One of the things David Hilbert was famous for was giving a modern axiomatization of (Euclidean) (3-dimensional) geometry. Here are his axioms (it is interesting to compare these with Euclid's axioms):

Undefined primitives: point, line, plane

Primitive relations: betweenness, containment, congruence (of segments and angles)

I. Incidence Axioms

1. Two distinct points determine a line.
2. Any two distinct points on a line determine *that* line.
3. Three non-collinear points determine a plane.
4. Any three non-collinear points on a plane determine *that* plane.
5. If two points lie in a plane, then the line they determine lies in that plane.
6. If two planes have a point in common, then they have a second point in common.
7. Every straight line contains at least two points, every plane contains at least three non-collinear points, and space contains at least four non-coplanar points.

II. Order Axioms

1. If point B is between points A and C, then B is between C and A and B lies on the line determined by A and C.
2. If A and C are on line l, then there is a point B on l between A and C and a point D on l so that C is between A and D.
3. Given three distinct points on a line, exactly one point lies between the other two.
4. (Pasch's Axiom) Given a triangle and a line intersecting one edge of the triangle, either the line intersects a vertex of the triangle or the line intersects a second edge of the triangle.

III. Parallels

1. Given a plane, a line l in that plane, and a point in that plane not on the given line, there is *one and only one* line through the point not intersecting l.

IV. Congruence

1. Given a line segment AB and a point X on line l, then upon a given side of X on line l there is one and only one point Y on l so that the segment XY is congruent to AB.

2. Congruence of line segments is reflexive, symmetric and transitive.
3. Suppose B is between A and C on line l, and suppose Y is between X and Z on line l. Then if segments AB and XY are congruent, and if segments BC and YZ are congruent, then the segments AC and XZ are congruent.
4. Given angle α, a line l in a plane $\mathcal{P}$ and a point X on line l, upon a given side l in $\mathcal{P}$ there is one and only one ray starting at X such that the angle formed by the ray and the line l is congruent to α and that all the interior points of the angle lie on the given side of l.
5. Angle congruence is reflexive, symmetric, and transitive.
6. SAS postulate for congruent triangles.

Continuity Axioms

1. (Archimidean Axiom) Given a segment AB on line l and a segment XY, if one lays off segments AA_1, A_1A_2, ... with A_i between A and A_{i+1}, and each A_iA_{i+1} congruent to XY, eventually B is between A and some A_i.
2. (Line completeness) An extension of a set of points on a line with its order and congruence relations that would preserve the relations existing among the original elements as well as the fundamental properties of line order and congruence (Axioms I-III and V-1) is impossible.