Egyptian Numbers

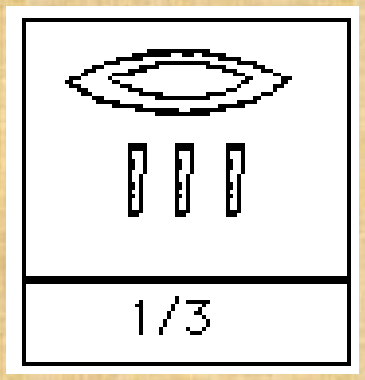
Fractions

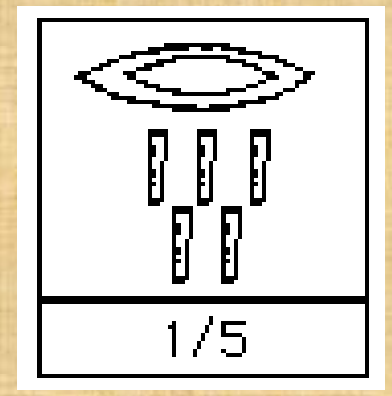
Egyptians invented Fractions

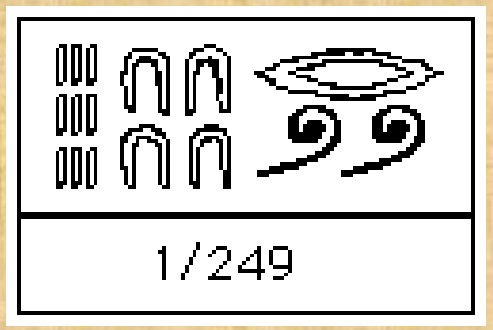
- It is said that the greatest addition to mathematics was their use of fractions. However there were only unit fractions (1/n).
- They did use the fraction 2/3, n/10, 2/n.
- The reason the Egyptians chose this method for representing fractions is not clear, although André Weil characterized the decision as "a wrong turn"

Unit Fractions

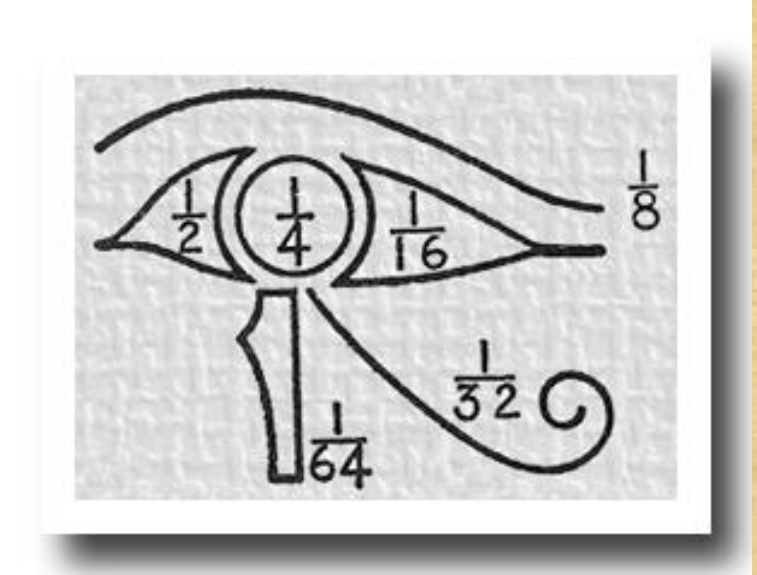
A unit fraction is of the form 1/*n* where *n* is an integer and these were represented in numeral hieroglyphs by placing the symbol representing a "mouth", which meant "part", above the number.







Eye of Horus



- Horus was Egyptian God who fought the forces of darkness (in the form of a boar - a pig) and won.
- His eye is a symbol for Egyptian Unit Fractions. Each part of the eye is a part of the whole.
- What does the fractions add up to?
- All the parts of eye, however, don't add up to the whole.
- Some Egyptologists think, is the sign that knowledge can never be total, and that one part of the knowledge is not possible to describe or measure.

- Fibonacci proved that any fraction can be represented as a sum of distinct unit fractions.
- An infinite chain of unit fractions can be constructed using the identity $\frac{1}{n} = \frac{1}{n+1} + \frac{1}{n(n+1)}$

Why use Egyptian fractions today?

Which is bigger?

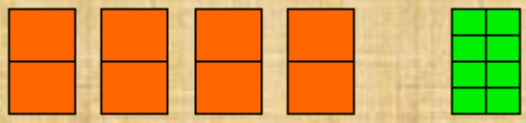
5/8 or 4/7?

1/6 or 1/8?

Why use Egyptian fractions today?

- So suppose you has 5 sacks of grain to share among 8 workers who has helped dig in a field this week and clear the irrigation channels.
- How are you going to give each 5/8?

Answer: We see give all at least half a sack of grain, so we give all 8 of them half a sack each, with one sack left.
Then the last sack we can split 8 ways.



5/8 = 1/2 + 1/8