

III. H. Geometry Polygon Congruence Distinction and Discrimination

Polygon Congruence Distinction and Discrimination

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Congruent polygons or solids have the same *size* and shape.

Similar polygons have the same shape.

The simple definitions above are standard and sufficient for grade school students and great mathematicians alike. Confusion arises, however, beyond the point of definition, when ideas such as perimeter and area are introduced. *Further learning causes confusion*, say the learning scientists, and this connection helps students confront such confusion in a manner that strengthens understanding.

The first common confusion follows the logical error of accepting the converse of a statement without sufficient thought. A correct **principle** follows from the definition above: *Congruent polygons have the same area and perimeter*. Since this **principle is not a definition**, the converse must be examined carefully. The erroneous converse is this: "Polygons are congruent if areas and perimeters are equal." A counter-example that disproves this converse can be found in the illustration below.

The second common confusion is induced from the study of congruent triangles. Because of the congruence postulates, students are tempted to think that any two polygons, not just triangles, are congruent if all sides and angles are congruent.

An example is shown here wherein all sides (and therefore perimeters) are congruent, as are all angles (and area). The figures clearly are not congruent, as they lack the same shape. One is only line-symmetric, and the other is only point-symmetric.

