### Why

We speak of a set of elements of a metric space which are all within some distance of a fixed point.

### Definition

The inspiration is balls in space.

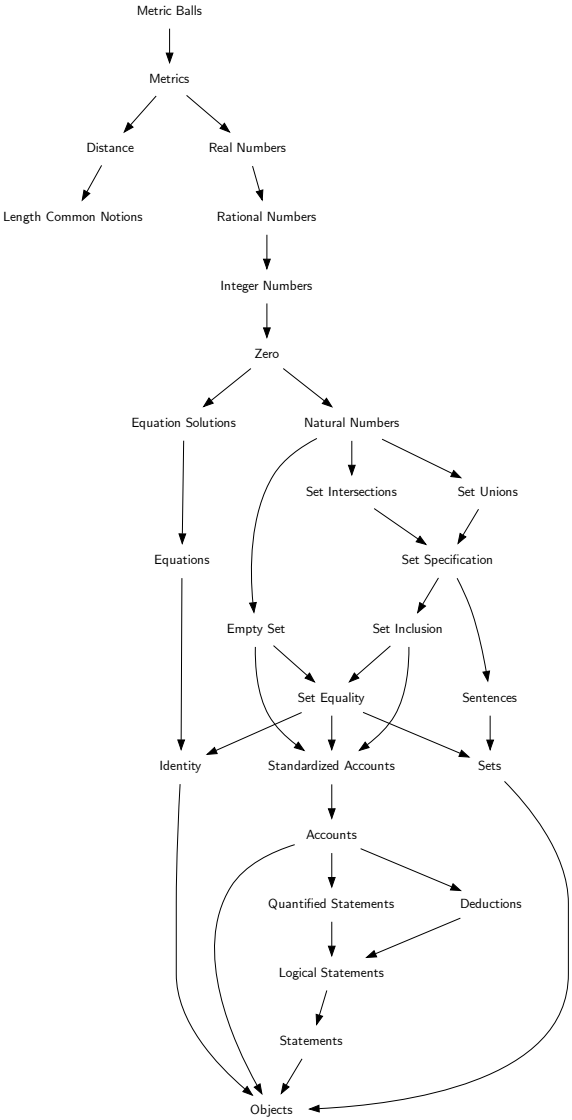
Consider a metric space and an element of the base set. The *metric ball* of radius $r$ centered at the element is the set of all elements which are less than $r$-distance from the elemnt.

### Notation

Let $(A, d)$ be a metric space. Let $a \in A$. Let $r$ be a real number. Then the ball centered at $a$ of radius $r$ is

$$\{b \in A \mid d(a, b) < r\}.$$

We denote the ball centered at $a$ of radius $r$ by $B(a, r)$.


Metric Balls
Metrics
Distance
Real Numbers
Length Common Notions
Rational Numbers
Integer Numbers
Zero
Equation Solutions
Natural Numbers
Set Intersections
Set Unions
Equations
Set Specification
Empty Set
Set Inclusion
Set Equality
Sentences
Identity
Standardized Accounts
Sets
Accounts
Quantified Statements
Deductions
Logical Statements
Statements
Objects