

Introduction to Virtual Math Teams With Collaborative GeoGebra

Presented by The Math Forum
Gerry Stahl, Drexel University

Virtual Math Teams Project

- **An integrated online environment for small teams of students to do math together**
- **Combines text chat with drawing spaces and spaces for storing ideas and findings**
- **Teachers can configure rooms for different topics and tools**
- **Lobby, wiki, multiple tabs for constructions, topic, help**

The VMT Lobby

Virtual Math Teams 3.0-Dev.03

Welcome Professor

- ☐ New to VMT?
- ☐ List of All Rooms
- ☐ My Profile
- ☐ My Teammates
- ☐ My Rooms
- ☐ Messages
- ☐ Manage Activities

- [VMT Help](#) Pages
- [VMT Sandbox](#) Room
- [VMT Lounge](#) Room
- [VMT Wiki](#) Pages
- [VMT Replayer 2.2](#)
- [VMT Replayer 3 Dev 2 \(12/22 - 1/30\)](#)
- [VMT Replayer 3 - current](#)
- [Logout](#)

View Chat Rooms as

Math Subject Tree Tabular List

Filter Chat Rooms By...

Project: iSchool Last Activity: Show All

▼ **Geometry** (2 Topics)

- ▶ **Activity1** (9 Rooms, 0 Active)
- ▼ **Activity2** (0 Rooms, 0 Active)
 - ▶ **Lucky Number 1**
 - ▼ **Team Bee 1**

Username	# of Messages	Last Active
at373	10	Feb 1, 2012 19:50
cbartizek	25	Feb 1, 2012 19:56
charlie_mcmichael	141	Feb 1, 2012 19:50
gerry	12	Jan 31, 2012 23:19
professor	8	Feb 1, 2012 19:57

Students find chat rooms with activities

Teachers overview student work

Researchers, teachers, students access chat logs

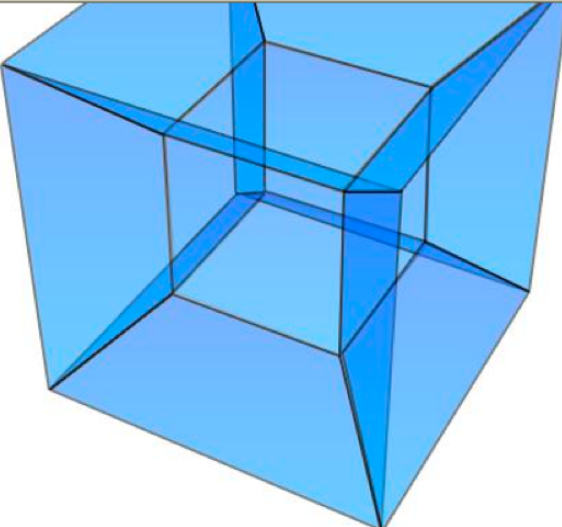
The Virtual Math Teams environment

ConcertChat Session Player - Room : channel:OID::1147211767857

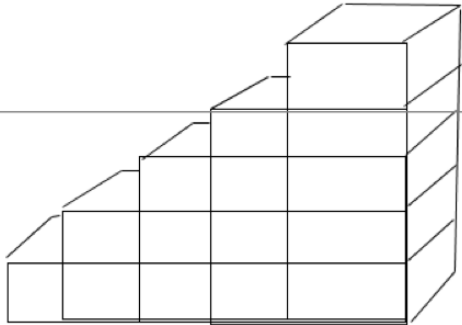
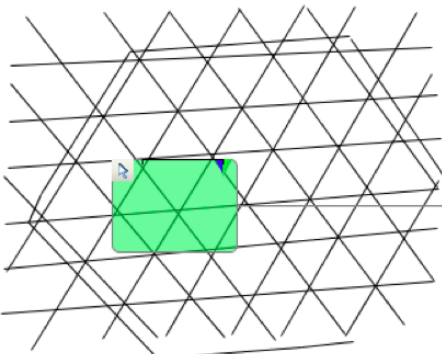
Whiteboard:

on your own solve them. Use the arrow by using the in order to

Last whiteboard action by 137 (5/16/06 7:17:47 PM EDT)



squares:
 $n(n-1)/2$
diamond:
 $n^2+(n-1)^2$



Current users:

137
Jason
nan
qwertyuiop

Chat: (0)

does everyone know what other people are doing?

- 137 5/16/06 7:14:25 PM EDT: Yes?
- qwertyuiop 5/16/06 7:14:25 PM EDT: no-just making triangles
- 137 5/16/06 7:14:33 PM EDT: I think...
- Jason 5/16/06 7:14:34 PM EDT: yeah
- nan 5/16/06 7:14:46 PM EDT: good 😊
- qwertyuiop 5/16/06 7:14:51 PM EDT: triangles are done
- 137 5/16/06 7:15:08 PM EDT: So do you want to first calculate the number of triangles in a hexagonal array?
- qwertyuiop 5/16/06 7:15:45 PM EDT: What's the shape of the array? a hexagon?
- 137 5/16/06 7:16:02 PM EDT: Ya.
- qwertyuiop 5/16/06 7:16:15 PM EDT: ok...
- Jason 5/16/06 7:16:41 PM EDT: wait-- can someone highlight the hexagonal array on the diagram? I don't really see what you mean...
- Jason 5/16/06 7:17:30 PM EDT: hmm.. okay
- qwertyuiop 5/16/06 7:17:43 PM EDT: oops
- Jason 5/16/06 7:17:44 PM EDT: so it has at least 6 triangles?
- Jason 5/16/06 7:17:58 PM EDT: in this, for instance

Message:

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Probability

Here are a set of challenges related to probability problems. **You can contribute** by adding your ideas about applying a strategy to a problem (adding content to a P#S# page), proposing a new strategy (adding a new column) or adding a new challenge (row).

Probability Strategies & Problems	S1. Drawing balls from a jar	S2. Solve Complementary Problem	S3. Enumerate & Organize your cases	S4. Use a Tree Diagram	S5. New Strategy
P1. The sock drawer	P1S1	P1S2	P1S3	P1S4	P1S5
P2. Box with three cards	P2S1	P2S2	P2S3	P2S4	P2S5
P3. Seating arrangements	P3S1	P3S2	P3S3	P3S4	P3S5
P4. Baseball World Series	(P4-S1 Example)	(P4-S2 Example)	(P4-S3 Example)	(P4-S4 Example)	P4S5
P5. Duck hunters	P5S1	P5S2	P5S3	P5S4	P5S5
P6. Clock hands	P6S1	P6S2	P6S3	P6S4	P6S5
P7. Length of Random Chords	P7S1	P7S2	P7S3	P7S4	P7S5
P8. New Problem	P8S1	P8S2	P8S3	P8S4	P8S5

If you need them, here are some [resources for probability](#)

Categories: [ProblemSolving](#) | [VMT](#)



navigation

- [VMT Lobby](#)
- [Wiki Main Page](#)
- [Recent changes](#)
- [Help](#)

search

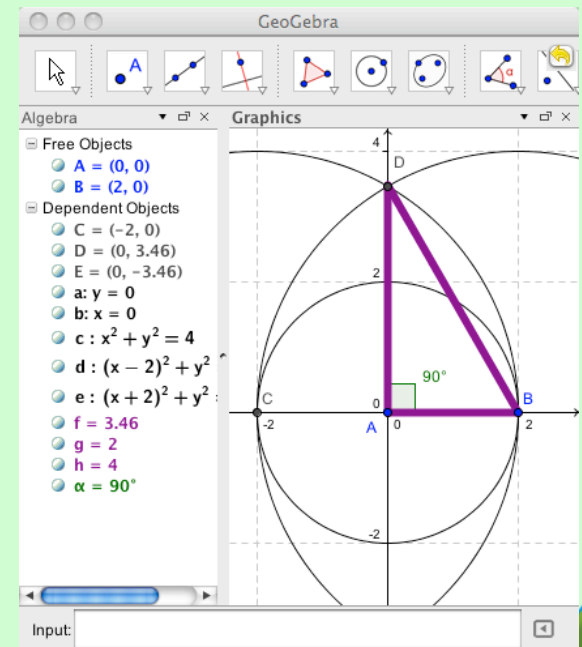
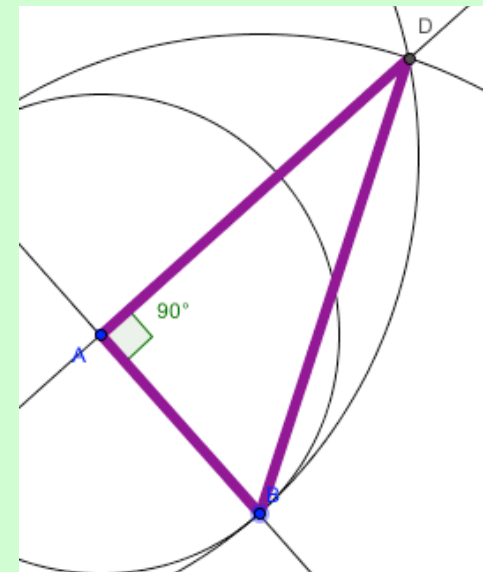
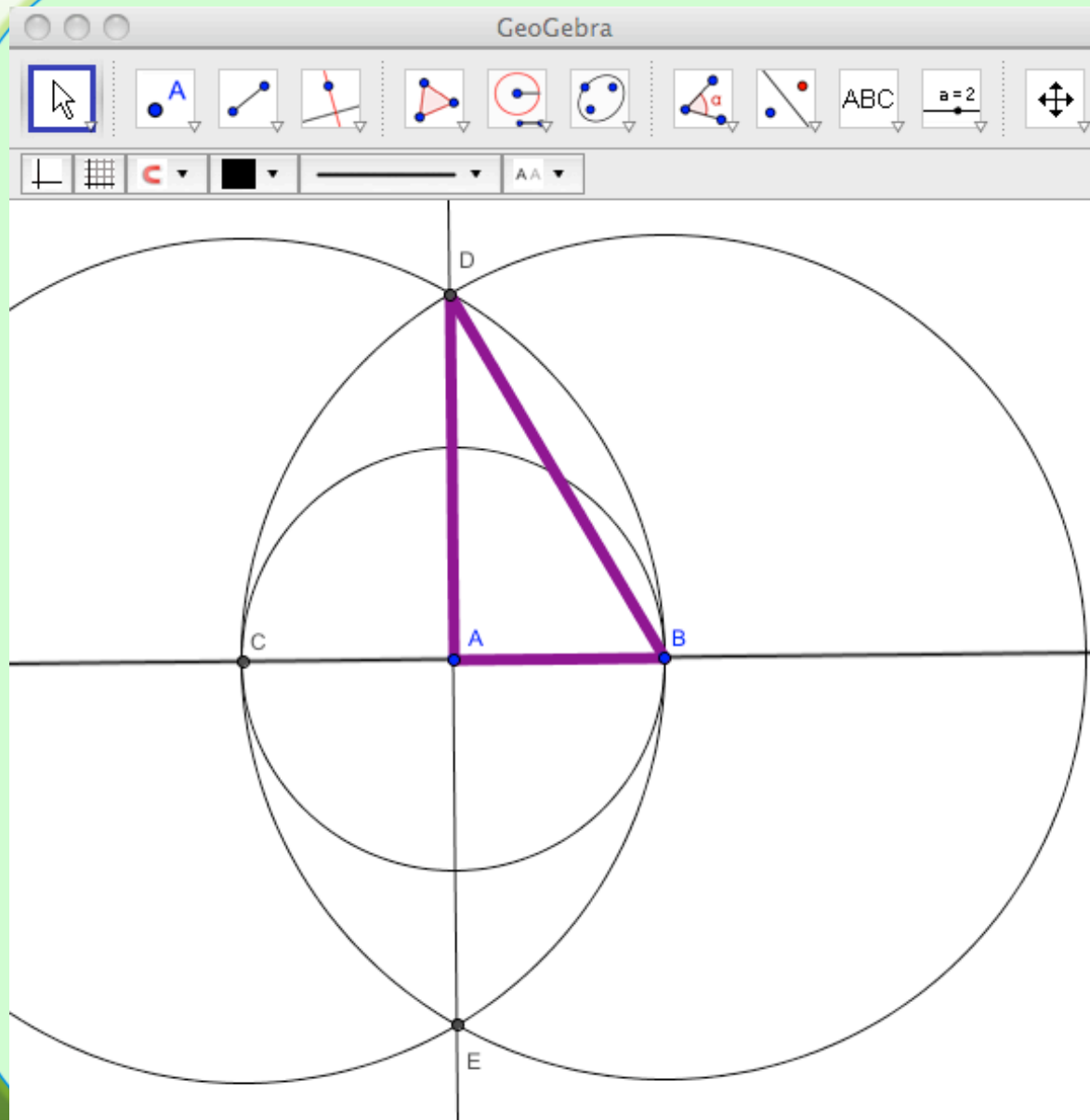
toolbox

- [What links here](#)
- [Related changes](#)
- [Upload file](#)
- [Special pages](#)
- [Printable version](#)
- [Permanent link](#)

Multi-User GeoGebra

- **Construct dynamic geometry together**
- **Drag and explore together**
- **Chat about actions and noticings**
- **See algebraic definitions and values**

Dynamic Geometry with GeoGebra



Exploration & Discourse: VMT-with-GeoGebra Construction & Chat

TabbedChat: vmt (CID:1261090089485)

File Edit Chat GG File GG Edit GG View GG Options GG Tools GG Window GG Help

Material: Whiteboard GeoGebra Summary

Algebra View Graphics View

Free Objects

- A(-0.4, 9.58)
- B(2.38, 1.76)
- C(9.24, 0.66)
- D(8.22, 6.4)

Dependent Objects

- E(3.91, 7.99)
- F(0.99, 5.67)
- G(5.81, 1.21)
- H(8.73, 3.53)
- a = 8.3
- b = 6.95
- c = 5.83
- d = 9.19
- e = 3.73
- f = 6.57
- g = 3.73
- h = 6.57
- i = 13.13
- poly1 = 48.41
- poly2 = 24.21

Auxiliary Objects

Chat (0)

EFGH, here

vmt 6:03:26 PM EST: interesting ... I dragged corner A around and watched how the areas of poly 1 and e changed

Gerry 6:04:05 PM EST: yeah, i c

Gerry 6:04:30 PM EST: poly2 seems to always be about half of poly1

vmt 6:05:14 PM EST: I bet that is always true because it is built from the midpoints of poly1

vmt 6:08:11 PM EST: Look! I connected A and C -- that forms two sets of similar triangles. I bet that if we made triangles DEH and DAC that DEH would be 1/4 the area of DAC because its b and h are 1/2

Gerry 6:10:00 PM EST: Cool! That proves it. If we draw BD, we will have 4 triangles each with a quarter the area of half the quadrilateral! Very elegant

Message:

Nice work, partner! Thanks for explaining it to me.

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Shared & Personal Spaces; Synch/Asynch

TabbedChat: Professor (CID:1328585967654)

File Edit

GeoGebra Summary A B C D Shared Whiteboard Topic Wiki

poly2

poly1

poly3

poly4

Refresh View Take Control nobody has control

Current users:
Professor

Chat (1)

- Professor leaves the room 2/6/12 11:03:57 PM EST
- Professor joins the room 2/6/12 11:24:03 PM EST
- Professor leaves the room 2/6/12 11:25:12 PM EST
- Professor joins the room 9:14:50 PM EST

Professor 9:18:40 PM EST: I moved the blue triangle

Professor 9:18:52 PM EST: So it seems to be generic

Professor 9:19:00 PM EST: or scalene

Professor 9:19:18 PM EST: I think there is an equilateral

Professor 9:19:27 PM EST: and a right triangle

Professor 9:19:38 PM EST: and probably an isosceles

Professor 9:20:03 PM EST: Does everyone else agree with my conclusion?

Message:
How do you think these were constructed?

Turn Taking for Multi-User Control

The screenshot shows the GeoGebra interface with a menu bar (File, Edit, Chat, GG File, GG Edit, GG View, GG Options) and a toolbar. The toolbar includes buttons for 'Whiteboard', 'GeoGebra', 'Summary', 'Topic', and 'Help'. Below these are 'Take Control' and 'Release Control' buttons, with arrows pointing to them. To the right are icons for a hand, a mouse cursor, a point 'A', and a line. The main workspace is split into 'Algebra View' and 'Graphics View'. The Algebra View shows a list of objects: Free Objects (A(-3.02, 0.56), B(0.22, 1.36), C(0.12, -4.42)), Dependent Objects (F(2.74, -1.4), G(-0.58, 4.6), a = 3.34, b = 0, c: $(x - 0.22)^2 + (y - 1.36)^2$, g: $-3.24x - 0.8y = -1.8$), and Auxiliary Objects. The Graphics View shows a coordinate plane with a circle, a line, and points A, B, C, F, G. A vertical text label on the left reads 'Last whiteboard action by Gerv (1:57:11 PM EDT)'.

Curricular Activities

- **Based on Common Core Standards**
- **Stress noticings and conjectures**
- **Promote math discourse**
- **Encourage collaboration**
- **Include individual reflection and group discussion**

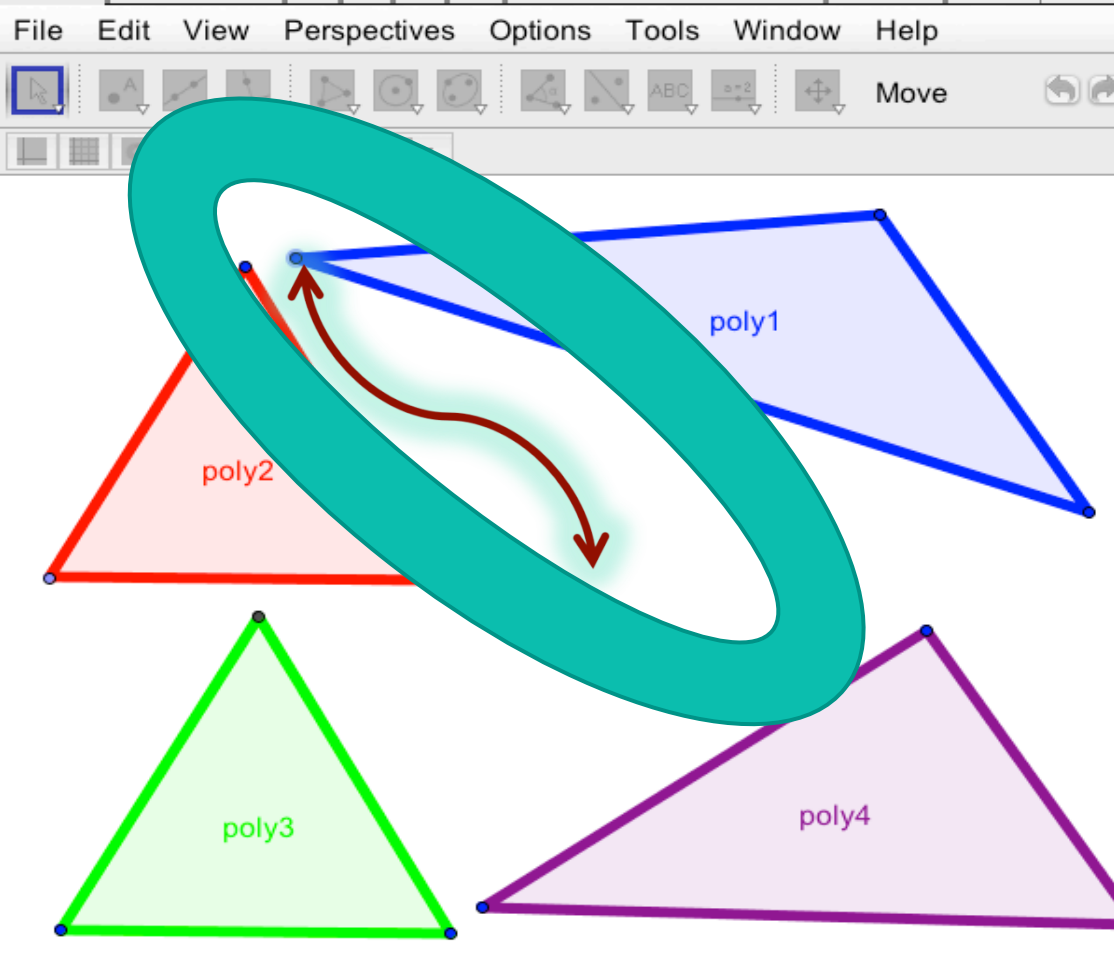
More Exploration, Less Instruction

TabbedChat: Professor (CID:1328585967654)

File Edit Chat GeoGebra

Material: GeoGebra Summary A B C D Shared Whiteboard Topic Wiki

File Edit View Perspectives Options Tools Window Help



poly1

poly2

poly3

poly4

Refresh View Take Control nobody has control

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Message: How do you think these were constructed?

Reflection on Math Discourse

- **Access to chat logs in convenient formats**
- **Wikis pages for sharing findings**
- **Replayer to review action in detail: drawing and chat coordinated in playback mode**

The VMT Re-Player

Material: GeoGebra

Current users: tutorA

Chat (0)

Free Objects

- A(-0.44, 2.6)
- B(2.06, -0.38)
- C(8.4, 4.52)
- D(2.06, 5.58)

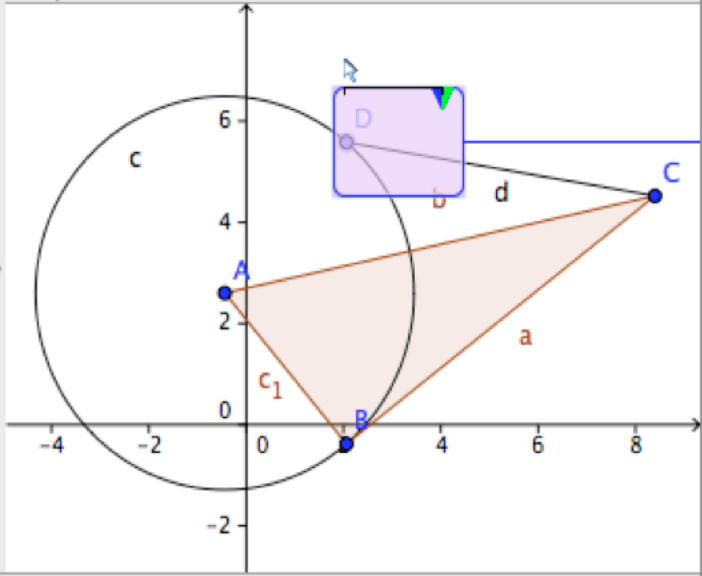
Dependent Objects

- a = 8.01
- b = 9.05
- c: $(x + 0.44)^2 + (y - 2.6)^2$
- c₁ = 3.89
- d = 6.43
- poly1 = 15.57

Auxiliary Objects

Algebra View

Graphics View



Message: Here is point D on the circle and on line segment CD. Try to drag this point and watch the circle

Speed: 1

Time to previous: -0:22 (Message by: tutorA)
Current action at: 4:39:56 PM (Awareness info)
Time to next: 0:00 (Message by: tutorA)

Time of Posting	andicat	Annie	jr6g	loretta
14:45:03			i don't know how to do a perpendicular	
14:45:16				should we do
14:45:20	i need my tool!			
14:45:24		So, Jen, what do you think would go into a		
14:45:37			a 90degree angle and	
14:45:40	i created a tool to make a perpendicular			
14:46:01				can we use the built in tool to do
14:46:13		I'm thinking that we can use the built-in perpendicular tool.		
14:46:39	oh - didn't know that			
14:46:42				its under the intersect point
14:46:47			the perpendicular tool is under the fourth	
14:46:48	i thought it was only something we created			

Professional Development

- **Special courses for math teachers**
- **Full credit toward degree and certification**
- **Flexible online offering**
- **Includes synchronous contact with other teachers**
- **Prepares for use of technology and curriculum in classrooms**

For further information

- **Gerry@mathforum.org**
- **<http://vmt.mathforum.org/vmt/courses.html>**
- **<http://vmt.mathforum.org/VMTLobby>**