

# Alan Siegel

## Interests

### 1) Algorithmic design and analysis, and the associated mathematical tools

Hashing, Random Functions, Random Graphs

Probability

General & Limited Independence

Discrete Math

Analysis (Asym. methods, ODEs, PDEs, etc.)

### 2) Naive Geometry

Isoperimetric inequalities

Algorithmic Constructions

### 3) Education

Algorithms

K-12 Math Education (social conscience)

## Education

A rough but fair paraphrase:

In Japanese classrooms, students learn mathematics and mathematical concepts by themselves via challenging problems that they solve with 3 to 6 minutes of thought.

— Former Senator and Astronaut John Glenn's Commission on Math and Science Education for the 21<sup>st</sup> Century.

Researcher: James Stigler, Psychologist, UCLA, Third International Math and Science Video Study.

Another paraphrase:

That is **not** at all what **Stigler's** videotapes show. The video study's classification of all classroom activities had no category that included teaching.

— Alan Siegel, Invited Speaker on K-12 Math Education, International Congress of Mathematicians, Madrid, 2006.

# Technical work

Algorithms and analysis.

Constant-time highly random hash functions

Design, properties, applications.

Naive Geometry

Let  $P$  be a simple  $n$ -gon. Let  $Q$  be a circular polygon with the same sidelengths as  $P$ .

Result: A simple straight edge and compass algorithm that splits the interior of  $Q$  into  $2n$  triangles and relocates them to cover the interior of  $P$ .

(Caveat: in certain cases,  $P$  and  $Q$  need to be enlarged by an identical helper triangle, which changes nothing.)