

The page features six decorative circles of varying shades of light purple. Three are solid and three are hollow. They are arranged in two rows: the top row has a hollow circle on the left, a solid circle in the middle, and a solid circle on the right; the bottom row has a solid circle on the left, a solid circle in the middle, and a hollow circle on the right. The text is centered over the right side of these circles.

# Ancient Egypt

By: Stephanie Storer

# History



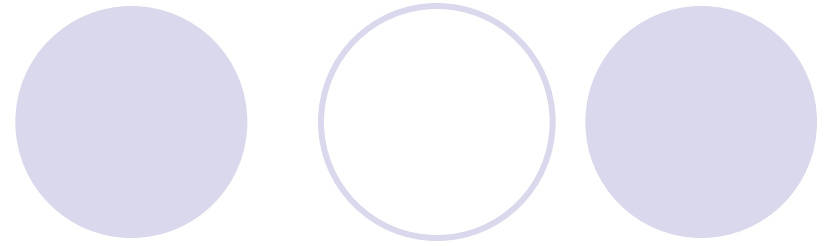
- Priests and Scribes invented system of numerals
  - Operations: no special symbols
    - Descriptions next to numerals
    - Rhetorical algebra
  - All we have left is on two papyrus rolls
- Priests in charge of recording wars, royal decrees, and history of reign
  - Sacred Writing (hieroglyphics)
    - Complex
  - Temple Writing (hieratic)
    - Shorthand
- Scribes: trusted slaves
  - Secretaries, accountants, government offices
  - May gain freedom



# Education

- **Arithmetic was easier**
  - More precise in terms of fractions
    - No reoccurring decimals
    - Did not round off figures when dividing
- **Plato's discovery when studying in Egypt**
  - Arithmetic taught at same age as reading and writing
  - Learn how to manage a household
  - More alert and in touch with reality





# Egyptian Numbers





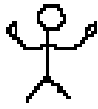
- Written right to left
- Fractions
  - Ahmes had written them as a number with a dot on top for hieratic they used an open mouth
    - Ex. 𐍌
- Lack of coinage led to a different approach to fractions
  - Used bread and beer in their surviving accounts of their arithmetic
  - Could not divide up fractions of coins like bread and beer
- Sophisticated calculations
  - Plan and build cities: still here today
  - Balance accounts
  - Record number of captives for labor
  - Estimate food and drink
  - Estimate dates of completion of various stages of work
  - Determine how much grain to put in bread of various nutritional value

# Egyptian Numbers cont.

- They used symbols for different numerals not necessarily by position
- Therefore, nine surprised men, five tadpoles, two pointed fingers, six lotus flowers, eight pieces of rope, six arches, three strokes would equal
  - 9,526,863
    - Representation of the population of New York City in 1975

1	10	100	1,000
			

Stroke      Arch      Coiled Rope      Lotus Flower

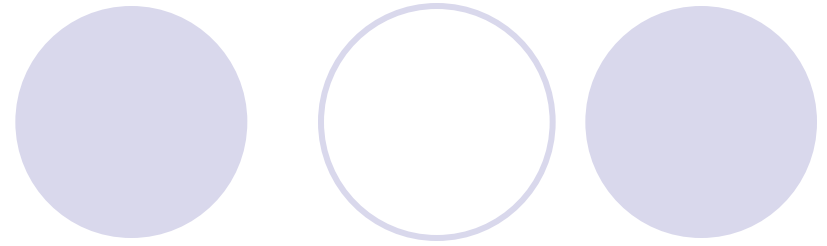
10,000	100,000	1,000,000
		

Pointed Finger      Tadpole      Surprised Man

# Multiplication: Egyptian Style

- Any whole number could be made up by adding selected terms from the binary series:  
1,2,4,8,16,32,64,128,256, etc.
  - Ex. 17 is  $1 + 16$
- Multiplying Numbers
  - Ex.  $17 * 256$ 
    - First break apart first number into the selected terms
    - Then take the number of times it is doubled and then double other number that many times
    - So 16 is doubled four times therefore we double 256 four times = 4096, now we look at the one and that is not doubled so we add  $4096 + 256 = 4352$

# Multiplication cont.



- Let's try  $13 * 226$

- Break apart  $13 = 8 + 4 + 1$

- 8 is doubled 3 times = 226 doubled 3 times = 1808
- 4 is doubled 2 times = 226 doubled 2 times = 904
- 1 is not doubled = 226
- Then add them all up together =  $1808 + 904 + 226 = 2938$

- Now try  $15 * 332$

- $15 = 8 + 4 + 2 + 1$

- 332 doubled 3 times = 2656
- 332 doubled 2 times = 1328
- 332 doubled 1 time = 664
- 332 doubled 0 times = 332
- Add them all up = 4980

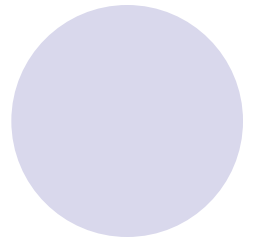
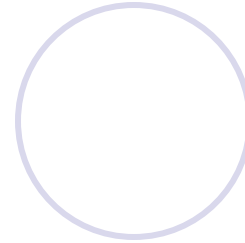
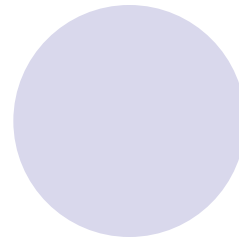
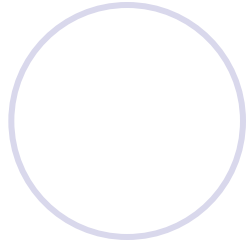
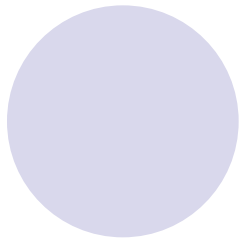
# Division and Fractions

- Multiplication is mirror image of division
  - Solving multiplication gives the division answer as well
  - Used division tables
- Fractions
  - Scribes makes subjective decisions about best choice of fractions
  - Broken down by rules
    - 1<sup>st</sup> all must be unit fractions
    - 2<sup>nd</sup> all denominators must be even
    - 3<sup>rd</sup> no fraction would be repeated
    - 4<sup>th</sup> all fractions in the expression are as small as possible
    - 5<sup>th</sup> never more than four unit fractions
  - Example  $2/27$  would equal  $1/18 + 1/54$
  - Served purely for didactic purposes
    - Rhind Papyrus
      - Earliest textbook on arithmetic

# Egyptian Calendar



- Three main seasons
  - Flooding of the Nile delta, period of seed-time and growth, period of the harvest
  - Every four months, each being 30 days
    - Extra five days were considered “temple days”
    - Quarter of a day considered a source of error
- Used the length of time between floodings
  - Became their year – irregular
    - Varied between 345 days to 415 days
  - Priests recorded floodings and the average was 365 days
- Priests also used the dog-star Sirius
  - Heliacal rising only happens once a year or once every 365 days
- Invented a final calendar based on sun and moon and constellations
  - Uses 24 hour days



**Any Questions??**