Source: [KBe2020math530index]

- Discussion Results: what is a number?
  - Something about group theory
    - This is more like a way of telling us how to use numbers, not really a good definition.
    - Set up bounds to define things
  - Different classes (natural, real, imaginary)
  - Where do you draw the boundaries between objects?
  - A way to quantify the nature of living and reality
- Number Systems
  - We want them to be desirable and group-like
  - Types
    - **Natural Numbers**
      - Integers greater than zero
    - Whole Numbers
      - Natural Numbers + 0
      - 0 is the hole.
    - Integers
      - { …, -2, -1, 0, 1, 2, … }
      - Good for algebra, we'll see later
    - Rationals
      - Like $\frac{1}{2}$.
      - A ratio/fraction/quotient of integers
    - **Real**
      - Like π
      - A number on the number line
        - A number that can be a distance to something.
        - A good enough definition that isn't "real analysis"
    - **Complex Numbers**
      - Like $5i$
      - There will be many complex numbers
        - Matrices with complex numbers can be different from real numbers
      - Complex plane
    - Hamaltonian numbers music video? #curiosity
  - Why do we want more numbers?
    - Why Zero?
      - Additive identity
        - Zero vector = identity vector
        - Frame of reference, starting point, nice and neutral
    - Zintegers?
      - Why negatives?
        - So you can make zero
        - Undo each other, undo a $+5$
        - Inverse
          - $-a$ and a are additive *inverses*
  - That's all we need to get to a group: [KBe2020math530refGroups]
