Ancient Greece

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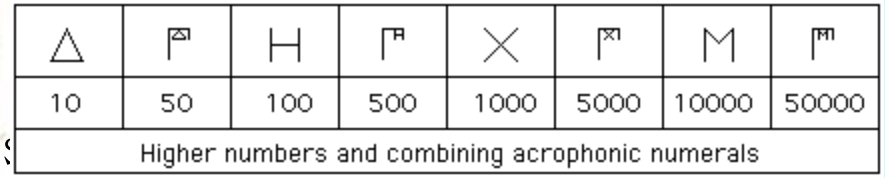
INTRODUCTION

- Not the fountainhead of sciences
- Main contribution to math was Geometry
  - Deductive logic
- Arithmetic and calculations (logistics) were regarded as different entities
- *Reductio ad absurdum*
  - Indirect proof
- Plato attacked idea of human experience
- Many other works were lost due to hostility
  - Less than one-tenth survives

NUMBER SYSTEMS

- Likely counted on abacus or tables
- Used two systems
  - –Herodian or Attic
    - •Base 10
    - •Used symbols in patterns
    - •No zero
  - –Ionic or Alexandrian
    - •24 Greek alphabet with 3 archaic letters



10	50	100	500	1000	5000	10000	50000
Higher numbers and combining acrophonic numerals							

1	α	alpha	10	ι	iota	100	ρ	rho
2	β	beta	20	κ	kappa	200	σ	sigma
3	γ	gamma	30	λ	lambda	300	τ	tau
4	δ	delta	40	μ	mu	400	υ	upsilon
5	ε	epsilon	50	ν	nu	500	φ	phi
6	ϛ	vau*	60	ξ	xi	600	χ	chi
7	ζ	zeta	70	o	omicron	700	ψ	psi
8	η	eta	80	π	pi	800	ω	omega
9	θ	theta	90	ϟ	koppa*	900	ϡ	sampi

*vau, koppa, and sampi are obsolete characters

PYTHAGORAS

- Started community that studied mysteries of math
- Believed in five basic ideas
  - Universe composed of numbers
- Doctrine passed by word of mouth, not written down
- Cited for two discoveries
  - Pythagorean Theorem
  - Musical chord harmonies
- Everything based on opposites
- Theology of number

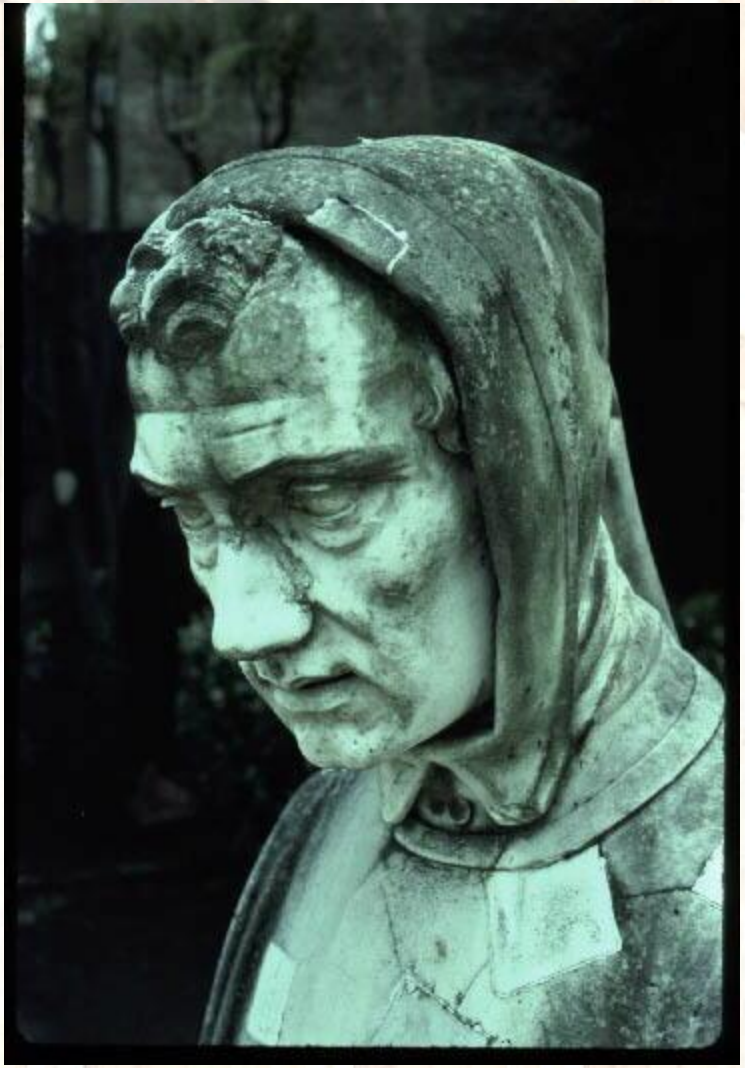
TAXONOMY OF NUMBERS

- Three definitions of number
  - Limited multitude
  - Combination of heaping up of units
  - Flow of quantity
- Perfect numbers
  - Sum of factors equal original number
  - Only four: 6, 28, 496, 8128
- Even: divided into equal parts
- Odd: not so divided
- Even-Odd: divided evenly only once by two
- Even-Even: divided repeatedly by two before unity is reached
- Odd-Odd: product of two odd numbers
- Amicable: sum of factors of two numbers equal one another
- Sociable: sum of factors of three numbers equal one another

EUCLID

- Wrote *Elements*, a book on Geometry
- Geometry means “earth-measuring” or “surveying”
- Regarded it as closed system, no experience needed

ALGEBRA



- Extension of rules of arithmetic to discover value of unknown numbers
- "Rhetorical"
  - Used words
- "Syncopated"
  - Used words and symbols
- Diophantus
  - Wrote *Arithmetika*

ALGEBRA

- Diophantine problem
  - To find two numbers such that their sum and the sum of their squares are two given numbers
- Example:
  - Sum = 20
  - Sum of squares = 208

Let numbers be 10 – x and 10 + x
Squaring gives x^2 – 20x + 100 and x^2 + 20x + 100
So, 2x^2 + 200 = 208
Solve to get x = 2
Therefore the numbers are 8 and 12

- Try these…..
- Sum = 22, Sum of squares = 250
- Sum = 54, Sum of squares = 2106

HYPATIA

- Daughter of Museum mathematician Theon
- Taught math
- Was killed by Christians
- Contributed to critique of Euclid's *Elements* and Diophantus' *Arithmetika*

QUESTIONS?

- Sources
  - www.google.com/images
  - *The Story of Numbers*, by John McLeish