G202 Take-Home Lab Exercise 1
Applications of Scientific Techniques

Part 1. Scientific Method

1-1. Here's a problem to think about. Rocks make up the foundation of the planet that we are living on. As solid rocks are exposed to the atmosphere and hydrosphere at the Earth's surface, they chemically alter, break apart and generally "weather". The product of rock weathering is soft, loose ("unconsolidated") sediment, that for now, we will refer to as "soil". So in a simple way, rocks near the Earth's surface are generally covered by a mantle of "soil" (weathered, soft, loose sediment).

Wherever you are sitting right now, you are likely in a building that is built upon soil and rock. Your job as a G202 student is to use the scientific method (as discussed in class and the notes) to determine how thick the mantle of soil is outside the door right now. Write a step-by-step summary of how you would apply the scientific method to determine soil thickness. Include in your discussion observations, hypotheses, data collection techniques, and hypothesis testing methods.

Part 2. Mathematics Review

Use your class notes and conversion tables to work the following problems.

2-1. Write the following numbers in scientific notation, to two decimal places:

2593810123 _____

98377 _____

1 _____

456 _____

381039948379 _____

2-2. Metric Conversion. Show all your work and unit cancellation.

10.73 km = ? m _____

27.3 m = ? mm _____

1 x 10^8 mm = ? m _____

25 kg = ? mg _____

2-3. English to Metric Conversion. Show all your work and unit cancellation.

How many feet are there in a mile?_____

How many centimeters are there in a meter? _____

How many feet are there in a meter _____

24 km = ? mi _____

3 m = ? inches _____

20°C = ? °F _____

453 cm = ? inches _____

Part 3. Algebra Review

3-1. Given that the formula for velocity is:

$V = d/t$ where d is distance, and t is time

algebraically re-arrange the equation to solve for time (show all your steps)

3-2. Evaluate the following exponential values (* = times, / = divided by):

$2^8 =$ _____

$2^8 * 2^{10} =$ _____

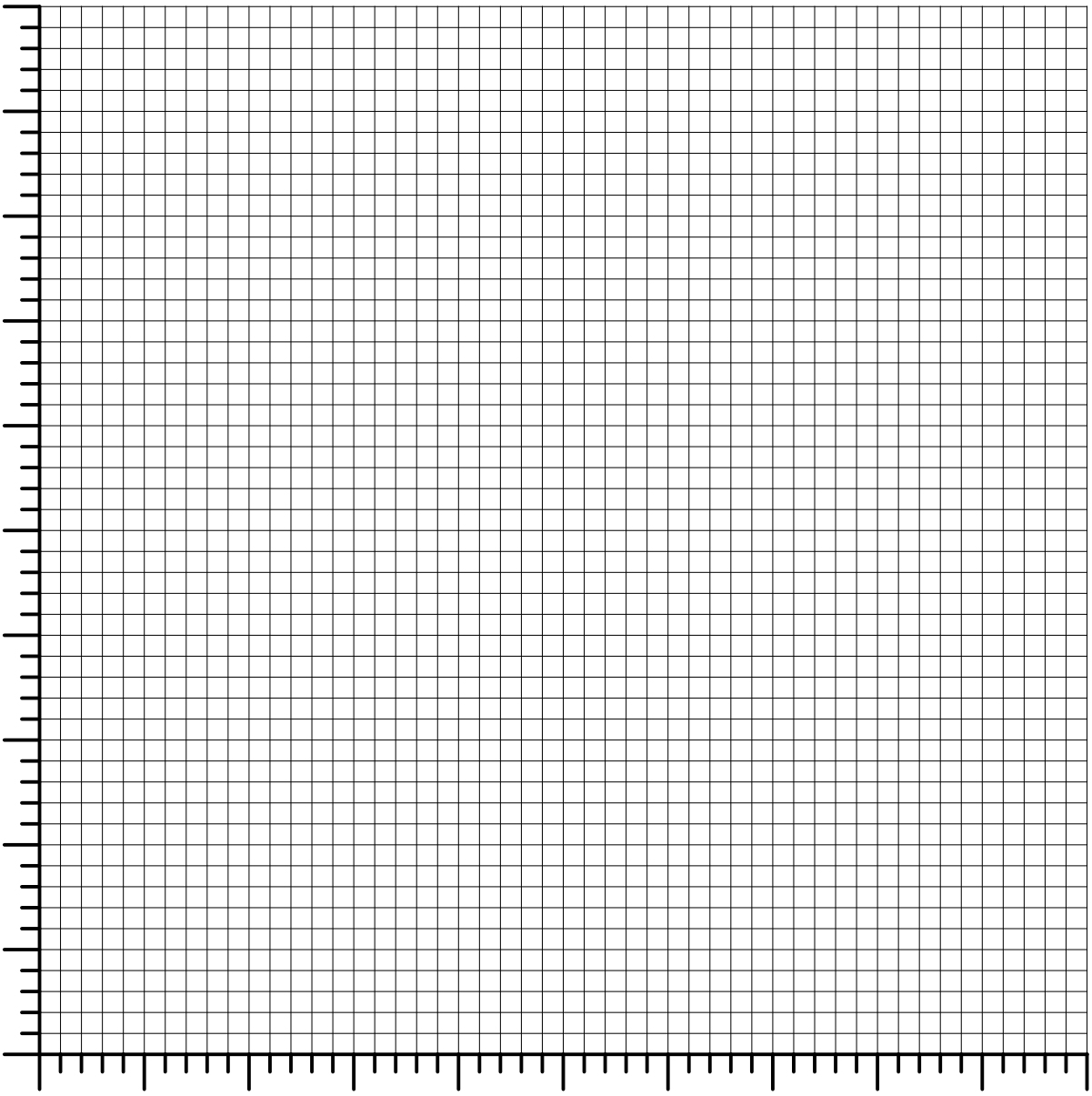
(y)*(y) = _____

$(x^4)/(x) =$ _____

Part 4. Graphing Review.

4.1 Use the blank graph on the following page, to plot the following data (Remember to scale the axes, label the axes, give the graph a title). Plot Gravel on the Y-axis and Distance on the X-axis.

Gravel Diameter (m)	Distance from Drainage Divide (km)
8.5	0.8
1.3	7.8
3.5	7.1
5.0	4.0
6.4	2.9
5.8	4.8
1.5	8.7
2.7	7.8
2.9	6.2
4.4	5.1
4.1	6.1
5.5	5.1
6.4	3.8
7.3	1.4
9.0	1.1
7.5	2.5



4-2. From your graph above, complete the following:

A. As best you can, approximate a best-fit line to the data (draw it on the graph)

B. Determine the slope of the line _____

C. Determine the Y-intercept of the line _____

D. What is the equation of the best-fit line? _____

Part 5. Scientific Visualization

5-1. In the space below, draw and label a cross-sectional sketch of a mountainous landscape with flat-lying layers of rock below the Earth's surface. On your sketch, illustrate a style of vegetation of your choosing. Be very neat, and try to do a good job with everything labelled!

5-2. In the space below, draw a sketch map of the State of Oregon showing the location of WOU, your home town, and the major roads that lead from home to campus. You can choose to show the whole state, or a portion of the state, depending on your locality. Make sure you include a map title, north arrow, approximate scale, labels of roads and cultural features. If you draw a map of only a portion of the state, then show a smaller inset sketch of the whole state, and where the bigger map is approximately located. Be very neat, and try to do a good job with everything labelled!