NAME: _____ **QUIZ SECTION:** _____

Atmospheric Sciences 101 Fall 2014
Homework #2 (Due Thursday, October 16, 2014)

1. Heat Transfer Methods [2] (0.5 pt. each)

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.

2. Types of scattering [3]

A) Fill in the blanks: _____ scattering occurs when the wavelength of light being scattered is much larger than the size of the particle. _____ scattering occurs when the particle is about the same size as the wavelength being scattered. [2]

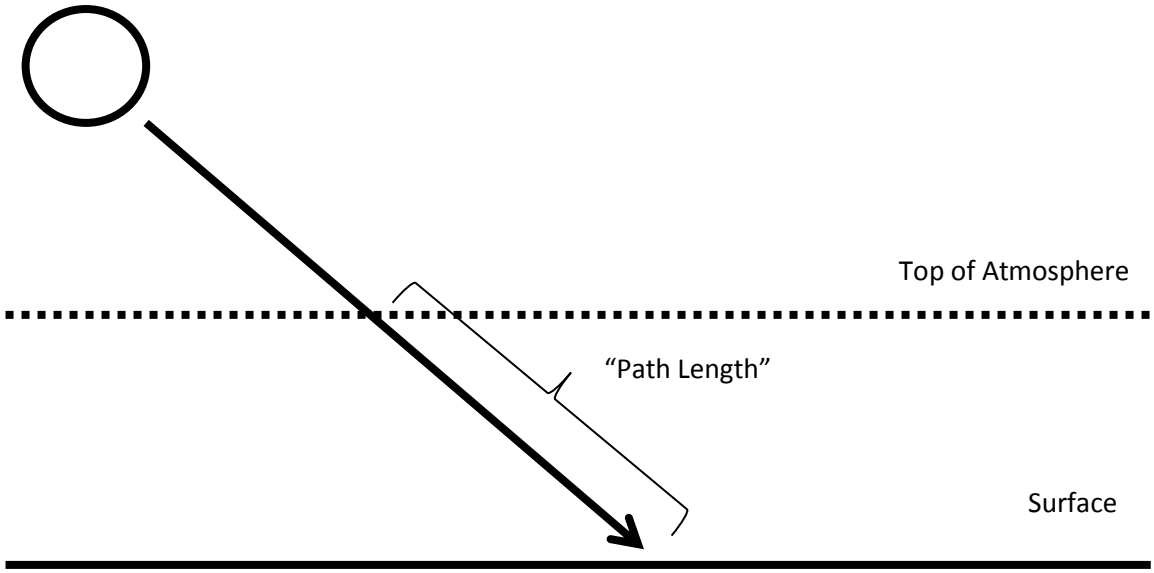
B) Explain why clouds appear white in terms of scattering. [1]

3. Scattering of Visible Light [2]:

A. Which color in the visible spectrum is scattered most effectively by the atmosphere [0.5]?

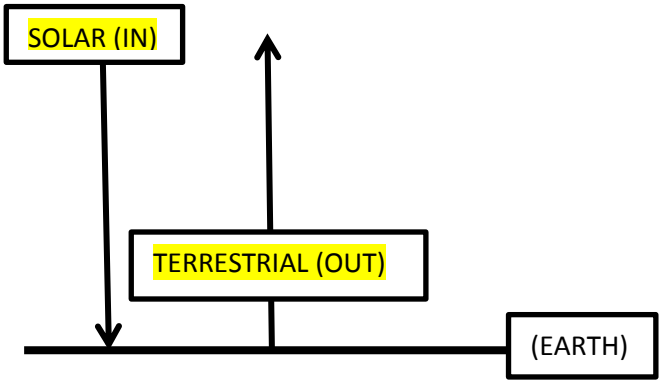
B. Throughout the day, the distance light must travel through the atmosphere (the "path length," see diagram) to reach you changes. At what time of day is it the shortest [0.5]?

C. In the late evening you see that the sun appears red, how has the amount of blue light that reaches you changed (compared to solar noon), how has the amount of red light changed [1]?

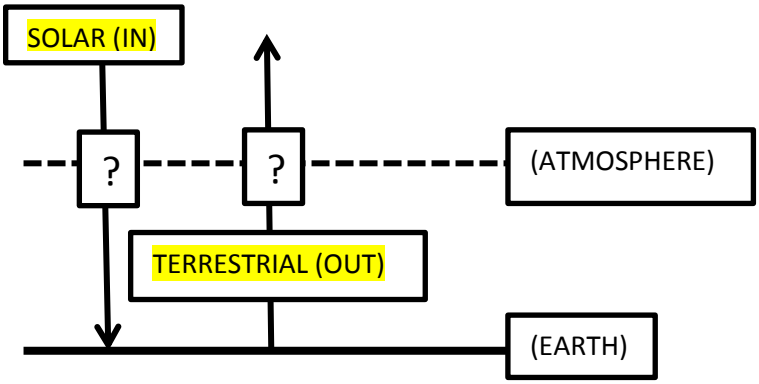


4. The "Greenhouse Effect:" [3]

A. Imagine that the Earth's atmosphere does not absorb any infrared (IR) radiation. The diagram below shows the Earth absorbing incoming solar radiation and all of the IR radiation emitted by the Earth escaping to space. If the temperature of the Earth is not changing, will the amount of incoming solar radiation be greater than, less than, or equal to the amount of outgoing IR radiation? [1]



B. Now imagine adding a layer of "greenhouse gases" to the atmosphere. How does this change the amount of solar radiation reaching the Earth? How does it change the amount of terrestrial IR radiation escaping to space? [1]



C. Do you expect the temperature of the Earth in scenario B to be higher, lower, or the same as in scenario A? [1]