APES MATH SKILLS – REMEDIAL ASSIGNMENT

No calculators are allowed on the AP exam, so do not use one now. You need to become comfortable with doing this type of math unassisted. *Show all work and units where applicable.*

pH PROBLEMS

1) What is the pH of a lake is the hydrogen ion concentration is 10^{-2} M? Is this acid or base?
2) If the pH of a sample of water is 11, what is $[H^+]$? Is this acid or base?
3) How many times *more basic* will a sample become if it increases from a pH of 8 to a pH of 11? Explain your answer.

HALF-LIFE – *Show work.*

4) An isotope of radioactive "Bauckium" has a half-life of 800 million years. If it is determined that a certain amount of stored Bauckium will be considered safe only when its radioactivity has dropped to 0.0625 of the original level, approximately how much time must the Bauckium be stored securely to be safe?

DIMENSIONAL ANALYSIS – *Show work and units.*

5) The combustion of one gallon of auto fuel produces about 5 pounds of carbon in the form of CO_2. Two cars are taking a 1600-mile road trip. The first car gets 20 mpg, and the second gets 30 mpg. Approximately how much LESS carbon in the form of CO_2 will be produced by the second car on this trip?
6) In 2016, the annual consumption of bottled water in the U.S. was about 39 gallons per capita. Calculate the approximate total 2016 consumption of bottled water in the U.S.
7) What is the percent of individuals who died if 60 died out of a population of 800?
8) If a population of 80,000 has 400 births, 80 deaths, 20 immigrants, and 50 emigrants in one generation, what is the net annual percent growth rate?
9) The country of Bauckistan has an estimated annual growth rate of 3%. At this current growth rate, approximately how many years will it take for its population to double?

METRIC CONVERSIONS, AREA AND VOLUME - *Show dimensional analysis in your work.*

10) 626 cm^3 = ___ m^3
11) 78 m^2 = ___ dm^2
12) 44.4 m^3 = ___ mm^3
13) 0.03 dam^2 = ___ m^2

MORE →

METRIC CONVERSIONS - *Show dimensional analysis in your work.*

14) 35.68 km = ___ cm
15) 4591 dg = ___ hg
16) 0.98 Tsec = ___ sec
17) 55.64 dam = ___ mm
18) 0.1479 GW = ___ MW
19) 7.05 L = ___ μ L

SCIENTIFIC NOTATION

20) Put 33445006.789 into scientific notation.
21) Put 0.0007878 into scientific notation.
22) Put 4.09×10^{-6} into standard notation.
23) Put 7.6111×10^{8} into standard notation.
24) $(3 \times 10^{9}) \times (4 \times 10^{6})$
25) $(9 \times 10^{12}) / (3 \times 10^{14})$

MULTIPLICATION AND DIVISION – *Show all work.*

26) 0.33 x 62
27) 1750 x 22
28) 31 / 140 (answer to 3 decimal places)
29) 5 / 870 (answer to 3 decimal places)
30) Explain how you could *estimate* the answer to the math problem if it were a multiple choice question which required no work: 410 x 0.26