

Chapters 1-3

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Chapter 1: The Origins

Mathematics originally centered itself around numbers, magnitudes, and form.

During the 19th century math broke away from the observations of nature.

Definitions

Mathematics-

Old Definition The science of number and magnitude.

New Definition The study of numbers, equations, functions, and geometric shapes and their relationships.

Origin of Counting

Counting originated with a one to one bases.

People would make notches in bone or wood.

Prehistoric Counting



A fibula of a baboon, marked with 29 notches, is considered to be the oldest mathematical artefact. It was discovered in the early 70's on the site of Border Cave in the Lebombo Mountains between South Africa and Swaziland. It has been dated to 35000 B.C.

Counting Animals

Darwin suggest in the *Descent of Man* (1871) that certain animals can distinguish between number, size, order and form.

Crows found that they can distinguish sets containing up to 4 objects.

Monkeys found to be able to count to at least 9.

Number Meanings

Number	Meaning
0	All
1	Yang
2	Yin
3	Neutrality
4	Creation
5	Restlessness
6	Responsibility
7	Though
8	Power
9	Highest Level of Change
10	Rebirth

The Use of Bases

Decimal	Base 10
Quinary	Base 5
Binary	Base 2
Tenary	Base 3
Vigesimal	Base 20

Bases Use Diversity

American Indians

Use Decimal	$\frac{1}{3}$
Use Quinary	$\frac{1}{3}$
Use Binary	$< \frac{1}{3}$
Use Tenary	$< 1\%$
Use Vigesimal	10%

Origins of Geometry

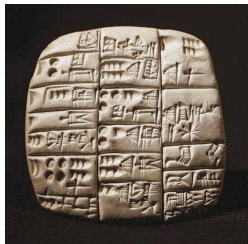
Herodotus believes that geometry started in Egypt due to the practical needs of surveying after annual flooding. These geometers were known as rope stretchers or surveyors.

Aristotle believes that geometry started in Egypt due to the existence of the priestly leisure class.

However, both could be wrong. Pottery, weaving, and basketry showed the use of geometry earlier than that of the Egyptians.

Chapter 2: Egypt

Some of the oldest records are from Egypt. Their records have survived 4,000 years due to Cuneiform.



Cuneiform wedge-shaped marks that are carved on soft clay tablets that are baked in ovens or by the heat of the sun.

Hieroglyphic Notation

Egyptians used a 10-scale base.

They carved the hieroglyphics on stone or wood.

They can be written vertically, left to right, or right to left.

Accuracy

Egyptians were known for their accuracy in counting and measuring.

The pyramids are a good example.

Calendar

The Egyptians observed that the annual flooding of the Nile took place after Sirius, the dogstar, rose in the east sky.

They realized this happened every 365 days.

They created a calendar of 12 months of 30 days each and 5 extra feasting days.

The civil year was short by a quarter of a day. So they advanced their calendar by one day every 4 years. This made the seasons coincide with the calendar.

Ahmes or Rhind Papyrus



It is 1 foot high and 18 feet long.

It is from the Middle Kingdom from about 2000-1800 B.C.

It is believed that Imhotep passed down some of his knowledge, and it ended up on the papyrus.

Imhotep



He was an architect and physician to the Pharaoh Zoser.
He supervised the building of the pharaoh's pyramid about 5,000 years ago.

Unit Fractions

Unit Fraction is a fraction whose numerator is 1.

Egyptian Geometry

The achievements of the Egyptians are overvalued due to the pyramids.

They seemed to be familiar with the Pythagorean theorem.

They also created a formula for the area of a triangle

$$Area = \left(\frac{1}{2}\right) bh$$

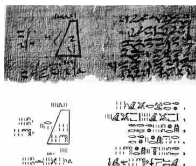
Area of a Circle

The Egyptians used the area of square to find the are of a circle. They placed an octagon inside a square, and they found the area of the square. Then they subtracted the 4 triangles on the corners. This gave them their area.

After using this method they had used, their assumption of π was very close the the real assumption.

$$\pi = 3\frac{1}{6}$$

Golenischev or Moscow Papyrus



It was purchased in Egypt in 1893.

It is 18 feet long and 3 inches wide.

It contains 25 examples which most of them are practical life problems.

It was written by an unknown scribe of the 12th dynasty (1890 B.C.).

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There was not much change in their Math throughout its long history.

Chapter 3: Mesopotamia

For their algebraic problems they used tables. For example they had a table that they used to calculate $n^3 + n^2$.

They were familiar with simple forms of factoring.

They did not use letters for unknowns.

Quadratic Equations

There were 3 types:

$$x^2 + px = q$$

$$x^2 = px + q$$

$$x^2 + q = px$$

Mathematical Weakness

Their papyri and tablets only concern specific cases and problems.
The tablets seem to be school problems.
There is no distinctions between approximations and exact answers.
There are no proofs.

References

A History of Mathematics; Boyer, Carl B.; 1991; John Wiley & Sons, Inc.

Experiment Revels Monkeys Able to Count at Least to Nine; Weiss, Rick; The Washington Post