Why

We identified points in $\mathbf{R}^2$ with elements of the plane in a natural way.[1]

Definition

Let $(x, y) \in \mathbf{R}^2$. Then $(r, \theta) \in \mathbf{R}^2$ is the *polar form* or *circular form* of (x, y) if

$$x = r\cos\theta \quad \text{and} \quad y = r\sin\theta.$$

In this case we call r and θ the *circular coordinates* or *polar coordinates*.

Since sin and cos polar coordinates are not unique.

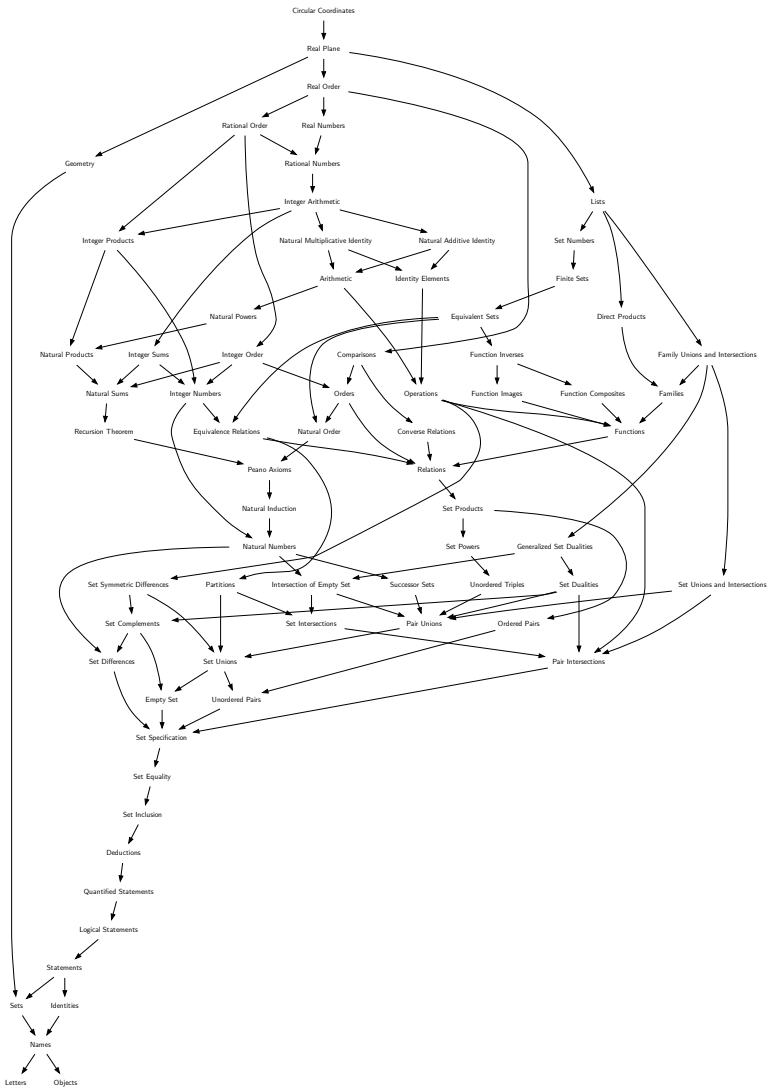
Non-uniqueness

A difficulty with polar coordinates is that there are many elements of $\mathbf{R}^2$ that correspond to the same point in the plane. For example, consider the points

$$(5, \pi/3), (5, -5\pi/3), (-5, 4\pi/3), (-5, -2\pi/3).$$

Each of these specifies the same point in $\mathbf{R}^2$.

[1] Future editions will expand on this in the genetic approach, and likely reference celestial motion.


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