NAME: _____ QUIZ SECTION: _____

Atmospheric Sciences 101 Winter 2015
Homework #2 (Due Thursday, January 22, 2015)

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

Name the type of heat transfer (conduction, convection, radiation, or advection) 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.

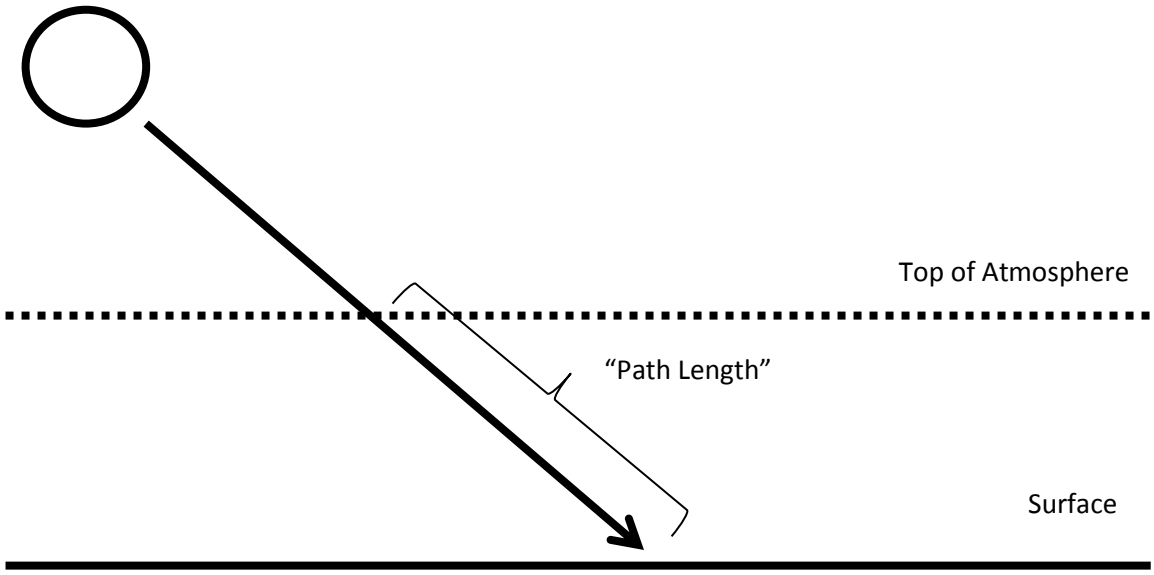
C. You are warmed as the sun comes out from behind a cloud.

D. A cold breeze blows into your house when you open the window on a cold night.

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

3. Scattering of Visible Light [3]:

A. Throughout the day, the distance light must travel through the atmosphere (the "path length," see diagram) to reach you changes. Would the path length be longer at noon or at 3:00 PM? [1]

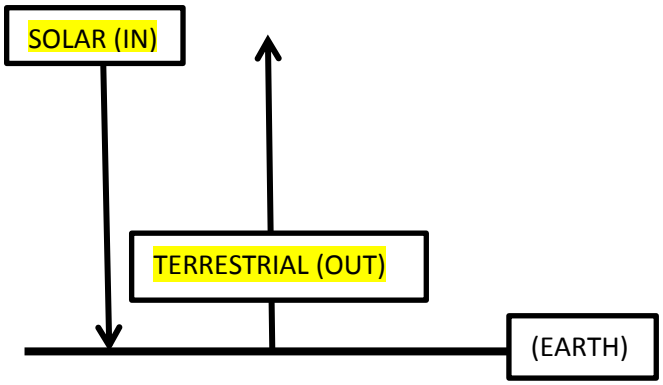


B. Which color(s) in the visible spectrum is scattered most effectively by the atmosphere? [1]

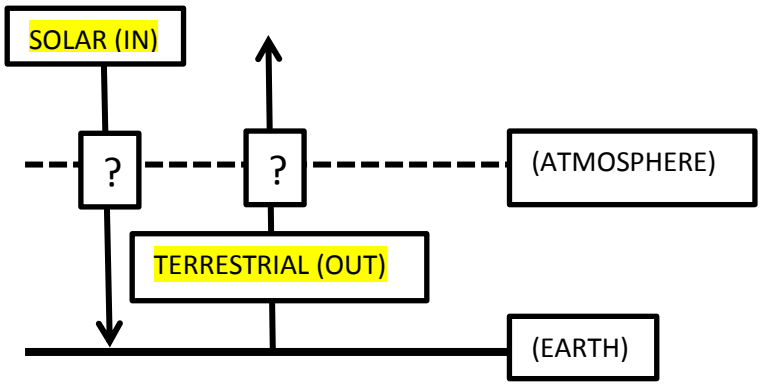
C. Is there a difference in the color of the sun when comparing sunrise and sunset? [1]

4. The "Greenhouse Effect:" [4]

A. Imagine that the Earth has no atmosphere. 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 we add an atmosphere, a small fraction of which are "greenhouse gases".
   i. How does this change the amount of solar radiation reaching the Earth? [1]
   ii. 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]