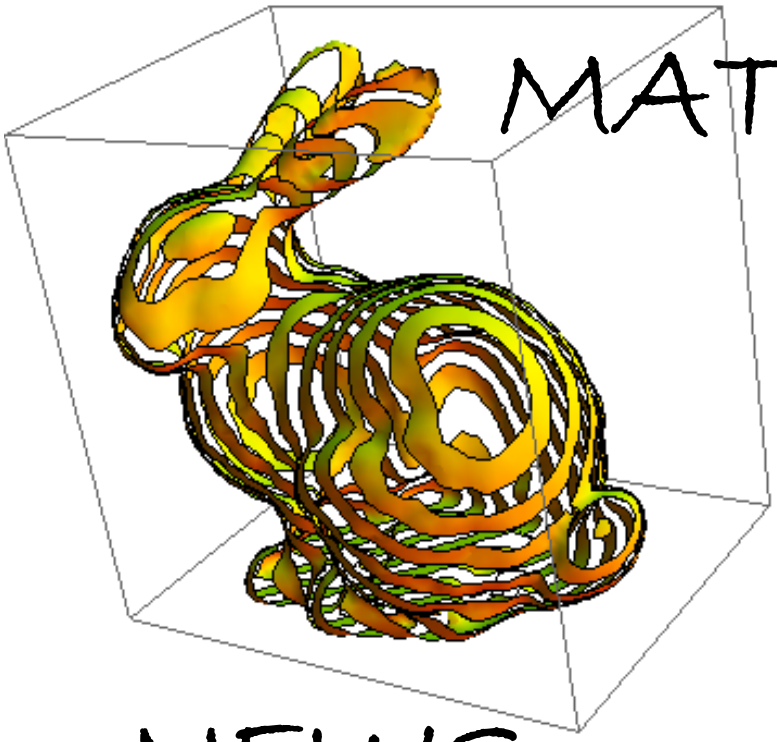

MATYCONN

Mathematical Association of Two-Year Colleges of Connecticut

NEWS

SPRING 2008

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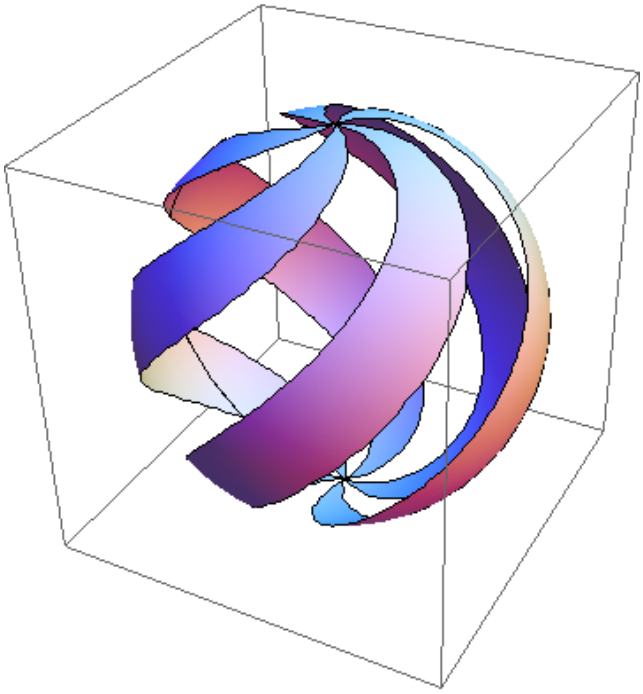

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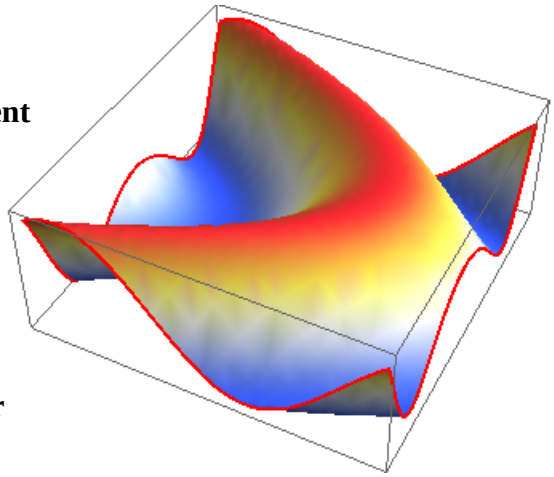

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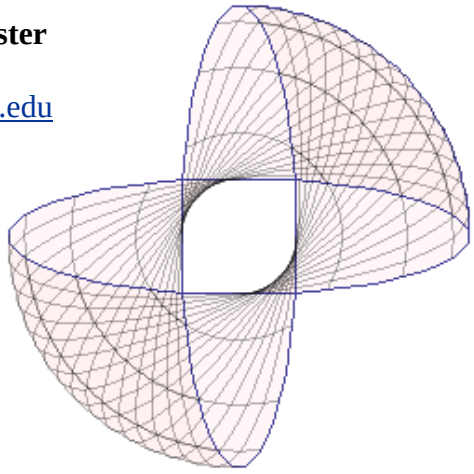

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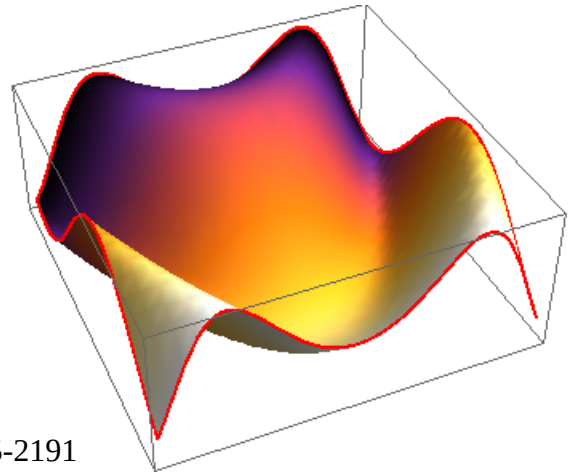

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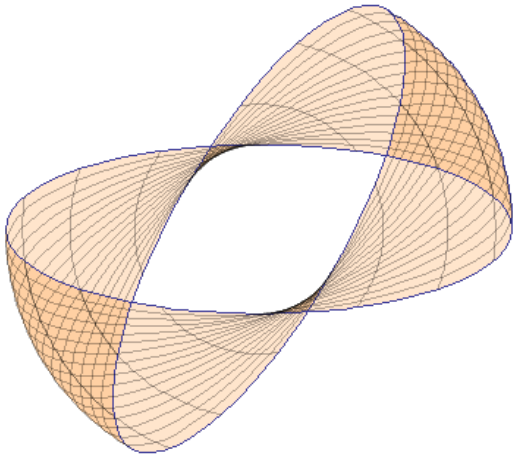

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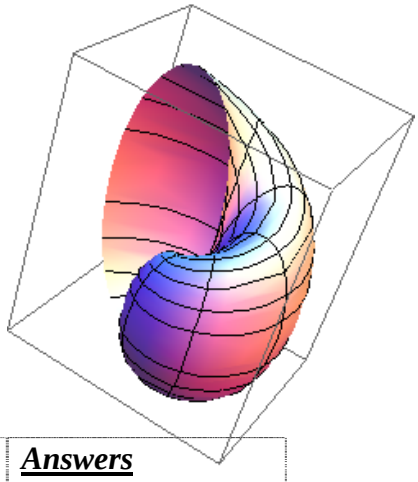
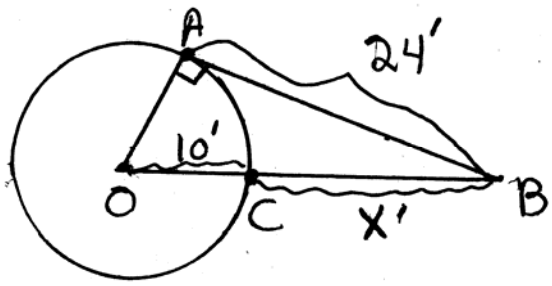


18th ANNUAL MATH CONTEST

The 18th Annual Math contest took place on Saturday, April 5, 2008, across the Connecticut Community College system.

2008 STUDENT MATH CONTEST

Questions	***Answers***
EACH OF THE FOLLOWING PROBLEMS, 1 THROUGH 6, IS WORTH ONE (1) POINT.	
1. COMPUTE AND SIMPLIFY, GIVEN THAT A IS NOT EQUAL TO ZERO, AND R IS NOT EQUAL TO 1: $[A - AR^2] / [AR - A]$	1. $-1 - R$ OR $-(1 + R)$
2. CHIEN MING-WANG WON 14 LESS THAN TWICE AS MANY GAMES AS JOSH BECKETT. BECKETT WON 2 FEWER GAMES THAN WANG. HOW MANY GAMES DID WANG WIN?	2. 18
3. THE AVERAGE OF SEVEN NUMBERS IS 9. IF YOU ADD A NEW VALUE OF 17, THEN WHAT IS THE NEW AVERAGE?	3. 10
4. COMPUTE AND SIMPLIFY: $[1+1/2+1/4+1/8]^{-1}$	4. 8/15
5. A CLASS OF 30 GIRLS AND 40 BOYS SPONSORED A HAYRIDE. IF 60% OF THE GIRLS AND 25% OF THE BOYS WENT ON THE RIDE, THEN WHAT PERCENT OF THE CLASS WENT ON THE RIDE?	5. 40 %
6. A FREIGHT TRAIN ONE MILE LONG IS TRAVELING AT A STEADY SPEED OF 20 MILES PER HOUR. IT ENTERS A TUNNEL ONE MILE LONG AT 1:00 pm. AT WHAT TIME DOES THE REAR OF THE TRAIN EMERGE FROM THE TUNNEL?	6. 1:06 PM
EACH OF THE FOLLOWING PROBLEMS, 7 THROUGH 14, IS WORTH TWO (2) POINTS.	
7. IN A SEQUENCE OF FIVE INTEGERS, THE THIRD INTEGER IS THE SUM OF THE PREVIOUS TWO, THE FOURTH INTEGER IS THE SUM OF THE PREVIOUS 3, AND THE FIFTH INTEGER IS THE SUM OF THE PREVIOUS 4. IF THE SUM OF THE FIVE INTEGERS IS 248, THEN WHAT IS THE VALUE OF THE THIRD INTEGER?	7. 31
8. ON CLAUDIA'S BIRTHDAY IN 2004, HER AGE WAS FOUR TIMES HER BROTHER'S AGE ON THAT DAY. ON HER BIRTHDAY IN 2005, HER AGE WAS THREE TIMES HER BROTHER'S AGE ON THAT DAY. IN WHAT YEAR WILL CLAUDIA'S AGE, ON HER BIRTHDAY, BE TWICE HER BROTHER'S AGE ON THAT DAY?	8. 2008

9. IN THE FOLLOWING DIAGRAM, SOLVE FOR X.  	9. 16 FT.
10. IF P IS A PRIME NUMBER, THEN FIND ALL VALUES OF P (< OR = 11) SUCH THAT $2^{(P-1)} + 1$ IS ALSO A PRIME NUMBER.	10. 2,3,5
11. YOU HAVE $2.05 IN NICKELS AND DIMES. IF THE NUMBER OF NICKELS IS 3 LESS THAN TWICE THE NUMBER OF DIMES, THEN HOW MANY NICKELS DO YOU HAVE?	11. 19
12. WHAT IS THE 209^{TH} DIGIT AFTER THE DECIMAL POINT IN THE REPEATING DECIMAL .76234 ?	12. 3
13. THE HYPOTENUSE OF THE SMALLER OF 2 SIMILAR ISOSCELES RIGHT TRIANGLES IS 2* SQUARE ROOT OF 2 CM. IF THE PERIMETER OF THE LARGER TRIANGLE IS TWICE THAT OF THE SMALLER TRIANGLE, THEN WHAT IS THE LENGTH OF EACH OF THE 2 CONGRUENT LEGS OF THE LARGER TRIANGLE?	13. 4 CM.
14. AN AIRPLANE FLIES ROUND TRIP, GOING A DISTANCE OF L MILES EACH WAY. THE VELOCITY WITH HEAD WIND IS 160 MPH, WHILE THE VELOCITY WITH TAIL WIND IS 240 MPH. WHAT IS THE AVERAGE SPEED FOR THE ENTIRE ROUND TRIP?	14. 192 MPH
EACH OF THE FOLLOWING PROBLEMS, 15 THROUGH 20, IS WORTH THREE (3) POINTS.	
15. TOMMY DECIDED, ONE DAY AFTER LOOKING IN THE MIRROR, THAT HE NEEDED SOME EXERCISE, AND HE NEEDED IT NOW! AND SINCE HIS BIKE HAD 2 FLAT TIRES, HE DECIDED TO GO FOR A JOG. SO THE NEXT MORNING, AT THE CRACK OF DAWN, HE LACES UP HIS KEDS, AND BEGINS JOGGING RIGHT OUTSIDE HIS FRONT DOOR. FIRST, HE RUNS ON A LEVEL ROAD, THEN HE COMES TO A HILL, AND RUNS TO THE TOP. WHEN HE GETS TO THE TOP OF THE HILL, HE THEN TURNS AROUND, AND HE RUNS BACK EXACTLY THE WAY HE CAME. NOW, ON LEVEL GROUND, TOMMY CAN RUN AT 8 MILES PER HOUR. UPHILL, HE RUNS AT 6 MILES PER HOUR, AND DOWNHILL, AT 12 MILES PER HOUR. UPON HIS RETURN HOME, AND BEFORE COLLAPSING ON THE KITCHEN FLOOR, HE NOTICES THAT HE HAD RUN FOR EXACTLY 2 HOURS. SO THE QUESTION IS: HOW FAR DID HE RUN?	15. 16 MILES

16. THE DOOMSDAY MOTEL CHARGES $40 PER NIGHT, WHEN EACH OF THEIR 60 ROOMS IS FULL. FOR EACH VACANT ROOM, THEY ADD $1 MORE TO THE PRICE OF THE ROOM. HOW MUCH SHOULD THEY CHARGE PER NIGHT, SO AS TO MAXIMIZE THEIR REVENUE?	16. $50 PER NIGHT
17. IN THE FOLLOWING SYSTEM OF EQUATIONS, FIND ALL POSSIBLE VALUES OF A, IF L1 IS PARALLEL TO L2. L1: AX + 3Y = 6. L2: 3X + AY = 16.	17. A= 3 OR – 3.
18. IN THE FOLLOWING DIAGRAM, THE RADIUS OF THE SMALLER CIRCLE IS R, AND THE RADIUS OF THE LARGER CIRCLE IS 3R. WHAT IS THE RATIO OF THE AREA OF THE LARGE INSCRIBED SQUARE TO THE AREA OF THE SMALL INSCRIBED SQUARE? 	18. 9:1
19. FIND THE SMALLEST INTEGER P, SUCH THAT P/2 IS A PERFECT SQUARE, AND P/3 IS A PERFECT CUBE.	19. 648
20. ON SATURDAY, MIKE RECEIVED HIS PAY, AND SPENT 1/3 OF IT. ON SUNDAY, HE SPENT 1/3 OF THE REMAINING MONEY, AND ON MONDAY, HE SPENT ½ OF WHAT REMAINED FROM SUNDAY. IF $10 THEN REMAINED, HOW MUCH PAY DID HE RECEIVE ON SATURDAY?	20. $45.

2008 MATYCONN SCHOLARSHIP RECIPIENTS

Phuong Diep Wilk, Tunxis Community College - First place

Juan Navarro, Norwalk Community College - Second place

Ethan Morehouse, Three Rivers Community College - Third place

ARTICLES

A BRIEF SYNOPSIS OF FEMALE MATHEMATICIANS

In order to set the stage for discussions on Gender Differences in Learning Mathematics, we begin with a short list and description of female mathematicians from 555 BC through the twentieth century. This is meant to show a continuum of meaningful female participation in mathematics from some of the earliest mathematical movements recorded. It also is meant to demonstrate that female mathematical participation is not "lightweight", having profoundly influenced mathematical thought. Similarly, it is included to provide context for discussions on gender differences in mathematics as well as to make them more interesting and accessible.

Theano

Women have been forcefully active in mathematics at least since the time of ancient Greece. One of the more well known instances of this relates to Pythagoras and his followers. Pythagoras (about 530 BCE) was an ancient Greek mathematician, astronomer and philosopher who founded a religious organization and school in Kroton, Italy (Pythagoras (530 B.C.), 2005, pp. 1-2). One of the organization's tenets was the practice of including women in all aspects of Pythagorian communal life, including the study and teaching of mathematics. In fact, Pythagoras has been referred to as the "feminist philosopher" (Osen, 1974, p. 15).

Less well known is his marriage to one of his students, Theano, who was 36 years his junior. The couple produced five children: three girls and two boys (Theano of Crotona (Italy), n.d., p. 1). Theano, the daughter of a physician named Brontinus, was highly educated (Thean of Thurii, 2001, p. 1). She was a great philosopher, scholar and mathematician in her own right. After Pythagoras' death, with the help of her three daughters and one of her sons, Theano became the head of the Pythagoras school. It is said that without her leadership it is unlikely ancient Mediterranean society would have been as influenced by the ideas of the Pythagorean Brotherhood (Theano of Crotona, n.d., p 1).

Theano has been credited on a number of topics, including cosmology, child psychology, numbers and virtue. According to tradition, her most well known treatise is the "The Theorem of the Golden Mean" (Theano of Thurii, 2001, p.1). The fact that Theano played such a central role in maintaining the Pythagorean order is no small matter, as the school is said to have influenced the thoughts of Plato, Socrates and Pericles. In Plato's "The Republic", Socrates' philosophical discussion with Glaucon concludes that male and female natures are alike enough such that both genders should experience similar educations:

> *…but if the difference consists only in women bearing and men begetting children, this does not amount to a proof that a woman differs from a man in respect of the sort of education she should receive; and we shall therefore continue to maintain that our guardians and their wives ought to have the same pursuits…..there is no special faculty or administration in a state which a woman has because she is a woman, or which a man has by virtue of his sex, but the gifts of nature are alike diffused in both…(Claeys and Sargent, 1999, pp. 29-30).*

The great statesman Pericles was deeply connected with a most extraordinary woman by the name of Aspasia. Aspasia played a strong role in influencing Pericles' belief that women should equally participate in the intellectual pursuits of men. Reportedly she wrote many of Pericles' speeches and influenced Plato's "Republic." Socrates also named her as one of his teachers (Osen, 1974, pp.19-20). Hence the Pythagorean practice of female participation in all or most parts of life continued to affect the thinking of ancient Greek rulers. This belief did not permeate throughout all of Greek life, however, since most women of that time period were not permitted to pursue intellectual endeavors. But the fact that some of Greece's rulers embraced the idea of educating women is a testament to Pythagorian wisdom as well as to the open minds of Socrates, Plato and Pericles.

Hypatia

Approximately one thousand years after the time of Theano, there lived another great female mathematician that history recorded. Her name was Hypatia and her life is at once both brilliantly stellar and worthy of a Greek tragedy. Hypatia was born in Alexandria about A.D. 370 and her father Theon was a prominent professor of mathematics at the University of Alexandria. Hypatia's upbringing unfolded at the world's greatest center of learning of her time. Her education included arts, literature, science, philosophy, and mathematics. Alexandria attracted scholars from all over the known world. It was in such an atmosphere of "learning, questioning and exploration" that Hypatia's childhood flourished (Osen, 1974, p. 23).

Not only did Theon instruct his daughter in intellectual excellence but he also invented a series of physical exercises for her in order that her body be maintained in as top condition as her mind. Reportedly, by age twenty she was five foot nine and highly athletic. She could ride horses, mountain climb, swim, and row (Hubbard, 1928, p. 2). Additionally, she had developed the art of rhetoric and was an excellent orator. In ancient Rome, orators were held in high regard. The ability to impress others through the use of speech was considered "the gift of gifts" until the Italian Renaissance introduced printing, after which the written word became highly prized (Hubbard, 1928, p. 2).

Hypatia wrote a number of mathematical treatises most of which were burned during the destruction of the Great Library of Alexandria. In the fifteenth century a portion of her treatise "On the Astronomical Canon of Diophantus" was located in the Vatican library. Other writings included "On the conics of Apollonius", "Almagest" and at least one treatise on Euclid. She also gave lectures on the "Arithmetica of Diophantus" to students from Europe, Asia, and Africa, which discussed first-degree and quadratic equations. Hypatia offered alternative solutions to some of these, as well as new algebraic problems (Osen, 1974, pp. 26-27).

Hypatia is also credited with a number of inventions. These include an instrument that distilled water, a tool to measure the specific gravity of water, a planisphere and an astrolabe. (Osen, 1974, pp. 28). Astrolabes are used to calculate the altitude of planets and stars, and planishperes show the positions of stars at a given point in time (Funk and Wagnalls, 1980, p.p. 42 and 606).

Hypatia was a Neoplantonist and, as such, practiced scientific rationalism. To quote Hypatia:

> *Neoplatonism is a progressive philosophy, and does not expect to state final conditions to men whose minds are finite. Life is an unfoldment, and the further we travel the more truth can we comprehend. To understand the things that are at*

our door is the best preparation for understanding those that lie beyond (Hubbard, 1928, p.1)

Unfortunately, such views were considered heretical by the early Christian church. The fact that Hypatia was both pagan and female further served to make her a target of the political forces of the time (Osen, 1974, p. 29). The new Christian bishop and future saint, Cyril, was threatened by Hypatia's lectures and writings (Hypatia, n.d., p. 1). Reportedly, Hypatia had impressed Orestes, then Roman Governor of Alexandria. "To rule by fettering the mind through fear of punishment in another world is just as base as to use force" she said in a lecture that Orestes attended (Hubbard, 1928, p. 8). She wrote that "All formal dogmatic religions are fallacious and must never be accepted by self-respecting persons as final" (Hypatia, n.d., p. 1).

Socrates Scholasticus, writes of her execution in his "Ecclesiastical History":

…it was calumniously reported among the Christian populace, that it was she who prevented Orestes from being reconciled to the bishop. Some of them, therefore, hurried away by a fierce and bigoted zeal, whose ringleader was a reader named Peter, waylaid her returning home, and dragging her from her carriage, they took her to the church called Caesareum, where they completely stripped her, and then murdered her with tiles. After tearing her body in pieces, they took her mangled limbs to a place called Cinaron, and there burnt them (Scholasticus, n.d. p. 1).

Truly, Hypatia's murder is a tragedy on par with the burning of the Library of Alexandria. Sadly, after Hypatia there was no continuance of her mathematical work due to the suppression of the dark ages. It was a time during which dogmatic religious fervor prevailed over science and mathematics. Men made few advances in mathematics and women contributed even less. The dark ages lasted for a millennium, after which the renaissance surfaced and the likes of Descartes, Newton, and Leibniz, would once again promote the cause of mathematics. (Osen, 1971, p.33).

Maria Agnesi

History records the fall of Rome as taking place in A.D. 476 after which Europe fell under the spell of the dark ages. During this period of time, education was difficult to come by and little progress was made in mathematics. Usually, the only opportunity provided for education was found in monasteries and nunneries. This was especially true for women as reading and writing were considered tempting and sinful (Osen, 1974, pp.33-34). Very few women managed to contribute to mathematics during the dark ages. Saint Hildegard from the Rhine and Hroswitha, a tenth century Saxon nun, are two exceptions (Osen, 1974, pp. 34-35).

During the Renaissance, Italy's attitude toward female education was highly enlightened and females were able to learn math, arts, literature and medicine. In fact, it is written that Italian men admired intelligent women and never ridiculed them for being educated (Unlu, 1995, p.1).

It was under these conditions that a most remarkable female was born on May 16, 1718 in Milan to a wealthy family. Her name was Maria Agnesi and her father, Pietro Agnesi, was a learned man who provided her with excellent tutors from the church. Young Maria was a brilliant student and by age 20 participated in debates her father arranged in his home for male guests. These debates were conducted completely in Latin

(O'Conner and Robertson, 1999, p.1). Reportedly, she learned five languages: Greek, Hebrew, Latin, French, and Spanish, as well as philosophy and science (Maria Agnesi, 1999-2006, p.1). During her teen years she studied Descartes, Newton, Leibniz, and Euler (Tee, 1983, p.1). At some point in her upbringing, Maria's mother died and Pietro Agnesi married twice more, producing a total of 21 children. In addition to her own educational training, it was Maria's responsibility to tutor her siblings (Maria Agnesi, 1999-2006, p.1).

One of Pietro's frequent guests was a monk named Ramiro Rampinelli who was a mathematician and former professor in Rome and Bologna. Rampinelli helped Maria with her studies in mathematics, using Reyneau's text "Analyse Demontree." Through his encouragement, she wrote a book on calculus, which was her most important work (O'Connor and Roberston, 1999, p. 4). It started out as a textbook for her brothers but as she became more involved in its writing, it grew into something much more (Riddle, 1995-2008, p.2). It took her ten years to complete, was two volumes long and dealt with both integral and differential calculus. Reportedly, there were times when she would work on a difficult problem all day long without resolution. Then, at night, she would rise to solve the problem while in a semi-sleepwalking state (Osen, 1974, p.42).

In 1748, "Analytic Institutions for the Use of Italian Youth" was published (Tee, 1983, p. 1). It was over one thousand pages long, volume one "covered arithmetic, algebra, trigonometry, analytic geometry and calculus", and volume two "covered infinite series and differential equations" (Maria Agnesi, 1999-2006, p. 1). One of the wonderful aspects of "Analytic Institutions" is that it coherently pulled together mathematical writings as diverse as Leibniz and Newton. Maria's fluency in several languages and her extensive scholarly background played a great role in her ability to translate and assemble mathematics from scattered sources (Osen, 1974, p. 43). The book was an academic success and as such was used as a textbook for teaching calculus. The French Academy of Science wrote in 1749:

> *This work is characterized by its careful organization, its clarity and its precision. There is no other book, in any language, which would enable a reader to penetrate as deeply, or as rapidly, into the fundamental concepts of analysis. We consider that treatise the most complete and best written of its kind (Tee, 1983, p.1).*

Included in "Analytic Institutions" is a discussion on a cubic curve today referred to as the "witch of Agnesi." In truth, the curve has absolutely nothing to do with witches and it obtained its name from a mistranslation of the Italian into English. The original Latin name is "versoria," meaning a "rope which turns a sail" (O'Connor and Robertson, 1999, p.4). "Versoria" was then written in Italian as "la versiera". This Italian version made its way to an Englishman who mistook "la versiera" to be "l'aversiera" which refers to "the witch" or "the she-devil" (O'Conner and Robertson, 1999, p.4). Hence, this cubic curve is today referred to as "the witch of Agnesi," the irony of which will be apparent later.

As a result of her book, Pope Benedict XIV appointed her to instruct mathematics at the University of Bologna and issued her a diploma from the University (Osen, 1974, p. 46). He also gave her a gold medal and gold wreath adorned with jewels. The Bologna Academy of Science selected her as a faculty member (Tee, 1983, p.1). Further, Maria had dedicated "Analytic Institutions" to the Empress Maria Theresa who in return

awarded Maria with a diamond ring and small crystal box covered in precious stones (Osen, 1974, p. 46).

It is unlikely that Maria accepted these positions. When her father died in 1751 she decided to dedicate the rest of her life to her true longing, i.e, the charitable caring for others. Her home was turned into a shelter for poor, sick, old women. Of Maria's efforts to help the unfortunate, Sister Mary Thomas wrote, "To extend her work more and more she saved on dresses, on her meals, and on her dear books, she did not hesitate to sell her imperial gifts and even the crown set with precious jewels given her by Pope Benedict XIV" (Osen, 1974, p. 47). In 1771, the archbishop requested that Maria run the Pio Institute Trivulzio, which was a home for the ill. Eventually she became a full time resident at the Institute. On January 9, 1799, she died at age eighty-one. She was buried in a common grave which contained the remains of fifteen old people. Although her grave is that of a pauper, Maria was, and still is, greatly honored in Italy. Streets in Milan, Monza, and Masciago are named after her. A school in Milan has her name as do scholarships dedicated to poor girls (Osen, 1974, pp. 47-48). In Luogo Pio, where she was buried, there is a cornerstone which reads "erudite in Mathematics glory of Italy and of her century" (Osen, 1974, p. 48). How ironic, that Maria Agnesi, who epitomized both high intelligence and sublime charity, is sometimes referred to in English textbooks today, as "the witch of Agnesi" (Osen, 1974, p. 45).

Lise Meitner

Lise Meitner was one of the greatest mathematical physicists of the twentieth century. (Osen, 1974, p.154). Her life was one of brilliance, but also one of sadness due to the prejudices she endured, having been born both Jewish and female. Born in 1878 in Vienna, Austria, Lise was one of eight children in a middle class family. Her family's financial situation was comfortable though they were not wealthy. The children were encouraged to read many books (Lise Meitner, n.d., p. 1). Reportedly, her interest in physics and math began when she read about Madame Curies' discovery of radium (Osen, 1974, p. 154). In 1901, Lise began undergraduate studies at the University of Vienna. By 1907, she had completed her doctoral degree and was studying in person, with Max Planck. She had also begun research on radioactive substances with a chemist named Otto Hahn, an endeavor which would continue for the next thirty years (Lise Meitner:A Battle for Ultimate Truth, n.d., p. 1).

Among Lise's accomplishments is a method she developed proving that nuclear particles "scatter". This in turn, eventually led to the discovery of the nuclear atom. She found a way to explain how electrons orbiting an outer-shell are expelled from an atom when they gain energy from other electrons that are losing energy (Lise Meitner, n.d., p. 2). But her greatest accomplishment occurred in 1939 when Lise uncovered the process of uranium fission (Osen, 1974, p.155). This will be discussed later.

Lise's family was not strictly "Jewish" since her brother once stated that his mother and siblings had been baptized as Protestants. This may not be entirely accurate. At least one source states that Lise did not become a Protestant until 1908 at age thirty and that two of her sisters were converted to Catholicism that same year (Lise Meitner (1878-1968), n.d., p. 2). Lise's Christian commitments would not afford her protection in future years from Nazi forces.

In 1938, Germany took over Austria. Lise's situation at the Kaiser Willhelm institute, where she worked, became very precarious. First, whispered words "The Jewess endangers our institute" were spread by a small time researcher who had become a Nazi. Then, her long time colleague, Otto Hahn, made a request to the institute's treasurer, that

Lise be removed (Bodanis, 2000, pp. 103-104). This was the same Otto Hahn with whom Lise was conducting research regarding radioactive substances for thirty years. Lise *must* have felt betrayed by Otto. His comment to another colleague was "Lise was very unhappy now that I had left her in the lurch" (Bodanis, 2000, p. 104). Lise wrote in her diary "Hahn says I should not come to the Institute anymore. He has, in essence, thrown me out" (Bodanis, 2000, p. 104).

Fortunately, Dutch scientists helped her escape to the Netherlands, albeit minus a visa (Osen, 1974, p. 155). Eventually, she ended up in Sweden having had to cross the North Sea with Nazi boats close behind (Leinhard, 1988-1997, p. 2). The journey had to have been traumatic. Biographer Ruth Lewin Sime writes of Lise's arrival at Manne Sigbahn's Stockholm institute "Neither asked to join Siegbahn's group nor given the resources to form her own, she had laboratory space but no collaborators, equipment, or technical support, not even her own set of keys" (Lise Meitner: A Battle for Ultimate Truth, n.d., p. 2). Amazingly, Lise kept up correspondences with Otto and in November of 1938, he secretly met her in Copenhagen to discuss their research (Lise Meitner, A Battle for Ultimate Truth, n.d., p. 2).

On Christmas Eve of 1938, Lise was visiting friends on the west coast of Sweden, with her nephew, Robert Frisch. Robert was working at the Neil's Bohr institute in Denmark and had a good grasp of Lise's work. The two of them got together and began to work on the most recent research and data gathered from Otto's and Lise's correspondences.

Lise had first met Einstein in 1905 during a lecture in which he discussed how energy can appear from disappearing mass, i.e., $E = mc^2$. Decades later Lise would remark that this lecture impressed her as being "…so overwhelmingly new and surprising that to this day I remember the lecture very well" (Bodanis, 2000, p. 108). Recounting that day on Christmas Eve Robert wrote:

> *Fortunately [my aunt] remembered how to compute the masses of nuclei…and in that way she worked out that the two nuclei formed by the division of a uranium nucleus would be lighter than the original uranium nucleus, by about one-fifth the mass of a proton. Now whenever mass disappears, energy is created, according to Einstein's formula* $E = mc^2$ *(Bodanis, 2000, p. 110).*

After thirty years of researching and experimentation, Lise had mathematically shown that when an atom is split, energy is released, as some of the atom's mass is lost. The lost mass is converted into energy. Hence, Einstein's equation $E = mc^2$ proved true. She published her work in 1939 (Osen, 1974, p. 155). Unfortunately, in 1945 Otto received the Nobel Prize for her work. This was due to the fact of her religion (Lise Meitner, 1998, p. 1), and that she had been separated from former colleagues and exiled into another country. The Nobel committee had failed to see her dominant role in the discovery (Lise Meitner A Battle for Ultimate Truth, n.d. p. 1). In 1966 the Atomic Energy Commission partially compensated for this cruel oversight by giving her the Fermi Award (Osen, 1974, p. 155). Some mathematical circles hold her accomplishments in as high esteem as of those of other highly accomplished women mathematicians (Osen, 1974, p. 155).

Like Maria Agnesi and Hypatia, Lise was deeply dedicated to her work and never married. Two years after receiving the Fermi award, in 1968, she died in Cambridge, England. She was almost 90 years old (Osen, 1974, p. 155). Interestingly, Otto Hahn had

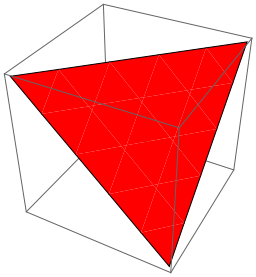
died a few weeks prior to Lise's death. In 1982, a new element was created, listed as number 109 in the Periodic Table. In Lise's honor, it is called "Meitnerium" (Bodanis, 2000, p. 227).

Summary

Women have participated in mathematics since at least days of Pythagoras. These superb female mathematicians were clearly far superior to most mathematicians of their day. They led colorful lives rich in meaning and purpose. Because of their gender, they all faced obstacles and suffering of one sort of another. This in part serves to demonstrate their dedication to their work.

Female participation in mathematics is an ancient tradition and continues today. Of course, not all female mathematicians are as brilliant as the four discussed here…but neither are the vast majority of male mathematicians. Modern female participation in mathematics is better known. Nonetheless, controversy exists regarding questions of relative (no pun intended, Dr. Einstein) cognitive process differences between the genders.

Submitted by:



Elizabeth Raver
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April 2008

News from Tunxis Community College

Tunxis Community College has been licensed and accredited by the Board of Governors to offer the only Honors program: Computer Science/Mathematics Associates Degree in the state. The program is designed to produce mathematics teachers, statisticians and software engineers. Students will complete their first two years at Tunxis and their junior and senior years at Central Connecticut State University. On March 14th (Pi day), the

presidents of Tunxis Community College and CCSU formally signed an articulation agreement which programmatically links the two institutions. (see photo)

Submitted by:

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April 2008

News from the "Northwestern Frontier"

We had to deal with some sudden personnel issues at the beginning of this Spring semester. Amanda Buckley abruptly (without warning) resigned only a week before the semester started. Luckily, we had 2 great adjuncts (Ed Nash & Liz Raver) who saved us by accepting 1 semester, temporary, Full-time teaching positions with us. Our search for a permanent Full-time Math Instructor is underway, and hopefully will yield good results for the Fall semester.

And, this was not the only personnel issue we had to deal with. My own health has been failing over the past several years (with a progressive back disability), and we had already built into the schedule my going to 1/2 time this semester (and this Fall). Our remaining adjuncts (all fantastic) have "stepped up to the plate" to help us out tremendously in covering our increasing number of classes.

Further, by the Fall semester we will have a new "boss", since our Division Director is retiring. So, we are in a "state of flux", and will be going thru a transitional period, personnel-wise, in the next year.

On the topic of increased numbers of classes, that has been due to historic Math enrollment levels in the past several semesters. Every semester we "smash" the previous records. Our Developmental enrollments have been driving the increases (along with Topics in Contemporary Math, which has grown from 1 section per semester to 6 sections per year). And, to be honest, we're seeing students coming out of High Schools less & less prepared (and with less & less responsibility & motivation). Many, literally, not even knowing their multiplication tables (a result of students' over-reliance on technology and abuse of graphing calculators).

I've been making use of a series of "Learning Attitudes & Study Skills" that I've developed (based on comments from my 5000+ students in my 25 year teaching career) to try to assist their "bridging the gap" from High School mentalities to College-level responsibilities. These "Learning Attitudes & Study Skills" are listed below for all colleagues to view and share:

Learning Attitudes:

1. Any and all questions are important. If you do not understand something it is absolutely vital that you ask questions (and get answers) so that you do understand, in order to be successful.

2. Be enthusiastic about learning (100% effort, 100% of the time). Find self-motivation and be a positive attitude learner (having goals with a plan, along with hope and faith in

yourself, are powerful tools in your success). Attend each and every class meeting; and during class, be an active participant.

3. Respect each course, your instructors, your classmates, and yourself; observe common etiquette in the classroom (listen and pay attention at all times).

4. Act maturely, be responsible, and take pride in your performance (this is not High School – act as an adult with the class being your professional workplace).

5. Be prepared to make sacrifices to succeed (have your priorities in order and use time management wisely) – your courses are a full-time job.

6. Comprehensive and thorough preparation in all aspects of each course (and for all varieties of situations) is absolutely necessary for success.

7. Maintain "poise under pressure" in all situations. Things in life always have "glitches" – develop ability to accomplish goals and be dependable no matter what (no excuses – "the show must go on" regardless of circumstances or other obligations).

8. "Life is full of choices" – make your choices wisely and fully informed; know (and accept) the consequences (no complaining, no "whining").

9. Take responsibility for all your actions (or inactions) including your learning. Do not assign "blame" to things/persons external to yourself.

10. Practice overall individual responsibility:
    a. Understand duty and achieve self-discipline (being dependable – no matter what else "comes up"; doing what needs to be done without being told).
    b. Practice high integrity and honor (performing so you'd be proud if others were watching your behavior.)
    c. Respect rules and regulations (each has its purpose).
    d. Expect no entitlements (nothing is "owed" to anyone; everyone must earn everything by "paying their dues"; effort alone is not sufficient).

11. Develop your analytical reasoning capabilities:
    a. Observation (figuratively "look around" and understand situation before attempting to produce answer).
    b. Organization and structure (an "eye for detail" along with an understanding of the "big picture").
    c. Critical thinking (step by step – justifying each step).
    d. Patience and persistence (among the most important of all).

12. Recognize the 5 levels of understanding (and work towards 5^{th} level – necessary to fully understand and hence to be successful):
    I. Understanding when someone else explains it (in class, listening to instructor)
    II. Understanding it on your own (doing homework).
    III. Understanding it on your own under time constraints (taking your own practice test).

IV. Able to demonstrate understanding it on your own under time constraints (taking actual in-class test).

V. Able to explain it to someone else, clearly and quickly (explaining it to classmate in Study Group).

Study Skills:

1. Take notes on: everything written on the board (write neatly and organized), all explanations/comments instructor makes, and any additional comments from classmates (consider using a tape recorder to enhance, but not replace, this process).

2. Make additions and refinements to your notes after class:
   a. Develop vocabulary lists (with definitions and usages) to enable you to fully understand specific language for each course.
   b. Add further explanations, instructions, and/or directions which you may not initially have had time to do.
   c. Identify and describe each type of technique and/or procedure encountered (to enable you to do that on homework exercises, projects, and/or test questions; and therefore to enhance your understanding and handling of every situation).
   d. In courses where feasible, utilize "directions writing" (writing a single set of directions to handle many varieties of 1 type of problem, which are general enough to handle the different varieties but specific enough to explain clearly what needs to be done); and "verbal flowchart writing" (writing a decision-making procedural strategy that creates a verbal path through a process).

3. Have textbook sections read completely and carefully, notes taken on reading, the previous class period's notes reviewed and refined, any written homework completed, and next class period's topics previewed before each and every class. Plan to spend a minimum of 6 hours per week (distributed throughout the week with a minimum of 1 hour everyday) to accomplish this. Do not be surprised if this needs to increase to 10-12 hours/week (every student is different in their learning needs).

4. Utilize an Academic Skills Center (if available) for tutorial service. They may have individual tutors in a variety of subject areas. On-line tutoring may also available. Contact your Academic Skills Center for details.

5. Form Study Groups (or join existing ones) to provide an additional (outside of class) forum for covering homework questions, reviewing class notes, and/or studying for tests. It is highly recommended that every student belong to one and that you begin as soon as possible. Form them with classmates you already know, with those sitting near you, or announce (or respond to an announcement) to the class as a whole (immediately before or after class period). It is suggested you use an on-campus location (such as an Academic Skills Center, or the Library) for your meetings; and, if possible, hold the meetings at the same time in the same location every week – to facilitate advertising this so that others can join. Further, if you use an Academic Skills Center, you may be able to coordinate your meeting time with one of the tutors' availabilities – if one is available in your subject area (to provide an additional learning resource); and, you should explore the idea of advertising your Study Group on an Academic Skills Center schedule (contact Director

to discuss both coordinating with tutor and inclusion on Academic Skills Center schedule).

6. For courses in which applicable, practice your test-taking skills by performing the following procedure (and repeating it as many times as necessary) for each test – it will not eliminate "test anxiety" but it will enable you to become more comfortable with any anxieties and, more importantly, to be able to function and perform even when you're feeling them. (Even if you do not have "test anxiety" you will still benefit from this procedure- remember Learning Attitude #12: the 5 levels of understanding):

   a. Create a test similar in format to what is indicated by your instructor.
   b. Establish fixed day and time (at least one week in advance) to conduct practice test.
   c. Duplicate testing environment – use same room if available (or similar room you can be undisturbed in); use only what is allowed on test.
   d. Give yourself same time limit as you will have in class to finish.
   e. Correct test and evaluate your performance.

7. Practice and utilize relaxation techniques (taking deep, slow breaths; closing eyes and imagining a peaceful scene) to use during tests to reduce anxieties.

8. Practice good nutrition (i.e. protein, fruits and vegetables – minimize junk foods/fast foods), drink sufficient water (8 glasses/day), get adequate sleep (8 hours/day), get proper exercise and stress reduction, and practice good personal hygiene (frequent hand washing) – all of this will enable you to stay healthy and to stay focused on studying and learning.

Submitted by:

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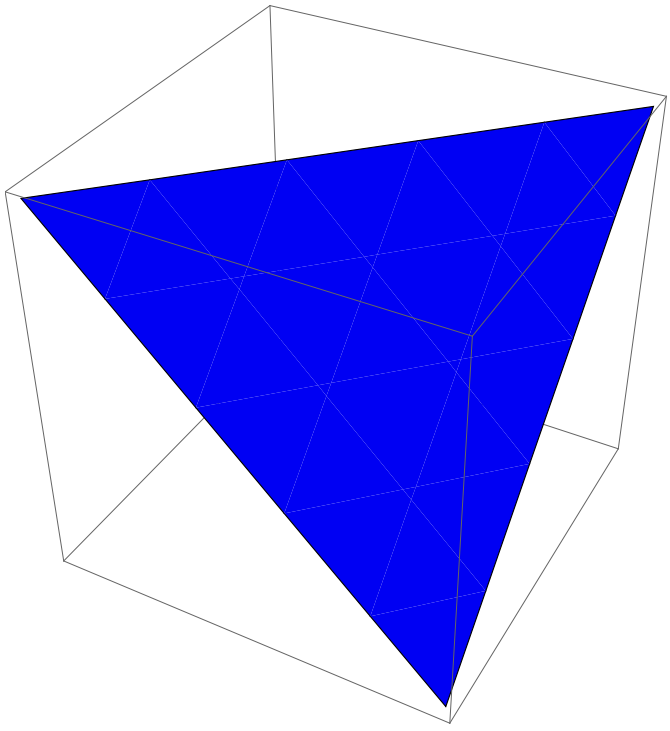
March 2008



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