

# Two Sides of the Same Coin: Transformations, Functions, and the Common Core

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## Overview

Common Core Standard G-CO2 says that students should “describe transformations as functions that take points in the plane as inputs and give other points as outputs.” The fact that geometric transformations are functions creates interesting and enjoyable opportunities to use this connection to help students understand fundamental function concepts.

By providing students with early kinesthetic and visual experiences with geometric transformations (reflections, rotations, translations) we can help students develop deeper and more robust function concepts and create opportunities for explicit discourse about important function ideas, and at the same time expose students to some beautiful connections between geometry and algebra.

## Transformations

Beginning in grade 8 the Common Core uses transformations as the bedrock on which congruence and similarity are built. In high school, the role of transformations is central not only to congruence and similarity, but also to properties of triangles and polygons (such as the base angle theorem for isosceles triangles). Similarity too plays a fundamental role, in defining the sine, cosine, and tangent for the acute angles of a right triangle.

## Functions

Also beginning in grade 8, functions get their own distinct major CCSSM category in addition to other Algebra topics. It would be hard to

overstate the importance of function in students’ mathematical experiences, yet we also know that students struggle with many function concepts. A number of the difficulties students have with functions can be alleviated by exploiting the connections between functions in geometry and functions in algebra. These activities can promote understanding of variables, function families, function notation, domain and range, composition, rate of change, and much more.

## Resources

The presentation sketch will be available on [www.geometricfunctions.org](http://www.geometricfunctions.org), along with more information about the value and motivation for this approach.

Twelve classroom-ready activities drawn from this work are available on [dynamicnumber.org](http://dynamicnumber.org). These activities come with sketches, student worksheets, and teacher notes. From time to time, we’ll make related posts on [blog.keycurriculum.com](http://blog.keycurriculum.com).

## Ongoing

We encourage you to use these activities with your students, and we’d love to get your feedback to help us refine the activities. As we develop more activities and other support materials, we’ll make them available on [www.geometricfunctions.org](http://www.geometricfunctions.org).

Finally, if this approach interests you, please sign up for our mailing list. Just send an email to [feedback@geometricfunctions.org](mailto:feedback@geometricfunctions.org) to let us know of your interest. Please include your name, email address, and any comments or suggestions you have for us.