Mathematicians in History – Srinivasa Ramanujan

Srinivasa Ramanujan was a self-taught Indian mathematician, viewed by many to be one of the greatest mathematical geniuses in history. As a student, he became so totally immersed in his work with mathematics that he ignored his other subjects and failed his college exams. Ramanujan's life is chronicled in the biography "The Man Who Knew Infinity: A Life of the Genius Ramanujan."

Write a one-page summary (OR make a poster) of the life of Srinivasa Ramanujan and his accomplishments.

Interesting issues:

Where and when was Srinivasa Ramanujan born?

At age 16, Ramanujan borrowed a mathematics book that strongly influenced his life as a mathematician. What was the name of the book?

Ramanujan got married on July 14, 1909. The marriage was arranged by his mother. How old was his bride at the time?

What jobs did Ramanujan hold in India?

Which renowned mathematician invited Ramanujan to England in 1914?

Ramanujan's health in England was poor. What was the cause of his poor health?

What is the significance of the taxi cab number 1729?

What were the circumstances that led to Ramanujan's death, and what was his age when he died?

Mathematicians in History – George Pólya

George Pólya was a Hungarian mathematician who spent much of his career on problem solving, and wrote the landmark text *How to Solve It*. It has been said of this book, "For mathematics education and the world of problem solving it marked a line of demarcation between two eras, problem solving before and after Pólya."

Write a one-page summary (OR make a poster) of the life of George Pólya and his accomplishments. Also, look up Pólya's most famous quotes and list your favorite quote.

Interesting issues:

Where and when was George Pólya born?

What circumstances led to Pólya leaving Göttingen after Christmas in 1913?

The political situation in Europe in 1940 forced Pólya to leave Zürich for the United States. Which university did Pólya work at upon arriving in the United States?

When was Pólya's monumental book *How to Solve It* published?

Summarize Pólya's strategy for solving problems.

At which American university did Pólya spend most of his career?

What was Pólya's mnemonic for the first fourteen digits of π?

How old was Pólya when he taught his last class, and what was the subject?

Mathematicians in History – René Descartes

René Descartes was an early 17th-century philosopher who made important contributions to mathematics. Cartesian geometry resulted from his application of algebra to geometry. The rectangular coordinate plane is also called the Cartesian plane in his honor. Descartes once said "Mathematics is a more powerful instrument of knowledge than any other that has been bequeath to us by human agency."

Write a one-page summary (OR make a poster) of the life of René Descartes and his accomplishments. Also, look up Descartes's most famous quotes and list your favorite quote.

Interesting issues:

Where and when was René Descartes born?

How old was Descartes when he enrolled at the Jesuit College at La Fleche?

Descartes's first major treatise on physics was *Le Monde, ou Traité de la Lumierè.* Whe did he choose not to publish his results?

Descartes's most famous quote, in Latin, is "Cogito, ergo sum." What is the English translation of this quote?

How did a fly help Descartes come up with the idea for the rectangular coordinate system?

Queen Christina of Sweden invited Descartes to Sweden in 1649, where he died shortly thereafter. Describe the circumstances that led to his death.

Mathematicians in History – Hypatia of Alexandria

Hypatia of Alexandria was one of the first women known to make major contributions to the field of mathematics. She was also active in the fields of astronomy and philosophy. One quote that has been attributed to her is "Reserve your right to think, for even to think wrongly is better than not to think at all."

Write a one-page summary (OR make a poster) of the life of Hypatia of Alexandria and her accomplishments.

Interesting issues:

Where and when was Hypatia born?

Who was Hypatia's father, and what fields was he involved in?

Hypatia lectured on the philosophy of Neoplatonism. What are the principle ideas of Neoplatonism?

What was Hypatia's relationship to Cyril and Orestes?

In the year 415 Hypatia was murdered. Describe the circumstances of her death.

Mathematicians in History – Carl Friedrich Gauss

Carl Friedrich Gauss was a German mathematician who lived in the 18th and 19th centuries, and was one of the most prominent and prolific mathematicians of his day. Gauss made significant contributions to the fields of analysis, probability, statistics, number theory, geometry, and astronomy, among others. The Prussian mathematician Leopold Kronecker once said of him, "Almost everything, which the mathematics of our century has brought forth in the way of original scientific ideas, attaches to the name of Gauss." Gauss once said "It is not knowledge, but the act of learning, not possession but the act of getting there, which grants the greatest enjoyment."

Write a one-page summary (OR make a poster) of the life of Carl Friedrich Gauss and his accomplishments. Also, look up Gauss's most famous quotes and list your favorite quote.

Interesting issues:

Where and when was Carl Friedrich Gauss born?

Gauss displayed incredible genius at an early age. Relay the story of how Gauss found his father's accounting error at only 3 years of age.

At what age did Gauss find a shortcut for summing the integers from 1 to 100?

Gauss's motto was "Few, but ripe." In your own words, explain the meaning of this motto.

In 1798, Gauss showed how to construct a regular 17-gon by ruler and compass. This was the first major advance in the area of regular polygons in approximately 2000 years. What is a regular 17-gon?

Gauss earned his doctorate in 1799 with a proof of what major mathematical theorem?

Gauss gained notoriety in the field of astronomy by accurately predicting the orbit of the newly discovered asteroid Ceres by inventing the method of least squares. Describe the method of least squares.

In 1821 Gauss built the first heliotrope. What is a heliotrope?

Describe the circumstances that led to Gauss's death.

Mathematicians in History – Sir Isaac Newton

Sir Isaac Newton was an English mathematician and scientist who lived in the 17th and 18th centuries. His work with motion and gravity helped us to better understand our world, as well as our solar system. Alexander Pope once said "Nature and Nature's laws lay hid in the night; God said, Let Newton be! And all was light."

Write a one-page summary (OR make a poster) of the life of Sir Isaac Newton and his accomplishments.

Interesting issues:

Where and when was Sir Isaac Newton born?

Describe Newton's upbringing, and his relationship with his mother and stepfather.

It has been said that an apple was the inspiration for Newton's ideas about the force of gravity. Explain how the apple is believed to have inspired Newton's ideas.

In a letter to Robert Hooke, Newton wrote "If I have been able to see further, it was only because I stood on the shoulders of giants." Explain what this statement means.

Newton is often referred to as the "Father of Calculus." What is calculus?

What are Newton's three laws of motion? Explain what they mean in your own words.

Where was Newton buried?

What did Newton invent for his pets?

Mathematicians in History – John Nash

John Nash is an American mathematician whose research has greatly affected mathematics and economics, as well as many other fields. While applying to go to graduate school at Princeton, one of his math professors said quite simply, "This man is a genius."

Write a one-page summary (OR make a poster) of the life of John Nash and his accomplishments.

Interesting issues:

Where and when was John Nash born?

Describe Nash's childhood, as well as his life as a college student.

What mental illness struck Nash in the late 1950's?

Nash was an influential figure in the field of game theory. What is game theory?

In 1994, Nash won the Nobel Prize for Economics. Exactly what did Nash win the prize for?

One of Nash's nicknames is "The Phantom of Fine Hall." Why was this nickname chosen for him?

What color sneakers did Nash wear?

Sylvia Nasar wrote a biography of Nash's life, which was made into an Academy Award-winning movie. What was the title of the book and movie?

What actor played John Nash in the movie?

Mathematicians in History – Pierre de Fermat

Pierre de Fermat was a French mathematician who lived in the 17th century. His work focused on number theory and probability. Although he did little publishing in his lifetime, he did pose many problems as challenges to the mathematical community of Europe.

Write a one-page summary (OR make a poster) of the life of Pierre de Fermat and his accomplishments.

Interesting issues:

Where and when was Pierre de Fermat born?

What is number theory?

Although Fermat lived until 1665, his health was so bad that it was believed by many that he had died in 1653. What was the cause of his near death?

The Fronde greatly disrupted Fermat's communication with the math community in 1648. What was the Fronde?

Fermat is best known today for Fermat's Last Theorem. What is Fermat's Last Theorem, and who finally proved this theorem in November 1994?

Fermat had a public feud with which well known-mathematician? Describe what the feud was about, and how it was resolved.

Mathematicians in History – Pythagoras of Samos

Pythagoras of Samos, often referred to simply as Pythagoras, was the leader of a society known as the Pythagoreans. This society was partially religious and partially scientific in nature. One of their mathematical achievements is the first proof of a theorem that related the lengths of the sides of a right triangle. This theorem is known as the Pythagorean theorem.

Write a one-page summary (OR make a poster) of the life of Pythagoras, the mathematical achievements of Pythagoras and his society, and the beliefs of the Pythagoreans.

Interesting issues:

What was the "semicircle?"

 Who were the mathematikoi, and by what rules did they lead their life?

What number did the Pythagoreans consider to be the "best" number, and why?

Which society was the first to know of the Pythagorean theorem?

The Pythagoreans believed that all relationships could be expressed numerically as a ratio of two numbers. They discovered, however, that the diagonal of a square whose side has length 1 was an irrational number. This number is $\sqrt{2}$. This discovery rocked the foundation of their system of beliefs, and they swore each other to secrecy regarding this discovery. A Pythagorean named Hippasus told others outside of the society of this irrational number. What was the fate of Hippasus?

Mathematicians in History – Evariste Galois

Evariste Galois was a brilliant mathematician who was interested in the algebraic solutions of equations. The amount and depth of work accomplished by Galois, who died before his twenty-first birthday, is legendary. Galois showed that there is no general solution to equations that are fifth-degree or higher: $ax^5 + bx^4 + cx^3 + dx^2 + ex + f = 0$.

Write a one-page summary (OR make a poster) of the mathematical achievements of Galois, his fascinating (but short) life, and the details surrounding his untimely death.

Interesting issues:

When and where was Galois born?

What was the fate of Galois's father?

Galois twice failed the admittance exam to École Polytechnique. What did he do to one of the examiners on his second attempt?

Galois was expelled from École Normale in December 1830. Why was he expelled?

Galois was arrested in 1831 after raising a toast to King Louis-Philippe. What was the toast, and how did he make it?

In 1831, Galois was arrested on Bastille Day. What was the charge?

On the night before his death, Galois wrote a letter to his friend Auguste Chevalier. What were the contents of the letter?

What were the circumstances that led to Galois's death? How old was Galois at the time?

Which mathematician published Galois's papers in 1846?

Mathematicians in History – Leonhard Euler

Leonhard Euler (pronounced "oiler") is believed by many to have been the greatest mathematician of the eighteenth century. He was clearly one of the most prolific – he authored over 800 papers and books. He is credited with introducing the function notation $f(x)$ that we still use today.

Write a one-page summary (OR make a poster) of the life of Euler and his mathematical achievements.

Interesting issues:

Where and when was Leonhard Euler born?

What currency did Euler's face appear on?

What are the "Seven Bridges of Konigsberg?"

Who invited Euler to Berlin in 1741?

On the day that he died, Euler was lecturing to his grandchildren; what was the subject?

What were his last words?

Besides function notation, what other notation did Euler introduce?

What physical condition did Euler have for the last 20 years of his life?

Mathematicians in History – Albert Einstein

Albert Einstein was named as *Time* magazine's "Man of the Century" for the twentieth century. That is quite an accomplishment for a man who once failed an exam that would have allowed him to study to be an electrical engineer. In 1901, working as a temporary high school math teacher, Einstein had given up the ambition to go to a university. However, while working in Switzerland's patent office, Einstein earned a doctorate in physics from the University of Zurich in 1908. Einstein introduced the theory of relativity, and became one of the most popular scientists ever. Einstein once said that compound interest was the most powerful force in the universe, and that it is the greatest mathematical discovery of all time.

Write a one-page summary (OR make a poster) of the life of Albert Einstein and his accomplishments. Also, look up Einstein's most famous quotes and list your 5 favorite quotes.

Interesting issues:

Where and when was Albert Einstein born?

What famous formula is credited to Einstein?

Einstein married Mileva Maric in 1903. What became of their sons Hans Albert and Eduard?

After divorcing Mileva in 1919, Einstein married his second wife Elsa. How did he know Elsa?

When did Einstein win the Nobel Prize, and what did he win it for?

Einstein came to Princeton University in 1932, planning to teach part of the year at Princeton and the remainder of the year in Berlin. What event prohibited Einstein from returning to Berlin in 1933?

In 1939 Einstein sent a letter to Franklin Roosevelt. What was the subject of that letter?

What job was Einstein offered in 1952?

When did Einstein die, and what were the circumstances of his death?

Mathematicians in History – Sofia Kovalevskaya

The story of nineteenth-century Russian mathematician Sofia Kovalevskaya is one of genius and determination. At a time when women were discouraged from studying mathematics, she developed into one of the most respected mathematicians of her day.

Write a one-page summary (OR make a poster) of the life of Sofia Kovalevskaya and her accomplishments.

Interesting issues:

Where and when was Sofia Kovalevskaya born?

What were the walls of her nursery papered with when she was 11 years old?

Who convinced Kovalevskaya's parents to allow her to study mathematics?

Who did Kovalevskaya marry, and what was his fate?

By the spring of 1874, Kovalevskaya had completed three papers while studying with which prominent mathematician in Berlin?

What job did Kovalevskaya hold after earning her doctorate?

In what European city did Kovalevskaya finally obtain a position?

When did Kovalevskaya die, and what were the circumstances of her death?

Kovalevskaya once said "It is impossible to be a mathematician without being a poet in soul." Explain what you think Kovalevskaya meant by that.

Mathematicians in History – Fibonacci

Fibonacci was a mathematician in the twelfth and thirteenth century who introduced the world to an important sequence of numbers known as the Fibonacci sequence.

Write a one-page summary (OR make a poster) of the life of Fibonacci and his accomplishments.

Interesting issues:

Where and when was Fibonacci born?

Where was Fibonacci educated?

What was Fibonacci's father's occupation?

What was Fibonacci's real name?

What is the Fibonacci sequence, and how is it created?

Which problem in Fibonacci's book *Liber abaci* introduced the sequence that came to be known as Fibonacci's sequence?

List at least 3 occurrences of Fibonacci's sequence in nature.

Fibonacci also wrote problems involving perfect numbers. What is a perfect number?