use lumens to compare the brightness of any bulb, regardless of the technology behind it, and regardless of whether it's incandescent, CFL or LED.

HOW INFRARED THERMOMETERS WORK:

- **INFRARED THERMOMETERS** use a lens to **focus infrared radiation being emitted by an object onto a detector** (called a thermopile).
- The optical system of an infrared thermometer **collects the infrared energy from a circular measurement spot** and focuses it on the detector.
- The detectors are typically equipped with a **black body surface** for **effectively absorbing** the IR radiation.

- The thermopile detector absorbs the infrared radiation **and turns it into HEAT.**

  ➔ The more infrared energy, the hotter the thermopile gets.

- This **heat is turned into electricity**. The electricity is sent to another detector, which uses it **to determine the temperature of whatever the thermometer is pointed at**.

  ➔ The more electricity, the hotter the object is.

CAUTION: A laser light allows you to pinpoint where the measurement is being taken - ***DO NOT POINT THE IR THERMOMETER AT ANYONE'S FACE!!*** ***Also – take care not to burn yourself on any of the bulbs!***

Overview of G-2 ENERGY EFFICIENCY Activity . . . .

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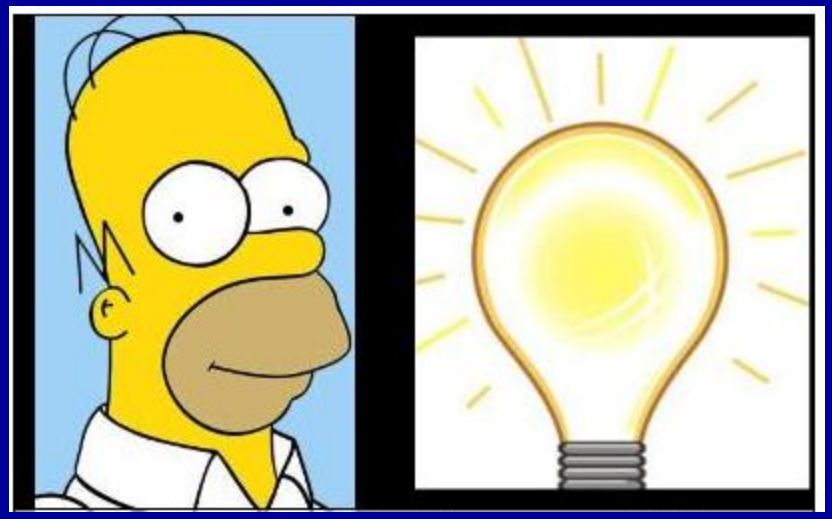

OK --TIME TO GET IN YOUR GROUPS!!

Send someone to get your group folder and begin!

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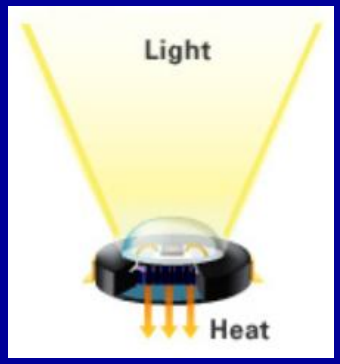

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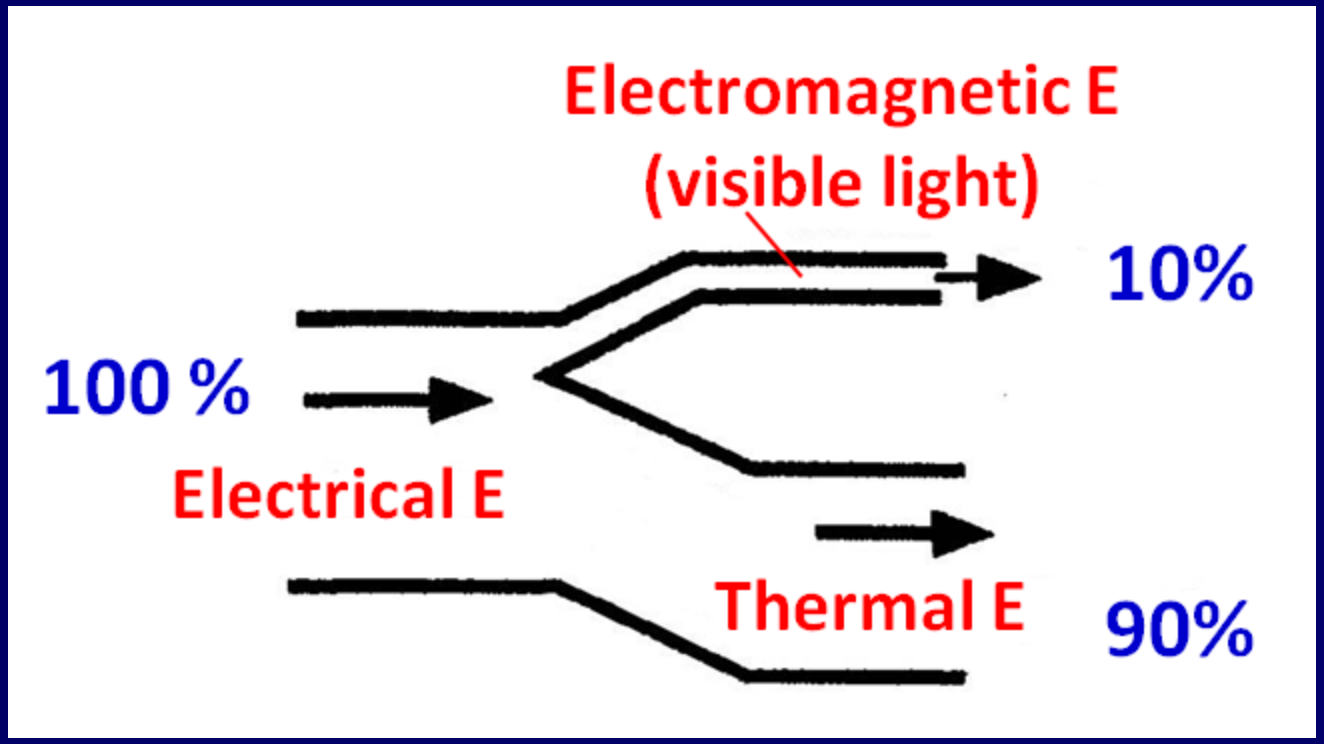

WHEN YOUR G-2
IS COMPLETE

and everyone present has signed
their name,
YOU MAY LEAVE . . . .

Have a great weekend & study hard
for TEST #2 on MONDAY!

FRIDAY Sep 30th

SIT IN YOUR GROUP AREA TODAY!

TODAY: Topic # 8 Wrap-Up,
Brief Test #2 Review &
Group Activity G-2

TEST #2 is on Monday Oct 3rd
The "Top 10" is now posted

MIDTERM EXAM-I is a week from Monday:
Monday Oct 10th