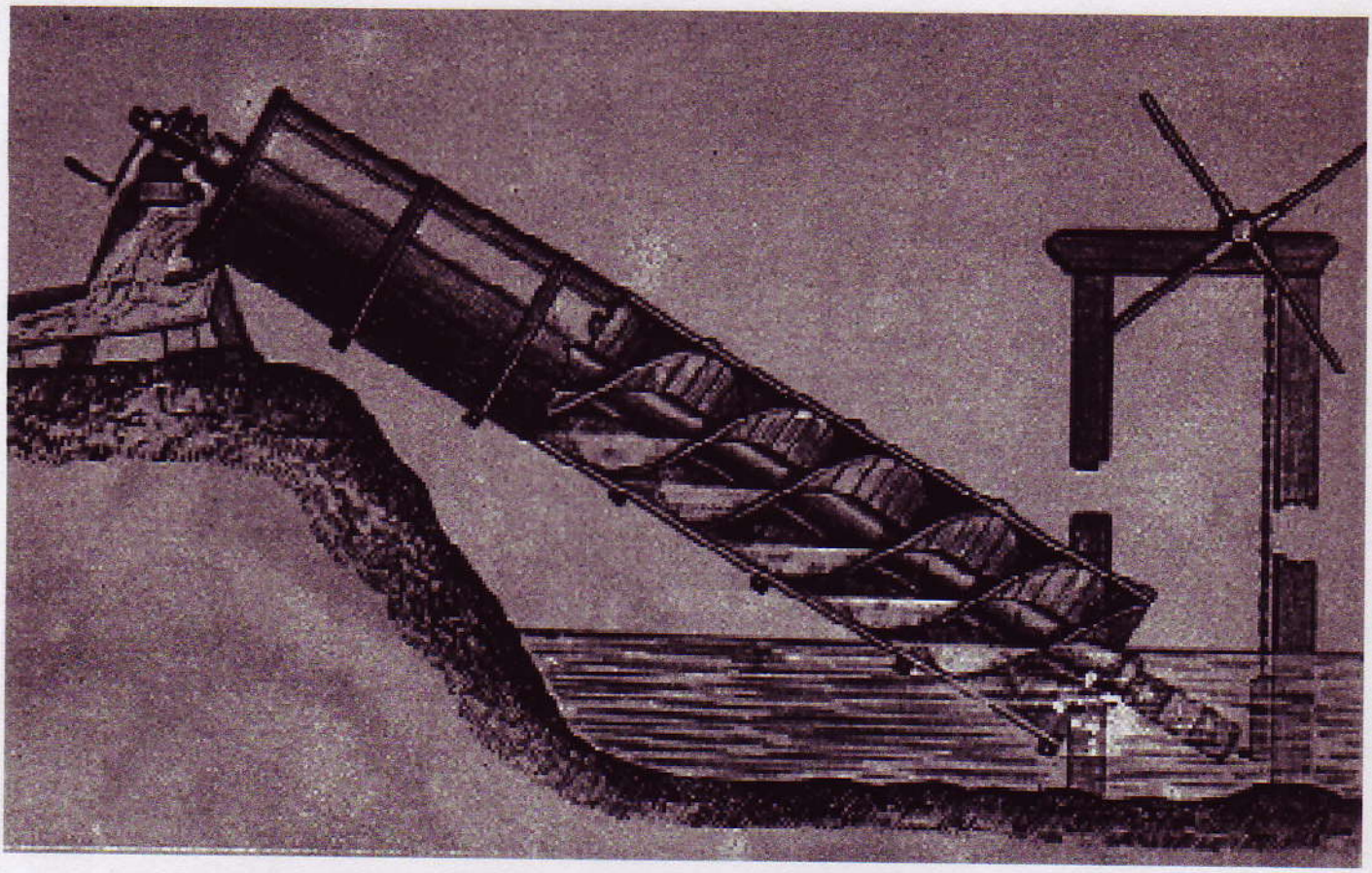


Archimedes von Syrakus (287? - 212 v. Chr.)

Edwards: „Der nächste Geist, der bzgl. der Brillanz mit ihm konkurrieren konnte, war der Geist Newtons"

Zahlreiche Erfindungen:

- Archimedische Schraube
- Körper verdrängen Wasser proportional zu ihrem Volumen (König Hierons Krone; Heureka!)
- Auftriebskraft im Wasser proportional zu Volumen
- keine Spiegel zum Entzünden angreifender Schiffe

Mathematik:

- Meisterlicher Umgang mit Flächen- und Volumenberechnung
  → Doppeltes reductio ad absurdum sein „Markenzeichen"
- Alle Arbeiten logisch geschliffen
  1. Kreismessung
  2. Die Quadratur der Parabel
  3. Kugel und Zylinder
  4. Über Spiralen
  5. Über Paraboloide, Hyperboloide und Ellipsoid
  6. Des Archimedes Methodenlehre von den mechanischen Lehrsätzen

1906 gefundener Brief an den Freund Eratosthenes
Hier gibt Archimedes seine math. Methoden preis!

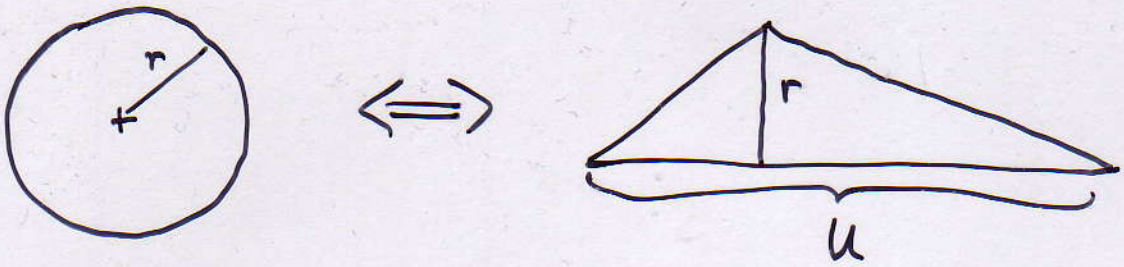
Die Kreismessung

Erster rigoroser Beweis für die Kreisfläche:

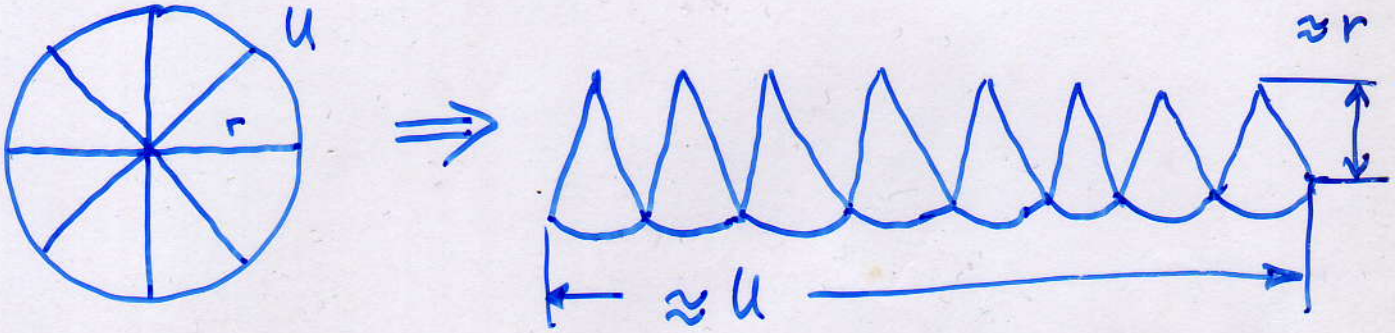
$$A = \frac{1}{2} U \cdot r$$

(r: Radius, U: Umfang)

$$3\frac{10}{71} < \pi < 3\frac{1}{7}$$

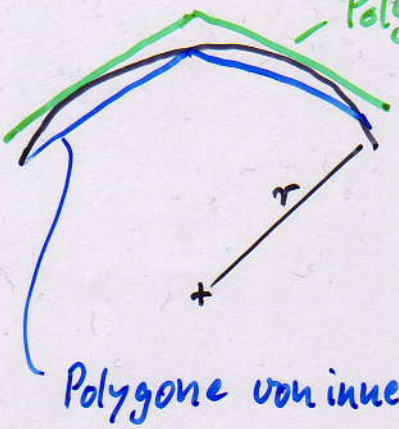


Heuristik:



Eigentlicher Beweis:

Kompressionsmethode und doppeltes reductio ad absurdum



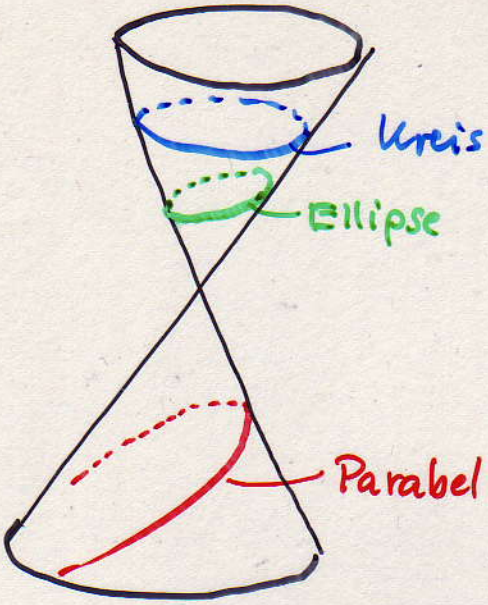
Einschliessung der Kreisfläche durch die Flächen regulärer Polygone von innen und aussen (Kompression)

Annahme 1: $A > \frac{1}{2} Ur$

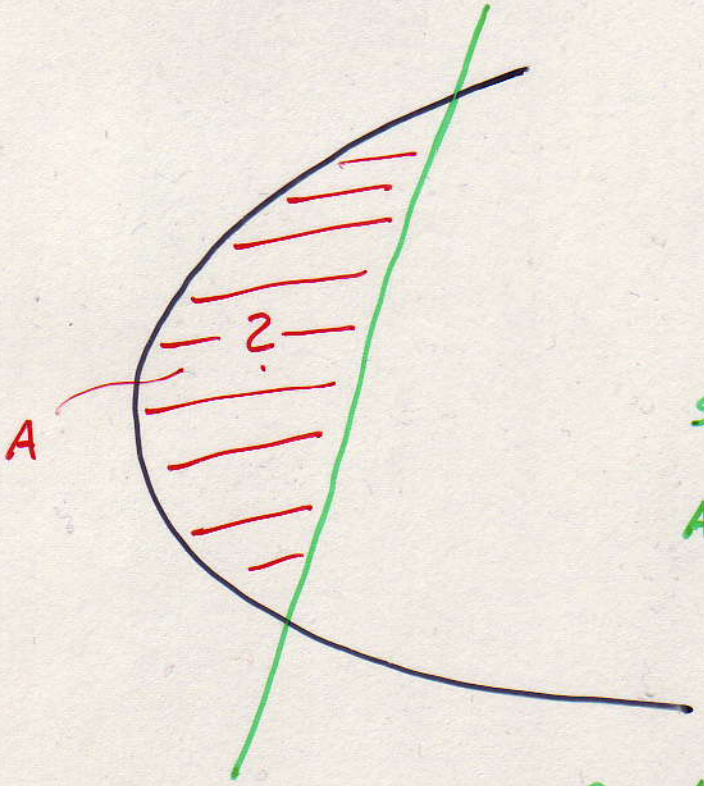
Annahme 2: $A < \frac{1}{2} Ur$

werden beide zum Widerspruch geführt $\Rightarrow$ $A = \frac{1}{2} Ur$

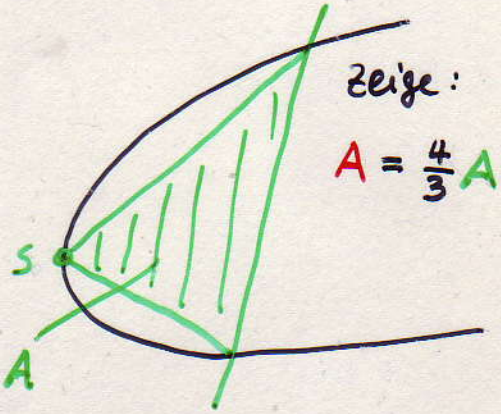
Die Quadratur der Parabel



Kegelschnitte

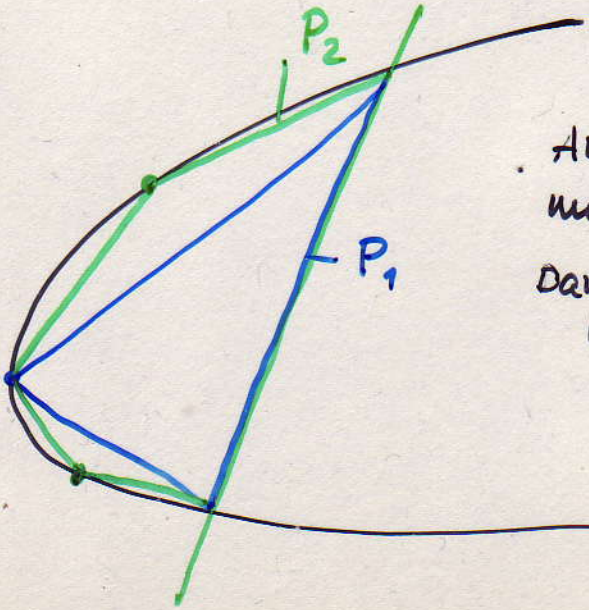


Archimedes' Idee:



Zeige:

$A = \frac{4}{3} A$

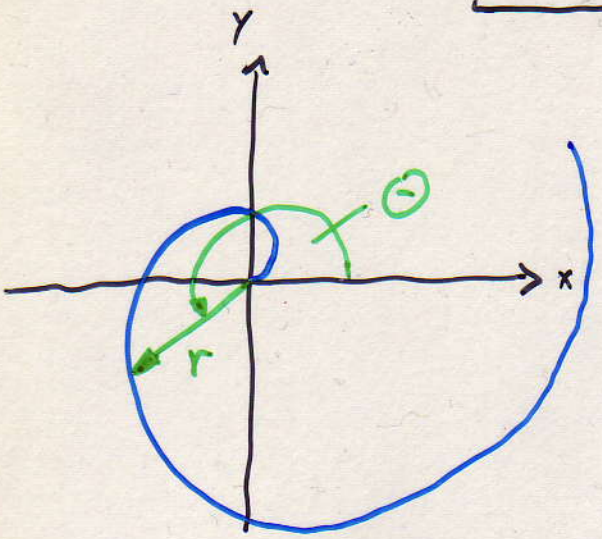


Ausschöpfung mit Polygonen

Dann: doppeltes reductio ad absurdum

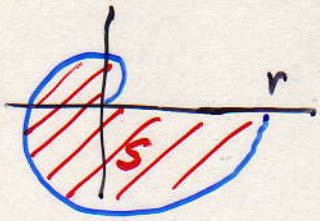
Archimedische Spirale

$$r = a \cdot \Theta$$



Archimedes berechnet:

- Tangenten
- Sektorenflächen



$a(S) = \frac{1}{3} \cdot a(k)$

k - Kreis um O mit Radius r

→ „Differentialrechnung" in der Antike

Warum ist Archimedes nicht der Begründer der Differential- und Integralrechnung?

- „Horror of the infinite" Angst vor „$n \to \infty$"! Daher verbleiben bei doppeltem reductio ad absurdum.
- keine allgemeine Theorie Jede Flächenberechnung wurde neu begonnen. Keine „Rezepte".
- Unkenntnis des Verhältnisses von Tangenten- und Flächenberechnung
  Erst Leibniz u. Newton erkennen im 17. Jhdt. die inversen Eigenschaften von Tangenten- und Flächenberechnung.

Heimlich, wenn des Nachb die Öllampen verlöschen....

Die „Methode" des Archimedes

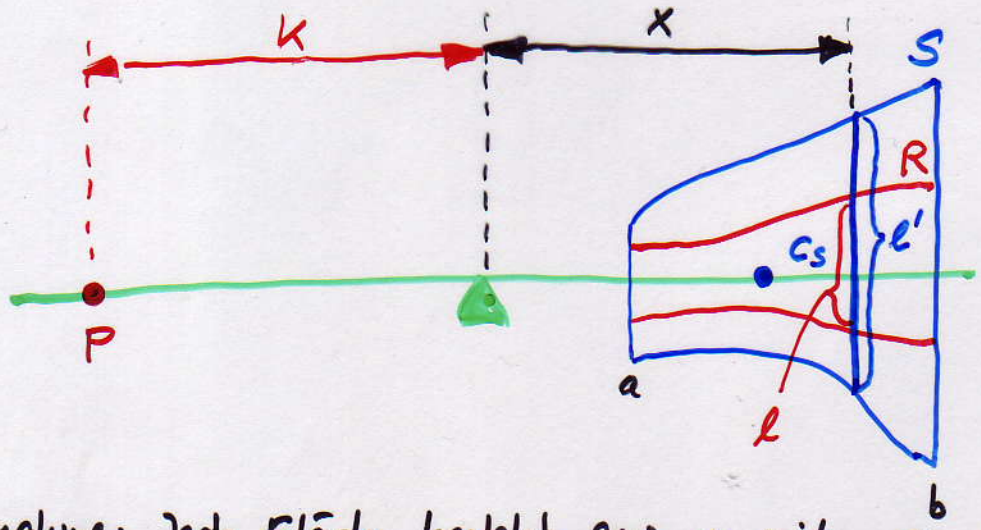
„For certain things first became clear to me by a mechanical method, although they had to be demonstrated by geometry afterwards because their investigation by the said method did not furnish an actual demonstration. ..."

Gegeben: 2 Flächen von Körpern S und R

$a(S)$ und Schwerpunktlage c_S bekannt

$a(R)$ unbekannt

1 Wippe für das Hebelgesetz



Annahme: Jede Fläche besteht aus ∞ vielen Streifen der Dicke 0.

Finde k, so daß $\quad k \cdot \ell = x \cdot \ell' \quad \forall x$

($\hat{=}$ Streifen ℓ bei P balanciert Streifen ℓ' bei x)

$\Rightarrow$ Bringe Fläche „im Schwerpunkt" an:

$$\boxed{a(R) \cdot k = a(S) \cdot \bar{x}_S}, \quad \bar{x}_S := \overline{Oc_S}$$

NEW YORK, TUESDAY, JULY 16, 1907.—FOURTEEN PAGES

BIG LITERARY FIND IN CONSTANTINOPLE

Savant Discovers Books by Archimedes, Copied About 900 A. D.

IT OPENS A BIG FIELD

Whether the Turks Destroyed the Libraries When They Took the City Always a Disputed Question.

COPENHAGEN, July 15.—Y. L. Heiberg, Professor of Philology in the University of Copenhagen, made a most interesting discovery in the Convent of the Holy Grave at Constantinople a few weeks ago.

While studying old manuscripts in the convent he discovered a number of palimpsests which, in addition to prayers and psalms of the twelfth century, included works by Archimedes.

The Archimedes manuscript was a copy made about the year 900 by a monk and later conveyed to Constantinople.

The Turkish authorities did not permit Prof. Heiberg to remove the manuscript. He was permitted, however, to make a copy of it, and this will shortly be published.

The fact that Prof. Heiberg copied the Archimedes manuscript apparently indicates that it consisted, entirely or in part, of works by Archimedes that have hitherto been lost, for he would hardly have taken the trouble to transcribe the books on plane geometry, solid geometry, arithmetic, and mechanics which have come down to us from among the writings by the great Greek. Perhaps, even, the manuscript found at Constantinople may contain the work on notation which Archimedes is supposed to have written and which, when it was lost, meant the loss to the world of the system he invented.

But whether this is so or not, the discovery is of extraordinary interest as showing that ancient manuscripts do exist in Constantinople—that the old legend, "Where the Turk's foot is planted grass never grows again" does not apply to all the libraries that were in the city when Mohammed II. took it in 1453. It may even be that careful search would result in the discovery of the lost books of Livy and Cicero and many other treasures of antiquity that vanished between the close of the classical age and the Renaissance. Perhaps, indeed, the book the loss of which was the greatest literary loss the world ever suffered, the Poems of Sappho, will be at last recovered and one of the chief objects of the proposed excavation of Herculaneum will be attained in another way.

For it has always been a disputed question whether the Turks destroyed or preserved the libraries they found in Constantinople. It is known that the Turk was always reluctant to destroy writing, lest perchance it should contain the name of God, but a good many scholars have been of the opinion that this scruple did not weigh with Mohammed and his followers when they entered the great city and started to make a bonfire of the treasures of antiquity that were contained in it.

Some years ago J. C. Robinson obtained permission to enter the Sultan's library of manuscripts, and saw 3,000 of them ranged in leather cases upon the wall. He came to the conclusion that Western scholars had examined them long before and that there was nothing of value in them. As a matter of fact, there is no record of any such examination.

Meredith Townsend, in "Asia and Europe," made an appeal for the examination of this library. He said: "The Sultan's library should be searched through as the first condition of the next loan made to Turkey—if there ever is another—and permission demanded to hunt for that older and more valuable store of manuscripts believed or known to be stored in the crypt of St. Sophia. * * * That is the last place left where we shall be likely to make a great literary find, and it should be searched before the great day when the destiny of the Ottomans is completed, and Constantinople once more sinks down, a mass of blood-stained ruins, fired by its possesors before they commence their final retreat to the desert from which, in the mysterious providence of God, they were suffered to emerge, in order to destroy the eastern half of the civilized world. The only other chance is in the Shereefal Palace, at Morocco, and it is uncertain if a library exists there."

Mr. Townsend might have referred to the further chance, a slight one, it is true, but still a chance, that the Chinese Empire may contain some of the lost treasures of the past. But the Danish savant's discovery in Constantinople indicates that that city is by far the best hunting ground for the modern Humanists, if any still exist.

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family, was to be auctione

expected it to sell for $800,000 to $1,200,000. The Greek Orthodox Patriarchate of Jerusalem brought action in Federal Court the day before the sale to block the auction. However, the judge, citing French law that asserts that a party who buys an object and owns it for at least thirty years acquires full title, denied the request.

The Greek counsel bid but dropped out at $1,900,000. The winning bid was $2,000,000 (plus a 10% commission to the auction house) from an anonymous American collector, who said that scholars will have access to the manuscript. So the manuscript passed from one anonymous owner to another. However, the Patriarchate threatened to take legal action to recover the palimpsest, which they asserted was stolen. Even so, the new owner permitted it to be put on display to the general public for the first time in a thousand years, as the New York Times of February 19, 1999 reported.

Eureka!

When the oldest surviving copy of the important mathematical works of Archimedes sold at Christie's in New York this fall for $2.2 million, the buyer was a low-profile American collector who wished to remain anonymous. So mathematicians, historians, scientists and scholars thought they would never see the Archimedes palimpsest again.

But this week the Walters Art Gallery in Baltimore announced that it would show the manuscript in a special exhibition from June 20 through Sept. 5.

Gary Vikan, director of the Walters, had gotten in touch with Simon Finch, the London dealer who bought the manuscript on behalf of the collector. It turned out that the new owner was a supporter of the Walters.

Mr. Vikan, who is a Byzantine scholar, said the Walters was the right place to show the work by Archimedes, the Greek mathematician and inventor. "We have the largest manuscript collection of any museum in the country," he said. "It's a bit like having Archimedes's brain in a box."

Because the manuscript is delicate, scientists at nearby Johns Hopkins University will digitize the images so they can be more throughly viewed. "We're going to do an audiovisual film to tell the story of Archimedes," Mr. Vikan said, "to tell about the transition of classical knowledge to modern times."

A palimpsest is a parchment or other writing surface that has been used more than once, so that the earlier writing is only partly visible. The 174-page Archimedes palimpsest is the only manuscript containing the mathematician's "Method of Mechanical Theorems" and the original Greek version of "On Floating Bodies." Copied during the 10th century by a scribe in Constantinople, the text of Archimedes's theories was washed off in the 12th century by monks so that the parchment could be re-used. Digital technology makes it possible to read beneath the monks' writing, revealing Archimedes's text and geometrical diagrams.