Name KEY

Atmospheric Sciences 211 September 29, 2003

Math/Chem Quiz (This does not count toward your grade.)
Do not use an electronic calculator.

1. ***Arithmetic***

   (a) 25% of 40 = 10

   (b) $\frac{1}{0.1}$ = 10

   (c) 2^3 = 8

   (d) $64^{1/2}$ = 8

   (e) 2^{-2} = $\frac{1}{4}$

   (f) $\frac{25\times10^8}{5\times10^{-5}}$ = 5×10^{13}

2. ***Express in Scientific Notation***

   (a) 0.00012 = 1.2×10^{-4}

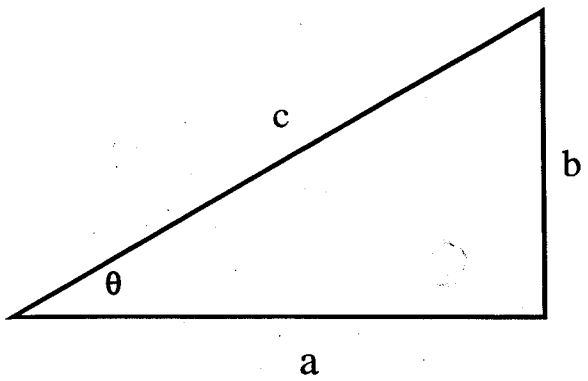
   (b) 300,000 = 3×10^5

3. ***Geometry and Trigonometry***

   (a) The area of a circle of radius ***r*** is: πr^2

   (b) The surface area of a sphere of radius ***r*** is: $4\pi r^2$

   (c) cos θ = a/b, b/a, (a/c), c/a, b/c, c/b [Circle the right answer.]



Continued Over . . .

4. Algebra

$PV = nRT$; solve for T.

$$T = \frac{PV}{nR}$$

5. Functions. Put the appropriate letter (a,b,c, or d) in front of each equation. [Assume r is a positive constant.]

b	$y = rt$	(a) y increments exponentially with t.
c	$y = r/t$	(b) y is proportional to t.
a	$y = r^t$	(c) y is inversly propotional to t.
d	$y = t^r$	(d) y has power-law dependence on t.

6. Conversion of units

(a) If your car can travel 20 miles on a gallon of fuel, and there are 4 quarts in a gallon, how many quarts are used on a 30-mile trip?

$$\left(\frac{1\ \text{gal}}{20\ \text{mi}}\right)\left(\frac{4\ \text{q}}{1\ \text{gal}}\right)(30\ \text{mi}) = 6\ \text{quarts}$$

(b) In a hypothetical country with 200 million people, the annual budget of the federal government is one trillion dollars. What is the per-capita federal budget (i.e., what an average person can expect to pay in taxes)?

$$\frac{\$1,000,000,000,000}{200,000,000} = \frac{10,000}{2} = \$5,000 \text{ per capita}$$

7. Chemistry:

a. Consider the following chemical reactions:

(1) $CO_2 + H_2O \longrightarrow CH_2O + O_2$

(2) $O_3 + O \longrightarrow O_2 + O_2$

For reaction (1), there is/are 3 type(s) of atom(s) and 4 type(s) of molecule(s).

For reaction (2), there is/are 1 type(s) of atom(s) and 3 (or 2) type(s) of molecule(s).

b. In what way(s) is ^{16}O different from ^{18}O (circle all that are appropriate)?

(a) mass (or atomic weight)

(b) number of electrons

(c) temperature

(d) number of atoms