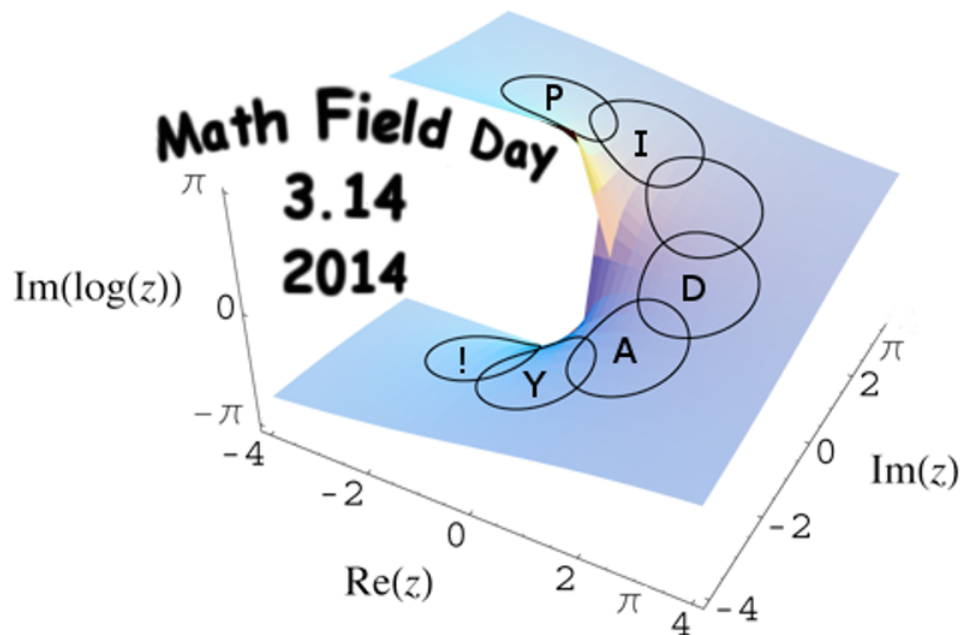# Math Field Day

College of the Desert

March 14, 2014

1   Overview

College of the Desert welcomes schools from across the Coachella Valley to join in Math Field Day, 2014. This year's theme is Math, Magic and Mystery.

Organizing Committee

- Sally Kalpakoff, Professor, COD;
- Carl Farmer, COD MESA Director;
- Jorge Perez, Prof. of Math, COD;
- Todor Nikolov, MESA President, COD;
- Geoff Hagopian, Prof. of Math, COD;
- Addican Hatch, Calculus Club President, COD.
- Steve Dostal, Prof. of Math, COD

Participating High Schools

- Cathedral City, Scott Parks
- Coachella Valley, Rommel Guerrero
- Desert Hot Springs, John Olver
- Indio High, David Chavez
- La Quinta, Dan O'Grady
- Palm Springs, Richard Hunsperger
- West Shores, Roseanna Radoff
- Xavier, Phil Epstein

Math Field Day 2014 is in tribute to the life and work of Palm Desert HS math teacher Jill Thomas Grant, whose enthusiasm for the joy of mathematics is an inspiration for our mathematical community.

Jill Thomas Grant

2   Schedule

Assemble in the hour before the start at 9:30 with an orientation to the day's events. Then teams will form to engage in various roughly 20-minute activities with a spirit of cooperative engagement. The plan is meant to be somewhat flexible to adapt to the circumstances at hand, but the general outline of the program will be:"

8:30am - 9:30am
Arrival time.
Assemble at the COD MESA Center in the MSTC building (see map.) Some groups will arrive earlier than others, so this is a sort of buffer zone for groups to arrive and find their way around.

9:30am - 10:00am
Orientation.
A description of the structure of the day's events and a brief description of the various activities.

10am - 12:30pm
Activities at various tables set up in the quad.
COD MESA students and faculty will be host each of the six teams cycling through six 20-minute activities.

12:30pm - 2pm
Lunch and Awards.

The activities described below pay homage to the centennial of the birth of Martin Gardner, whose books will be part of the prizes!

Read the collection of Martin Gardner's articles in "Hexaflexagons and Other Mathematical Diversions" for some ideas about the day's activities–or many of his other books (often found in used book stores) for adventures in math, magic and mystery, which is the theme for Mathematics Awareness Month this year .
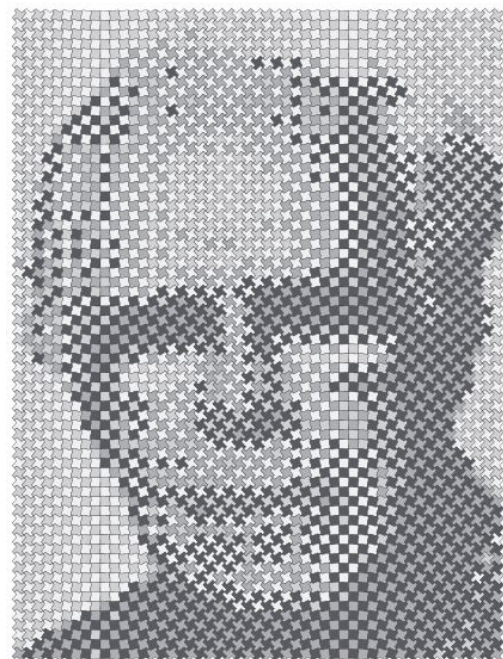
Martin Gardner

3   Activities

3.1   Round 1 of Ken Ken

Kenken is a popular number-puzzle game. Learn how to play on-line or better yet, go to your local library and get a book of puzzles.

For online resources look to the
New York Times puzzle page,
An article, Triangular Numbers, Gaussian Integers and Kenken, (follow hyperlink)
an Iphone app and/or kenken.com.

The plan is to have Kenken as a kind of elimination event, where winners go on to harder puzzles and those eliminated go on to other puzzles.

A 5×5 Kenken puzzle.

3.2   4-D Tic Tac Toe

In regular 2D tic-tac-toe a row or column or diagonal of xxx or ooo will win. We skip right past 3D tic-tac-toe to a version of 4D tic-tac-toe: Imagine a stack of four parallel 4×4 grids. A winning entry will be 4 of the same symbols in a straight line on the larger grid (as shown.)
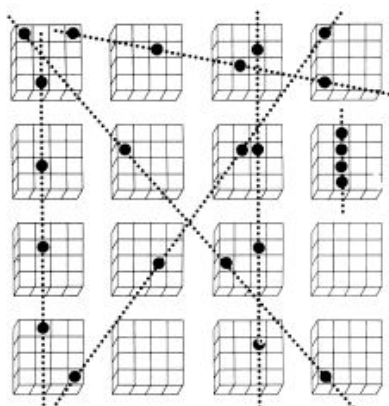
4D Tic-Tac-Toe.

Try the applet at newgrounds or
Link to an on-line game applet at Caltech (you may have to put this site on your java trusted list.)

Unlike 2D tic-tac-toe, you can easily have more than 2 players in 4D tic-tac-toe. Try building skill with the $3 \times 3 \times 3$ grid here, then a $4 \times 4 \times 4 \times 4$.

There are a slew of interesting tic-tac-toe questions to boot. How many ordinary tic-tac-toe games are there? How many different ways to win? How do these questions generalize to 4D tic-tac-toe?

3.3   Hexaflexagons

Origami your Mathemati!
Vi Hart's 4-part Youtube exploration of trihexaflexagation is a good way to get started with this. Students will build constructs from scratch and be judged on the craftsmanship, aesthetic appeal and creativity of their flexagons.
Read the original article Flexagons, by C.O.Oakley
Read The Faces of the Tri-Hexaflexagon
Read It's Ok to be Square if You're a Tri-Hexaflexagon
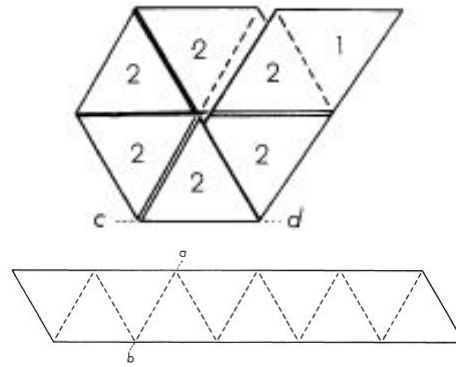
flexagon

3.4   Orienteering

Orienteering is the practice of using maps and compasses on knowledge of earth's geography to find your way around a map with a compass and a measure of distance (with foot orienteering the measure of distance is a step size. Given your initial position on a map a sequence of direction/distance pairs, can you find your way to the treasure?
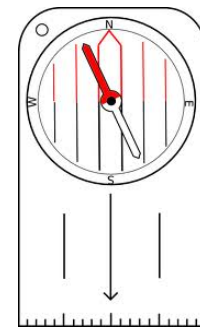
orienteering tool

3.5   The Pentomino Game
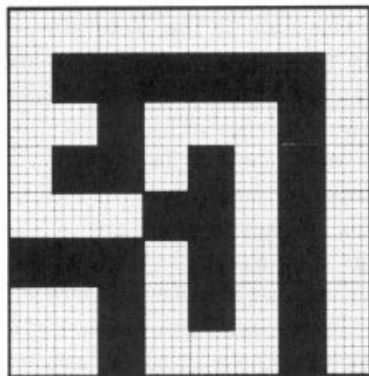
pentominos

What is the minimum number of pentominoes that can be placed on a checkerboard in such a way that it is impossible to place any of the remaining pentominoes on the board?

Two or more players take turns in choosing a single pentomino and placing it wherever they wish on the board. The pieces have no "top" or "bottom" faces. As in all problems mentioned in this article, asymmetrical pieces may be used with either side up. The first player who is unable to place a piece is the loser. Create your own pentomino sets for practice, or use the stencils here.
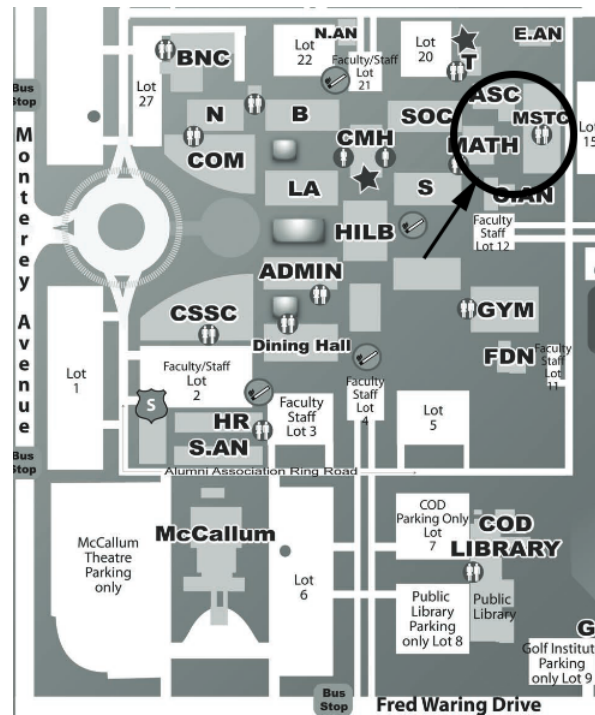
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4 Location/Contact Information

College of the Desert
43-500 Monterey Ave.
North of Fred Waring and west of Portola Ave.
Activities start in the MSTC (Math, Science & Technology Center) as shown below:

For further information, please contact
(1) Dean Jim Berg: jberg@collegeofthedesert.edu
or
(2) Geoff Hagopian: ghagopian@collegeofthedesert.edu

5 Transportation

Each team is responsible for organizing their own transportation.

Parking permits will be provided.