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Classifying triangles and quadrilaterals.

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From the text: Classification of shapes in middle school and high school geometry often seems mysterious to students, featuring strange terms such as isosceles, trapezoid, and kite, which are defined by a mixture of parallelism and metric ideas. The purpose of the following activities is to introduce a more natural way to classify triangles and quadrilaterals. The Common Core State Standards for Mathematics (CCSSM) for middle school (seventh-grade geometry) states that students will "draw, construct and describe geometrical figures and describe the relationships between them". The standards later state: "During high school, students begin to formalize their geometry experiences from elementary and middle school, using more precise definitions and developing careful proofs". The problem for students is that their natural instinct is to associate a name with a particular shape or prototype. This natural inclination provokes confusion in students' understanding of geometric definitions, particularly widely accepted classifications of two-dimensional figures in a hierarchy based on properties. What we propose here addresses the problem by introducing a new notation that enables a framework for the coexistence of two conceptual perspectives that until now have competed with each other. In this framework, students understand the integrating nature of the inclusive conceptual approach (IA) (e.g., for which equilateral triangles are isosceles) as a natural complement to an exclusive classification approach (EA) (e.g., for which equilateral triangles are not isosceles).

Classification: G40
Keywords: elementary geometry; triangles; quadrilaterals; classification; classes of geometric shapes; definitions; properties; student activities; partitions; side length; angles; partition pairs; conceptual schemes for triangles; conceptual schemes for quadrilaterals; worksheets
http://www.nctm.org/Publications/mathematics-teacher/2013/Vol106/Issue7/Activities-for-Students_-Classifying-Triangles-and-Quadrilaterals/