**Why**

We are constantly thinking of the $\mathsf{R}^2$ as points of a plane.[1]

**Discussion**

We commonly associate elements of $\mathsf{R}^2$ with points on a plane. (see Geometry).

**Principle 1** (Line Sets)**.** *Given a plane, there exists a set of its (infinite) lines.*

**Principle 2** (Real Plane Correspondence)**.** *Let L be the set of lines of a plane. Then $\cup L$ is the set of points of the plane. There exists a one-to-one correspondence mapping elements of $\cup L$ onto elements of $\mathsf{R}^2$.*

For this reason, we sometimes call elements of $\mathsf{R}^2$ *points.* We call the point associated with $(0,0)$ the *origin.* We call the element of $\mathsf{R}^2$ which corresponds to a point the *coordinates* of the point.

**Visualization**

To visualize the correspondence we draw two perpendicular lines. We then associate a point of the line with $(0,0) \in \mathsf{R}^2$. 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.
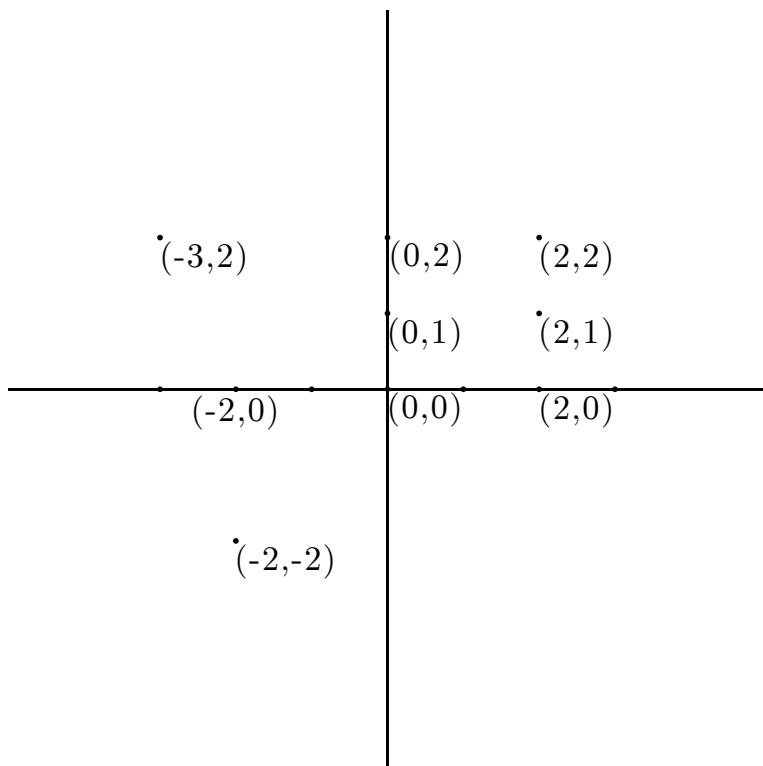
[2]Future editions will expand this.

Figure 1: The real plane

Given that we have identified a plane with $\mathbf{R}^2$ in this manner, we call $(x, y) \in \mathbf{R}^2$ the *coordinates* of the point it corresponds to. Many authors refer to this identification as a *Cartesian coordinate system* (or *Rectangular coordinate system*, *x-y coordinate system*).

Real Plane

Real Order

Real Numbers

Rational Order

Geometry

Rational Numbers

Lists

Integer Arithmetic

Set Numbers

Natural Multiplicative Identity

Natural Additive Identity

Integer Products

Direct Products

Finite Sets

Identity Elements

Arithmetic

Equivalent Sets

Operations

Natural Powers

Family Unions and Intersections

Function Inverses

Comparisons

Integer Order

Natural Products

Integer Sums

Families

Function Images

Function Composites

Orders

Natural Sums

Integer Numbers

Functions

Converse Relations

Equivalence Relations

Natural Order

Recursion Theorem

Relations

Peano Axioms

Set Products

Natural Induction

Generalized Set Dualities

Set Powers

Natural Numbers

Set Unions and Intersections

Set Dualities

Unordered Triples

Intersection of Empty Set

Successor Sets

Partitions

Set Complements

Pair Unions

Set Intersections

Ordered Pairs

Pair Intersections

Set Unions

Set Differences

Empty Set

Unordered Pairs

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects