

ORDER AND DISORDER IN THE DEFINITION OF SYMMETRY IN SECONDARY SCHOOL MATHEMATICS

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There are several different approaches to the definition of Symmetry, depending on the perspective taken. Mathematicians treat Symmetry in various ways: As a property of an object, as a special relation between objects, or as a special kind of transformation. In teaching mathematics, teachers and textbooks usually distinguish between symmetry in geometry and symmetry in other branches of mathematics. Even in geometry they deal separately with symmetrical geometric figures and different transformations. In algebra and calculus symmetry is defined differently for different kinds of objects. Thus, no wonder Symmetry is associated with disorder and often viewed as a collection of disconnected concepts. The analysis of mathematical dictionaries supports standpoint.

It should be noted that some scholars discuss symmetry in its general sense and relate to Symmetry as proportion, harmony, boundless, order, and repetition. According to Rosen (Symmetry in Science, 1995): Symmetry is *immunity to a possible change* (p.2, *ibid.*). However, this definition is much too broad and general for school mathematics. Many researchers stress the importance of the role of definition of mathematical concepts for mathematical understanding. Special attention is given to an hierarchical approach to the definition of mathematical concepts.

We propose a unifying hierarchical definition of Symmetry in mathematics. The definition that we suggest is similar to what Rosen does for Symmetry in science. We look at the immunity of a property of a mathematical object with respect to a possible change. This possible change corresponds to a transformation that can be applied to the object. Thus, symmetry has to do with a TRIPLET consisting of an OBJECT (S), a specific PROPERTY (Y) of the object, and a TRANSFORMATION (M) satisfying the three conditions. In our talk the conditions will be presented and exemplified, and the implications of the definition will be discussed.