

Humanistic Mathematics: A Philosophy, a Journal, and a Community

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Humanistic Mathematics

I use the term here to mean aesthetic, cultural, historical, literary, pedagogical, philosophical, psychological, and sociological aspects of mathematics as a human endeavor.



JOURNAL OF HUMANISTIC MATHEMATICS

- ▶ Created by Gizem Karaali
- ▶ Rebirth of Alvin White's Humanistic Mathematics Network Journal
- ▶ Editors: Gizem Karaali and Mark Huber
- ▶ First issue published in Jan 2011
- ▶ Twice a year publication, open access (free to authors)
- ▶ Online: <http://scholarship.claremont.edu/jhm/>

Architecture: Mathematics made
visible

Brú na Bóinne

Neolithic site (35th-32nd century BCE)



Photo: MLH

Inner sanctum designed for the sun to hit on winter solstice

Megalithic Art at Brú na Bóinne



Photo: MLH

Kheops pyramid



Photo: Nina Aldun Thune

La Tour Eiffel



Photo: MLH

The Gateway Arch



Photo: MLH

The Guggenheim Museum

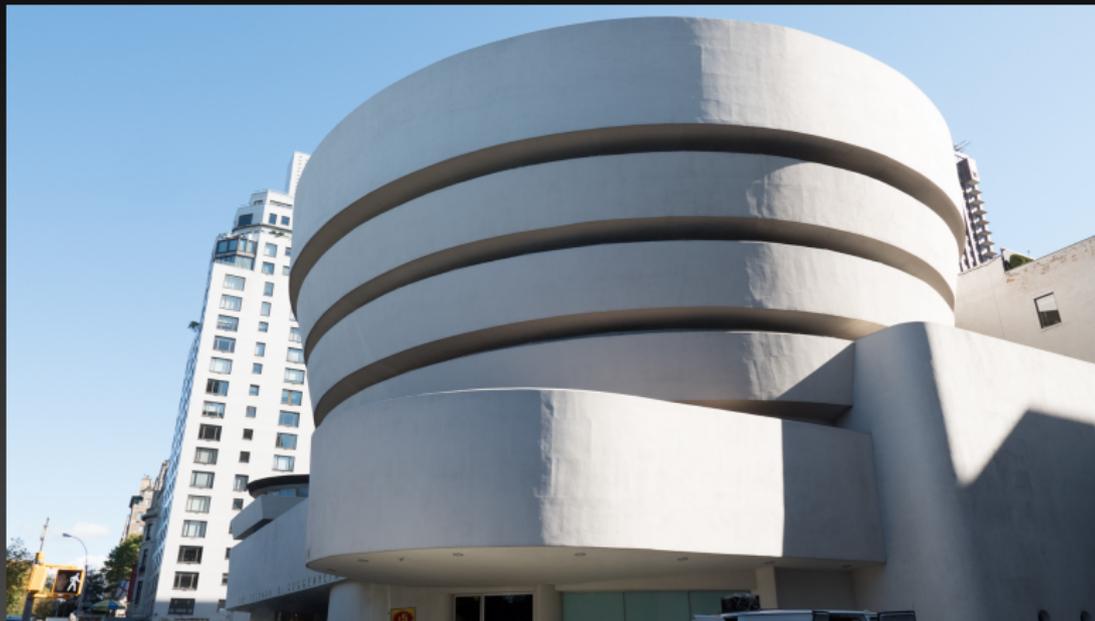


Photo: MLH

Sydney Opera House



Photo: MLH

Back to polyhedra...



Photo: MLH

A Crop Circle that encodes the first ten digits of π



Photo: Author unknown

A Julia Set Crop circle



Photo: Author unknown

Art

Raphael's *The School of Athens*



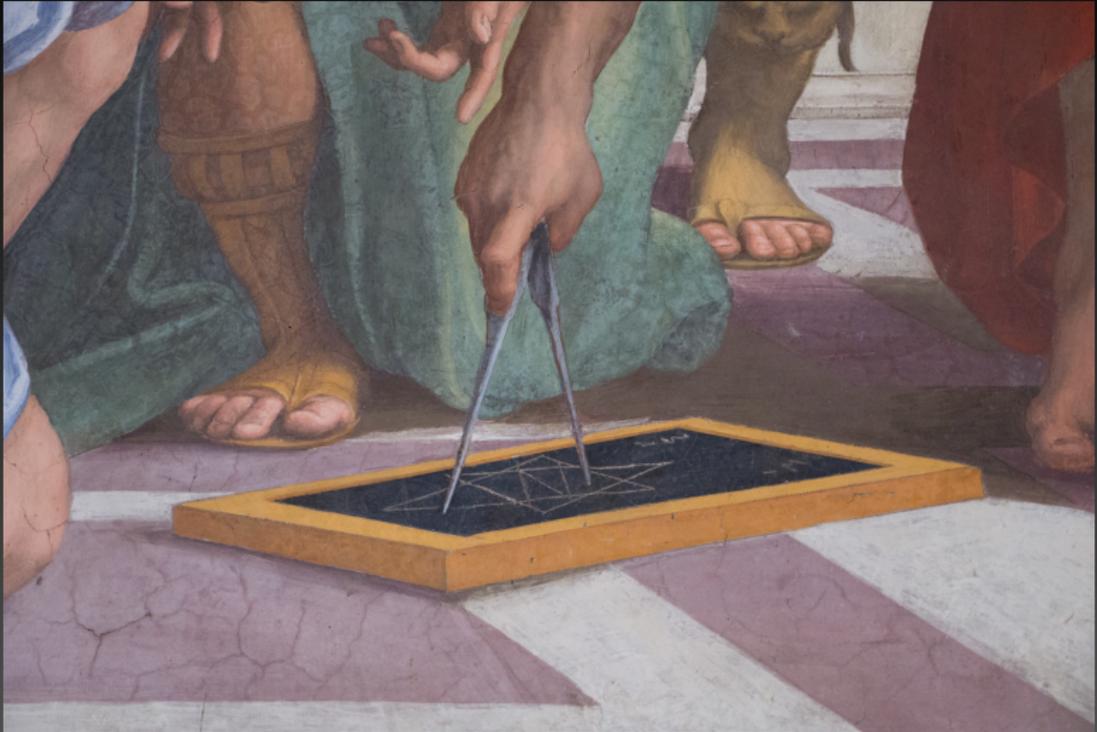
Raphael's *School of Athens* (Photo: MLH)

Raphael's *The School of Athens*



Raphael's *School of Athens* (Photo: MLH)

Raphael's *The School of Athens*



Raphael's *School of Athens* (Photo: MLH)

What was Raphael having Euclid prove?

Raphael's *School of Athens*: A Theorem in a Painting?

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Abstract

Raphael's famous painting *The School of Athens* includes a geometer, presumably Euclid himself, demonstrating a construction to his fascinated students. But what theorem are they all studying? This article first introduces the painting, and describes Raphael's lifelong friendship with the eminent mathematician Paulus of Middelburg. It then presents several conjectured explanations, notably a theorem about a hexagram (Fichtner), or alternatively that the construction may be architecturally symbolic (Valtieri). The author finally offers his own "null hypothesis": that the scene does not show any actual mathematics, but simply the fascination, excitement, and joy of mathematicians at their work.

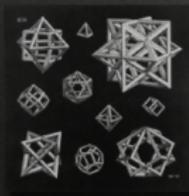
Raphael's famous painting *The School of Athens* shows among the great

The mathematics of the painting

Mathematics used in several ways in article

- ▶ Need to use math to undo perspective and see what figure would be from above
- ▶ Need to show that a candidate theorem is actually true

M.C. Escher



Study for Stars - 1948 Woodcut



Stars - 1948 Wood Engraving



Stars - 1948 Wood Engraving



Double Planetoid - 1948 Wood Engraving



Rippled Surface - 1950 Linoleum Cut



Gravity - 1952 Lithograph,
Watercolor



Concentric Rinds - 1953 Wood
Engraving



Concentric Rinds - 1953 Wood
Engraving

<http://www.mcescher.com/gallery/mathematical/>

The screenshot shows a web browser window with the URL `scholarship.claremont.edu/do/search/?q=title%3AEscher%20OR%20title%3AEscher%27&start=0&context=1694802&sort=score`. The page title is "Searching *Journal of Humanistic Mathematics*". Below the title, it says "Showing 3 out of 3 results. Starting at result 1." There are two buttons: "My saved searches" and "Save this search".

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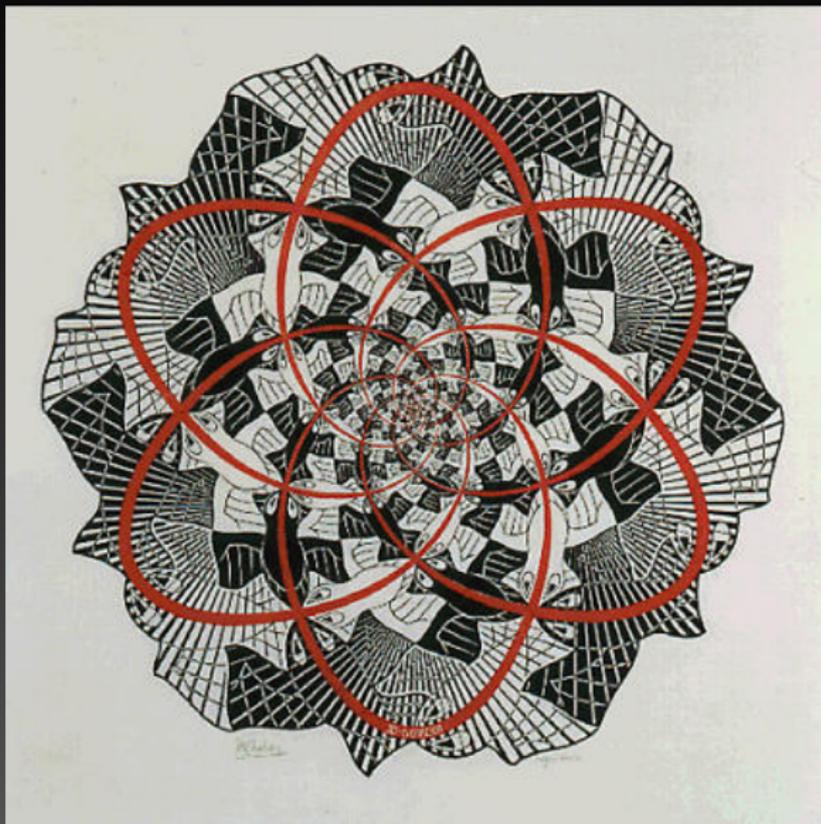
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Escher's Sphere Surface

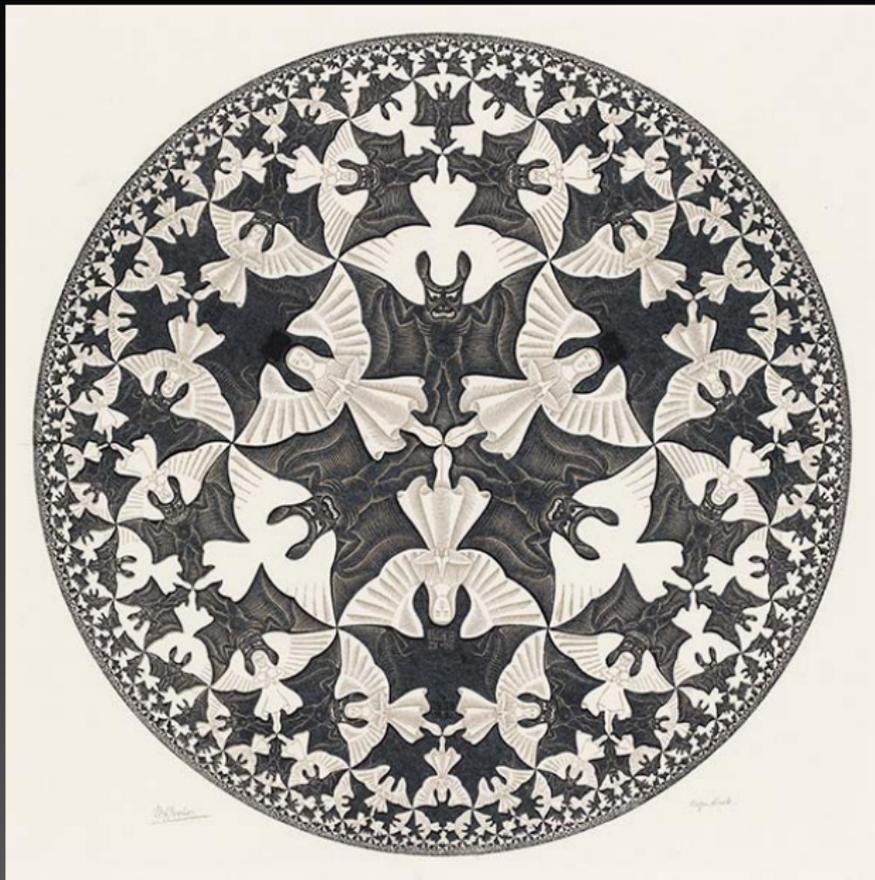


<http://www.mcescher.com/Gallery/recogn-bmp/LW427.jpg>

Escher's Path of Life III



Escher's Circle Limit IV



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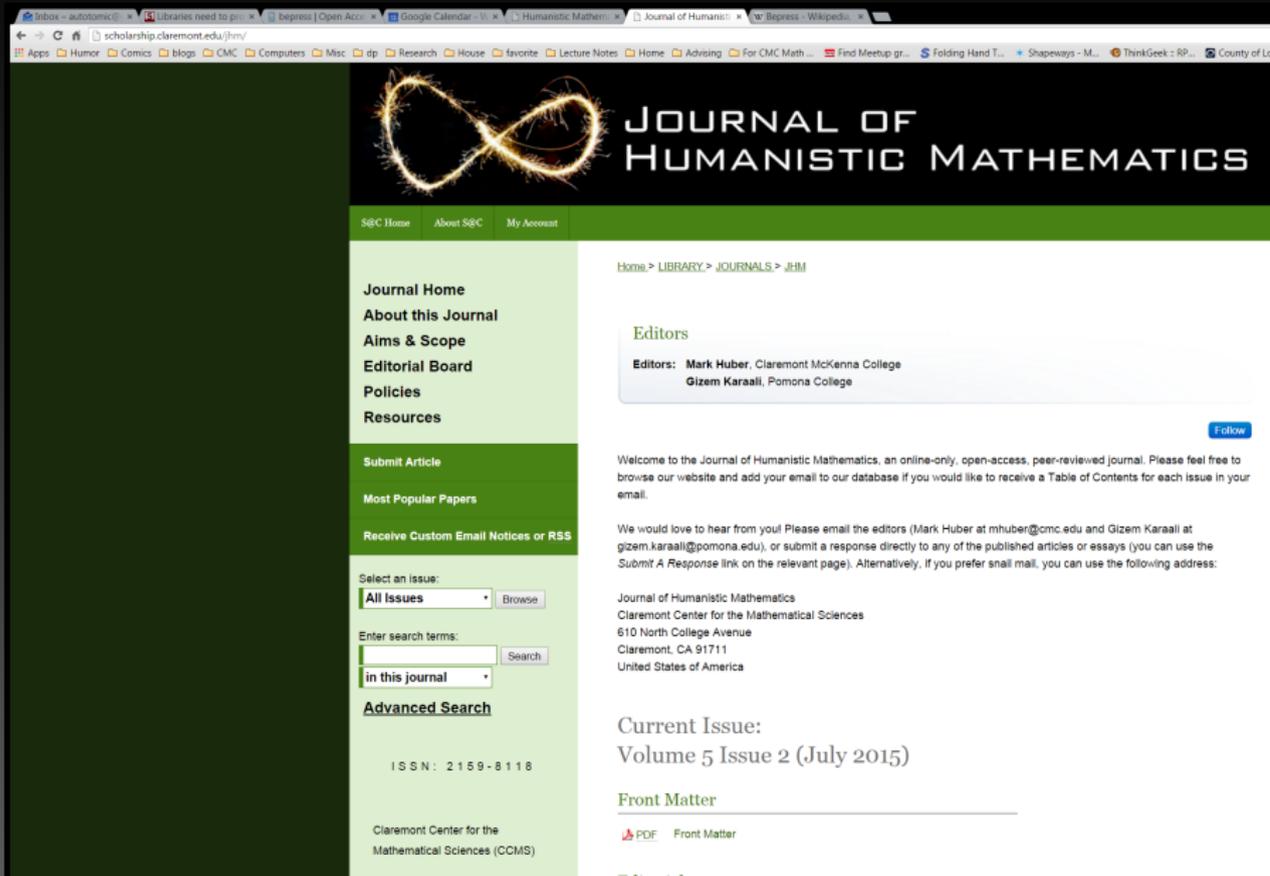
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Handling submissions

The screenshot shows a web browser window with the URL `scholarship.claremont.edu/cgi/editor.cgi?context=jhm`. The page header includes the **bepress™** logo and the site title **Journal of Humanistic Mathematics**. A navigation bar contains links for **Manage Submissions**, **Upload Submission**, **Usage Reports**, **Configuration**, **Mailing Lists**, and **My Account**. A left sidebar lists options: **My Submissions**, **Reviewer List**, **Reviewer Report**, **Preview site**, **Update site**, **Go to site**, **Preferences**, **Log out**, and **Editor report**. The main content area is titled **Show these submissions:** and includes a search filter with the following fields: **State:** (dropdown menu set to "Not yet published" and a "show all submissions" link), **Assigned to:** (dropdown menu set to "Mark Huber"), **Last Name:** (dropdown menu set to "is" and an empty text input), and a **Search** button. Below the search area, a table displays a list of submissions. The table has columns for **ID**, **Author**, **Title**, **Last Event**, **Date of Last Event**, **Waiting for Editor** (with a red dot indicator), **Type**, and **Locked by Editor**. The table shows four rows of submission data.

ID	Author	Title	Last Event	Date of Last Event	Waiting for Editor	Type	Locked by Editor
1322	Janice Dykacz	Chi and the Moebius Strip	Initial submission	Mon Nov 2 2015	•	Poetry	
1321	Justus R. Riek	Simple Tools with Nontrivial I...	Revision uploaded	Mon Nov 9 2015	•	The World of Mathematics	
1320	Paul H. Grawe	A Meeting of Minds: An Alterna...	Initial submission	Sat Oct 31 2015	•	Article	
1319	gene grabiner	cicadas	Initial submission	Fri Oct 30 2015	•	Poetry	

The final product



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Editors: **Mark Huber**, Claremont McKenna College
Gizem Karaali, Pomona College

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We would love to hear from you! Please email the editors (Mark Huber at mhuber@cmc.edu and Gizem Karaali at gizem.karaali@pomona.edu), or submit a response directly to any of the published articles or essays (you can use the Submit A Response link on the relevant page). Alternatively, if you prefer snail mail, you can use the following address:

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Current Issue:

Volume 5 Issue 2 (July 2015)

Front Matter

Front Matter

Involving the public with math

National Museum of Mathematics

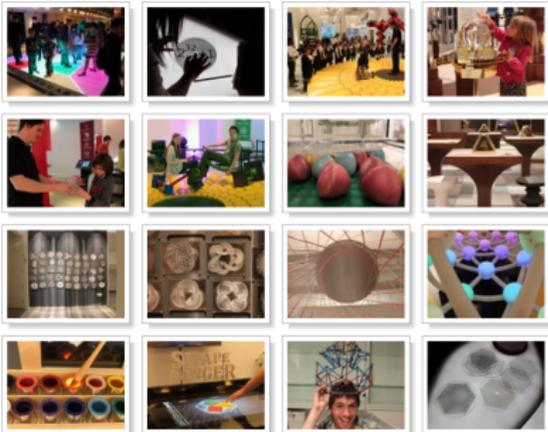
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See mathematics in action.



Photo Gallery



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National Museum of Mathematics



Photo: MLH

National Museum of Mathematics



Photo: MLH

National Museum of Mathematics

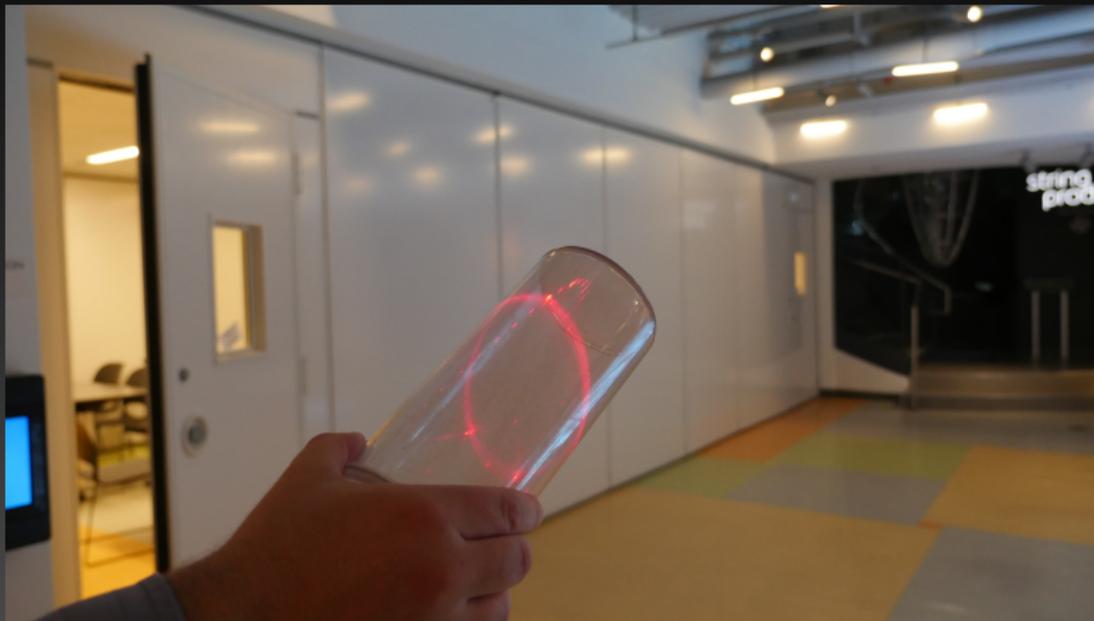


Photo: MLH

National Museum of Mathematics

Mo'Math Mo'Fun!

Ryan Rosmarin

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Synopsis

A youth named Kartik encounters the National Museum of Mathematics in NYC.

In 2006, the only mathematics museum in The United States at the time, The Goudreau Museum, shut its doors. Shortly after, a team began planning to create a Museum of Mathematics with a much larger scope. Led by Glen Whitney, a hedge fund quantitative analyst at Renaissance Technologies, a group of innovators got to work dreaming up the museum. Prior to opening, the museum raised over 22 million dollars; this enabled the idea to morph into an incredible reality.



Using recreational mathematics

The screenshot shows a web browser displaying a New York Times article. The browser's address bar shows the URL: www.nytimes.com/2015/10/12/opinion/the-importance-of-recreational-math.html?_r=0. The page header includes the New York Times logo, a search icon, and a 'LOG IN' button. Below the header, there are three featured articles with author portraits and names: 'Cruel and Unusual Punishments Before the Supreme Court' by David Brooks, 'The Republicans' Incompetence Caucus' by David Brooks, and 'Obama's Doctrine of Restraint' by Roger Cohen. The main article is titled 'The Importance of Recreational Math' by Manil Suri, dated OCT. 12, 2015. The article text discusses a woman named Marjorie Rice who discovered new tessellations. To the right of the text is an image of a hand interacting with a grid of numbered tiles. Below the image is the caption 'Chris Hondros/Getty Images'. At the bottom of the article, there is a 'RECENT COMMENTS' section. The browser's taskbar at the bottom shows several open files, including 'momath-jhm.pdf' and 'escher-figure3.jpg'. The URL 'http://momath.org/gallery/' is visible at the bottom of the page.

SECTIONS

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The Importance of Recreational Math

OCT. 12, 2015


Manil Suri

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Baltimore — IN 1975, a San Diego woman named [Marjorie Rice](#) read in her son's Scientific American magazine that there were only eight known pentagonal shapes that could entirely tile, or tessellate, a plane. Despite having had no math beyond high school, she resolved to find another. By 1977, she'd discovered not just one but four new tessellations — a result noteworthy enough to be [published](#) the following year in a



Chris Hondros/Getty Images

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Recreational Mathematics—Only For Fun?

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Synopsis

In this paper, I explore recreational mathematics from two perspectives. I first study how the concept appears in educational policy documents such as standards, syllabi, and curricula from a selection of countries to see if and in what way recreational mathematics can play a part in school mathematics. I find that recreational mathematics can be a central part, as in the case of India, but also completely invisible, as in the standards from USA. In the second part of the report, I take an educational historical approach. I observe that throughout history, recreational mathematics has been an important tool for learning mathematics. Recreational mathematics is then both a way of bringing pleasure and a tool for learning mathematics. Can it also be a tool for social empowerment?

1. Introduction.

To do mathematics just for the pleasure of it is a popular activity; we find mathematical games such as sudoku and kakuro in newspapers and apps for our mobile phones. Doing mathematics for fun, otherwise called *recreational mathematics*, has a long history [30]. One of the oldest finds of written

Teaching

Teaching and humanistic mathematics

Does a humanistic mathematical view impact teaching?

- ▶ Recognizing that mathematics is socially constructed can make sense of incongruities in mathematics
- ▶ Introducing creativity earlier into mathematical teaching
- ▶ Appreciation of the ``half-finished building''
- ▶ How does mathematics fit into larger societal concerns?
- ▶ Ongoing controversies/research in mathematics

Using recreational mathematics



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[Developing a Healthy Scepticism About Technology in Mathematics Teaching](#)

Date: 01/2013

Author: Peter J. Rowlett

Publication: [Journal of Humanistic Mathematics](#)

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Schilling Kinematic Model

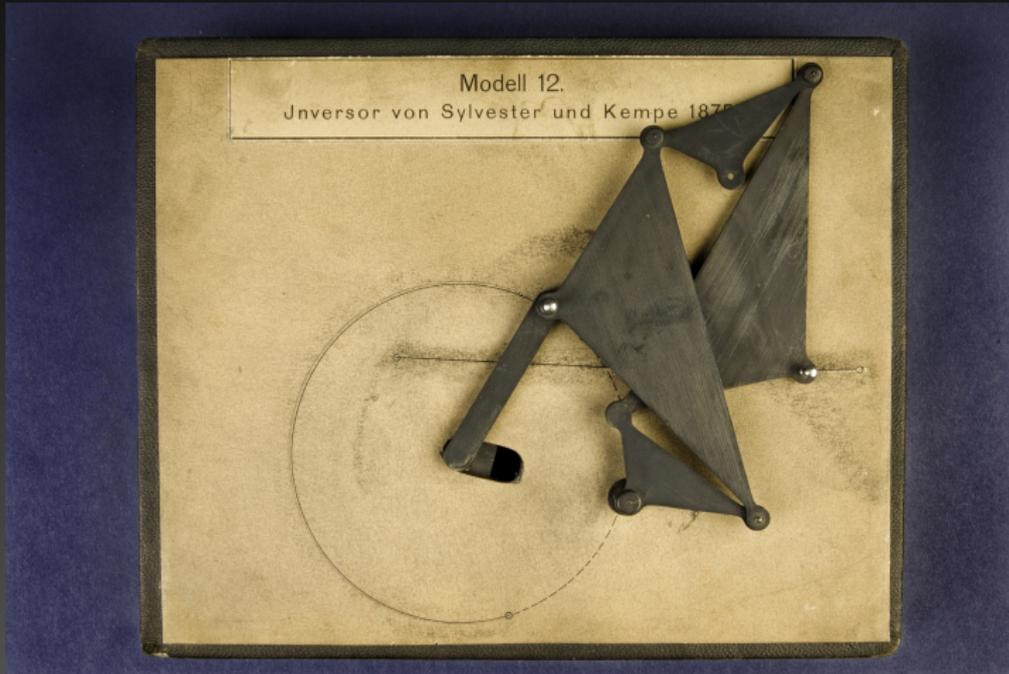
Teaching mathematics in 1900

- ▶ Used physical models to trace curves
- ▶ German firm Schilling created curves mechanically
- ▶ Example: linkages = joined rods move around pivot points

Schilling Kinematic Model

Sylvester-Kempe Inversor

``Inverts'' circular motion back to straight line motion



Schilling Kinematic Model

The Schilling Kinematic Models at the Smithsonian

Amy Shell-Gellasch

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Smithsonian National Museum of American History, Washington, DC 20001, USA

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Synopsis

The kinematic models manufactured by the German firm of Martin Schilling were used in the late 19th and early 20th centuries to depict mathematical curves. The Smithsonian Institution owns twelve Schilling models. As a volunteer researcher in mathematics at the Smithsonian National Museum of American History, the author has chosen a few of her favorite models as an introduction to this interesting set of kinematic models.

In 2012, I moved to the Washington DC area. Move number 4 in ten years of marriage, that's what I get for marrying a career Army officer.

Before I even looked for a job, I contacted my colleague Peggy Kidwell, Curator of Mathematics at the Smithsonian's National Museum of American History (NMAH) to see if we could work together on a project. She confessed that she had no funding. I replied that I would be happy to volunteer, as long as I could have a Smithsonian nametag. So that is what I have!

Beauty

Mathematicians on beauty

Mathematics, rightly viewed, possesses not only truth, but supreme beauty--a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show.

Bertrand Russell, *A History of Western Philosophy*

Mathematicians on beauty

