Definition: Point

A **point** is a primitive notion in geometry that represents a location in space with no dimension (no length, width, or height). In Euclidean geometry, points are the fundamental building blocks from which all other geometric objects are constructed.

Formal Treatment

In different mathematical contexts, points are formalized differently:

1. **Euclidean Geometry**: Points are undefined primitives satisfying Euclid's axioms
2. **Coordinate Geometry**: A point in n-dimensional space is represented as an ordered n-tuple $(x_1, x_2, ..., x_n)$
3. **Set-Theoretic**: In Euclidean Space, a point is simply an element of $\mathbb{R}^n$

Notation

Points are typically denoted by capital letters: A, B, C, P, Q, etc.

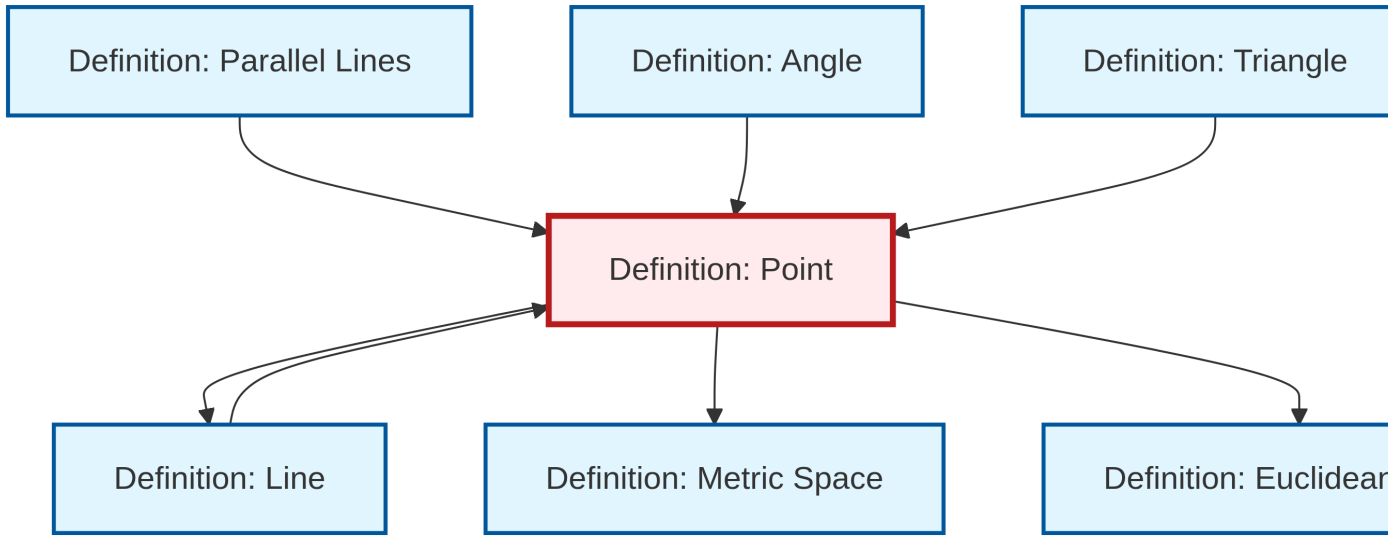
Properties

- Points have position but no size
- Two distinct points determine a unique Line
- Three non-collinear points determine a unique plane

Examples

- The origin $(0, 0)$ in the Cartesian plane
- Any element of a Metric Space
- Vertices of geometric figures like triangles and polygons

Dependency Graph



Local dependency graph