MATH 123

Learning Math by Teaching Math
Spring 2006

1   Technical Information

Math 123, Learning Math by Teaching Math meets twice a week. We will meet every Monday and Wednesday from 12pm-2pm. Mondays will be regular class meetings in DRL, whereas on Wednesdays we will visit University City High School (UCHS).

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Course web page: `http://s89940423.onlinehome.us`

2   Goals of the Course

In this course, you will:

- Learn new ideas in geometry and examine your understanding of previously learned geometry;

- Develop effective methods for teaching with understanding; and

- Explore the context in which geometry is taught in high school.

3 Course Structure

3.1 In the Classroom

This class will be split between sessions at Penn and sessions at UCHS. For the first three weeks of class, we will be at Penn full-time. We will use this time to refresh your geometric knowledge, to discuss pedagogical strategies, and to learn about the context in which you will be teaching.

Once the Philadelphia Public School District semester begins, we will spend one class per week at Penn and one class per week in the high schools. The Penn session will be devoted to specific preparation for the upcoming high school session: discussing issues brought up in the previous weeks session, exploring the geometric topic of the week, and analyzing the week's geometric activity in preparation for teaching it. The activities are designed to do one or more of the following:

1. Reinforce concepts taught during the regular class with which students usually have trouble;

2. Place concepts in new contexts and make connections between them;

3. Enrich the students' experience by showing them geometry they ordinarily would not see.

During the high school sessions, half of the class will go to UCHS with Michael to work with Scott Koehler's 10th grade geometry class; the other half will go to UCHS with Clay to work with Marcus Smith's 10th grade geometry class. You will go to the same high school each week so that you have the opportunity to develop a relationship with the students. During these sessions, we will take over the geometry class in order to do the activity discussed during the Monday session with the students. You are responsible for bringing copies of the labs and any materials necessary to do them (materials and copies will be given to you in class at Penn on Monday). You will usually be working two-on-two or one-on-two with the high school students, guiding them through the week's activity. At the end of the lab, both you and your student(s) will evaluate how the lab went, and you will provide additional feedback to your student(s).

The Sayre group will then reconvene back at Penn to discuss how the day's session went. The UCHS group, on the other hand, will meet at Penn prior to going to UCHS.

3.2 Weekly Readings

You should come to Monday classes having read:

- The chapters of the geometry textbook that the high school students have gone through that week (these will be posted each Wednesday).

- The week's lab (again, posted each Wednesday).

- Any articles handed out the previous Monday (which will generally be short but pertinent).

All course materials will be provided by the Penn Math Department and the Access Science program.

3.3   Assignments and Grading

Your grade in this course will be based on the following three criteria:

Class Participation (50%): This includes your contribution to class discussions and math activities at Penn as well as your dedication to teaching in the high school classroom. *By taking this class, you are making a commitment to your student(s), so attendance is essential. Even one unexcused absence will be detrimental to your class participation grade.*

Journal (20%): You should keep a journal (with at least weekly entries) that records your thoughts about:

- Your experience in the high school classroom: What motivates your student(s)? What are your students' preconceptions about the material? What techniques worked and should be continued or emphasized? What needs to be improved, and how will you improve it?

- The readings and in-class activities: How (if at all) do they relate to your own educational experience? How (if at all) do they relate to your experience in the high school classroom? How can you incorporate their ideas into your teaching?

These questions are, of course, just a guideline; you should feel free to explore what interests you–you can even write about the geometry itself if you want. You should keep your journal in electronic format on the course webpage; the weekly journal entries should be submitted **each Friday**. It doesn't have to be long (a couple of paragraphs each week is fine), but you should put a fair amount of thought into it.

Project (30%): You will work with a group of other Penn students to create your own geometry activity. The process of completing your activity will be spread out over the course of the semester, with both individual and group milestones every couple of weeks. We will then teach the activities you create during the last two weeks of class.

4   Weekly Schedule

The following schedule is subject to change

Monday	Wednesday
9 January Introduction to Math 123	**11 January** Student reactions, teaching styles
16 January MLK Holiday No class	**18 January** Introduction to the School District of Philadelphia
23 January Class discussion	**25 January** Class discussion
30 January Class discussion	**1 February** 1st visit to UCHS
6 February Prepare for first activity	**8 February** Geometry Taboo
13 February Pick's Theorem dry run	**15 February** Pick's Theorem
20 February The Koch Snowflake dry-run Fractal dimension & the Cantor set	**22 February** Digital Camera dry-run *idea for final project topic* *due in journal entry*
27 February Koch Snowflake or Digital Camera Lab at UCHS	**1 March** Benchmark test No UCHS visit
6 March Spring Break No Class	**8 March** Spring Break No Class
13 March TBA	**15 March** TBA
20 March Non-Euclidean geometries *rough draft of activity due*	**22 March** Alternate Pythagorean Theorem
27 March *list of materials due*	**29 March** Activity to be determined
3 April Euler characteristic	**5 April** Platonic Solids
10 April *final projects due this week*	**12 April** High School Spring Break No class visit
17 April	**19 April** Implement final projects