



Bridging for Math Strength Resources

Standards of Learning Curriculum Framework

Standard of Learning (SOL) 3.12abc

- a) define polygon;
- b) identify and name polygons with 10 or fewer sides; and
- c) combine and subdivide polygons with three or four sides and name the resulting polygon(s).



Student Strengths	Bridging Concepts	Standard of Learning
Identify and describe plane figures (circles, triangles, squares, and rectangles) according to their characteristics (number of sides, vertices, and angles). Squares and rectangles have four right angles.	<p>Students have prior experiences with polygons through exploration of triangles, squares, and rectangles.</p> <p>Students are learning that root words can change the meaning of a word (such as tri- means 3, as in tricycle, triceratops, <i>triangle</i>)</p>	<p>Students can</p> <ul style="list-style-type: none"> a) define polygon; b) identify and name polygons with 10 or fewer sides; and c) combine and subdivide polygons with three or four sides and name the resulting polygon(s).

Understanding the Learning Trajectory

Big Ideas:

- The study of geometry helps students represent and make sense of the world. Students develop knowledge about how geometric figures relate to each other and begin to use mathematical reasoning to analyze and justify properties and relationships among figures. Students discover these relationships by constructing, drawing, measuring, comparing, and classifying geometric figures. (VDOE Grade 3 Curriculum Framework)
- Investigations should include explorations with everyday objects and other physical materials. Exercises that ask students to visualize, draw, and compare figures will help them not only to develop an understanding of the relationships, but to develop their spatial sense as well. In the process, definitions become meaningful, relationships among figures are understood, and students are prepared to use these ideas to develop informal arguments. (VDOE Grade 3 Curriculum Framework)
- The van Hiele theory of geometric understanding describes how students learn geometry and provides a framework for structuring student experiences that should lead to conceptual growth and understanding.
 - a. Level 0: Pre-recognition. Geometric figures are not recognized. For example, students cannot differentiate between three-sided and four-sided polygons.

<p>b. Level 1: Visualization. Geometric figures are recognized as entities, without any awareness of the parts of figures or relationships between components of a figure. Students should recognize and name figures and distinguish a given figure from others that look somewhat the same. (This is the expected level of student performance during Kindergarten and grade one).</p> <p>c. Level 2: Analysis. Properties are perceived but are isolated and unrelated. Students should recognize and name properties of geometric figures. (Students are expected to transition to this level during grades two and three.) (VDOE Grade 3 Curriculum Framework)</p> <ul style="list-style-type: none"> • A polygon is a closed plane figure composed of at least three line segments that do not cross. (VDOE Grade 3 Curriculum Framework) • Polygons may be described by their attributes (e.g., sides and vertices). Line segments form the sides of a polygon and angles are formed by two line segments coming together at a vertex of a polygon. (VDOE Grade 3 Curriculum Framework)
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Formative Assessment:

- VDOE Just in time Quick Check SOL 3.12a [PDF](#) / [Desmos](#)
- VDOE Just in time Quick Check SOL 3.12b [PDF](#) / [Desmos](#)
- VDOE Just in time Quick Check SOL 3.12c [PDF](#) / [Google slides](#)

Important Assessment Look Fors:

- The student’s drawings of polygons contain closed figures without curves or crossed segments.
- The student recognizes that concave or irregular figures are polygons.
- The student is able to count the sides of a polygon, including polygons that are concave.
- The student can recognize a new figure that is created by combining smaller figures.
- The student can identify and name smaller figures when decomposing a larger figure.

Purposeful Questions:

- What is a polygon?
- Why is this shape a polygon?
- Why isn’t a circle a polygon?
- How can the properties of specific polygons be used to define and classify them?
- What does it mean to combine polygons?
- What does it mean to subdivide polygons?
- What happens when we combine or divide shapes into other shapes?
- How many ways can you subdivide a square? A rhombus? A trapezoid? A rectangle?

Bridging Activity to Support Standard	Instructional Tips
<p>Routine Which One Doesn’t Belong? Seeing Shapes</p> <p>Guess My Rule: Sides and Corners</p> <p>Guess My Rule: Polygon Sort</p>	<p>For the “Which One Doesn’t Belong?” routine, students are presented with a set of four images and are encouraged to decide which one doesn’t belong. There are many answers when exploring this routine, so students should provide justification when explaining which one doesn’t belong. Since this routine allows for a variety of answers, students are engaged and excited to participate.</p> <p>For the “Guess My Rule: Sides and Corners” routine, students have to decide why some shapes belong in the circle, and some shapes do not. Student discussion should focus on what they know about the various polygons displayed.</p> <p>For the “Guess My Rule: Polygon Sort” routine, students have to decide why each group of shapes belong in each part of the Venn diagram and why some shapes do not. Student</p>

Same but Different: Shapes	<p>discussion should focus on what they know about the various polygons displayed.</p> <p>For the Same & Different routine, display pictures A and B and ask students to think about how they are the same and how they are different. Provide students with time to think. Then have the students share their thinking while the teacher records students' ideas on the board using a T-chart. Click here for more information about this routine: Same and Different routine.</p>
<p>Rich Tasks</p> <p>Polygon Picture Task (Henrico Public Schools)</p>	<p style="text-align: center;">Polygon Picture Task</p> <ol style="list-style-type: none"> 1. Create a picture in the box using at least 5 polygons. Describe each polygon used. Explain your thinking using pictures, words, and symbols. 2. Subdivide one of your polygons into 2 polygons. Explain the resulting polygons using pictures, words, and symbols.
<p>Games/Tech</p> <p>Desmos 3.12b Polygraph: Identifying Polygons</p> <p>Guess My Rule</p> <p>Fill the Hexagons</p>	<p>This Custom Polygraph is designed to spark vocabulary-rich conversations about polygons and their physical characteristics. Key vocabulary that may appear in student questions includes: quadrilateral, pentagon, hexagon, heptagon, octagon, and nonagon.</p> <p>Players take turns sorting different shape cards according to a rule. The other player tries to guess the rule.</p> <p>Students will use pattern blocks to explore ways to combine different shapes to create a hexagon.</p>
<p>Other Resources:</p> <ul style="list-style-type: none"> • VDOE Mathematics Instructional Plans (MIPS) <ul style="list-style-type: none"> ◦ 3.12ab - Polygons Galore! (Word) / PDF Version ◦ 3.12c - Combining Polygons (Word) / PDF Version ◦ 3.12c - Subdividing Polygons (Word) / PDF Version ◦ 3.12c - What is It Worth? (Word) / PDF Version • VDOE Word Wall Cards: Grade 3 (Word) and (PDF) • Desmos: 3.12 Vocabulary Review • Virtual Manipulatives: <ul style="list-style-type: none"> ◦ Geoboard ◦ Pattern Shapes ◦ Shapes ◦ Tangrams ◦ Power Polygons • Polygons: Students will identify a variety of different polygons according to the directions. • Math in Our Word: Hidden Triangles: Students explore subdividing a variety of shapes into triangles. <p>Learning Trajectory Resources:</p> <p>Charles, R. (2005). Big ideas and understandings as the foundation for elementary and middle school mathematics. <i>Journal of Mathematics Education Leadership</i>, 7(3), NCSM.</p> <p>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/</p> <p>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.</p>	

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 \(SOL\)](#)