Why

We are constantly thinking of $\mathbf{R}^3$ as points of space.[1]

Definition

We commonly associate elements of $\mathbf{R}^3$ with points in space. (see Geometry).

Principle 1 (Plane Sets)**.** *There exists a set of all planes.*

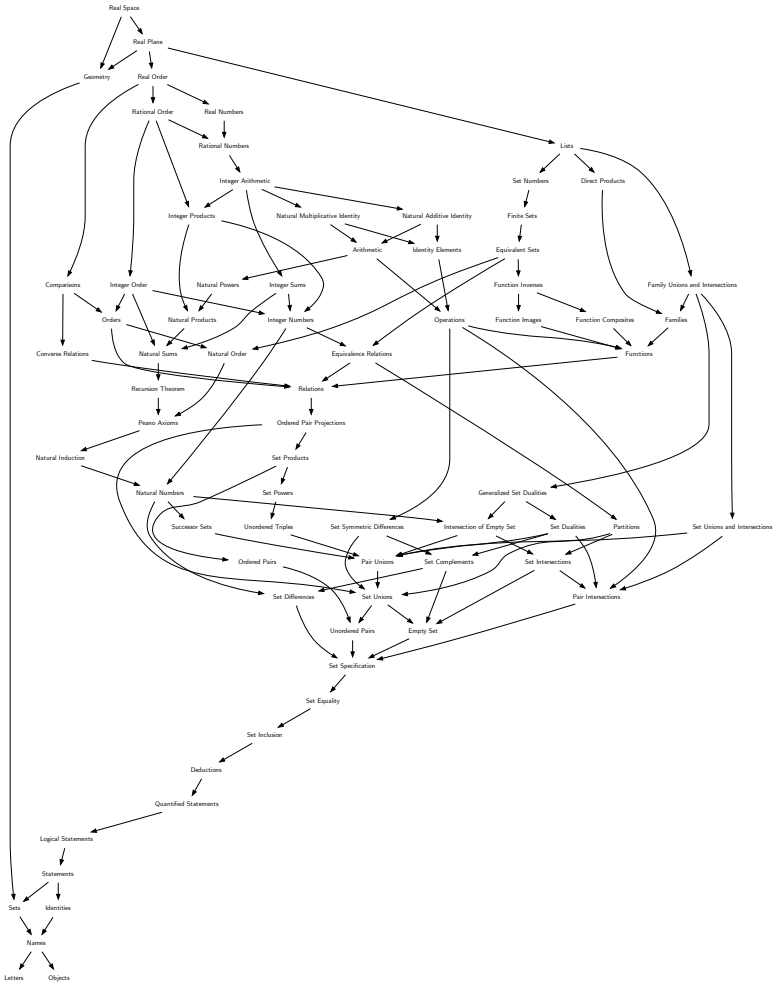
Principle 2 (Real Space Correspondence)**.** *Let P be the set of all planes of space. Then $\cup P$ is the set of all lines and $\cup\cup P$ is the set of all points. There exists a one-to-one correspondence mapping elements of $\cup\cup P$ onto elements of $\mathbf{R}^3$.*

For this reason, we sometimes call elements of $\mathbf{R}^3$ *points*. We call the point associated with $(0, 0, 0)$ the *origin*. We call the element of $\mathbf{R}^3$ which corresponds to a point the *coordinates* of the point.

Visualization

To visualize the correspondence we draw three perpendicular lines. We call these *axes*. We then associate a point of the line with $(0, 0, 0) \in \mathbf{R}^3$. We can label it so. We then pick a unit length. And proceed as usual.[2]

[1] Future editions will modify this sheet.
[2] Future editions will expand this.


Real Space
Real Plane
Geometry
Real Order
Rational Order
Real Numbers
Rational Numbers
Lists
Integer Arithmetic
Set Numbers
Direct Products
Integer Products
Natural Multiplicative Identity
Natural Additive Identity
Finite Sets
Arithmetic
Identity Elements
Equivalent Sets
Comparisons
Integer Order
Natural Powers
Integer Sums
Function Inverses
Family Unions and Intersections
Orders
Natural Products
Integer Numbers
Operations
Function Images
Function Composites
Families
Converse Relations
Natural Sums
Natural Order
Equivalence Relations
Functions
Recursion Theorem
Relations
Peano Axioms
Ordered Pair Projections
Natural Induction
Set Products
Natural Numbers
Set Powers
Generalized Set Dualities
Successor Sets
Unordered Triples
Set Symmetric Differences
Intersection of Empty Set
Set Dualities
Partitions
Set Unions and Intersections
Ordered Pairs
Pair Unions
Set Complements
Set Intersections
Set Differences
Set Unions
Pair Intersections
Unordered Pairs
Empty Set
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
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Statements
Sets
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