# Space, sets and beyond

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## First cycle

General spaces advance the study of naive geometry.

1. Naive geometry: Zeno, Eudoxus.
2. Axiomatic geometry (unique model intended): Euclid, Apollonius (c. 300–200 B.C.).
3. Algebraic technique (coordinate geometry): Descartes 1596–1650.
4. Non-Euclidean geometry (independence of the "parallels axiom": models without parallels axiom constructed from a model with it): Gauss, Bolyai, Lobatchewski (early 19C).
5. Locally Euclidean spaces: Riemann 1826–1866, Lie.
6. Relationships between spaces (continuity, linearity): Cauchy, Cayley, Weierstrass, Dedekind (1880–present).

## Second cycle

Toposes can be viewed as even more general spaces.

1. Naive set theory: Peano, Cantor (c. 1900).
2. Axiomatic set theory (unique model intended): Hilbert, Gödel, Bernays, Zermelo, Zorn, Fraenkel.
3. Abstract algebra (mathematical logic): Boole, Poincaré, Hilbert, Heyting, Brouwer, Noether, Church, Turing.
4. Non-standard set theories (independence of the "axiom of choice" and "continuum hypothesis"; Boolean-valued models; non-standard analysis): Gödel, Cohen, Robinson (1920–50).
5. Local set theory (sheaves): Leray, Serre, Grothendieck, Lawvere, Tierney (1945–70).
6. Relationships between toposes (a "topos" is a generalized set theory): (1970–present).