Five Bakersfield College students presented posters at the Spring 2013 meeting of the Mathematical Association of America. This year’s meeting of the Southern California/Nevada Section was held on April 20 at the University of San Diego. The student poster session consisted of forty-three projects presented by students from UC’s, California State Universities, Two-year colleges, and private schools.

**Theoretical Monsters Featuring Natali’s Square**

Ever heard of a square referred to as something dull and plain? There’s more to a square than you think. A square is not as plain and dull as it is made out to be, but its behavior is as complicated as the theoretical monsters featured in this investigation. Sierpinski’s Triangle, Koch’s Snowflake, the Fibonacci Sequence, and Natali’s square all share a pattern that repeats infinitely. In this investigation Natali’s Square and its fractal behavior will be the main focus.

**Faculty Advisor: Rebecca Head**
In typical undergraduate-level physics courses, collision problems often assume many special cases to simplify the math involved. In this project, however, a Java program was written to detect collision between arbitrary concave polygons and models partially-elastic collisions while considering many variables including friction, gravity, linear and angular momentum, and impacts that are not necessarily directed at a plate’s geometric center. Collisions are detected a posteriori with the ray casting algorithm and force over time is simulated based on the angle of the impact and relative velocities of the objects.

Faculty Advisor: Rebecca Head
Breaking the Code

Caleb Geiger

Cryptology is a field of mathematics that is both highly applicable and fascinating to study. In this project, examples are used to explain how RSA encrypted messages can be read with the use of assorted factorization algorithms. These algorithms are then compared to algorithms that are currently used to factor bi-primes, such as the quadratic sieve, Fermat’s factorization method, and general number field sieve.

*Faculty Advisor: Rebecca Head*

*Breaking the Code* received a Meritorious Award
Fishing is a popular pastime all over the world. Some anglers prefer the artistic expression of fly fishing, while others enjoy the simplicity of spin fishing. All anglers can agree, however, that fishing is a great way to get close to nature and experience a sense of satisfaction and tranquility. This project presents a mathematical comparison of a fly fishing rod versus a spin fishing rod and the energy stored in the flexed rod. To carry out this analysis, data was gathered under multiple loads to create a mathematical model of each rod. The final result displays the stored energy in each rod at different points along its length.

*Faculty Advisors: Rick Darke and Rebecca Head*
This project is an investigation of the mathematical model used to relate quantities, such as transmissivity, storativity, and hydraulic gradient, which must be considered to pump water from an aquifer. The values of these measures contribute to the three-dimensional shape of water withdrawal, otherwise known as the cone of depression. After this brief introduction, if you ever find yourself quenching your thirst in Kern County, you will be sure to value every sip.

Faculty Advisor: Rebecca Head
Bakersfield College Mathematics Students and Faculty