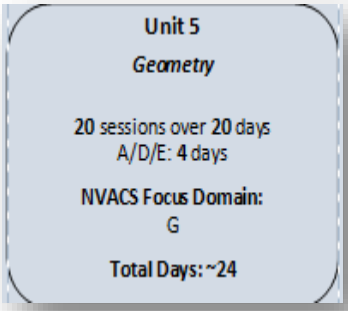
First Grade Unit 5: Geometry



Big Conceptual Idea: K-6 Progression on Measurement and Data (Measurement Part) (pp. 1-4, 8-11), K-5 Progression on Geometry (pp. 1-5, 8-9)

Read the Bridges Unit Overview/Introduction for Unit 5 pp. i-vi. Also, read each Module Overview for the current week's sessions, and the current Session Summary along with details for the teaching of each session as you work through Unit 5. These Introduction/Overview/Summary sections provide focus, clarity, vocabulary, definitions, and examples for the "big mathematical ideas and understandings" critical to 1st Grade. This information will support your professional decision-making within the Sessions and Modules as needed.

Mathematical Background: Read Bridges Unit 5 Overview pages (pp. i-xi)	Essential Questions for teacher consideration: What experiences and discussions will I provide to support students' understanding of identifying, describing, constructing, drawing, comparing, composing, and sorting two- and three-dimensional shapes? Using pattern blocks, Polydrons, shape-sorting cards, and paper shapes how will I support understandings of components and properties of geometric shapes, composing and decomposing such shapes, and spatial structuring and spatial relations?

1st Grade Curriculum Pacing Framework: Balanced Calendar

Instructional note:

> "If you learn something deeply, the synaptic activity will create lasting connections in your brain, forming structural pathways, but if you visit an idea only once or in a superficial way, the synaptic connections can "wash away" like pathways made in the sand." (Boaler, 2016, p. 1)

The big idea for *Unit 5* is deepening students' understandings of the attributes of two-dimensional and three-dimensional shapes, and beginning reasoning about the relationships of shapes to one another and parts of shapes to the whole. Descriptions of the Van Hiele levels of sophistication for geometric thinking are included in the *Bridges Unit 5 Introduction* (pp. 2-3). Students advance through the levels of geometric understanding as they have experiences and explore with shapes. For most of elementary school instruction students are involved with recognizing shapes, discussing shapes in terms of geometric properties, making comparisons between shapes, and beginning to reason about shapes based on their attributes. "All teachers should be aware that the experiences they provide are the single most important factor in moving children up this developmental ladder" (Van de Walle, Karp, Lovin, & Bay-Williams, 2014, p.304).

Distinction between defining and non-defining properties for two-dimensional and three-dimensional shapes are a major instructional target for 1st grade. Teachers utilize tasks or activities involving shapes to clarify the geometric terms or vocabulary students use, and continue to introduce new and more precise understanding of geometric content. Encourage students to use terminology such as edges, faces, surfaces, vertices, etc. (see definitions below), as they talk and write about their experiences with shapes. These terms are not expected to be mastered by students, but used to exposure students to precise academic terminology, thus supporting development of academic vocabulary and geometric concepts including shape attributes and properties.

Seeing relationships is a focus throughout all mathematics instruction. Developing the big idea of part-whole relationships occurred throughout the previous units. Geometry continues to support this idea of "building understanding of part-whole relationships as well as the properties of the original and composite shapes. Note that the process of combining shapes to create a composite shape is much like combining 10 ones to make 1 ten" (K-6 Progression on Geometry, 2013, p. 8). "Geometry instruction in grades pre-K-2 helps children learn more about the world they live in while also playing a significant role in supporting the development of number concepts" (Van de Walle et al., 2014, p. 299). Geometry instruction also develops "…the background for measurement and for initial understandings of properties such as congruence and symmetry" (NVACS, 2010, p. 13). Clements and Sarama state "…spatial sense can be defined as an intuition about shapes and the relationships between shapes and is considered a core area of mathematical study in the early grades" (as cited in Van de Walle et al., 2013, p. 299). For this reason, *NVACS* also identifies geometrical reasoning as one of the four critical content areas in mathematics for first grade and includes three important goals for elementary geometry: 1) geometric shapes, components, and properties; 2) composing and decomposing shapes; and 3) spatial relations and spatial structuring. These foci also include the idea, "Shapes can be moved in a plane in space without changing the shape's properties, and these movements can be described in terms of translations (slides), reflections (flips) and rotations (turns)" (Van de Walle et al., 2014, p. 299).

Support and instruct to the developmental understanding of:

> **Circle**- a two-dimensional (flat) shape made by drawing a curve that is always the same distance from a point called the center.

Triangle- a two-dimensional (flat) shape with 3 sides.
Rectangle- a two-dimensional (flat) shape with 2 pairs of parallel sides (4 sides total) and 4 right angles.
Square- a two-dimensional (flat) shape with 4 congruent sides and 4 right angles.
Hexagon- a two-dimensional (flat) shape with 6 sides.
Trapezoid- a two-dimensional (flat) shape with 4 sides, exactly 1 pair of which are parallel.
Rhombus-a two-dimensional (flat) shape with 4 congruent sides.
Cube- a three-dimensional shape (solid) whose 6 faces are all squares.
Cone- a three-dimensional shape (solid) with a circular or elliptical base and a curved surface that tapers to the vertex.
Sphere- a three-dimensional shape (solid) constructed so that every point of the surface is the same distance from a point called the center.
Cylinder- a three-dimensional shape (solid) with one curved surface and two congruent flat ends that are circular or elliptical.
Vertex/corner– the point at which the sides of a polygon, or the edges of a polyhedron meet.
Edge– (1) Any side of a polyhedron's faces. (2) A line segment or curve where two surfaces of a geometric solid meet. (e.g. The edge is the circular portion or circumference of the base of a cone).
Face– a flat surface on a 3-dimensional figure. Some special faces are called bases. More generally, any 2-dimensional surface on a 3-dimensional figure.
Surface– the boundary of a 3-dimensional object. The part of an object that is next to the air. Common surfaces include the top of a body of water, the outermost part of a ball, and the topmost layer of ground that covers the earth.
Pyramid– a polyhedron made up of any polygonal region for a base, a vertex (apex) not in the plane of the base, and all of the line segments with one endpoint at the apex and the other on an edge of the base. All faces, except perhaps the base, are triangular. Pyramids get their name from the shape of their base.
Rectangular prism– a prism with rectangular bases. The four faces that are not bases are either rectangles or parallelograms. For example, a brick models a rectangular prism in which all sides are rectangles.
Triangular prism– a prism whose bases are triangles.

Students explore 2-dimensional and 3-dimensional shapes and fractions (partitioning shapes into equal parts – halves and fourths and able to talk about the whole in relationship to the parts and the parts in relationship to the whole). Over time, with supportive and scaffolded instruction and interactions, students come to more precise understandings of shapes, as well as develop appropriate precision with geometric content and vocabulary. Consider the following possible misconceptions throughout the Unit:

- A trapezoid is always red (trapezoids in pattern blocks are red).
- Triangles are always equilateral (triangles in pattern blocks and on many pre-made posters are often equilateral).
- Size and orientation change the shape (triangles must be oriented with the horizontal base parallel to the bottom of the page; students consider a triangle with a horizontal base parallel to the top of the page as "upside down").
- A rhombus can be called a diamond (a diamond is not a shape, but a gemstone).
- Pattern blocks or attribute blocks are 2-D shapes (pattern blocks have thickness and are precisely 3-D; 2-D shapes can be constructed by tracing the footprint or outline of the pattern block resulting in the 2-D shape).

Consider using shapes of various colors, sizes, and orientations so students focus on defining attributes and characteristics rather than non-defining attributes.

Students also engaged in geometric activities in the October and December *Number Corner* activities. These prior experiences support students' continued work with geometry understandings during this *Unit.* Further experiences will also be continued in February *Number Corner*.

On-going enrichment:
Continue noting the *Skills Across the Grade Level* chart in the Introduction section (Unit 5 p. ix). All geometry standards for first grade are expected to be secure at the end of this *Unit*. This is important information for those day-to-day professional instructional decisions you have to make within each session as to what discussions or activities to extend or cut short or emphasize or skip or, etc. Expect all students to engage in the math.

Continue to consider "Support" and "Challenge" options within each *Session*, and "Game Variations", "Differentiate", and "English-Language Learners" ideas in *Work Places*.

Essential Academic Vocabulary Use these words consistently during instruction.	
New Academic Vocabulary: (first time explicitly taught) *indicates Word Resource Cards are available in the Bridges materials	Review Academic Vocabulary: (Vocabulary from Number Corner or previous units)
Side* Net Fraction*	*Attribute** *Add** *Addition* *Circle** *Compare** *Cone** *Cube** *Cylinder** *Edge** *Equal*/the same as* *Equation** *Face** *Flat* *Fourth** *Half** *Hexagon** *Parallel Lines* *Pyramid** *Quarter (one fourth)* *Rectangle** *Rectangular prism** *Rhombus** *Rotate/Turn* *Solid* *Sphere** *Square** *Tally* *Third** *Trapezoid** *Triangle** *Triangular prism** *Two-Dimensional shape (2-D)** *Three-Dimensional shape (3-D)** *Vertex or Corner*

Additional terminology that students might need support with: actual, actually, curved, identify, information, problem solving, strategies, plus, predict, prediction, slide (move over)

*Collaborative Team Conversations (CTC)

Consider using *one* of the following as part of the formative assessment process at the lesson level to **collect student work** to analyze for <u>evidence of mathematical understanding</u>:

Guiding question:
"What language are students using to identify, describe, and justify their understandings of 2-D and 3-D shapes (names, defining attributes)?"
"How are students able to compare and decompose shape compositions to identify shapes that are not included?"
"How are students partitioning shapes into smaller portions?"
"How are students composing smaller shapes to make a new shape?"
"If needed, what intensification interactions will support the understanding geometry vocabulary, concepts and/or spatial reasoning skills?"

Lesson	Evidence	Look for
U5M2S5 *Shapes Checkpoint* TG pp. 22-24	*Shapes Checkpoint* observation and student record sheet (TG U5M2S5 p. T6-T7) *Shapes Checkpoint Scoring Guide* (AG Bridges Unit Assessments pp. 49-51)	Focus CTC around conceptual understandings of the big idea and strategies used: • understanding and using precise names of 2-D and 3-D shapes (see Essential Academic Vocabulary table above) • understanding and using precise and defining attributes of 2-D and 3-D shapes (see Essential Academic Vocabulary table above) • comparing and visually recognizing differences groups of shapes
U5M3S5 *Unit 5 Assessment, Part 1 & Part 2 #5, 6, 7, 8* TG. pp. 27-29, 33-34	*Unit 5 Assessment, Part 1 & Part 2 #5, 6, 7, 8* observations and student record sheet (TG U5M3S5 p. T12-T13) *Unit 5 Assessment, Part 1 & Part 2 #5, 6, 7, 8 Scoring Guide #5, 6, 7, 8* (AG Bridges Unit Assessments pp. 54-55, 57)	Focus CTC around conceptual understandings of the big idea and strategies used: • using precision and accuracy in identifying attributes • identifying fourths and halves • understanding the size of parts gets smaller with more parts • composing a shape with smaller shapes • using a variety of shapes in different placements

Learning Cycle Assessments (summative)	*No other assessment at this time*	

Standards listed in **bold** indicate a focus of the lesson.

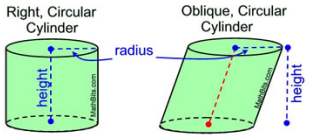
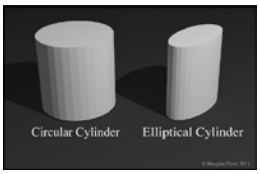
NVACS (Content and Practices)	Mathematical Development of the Big Idea	Instructional Clarifications & Considerations
Module 1- Session 1: What's in the Box?		
1.MD.4 1.G.1 MP.1 MP.7	Access Prior Learning: • Kindergarten student worked on correctly naming shapes regardless of their orientations or overall size. Securing the Big Idea and key Strategic Behaviors: • identifying 2-D shapes • analyzing and describing 2-D shapes by defining and non-defining attributes	Guiding Questions: • What are shapes? • How can you organize shapes? • How can you describe shapes? Instructional Notes: • Consider sending the *Family Letter* home. Find it here. • Consider starting a KWL chart to pre-assess the misconceptions that students might have about shapes. Do not correct these misconceptions at this time but use this chart to inform classroom discussions and discoveries throughout the unit. • The pattern block web app can be useful throughout this unit. • Although the teacher's guide appears to have "scripted" responses, the sessions are not intended to be taught as a scripted lesson. The suggested conversations are to showcase how student misconceptions about shapes might be dealt with through student discourse. They are also a guide of how to respond to student misconceptions while protecting the class culture of inquiry-based learning and risk taking. • This lesson addresses two student misconceptions: size and color, which are non-defining attributes. • Pay particular attention to the note on page 6 in regards to rectangles and squares. Child Watching: • Identify students who think that a shape's color or size is a defining attribute. Address this through questioning and classroom discourse techniques.
Module 1- Session 2: Shape Sorting with Attribute Cards		
1.MD.4 1.G.1 MP.4 MP.7	Access Prior Learning: • Kindergarten student worked on correctly naming shapes regardless of their orientations or overall size. • Connect to previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 2-D shapes • analyzing and sorting 2-D shapes by defining and non-defining attributes	Guiding Questions: • What are shapes? • How can you organize shapes? • How can you describe shapes? Instructional Notes: • Some students might believe triangles need to be equilateral or have a horizontal base parallel to the bottom of the page. Expose students to a variety of triangles, such as isosceles and scalene triangles, and in various orientations. Students do not need to know the terms isosceles and scalene. • This lesson adds geometry vocabulary to describe shapes by straight and curved sides and closed shapes with no holes or gaps. • Allow misconceptions to present themselves for rich classroom discussion. Making a statement like "color doesn't matter" before students have a chance to discuss their thoughts can limit discussion and student growth. Discovery through experience and classroom discussion fosters growth, as opposed to direct explanation. "Students with a growth mindset have more positive brain activity when they make mistakes, with more brain regions lighting up and more attention to and correcting of errors." (Moser et al., 2011, pp. 1484-1489). Enrichment: • See *Extension* in the margin (p. 16). Child Watching: • Observe for the following misconceptions about shapes: color, size, orientation, leaving gaps or curved edges on drawings, only equilateral triangles are triangles.
Module 1- Session 3: Last Shape in Wins		
1.G.1 1.G.2 MP.1 MP.7	Access Prior Learning: • Kindergarten student worked on correctly naming shapes regardless of their orientations or overall size. • Connect to previous geometry discussions.	Guiding Question: • How can you make shapes from other shapes? Instructional Notes: • The online digital *Work Place* game: Last Shape In Wins is provided on the Educator Site. • See the *Work Place Sentence Frames* for Unit 5 here. • These sessions contain critical geometry vocabulary. Utilize, post and review the Vocabulary Resource Cards. • Read the Math Practices in Action in the margin (p. 22). • Students may discover that some of the pattern block shapes take up more area than others which supports understanding of composing or decomposing shapes. *-continues on next page-*

	Securing the Big Idea and key Strategic Behaviors: • identifying 2-D shapes • analyzing 2D shapes • composing new shapes using 2-D shapes	Enrichment: • See the *Game Variations* on *Work Place Instructions* (p. T5). Child Watching: • Identify students unsure of the names of the shapes or having difficulty telling them apart (see p. T4 for support).
Module 1- Session 4: Pattern Block Puzzles: How Many Ways?		
1.G.1 1.G.2 MP.7	Access Prior Learning: • Kindergarten student worked on correctly naming shapes regardless of their orientations or overall size. • Connect to previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 2-D shapes • analyzing 2D shapes • composing new shapes using 2-D shapes	Guiding Question: • How can you make shapes from other shapes? Instructional Notes: • The online digital Work Place game: Pattern Block Puzzles is provided on the Educator Site. • The idea of 3 triangles fitting into a trapezoid shape begins building the idea of parts and wholes. Enrichment: • See the *Assessment and Differentiation Chart* on *Work Place Guide* (p. T6). Child Watching: • Identify students unsure of the names of the shapes or having difficulty telling them apart (See p. T6 for support).
Module 1- Session 5: There's a Shape in My Pocket		
1.G.1 1.G.2 MP.1 MP.7	Access Prior Learning: • Kindergarten student worked on correctly naming shapes regardless of their orientations or overall size. • Connect to previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 2-D shapes • analyzing and sorting 2-D shapes by defining and non-defining attributes	Guiding Question: • How do attributes help you identify and sort shapes? Instructional Notes: • Address the misconception that a rhombus is a diamond by reinforcing that a diamond is a type of rock and not a shape. • A square is both a rhombus and a rectangle. • Every rhombus is a kite, however, not every kite is a rhombus. A rhombus is an equilateral with all four sides equal in length. A kite has two pairs of adjacent side equal in length, but not equal to each other. Enrichment: • See the *Extension* activity in margin (p. 38). Child Watching: • Observe how students are describing shapes. Are they beginning to use vocabulary such as sides and vertices? Are they beginning to gain confidence in naming shapes?
Module 2- Session 1: Shape Detectives		
1.G.1 MP.7	Access Prior Learning: • Kindergarten students described 2-D and 3-D objects in the environment using names of shapes regardless of size or orientation. • Connect to all previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 3-D shapes • analyzing 3-D shapes by defining and non-defining attributes • locating 3-D shapes in the environment	Guiding Question: • Where do you find 3-D shapes? Instructional Notes: • Read the *About This Session* in the margin (p. 4). • A two-dimensional shape is the line segments which form the shape lying in a plane. When you cut out a shape from paper, mathematically that shape then has depth and is three-dimensional. Consider for this lesson just drawing a circle (or rectangle) on a piece of paper as opposed to actually cutting it out. • In early development students may confuse many actual three-dimensional shapes with narrow depth as "flat" or two-dimensional. Bridges actually uses pattern blocks in Kindergarten as 2-dimensional shapes. To clarify, if you trace around these shapes the "footprint" that results will actually be the two-dimensional shape. • Conversation around the image of the three dimensional shape on the card might need to occur. Show how the artist tries to represent all the sides in the image but address the fact that an artist cannot show all the sides at one time on the paper, just as your eyes cannot see all sides of the solid cube at one time either, but the sides are still there. Also, the artist shows a sphere as 3-dimensional by drawing or shading a shadow to show depth. Enrichment: • See the *Extension* activity in margin (p. 6). Child Watching: • Are students beginning to use more precise vocabulary and gaining confidence with shapes?

Module 2- Session 2: Mystery Bag Sorting

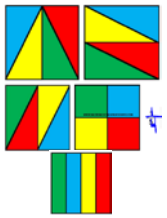
1.G.1 1.MD.4 MP.7 MP.8	Access Prior Learning: • Kindergarten students identified and described shapes by attributes. • Connect to all previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 3-D shapes • analyzing 3-D shapes by defining and non-defining attributes • locating 3-D shapes in the environment	Guiding Questions: • What do you see that is the same or different? • What attributes do you already know about? Instructional Notes: • Read the *Math Practices in Action* in the margin (p. 9). • Encourage the use of accurate and precise geometry vocabulary. • Consistently expose students to precise vocabulary by repeating what students might say with precise language. Enrichment: • See the *Extension* activity in margin (p. 10). Child Watching: • Identify students using accurate vocabulary to describe the shape attributes.

Module 2- Session 3: Shape Walk

1.G.1 1.MD.4 MP.7 MP.8	Access Prior Learning: • Kindergarten students described 2-D and 3-D objects in the environment using names of shapes regardless of size or orientation. • Connect to all previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 3-D shapes • analyzing 3-D shapes by defining and non-defining attributes	Guiding Questions: • What 3-D shapes do you see around you? • What do you notice that is the same or different?  Instructional Notes: • Model precise mathematical language for students to hear. Students, however, are not expected to use formal names such as "right circular cylinder." • Students are likely to generalize shapes in the real world which could result in misconceptions. For example, they might select a water bottle as a cylinder. Mathematically a plastic water bottle with hourglass curved face and/or ridges is not truly a cylinder. Use students' generalizations as an opportunity to discuss the precise attributes by posing a question such as, "What attributes does this water bottle have that make you say it is a cylinder?" Honor student thinking and discovery, while pointing out the attributes (such as the lip on the lid, or the ridges) that make it a non-example.  • Place 3-dimensional solids next to the object for comparison. There are many types of water bottles in a school setting. Some of them will be true (right circular) cylinders and some may not be. See pictures.  • A *straw is another non-example of a cylinder because it does not have bases*. Other non-examples of right circular cylinders include soda cans and some containers of canned food. • The standard states: 1.G.2- Compose 2-D or 3-D shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) (NVACS, 2010). There are other types of cylinders and cones. It is not necessary to name them or have students identify them. It is only necessary for them to distinguish the attributes that make a true right-circular cylinder and identify when a solid is a non-example.  • Non-examples for right circular cones include: traffic cones (it has a lip), ice cream cones (it has no base), party hat (it has no base), and teepee (no base and not a culturally responsive example). • Validate students reasoning of approximate objects but provide accurate and precise language and concepts within the discussion. Spend time addressing why a shape doesn't meet the criteria. Perhaps the Shape Walk becomes more of a "Finding the Rare Shape Hunt" and a celebration occurs if an accurate example is found. Enrichment: • See the *Extension* activity in margin (p. 13). Child Watching: • Identify students using imprecise vocabulary to describe the shape attributes and extend precise vocabulary when appropriate. • Identify students finding non-examples of the solids help them discover the different attributes that make it a non-example.

Module 2- Session 4: Cube Studies		
1.G.1 1.G.2 MP.4 MP.7	Access Prior Learning: • Kindergarten students composed simple 2-D shapes to form larger shapes. • Connect to all previous geometry discussions. Securing the Big Idea and key Strategic Behaviors: • identifying 3-D shapes • analyzing 3-D shapes by defining and non-defining attributes • constructing 3-D shapes	Guiding Question: • What does a cube look like and feel like? Instructional Notes: • Consider including an orange pattern block in this session. Although an orange pattern block is actually a rectangular prism, it has two square faces and can be easily confused with a cube. Capitalize on the opportunity to discuss the differences. • A unifix cube is a non-example of a cube due to the protruding affixation feature and the open face. Enrichment: • *Work Place Guide Assessment & Differentiation* chart (p. T1). Child Watching: • Identify students using imprecise vocabulary to describe the shape attributes and extend precise vocabulary when appropriate.
Module 2- Session 5: Four Triangles & One Square		
1.G.1 1.G.2 MP.4 MP.7	Access Prior Learning: • Kindergarten students composed simple 2-D shapes to form larger shapes. • Connect to all previous geometry sessions. Securing the Big Idea and key Strategic Behaviors: • identifying 3-D shapes • analyzing 3-D shapes by defining and non-defining attributes • constructing 3-D shapes	Guiding Question: • How do you make a 3-D shape? Instructional Notes: • Although students will be building pyramids with 4 triangles and a square, pyramids can be made with other shapes as the base. • Polydrons are mathematically not 3-D shapes themselves. Support students with any confusions with this use of materials. • The *Assessment Binder* under the *Bridges Unit Assessment* tab provides the scoring guide for this checkpoint (p. 51). • Read the *Math Practices in Action* in the margin (p. 26). • Kindergarten students had limited exposure to pyramids, so this content will be new information. Enrichment: • See the *Extension* activity in margin (p. 26). Child Watching: • Use the scoring guide to assess students and inform your instruction.
Module 3- Session 1: Nine-Patch Inventions		
1.OA.6 1.G.1 1.G.2 MP.2 MP.7	Access Prior Learning: • Activate prior knowledge about quilts, by perhaps bringing in an example, or showing images. Developing the Big Idea and key Strategic Behaviors: • composing a new pattern from shapes • understanding part/whole relationship • writing equations	Guiding Questions: • How can a grid represent an equation? • How many equations do you think you can make from the same grid colored differently? Instructional Notes: • Make a deliberate connection to part/whole relationships with addition and subtraction equations and the idea that shapes can also be composed of parts that can make a whole shape when put together, or when decomposed can be parts of a whole shape. This supports the part/part/whole reasoning students are developing. • There are various suggested literature connections listed on p. 4 that can be read to the class to build background knowledge of quilting. Child Watching: • Identify students making connections to the parts and wholes (e.g. 3 and 6 both parts of 9).
Module 3- Session 2: Nine-Patch Mini-Quilts		
1.G.2 MP.6 MP.7	Access Prior Learning: • Activate prior knowledge about quilts, perhaps bring in an example, or show images. Developing the Big Idea and key Strategic Behaviors: • composing a new pattern from shapes • using and making sense of structure	Guiding Questions: • How many different patterns do you think we can make with our quilt squares? • What happens when you change the pattern around? Instructional Notes: • Read the *About This Session* in the margin (p. 8). • Emphasize Math Practice 7 in this lesson and support students in looking for and making use of structure. • "As students combine shapes, they continue to develop their sophistication in describing geometric attributes and properties and determine how shapes are alike and different, building foundations for measurement and initial understandings of properties such as congruence and symmetry" (K-5 Progression on Geometry, pp. 8-9). Child Watching: • Identity students experimenting with and seeing results of combined shapes.

Module 3- Session 3: Sandwich Fractions

1.G.1 1.G.3 MP.6 MP.7	Access Prior Learning: • Kindergarten students were not exposed to fractional parts, only the idea of composing shapes with smaller shapes. Securing the Big Idea and key Strategic Behaviors: • partitioning shapes into smaller equal fractional pieces – halves and fourths • understanding part/whole relationship	Guiding Questions: • What do you know about sharing? • Do you ever have to share? Instructional Notes: • Read the *Math Practices in Action* in the margin (p. 15). • "…students learn to intentionally compose and decompose plane and solid figures building an understanding of part-whole relationships as well as the properties of the original and composite shapes" (K-5 Progression on Geometry, p. 8). • Precision is important when thinking about parts having to be exactly the same. • In 2nd grade students will explore that halves do not need to be the same shape to represent the same area. Halves shaped like triangles and halves shaped like rectangles are both still the same amount if the whole is the same. • Research suggests "…starting work with fractions using words and not symbols…This approach of using words rather than symbols emphasizes that *one half* or *one fourth* is one number. This is an important foundation for ensuring that subsequent work in fractions is well grounded" (Small, 2014, p. 8). Therefore, when labeling and naming fractions, use the word labels (one-fourth, one half) and do not introduce the symbol (1/4 or 1/2). It is not necessary at this time for students to understand fraction notation. "Fraction symbolism represents a fairly complex convention that can be misleading to children. That is why it is important in grades pre-K-2 to use fraction words and postpone introducing fraction symbolism. Let children first focus on making sense of fractions without the complication of also trying to make sense of the symbolism" (Van de Walle et al., 2014, p. 256). • A common misconception occurs when attempting to help students make sense of fractions by teaching them to think of one fourth as 1 "out of" 4. This creates the idea that 1 and 4 are two separate numbers and that there are 4 wholes, when a fraction represents parts of a one whole. The standards state, "…describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares" (NVACS, 2010, 1.G.3). The term "shares" reinforces the idea that it is a piece of a whole. • Even though the materials suggest labeling the parts with ½ or ¼, consider labeling these with just the words one-half or one-fourth, not the symbols. Reinforce the idea of fractions as numbers by counting them using the language one-fourth, two-fourths, three-fourths, four-fourths. Enrichment: • Ask students to find as many ways as they can to represent fourths. There are several ways students can do this beyond the typical squares and triangles. Consider the possibilities of mixing these ideas as well; perhaps one side is cut into bars, and the other side is cut into squares. This online game, Thirteen Ways of Looking at a Half would be a great tool to enrich as suggested by the Bridges educator site.  Child Watching: • Identify students' struggling with precision resulting in sizes that are not equal.

Module 3- Session 4: Paper Pizzas

1.G.1 1.G.3 MP.4 MP.7	Access Prior Learning: • Kindergarten students were not exposed to fractional parts, only the idea of composing shapes with smaller shapes. Securing the Big Idea and key Strategic Behaviors: • partitioning shapes into smaller equal fractional pieces – halves and fourths • understanding part/whole relationship	Guiding Question: • How can you equally share a pizza? Instructional Notes: • See the notes above about fraction labeling. Even though the materials suggest labeling the parts with ½ or ¼, consider labeling these with the words "one-half" or "one-fourth," not the symbols. • Reinforce the idea of fractions as numbers by counting them using the language one-fourth, two-fourths, three-fourths, four-fourths. • Encourage students to attend to precision as they cut. • Pieces of pizza are not triangles due to the curved edge. If this comes up, consider showing students a triangle shape and compare it with the slice of pizza to highlight the differences. Reinforce "one-fourth" as the label you have given the piece, a one-fourth slice. Enrichment: • See Step 12 (p. 20). Child Watching: • Observe for students' use of precise language.

Module 3- Session 5: Fraction Bingo		
1.G.3 MP.2 MP.7	Access Prior Learning: • Kindergarten students were not exposed to fractional parts, only the idea of composing shapes with smaller shapes. Securing the Big Idea and key Strategic Behaviors: • partitioning shapes into smaller equal fractional pieces – halves and fourths • understanding part/whole relationship	Guiding Question: • What patterns do you notice? Instructional Note: • The fraction bingo cards do have the symbol (½, etc.) written on the cards. This is appropriate for student exposure, however, consider adding the fraction words (*one-half* or *halves, etc.)* to support the standard expectation. Enrichment: • See the *Extensions* in the margin (p. 24). Child Watching: • Identify students' use of precise language. Are they counting fractional parts with the terms one-half, two-halves? • Observe for understanding of the "whole." You can assess this by frequently asking, "What is the whole?"
Module 3- Session 6 & 7: Unit 5 Assessment, Part 1 & Part 2 (spread over 2 days)		
1.G.1 1.G.2 1.G.3 MP.1 MP.2 MP.7	Access Prior Learning: • Kindergarten students were not exposed to fractional parts, only the idea of composing shapes with smaller shapes. Securing the Big Idea and key Strategic Behaviors: • identifying 2 and 3-D shapes • composing and decomposing shapes • partitioning shapes into smaller equal fractional pieces – halves and fourths • understanding part/whole relationship	Instructional Notes: • The *Assessment Guide* under the *Bridges Unit Assessmentst* tab provides the scoring guide for *Unit 5 Assessment* (p. 56). • The *Grade 1 Assessment Map* in the *Assessment Binder* under the Overview tab (pp. 13-15) identifies the Geometry Standards targeted for mastery (secure understandings). If students are still struggling, consider using the next module as time to provide intensification, and support. *April Number Corner* will also revisit these standards. Child Watching: • Use the Scoring Guide to inform your instruction. If any students are not secure, consider pulling for small group support throughout the next week.
Module 4- Session 1: Shape Riddles		
1.G.1 MP.1 MP.7	Access Prior Learning: • The previous sessions have provided students with many shape experiences that they will draw upon during this lesson. Securing the Big Idea and key Strategic Behaviors: • identifying 2-D shapes • analyzing 2-D shapes by defining attributes	Guiding Questions: • What do you know about these shapes? • How are they the same and different? • What does eliminate mean? Instructional Note: • The online digital resource for this work place, Shape Riddles is provided on the Educator Site. Enrichment: • See *Assessment & Differentiation Chart* on the *Work Place Guide* (p. T3). Child Watching: • Observe for the language students use when discussing shapes. Begin thinking about which students are in Van Hiele Level 0 and describing shapes as "boxes" or "icicles." Observe which students are in Van Hiele Level 1 and are using the language of geometry, describing shapes by their attributes. • Observe student reasoning and deduction skills as they eliminate shapes that don't fit the clue. • Identify students who are confused with the language and possibly eliminate triangles when the prompt is "My shape has 3 straight sides."
Module 4- Session 2: Shape Sorting & Graphing		
1.G.1 1.MD.4 MP.1 MP.7	Access Prior Learning: • The previous sessions provided students with many shape experiences that they will draw upon during this lesson. • Students engaged in sorting and graphing in the previous unit with their height measurements.	Guiding Question: • How many different ways can you sort shapes? Instructional Notes: • Read the *Math Practices in Action* in the margin (p. 9). • Consider asking students to do an open sort of their shapes before using the Shape Sorting & Graphing Record Sheet which limits their sorting to only 2 categories. Enrichment: • *See Work Place Game Variations* (p. T8). *-continues on next page-*

	Securing the Big Idea and key Strategic Behaviors: • analyzing and sorting shapes by defining attributes • analyzing graphs and data	Child Watching: • Observe for the language students use when discussing shapes. Begin thinking about which students are in Van Hiele Level 0 and describing shapes as "boxes" or "icicles." Observe which students are in Van Hiele Level 1 and are using the language of geometry, describing shapes by their attributes. • Observe student reasoning and deduction skills as they label the columns and generate sorting categories.
Module 4- Session 3: More Shape Riddles		
1.G.1 MP.1 MP.7	Access Prior Learning: • The previous sessions provided students with many shape experiences that they will draw upon during this lesson. • Connect to Session 1. Securing the Big Idea and key Strategic Behaviors: • analyzing 2-D shapes by defining attributes • sorting shapes by defining attributes	Guiding Questions: • What do you know about these shapes? • How are they the same and different? • What does eliminate mean? Enrichment: • Encourage students to create their own riddles for others. Child Watching: • Observe the language students use when discussing shapes. Begin thinking about which students are in Van Hiele Level 0 and describing shapes as "boxes" or "icicles." Observe which students are in Van Hiele Level 1 and are using the language of geometry, describing shapes by their attributes. • Observe student reasoning and deduction skills as they eliminate shapes that don't fit the clue.

References

Common Core Standards Writing Team. (2011, May 29). *Progressions for the Common Core State Standards in Mathematics (draft). Measurement and Data (Measurement).* Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

Common Core State Standards Writing Team. (2013). *Progressions for the Common Core State Standards in Mathematics (draft). Geometry, K-6.* Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

Council of Chief State School Officers. (2010). The Nevada Academic Content Standards. Retrieved from http://www.doe.nv.gov/uploadedFiles/nde.doe.nv.gov/content/Standards_Instructional_Support/Nevada_Academic_Standards/Math_Documents/mathstandards.pdf.

Moser, J., Schroder, H.S., Heeter, C., Moran, T.P., & Lee, Y.H. (2011). *Mind your errors: Evidence for a neural mechanism linking growth mindset to adaptive post error adjustments*. Psychological Science, 22, 1484-1489.

Sarama, J., & Clements, D. H. (2009). *Learning and teaching early math: The learning trajectories approach*. New York, NY: Routledge.

Small. M. (2014). *Uncomplicating fractions to meet common core standards in math, K-7.* New York, NY: Teacher's College Press.

Van de Walle, J., Karp, K., Lovin, L., & Bay-Williams, J. (2014). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades pre-k-2.* (2nd ed.). New York, NY: Pearson.