

NOTES ON THE GEOMETRY PROBLEM

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Paper III

1. The language.

One of the reasons Plane Geometry might be a rewarding domain for artificial intelligence is that there is a good chance that we could find a language that was simultaneously suitable for machine use and human use. A rather small vocabulary is required, and very little grammar outside that of propositional calculus would be needed. A little bit of lower functional calculus and some special grammatical states or "moods" would be all that need be added. The "moods" are sentences which bear on the various parts of the master organization: they assign to a proposition the status of fact, assumed premise, question to be answered, order ("work on this subgoal: ___") etc. I think that incorporation in the object language of terms which can describe machine orders will cost little and lead to valuable observations, but I would concede that it might be overambitious on a first study. These terms will appear in some form in the pre-assembled program, in any case.

Nouns: "AB", "∠ABC", "p", $C(P,r)$ etc. represent line segments, angles, points, circles, etc. Other terms like "square ABCD" can be a priori or later defined.

Relation terms: Equality: $\underline{AB} = \underline{CD}$ (length equality)

$$\angle A = \angle B$$

Congruence \cong

Similarity \sim

Parallelism \parallel

Perpendicularity \perp etc.

2. Logic.

Most of elementary geometry can be handled through propositional calculus, or at least most of the formal proofs. The formalization of "construction" may be a little tricky.