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]

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[1]Future editions will modify this sheet.

[2]Future editions will expand this.

Real Space

Real Plane

Geometry

Real Order

Real Numbers

Rational Order

Rational Numbers

Lists

Direct Products

Set Numbers

Finite Sets

Natural Multiplicative Identity

Natural Additive Identity

Integer Products

Integer Arithmetic

Equivalent Sets

Identity Elements

Arithmetic

Family Unions and Intersections

Function Inverses

Comparisons

Integer Order

Integer Sums

Natural Powers

Families

Function Composites

Function Images

Operations

Orders

Integer Numbers

Natural Products

Functions

Converse Relations

Natural Order

Equivalence Relations

Natural Sums

Relations

Recursion Theorem

Ordered Pair Projections

Peano Axioms

Set Products

Natural Induction

Generalized Set Dualities

Set Powers

Natural Numbers

Set Unions and Intersections

Set Dualities

Unordered Triples

Successor Sets

Intersection of Empty Set

Partitions

Set Symmetric Differences

Ordered Pairs

Pair Unions

Set Intersections

Set Complements

Pair Intersections

Set Unions

Set Differences

Unordered Pairs

Empty Set

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects