Some axioms for plane geometry

Basic relations (vocabulary): There are points and lines. A is on ℓ; AB and CD have the same length; more generally two plane figures are congruent (in particular angle ABC = angle DEF. Also one angle (line segment) is greater than another.

usual basic definitions E.g. If the line AB intersect the line CD at E and $\angle AEC = \angle AED$ the two angles are called right angles.

Two lines are parallel if they do not intersect.

Postulates

1. Through any two points there is a unique line.

2. For any point A and line segment AB, it is possible to draw a circle with center A and radius AB.

3. All right angles are equal.

4. Through any line ℓ and a point not on that line there is unique line ℓ' that is parallel to ℓ.

5. (SAS) If two triangle have two sides and the included angle equal then the triangles are congruent.

Theorems

The following result uses postulate 2; it combines Propositions 1 and 2 of Euclid and we will work from it.

Theorem 1. Given lines AB and CD there is a point B' on the line CD such that AB and CB' are congruent.