

# Augarithms



Vol. 19, No. 4

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October 26, 2005

*The new fall schedule is revealed...*

## Mathematics Colloquium Series

Unless otherwise indicated, colloquia are held Wednesdays from 3:40 - 4:40. Refreshments are provided.

Sept.	14	Kenneth Kaminsky, Augsburg College
	28	Stephen Willson, Iowa State University
Oct.	12	Juan Pablo Trelles, University of Minnesota
	→ 26	<b>Blake Boursaw, Augsburg College</b>
Nov.	9	Jennifer Geis, Augsburg College
	30	Mary Laurel True, Augsburg College

## The Noble Path of Problem Solving



Blake Boursaw

by Blake Boursaw,  
Augsburg College

Ever been puzzled?  
Confused? Unsure of  
what to do? We have  
a (mathematical) path  
for you!

In 1945, George  
Pólya's published his  
now-classic "How to  
Solve it: A New As-  
pect of Mathematical

Method". At its heart, Pólya's work proposes a division of the problem-solving path into four major steps:

- 1) Understanding the Problem
- 2) Devising a Plan
- 3) Carrying out the Plan
- 4) Looking Back

After exploring Pólya's methods in context for a bit, we'll dive into playing with pretty problems from a mind-bending variety of places. Folks interested in mathematical competitions are especially encouraged to attend, but minimal mathematics background will be assumed and a good time is guaranteed to all!

At the end of our problem solving play, a special prize will be awarded to the wearer of the most creative thinking cap.

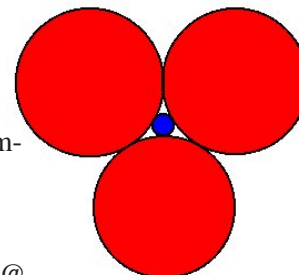
Note: Pictures of Pólya are available at

<http://www-groups.dcs.st-and.ac.uk/~history/PictDisplay/Polya.html>

## Problem of the week...

Solvers of the problem from vol. 19.3 include **Erik Sevre** and **Tiny Hans Knekmekk**. The problem from vol. 19.2 was nicely solved by **Scott Erway** of Itasca Community College in Grand Rapids. Here is this week's problem of the week:\*

If the radius of the small circle is  $r$ , what is the common radius of the larger circles?



Send solutions to the editor at [kaminsky@augsb.org](mailto:kaminsky@augsb.org)

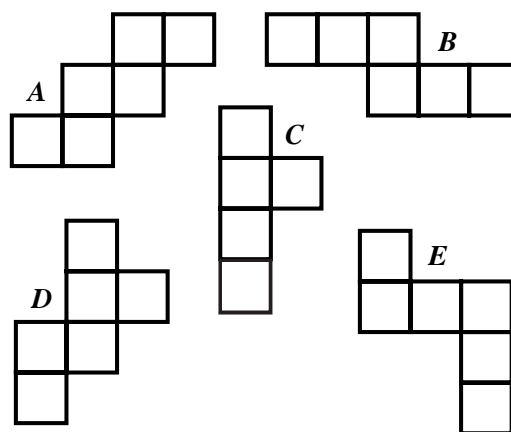
or slip them under his door at Science Hall 137E.

\*reproduced with permission from Bradley University's 'potw' page  
<[bradley.bradlye.edu/~delgado/](http://bradley.bradlye.edu/~delgado/)>

## Puzzle of the week...

The following readers solved the playing-card puzzle of vol. 19.3: **Britta Boyum, Richard Garnett, Regina Hopingardner, Karena Jones, Katie Medd, Binh Nguyen, Jonathan Pierpont, and Ellen Waldow**. And here is this week's puzzle:

Which of the figures below cannot be folded into a cube?



Send solutions to the editor at [kaminsky@augsb.org](mailto:kaminsky@augsb.org), or slip them under his door at Science Hall 137E. Source: Giant Book of Challenging Thinking Puzzles by Michael A. DiSpezio

## Augarithms

The bi-weekly newsletter of the  
Department of Mathematics at Augsburg College.

Editor.....Ken Kaminsky <[kaminsky@augsb.org](mailto:kaminsky@augsb.org)>

## Died on this day...Takakazu Seki\*

Born in 1642 **Takakazu Seki** was born into a samurai warrior family. However at an early age he was adopted by a noble family named Seki Gorozayemon. The name by which he is now known, Seki, derives from the family who adopted him rather than from his natural parents.

Seki was an infant prodigy in mathematics. He was self-educated in mathematics having been introduced to the topic by a servant in the household who, when Seki was nine years old, realized the talent of the young boy.

Seki soon built up a library of Japanese and Chinese books on mathematics and became acknowledged as an expert. He was known as 'The Arithmetical Sage', a term which is carved on his tombstone, and soon had many pupils. His position in life has been described as follows:-

*In due time he, as a descendant of the samurai class, served in public capacity, his office being that of examiner of accounts to the Lord of Koshu, just as Newton became master of the mint under Queen Anne. When his lord became heir to the Shogun, Seki became Shogunate samurai and in 1704 was given a position of honor as master of ceremonies in the Shogun's household.*

In 1674 Seki published *Hatsubi Sampo* in which he solved fifteen problems which had been posed four years earlier. The work is remarkable for the careful analysis of the problems which Seki made and this certainly was one of the reasons for his great success as a teacher.

Seki anticipated many of the discoveries of Western mathematics. He was the first person to study determinants in 1683. Ten years later Leibniz, independently, used determinants to solve simultaneous equations although Seki's version was the more general.

Seki also discovered Bernoulli numbers before Jacob Bernoulli. He studied equations treating both positive and negative roots but had no concept of complex numbers. He wrote on magic squares, again in his work of 1683, having studied a Chinese work by Yank Hui on the topic in 1661. This was the first treatment of the topic in Japan.

In 1685, he solved the cubic equation  $30 + 14x - 5x^2 - x^3 = 0$  using the same method as Horner a hundred years later.

He discovered the Newton or Newton-Raphson method for solving equations and also had a version of the Newton interpolation formula.

Among other problems studied by Seki were Diophantine equations. For example, in 1683, he considered integer solutions of  $ax - by = 1$  where  $a, b$  are integers.

Secrecy surrounded the schools in Japan so it is hard to determine the contributions made by Seki, but he is also credited with major discoveries in the calculus which he passed on to his pupils.

Seki died in Edo (now Tokyo), Japan on October 24, 1708.

*\*Article by J J O'Connor and E F Robertson  
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**Takakazu Seki**

## Need an Advisor?

If you are thinking of becoming a mathematics major, but don't have an advisor within the department, feel free to talk to your math prof. or send an e-mail to the department chair, Professor Rebekah Dupont at [dupont@augsborg.edu](mailto:dupont@augsborg.edu). Advising for spring semester begins November 14.

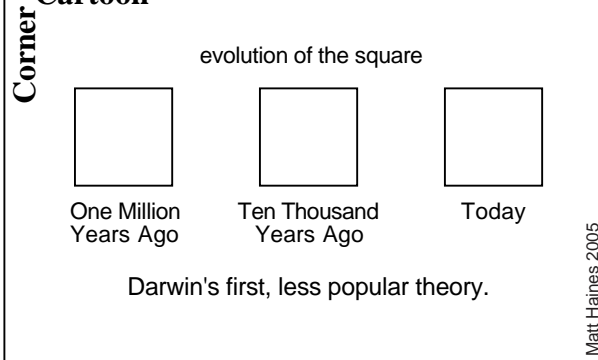
## Howard Singer coming to campus

You know about the Weather Bureau, right? Did you know there's a Space Weather Bureau, too? Both organizations involve scientists, mathematicians, and computer experts who work to better understand and forecast changes and extreme events in Earth's environment, and both are part of an agency of the Federal Government, NOAA (National Oceanographic and Atmospheric Administration.)

On November 7, Dr. Howard Singer of NOAA's Space Environment Center in Boulder, CO will be on Augsburg's campus to make two presentations and to meet with faculty and students interested in space weather and in careers in atmospheric and space research.

1. At 12:10, Dr. Singer will make a 20-minute presentation in Room 21 of Science Hall in the Physics 245 class (Modern Physics), introducing his work and its relation to physics and mathematics.
2. At 3:00 p.m. Dr. Singer will present a public lecture on Space Weather, also in Science 21.

### Cartoon



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