

List of Axioms and Theorems from the Second Exam

Axiom A.1 Lines, planes, and space are sets of points. Space contains all points..

Axiom A.2 Any two distinct points are on exactly one line. Every line contains at least two points.

Axiom A.3 Any three noncollinear points are on exactly one plane. Each plane contains at least three noncollinear points.

Axiom A.4 If two points of a line are in a plane, then the entire line is in the plane.

Axiom A.5 In space, if two planes have a point in common, then the planes have an entire line in common.

Axiom A.6 In space, there exist at least four points that are noncoplanar. In space, nobody can hear you scream.

Axiom A.7 (Ruler) The points on a line can be put in one-to-one correspondence with the real numbers

Axiom A.8 (Plane Separation) Each line in a plane separates all the points of the plane that are not on the line into two nonempty sets, called the half planes, with the following properties:

1. The half planes are disjoint convex sets.
2. If P is in one half plane and Q is in the other half plane, then segment PQ intersects the line that separates the plane.

Axiom A.9 (Angle Measurement) Every angle has a measure that is a real number between 0 and 180 (inclusive). The number 180 corresponds to a straight angle, and the number corresponds to an angle where the two rays of the angle are the same ray.

Axiom A.10 (Angle Construction) Let ray AB be on the edge of a half plane. For every real number r such that $0 < r < 180$, there exists exactly one ray AC, with point C in the half plane, such that the measure of angle CAB is r .

Axiom A.11 (Angle Addition) If D is a point in the interior of angle ABC, then $m(\text{BAD}) + m(\text{DAC}) = m(\text{BAC})$

Axiom 1.1 SAS congruence condition

Axiom (The Euclidean Parallel Postulate) For any line L and any point P not on L, there is not more than one line M that passes through P and is parallel to L

Theorem A.1 If two distinct lines intersect, they intersect in exactly one point

Theorem A.2 (Pasch) If a line intersects a side of a triangle and does not intersect any of the vertices, then it also intersects another side of the triangle.

Theorem A.3 (The Crossbar Theorem) The following are equivalent

1. Ray CD is between rays CA and CB
2. Ray CD intersects side AB of triangle ABC at a point between A and B

Theorem 1.1

1. Supplements of congruent angles are congruent
2. Complements of congruent angles are congruent
3. The sum of the measures of two angles in a linear pair is 180

Theorem 1.2 Vertical angles are congruent

Theorem 1.3 (The isosceles triangle theorem) $CS \rightarrow CA$

Theorem 1.4 The ASA congruence condition

Unnumbered theorem: $CA \rightarrow CS$

Theorem 1.5 The median to the base of an isosceles triangle is the perpendicular bisector as well as the angle bisector of the angle opposite the base

Theorem 1.6 Every point on the perpendicular bisector of a segment is equidistant from the endpoints of the segment

Corollary 1.2 A point is equidistant from the endpoints of a segment iff it is on the perpendicular bisector of the segment.

Corollary 1.3 If each of two points is equidistant from the endpoints of a segment, then the line through these points is the perpendicular bisector of the segment

Theorem 1.7 The main diagonal of a kite (the diagonal that connects the vertices where the congruent sides intersect) bisects the angles at these vertices and is the perpendicular bisector of the other diagonal

Corollary 1.4 The diagonals of a rhombus are perpendicular bisectors of each other, and each bisects a pair of opposite angles

Theorem 1.8 The SSS congruence condition

Theorem 1.9 (Hypotenuse-Leg Congruence Condition) If the hypotenuse and leg of one right triangle are congruent to the hypotenuse and leg of another right triangle, then the triangles are congruent.

Theorem 1.10 (Exterior Angle Theorem) An exterior angle of a triangle is greater than either of the remote interior angles

Corollary 1.5 Through a point not on a line, there is a unique perpendicular to the line

Theorem 1.11 Hypotenuse-Acute Angle congruence condition

Theorem 1.12 A point is on the angle bisector of an angle iff it is equidistant from the sides of the angle

Theorem 1.13 Given two non-congruent sides in a triangle, the angle opposite the longer side is greater than the angle opposite the shorter side (BS \rightarrow BA)

Theorem 1.14 Given two non-congruent angles in a triangle, the side opposite the larger angle is longer than the side opposite the smaller angle (BA \rightarrow BS)