

AOS 100/101
Spring 2008

HOMEWORK #1
(Due Fri. February 8)

Please provide concise, grammatically correct, neatly written answers to the following questions. All questions can be answered in, at most, a few sentences. Don't forget to write your name on your answer sheet!!!

NAME:

- 1) It is a fact that wind speeds of $\sim 18 \text{ m s}^{-1}$ (meters per second) can often break twigs and small branches off of trees. Wind speeds of $\sim 25 \text{ m s}^{-1}$ can, however, uproot trees and do extensive property damage. This seems like a huge difference in destructive capacity for a relatively small difference in wind speed. With reference to the definition of *kinetic energy*, explain why this set of observations is true.

(10 pts)

- 2) An elastic, rubber balloon is inflated inside an office that is at room temperature (20°C). Once it is sealed (airtight) it is placed in a giant freezer. The atmospheric pressure is the same in the freezer and the office.

- (a) How does the temperature of the air *inside the balloon* change?
- (b) How does the speed of the molecules of air inside the balloon change? Explain with reference to the definition of temperature.
- (c) Is the force associated with each molecular impact on the *inside* of the balloon larger or smaller after moving the balloon to the freezer? Explain your answer.
- (d) What change to the balloon would be observed? Explain.

(15 pts)

- 3) Photosynthesis by the first life forms on Earth radically changed the chemical composition of our atmosphere. Name two chemicals that were added to the atmosphere as direct or indirect consequences of photosynthesis and describe their respective effects on the subsequent evolution of life on Earth.

(10 pts)