



THE NEW JERSEY ITALIAN HERITAGE COMMISSION



Maria Gaetana Agnesi

Scholar
1718–1799

Grade Level: 9–12

Subjects: Mathematics / Language Arts

Categories: Italian and Italian American Women

Standards:

Please see page 5 of the lesson plan for complete New Jersey Student Learning Standards alignment.

Objectives:

The students will be able to:

1. identify Maria Gaetana Agnesi as a famous mathematician.
2. discuss the type of commitment that Maria Gaetana Agnesi devoted to mathematics as a young woman and whether it was what truly made her happy.
3. using the proper writing process, write an essay about Maria Gaetana Agnesi based upon given questions to research.
4. determine how Maria Gaetana Agnesi influenced other women.

Abstract:

Maria Gaetana Agnesi was truly a great influence for future Italian and Italian American women for her inner strength and perseverance to achieve her goal. She was groomed by her father from the time she was a young girl to be a scholar. This was an unusual practice during the 1700s as most females were educated only through nunneries or monasteries. Her father requested her presence during many gatherings at his house where many intellectual men tended to gather to discuss subjects such as philosophy, mathematics, and the world around them. Maria became a scholar of three ancient languages and mathematics, specifically in calculus. She developed one of the earliest textbooks with the help of Ramiro Rampinelli, her mentor. She was given international recognition for her work and was offered the status of professor at the University of Bologna. So why did she give up all her hard work and pursue a completely different path in life?

Background:

Maria Gaetana Agnesi was born in Milan, Italy, on May 16, 1718. She was the eldest of 21 children. Her father, Pietro Agnesi, was a wealthy, intellectual man whose family made its money from silk. Pietro encouraged all of his children to be intellectuals. He spent a considerable amount of money for his daughter, Maria, to be tutored by male mentors and requested her presence during gatherings he frequently held at his house with intellectuals of the day. This was not an easy thing for Maria since she was a shy girl by nature. The discussions that took place during these gatherings focused on philosophical and mathematical issues. He felt this was the only way to ensure a comprehensive education for his daughter, a prodigy. At that time, women were for the most part educated through nunneries or monasteries. Maria spoke fluent French by the time she was five years old. At the age of nine, she had mastered several ancient languages including Latin, Greek, and Hebrew. In her early teens, Maria mastered mathematics studying Reyneau's calculus under a monk named Ramiro Rampinelli, who was a professor in Rome and Bologna. He was also an intellectual colleague of her fathers who frequented the gatherings at her house. When her mother died, Maria took over as caretaker of their house, caregiver for the other 20 children and her father, while also keeping up her studies. She no longer had time to join her father's gatherings.

In 1738, Maria published a collection of essays called *Propositiones Philosophicae* which were about natural science and philosophy. At age 20, she began working on a textbook called *Analytical Institutions*. This text was meant as a teaching tool but has also been said to have been created for her two brothers. She was encouraged to begin this project by her mentor, Ramiro Rampinelli. She also had input on the content of her book from Rampinelli's teacher, Riccati. The original book went through many revisions with guidance from Rampinelli and Riccati. The book contained four sections: Analysis of Finite Qualities, Analysis of Infinitely Small Quantities, Integral Calculus, and Inverse Method of Tangents and Differential Equations. Her text is best known for a calculus curve she wrote, an equation named "Witch of Agnesi." The text was published in her home and funded by her father. She wanted to be sure that she was able to supervise the manner in which the book was published. Later on, the text was translated into several other languages and published internationally. Pope Benedict XIV reviewed the text and remarked that Maria would bring international recognition to Italy and the Academy of Bologna. As a result of her published text, the President of the Bologna Academy of Science, along with three professors, elected Maria to the status of professor at the Academy. It is unclear and disputed whether or not she took this position.

Her interest in mathematics died along with her father in 1752. It is said that she was approached to consult on a mathematical issue soon after her father's death and declined the offer stating that mathematics was no longer of interest to her. She decided to take her life in a new direction and focused on her religious beliefs. She found that helping the poor, homeless, and sick people, particularly women, became her new priority. Maria soon became the director of a new institute called the Pio Istituto Trivulzio. She remained serving ill and dying women at this institute until her own death on January 9, 1799 in Milan. Her devotion to her family and to the women at the institute never allowed Maria the opportunity to marry.

During the Enlightenment era, Maria Gaetana Agnesi was an example and role model for future female scholars.

Materials:

- Background Information
- Internet Access

Procedures:

- I. Hold a class discussion about the following issues:
 - a. What comes to mind when the students hear the word “calculus”?
 - b. What do the students think is the purpose for learning mathematics?
 - c. What interests do the students have in mathematics?
 - d. What do the students dislike about mathematics?
- II. Explain to the students that they will be learning about a famous Italian woman who is well known for her work in mathematics.
- III. Discuss the background information with the students or download it and have the class read it aloud or independently.
- IV. Discuss as a class what the students feel would be involved in writing and publishing a textbook. Do the students feel that this would be something that would interest them at the age of 20?
- V. Have the students do further research on the life of Maria Gaetana Agnesi.
 - a. <http://witchofagnesi.org/>
 - b. <http://www.newadvent.org/cathen/01214b.htm>
 - c. <https://www.agnesscott.edu/lriddle/women/agnesi.htm>
 - d. <https://www.famousscientists.org/maria-gaetana-agnesi/>
- VI. Pose and ask the students to respond in essay form to the following questions:
 - a. By her early teens, Maria had mastered mathematics. Considering that she would have been about your age right now, how do you think she was able to accomplish this? What type of childhood do you think she had?
 - b. Would you have been able to complete the same accomplishment by this age?
 - c. What type of work do you feel is necessary to achieve this accomplishment?
 - d. Would achieving mastery of mathematics by this age be a joyous event for you?
 - e. Do you feel that Maria was happy in the course of her childhood?
 - f. Why do you suppose that she turned away from mathematics after the death of her father?
 - g. What do you think truly made her happy in life?
 - h. In what way do you think Maria influenced or could influence other women to pursue a professional career?

Homework:

Have the students complete their essay on Maria Gaetana Agnesi if they were not able to complete it during class time.

Assessment:

Evaluate the students’ essays for content and thoroughness.

Extensions:

- Have the students reflect on a time that they completed an activity or joined a group only to satisfy someone else. Doing so may not have necessarily been what they wanted to do

themselves. For example, a father pushes his son to be on the football team because that is what he did when he was young. The son has no interest in football and resists joining. The father continues to push the football issue. What is the son to do? The students should write a short essay explaining the situation, how they handled it, and how it made them feel to have someone impose unwanted expectations on them. How does this relate to Maria Gaetana Agnesi?

- Have the students research the role of women during the 18th century. What sort of challenges did women encounter if they chose to pursue an education or any type of professional career during this era?
- Have the students investigate and respond in essay form on the following question: Why did Maria Gaetana Agnesi abandon her study of mathematics after her father died?

Background Resources:

www.agnesscott.edu/Lriddle/WOMEN/agnesi.htm

<http://www.astr.ua.edu/4000WS/AGNESI.html>

New Jersey Student Learning Standards

English Language Standards

W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

SL.9-10.1d

Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

SL.11-12.1d

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.