

Winchester Math Curriculum Grade 3

Subject	Mathematics
Grade/Course	Grade Three
Unit of Study	Unit 6: Geometry
Pacing	March
Unit Summary	In Unit 6, students develop increasingly precise ways to describe, classify, and make generalizations about two-dimensional shapes, particularly quadrilaterals. In Module 1, students explore polygons in a variety of creative ways. In Module 2, they form polygons and special quadrilaterals to build understanding that shared attributes can define a larger category. Module 3 combines geometry and measurement as students measure the perimeters and areas of polygons. Module 4 offers students opportunities to apply what they've learned about quadrilaterals and area in the context of fractions.
<u>Overarching Mathematical Practices</u>	
<p>3.MP.1 Make sense and persevere in solving problems. 3.MP.2 Reason abstractly and quantitatively. 3.MP.3 Construct viable arguments and critique the reasoning of others. 3.MP.4 Model with mathematics. 3.MP.5 Use appropriate tools strategically. 3.MP.6 Attend to precision. 3.MP.7 Look for and make use of structure. 3.MP.8 Look for and express regularity in repeated reasoning.</p>	
<u>Unit CT Core Content Standards</u>	
<p><u>3.MD.C.5a</u> A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.</p> <p><u>3.MD.C.5b</u> A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.</p> <p><u>3.MD.C.7.A</u> Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.</p> <p><u>3.MD.C.7.B</u> Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.</p> <p><u>3.MD.C.7.D</u> Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.</p> <p><u>3.MD.D.8</u> Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the</p>	

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same perimeter and different areas or with the same area and different perimeters.

3.G.A.1

Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

3.G.A.2

Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*

“Unwrapped” Standards

Skills	Content
Use	square unit to measure area
Cover	plane figure with square units to find area
Find	<ul style="list-style-type: none"> ● area of rectangle by tiling ● area of rectilinear figures by decomposing into non-overlapping rectangles ● perimeter given side lengths ● unknown side length
Show	area would be the same as tiling, if multiplying side lengths
Multiply	whole number side lengths to find area in the context of real world problems
Represent	products as rectangular areas
Recognize	<ul style="list-style-type: none"> ● area as additive ● rhombus, rectangles, and squares as examples of quadrilaterals
Draw	examples of quadrilaterals that are not in subcategory of square, rectangle or rhombus
Add	the areas of non-overlapping parts of rectilinear figures
Apply	techniques to solve real world problems
Solve	<ul style="list-style-type: none"> ● problems involving perimeter of polygons ● problems exhibiting rectangles with the same perimeter and different areas and the same area and different perimeters

Understand	shapes in the same category share attributes and attributes can define a larger category
Partition	shapes into equal areas
Express	each equal area as a unit fraction

Essential Questions	Corresponding Big Ideas
<ol style="list-style-type: none"> How do we communicate with mathematics? Why are geometry and geometric figures relevant and important? How are attributes used in mathematics? 	<ol style="list-style-type: none"> We communicate with mathematics using precise words, symbols, and numbers most appropriate for the situation and/or context. Geometry is everywhere. It has many practical uses in everyday life such as in building things, shapes are used in many recreational activities, and in food design. Attributes are used to describe the characteristics or features of an object that allows for grouping with other similar objects.

Evidence of Learning - Assessment

Pre/Post Assessment	Interim Assessment	Additional Evidence of Learning
<ul style="list-style-type: none"> Unit 6 Pre-Assessment - Module 1, Session 1 Unit 6 Post-Assessment - Module 4, Session 4 Number Corner Checkup 3 	<ul style="list-style-type: none"> Polygons and Quadrilaterals Checkpoint - Module 2, Session 4 	<p>Options</p> <ul style="list-style-type: none"> Exit tickets <p>Observational Assessments</p> <ul style="list-style-type: none"> Tangram Polygons - M1, S5 Geoboard Polygons - M2, S2 Guess My Quadrilateral - M3, S2 Area or Perimeter - M3, S5

Smarter Balanced Interim Assessment

[Smarter Balanced General Scoring Rubrics](#) - 4 Rubrics included - Score Pt 4 to Score Pt 1

Smarter Balanced Interim Blocks

Interim assessment blocks may be used for a variety of assessment purposes, including: pre/post, interim and formative (additional evidence of learning).

- The [Style Guide](#), which aligns with the expectations of Smarter Balanced Assessments, will support the creation of unit- and standard-aligned items for instructional use.

- The items on the interim assessments are developed under the same conditions, protocols, and review procedures as those used in the summative assessments. Therefore, they assess the same Common Core State Standards, adhere to the same principles of Universal Design in order to be accessible to all students, and provide evidence to support Smarter Balanced claims in mathematics and ELA/literacy. The interim assessment items are non-secure but non-public. This means that educators may view the items, however, they should not be made public outside of classroom, school or district.

Interim Assessment Block - access through [CSDE Assessment Portal](#)

- IAB - Geometry

- **Some interim blocks show clear, strong alignment to priority standards within the unit. Other blocks have been placed in one specific unit but could be aligned to the priority standards of several units. Blocks have been spread out over the course of all units for a more balanced approach to assessment throughout the school year. These interim blocks, used in partnership with the Style Guide, will support the creation of unit- and standard-aligned items for instructional use.*

Learning Plan

Researched-based Instructional Resources and Methods

Sequence of Instruction:

Number Talk/Number Corner → Problem + Investigations → Work Places → Math Forum → Daily Practice or Home Connection

Bridges Number Corner: The focus areas for Number Corner aligned to Unit 6 are:

Measurement and Data

- Time to the nearest minute - analog and digital
- Elapsed time
- Collecting data related to time and solve problems about the data
- Find area and perimeter of rectilinear figures
- Creating figures with square feet
- Create figures from give dimensions
- Compare perimeter

Computational Fluency

- Multiplication facts for 6 and 9
- Find patterns

Fractions

- Use number line to represent and compare fractions

Bridges - Whole Group, Small Group, and Independent Problem Centered Activities

Module 1	Module 2	Module 3	Module 4
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Problem + Investigation <ul style="list-style-type: none"> ● Sessions 2-5 Problem String <ul style="list-style-type: none"> ● None Work Place <ul style="list-style-type: none"> ● Sessions 1-2, 5 Math Forum <ul style="list-style-type: none"> ● None Daily Practice <ul style="list-style-type: none"> ● Sessions 1-5 Home Connection <ul style="list-style-type: none"> ● Sessions 2,4 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1, 3-6 Problem String <ul style="list-style-type: none"> ● None Work Place <ul style="list-style-type: none"> ● Session 2 Math Forum <ul style="list-style-type: none"> ● None Daily Practice <ul style="list-style-type: none"> ● Sessions 1-6 Home Connection <ul style="list-style-type: none"> ● Sessions 1,3,5 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-5 Problem String <ul style="list-style-type: none"> ● None Work Place <ul style="list-style-type: none"> ● Sessions 2-3, 5 Math Forum <ul style="list-style-type: none"> ● None Daily Practice <ul style="list-style-type: none"> ● Sessions 1-5 Home Connection <ul style="list-style-type: none"> ● Sessions 1,3,5 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-3 Problem String <ul style="list-style-type: none"> ● None Work Place <ul style="list-style-type: none"> ● Sessions 2,4 Math Forum <ul style="list-style-type: none"> ● None Daily Practice <ul style="list-style-type: none"> ● Sessions 1-4 Home Connection <ul style="list-style-type: none"> ● Sessions 2,3
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Possible Misconceptions	Teacher Moves
<ol style="list-style-type: none"> 1. Students may incorrectly count unit squares covered to determine the area of shape using graph paper. 2. When students use geoboards to create very unusual shapes, they may not be able to determine the area with square units. 3. Instead of multiplying, some students may merely count unit squares to determine the area. Applying multiplication facts may be the issue. 4. Some students may count unit squares to determine the area without realizing that the distributive property with multiplication may make the area of a rectangular region easier to find. 5. Some students may be challenged by simply visualizing and finding the rectangles in more complex figures. 6. Some third graders may be confused when given a rectangle with only two of the side lengths shown or a problem situation with only two of the side lengths provided. The students may add only the dimensions shown to find the perimeter. 7. Students are often confused between the concepts of area and perimeter. 	<ol style="list-style-type: none"> 1. To avoid an incorrect count, students can put the numbers of the counting sequence in each square as they count them. 2. Help students visualize square units as they use geoboards to find the area. 3. To address this, have them sketch a rectangle with rows of squares and ask them to write a number sentence instead of counting, such as "4 rows of 5 squares = $5+5+5+5 = 4 \times 5 = 20$ squares." 4. Create additional experiences with tiles to determine area using the distributive property. Students should describe and explain how they found the area. 5. Provide additional experiences for these students to locate the rectangles before finding the area. 6. To avoid this misconception, have students write the dimension on the other sides of the rectangle. 7. Provide additional experience for students to discover that the concept of an object's perimeter as a one-dimensional attribute and area as two-dimensional. Student

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<p>8. Some third graders may identify a square as a “non-rectangle” or a “non-rhombus” and may not understand that a square is a rectangle because it has all the properties of a rectangle. Some students may be able to tell the properties of each shape separately, but may not figure out the relationship between the shapes. For example, students may not notice the properties of square that are characteristic of other shapes, too.</p> <p>9. Some third graders are confused with the concept that equal shares of identical wholes may not have the same shape. Some students may not understand an area model represents one out of two or three of four fractional parts without understanding the parts are equal shares.</p>	<p>should talk about the fact that area is expressed with square units.</p> <p>8. Provide toothpicks or straws to create shapes. To help students visually see the relationship between a rhombus and a square, ask students to change the angles. Have students talk about the relationship they notice as they moved the angles. As students develop definitions for specific shapes, relationships between the properties will make sense to them.</p> <p>9. Additional experiences and discussions about equal shares with different shapes will help students begin to understand this confusing concept.</p>
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Vocabulary and Representations

Tier 2 (Academic Vocabulary)	Tier 3 (Domain Specific Vocabulary)
<p>angle*</p> <p>area*</p> <p>attribute</p> <p>centimeter (cm)*</p> <p>congruent +</p> <p>dimension</p> <p>distance</p> <p>divide*</p> <p>equilateral +*</p> <p>estimate*</p> <p>fraction*</p> <p>length*</p> <p>meter (m)*</p> <p>multiply*</p> <p>parallel +*</p> <p>pattern*</p> <p>rotation</p> <p>similar</p> <p>width</p>	<p>acute angle +*</p> <p>array*</p> <p>closed figure</p> <p>denominator*</p> <p>equilateral triangle +*</p> <p>equation*</p> <p>equivalent fractions*</p> <p>hexagon*</p> <p>irregular polygon</p> <p>line of symmetry +*</p> <p>numerator*</p> <p>obtuse angle +*</p> <p>open figure</p> <p>parallelogram +*</p> <p>pentagon*</p> <p>perimeter*</p> <p>perpendicular +*</p> <p>polygon*</p> <p>quadrilateral*</p> <p>rectangular array*</p> <p>regular polygon</p> <p>rhombus*</p> <p>right angle +*</p> <p>side length</p>

	<p>square centimeter*</p> <p>square unit*</p> <p>symmetry +*</p> <p>vertex*</p> <p>*Smarter Balanced Vocabulary is focused on major mathematical concepts. (Not all possible words have been identified by SBAC)</p> <p>+ Students are not responsible for these vocabulary words, however they should have some understanding of the mathematical concept.</p>
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Mathematics Teaching Practice Resources

1. **Bridges** - Reference Math Practices in Action Notes - The notes identify how particular mathematical practice is employed in a specific activity.
2. Bridges - [Geometry Mathematics Background](#)
3. Bridges - [Cycle of Instructional Strategies for Geometry](#)
4. **[Math Practices Teacher Question Starters](#)**
5. **[Implementing the Standards of Mathematics Practice](#)**
6. [Illustrating the Standards of Mathematical Practice](#)
7. Grade 3 - [Standards + Practice Explanations and Examples](#)
8. [Math Practice Standards Posters](#) Gr. 2-3
9. **[Supporting Productive Struggle](#)**
10. **[Use and Connect Mathematical Representations](#)**
11. [Number Talks Matter - Number Talks at a Glance](#) and Fluency without Fear
12. [Bridges Interactive Math Manipulatives](#)
13. [National Library of Virtual Manipulatives](#)
14. [Illustrative Math – Grade 3](#) - Resources and activities for the grade aligned by standard.
15. [Accountable Talk Moves](#)
16. [Contribution Checklist](#)
17. [Sentence Frames that Can Build Metacognitive Thinking](#)
18. [Sample Language Frames for Mathematics](#)
19. [Building a Mathematical Mindset Community](#)
20. [Teacher/Student Actions](#)
21. [Three Act Math Tasks](#)
22. K-5 Math Resources - Grade 3
 - a. [Geometry](#)
 - b. [Square Units](#)
 - c. [Area on a Geoboard](#)
 - d. [Find the Area](#)
 - e. [Find Area of Rectilinear Figures](#)
23. LearnZillion
 - a. [Find the Perimeter of a Polygon with More than Four Sides](#)
 - b. [Use a Chart to Understand how Rectangles can have the Same Perimeter and Different Area](#)
 - c. [Find the Perimeter with Missing Side Lengths](#)

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- d. [Recognize Shape Attributes](#)
- e. [Sort Quadrilaterals by Attributes](#)

Suggestions for Differentiation, Scaffolding and Intervention

Differentiation or Intervention

Any teacher moves/strategies that address misconceptions can be used in differentiation or as interventions.

Math Teaching Practice Resources contain resources that provide opportunities for differentiation, intervention, or extension aligned to the strategies below.

- [How to Select Math Intervention Content](#)
- [Coherence Map in Math](#) – The coherence map shows how standards within and across grades build upon each other. You can use the map to assist you in to build student understanding by linking together concepts within and across grades and identify gaps in a student's knowledge by tracing a standard back through its logical prerequisites.
- [CT Dept. of Education Evidence-based Practice Guides](#) – These guides provide links to “evidence-based activities, strategies and interventions (collectively referred to as 'interventions').”
- Evidenced-based strategies for supporting struggling students (U.S. Dept. of Education – [What Works Clearinghouse](#))
- Ensure instructional materials are systematic and explicit. In particular, they should include numerous clear models of easy and difficult problems, with accompanying teacher think alouds.
- Provide students with opportunities to solve problems in a group and communicate problem-solving strategies.
- Teach students about the structures of various problem types, how to categorize problems based on structure, and how to determine appropriate solutions for each problem type.
- Students should work with visual representations of mathematical ideas.
- If visual representations are not sufficient for developing accurate abstract thought and answers, use concrete manipulative first. (Include the next line for middle school and older students only) Although this can also be done with students in upper elementary and middle school grades, use of manipulatives with older students should be expeditious because the goal is to move toward understanding of and facility with visual representations and finally to the abstract.
- Provide carefully constructed questions to help direct students in determining what to do to solve problems, but they shouldn't be told how to reach the solution.
- Instruction during the intervention should be explicit and systematic. This includes providing models of proficient problem solving, verbalization of thought processes, guided practice, corrective feedback, and frequent cumulative review.

Intervention for

- Provide about 10 minutes per session of instruction to build quick retrieval of basic arithmetic facts. Consider using technology, flashcards, and other materials for extensive practice to facilitate automatic retrieval.
- For students in K -2 explicitly teach strategies for efficient counting to improve the retrieval of mathematics facts.
- Teach students in grade 2-8 how to use their knowledge of properties, such as commutative, associative, and distributive to derive facts in their heads.
- [How to Promote Acquisition of Math Facts – Intervention for struggling students](#)
- [National Center on Intensive Intervention - Basic Facts](#)

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- Once a strategy has been taught, it is important to reinforce it. The reinforcement or practice exercises should be varied in type and focus as much on the discussion of how students obtained their answers as on the answers themselves.
- Having students work in groups (as opposed to handing your bright students a workbook to work on when the classroom material isn't challenging enough) with other children ready for advanced material shows them that mathematics is not a solitary discipline -- mathematics is exciting and vibrant and creative and fun.
- Struggles with basic facts - need more experience with concrete and pictorial representations, including describing what their models represent to make connection to basic facts. Time and experience with developing strategies that are based on patterns and properties will help support learning the facts. It is important to give students time to learn and understand these concepts before procedural skill practice takes place.
- [Concrete, Representational, Abstract Progression](#)

EL Strategies

- [Colorin Colorado](#) – A Bilingual site for educators and families of English learners
- [Stanford University - Principles for Mathematics Instruction of ELs](#)
- [CT State Dept. Of Education English Learner Standards and Resources](#)
- Nonverbal responses, such as thumbs up, will help you check for understanding without requiring students to produce language. ELLs can participate and show that they understand a concept, or agree or disagree with an idea, without having to talk. This is especially important for students whose comprehension of English is more advanced than their ability to speak the language.
- Pre-teach vocabulary in ways that connect to students' prior knowledge.
- Display posters of graphic representations of vocabulary words.
- <http://www.cal.org/siop/lesson-plans/>
- Provide support to assist in explaining thinking with sentence starters and work banks.
- Use Work Place Sentence Frames or other sentence frames to assist students in math discourse.
- Speak slowly and use clear articulation. Reduce the amount of teacher talk and use a variety of words for the same idea. Exaggerate intonation and place more stress on important new concepts or questions. After asking a question, wait for a few moments before calling on a volunteer. Writing the question on the board will also help.
- English language learners are not always able to answer the questions posed to them, especially when the questions are open-ended. Provide support for and improve the participation of students with lower levels of English proficiency by using a prompt that requires a physical response, like "Show me a half, a third, etc.." or "Touch the larger number."
- [Increase academic language knowledge for English learner success.](#)

Extension:

- Students can choose two quadrilateral shapes (square, rectangle, rhombus, parallelogram, or trapezoid) to compare and contrast using a Venn diagram.
- Create real world problems for area and perimeter.
- Create tangram puzzles.

Interdisciplinary Connections

Children's Literature - * Bridges recommended titles - # Bridges titles embedded in unit

The 329th Friend by Marjorie Weinman Shamat

Spaghetti and Meatballs for Dinner by Marilyn Burns

**Grandfather Tang's Story* by Ann Tompert

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**Three Pigs, One Wolf, and Seven Magic Shapes* by Grace Maccarone
Shape Up by David Adler
If You Were a Quadrilateral by Molly Blaisdell
**The Tangram Magician* by Lisa Campbell Ernst & Lee Ernst
**The Greedy Triangle* by Marilyn Burns

ELA

[CCSS.ELA-LITERACY.SL.3.1](#)

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 3 topics and texts*, building on others' ideas and expressing their own clearly.

[CCSS.ELA-LITERACY.SL.3.1.A](#)

Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

[CCSS.ELA-LITERACY.SL.3.1.B](#)

Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).

[CCSS.ELA-LITERACY.SL.3.1.C](#)

Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.

[CCSS.ELA-LITERACY.SL.3.1.D](#)

Explain their own ideas and understanding in light of the discussion.