

ZMATH 2015e.00612

Rathouz, Margaret; Novak, Christopher; Clifford, John

Transforming shapes physically and analytically.

Math. Teach. (Reston) 107, No. 2, 150-155 (2013).

From the text: Constructing formulas “from scratch” for calculating geometric measurements of shapes – for example, the area of a triangle – involves reasoning deductively and drawing connections between different methods. Visual and manipulative models also play a role in helping students understand the underlying mathematics implicit in measurement and make sense of the numbers and operations in formulas. The authors – two mathematicians and one mathematics educator – wondered about physical models: What assumptions are made in using representations to help students, teachers, and mathematicians better understand mathematical ideas? When should educators be cautious or skeptical about what physical or visual models suggest? These questions led to discussions within the authors’ department that involved ideas of proof and the extent to which visual models can convince others of the validity of mathematical claims. In addition, they began to consider the mathematical tools used to generalize measurement methods. In this article they focus on understanding area formulas for circles and ellipses, but readers are encouraged to think more broadly about the benefits and limitations of using physical representations as tools to understand abstract ideas.

Classification: G40 G70 I60

Keywords: geometry; geometric concepts; visualization; concept formation; transformations; transformation functions

<http://www.nctm.org/publications/article.aspx?id=39209>