

Project Math

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This is a math course that was designed for adult education diploma classes (the classes met for 3 hours a night for 15 weeks.) The goal was to immerse the student in a 'real life' project and, through the project, learn math and critical thinking skills. The course can accommodate a wide range of math levels, but students should have good arithmetic skills. I taught this class once (at the time of this writing) in the spring of 2007, and have since revised about 20% of the material.

There are four units – the stock market, designing and building toothpick bridges, buying a car, and topography. The beginning page of each unit gives an overview of the lesson plans, the math skills taught, and any out of the ordinary materials you will need (a detailed materials list is found with each lesson plan). The stock market unit and buying a car unit require the use of the internet. The stock market is designed to be set up on the first class and followed for the rest of the semester, trading as often as you would like. Trading is time consuming, so it will affect the flow of the other units. (The lessons are set up to spend about 15 or 20 minutes on stocks, with the rest of the class time on the project.)

All work is designed to be done in groups. Be sure the students understand this when they register for the class. The size varies depending on the project. The stock and the car units are best done in pairs (I found that the physical layout of the computers limits communication between more than two people), and the stock and topography units can have group sizes of 3 or 4. Encourage the students to discuss the problems with their group first before asking the teacher for help.

Assessment was a difficult piece to work out for this class. The purpose of this class was to engage the student as much as possible and all of the work was done in class. (The homework reviews the concepts covered – it is not more work on the project). I felt that the grading should reflect this. The students received a class grade every night, totaling 50 points. I included grade sheets with each lesson plan, and I passed these out to the students at the beginning of class so they knew exactly what was expected of them. The grade sheets gave 10 - 15 points for their stock work, and the remaining points to each task the student was to complete. I carried a red pencil as I walked from group to group, so I was checking off their work as they were doing it. For example, if a worksheet packet was worth 30 points, I figured out how many points I wanted each question to be worth, and graded their worksheets as the class progressed. This took a little getting used to, but, since the students are in groups, I only needed to check the work/calculations of each group, and not each student (although I needed to check to see that each student was doing the work). Leave time at the end of the night to tally and record each

student's grade sheet. If you do a lot of stock trading, you will want to change the grade sheet, so that the number of points reflects the class time spent.

There are also quizzes and/or a test and/or a project for each unit. Since the units are so different, I did not feel a final made sense and the students had an end of the unit test (on topography) on finals night. Since I wanted to encourage the students to do the work while they are in class, and because some students have such large test anxiety, I counted the tests and quizzes as only 25% of their grade; homework counted as 10% and their class work (the 50 points weekly grade sheet) counted as 65% of their grade. The philosophy being – if they did their class work, they would do well in the class!

The units are laid out as follows: 6 classes for the bridge unit, 5 classes for the car buying unit, and 4 classes plus a test for the topography unit (the stocks are ongoing throughout the course). When you include the first class to set up the stocks and do some group activities (described in the next paragraph), you can see this comes to 17 classes. (This is because I added a project to the car buying unit – the students really liked this unit and I thought the project fit well). Obviously, some things need to be cut and I include suggestions in the beginning of each unit on things you can leave out. Also, the listed number of classes per unit assumes limited stock work of 15 -20 minutes per class (described in more detail in the stock unit). If the students pick more than two stocks and trade often, this will fill up class time and expand the number of classes needed for the other units, so you may be able to leave out a unit out entirely. The units can be done in any order; they are independent of each other.

First Class

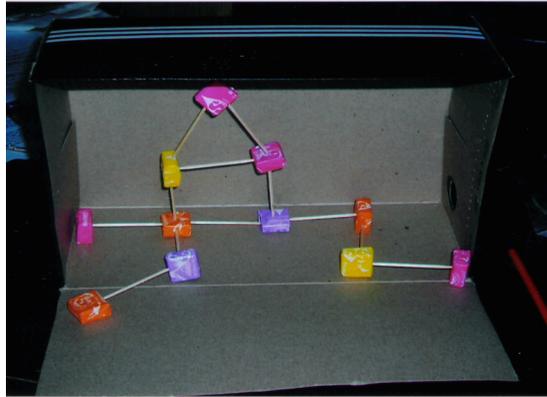
Materials needed:

- Toothpicks
- Starbursts
- Shoebox
- string

After reviewing the course layout, grading, expectations, etc of the course, it is a good idea to do a couple of fun group activities so the students can get to know each other a bit and get used to working in groups. I used the following two activities. The first is called the starburst activity; this was used in my daughter's eighth grade pod at the Cooperative Middle School in Stratham. Break the students into groups of at least three, four or more is better. Create a structure out of toothpicks and starbursts, such as the one pictured below (one for each group). Place each structure in a shoebox at one end of the room so it is hidden from view. At the other end of the room, provide toothpicks and starbursts. The idea is for the students to recreate the

structure in detail, including color and orientation of the starburst, but, only one person in the group can see the structure. This person is called the looker. Assign one other person in the group to be the builder. The rest of the group walks between the looker and the builder. They get directions from the looker and relay them to the builder. No drawings or sketches are allowed – they can only use words. The first group to recreate the structure correctly wins.

Sample structure:



The second activity, string shapes, comes from Ruth Estabrook's Active Mathematics book, p.60, available through Adult Education (a wonderful book!). Break the students into teams, again with a minimum of three people per team, but four or more is better. Each group gets a 20 foot long piece of string tied together to make a large loop. You will call out the names of a variety of shapes, and each group must work together to make the shapes. The first team to make the shape correctly gets a point. Some shapes you could use are circle, rectangle, square, acute triangle, obtuse triangle, equilateral triangle, pentagon, hexagon, parallelogram, diamond, isosceles triangle, trapezoid, rhombus, scalene triangle, etc. Most of the students have seen these words before and it creates some discussion as they try to remember them.

After finishing these activities, spend the rest of the class having students set up their stock portfolios.