MATH S-301, SUMMER 2006
Theory and Practice of Teaching Number Theory

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Schedule:
The course meets every day for three weeks in two and a half hour sessions. The schedule is July 5–21, and the class will meet each weekday afternoon from 1–3:30.

Goals and Prerequisites:
This course is aimed at high school and middle school mathematics teachers. It addresses educational theory and educational practice, and includes the process of creating, testing, and refining lesson plans and classroom activities. It aims to give the teacher a foundation in the fundamental working and structure of mathematical theory. Prerequisites include knowledge of and experience teaching number systems, algebra, and other pre-Calculus mathematics.

Topics:
This course introduces middle grade and high school teachers to the foundations and concepts in basic number theory (see day-by-day syllabus below) as well as a discussion of all aspects of arithmetic. The course also provides a variety of activities which the teachers can bring to their classrooms to enhance their students' understanding of number systems.

Text:
The textbook we will follow for much of the course is "Number Theory and Its History," by Oyestein Ore, Dover Publications, ISBN # 0-486-65620-9. Copies will be available in the Harvard COOP.

The second textbook is recommended, especially for teachers looking for more background on some of the in-class activities. It is "TriMathlon: A Workout Beyond the School Curriculum" by Judith D. Sally and Paul J. Sally, Jr., published by A. K. Peters Ltd., ISBN #1-56881-184-5.

Homework:
Homework will be assigned daily and will be due at the start of the next class. It will be graded, corrected, and returned at the following session.

Exam:
There will be a two-hour final examination during the last class meeting on July 21.

Grades:
Grades will be based equally on homework performance, final exam score, and classroom participation.

Approximate Day-by-Day Syllabus:

Date	Topics	Break-out Activity
July 5	Number Systems	Triangle Game
6	Rules of Arithmetic	Square Game
7	Multiplicative Inverses	Two-Digit Palindromes
10	Cancellation Laws	Three-Digit Palindromes
11	Modular Arithmetic	Modular Arithmetic Tables
12	Division Algorithm	Base Representation of Integers
13	Rules of Divisibility	Inventing New Rules?
14	Prime Numbers	Counting Divisors
17	Prime Factorization	Wordsworth
18	Greatest Common Divisors	Four Numbers Game
19	Euclidean Algorithm	Fibonacci Numbers
20	Rational Numbers	Egyptian Fractions
21	Final Exam	

Additional topics may include: Order, Products of Negative Numbers, Real Numbers and Repeating vs. Non-repeating Decimals