**APES MATH TIPS for the AP Exam**

1) **Show all *work*. Even 2+2** No work, no credit.

2) **Look for operation hints in word problems. “**Is” means equals, “of” means multiply and “per” or “in a” mean divide.

3) **Show all *units*.** Units provide valuable information and may be part of the points provided.

4) **Develop good *“math sense”* or *“math literacy.”*** The answers should make sense. If you

calculate a cost of $50 billion per gallon of water, does this seem right?

5) **Know *simple conversion factors*** such as the number of days in a year (365) or hours in a day (24) seconds in an hour (3600). Other good numbers to know: U.S. population = ~ 300 million (300,000,000) 3 x 108 World population = ~ 7 billion (7,000,000,000) 7x 109

6) **Know/convert *metric prefixes*.** The #’s below go with base units (g, m, W, etc) in conversion factors.

T tera- 1012 (trillion 1,000,000,000,000)

**G giga- 109 (billion 1,000,000,000)**

**M mega- 106 (million 1,000,000)**

**k kilo- 103 (1000)**

h hecto- 102 (100)

da deka- 101 (10)

d deci- 10-1 (0.1)

**c centi- 10-2 (0.01)**

**m milli- 10-3 (0.001)**

μ micro- 10-6 (one-millionth 0.000001)

n nano- 10-9 (one-billionth 0.000000001)

7) Understand common statistical terms. The **mean** is the mathematical average. The **median** is the

50th percentile, which is the middle value in the distribution of numbers when ranked in

increasing order. The **mode** is the number that occurs most frequently in the distribution.

8) **Be comfortable working with *negative numbers*.** Going from -8 ºC to +2 ºC is a 10º change.

9) **Graphing tips:** include a title and key; set consistent increments for axes; connect dots with straight lines unless told specifically to draw a smooth curve. Points have to be as accurate as you can possibly make them and use empty graphs in answer sheet, not blank lined paper.

10) **Recognize units of *area* and *volume*, and be able to *convert volumes*.**

1 m = 1 x 103 mm, BUT 1 m3 = \_?\_ mm3 1 m3 = (1x103 mm)(1 x103 mm)(1x103mm) = 109 mm3

11) Start unit conversion problems with the value’s whose unit has no denominator or “buddy.” For example, if you are given that there are 4 oranges per box, oranges are $5 per box and asked to calculate the cost of 420 oranges, you would start the problem with 420 oranges, not the fractions 4 oranges/box or $5/box.

12) **Put very large or very small numbers into *scientific notation*.**

310,000,000 = 310 million = 310 x 106 = 3.1 x 108 0.000 000 000 000 097 = 9.7 x 10-14

When multiplying in scientific notation, multiply the coefficients and add the exponents. When dividing, divide the coefficients and subtract the exponents.

13) **Calculate *percentages. Part /Whole x 100*** Example: 80/200 = 40/100 = 0.4 x 100 = 40%

14) **Calculate percent change:**

a) The rate of change (percent change, growth rate) from one period to another =

[(Final Value – Initial Value) / Initial Value] \* 100

b) **Annual rate of change:** take answer from step a) and divide by the number of years between

past and present values

Example: A particular city has a population of 800,000 in 1990 and a population of

1,500,000 in 2008. Find the growth rate of the population in this city:

Growth Rate = (1,500,000 - 800,000) / 800,000 \* 100 = 700,000/800,000 \* 100 = 87.5%

Average Annual Growth Rate = 87.5% / 18 years = 4.86 %

15) **Know growth rate calculations.** Growth rate = [CRUDE BIRTH RATE + immigration)]

– [(CRUDE DEATH RATE + emigration)]

CBR = crude birth rate = # births per 1000, per year CDR = crude death rate = # deaths per 1000, per year

(CBR – CDR) / 10 = percent change

16) **Know the *Rule of 70* to predict doubling time.**

Doubling time = 70 / annual growth rate (in %, not decimal!)Example: If a population is

growing at a rate of 4%, the population will double in 17.5 years. (70 / 4 = 17.5)

17) **Know that “*per capita*” means per person; per unit of population.**

18) **Population Density** = Individuals/Land Area – Usually people/km2  or millions of km2