

Definition 38 *Triangular region* is the union of a triangle and its interior.

Definition 39 A *polygonal region* is the union of a finite number of triangular regions such that if two triangular regions intersect, their intersection is an edge or vertex of both.

Definition 40 The *altitude* of a triangle is a perpendicular segment from a vertex to the line containing the opposite side.

Postulate 19 α is a function from the set of all polygonal regions to the set of all real numbers.

Postulate 20 For every polygonal region R , $\alpha(R) > 0$.

Postulate 21 If two triangular regions are congruent, then they have the same area.

Postulate 22 If two polygonal regions intersect only in edges and vertices, or not at all, then the area of their union is the sum of their areas.

Postulate 23 If a square region has edges of length a then its area is a^2 .

Theorem 65 [*Rectangle Formula*] The area of a rectangular region is the product of its base and its altitude.

Theorem 66 The area of a right triangle is half the product of the lengths of its legs.

Theorem 67 The area of a triangle is half the product of any base and the corresponding altitude.

Theorem 68 The area of a parallelogram is the product of any base and the corresponding altitude.

Theorem 69 The area of a trapezoid is half the product of the altitude and the sum of the bases.

Theorem 70 If two triangles have the same altitude, then the ratio of their areas is equal to the ratio of their bases.

Theorem 71 If two triangles have the same bases, then the ratio of their areas is the ratio of their corresponding altitudes.

Corollary 4 If two triangles have the same base and the same altitude then they have the same area.