



“MathBlast”

Tuesday, December 14, 2010 at Williams College
Sponsored by the Williams Center at Mount Greylock Regional School

“MathBlast” is a morning for Greylock 10th graders and math teachers to participate in hands-on activities with Williams College professors. Students and teachers will each choose four thirty-minute workshops ranging from statistics to knot theory.

The Workshops **(Students rank workshop choices on attached form)**

- **Why Knot?**
Instructor: Professor Colin Adams
- **The Shape of the Universe**
Instructor: Professor Satyan Devadoss
- **Testing Fairness**
Instructor: Professor Dick Deveaux
- **Fractals and Natural Shapes**
Instructor: Professor Cesar Silva
- **Robot Math**
Instructor: Professor Tom Garrity
- **MP3 Players and Digital Compression**
Instructor: Professor Mihai Stoiciu

The Schedule

8:55-9:05	Opening Remarks in Bronfman Auditorium
9:10-9:40	Workshops
9:50-10:20	Workshops
10:25-10:35	Snack break in Bronfman lounge area
10:40-11:10	Workshops resume
11:20-11:50	Workshops
12:00	Greylock students catch bus back to school.

“MathBlast” WORKSHOP REGISTRATION

Please look over the workshop descriptions carefully and rank the workshops 1-6, with 1 your first choice and 6 your last.

Name: _____ Teacher _____

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Morning Workshops:

Please list your workshop choices in order (Do not list workshops more than once):

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

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“MATHBLAST” WORKSHOP DESCRIPTIONS

1. **Why Knot?**
Instructor: Professor Colin Adams

Take a string, tie a knot and glue the loose ends together. How can you tell if you can disentangle the knot without cutting it open? Knot theory has applications to DNA and to synthetic chemistry, where chemists try to create knotted molecules. We will discuss various aspects of knot theory, make some human knots and talk about how to describe knots over the phone or to a computer.

2. **The Shape of the Universe**
Instructor: Professor Satyan Devadoss

People used to believe our Earth was flat, but now we know it's a sphere. So what is the shape of our universe? Does it have an end? How can we possibly understand its shape when it always surrounds us? Find out the answers based on the simple idea of multiplying pictures.

3. **Testing Fairness**
Instructor: Professor Dick De Veaux

If we spin a coin 100 times and we get 52 tails, should we decide it isn't fair? What if we got 60 tails? 90? How many tails would you need to decide? We'll collect data by spinning pennies from the 1960s (which some people say come up tails too often.) Using statistics, we'll see if they are "fair" or not.

4. **Robot Math**
Instructor: Professor Tom Garrity

How can a robot "see" the world? One approach is to use geometry and polynomials as a description of the world, allowing the robot to see (and thus move about and interact with us) by doing math.

5. **Fractals and Natural Shapes**
Instructor: Professor Cesar Silva

Natural shapes such as trees, clouds and feathers are difficult, if not impossible, to model with Euclidean geometry, but they *can* be described with fractals. You will learn how to produce fractals using a simple computer program and then you will create your own fractals.

6. **MP3 Files and Digital Compression**
Instructor: Professor Mihai Stoiciu

Have you ever wondered why an MP3 file takes so little space on your hard drive, MP3 player, or iPod? An MP3 file is obtained through digital compression, a procedure which takes out sounds that the human ear cannot hear very well, making the file smaller. In this workshop we will describe the beautiful mathematical ideas behind digital compression.