

MATHEMATICS ASSESSMENT
Department of Geology
University of Puerto Rico at Mayagüez

This questionnaire is intended for geology students only. The results of this assessment will help the Department to design and modify the curriculum to meet the graduating student profile. Do not write your name nor student number. If you have answered this questionnaire before, you do not have to do it again.

Year of Study: First _____ Second _____ Third _____ Fourth or More _____

Which mathematic courses have you taken? If so, indicate the final grade.

Mate 3171 (Pre-Calculus I) _____ Mate 3031 (Calculus I) _____

Mate 3172 (Pre-Calculus II) _____ Mate 3032 (Calculus II) _____

None _____

Have you repeated a mathematic course? If so, indicate how many times?

Mate 3171 (Pre-Calculus I) _____ Mate 3031 (Calculus I) _____

Mate 3172 (Pre-Calculus II) _____ Mate 3032 (Calculus II) _____

None _____

Rate the importance (1=high, 4=low) of the reasons for having problems with mathematics.

_____ Lack of background in Mathematics _____ Math courses don't apply to Geology

_____ Lack of background in Engineering _____ Other (specify): _____

_____ I did not have problems with mathematics

Do you consider mathematics is important in Geology? Yes _____ No _____

Do you like mathematics? Yes _____ No _____

Do you consider yourself good in mathematics? Yes _____ No _____

Do you feel phobia toward mathematics? Yes _____ No _____

Do you feel anxiety when answering mathematical problems? Yes _____ No _____

A new mathematics course for geologist must be developed? Yes _____ No _____

Based on your experience or rationale indicate the level of importance of the following mathematical topics in the field of Geology:

Topics	Very High	High	Low	Very Low	None	Don't know
Polynomials and Factoring						
Solutions of Equations						
Functions						
Graphical representation of functions						
Modeling with Mathematics						
Quadratics Functions						
Complex numbers						
Rational Functions						
Partial Fractions						
Exponential and Logarithmic Equations						
Measurements of Angle						
Triangle and Rectangle Trigonometry						
Cosine and Sine Graphics						
Graphics for Different Trigonometric Functions						
Inverse Trigonometric Functions						
Trigonometric Equations						
Matrix Operations						
Ellipses						
Hyperbolas						
Binomial Theorem						
Derivatives						
The Chain Rule						
Linear Approximations and Differentials						
Optimization Problems						
Newton's Method						
Anti-derivatives						
Areas and Distances						
The Fundamental Theorem of Calculus						
Areas Between Curves						
Volumes						
Exponential Growth and Decay						
Power Series						
The Binomial Series						
Tree – Dimensional Coordinate Systems						
Vectors						
Equations of Lines and Planes						
Curves Defined by Parametric Equations						
Polar Coordinates						
Cylinders and Quadric Surfaces						
Cylindrical and Spherical Coordinates						

Answer the following questions:

#1 En el laboratorio se precipitó calcita a condiciones de superficie (25°C y 1 Atm.) y se midieron las concentraciones (ppm) de Fe²⁺ y Sr²⁺ presentes. Asumiendo que el Fe²⁺ y Sr²⁺ presentes entraron en la calcita solo por sustitución del Ca²⁺ en el latiz del cristal;

- A. Calcule los coeficientes de distribución de Fe²⁺ y Sr²⁺ en la calcita precipitada.
- B. Basado en las concentraciones de Fe²⁺, Sr²⁺ y Ca²⁺, ¿de qué tipo de fluido estamos precipitando la calcita?
- C. ¿Que implican los coeficientes de distribución de Fe²⁺ y Sr²⁺ con respecto a cuál de estos iones es preferido o rechazado en la estructura del cristal en relación al fluido?

Concentraciones en el fluido (ppm):

$$\text{Fe}^{2+} = .002 \quad \text{Sr}^{2+} = 10 \quad \text{Ca}^{2+} = 411$$

Concentraciones la calcita (ppm):

$$\text{Fe}^{2+} = 10 \quad \text{Sr}^{2+} = 1000 \quad \text{Ca}^{2+} = 400,000$$

Pesos moleculares:

$$\text{Fe}^{2+} = 55.85 \quad \text{Sr}^{2+} = 87.62 \quad \text{Ca}^{2+} = 40.08$$

$$\frac{(Me^{2+})_{xtal}}{(Ca^{2+})_{xtal}} = K D M e \frac{(Me^{2+})_{xfluid}}{(Ca^{2+})_{xfluid}}$$

#2 Determine the true thickness of a unit with a 17° , 25° SE strike and dip if you were only able to measure the unit as 12.4 m in a 345° direction.

#3 Provide comments about the mathematical courses in the Geology curriculum.