



Why

We are constantly thinking of the elements of \mathbf{R}^2 as points of a plane.¹

Discussion

We commonly associate elements of \mathbf{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 \mathbf{R}^2 .*

For this reason, we sometimes call elements of \mathbf{R}^2 *points*. We call the point associated with $(0,0)$ the *origin*. We call the element of \mathbf{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 $(0,0) \in \mathbf{R}^2$. We can label it so. We then pick a unit length. And proceed as usual.²

¹Future editions will modify this sheet.

²Future editions will expand this.

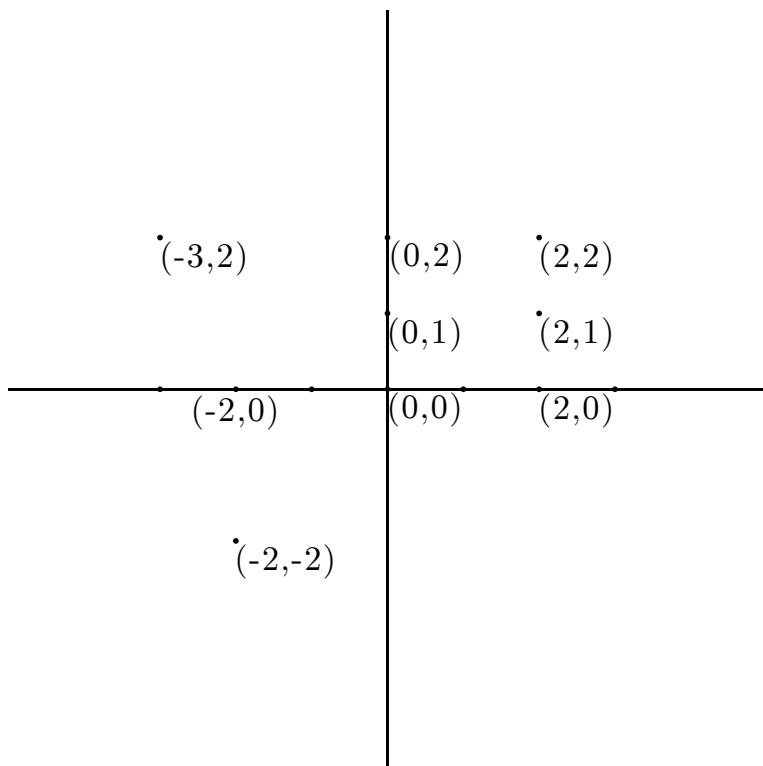


Figure 1: The real plane

Given that we have identified a plane with \mathbf{R}^2 in this way, 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*).

