1. Absorption and Emission of Electromagnetic Radiation (4)

A. As the temperature of an object increases:
   
i. What happens to the molecular motions (kinetic energy) of the object?

   ii. What happens to the wavelength of any emitted radiation?

   iii. What happens to the intensity of any emitted radiation?

B. Why would a hypothetical object that was 0K (–273°C), not emit radiation of any wavelength.

2. Satellite Images (4)

Refer to the two image links adjacent the link to the homework assignment.

A. In the visible satellite image there appears to be significant cloud coverage above Texas, but in the IR image the cloudy area appears gray. What can you infer about the height of these cloud tops?

B. Both figures show bright clouds over Kansas. What can you infer about the temperature of the tops of these clouds?

C. From the IR image, how does the temperature of the cloud-free Central Plateau of Mexico compare to the temperature of the water in the Gulf of Mexico?

D. In the visible satellite image over Ontario the area is dark, but in the IR image the area is bright. What are the qualities of these clouds that result in this observation?
3. The Sun/Earth System (4)

A. What is the source of the incoming radiation striking the earth-atmosphere system and what region[s] of the electromagnetic spectrum does it encompass? [2]

B. What are the sources of the outgoing radiation exiting the top of the atmosphere and what region[s] of the electromagnetic spectrum does it encompass? [2]

4. Heat Transfer Methods (4)

Name the type of heat transfer (conduction, convection, or radiation) associated with each of the following observations:

A. Smoke rises from a chimney.

B. The handle of a cast iron pan feels hot after the pan has been heated for some time.

C. You are warmed as the sun comes out from behind a cloud.

D. The branches of the tree above a campfire sway gently.

5. Radiative Equilibrium (4)

Radiative equilibrium is a balance between the incoming and outgoing radiation.

A. What would happen to the temperature on Earth if the incoming radiation suddenly became greater than the outgoing radiation?

B. As the temperature of the Earth changed according to question B, what would happen to the amount of outgoing radiation?

C. At what point would the temperature stop changing? [2]