

## Annotated Bibliography

### Primary Sources

#### Books

Descartes, René, and Donald A. Cress. “*Discourse on Method and Meditations on First Philosophy*.” Indianapolis, Hackett Pub., 1980.

This translation exposed me to the core principles of Rene Descartes' philosophy which is 'Doubt everything' and 'Focus on foundational principles'. It helped me make the important connection between his philosophy and his mathematics. I formulated my thesis on the intersection of cartesian philosophy and mathematics in the Interactions section of my website including a direct quote from this brilliant primary source of Descartes.

Descartes, René, and Laurence J. Lafleur. “*Rules for the Direction of the Mind*.” Indianapolis, Bobbs-Merrill, 1961.

This translation gave me an excellent perspective on how Descartes as a philosopher influenced Descartes as a mathematician. For instance, in rule 4 of this book, he proposes that the mind requires a fixed "method" to discover truth and then he extended this idea of "method" to include all problem-solving techniques in algebraic geometry. The genius of his analytical geometry was this emphasis on problem-solving using algebraic techniques and I have included that theme in my Thesis and Invention sections of my website.

Descartes, René, et al. “*The Geometry of Rene Descartes*.” New York City, Dover Publications, 1954.

This is a translation of the game changing appendix where Rene Descartes introduced the idea of solving geometric problems using algebraic methods. I quoted the opening sentence of this book in my chapter on Invention. I read and re-read numerous examples from this book, where Descartes applied algebra to geometric shapes, which is the key theme captured throughout my website.

Euclid, and Thomas Little Heath. “*The Thirteen Books of Euclid's Elements*.” 2nd ed., New York City, Dover Publications, 1956.

Descartes read this work from Euclid and immersed himself in all the cumbersome geometric constructions and methods which was the signature contribution of ancient Greek mathematicians. However, to Descartes' credit, he found a brilliant and elegant approach to simplify this mathematics using algebraic equations. Reading this book gave me a rich appreciation of deep intellect of Greek mathematicians and I have included their role in the Investigation section of my website.

Newton, Isaac, and Andrew Motte. “*Newton's Principia the Mathematical Principles of Natural Philosophy (1846).*” Library of Congress, Congress.gov, 1848, [www.loc.gov/resource/gdcmassbookdig.newtonsprincipia00newt\\_0/?sp=7&r=-1.533,-0.024,4.066,1.852,0](http://www.loc.gov/resource/gdcmassbookdig.newtonsprincipia00newt_0/?sp=7&r=-1.533,-0.024,4.066,1.852,0). Accessed 1 Feb. 2024.

This book by Sir Isaac Newton and translated by Andrew Motte covers his mathematical advances in calculus. The key part of my thesis is that Newton's calculus was built on the foundation of Descartes' analytical geometry. This connection between Cartesian Geometry and Newtonian Calculus is covered in Influence section of my website.

Tannery, Paul, and Adam Charles. “*Oeuvres de Descartes.*” Internet Archive, Paris : L. Cerf, 1897

This book, "Oeuvres de Descartes," holds a pivotal entry from Isaac Beeckman's journal, documenting the day after Descartes cracked the Dutch puzzle. This encounter not only reflects the profound influence of geometric puzzles on Descartes' analytical geometry but also for the first time made Descartes realize his mathematical abilities. Through their close friendship and intellectual exchanges in Holland, Beeckman served as a mentor guiding Descartes towards realizing his mathematical genius and is featured in the Investigation section of my website.

## Visual Images

B. Holl, “*Leonhard Euler, head-and-shoulders portrait, left profile.*” Library of Congress, Congress.gov, [www.loc.gov/item/2005685424/](http://www.loc.gov/item/2005685424/). Accessed 18 Feb. 2024.

Euler extended Descartes coordinate geometry to three-dimensional space which opened so many possibilities of real-world applications. Euler played a big role in ensuring the Cartesian legacy and is featured in the Influence section of my website.

Charles Perrault. “*Portrait of Marin Mersenne.*” Hommes illustres qui ont paru en France pendant ce siècle, 1696-1700, Linda Hall Library, <https://www.lindahall.org/about/news/scientist-of-the-day/marin-mersenne/>

Mersenne was a French polymath and a Jesuit priest who played a big role in shaping Descartes' mathematical and religious perspectives. He was known as the intellectual clearing house of Europe at that time and allowed Descartes to tap into his vast network of connections. I have included Mersenne as a key influencer in the Investigation section and quoted from a letter Descartes wrote to Mersenne in the Interactions section of my website.

Cheffer, Henry. “*René Descartes (1596-1650) France(1937), No. 331.*” Wake Forest University, [users.wfu.edu/kuz/Stamps/Descartes/Descartes.html](http://users.wfu.edu/kuz/Stamps/Descartes/Descartes.html) Accessed 1 Feb. 2024.

The 1937 French stamp honoring René Descartes underscores his enduring significance in European history making it my choice of image to be used in Thesis section. Featuring the book “Discourse de La Méthode,” the stamp pays

tribute to Descartes' groundbreaking work, including the appendix on La Géométrie, which laid the foundation for analytic geometry. The subsequent correction of the stamp's title (from No. 330 to No. 331) reflects the meticulous attention given to honoring Descartes' legacy.

Descartes, René, "*Les Meditations*," 1641. Gallica. Accessed 16 Mar. 2024.

I have included the title page of this book in the Interactions section of my website. This primary resource by Rene Descartes written in Latin in 1641 exposed me to his philosophy. It helped me make the important connection between his philosophy and his mathematics.

Descartes, René, "*Le Monde*." Gallica, [gallica.bnf.fr/ark:/12148/bpt6k5534491g.r=.langEN](https://gallica.bnf.fr/ark:/12148/bpt6k5534491g.r=.langEN). Accessed 5 Feb. 2024.

I have included the title page of this book in the Interactions section of my website. This was a work from Rene Descartes which was published 14 years after his death. The delayed publication of this book is an example of Descartes' complicated relationship with the catholic church.

Federico Commandino. "*Italian Translation of Euclid's Elements*", 1575 , Caltech. Caltech Archives, [digital.archives.caltech.edu/collections/Photographs/RB-E1575-1/](https://digital.archives.caltech.edu/collections/Photographs/RB-E1575-1/) Accessed 1 Feb. 2024.

I have included the title page of this book in the Investigation section of my website to highlight the significance of Descartes' exposure to geometry during his studies at La Flèche. Euclid's systematic presentation of geometry, with its rigorous axioms and logical deductions, provided Descartes with a foundational understanding of shapes, lines, angles, and solids.

Frans van Schooten. "*MacTutor*", DJF/JOC/EFR, <https://mathshistory.st-andrews.ac.uk/Biographies/Schooten/pictdisplay/>. Accessed 14 Feb. 2024.

I have included the image of Schooten in the Influence section of my website to highlight how Schooten was a key link between Descartes and Newton. Schooten was first to translate Descartes' works into Latin and engrave one of the few images of Descartes for history to remember. Newton read Schooten's version of La Geometrie, which he incorporated into his formulation of Calculus.

Galilei, Galileo. "*The Dialogue concerning the Two Chief World Systems*." Library of Congress, Congress.gov, 1632, [www.loc.gov/resource/rbc0001.2013rosen1350/?sp=6&r=-0.829,0,2.659,1.346,0](https://www.loc.gov/resource/rbc0001.2013rosen1350/?sp=6&r=-0.829,0,2.659,1.346,0) Accessed 2 Feb. 2024.

By featuring the title page of Galileo's "The Dialogue " on the Investigation section of my website, I wanted to highlight the significance of Descartes' exposure to Galileo's work during his studies at La Flèche. In the Interactions section, I have also highlighted that Descartes was increasingly aligning towards Galileo's heliocentric worldview, as depicted in the dialogue, which made him

wary of catholic church and was one of the key reasons why he left Paris for a more liberal Holland.

General Trattato Di Numeri “*General Treatise on Number and Measure, 1556*” of Nicolo Tartaglia (1500-1557). Mathematical Association of America, <https://maa.org/press/periodicals/convergence/mathematical-treasures-nicolo-tartaglias-general-trattato-di-numeri-et-misure>

I used this work of Tartaglia in the investigation section of my website to emphasize his role in Descartes' introduction to algebra while studying at La Flèche. Tartaglia's methods for solving cubic equations influenced Descartes and future mathematicians, shaping the path of algebra's development.

Gottfried Wilhelm Leibniz. “*October 1684 issue (number X) of Acta Eruditorum.*”, 1684 Mathematical Association of America, [maa.org/book/export/html/641727](https://maa.org/book/export/html/641727). Accessed 14 Feb. 2024.

I have included the title page of this book in the Influence section of my website to highlight Cartesian influence on Leibniz. While stationed in Paris, he came across Descartes' mathematics and built his calculus on the foundation of Cartesian geometry. He published his findings in Acta Eruditorum, around the same time as Newton.

Gottfried Wilhelm Leibniz. “Gottfried Wilhelm Leibniz” Britannica, [www.britannica.com/biography/Gottfried-Wilhelm-Leibniz](https://www.britannica.com/biography/Gottfried-Wilhelm-Leibniz). Accessed 14 Feb. 2024.

I have included the image of Gottfried Wilhelm Leibniz in the Influence section of my website to highlight how he was influenced by Rene Descartes' analytical geometry. Leibniz eventually contributed to the invention of calculus in 1684. Leibniz extensively studied Descartes manuscripts while he was stationed in Paris and was instrumental in spreading the idea of Cartesian mathematics across Europe.

Hals, Franz. “*Rene Descartes 1596-1650*” World History Encyclopedia [https://www.worldhistory.org/Rene\\_Descartes/](https://www.worldhistory.org/Rene_Descartes/) Accessed 10 Feb. 2024.

This portrait of René Descartes by Franz Hals is a compelling depiction of the eminent mathematician and philosopher. Hals masterfully captures Descartes' intellectual depth and contemplative spirit, making it a fitting choice for my website cover.

Lefèvre, Roland. “*Pierre de Fermat.*” The Narbonne City Museums, France, Encyclopedia Britannica, 8 Jan. 2024, [www.britannica.com/biography/Pierre-de-Fermat](https://www.britannica.com/biography/Pierre-de-Fermat). Accessed 1 Feb. 2024.

I have included this portrait of Fermat in the Investigation section of my website because the story of Descartes is not complete without mentioning Fermat. Their fierce rivalry influenced and shaped each other and to this day the controversy remains as to who really invented analytical geometry first.

Leonhard Euler. “*Introductio in Analysin Infinitorum*.” 1748. Mathematical Association of America, [maa.org/press/periodicals/convergence/mathematical-treasures-eulers-analysis-of-the-infinite](https://maa.org/press/periodicals/convergence/mathematical-treasures-eulers-analysis-of-the-infinite). Accessed 14 Feb. 2024.

I have included the title page of Leonhard Euler's *Introductio* in the Influence section of my website to highlight Cartesian influence on future mathematicians. Euler published his work extending Descartes' coordinate geometry to three-dimensional space.

Thomas Vaughan “*Fama Fraternitatis: A Rosicrucian Text*.” Google Books, Google tr 1614, [books.google.com/books/about/Fama\\_Fraternitatis.html?id=hrDRswEACAAJ](https://books.google.com/books/about/Fama_Fraternitatis.html?id=hrDRswEACAAJ). Accessed 1 Feb. 2024.

I have included the title page of the book *Fama Fraternitatis*, legendary first manifesto of Rosicrucians in the Interactions section of my website to highlight Descartes' connections with Rosicrucians. Descartes collaborated with multiple prominent Rosicrucians in his time, and it is this link which caused him to be cautious in his interactions with Catholic church and delayed the publication of his first book.

Van Schooten's “*Latin Translation of La Geometrie*.” 1659 Mathematical Association of America, <https://maa.org/publications/periodicals/convergence/the-geometry-of-rene-descartes> Accessed 1 Feb. 2024

I have included the title page of Schooten's translation of *La Geometrie* on my thesis page to highlight its pivotal role in connecting Descartes' mathematical findings to Newton's calculus. Schooten's notes and simplifications facilitated Newton's understanding of Descartes' work, leading to the development of modern-day calculus.

Pierre de Fermat, “*Varia Opera Mathematica*.” Smithsonian Libraries, [si.edu, library.si.edu/digital-library/book/variaoperamathe00ferm](https://si.edu/library.si.edu/digital-library/book/variaoperamathe00ferm). Accessed 1 Feb. 2024.

I have included the title page of *Varia Opera Mathematica* in the Investigation section of my website to highlight Fermat's contributions to analytic geometry. Fermat also independently discovered analytical geometry at the same time as Descartes but did not publish his work until after his death in 1679.

Van Schooten, Franciscus (1581-1646), Draughtsman and engraver. “*Engraved Portrait of René Descartes (1596-1650)*.” *JSTOR*, [jstor.org/stable/community.30137122](https://www.jstor.org/stable/community.30137122). Accessed 22 Feb. 2024.

I have included this portrait of Rene Descartes by Frans van Schooten to emphasize the role of Schooten in this story of mathematics. Schooten's translation of *La Geometrie* to Latin enabled Newton to read Descartes' work and eventually extend the Cartesian mathematics to Calculus. Schooten is truly the link between Descartes and all the greats who came after.

## Secondary Sources

### Books

Aczel, Amir D. “*Descartes' Secret Notebook: A True Tale of Mathematics, Mysticism, and the Quest to Understand the Universe.*” New York City, Broadway Books, 2005.

This was a very engaging read of how Leibniz, while in Paris came across Descartes' works including his secret notebook. This was my best secondary source for establishing the connection between Descartes and Leibniz. I drew lot of inspiration from this book to formulate my thoughts on Descartes-Leibniz connection which is covered in Influence section of my website.

Allen, Tony, et al. “*Timelines of Science.*” New York City, DK Publishing, 2023.

The timeline view in this book helped me understand how the inquisition of Galileo had a direct impact on mathematicians during and after his time. Descartes, who was aligning towards a helio-centric view delayed the release of his book, *Le Monde*. My research on the complicated relationship between Descartes and Catholic church was influenced by this book and is included in the Interactions section of my website.

Berlinski, David. “*Infinite Ascent : a Short History of Mathematics.*” New York City, Modern Library, 2005.

This book presented the counterargument that the leading ideas of analytical geometry were not explicitly mentioned in *La Geometrie*. The author wondered how Descartes could have seen so much while saying so little. I took inspiration from this book to frame my counterargument and rebuttal in the Invention section of my website.

Blanchard, Jean-Vincent. “*Éminence: Cardinal Richelieu and the Rise of France.*” Walker Books, 2011.

I focused all my reading and research on the history of mathematics except for this one book which had no mathematics. One of the nagging questions for me from the very beginning of this project was ‘why a rich and politically connected man such as Descartes lived the life of an exile all through his adult life’ and most of my research pointed to Cardinal Richelieu. I took lot of inspiration from this book to reconstruct the political landscape of 17<sup>th</sup> century Europe which is covered in Interactions section of my website.

Cook, Harold John. “*The Young Descartes: Nobility, Rumor, and War.*” Chicago, U of Chicago P, 2018.

While the primary focus of my project was Descartes as a mathematician, his other roles in life – soldier, traveler, philosopher, nobleman – and how these roles influenced his mathematics was always at the back of my mind. This brilliant biography of Descartes helped me dig deeper into some of those other roles against the backdrop of a tumultuous political and religious climate of France, and

larger Europe. I took lot of inspiration from this book to construct the story of how Descartes was shaped by politics, religion, war and church in the Interactions section of my website.

Davis, Philip J., and Reuben Hersh. "*The Mathematical Experience.*" Boston, Birkhäuser, 1981. Britannica School.

This book highlighted the early advances in geometry by Greek mathematicians such as Aristotle, Plato and Euclid. This book also explained how Descartes was influenced by these mathematicians and how this led him to invent Cartesian geometry. The Ancient Greek Mathematical influences on Descartes, covered in the Investigation section of my website drew lot of inspiration from this book.

Freely, John. "*Aladdin's Lamp: How Greek Science Came to Europe through the Islamic World.*" New York City, Alfred A. Knopf, 2009.

This book tells the beautiful story of how Greek mathematics came to Europe through the Islamic world and how the scholars in medieval Baghdad translated the works of Greek thinkers into Arabic, which in turn was translated to Latin and made its way to Europe. Even though I did not use the impact of Arab Mathematicians in my website, I was enriched by the knowledge of how interconnected the advent of mathematics is to the rise and fall of civilizations.

Glass, Julie. "*The Fly on the Ceiling: A Math Myth.*" Illustrated by Richard Walz, New York City, Random House, 1998.

From this book, I read the fascinating story of how Rene Descartes invented his amazing Cartesian Coordinates system taking inspiration from a fly on his ceiling. This was one of the books which got me intrigued on the topic of Descartes and made me choose this topic. I have used the cover of this book in the Invention section of my website.

Hawking, Stephen. "*God Created the Integers: The Mathematical Breakthroughs That Changed History.*" Philadelphia, Running Press, 2005.

This book gave me an idea of Stephen Hawking's point of view on Descartes. One of the common criticisms against Descartes is that he never intended for all the real-life applications of analytical geometry, however Steven Hawking, in this book, gave me the perspective that Descartes chose that writing style to be on the right side of the catholic church. I have included this perspective in my counterargument chapter within the Invention section.

Hollingdale, Stuart H. "*Makers of Mathematics.*" London, Penguin Books, 1991.

This is one of the first books where I started to explore Descartes' role as a soldier and how the history of math is intertwined with the history of wars throughout civilization. I used two direct quotes from this book in my thesis and influence sections. I also drew inspiration from this book to formulate my thinking on how WARs shaped Descartes, which is included in the Interactions section of my website.

Merzbach, Uta C., and Carl B. Boyer. "*A History of Mathematics.*" 3rd ed., Hoboken, John Wiley and Sons, 2011.

This is one of the best books on the topic of history of mathematics that I read as part of this project. It provided me with the perspective that it was not just Descartes but Fermat and other mathematicians who also worked to invent analytical geometry. I used 4 direct quotes from this book which are used in the Investigation, Interactions and Invention sections of my website.

Pickover, Clifford A. "*The Math Book: From Pythagoras to the 57th Dimension, 250 Milestones in the History of Mathematics.*" New York City, Sterling, 2009.

This book opened my eyes to the idea of "Simultaneous Discovery" with so many examples including Descartes/Fermat, Leibniz/Newton and Darwin/Wallace. According to the author, simultaneous discoveries happen because the time was right for such discoveries, given humanities accumulated knowledge at the time the discoveries were made. I have covered this in the Investigation section of my website, where I mentioned that Fermat should also get the credit for inventing Analytic Geometry.

Smith, Kurt. "*Simply Descartes.*" SIMPLY CHARLY, 2018.

The author of this book, who is also a professor of philosophy, was able to explain Descartes' philosophy in a non-academic manner. The chapter in this book on truth and certainty helped me understand at a deeper level the connection between Descartes philosophy and mathematics. I used some of this reading to formulate my thinking on Cartesian Philosophical Undertones which is covered in the interactions section of my website.

Stillwell, John. "*Mathematics and Its History.*" 3rd ed., New York City, Springer, 2010.

This book gave me a good understanding of the history of algebra. It talks about early advancements from Indian/Arab Mathematicians to Tartaglia, Cardano, Viete and how they influenced Descartes. I relied on this book to formulate my thinking on the history of algebra which is covered in the Investigation section of my website.



## Scholarly Papers

Grabiner, Judith. "Descartes and Problem-Solving." *Mathematics Magazine*, vol. 68, Apr. 1995, pp. 83-97. JSTOR, [www.jstor.org/stable/2691183](http://www.jstor.org/stable/2691183). Accessed 17 Apr. 2024.

Of all the contemporary mathematical historians I came across while building my website, Judith Grabiner inspired me the most. She is a protégé of Uta Merzbach and wrote this very insightful paper on the problem-solving approach of Descartes. I used a direct quotation in the Interactions section of my website and used her paper to formulate my thinking on Cartesian philosophy and the counter argument in Invention section of my website.

Moorman, R. H. "The Influence of Mathematics on the Philosophy of Descartes." *National Mathematics Magazine*, vol. 17, no. 7, 1943, pp. 296-307. JSTOR, <https://doi.org/10.2307/3029936>. Accessed 21 Feb. 2024.

Moorman's excellent journal showed me how math and philosophy were closely linked in Descartes' thinking. I took a direct quote from this journal which calls out Descartes' greatness among his contemporaries and used it in my thesis section. I also relied on this journal to prepare for my second interview with Dr Hunter and helped me come up with my hypothesis that Descartes' philosophy deeply influenced his mathematics.

Watson, Richard A. "John R. Cole., the Olympian Dreams and Youthful Rebellion of Rene Descartes." *International Studies in Philosophy*, vol. 26, no. 4, 1994, pp. 116-17, <https://doi.org/10.5840/intstudphil199426489>.

From this article, I got an interesting exchange between Issac Beeckman and Rene Descartes, where Beeckman introduced Rene Descartes to a Dutch puzzle which many mathematicians and professors could not solve. Descartes solved it within a day making him realize for the first time that he was a very gifted mathematician. This early intervention of Beeckman in Descartes life is the reason why I included Beeckman in the Investigation section of my website.

## Visual Images

"Computer Aided Design (CAD) Drawings." Machines That Make (MTM), MIT Center for Bits and Atoms, [mtm.cba.mit.edu/2020/2020-06\\_cad-hello-world/](http://mtm.cba.mit.edu/2020/2020-06_cad-hello-world/). Accessed 21 Feb. 2024.

CAD software uses the basic x, y, z coordinates to represent extremely complex computer drawings. I have used this visual of a CAD drawing in the Impact section of my website to showcase examples of applying cartesian mathematics to real world use-cases.

"Cartesian Coordinates." Britannica, Encyclopedia Britannica, 19 Jan. 2024, [www.britannica.com/science/Cartesian-coordinates](http://www.britannica.com/science/Cartesian-coordinates). Accessed 21 Feb. 2024.

I have used this image of the 2-dimensional version of Rene Descartes' brilliant Cartesian Coordinates system in its modern-day fashion in the Invention section of my website. This image helps tell the story of how the Cartesian Coordinates

system had evolved over the years from imaginary lines on a bedroom ceiling to real lines on a coordinate plane.

“3D Computer Graphics software.” 27 June 2023. Medium, [medium.com/@2022a1r093/the-art-and-science-of-computer-graphics-and-animation-51d89a2ff609](https://medium.com/@2022a1r093/the-art-and-science-of-computer-graphics-and-animation-51d89a2ff609).

I used this fantastic visual of a computer graphic animation built using cartesian concepts in the Impact section of my website. I have used this visual to showcase the unlimited possibilities of 3D computer graphics which is built on something as foundational as coordinates.

Claude Mellan. “*Portrait of Cardinal Duc de Richelieu*” (French, 1585–1642). metmuseum, <https://www.metmuseum.org/art/collection/search/393597>. 1651 Accessed 22 Apr. 2024.

This is the portrait of Cardinal Richelieu who was Louis XIII's chief-minister and led France into the Thirty-Years' War against the Habsburgs. While Richelieu was singularly responsible for supremacy of France in the 17<sup>th</sup> century, he was also one of the reasons why Descartes flee Paris. I included this portrait in the Interactions section of my website to highlight how Politics impacted Descartes.

Messmer, Lyme. “*Places associated with Descartes in Europe.*” Taken from the book *The Young Descartes: Nobility, Rumor, and War*, Harold J Cook, The University of Chicago Press.

This image covers the extent of travel Descartes did all over Europe as a soldier mathematician and a philosopher. I included this image in the Interactions section of my website to highlight how these travels shaped Descartes and inspired him to create some of the most insightful philosophical and mathematical works.

“*View of the Jesuit College at La Flèche and its Formal Gardens,*” 1655, Bibliotheque Nationale, Paris. *Gallica*. Accessed 22 Apr. 2024.

I included this captivating image of La Flèche in the Investigation section of my website to highlight how *SERENDIPITY* played a role in Descartes' success. Ignatius Loyola's idea of free, high-quality Jesuit education led Descartes to be one of the first students at La Flèche, where he received abundant exposure to knowledge and contributed to his intellectual development. This picture is a good reminder of how schools play a pivotal role in the creation of great thinkers like Descartes.

“*Geographic Information Systems (GIS).*” EarthDATA, [www.earthdata.nasa.gov/learn/backgrounders/gis](https://www.earthdata.nasa.gov/learn/backgrounders/gis). Accessed 21 Feb. 2024.

This is an image of NASA's GIS interface which overlays data of the earth using the Cartesian Coordinates system to explore the earth from satellite mapping and imagery tool. I included this image in the Impacts section of my website to showcase how the Cartesian Coordinates system still impacts the world in ways nobody thought back in the 17th century.

Glass, Dr. Julie, “*The Front Page of the Fly on the Ceiling Book.*” Penguin Random House Canada, 19 May 1998, [www.penguinrandomhouse.ca/books/60657/the-fly-on-the-ceiling-by-dr-julie-glass-illustrated-by-richard-walz/9780679886075](http://www.penguinrandomhouse.ca/books/60657/the-fly-on-the-ceiling-by-dr-julie-glass-illustrated-by-richard-walz/9780679886075). Accessed 1 Feb. 2024.

This is the image of the book with the title page depicting the fly who inspired Descartes to invent analytical geometry. I included this visual in the Invention section of my website to showcase Descartes’ profound intellect and ability to draw inspiration from the most mundane of things such as a fly.

“*Magnetic Resonance Imaging (MRI)s reconstructing brain image*”, The Evolution Of MRI Imaging Equipment, AIMS Education College of Health Sciences, 7 Oct. 2013, <https://aimseducation.edu/blog/the-evolution-of-mri-imaging-equipment>

This is a great visual of using cartesian coordinates in medical imaging to depict the anatomy of brain. I used this visual in the Impact section of my website to showcase the sheer diversity in applications using Descartes’ mathematics even in fields such as medical instrumentation.

“*Google Maps Coordinates Chicago, IL.*” Google Maps Platform, Google, [developers.google.com/maps/documentation/javascript/coordinates#tile-coordinates](https://developers.google.com/maps/documentation/javascript/coordinates#tile-coordinates). Accessed 16 Feb. 2024.

This visual of GPS enabled mapping is a powerful use case of cartesian mathematics. The Google Maps interface shows coordinates for Chicago, IL: latitude/longitude values, world coordinates, pixel coordinates, and tile coordinates. I used this visual in the Impact section of my website to highlight that even everyday applications such as GPS have Cartesian mathematics powering it.

“*Robotic Arms.*” Medium, 30 Jan. 2024, [medium.com/@pacogarcia3/convert-y-z-coordinates-into-angles-for-a-two-axis-robot-arm-from-fdxlabs-d480b01fc9a4](https://medium.com/@pacogarcia3/convert-y-z-coordinates-into-angles-for-a-two-axis-robot-arm-from-fdxlabs-d480b01fc9a4).

This is a powerful visual of cartesian coordinates-based robotics use case. I used this visual in the Impact section of my website to showcase that something as complex as Robotics can be built by modeling robotic movements and performances of tasks as functions of cartesian coordinates.

“*Trajectory of Solar Eclipse using Cartesian Coordinates*”, Great American Eclipse 2024, <https://www.greatamericaneclipse.com/april-8-2024>

This is a pretty topical image of the trajectory of the total solar eclipse North America witnessed a few weeks back in April. I used this visual in the Impact section of my website to showcase how Cartesian Coordinates was used to plot the path of the eclipse throughout North America allowing us to plan and enjoy this once in a lifetime spectacle.

## Podcasts

Cottingham, John, and Susan James, narrators. "Cogito Ergo Sum." Hosted by Melvyn Bragg, produced by Thomas Morris. 28 Apr. 2011. *BBC*, [www.bbc.co.uk/sounds/play/b010mvcp](http://www.bbc.co.uk/sounds/play/b010mvcp). Accessed 16 Mar. 2024.

I listened to this brilliant podcast from BBC which helped me understand what Cartesian philosophy was all about. The narrators did an excellent job of explaining the two central ideas of his philosophy - the Cogito argument and Cartesian doubt. This podcast also helped me connect how all of Descartes' mathematics was built on the foundation of his philosophy and helped me author the topic of 'Cartesian Philosophical Undertones' in Interactions section of my website.

*"In our Time: Philosophy - The Mind/Body Problem."* BBC Radio, 13 Jan. 2005.

This was yet another brilliant podcast on Descartes's Cartesian Dualism. Melvyn Bragg discussed the mind body problem which was first introduced by Descartes in his work *Meditations*. This podcast helped me understand Cartesian philosophy at a deeper level and is reflected in 'Cartesian Philosophical Undertones' in the Interaction section of my website.

"Cogito Ergo Sum The Philosophy of Descartes." The Philosophy of Descartes, La Trobe University, 14 June 2014.

In this podcast, I got a deeper understanding of the Cogito argument. Descartes' quest for finding certainty and truth manifested not only in his philosophical work but also led to some of most important mathematical works. This podcast helped me understand connections between his philosophy and mathematics and is reflected in 'Cartesian Philosophical Undertones' in the Interactions section of my website.

## Audio Visuals

Hawking, Steven, narrator. *"Descartes and Cartesian Coordinate System."* Genius By Stephen Hawking, pbslearningmedia series.

I included this clip in my thesis page as I wanted to highlight how a contemporary great mathematician such as Hawking thought of Descartes. The extended audio covers Stephen Hawking's thoughts on how Rene Descartes algebraically created a cartesian plane and how this deeply impacts the world and our day-to-day lives. The gif shows the animation of how to locate a point in three-dimensional space.

## Movie

Rosseleni, Roberto, director. “*Cartessius*.” ORTF, 1974. *Youtube*,  
[www.youtube.com/watch?v=z7wHbNPUo6M](https://www.youtube.com/watch?v=z7wHbNPUo6M). Accessed 16 Apr. 2024.

This movie painted the times of Descartes, which was filled with wars and threat of religious persecution if your views stray too far from views of the catholic church. It gave me a good understanding of how Descartes neither agreed blindly to the church nor took the aggressive approach of inventors such as Galileo who got struck down by the church. It offered me a perspective of why he chose an extremely introverted middle path and is reflected in the Interactions section of my website.

## Documentaries

Satoy, Marcus Du, performer. “*The Story of Maths*.” Athena Productions, 2009.

This wonderful documentary by Marcus Du Satoy on the story of math gave me the brilliant insight that all mathematicians extend and evolve the ideas of mathematical giants before them. I used two multimedia clips from this documentary to highlight the invention of cartesian coordinates and it's real-world applications.

## Websites

“*The Geometry of Rene Descartes*.” MAA, 2009,  
<https://maa.org/publications/periodicals/convergence/the-geometry-of-rene-descartes> Accessed  
 11 Feb. 2024.

I used this website to understand how Rene Descartes made the Cartesian Coordinates system, how his theorems and ideas worked, and how they had a huge impact on the world that we live in. This content influenced how I formulated and authored the Invention section of my website.

“*PBS Learning Media*.” Bigger Bang Communications, Accessed 22 April. 2024.  
[cptv.pbslearningmedia.org/resource/hawking\\_genius\\_ep01\\_dimensions/descartes-and-cartesian-coordinate-system/](https://cptv.pbslearningmedia.org/resource/hawking_genius_ep01_dimensions/descartes-and-cartesian-coordinate-system/). Accessed 10 Feb. 2024.

I used this extremely well-designed educational website for a powerful audio that vocalizes what Steven Hawking thought about Rene Descartes, which is included in my Thesis page. In the extended audio, Steven Hawking shares his thoughts on how Descartes conceptualized the Cartesian coordinates system and how it still impacts our day-to-day lives.

“*Stanford Encyclopedia of Philosophy*.” Stanford, 3 June 2020,  
[plato.stanford.edu/entries/descartes-method/#MethMath](https://plato.stanford.edu/entries/descartes-method/#MethMath). Accessed 17 Feb. 2024.

This website goes deep into the analytical geometry of Descartes and unravels how he invented cartesian coordinates. This paper helped me understand how Descartes borrowed his idea of method from philosophy to mathematics, which I have covered in the Interactions section of my website.

## Interviews with Experts

Dinkins, Hunter G. “*Videoconference interview with the author.*” 11 Jan. 2024.

One of the first interviews that I had was with Dr. Hunter G. Dinkins PHD from MIT. Our conversation focused on Descartes' invention of Cartesian Geometry and how it influenced other mathematicians such as Sir Isaac Newton and Gottfried Wilhelm Leibniz. He also nudged me to explore Descartes philosophy and recommended the brilliant book from John Stilwell, *Mathematics and Its History*

Dinkins, Hunter G. “*Videoconference interview with the author.*” 18 Mar. 2024.

In my second interview with Dr. Hunter Dinkins PHD, we dug deeper into the topic of how Descartes philosophy influenced his mathematics. He confirmed my hypothesis that the cartesian approach of breaking down problems to their most fundamental principles and then building on top of them has become an accepted practice in modern mathematics.

Edwards, Richard Abe, Dr. “*Videoconference interview with the author.*” 25 Mar. 2024.

In this insightful interview, Dr. Richard Edwards, a respected authority in the topic of history of mathematics, confirmed my thesis of the transformative impact of Descartes La Geometrie. Dr. Edwards eloquently articulated how Descartes "**mathematized**" the natural world using algebraic equations. Additionally, he also recommended Stuart Hollingdale's brilliant work, *Makers of Mathematics*.

Shell-Gellasch, Amy. “*Videoconference interview with the author.*” 18 Mar. 2024.

I had a very insightful interview with Dr Amy Shell-Gellasch PHD, who is an expert on the history of mathematics, and has written a book, ‘Algebra in Context’, on the history of analytical geometry. The conversation covered all aspects of Descartes' work, including his invention of cartesian geometry, how it influenced mathematicians after his time, and real-world use-cases. She also offered a unique insight, that if Descartes did not invent this concept, then someone else would have, however, he packaged it so well that it triggered a new field in mathematics.