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Old and new results in the foundations of elementary plane Euclidean and non-Euclidean geometries.

Am. Math. Mon. 117, No. 3, 117-219 (2010).

This paper gives an overview of plane geometry (both Euclidean and non-Euclidean) from an axiomatic point of view. The first section is particularly worth-reading and becomes a very good introduction to understand the chain: Hilbert planes \supset semi-Euclidean planes \supset Pythagorean planes \supset Euclidean planes \supset Archimedean Euclidean planes \supset {real Euclidean plane} by presenting step by step the more demanding axioms satisfied by these geometries. In the second section constructibility problems in hyperbolic planes are considered and, finally in the last section undecidability and consistency of elementary geometry are also discussed.

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