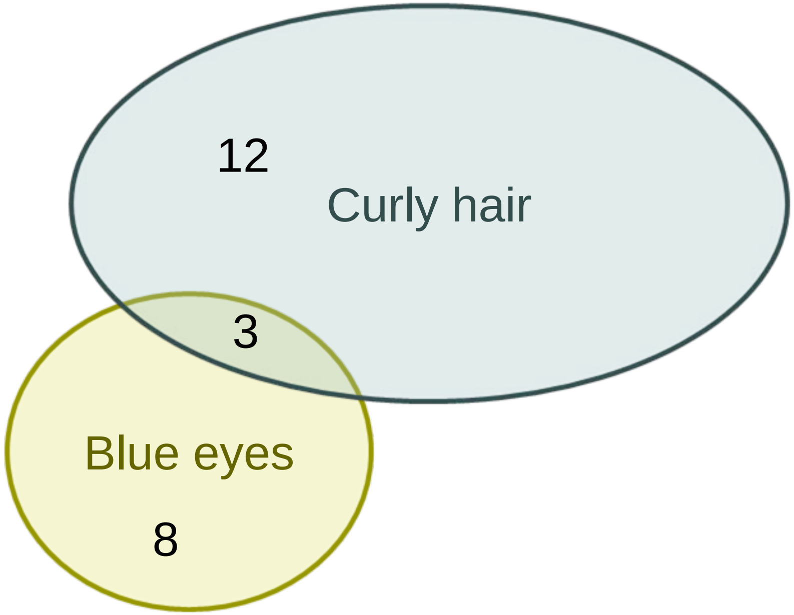
Numbers

Quiz

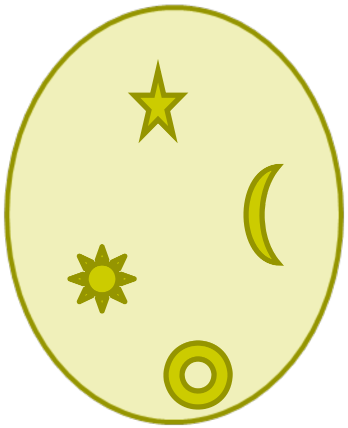
- please get a blank sheet of paper and answer these questions. Don't forget to write your name!

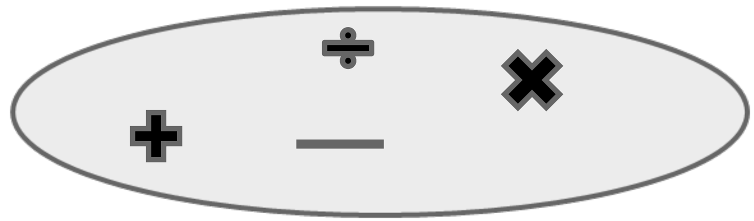


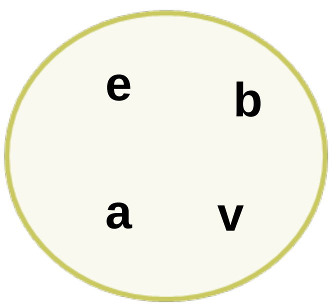
1. C={people in room 135 with curly hair}, B={people in room 135 with blue eyes}
   1. Mark the union of sets B and C.
   2. How many people have blue eyes?
   3. If a person has brown eyes and curly hair where do they fit into the diagram?
   4. What is the complement of $B \cup C$?
2. What does it mean that there is a 1-1 correspondence between two sets? Give an example of two sets that are equivalent?

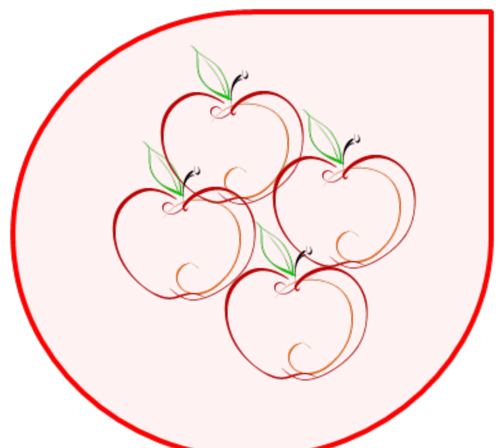
What is a number?

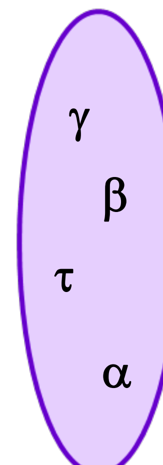
- What do you notice about these sets:











Whole numbers

- The cardinal number of a set is a property shared by every set equivalent to it and by no set that is not equivalent to it.
- We will write $n(A)$ for the cardinal number of A.
- If A is an empty set then $n(A)=0$.
  - $n(\{1,2,3\})= 3$
  - n({pear, apple, sun, date})= 4

Ordering whole numbers

- What would it mean to say that 3 is smaller than 5?

- If a=*n*(A) and b=*n*(B). Then a<b or b>a if A is equivalent to a proper subset of B.

- A whole-number line is a sequence of equally spaced marks where numbers represented by the marks start on the left with 0 and increase by one each time we move one mark to the right.

Exercises

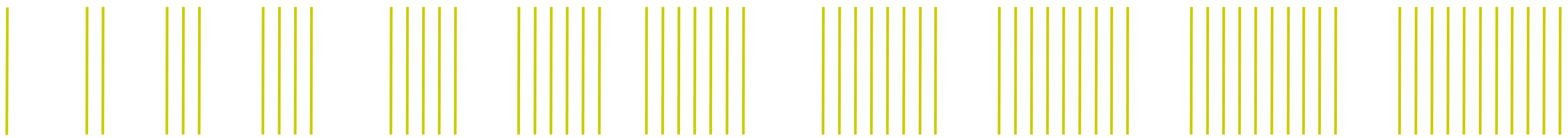
- If we know that $n(A)=3$ and $n(B)=6$, can we conclude that A is a subset of B? -- NO
- Is it true that if A=B, then $n(A)=n(B)$? -- YES
- Are all the numbers in the following statements used in the same way?
  - The dorm has nineteen stories. -- cardinal
  - Sue lives on fifth floor. -- ordinal
  - My birthday is on the thirteenth day of the month. -- ordinal
  - “Please, turn to page fifty.” – nominal (identification)

Numerals

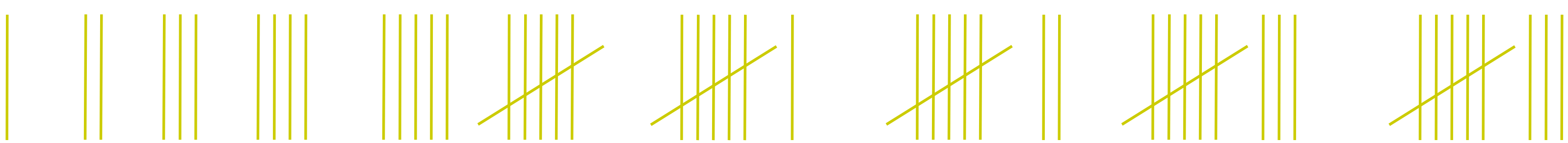
- Symbols that represent numbers.
  - Tally,
  - Egyptian,
  - Roman,
  - Babylonian,
  - Mayan,
  - Hindu-Arabic

numeration systems

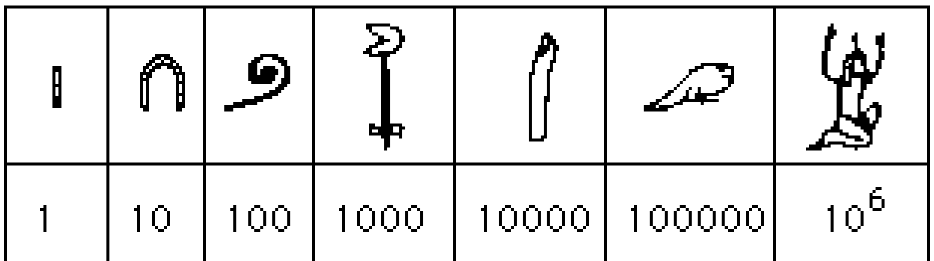
Tally system



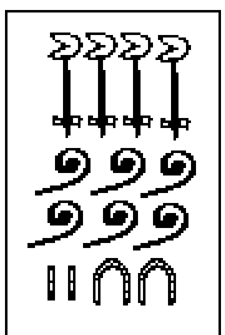
Improved:



Egyptian numeration system



Egyptian numeral hieroglyphs



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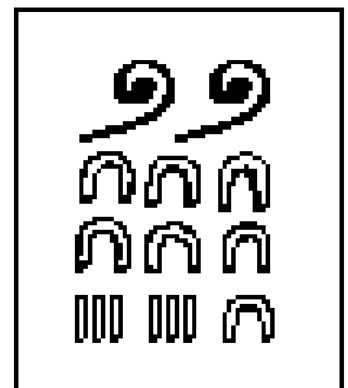

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Roman numeration system

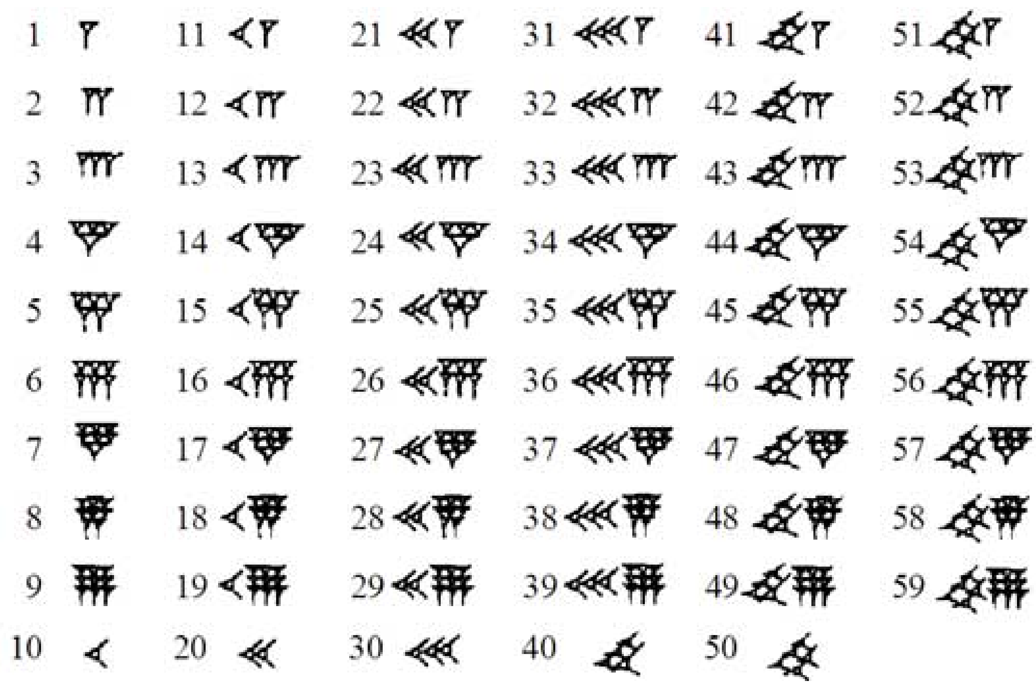
- I 1
- V 5
- X 10
- L 50
- C 100
- D 500
- M 1000

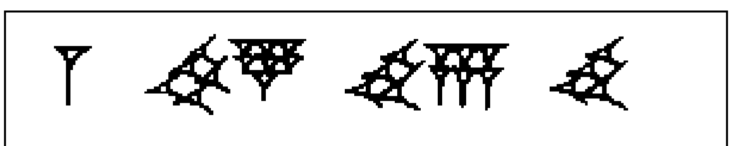
MMVII

MCMLXXIV

Babylonian numeration system

- First place value system

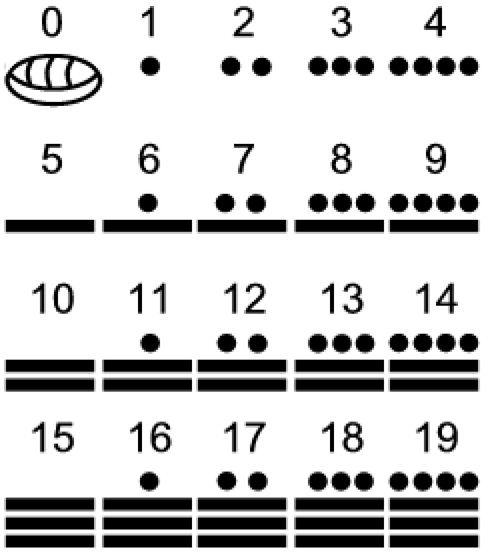


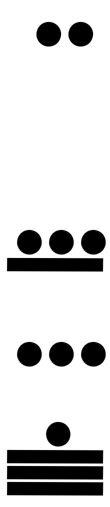


1,57,46,40 = 424000

Mayan numeration system

- Vertical place value system





$18*20^3=144000$

$18*20^2=7200$

$18*20 = 360$

20

1

Candy factory problem

- See other file.
- In the first problem about how you'd pick digits, Kari noted that I basically wanted you to think like me. Although that may be true ☺ I'd also like you to think like you. Can you think o advantages and disadvantages of both choice of numerals: the one you initially thought of and the one that you used for subsequent problems?