

## TED Connection: Revealing Archimedes' Lost Codex

### Overview

Mensa for Kids' TED Connections are short, easy to use guides that help teachers, parents and youth use TED talks in a classroom or home setting. Rather than a lesson plan format, they have a list of discussion questions, all at higher levels of thinking.

Curator extraordinaire **Will Noel** shares how it took a team of passionate people across a rainbow of disciplines to discover the lost words of an ancient Greek mathematician. He shares why he believes libraries must share to make sure that ancient manuscripts survive and gives us a new view on very old parchment.



### A message from Will Noel:

Thank you so much for your interest in this story. If you want to play your part in saving the writings of Archimedes, then you need to tell people about it, and pass the story along. The more people that care, the more likely it is that works of cultural heritage will survive for later generations to enjoy.

### WATCH THE TED TALK AT:

[ted.com/talks/william\\_noel\\_revealing\\_the\\_lost\\_codex\\_of\\_archimedes](https://ted.com/talks/william_noel_revealing_the_lost_codex_of_archimedes)

## Think about it

1. Why and how does Noel say that ancient texts survived? What do you think will make contemporary text survive (if you think it will)?

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2. Noel describes how we know about Archimedes from three books, called A, B, and C, two of which were lost centuries ago and one which was discovered just over a century ago. What part of the story of the lost texts of Archimedes struck you as most ironic?

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3. What does the way in which the person who compiled the prayer book tells us about the value of writing materials at the time? Can you think of something as valuable and at the same time necessary today?

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4. Heiberg discovered two unique texts by Archimedes, *The Method of Mechanical Theorems* and *The Stomachion*. Ironically, their discovery made their condition worse. Why does that happen? How can we balance the need and desire to view and study ancient artifacts and texts and archeological sites without destroying them?

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**5.** Although it seems like this type of text would be at the Library of Congress or some other incredible repository, instead it was bought by a private owner in 1998. Noel describes: "He wanted to make that which was fragile safe. He wanted to make that which was unique ubiquitous. He wanted to make that which was expensive free. And he wanted to do this as a matter of principle."

Noel uses the literary device anaphora here, which is the repetition of a word or phrase at the beginning of every clause. It comes from the Greek meaning, "Carrying up or Back." Search for another famous example of anaphora and transcribe it below.

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Epistrophe is the repetition of a word or phrase at the end of every clause. Rewrite Noel's sentences, changing the anaphora to epistrophe. How does this change the feeling?

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**6.** He says that they gathered the friends of Archimedes to try to resurrect the text. Noel says that the people who came from wide ranging disciplines like program management and particle physics didn't come for money. Rather, they came for Archimedes. Do you think it's possible to be friends with someone you've never met? What does the willingness of these experts from such broad endeavors tell us about the power of intellectual passion?

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**7.** The glue was a problem. The brown hide glue wasn't an issue as much as the Elmer's Wood Glue. Noel describes that the polyvinyl acetate emulsion that is Elmer's Wood Glue doesn't dissolve in water once it's dry and is tougher than the parchment itself. Again, it's ironic that something that was designed to preserve the parchment ended up being destructive. Can you think of something that was destroyed in the very act of trying to preserve it? Can you think of things with this potential?

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**8.** It took four years to take the book apart, and every little tiny scrap had to be saved because it might contain unique Archimedes text. How is this an example of law of supply and demand in economics?

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**9.** Noel describes the technique they used to try to be able to read the text that was hidden behind the other text and how the quest led them to Stanford's Synchrotron Radiation Lightsource Lab and the most powerful light source in the Solar System. The Stomachion involved a fourteen-part square and Archimedes' study of how you could combine those fourteen bits and still have a perfect square. How are the purpose of Stanford's lab and the purpose of Archimedes similar?

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**10.** The quote by Athenian orator Hyperides also discovered within the Archimedes text that Noel shares reads:

*"Best of all is to win. But if you can't win, then you should fight for a noble cause because then you'll be remembered. Consider the Spartans. They've won innumerable victories, but no one remembers what they are because they were all fought for selfish ends. The one battle the Spartans fought that everyone remembers is the battle of Thermopylae when they were butchered to a man but fought for the freedom of Greece."*

How are the words of Hyperides as valuable to us in their own way as the mathematics of Archimedes? Are the disciplines of philosophy and “hard” sciences necessarily at odds?

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**11.** Noel describes the conundrum that if you want books to survive, you must hide them, yet once you turn those books to data, you must share it to preserve it. He says, “If you want data to survive, let it out and let as many people as possible see it... Why don’t we just let everybody have access to this data and curate their own collection of ancient knowledge and wonderful and beautiful things and increase the beauty and the cultural significance of the Internet?”

What exists now in digital form that you would like to curate for yourself in a collection of “wonderful and beautiful things?”

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**12.** In Q&A related to the TED Talk, Noel argues: “And the great thing about digital data, particularly of historic collections, is that they’re the greatest advert that these collections have. So: Why on Earth would you limit how people can use them? The digital data is not a threat to the real data, it’s just an advertisement that only increases the aura of the original, so there just doesn’t seem to be any point in putting restrictions on the data.

The other main reason to do it is to increase the knowledge of and research on your collection by the people, which has to be part of your mission at least, even in the most conservative of institutions. People can find out more about your materials, work on them, and add knowledge to your collections. And that’s good for everybody, not just institutions. That’s what history is, and that’s what makes history alive.”

Describe the competing forces at work in this debate. Who wants/needs data restricted and who benefits from its being shared? What is your judgment? If you were the curator of a museum, would you buy Noel's argument that the more you give your beautiful things away, the more you will lure people to you to see them in person?

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**13.** In a speech, Noel said, "My mission is to bring art and people together, for learning, discovery, and enjoyment." Which of these three things did he best accomplish for you in this TED Talk?

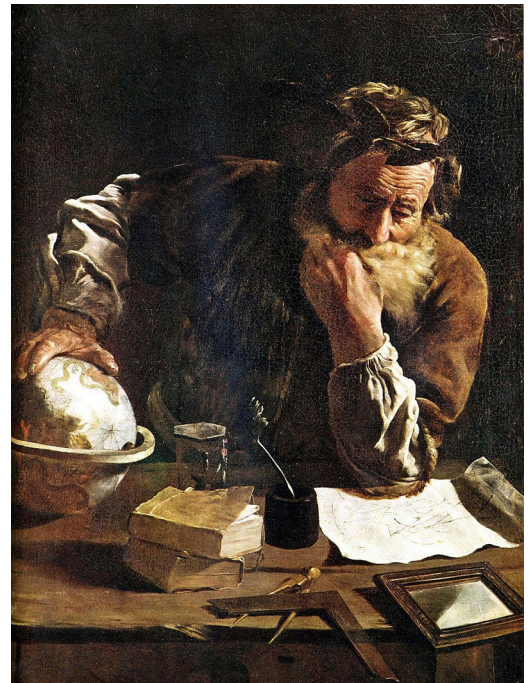
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## Do it

- Perform Archimedes' Displacement experiment: [explorable.com/displacement-experiment](http://explorable.com/displacement-experiment)
- Play with Archimedes' perfect square puzzle: [bit.ly/arch-puzzle](http://bit.ly/arch-puzzle). You can read about it and get a nice bibliography of other writings about it at [mathworld.wolfram.com/Stomachion.html](http://mathworld.wolfram.com/Stomachion.html).
- We know Archimedes was an ancient Greek mathematician. Analyze this painting by the Italian painter Ferri of him and describe the anachronisms (out of time mistakes) you see. What in this picture doesn't match the time period he actually lived in?
- Try to solve a very difficult math problem created by Archimedes: [bit.ly/arch-cattle](http://bit.ly/arch-cattle)
- Use a content curation tool (try one of the ones listed below) to gather your own collection of wonderful and beautiful things you find on the Internet.

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|------------------------------------------------------|--------------------------------------------------------|
| ▶ <a href="http://paper.li">paper.li</a>             | ▶ <a href="http://diigo.com">diigo.com</a>             |
| ▶ <a href="http://storify.com">storify.com</a>       | ▶ <a href="http://livebinders.com">livebinders.com</a> |
| ▶ <a href="http://list.ly">list.ly</a>               | ▶ <a href="http://symbaloo.com">symbaloo.com</a>       |
| ▶ <a href="http://pearltrees.com">pearltrees.com</a> | ▶ <a href="http://bundlr.com">bundlr.com</a>           |
| ▶ <a href="http://scoop.it">scoop.it</a>             |                                                        |



## Read about it

- Your library should have a database with access for you to read this paper Noel published on the study of the Palimpsest: *Infinite Possibilities: Ten Years of Study of the Archimedes Palimpsest*. By: Easton, Roger L., Noel, William, Proceedings of the American Philosophical Society, 0003049X, March 2010, Vol. 154, Issue 1.
- Read what Stanford has to say about their role in the revealing of the text: [bit.ly/arch-stanford](http://bit.ly/arch-stanford)
- Explore the writings of Hyperides: [bit.ly/read-hyperides](http://bit.ly/read-hyperides)
- Read the funeral speech of Hyperides: [bit.ly/funeral-speech](http://bit.ly/funeral-speech)
- *Archimedes and the Door of Science* by Jeanne Bendick (ages 10 & up)

- *The Archimedes Codex: How a Medieval Prayer Book Is Revealing the True Genius of Antiquity's Greatest Scientist* by Reviel Netz and William Noel (older readers)
- *Archimedes to Hawking: Laws of Science and the Great Minds Behind Them* by Clifford Pickover (older readers)
- *The Usborne Book of Scientists (From Archimedes to Einstein)* by Struan Reid and Patricia Fara (youth readers)

## Watch it

- *NOVA's Infinite Secrets: The Genius of Archimedes*: [bit.ly/nova-infsec](https://bit.ly/nova-infsec)
- *How taking a bath led to Archimedes' Principle*: [bit.ly/arch-bath](https://bit.ly/arch-bath)
- *Absolute Genius - Archimedes (Season 1, Ep. 1)*: [bit.ly/arch-inf](https://bit.ly/arch-inf)
- *Archimedes and the Quest for the Theory of Everything*: [bit.ly/arch-quest](https://bit.ly/arch-quest)
- *Mythbusters* tries to recreate the death ray: [bit.ly/myth-death](https://bit.ly/myth-death)
- Archimedes has his own YouTube channel at [youtube.com/user/ArchimedesPalimpsest](https://youtube.com/user/ArchimedesPalimpsest)

## Surf it

- Follow Will Noel on Twitter at @WillNoel [<https://twitter.com/WillNoel>]
- Explore the Archimedes Palimpsest online at [archimedespalimpsest.org](https://archimedespalimpsest.org)
- Attend a virtual Archimedes conference at [bit.ly/explore-archimedes](https://bit.ly/explore-archimedes). Read more, watch a talk, and find more buried treasure.
- Read a bio of Archimedes: [famousscientists.org/archimedes](https://famousscientists.org/archimedes)
- Explore the Stanford lab: [bit.ly/lab-stanford](https://bit.ly/lab-stanford)
- Explore illuminated manuscripts: 

▶	<a href="https://bit.ly/ill-man">bit.ly/ill-man</a>	▶	<a href="https://bit.ly/walters-man">bit.ly/walters-man</a>
▶	<a href="https://bit.ly/bodley-man">bit.ly/bodley-man</a>	▶	<a href="https://bit.ly/warburg-man">bit.ly/warburg-man</a>
▶	<a href="https://digitalcollections.nypl.org">digitalcollections.nypl.org</a>		
- Learn about Heiberg: [bit.ly/heiberg](https://bit.ly/heiberg). (His name might look like it should be pronounced "Heeberg," but in Germanic languages, when encountering "i" and "e," you say the second letter that you see!)