



Bridging for Math Strength Resources

[Standards of Learning Curriculum Framework](#)

Standard of Learning (SOL) 5.14a Recognize and apply transformations, such as translation, reflection, and rotation.



Student Strengths	Bridging Concepts	Standard of Learning
Students can identify and classify polygons based on their characteristics. Students recognize congruent shapes with the same spatial orientation.	Students can recognize congruent shapes regardless of spatial orientation.	Students can recognize and apply transformations, such as translation, reflection, and rotation.

Understanding the Learning Trajectory

Big Ideas:

- Transformations describe the ways properties change or do not change when a shape is moved in a plane or space. These changes can be described in terms of translations, reflections, rotations, dilations, the study of symmetries, and the concept of similarity (Van de Walle et al., 2018).
- An infinite number of transformations can be made to any shape.
- When congruent figures are translated, rotated, or reflected, they remain congruent
- Similar shapes made by transformations are larger or smaller than the original shape, but corresponding sides are proportional and corresponding angles are congruent (Charles, 2005).

Formative Assessment:

- VDOE Just in time Quick Check SOL 5.14a [PDF](#) / [Desmos](#)

Important Assessment Look Fors:

- The student determines if a transformation of two congruent figures is a translation, reflection, or rotation.
- The student recognizes the change in orientation for each type of transformation.
- The student explains that translated figures must be congruent.

Purposeful Questions:

- How are translations, reflections, and rotations similar and/or different?
- What common term could you use to rename each mathematical term?
- What changes and does not change when you translate/reflect/rotate a figure?
- What does it mean for two shapes to be congruent?

Bridging Activity to Support Standard	Instructional Tips
Routine: Same But Different	In this routine students have the opportunity to explore polygons that are congruent and noncongruent. The spatial orientation of the congruent figures has been changed (transformation).
Rich Tasks: Mystery Transformations	In this task students work with a partner to take turns using different transformations to move an L around a grid. Students need to make sure that with each transformation they keep the shape congruent to the original. As they work on this task, they should discuss the type of transformation they are using to move the shape.
Games/Tech: Desmos 5.14a Polygraph: Transformations Transformations Geogebra	This Custom Polygraph is designed to spark vocabulary-rich conversations about transformations. Key vocabulary that may appear in student questions includes: translation, rotation, reflection, line of reflection, pre-image and image. In this geogebra Transformations activity, students can explore different transformations to discover that the image remains congruent (except with enlargement) regardless of the orientation on the coordinate plane.

Other Resources:

- VDOE Mathematics Instructional Plans (MIPS)
 - [Slides, Flips, and Turns](#)
- VDOE Algebra Readiness Remediation Plans
 - [Reflections](#)
 - [Transformations](#)
 - [Translations](#)
- VDOE Word Wall Cards: Grade 5 [Word](#) / [PDF](#)
 - Translation
 - Reflection
 - Rotation
- Desmos Activity
 - [Polygraph: Transformations](#)

Learning Trajectory Resources:

Charles, R. (2005). Big ideas and understandings as the foundation for elementary and middle school mathematics. *Journal of Mathematics Education Leadership*, 7(3), NCSM.

Clements, D. H., & Sarama, J. (2019). Learning and teaching with learning trajectories [LT]2. Marsico Institute, Morgridge College of Education, University of Denver. <https://www.learningtrajectories.org/>

Common Core Standards Writing Team. (2019). [Progressions for the Common Core State Standards for Mathematics](#). Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

Richardson, K. (2012). *How Children Learn Number Concepts: A Guide to Critical Learning Phases*. Bellingham: Math Perspectives Teacher Development Center.

Van De Walle, J., Karp, K. S., & Bay-Williams, J. M. (2018). *Elementary and Middle School Mathematics: Teaching Developmentally*. (10th edition) New York: Pearson (2019:9780134802084)

VDOE Curriculum Framework for All Grades - [Standard of Learning Curriculum Framework \(SOL\)](#)