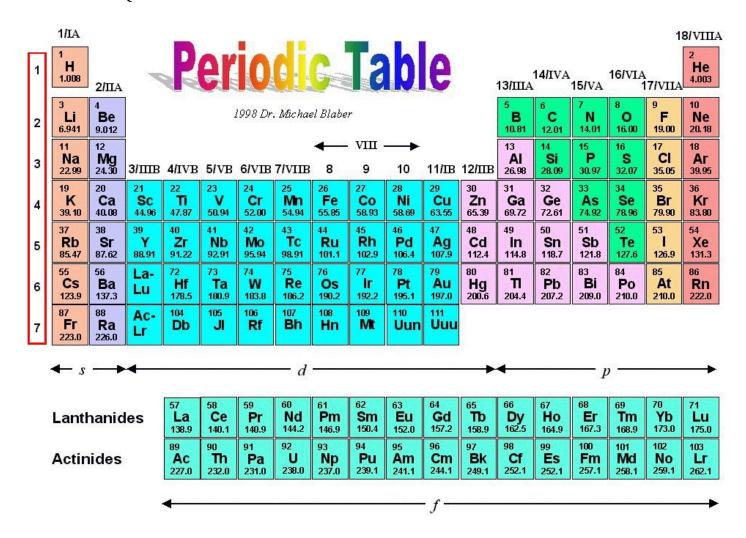# GEL3050 Mineralogy
Chemistry, Math, Mineral ID Pre-Test Review Sheet

Disclaimer: This review sheet is courtesy of the instructor. While care has been taken to include everything that might be tested, omissions or oversights may have occurred. The instructor shall NOT be liable for any missed answer on your part just because the topic is not explicitly mentioned here. It is still the STUDENT'S RESPONSIBILITY to know and be able to use these basic concepts which should have been learned previously.

Please review in detail the following basic mineral identification, chemistry & mathematical concepts. You will be tested on these generalities during the first week of class. If you receive less than 70% on each test you may FAIL the class, because you are expected to know the basics below. I will NOT have time to tutor or re-teach you! YOU WILL NEED A SCIENTIFIC CALCULATOR FOR THE COURSE. Be familiar with the operation of your calculator!!!

CHEMISTRY REQUIREMENTS - *TESTED ONLINE*

Be familiar with the use and application of the Periodic Table. More specifically with:

Element Names and Associated Symbols   Example: Au = Gold, Hg = Mercury, Fe = Iron

The Atomic Model   Example: How many Protons, Neutrons, Electrons & major occupied electron levels are in a Calcium Atom? 20 Protons, 20 Electrons, 20 Neutrons, 4 major occupied electron levels

Calculating Neutrons   Example: How many Neutrons are in Chromium? 52 - 24 = 28

Atomic Mass Calculation of Compounds   Example: What is the atomic weight of Quartz? SiO_2 = 28.09 + 2x16.00 = 60.09g/mol

Simple Mol Calculations   Example: How many moles of Quartz are in 100.0g? 100.0g÷60.09g/mol = 1.664mol

Common Valences of Elemental Ions   Example: O = -2, Ca = +2, Cl = -1, Fe = +2 or +3

Ionic Compounds & Associated Formulas   Example: Reaction of Calcium & Chlorine makes...? $CaCl_2$

Outside the Periodic Table:

Polyatomic Ions   Example: What is a Nitrate? $NO_3{}^{-1}$

Also be familiar with:
•   difference between covalent, ionic, metallic and hydrogen bonding
•   difference between cations and anions
•   meaning of chemical formulas and subscripts
•   understand pH and the difference between oxidizing and reducing environments
•   working knowledge of solutions, solubility, mixtures, homogenous and heterogenous systems, and precipitation is a must.
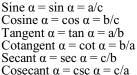

MATH REQUIREMENTS - *TESTED ONLINE*

Solving for Other Variables in Equations   Example: If F = m×a, what is a?   a= F/m

Straight Line Equation & Rectilinear Coordinates   Example: If m=3, b=1, y=10, what is x? x=3
y = m x + b

Percent Calculation   Example: You analyze 125g of rock and measure 1.8g potassium in the sample. What is the percentage of potassium? 1.8g/125g x 100 = 1.4%

TRIGONOMETRIC FUNCTIONS OF A RIGHT TRIANGLE
Sine α = sin α = a/c
Cosine α = cos α = b/c   Taking the Inverse of tan....
Tangent α = tan α = a/b
Cotangent α = cot α = b/a
Secant α = sec α = c/b
Cosecant α = csc α = c/a

==FOCUS ON THE TANGENT FUNCTIONS, especially figuring slope angles if height and length are given!!!==

EQUATIONS FOR AREA
Area of a circle with radius r $A = \pi r^2$ ($\pi = 3.1416$)
Area of a triangle with a base b and altitude h   A = 1/2 bh
Area of a rectangle with sides a and b   A = ab
Area of a parallelogram with sides a and b and an included angle z   A = ab sin z.
Area of a trapezoid whose parallel sides are a and b and with an altitude h   A = 1/2(a + b)h.

EQUATIONS FOR CIRCUMFERENCE
Circumference of a circle with a diameter d $C = \pi d$.
Circumference of a triangle of sides a, b and c   C = a + b + c.
Circumference of a rectangle with sides a and b   C = 2 a + 2b.

EQUATIONS FOR VOLUME
Volume of a regular prism   V = area of base x altitude.
Volume of a pyramid   V= 1/3 area of base x altitude.
Volume of a cylinder with radius r and height h $V = \pi r^2 h$
Volume of a cone with radius r and height h $V = 1/3 \pi r^2 h$

SIGNIFICANT DIGITS
The significant digits are all the digits you measured + the one you estimated.
Counting Significant Digits - Four basic rules:
Zeroes in the beginning of a number never count.   Zeroes at the end of a number count only if there is a written decimal point.
The digits 1 - 9 always count.   Zeroes between the digits 1 - 9 always count.
Calculating with significant digits: RULE: Answer can only be as precise as the least precise number used!
Addition / Subtraction: Example: 1.45 + 1.4318 = 2.88!
Multiplication / Division: Example: 3.0 x 1.26 = 3.9!

THE METRIC SYSTEM
Know the metric system backwards and forwards, especially units for MASS, LENGTH, VOLUME.

MINERAL IDENTIFICATION [This Test is TIMED!!!] - *TESTED IN-CLASS*

MOHS HARDNESS MINERALS
Be able to identify ALL Mohs hardness minerals using real hand samples. You may use ID tools, such as streak plates, glass and copper, hydrostatic SG Method, but NO written material! Be able to give the mineral name and the chemical composition!
Be able to sort a set of Mohs minerals in order from softest to hardest!