Physics 100 HW 1 (Due 1/17/07)   Name_____

1. What is your height (or what would you like your height to be) in:
   a) inches? **b)** feet? **c)** millimeters? **d)** centimeters? **e)** meters? **f)** kilometers?

2. How many seconds are there in one calendar year?

3. Give your age (or what age you would like to be) in:
   a) years **b)** months **c)** weeks **d)** days **e)** hours **f)** minutes **g)** seconds **h)** microseconds.

4. The minute and second hands on my watch are both 1 cm long; the hour hand is 0.5 cm long. At what speeds do the *tips* of each hand move?

   a) second hand:

   b) minute hand:

   c) hour hand:

5. Take a piece of paper roughly the same size as this one and measure the sides (in cm).

   a) What is its area (in cm^2)?

   Cut it in half 12 times and paste/tape the last remaining piece on to this sheet.

   b) What is the area of the piece that is left?

   c) Compare the ratio of the measured areas of **b)** to **a)** to what you calculate from multi-plying $\frac{1}{2}$ by itself 12 times.

   (You are not done yet, there is more on the other side!)

For the following problems use the x^y key on your calculator plus trial and error to get a *roughly correct* answer.

6. A hydrogen atom has a cross-sectional area of about 10^{-18} cm^2. How many times would you have to cut the paper in half (see previous problem) to get down to this size?

7. The entire surface of the Earth has an area of about 5×10^{18} cm^2. How many times would you have to double the size of this paper to make it have an area that large?

8. In recent years, the amount of oil used by the US has been increasing by about 3% each year. (This means that each year we consume 1.03 times the amount we consumed the previous year.) The US currently consumes about 20 million barrels of oil per day. If we continue increasing our consumption at the same 3%/year rate, how many barrels per day will the US consume 30 years from now (*i.e.*, in 2037)?

9. You have 2 parents, 4 grandparents, 8 great grandparents, 16 great-great grandparents, 32 great-great-great grandparents, etc.

   a) Go back 40 generations (about 1000 years): how many great-great-great-...etc grandparents do you have?

   b) How does this number compare with the population of the Earth at that time (which was about 300 million people)?