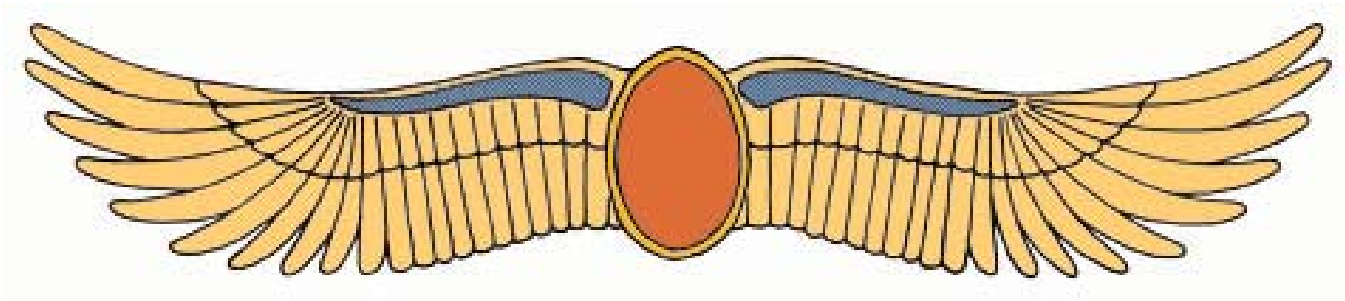

HIEROGLYPHS

FOR ANYONE

written and illustrated by

Scot Bruaw

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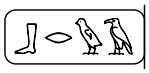
HIEROGLYPHS

FOR ANYONE

an introduction to ancient Egyptian
hieroglyphic writing and numbering

written
and illustrated
by
Scot
Bruaw



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Hieroglyphs for Anyone is an introduction to the study of ancient Egyptian hieroglyphic writing. The goal of this book is to take the mystery out of Egyptian hieroglyphs. It is not my intent to teach you to read hieroglyphic writing. Like any language, learning to read hieroglyphs takes time and commitment. Treat this book as a fun introduction that you should build on with further research.

Teachers and home schoolers are especially encouraged to use this book as a teaching reference. Worksheets and other teacher's resources are available from www.greatscott.com.

I'd like to thank everyone who has offered their insight into Ancient Egypt, without your help I would have given up long ago. I want to also thank Janet Davis for her proofreading talents. I want to also thank Chris Maiorana and Bernardo da Graca for their insight into Adobe Acrobat.

Happy Learning,
Scot

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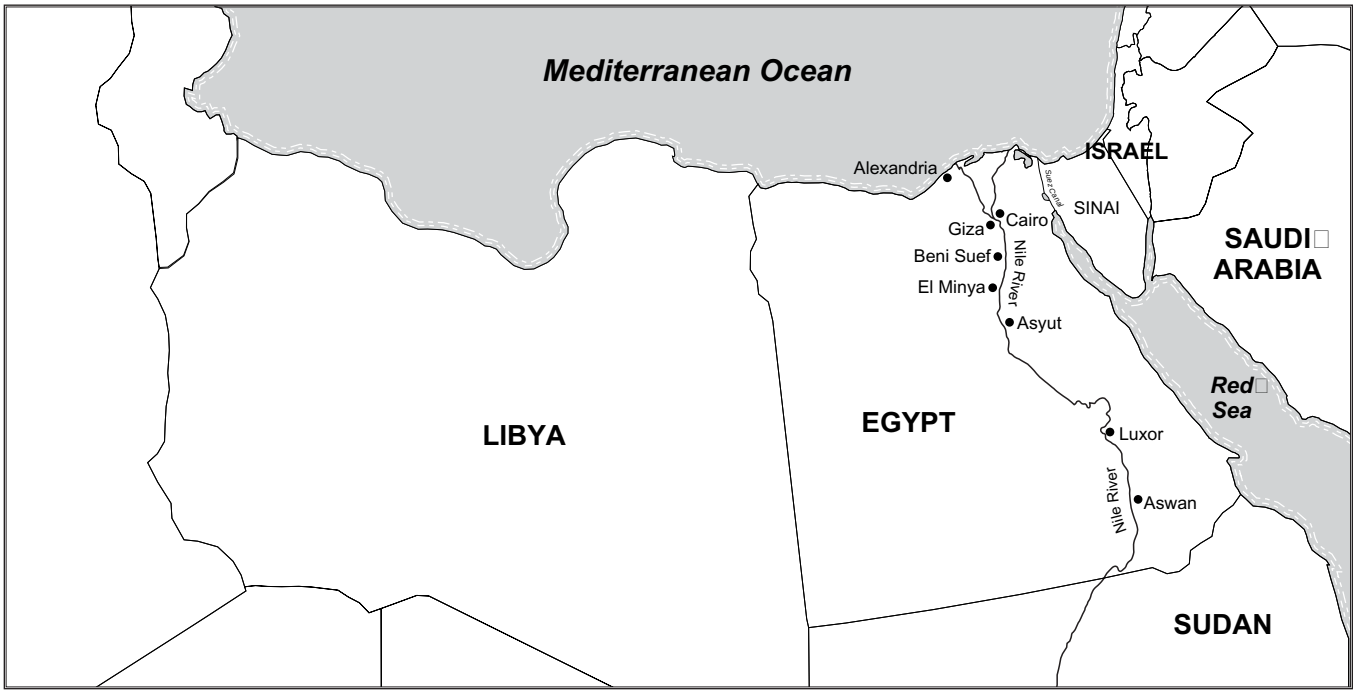
LESSON 1

EGYPT, THEN & NOW



Egypt, Now

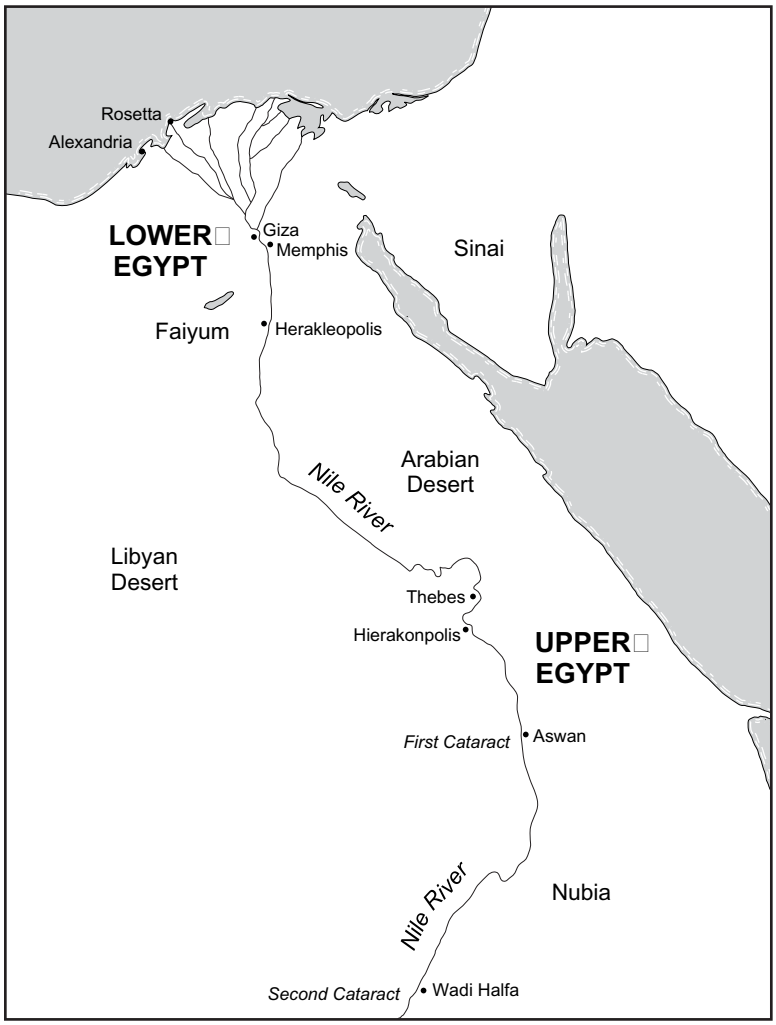
Egypt is located in the northeast corner of Africa at the eastern end of the Mediterranean Ocean. Israel borders it in the east across the Sinai Peninsula. Libya marks Egypt's western border and Sudan forms the southern.

In 1967, during the Six Day War, Israel seized the Sinai. In 1978, after years of hostilities, representatives from Israel and Egypt met at Camp David, Maryland and signed a landmark peace accord. The following year the two countries finalized peace negotiations with a treaty. The Sinai was returned to Egypt and peace was restored. This treaty remains in effect and is a stabilizing force in the volatile Middle East.

The Nile River is Egypt's most distinctive geographic feature. It flows from the mountains in the South northward across the desert to the Mediterranean Ocean. The Nile is the world's longest river and the only major river that flows south to north. The Aswan Dam, completed in 1970, controls seasonal flooding and provides hydroelectric power.

Agriculture is a large part of the Egyptian economy. Grains, vegetables, dates and citrus are grown. Egyptian cotton is prized for its long fibers.

Egypt, Then



Agriculture was also important in Ancient Egypt. The Ancient Egyptians were farmers who grew crops in the flood plains of the Nile. Primarily they grew crops of barley and wheat. The Nile River was essential to life in ancient Egypt. The river provided water for irrigation and silt from annual flooding fertilized the fields.

Every year in the middle of the month of July the snow melted on the mountains in the south. Downstream the Nile swelled with water and flooded the fields. This began the Season of Inundation in Egpyt. For the next several months, the flood plains of the Nile remained underwater. When the water receded in September or October a layer of mud and silt remained. This fertilized the soil for the next crop. This annual cycle allowed the Egyptians to consistently grow bumper crops.

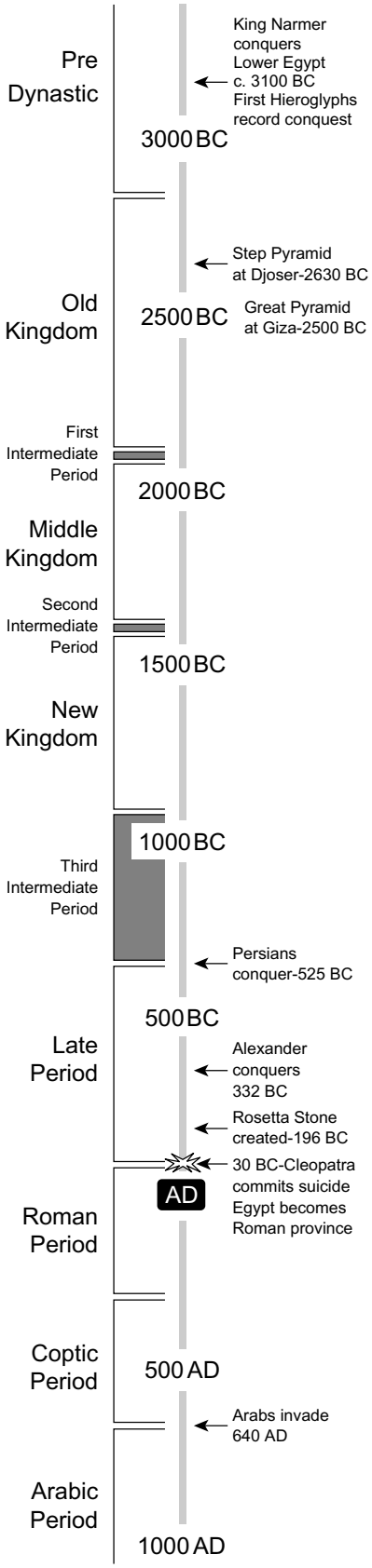
The Nile was also the highway of Egypt. Ancient Egypt followed the Nile River upriver from the delta to the rapids at Aswan. Boats could sail upstream with the wind and drift downstream on the current. Towns and villages were situated along the river just above the high water mark.

The expanse of desert surrounding the Nile formed a natural barrier to invaders. In relative safety with an abundant food supply, the ancient Egyptian culture flourished.

Around 3100 BC, kings in the upland region of the Nile in the South began conquering local rulers and consolidating them under their control. By 2650 BC, the power of the kings had grown so much they had unified the upland and lowland regions of the Nile under a single rule. The rulers who controlled a unified Egypt were known as the "King of Upper and Lower Egypt." These kings, more frequently called "pharaohs," were considered 'living gods.' They acted as the earthly embodiment of the gods of ancient Egypt.

Times of unified rule provided social stability and allowed the Egyptians to focus on the arts. The great building projects were built during times of unified rule—including the sphinx, the pyramids at Giza and the necropolis at Thebes. Artistic style was formalized with the establishment of rules for writings and drawings. These rules were codified into a canon (a set of guidelines). The canon kept art and writing relatively unchanged through nearly 3000 years of Egyptian history.

Although times of unified rule were productive, disruption was inevitable. Civil war and foreign domination caused political instability. Without the support of local rulers, a pharaoh couldn't maintain control over Egypt. Power fragmented between local rulers. Strife and infighting would continue until a strong ruler was able to



restore centralized power. Times of social strife are referred to as Intermediate Periods.

Around 1000 BC, Egypt was entering it's third (and last) Intermediate Period. The pharaohs were weak and control was fragmented. It was in this state in 525 BC that the Persians conquered Egypt. They were driven out in 404 BC, but returned again in 343 BC.

In 332 BC while building his Greek empire, Alexander the Great took control of Egypt and appointed his general, Ptolemy I, governor. After Alexander died, Ptolemy assumed the role of pharaoh. His descendants continued to rule Egypt for the next 300 years. The Greeks were dedicated to the classical forms of Egyptian art. There was a renewed interest in hieroglyphic writing and the number of hieroglyphic characters in commonl use increased from 700 to 3000.

The infamous Cleopatra (Cleopatra V) was the last of the Greek pharaohs. In 30 BC, during a roman civil war, Cleopatra and her lover Marc Antony were allied against Octavian (later called Augustus). After they were defeated at the Battle of Actium, she committed suicide by plunging her hand into a basket of poisonous vipers. With her death, Egypt became a Roman province and the reign of the pharaohs ended. The Romans were much less tolerant of Egyptian culture and many traditions were banned. Ancient Egyptian writing forms began to disappear.

Several centuries later in 640 AD with the Roman Empire in decline the Arabs overran Egypt. As Arabic customs and language spread, Ancient Egyptian culture and spoken language slowly disappeared. Egypt has since been occupied several times by the French and the British, but Arabic remains the language of Egypt.

THE BASICS

LESSON 2

Through written language, individuals can record events and even speak across time. Egyptologists have been able to learn a great deal about the ancient Egyptians through their writings. Some of these writings are almost 5,000 years old.

Writing with Pictures

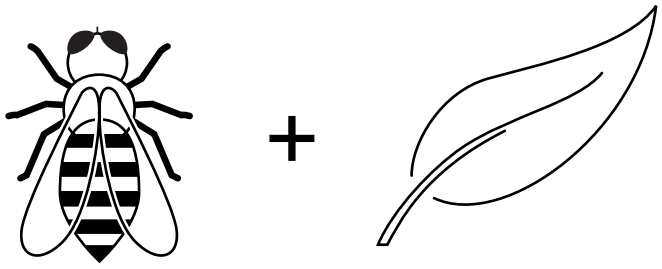
Writing and speech go hand in hand. Writing is simply a recorded form of speech. Early forms of writing used pictures to relate stories. In prehistoric times, cave dwellers painted scenes of hunts on the walls of their caves but these stories relate only those things which could be drawn. It is easy to represent a general idea but difficult to convey specifics. And so some spoken words could not be written. Names or abstract concepts that could not be drawn could not be included.

The Ancient Egyptians changed this by using pictures to represent sounds. The pictures represent the sound of the object when pronounced. By combining the sounds of images together, the ancient Egyptians were able to form words and statements and write anything that could be spoken.

The pictures the Ancient Egyptians used to write with are called hieroglyphs. A hieroglyph is an icon which represents a common object. The sound of a hieroglyph is the sound of the object as pronounced in the Ancient Egyptian language.

Rebus Puzzles

Hieroglyphics are grouped together to make more complex sounds. Groups of hieroglyphic characters are interpreted much like a modern rebus puzzle. A rebus is a picture puzzle which is read by combining the sounds of the images. The combined sounds of the images make a saying or phrase.



REBUS PUZZLE

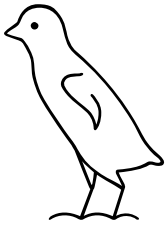
belief

Consonants & Vowels

The spoken language includes vowel sounds, but hieroglyphic writings represent the consonant sounds from the spoken language. Modern abbreviations ‘mtn’ and ‘blvd’ are created by omitting vowels. Although abbreviated these words are recognizable and spoken aloud with vowel sounds. Hieroglyphic writings are written in much the same way.

There are a few exceptions where hieroglyphic characters represent vowels. These are soft vowels and are used in cases where leaving them out might cause confusion, for instance where a word or name begins or ends with a vowel sound.

Because the spoken language of Ancient Egypt has long been extinct the true vocalization of many words are unknown. When there is doubt about vocalizations, Egyptologists typically insert an ‘e’ sound between consonants to make the word pronounceable.

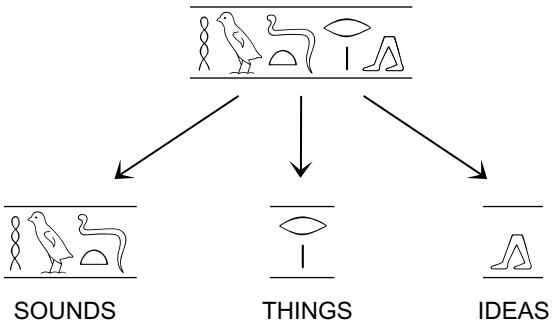


THE CHARACTERS

LESSON 3

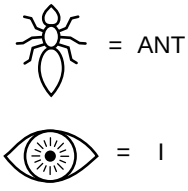
Hieroglyphic characters are iconic representations of objects from Egyptian life and are used to represent sounds or ideas. Hieroglyphs can take several meanings:

as the **sound** of the object
as the **thing** shown
as an **idea** associated with the thing shown



FUNCTIONS OF HIEROGLYPHS

SOUNDS (PHONOGRAMS)



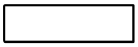
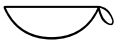
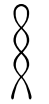
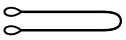
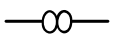
MODERN PHONOGRAMS

Phonogram characters represent the sound of the hieroglyph. Individual sounds are combined to form more complex sounds. 'Words' are formed with combinations of characters. A hieroglyphic character's sound is the pronunciation of the object it represents. Although most phonogram characters represent consonant sounds, there are a few that represent vowel sounds, an example would be where a vowel is important to proper pronunciation. The name "Gus"

without vowels, GS, is pronounced “gus” and is still recognizable. But the name “Aaron” without the vowels, RN, pronounced “ern” is not recognizable. But with selective vowels in place, ARON, would be recognizable as “airon.

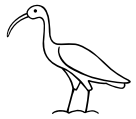
SINGLE SYLLABLES (MONOLITERALS)

The simplest sounds in hieroglyphic writing are single syllables. These hieroglyphs, known as **monoliterals,** are also the most frequently used characters. In modern writing, individual letters represent single syllable sounds. Single syllable hieroglyphs represent the basis for hieroglyphic writing and are often referred to as the “alphabet.”

	vulture	**a** in father		owl	**m** in moon		pool	**sh** like show
	reed	**i** in filled		water	**n** in noon		hill	**k** in key
	two reeds	**ee** like discovery		mouth	**r** like right		basket w/ handle	**k** in basket
	arm & hand	**a** like car		courtyard	**h** in hat		jar stand	**g** like go
	quail	**oo** like too w in wet		twisted flax	**h!** like ha!		loaf	**t** like tap
	foot	**b** like boot		placenta or ball of twine	**kh** like in Scotch loch		tethering rope	**tj** like church
	mat	**p** in pedestal		animal’s belly	**ch** like in German ich		hand	**d** in dog
	horned viper	**f** like feel	 or 	folded cloth door bolt	**s** in saw		snake	**dj** like adjust

TWO SYLLABLES (BILITERALS)

Two syllable sounds are referred to as **biliterals.** These characters were a way of simplifying writing. Instead of writing two single syllable characters, the writer could use a single character. Using one symbol instead of two, writings can be made shorter and therefore easier to draw. As with alphabet characters, each biliteral hieroglyph represents the sound of the object.

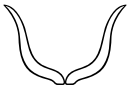

ibis **nb(?)**


jackrabbit **wn**

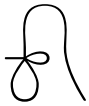

basket **nb**


twine spool **adj**


herb **hn**


horns **wp**


lotus plant **kha**


lasso **wa**

SOME BILITERAL CHARACTERS

THREE SYLLABLES (TRILITERALS)

Triliterals represent three syllable sounds. They do not occur as frequently as biliterals, but are used in the same way. They represent a sound that would otherwise be written with three alphabet characters.


sandal strap **anh**


lion head **haut**

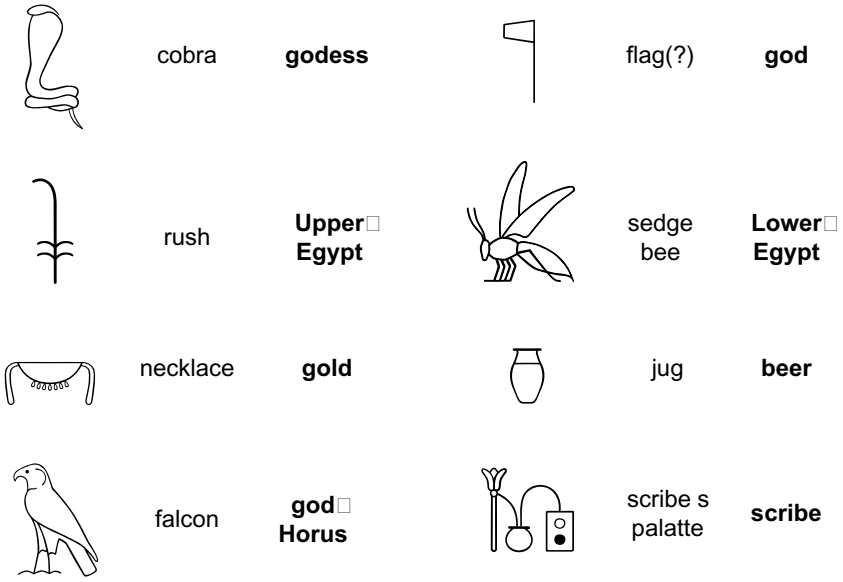

swab **wah**


heart & windpipe **nfr**

TRILITERAL CHARACTERS

Things (ideograms)

Ideogram characters present things–tangible objects. Unlike phonogram characters these hieroglyphs do not represent a sound, instead they are read as the object or an other object associated with the object.



IDEOGRAM CHARACTERS

Some phonogram characters were used as ideograms. In these situations, phonogram characters are often followed by a special character | called the 'ideogram sign.' This character represents the number one. The presence of the 'ideogram sign' means "one of" the object shown. In this context the hieroglyph would be interpreted literally as "one of" the object shown instead of the sound of the object.

IDEOGRAM SIGN
The ideogram sign makes a phonogram into a ideogram

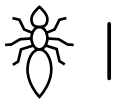
Ideas (determinatives)

Determinative characters are not spoken. They usually accompany a group of phonetic characters which represent a word. The determinative character lends meaning to the word and clarifies the meaning of phonetic characters.

Determinative characters function by implying meaning to a word. Typically, a determinative appears at the end of a word to assist the reader to properly interpret the word. In English, words might have multiple meanings depending on the context in which they appear. In hieroglyphic writing, the presence of determinative characters establishes context.

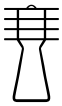
Because hieroglyphic characters don't represent vowels (see Lesson 2: The Basics), the same group of consonants can be interpreted several different ways. In a modern context, STR might represent "stair", "star" or "store". To eliminate confusion, a determinative character could be added.

In the modern rebus at left, the  character represents: ANT. But does it mean "ant" or "aunt"? The addition of a determinative character would clarify meaning. If "ant" is the proper interpretation we would add the "ideogram sign" to show the hieroglyph is meant to be interpreted literally. If "aunt" was the proper interpretation we might add the modern determinative character to lend the meaning of "woman" to the word.



ant **aunt**

DETERMINATIVE
Determines the meaning of a word.

	man seated	**man & his work**		woman	**woman**		arms shrugging	**not**
	man hand to mouth	**eating, speech**		god	**god**		eye	**see**
	man slumped	**tired, weak**		legs walking	**go to**		papyrus scroll	**things written**
	sun's rays	**sunshine**		sun	**day, time**		rain from sky	**moisture**
	papyrus	**green, vitality**		bundled stalks	**stability**			

COMMON DETERMINATIVES

LESSON 4

THE RULES

All writing systems need rules to work. Rules of writing were as important to the ancient Egyptians as they are to us today.

Can you read this?

Something as simple as writing direction can greatly affect legibility. The rules that dictated hieroglyphic writing were formalized in a canon of style. Among other things, the canon dictated reading direction and proper hieroglyph placement. Because of this, hieroglyphic writing remained unchanged for more than 2500 years.

READING DIRECTION

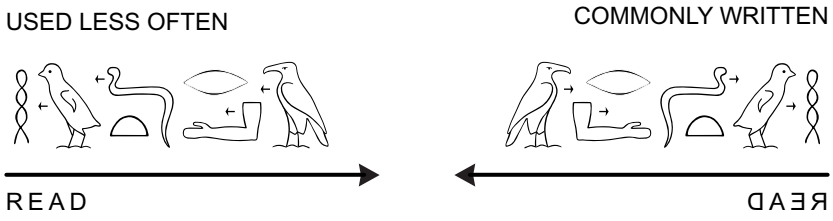
Hieroglyphic writings can be written either direction. Typically they were written

← right-to-left

but they could also be written

left-to-right →

Animals and human figures face the direction from which they are read. To determine reading direction, read into the face of hieroglyphs.



BLOCKS OF HIEROGLYPHS
Reading starts from the direction animal and human figures face

Character Placement

STACKED CHARACTERS
Shorter characters are stacked to minimize gaps

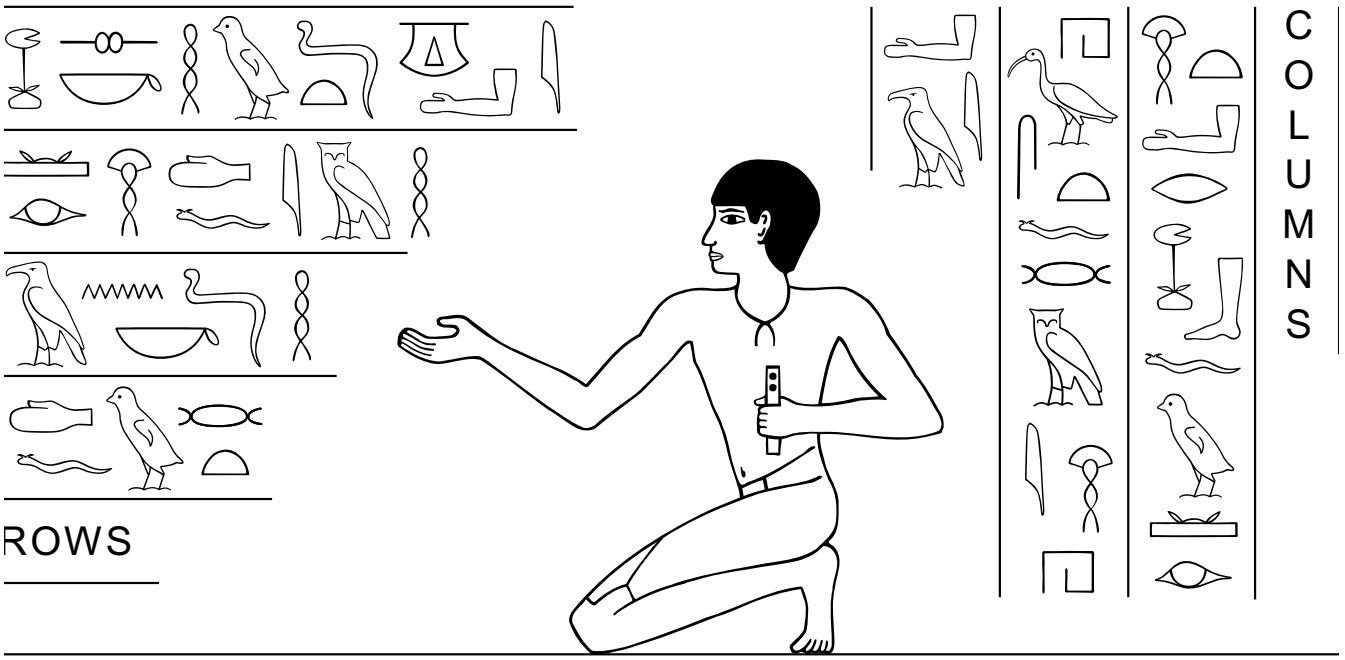
An important part of hieroglyphic writing involves the proper placement of characters. Characters are positioned so the writing space is evenly filled. Shorter hieroglyphs can be stacked to minimize gaps between characters.

Stacked hieroglyphic characters are read across according to the reading direction then downward. Characters earlier in the reading order precede those that follow and characters above take precedence over those below.

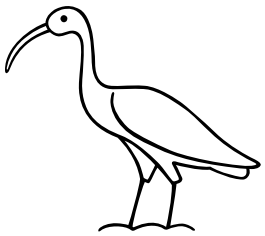
READING ORDER
Reading starts from the direction animal and human figures face

Rows and Columns

Characters can be written in rows or columns. Rows and columns are separated by lines that direct the reader through the writings. Modern letters are also written in rows and sometimes columns.

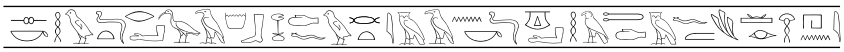


ROWS AND COLUMNS



WRITING METHODS

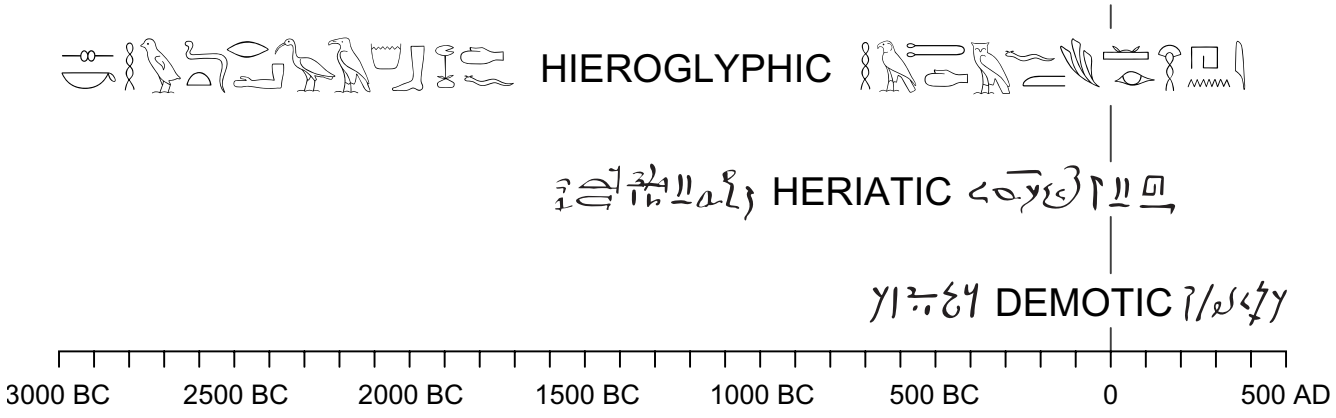
LESSON 5



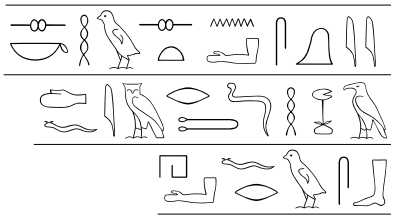
Although hieroglyphic writing was the formal written language of Ancient Egypt and the one most people are familiar with, there were also other writing methods used. These other forms of writing had their roots in hieroglyphic writing.

The process of drawing the picture for each hieroglyph was time consuming. Faster writing techniques were created by developing simplified versions of hieroglyphic writing. This made the process of writing easier. These written forms were appropriate for different situations–formal writings, religious subjects, and quick notes.

Today's written language also takes many forms, each appropriate for a different occasion. Printed and handwritten letters may represent the same characters but differ in appearance. Their usage is likewise appropriate for different situations.



HIEROGLYPHIC

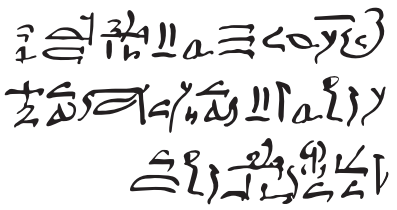


HIEROGLYPHIC
Hieroglyphic writing is the formal writing method of ancient Egypt.

The earliest form of writing in Ancient Egypt was **hieroglyphic**. Hieroglyphic writing first appeared around 3000 BC and remained in use until 400 AD. It was engraved in the stonework of temples, decorated the walls of tombs and was written on papyrus scrolls. It was used for monuments and religious subjects as well as everyday writings.

In today's English, printing is the formal, hand-lettering technique. School children learn to write by carefully drawing lines to represent printed lettering. Hand printed letters are essential anytime clarity is of the essence, like filling out a form where you might be asked to 'print legibly'. Printing is the writing method of choice when legibility and presentation are important.

HERIATIC



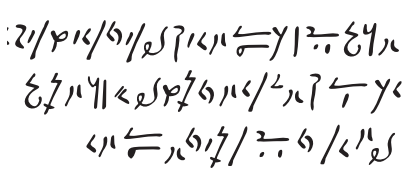
HERIATIC
Heriatic writing is a script writing method.

Heriatic is a script form of hieroglyphic writing where characters are written with quick, short brush strokes. Heriatic writing varied from writer to writer just like modern handwriting. Characters are recognizable from their hieroglyphic origins, but less attention is given to details. It was intended to be a faster method of writing. Heriatic writing appeared around 1600 BC and was only used for day to day writings. Around 1000 BC, it began to be used more on stonework and for religious subjects.

Unlike hieroglyphic writing, heriatic was written in only one direction, from right to left. Ligatures join pair of characters and allow them to be written with one stroke.

Modern handwriting is a good analogy for heriatic writing. It is jotted down quickly and represents a loose approximation of the more formal printed letters. Handwriting is an acceptable, casual method of writing.

Demotic



DEMOTIC
Demotic writing is a shorthand technique.

Demotic writing appeared around 700 BC and replaced heriatic writing for all commonplace writings–excluding religious subjects. Demotic was a simplification of heriatic writing. Characters were altered so significantly that their hieroglyphic origins are not apparent. Demotic became more alphabetic in nature and used ligatures as bridges to group characters together.

Shorthand can be thought of as a modern equivalent of demotic. Shorthand is a swift writing technique where large amounts of information can be recorded rapidly, and is often used to record legal proceedings. It is a simplified writing technique. A single character represents a sound which represents several letters. Shorthand documents are usually transcribed later into a longhand form to make them more readable.

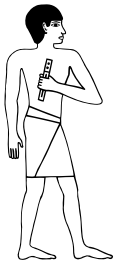
Coptic

ϩⲛ̄ ⲧⲉϩⲟⲩⲉⲓⲧⲉ ⲛⲉϥ
ⲣϥⲱⲟⲟⲛ ⲛ̄ⲩ ⲏⲱⲉⲓⲧ
ⲭⲉ ⲛⲓ ⲛⲩⲉⲧ ⲱϩⲉⲧⲉ

COPTIC
Coptic combines characters from demotic and greek.

Around 300 AD, during the Roman occupation of Egypt, **Coptic** came into use. Coptic was a hybrid of Greek and demotic. The Greek alphabet was combined with seven demotic characters which represented sounds not present in Greek.

Coptic is the only surviving link to the language of ancient Egypt. It is still spoken by small groups in Egypt. Since hieroglyphics were written without vowels (see Lesson 2: The Basics), the true vocalizations are not known, but because Coptic combines demotic characters with Greek vowels it offers insight into many of the vowel sounds of ancient Egyptian words. Based on the vowel sounds of Coptic, modern researchers are able to guess at the vocalizations that were used by the ancient Egyptians.



LESSON 6

PICTOGRAPHS

Pictographs are pictures that show people or gods involved in events, activities or rituals. These drawings were a form of storytelling. The picture is the story.

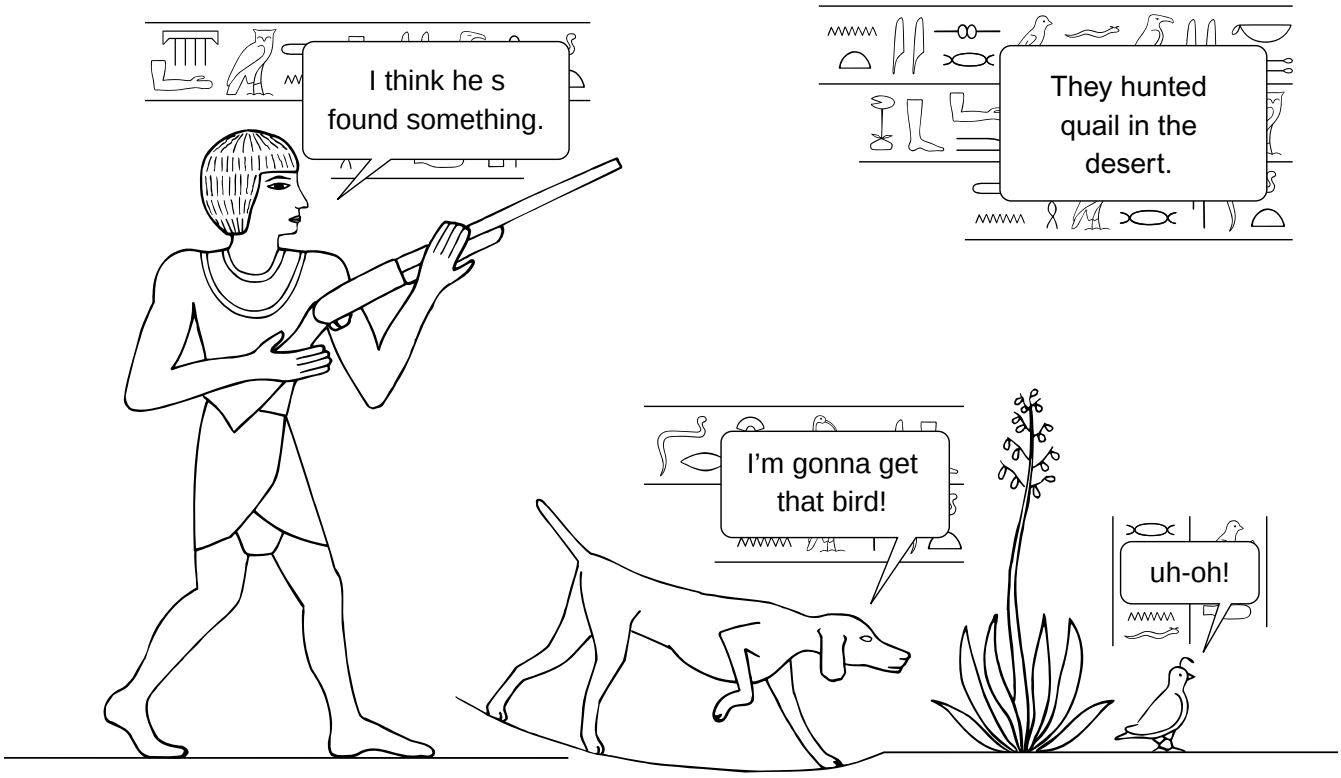
Pictographs decorate the walls of temples and tombs and appear on scrolls and household objects. In tombs, the drawings might show the deceased interacting with the gods, in a battle, hunting or engaged in an everyday activity.

Hieroglyphic writing often accompanies pictographs. Hieroglyphic writing surrounds the pictograph and fills in the details of the event.

PICTOGRAPH
Images show people in activities

Ancient Cartoons

Think of a pictograph as a frame of a cartoon strip. Like a cartoon, the drawing shows people in action. Hieroglyphic writing might act as a caption for the scene or represent the words spoken by the figures.



HUNTING

The Ancient Egyptians were technologically advanced and they expected their art to be technically accurate. A canon of style dictated how figures were drawn. Artistic expression was discouraged. The canon was a set of rules created to keep the appearance of drawings consistent. The style of figures remained virtually unchanged for over 3000 years.

Perspective

Today we are accustomed to photographic images and drawings that appear in **perspective;** objects that are farther away appear smaller and may be obscured by closer objects. Since perspective mimics the way our eyes see, these images appear to be more "real."

Ancient artists used varying perspectives within an image—showing each part from it's most recognizable view—to show as much information as possible. The appearance of contradictory views (perspectives) within the same image is what make Ancient Egyptian drawings instantly recognizable.

Overlapping images obscured information and was discouraged. Images were drawn to reduce a sense of depth. Information always took precedence over aesthetics. A drawing showed as much information as possible, even if it meant the image would be distorted.

Multiple perspectives are most apparent in the awkward-looking images of human figures. Figures appear with the head in profile but the eye is rendered from a front view. Shoulders and waist are shown from the front, while the chest, hips, legs and arms are seen from the side. Showing a figure this way reduced overlap and displayed body parts from their most recognizable view.

Figures are usually seen with both feet firmly planted on the image baseline–a horizontal line which forms the bottom edge of the drawing. Figures appear sitting or standing, but movement was minimized. Only in hunting and battle scenes do we see figures in poses suggestive of motion.

Objects in the hands of figures had symbolic importance. An object like a mace or a staff might represent the person's rank. The hand it was carried in might be equally important. Figures can appear with two right hands when depicted with two objects that would be carried in the right hand.

Grids

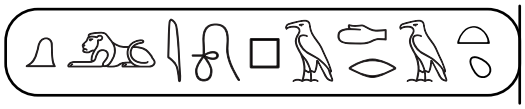
When laying out a picture the artist would mark a grid on the drawing surface. When drawing the figure, the grid provided reference points to keep the figure in proportion. Key locations on the grid corresponded to specific locations on the figures.

LESSON 7

CARTOUCHE

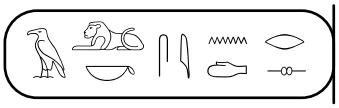
A cartouche is a technique used to write a royal name. A royal name has many parts–reflecting position, status, etc. The cartouche portion of the royal name usually refers to the person's proper name. Hieroglyphic characters spelling out the name are written within an oval shape depicting a loop of rope with a knot. The loose ends of the rope extend straight out from the knot although the knot is not usually drawn. The oval shape may appear as a rope or it may be represented as a line.

A cartouche can be oriented horizontally or vertically depending on whether it is used in a column or a row.



CARTOUCHE OF CLEOPATRA

As with other hieroglyphic writings, names are written phonetically without vowels. Vowels are only used sparingly to eliminate confusion, specifically when a name begins or ends with a vowel or when a vowel sound is critical to the proper interpretation of name.



CARTOUCHE OF ALEXANDER THE GREAT

NUMBERS

LESSON 8

1 = 1

10 = 1 x 10

100 = 1 x 10 x 10

1,000 = 1 x 10 x 10 x 10

10,000 = 1 x 10 x 10 x 10 x 10

BASE 10 NUMBERS
Values increase by a factor of 10

Just like the modern arabic numbering system, hieroglyphic numbers are grouped in multiples of ten. Each group being ten times larger than the previous. These are base ten numbers.

The modern method of writing numbers originated with the Arabs. It relies on the position of characters relative to one another to maintain their values. With this numbering system, the character's position determines its value. Each character, or 'digit,' records a numeric value and each digit to the right increases this value by ten times. When a digit has no value, a zero acts as a placeholder for that digit. Thus a number's position is very important to its value.

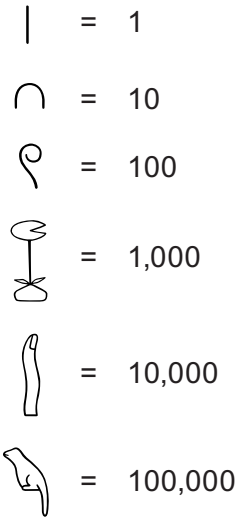
106 ≠ 160 ≠ 016

POSITIONAL NUMBERING
The position of a number is important to its value.

The Egyptian system was non-positional. Instead of keeping track of numbers based on position, the Egyptians used different characters to represent each factor of ten.

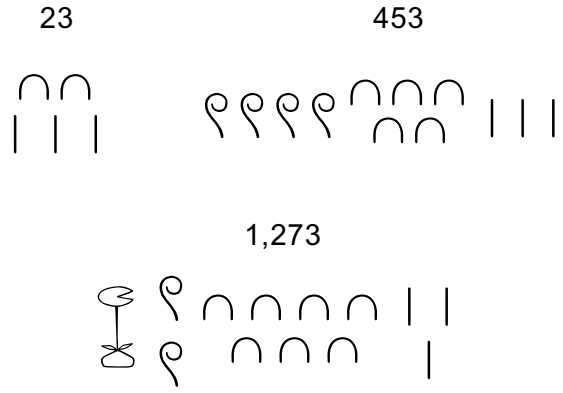
10 10 1 1
10 1 1 1
=
10 10 10
1 1 1 1 1
=
1 10 1 10
1 1 10 1

NON-POSITIONAL NUMBERING
The relative position of a number does not affect its value.



HIEROGLYPHIC NUMBERS

As with hieroglyphic writing, numbers were shown with hieroglyphic characters. A character was repeated as many times as was necessary to write a value. Typically, larger values were written first and were followed by lesser values. A hieroglyphic number is read by adding up the hieroglyphic characters. The result is the number's value.



HIEROGLYPHIC NUMBERS

Since the Egyptian system was not positional, characters could be written in any order, but typically they were written from largest to smallest. If a factor of ten had no value, that character was left out.

PLURALS

Like the modern words 'several' or 'many,' the Egyptians also had methods for showing qualitative values. The non-specific value 'several' and 'many' are noted by adding 'ideogram signs.' These characters act as determinatives (see Lesson 2: The Basics). Ideogram signs were placed beneath or after the word. 'Several' was represented with two ideogram signs. 'Many' was shown with three ideogram signs.

SEVERAL & MANY
the 'ideogram sign' acts to infer quantity

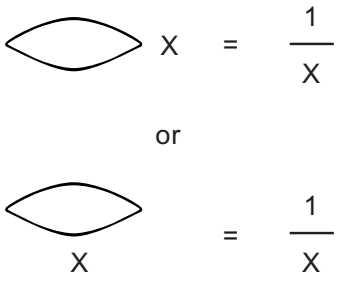
FRACTIONS

LESSON 9

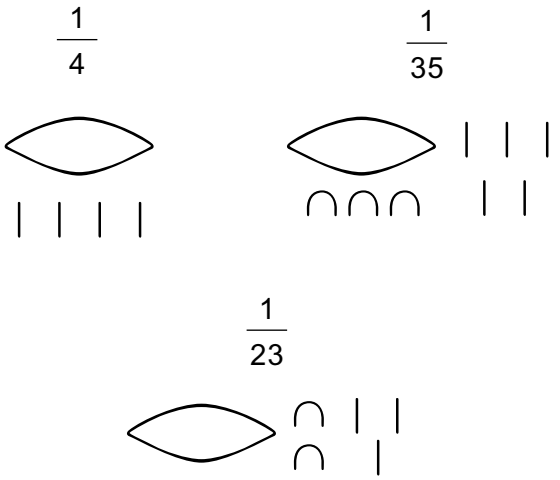
A hieroglyphic fraction is created by a placing a special character which means ‘part’ above or alongside number characters.

The translation of a hieroglyphic fraction is read as “final part missing from the whole” of x parts. The fraction refers to the singular part which is missing. This logic contradicts modern fractions. Consider the question of a half-full glass of water. Is it half-full or half-empty? Our modern fraction method would consider it half-full. The ancient Egyptians would consider it half-empty.

For simplicity since only one part is missing, we think of Egyptian hieroglyphic fractions in a modern context as having a numerator of 1 or being “one part” from a total of x parts.



EGYPTIAN FRACTION
Only the denominator changes.



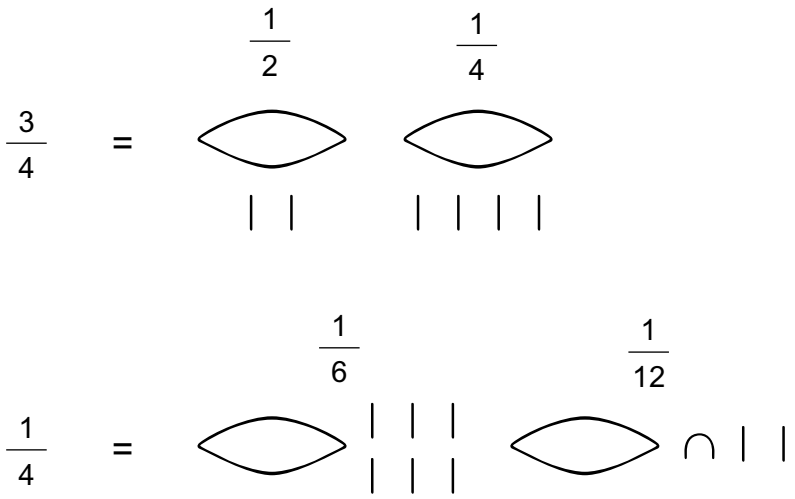
HIEROGLYPHIC FRACTIONS

$$\frac{X}{Y}$$

MODERN FRACTION
Numerator and denominator change.

Modern fractions have two values: a numerator and a denominator. The denominator represents the total parts of a fraction, while the numerator represents the fractional number of these parts. These numbers are stacked atop one another, separated by a bar.

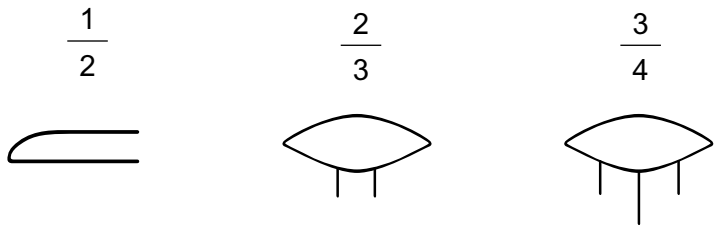
Modern fractions commonly describe parts of a number other than one. Numerators can vary in modern fractions. In hieroglyphic numbers when a fraction had a numerator value greater than one, the Egyptians combined several smaller fractions together. The sum of these smaller fractions represents the total value.



ADDITIVE FRACTIONS

Common Fractions

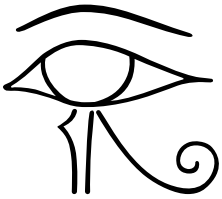
To keep common fractions simple, the Ancient Egyptians reserved a few special characters to represent commonly used fractions. These could be used in place of additive fractions.



COMMON FRACTIONS

EYE OF HORUS

LESSON 10



EYE OF HORUS

The Eye of Horus was a powerful symbol in Ancient Egypt. It represented "protection" and "health." The Eye of Horus is a depiction of a human eye combined with the cheek markings of a falcon. It was a widely used symbol and appears as a determinative character in hieroglyphic texts. It was also worn as an amulet to disperse evil.

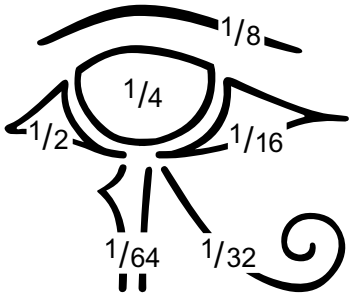
Legend of Horus

Horus was the falcon-headed god of Egyptian legend. He was the son of the gods Osiris and Isis. They were brother and sister. Osiris was the ruler of Egypt. Seth, his brother, was jealous. He murdered Osiris and cut his body into pieces before scattering them throughout Egypt. When Isis heard this, she took the form of a bird and flew across Egypt collecting the pieces of Osiris' body. With a little help from other gods she reassembled Osiris and beat her wings furiously, forcing breath into him. Osiris was revived as the god of the afterlife.

To avenge his father and gain the throne of Egypt, Horus fought his uncle Seth. Even though Horus lost an eye he won the battle and became ruler of Egypt. Thoth, the Ibis-headed god, recovered Horus' eye and reassembled it. In a gesture of respect for his father, Horus presented it to Osiris. Because of his noble deed, his eye was regarded as a powerful symbol of health and protection.

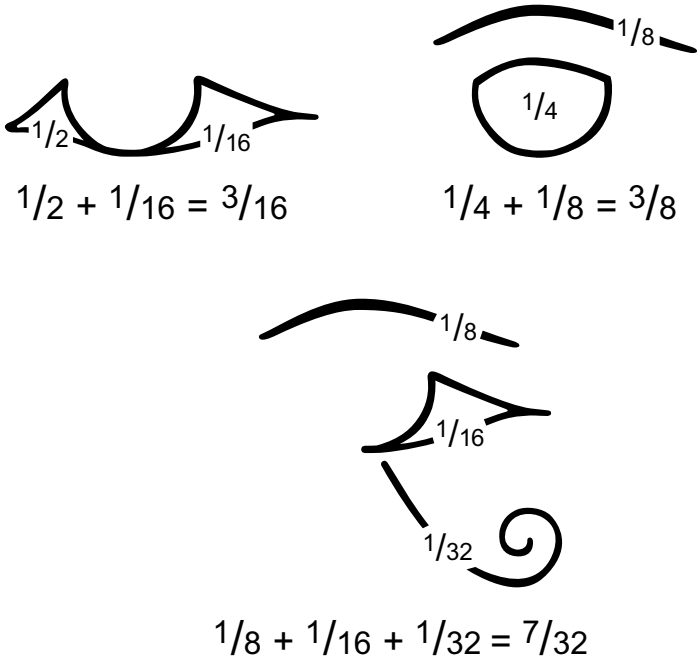
Horus was known as a 'living god' because the pharaoh on earth was considered to embody him. For this reason a portion of a pharaoh's name always carried Horus as a title.

Eye of Horus Fraction



VALUES OF PARTS

The Eye of Horus can also be used as a fraction in heriatic writings. It was typically used to record quantities of land and grain. The eye is divided into pieces, each part representing a fractional value. The complete Eye of Horus represents a whole or 1 although the sum of the parts actually represents 63/64. Different fractions are created by combining different sections together. Only the parts necessary to depict a value are present in a fraction.



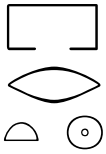
EYE OF HORUS FRACTIONS

MEASURES

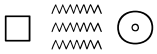
LESSON 11

MONTHS

Inundation



Winter



Summer

The ancient Egyptians divided the year into 12 months and assigned 30 days to each month. To complete the year they added an extra 5 days to the end. These days were called “epagomenal” days and were used for festivals to celebrate certain gods.

Each year had three seasons, for each cycle of the Nile.

- Inundation (time of the flooding)
- Winter (emergence of fields from the water)
- Summer (the dry months)

There were four months in each season. Months were refered to by their sequence within the season. For instance the “second month of the Inundation” or “third month of Summer.”

SEASONS

Because the Egyptian calender was only 365 days and the solar year is actually 365 1/4 days long there is a a discrepancy of 1/4 day. Today this is corrected for by the addition of an extra day at the end of February once every four years called “leap year.” Because the Egyptian calendar didn’t adjust for this, the calender was shifted back one day every four years. After 400 years the calendar was off by 100 days, thus the calendar season frequently did not correspond to the actual climactic season. The Summer calender season might occur during winter or the Inundation season might occur in the dry months.

Just prior to the flooding of the Nile each year, the star Sirius appeared in the sky. This event occurs around July 19th on today’s calendar. This marked the first day of the Egyptian astronomical year. This date

represented the ideological first day of the first month of Inundation, or New Year's day in Ancient Egypt although the calendar frequently didn't correspond.

Years were not numbered consecutively. They were numbered based on the reign of the pharaoh. For instance, "fourth year of the reign" of the pharaoh.

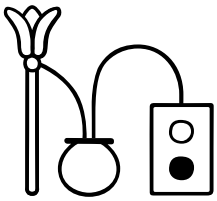
Hours

The Ancient Egyptians were the first to divide the day into 24 'hours.' Since they had nothing with which to measure time, it was relative. The day was divided into twelve hours of daylight and twelve hours of night. Since the length of daylight hours varied with the season, hours could be longer or shorter depending on the time of the year. Some hours were named for a religious or practical event that occurred during that hour. Hours were named for lunch and supper or hours could be identified by their sequence in the day or night, for instance "fourth hour of the night."

Distance

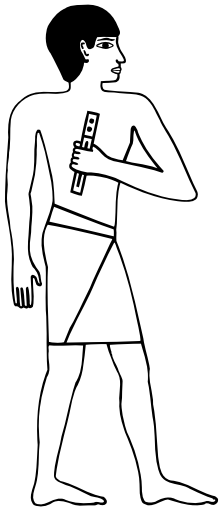
The standard unit of measure in Ancient Egypt was the royal cubit. The standard cubit was based on the distance from the tip of the middle finger to the elbow of an average man (approx 18 in, 457mm). Because of variations between individuals, the length of measure was standardized as the royal cubit (20-5/8 in, 523mm). A royal cubit is divided into 7 palms, which divides into 4 digits (fingers). Palms and digits (fingers) were based on the width of their respective body parts.

The measurement tool used in Ancient Egypt was the cubit stick, similar to a modern yardstick. All cubit sticks were measured against a master royal cubit that was carved into a block of stone. Because all cubit sticks were calibrated from a single source, the Ancient Egyptians were able to maintain excellent accuracy. Modern surveyors have measured the base dimensions of the Great Pyramid to be 440 cubits per side, the largest variance per side is at most 4 in (102mm).



SCRIBES

LESSON 12



SCRIBE

Scribes were the record-keepers of Ancient Egypt. They were the educated members of society. For this reason, they were well-respected. Although scribes were usually boys, girls could also become scribes. Learning the language required study. An aspiring scribe might be trained at a special school or apprentice to a master scribe. Students received training in hieroglyphic and hieratic writing, a cursive form of hieroglyphic writing (see Hieroglyphs: Writing Methods). Because papyrus paper was expensive, students typically practiced on pieces of broken pottery, lamb skin, etc., reserving papyrus for special occasions.

In school, students were kept in line under threats of a beating with a stick. The determinative hieroglyphic character for learning is represented as a man with a stick. This character also represents hitting or beating.

The tools of a scribe were a water pot, a reed brush and a palette all tied together with a length of rope. The palette had two wells which held black and red pigments. After completing their education a scribe might work as a clerk for a landowner or as a priest in a temple. An ambitious scribe might even work their way up to an influential position like the advisor to a nobleman. In pictographs, scribes are usually depicted holding their writing palettes to their chests.

PAPYRUS STALK HIEROGLYPH

Papyrus paper was create from the stalks of the papyrus plant–a type of sedge grass that traditionally grew wild along the Nile. It grew to 16 ft (5m) with stems up to 2" (5cm) across. The draining of wetlands and climactic changes have eliminated the natural habitat of papyrus and it no longer grows wild in Egypt.

Papyrus stalks were the primary building material of the ancient Egyptians. There was no natural source of wood, but papyrus was abundant and proved to be a versatile building material. In addition to being made into paper, papyrus stalks were used for sails, boats and huts. Papyrus stalks could be bundled together to form a pontoon for the side of a boat or it could be woven together into mats for the walls of a hut.

To make papyrus paper, stems were cut into lengths and skinned to reveal the core. The core was sliced lengthwise into thin strips. Strips were placed at right angles to each other to create a mat and crushed together. The papyrus was placed under a heavy object while it dried. Resin from the plant acted as a natural glue, binding the strips together. After the papyrus mat dried, the surface was rubbed with a stone to prepare it for writing. The result was a flexible and durable writing surface.

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