

Source: [\[KBe\]-2020math520-index](#)

- 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
 - $\{ \dots, -2, -1, 0, 1, 2, \dots \}$
 - 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: [\[KBe\]-2020math530-flo-groups](#)