The Summer Mathematics Program for High School Students at the University of Utah provides outstanding students an opportunity to develop their talents to the fullest. By presenting intriguing puzzles, challenging problems and powerful ideas, the program stimulates curiosity, develops the intellect, and lays a strong foundation for future work in mathematics, the sciences, or science related careers.

- Participants will receive three university credits in mathematics.
- The $425 program fee covers tuition, books, and lunch.
- Students who live far from the University may arrange to stay in the dorms.
- Scholarship aid is available for over half of the participants, and can be for both tuition and housing. All applicants will be considered for scholarships.
- Prerequisites for the Summer Mathematics Program for High School Students are algebra, geometry, and trigonometry. Calculus is not required.
- Preference will be given to students between their junior and senior years.

Find at least three positive integer solutions to the equation:

\[ x^2 - 103y^2 = 1 \]

Goldbach Conjecture:
Every even number greater than 2 can be written as the sum of two primes

\[ 100 = 53 \times 47 \]

Preference will be given to applications received by April 4, 2003

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For information on other youth programs at the University of Utah visit http://www.smartkids.utah.edu
The Program

June 9 - June 26, 2003
Monday - Thursday
8:30 AM - 4:00 PM

The Program consists of four parts: (1) a three-week long class, "Explorations in Number Theory," (2) lunch, where participants get to know each other and the program staff, and where they have the opportunity to discuss mathematics in an informal setting, (3) three week-long afternoon workshops, each on a different topic, (4) a computer lab, scheduled to meet the needs of the morning and afternoon sessions. In the computer lab, students will learn to explore number-theoretic questions using the flexible and powerful Python language.

The morning class is a rapid three-week introduction to Number Theory, one of the deepest and most exciting branches of modern mathematics. We start with properties of prime numbers and methods for finding integer solutions to problems, then quickly develop enough background to state and discuss unsolved problems and applications to modern technology. One of the major applications is cryptography, the science of sending secret messages. Cryptography and the number theory it depends on is an exciting area of active research which is also vital to our national security. Students will learn to encode and decode messages using sophisticated mathematical techniques.

The afternoon workshops this year will be devoted to (1) Knot Theory, (2) Combinatorics and Discrete Probability, and (3) Discrete Dynamical Systems. They give students an idea of the great range of ideas, problems, and applications in mathematics.

Problem sessions are integrated into both the morning class and the afternoon workshops. Participants work both individually and in groups and are assisted by program staff, including faculty, graduate students, and undergraduates who are alumni of past summer programs. These sessions give all participants direct experience in problem-solving and in communicating the results of their work.

The lunch break provides students with an opportunity to get to know each other and the program staff outside the classroom. On some days the lunch break includes an activity, such as frisbee, tennis, or a visit to the Student Union or a museum on campus.

Theorem (Euclid): There are infinitely many primes