Quiz #1

PHYSICS 1500

12 January, 2006

You are not allowed to use any outside sources of information during the quiz. Please use the attached sheet for scratch work and write only your final answer on this page. For quantitative problems don’t forget to write your answer with the correct number of significant figures and include units.

When you are finished, fold the quiz in half along the the length of the paper and write your name on the top right of the back side.

Problem #1  The value of the speed of light is now defined as \(2.99792458 \times 10^8\text{m/s}\).

a. Express the speed of light to three significant figures.

**Answer:** \(3.00 \times 10^8\text{m/s}\)

b. Express the speed of light in miles per hour to three significant figures.

**Answer:** \(3.00\text{m/s} \times \frac{3600\text{s}}{1\text{h}} \times \frac{1\text{km}}{1000\text{m}} \times \frac{0.621\text{mi}}{1\text{km}} = 6.70 \times 10^3\text{mph}\)

Problem #2  The amount of water in reservoirs is often measured in acre-ft. One acre-ft is a volume that covers an area of one acre to a depth of one foot. An acre is an area of 43,560\text{ft}^2. Find the volume in SI units of a reservoir containing 413.5 acre-ft of water.

**Answer:** \(413.5\text{acreft} \times 43560\text{ft}^2 \times \frac{m^3}{(3.281\text{ft})^3} = 5.100 \times 10^5\text{m}^3\)

Problem #3  Scientists prefer using SI units whenever possible because it gives them a common basis for talking with other scientists about numerical values for physical quantities. Why, then, is the amount of water in a reservoir measured in acre-ft? Does your answer also explain why the United States continues to measure distance along roads in miles rather than kilometers?

**Answer:** In this case it seems likely that farmers who use the water for irrigation would find acre-ft a more useful measure of the volume of water in the reservoir since it tells them how much area (in acres) can be covered to a depth of one foot with the available water.