Winchester Math Curriculum Grade 2

Subject	Mathematics
Grade/Course	Grade Two
Unit of Study	Unit 6- Geometry
Pacing	March
Unit Summary	Second graders will investigate two dimensional shapes, fractions (halves and fourths), congruence, symmetry, and transformations (slides, flips, and turns) using a variety of tools and models. There is a strong emphasis on identifying, describing, constructing, drawing, comparing, contrasting and sorting various types of triangles and quadrilaterals, as well as other shapes, throughout the unit. The first grade focus on composing and decomposing shapes resurfaces at a more sophisticated level in Modules 2-4 as students are introduced to concepts of tiling a plane (tessellating) and finding the areas of shapes by counting the number of units it takes to cover them without leaving any gaps or holes.

Overarching Mathematical Practices

2.MP.1 Make sense of problems and persevere in solving them.
2.MP.2 Reason abstractly and quantitatively.
2.MP.3 Construct viable arguments and critique the reasoning of others.
2.MP.4 Model with mathematics.
2.MP.5 Use appropriate tools strategically.
2.MP.6 Attend to precision.
2.MP.7 Look for and make use of structure.
2.MP.8 Look for and express regularity in repeated reasoning.

Unit CT Core Content Standards

2.G.A.1- Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.1 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
2.G.A.2- Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
2.G.A.3- Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.
2.MD.C.8- Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?
2.MD.D.10- Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
2.NBTA..1- Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.
2.NBT.A.3- Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
2.NBT.B.5- Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
2.NBT.B.6- Add up to four two-digit numbers using strategies based on place value and properties of

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operations.
2.NBT.B.7- Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
2.OA.A.1- Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
2.OA.B.2- Fluently add and subtract within 20 using mental strategies.2 By end of Grade 2, know from memory all sums of two one-digit numbers.
2.OAC..4- Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

"Unwrapped" Standards

Skills	Content
Recognize	● shapes with specific attributes ● equal shares of the identical wholes need not have the same shapes
Draw	● shapes with specific attributes ● a graph to represent a data set
Identify	● triangles ● quadrilaterals ● pentagons ● hexagons ● cubes
Partition	● rectangle into rows and columns with equal size squares ● circles and rectangles into equal shares
Describe	● shares as halves, thirds, and fourths
Count	● total number of shares
Solve	● word problems about money ● simple problems presented in bar graph ● one and two-step word problems
Understand	● three digits in a three digit number represent hundreds, tens, and ones ● adding and subtracting three-digit numbers; hundreds to hundreds, tens to tens, and ones to ones ● necessity to compose and decompose hundreds and tens in computation
Read and Write	numbers to 1000 using numerals, number names, and expanded form
Fluenty	● add and subtract within 1000 using strategies ● add and subtract within 20

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Add	up to four two-digit numbers
Add and Subtract	within 1000
Relate	strategy to written method
Use	● symbol for unknown ● addition to find to number of objects in an array
Write	an equation to express the total as the sum of equal addend.

Essential Questions	Corresponding Big Ideas
1. How do fractions help describe shapes and groups? 2. How can you find the area of given shapes? 3. Why do we need mathematical operations? (addition/subtraction)	1. Fractions represent equal parts of shapes or groups and help to describe these parts. 2. The area of a shape can be found by counting units. 3. Operations create relationships between numbers and when acted up result and a new number.

Evidence of Learning - Assessment

Pre/Post Assessment	Interim Assessment	Additional Evidence of Learning
● Unit 6 Pre-Assessment - Module 1, Session 1 ● Unit 6 Post-Assessment - Module 3, Session 6 ● Number Corner Checkup 3	N/A	Options ● Exit Tickets Observational Assessments ○ Last Shape in Wins, M1, S1 ○ Find the Area, M2, S4 ○ Fill for Less, M3, S1 ○ Halves & Half-nots, 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.

Interim Assessment Block - access through CSDE Assessment Portal

· 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

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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.

Learning Plan

Researched-based Instructional Resources and Methods

Sequence of Instruction:
Number Talk/Number Corner→ Problem + Investigations→Work Places→Home Connections

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

- Attributes of three-dimensional shapes
  - faces
  - edges
  - vertices

Measurement

- Money
  - Counting quarters
  - Counting dollars
  - Working with money amounts less than a dollar

Computational Fluency

- Two and three digit subtraction
- Addition facts to 20

Number Sense

- Locating numbers on a number line
- Locating points on a number line to solve problems
- Place value on a number line

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

Module 1	Module 2	Module 3	Module 4
Problem + Investigation ● Sessions 2-5 Work Place ● Session 1-5 Assessment ● Session 1 Home Connection ● Sessions 1, 3, 5	Problem + Investigation ● Sessions 1-3, 5 Work Place ● Sessions 1-5 Home Connection ● Sessions 2, 4	Problem + Investigation ● Sessions 1-5 Work Place ● Sessions 1-6 Assessment ● Session 6 Home Connection ● Sessions 1, 3, 5	Problem + Investigation ● Sessions 1-4 Work Place ● Sessions 1-2 Home Connection ● Session 1, 3

Possible Misconceptions	Teacher Moves
1. Some second graders believe a shape can	1. It is critical to have learners touch and feel

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be changed by its orientation.	shapes. As they touch shapes, students will discover the shape will not change regardless of the orientation.
2. Some students may not be able to distinguish between a row and a column.	2. Through discussion, students will learn to make distinction between rows and columns.
3. For some students, the idea that equal shares of identical wholes may not have the same shape is difficult to grasp.	3. Additional experiences working with the same wholes cut in equal shares differently will assist students in understanding that the shape of the shares are not always the same.
4. Some students may not understand that an area model may represent one out of two or three or four fractional parts without understanding the parts are equal shares.	4. Experiences and discussions about equal shares with different shapes will help student understand this confusing concept.
5. Second grade students do not need to have facility using the standard algorithm adding and subtracting. They should focus their work on developing and using efficient strategies that make sense. Although some students may be ready to write equations, composing ten when regrouping in addition and decomposing tens when regrouping in subtracting may be challenging to other students.	5. Concrete representations, number lines, and hundreds charts will help students to develop a deeper understanding of the process of regrouping than only following rote procedures.
6. Watch for students who are making reasoning errors when working with concrete materials or objects as they begin to use more sophisticated strategies. Students may double count a number when adding or subtracting. This may occur with physical objects or pictures or using hundreds chart. Students may decompose a number to make a ten and then incorrectly add the original added on to the ten.	6. The sooner such misconceptions are addressed through questions and use of concrete examples, the more likely a student is to self-correct with similar examples. Students do not have to be fluent with all of the mental strategies. They should have opportunities to practice, explain, and compare strategies. Using the strategies that make sense to them will help students to be ready for drill and practice opportunities to be fluent with facts.
7. Teaching key words does not help students to develop an understanding of problem situations.	7. Rather, by using concrete models and drawing pictures, students can relate their actions to whether the situation calls for addition or subtraction. In missing addend cases, students will determine which operation (addition or subtraction) makes the most sense to them, and whether it will result in a correct solution.
8. Students who struggle with two-step	8. These student should work to identify

problems.	missing information needed to solve the problem. While the question in the problem will focus on the final answer, identifying missing information will help students to recognize they need to perform an operation to find that information.

Vocabulary and Representations

Tier 2 (Academic Vocabulary)	Tier 3 (Domain Specific Vocabulary)
area* column congruent + critique reasoning + equal parts fourth half halves pattern* quarter (one-fourth) row thirds viable argument +	array* equation* equilaterall+* hexagon* isosceles triangle + line of symmetry +* parallel lines +* quadrilateral* octagon* pentagon* right angle* rhombus* scalene triangle symmetrical + symmetry +* tessellation + trapezoid vertex*

*Smarter Balanced Vocabulary is focused on major mathematical concepts. (Not all possible words have been identified by SBAC)

\+ Students are not responsible for these vocabulary words, however they should have some understanding of the mathematical concept.

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. K-5 Math Teaching Resources

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    - Grade 2 Geometry
    - Grade 2 Number
6. Grade 2 - Standards + Practices - Explanations and Examples
7. Exploring the Math Practice Standard: Precision
8. Addition and Subtraction Problem Types
9. Number Talks Matter - Number Talks at a Glance and Fluency without Fear
10. LearnZillion Grade 2:
    - Understand that Shapes are Defined by their Sides and Angles
    - Identify Quadrilaterals
    - Equal Shares can have Different Shapes
    - Design a Flag
    - Practice Decomposing Numbers to Add and Subtract
9. Howard County Math Resources
    - Learning Targets and Instruction Strategies for Standards of Mathematics Practice
    - Ideas to Close or Bring Back to Summarize Learning
10. Journal Prompts for Math
11. Bridges Interactive Math Manipulatives
12. Illustrative Math – Grade 2 - Resources and activities for the grade aligned by standard.
13. Bridging Practices - UCONN – Training and a Task Repository to develop and support student capacity for argumentation in mathematics
14. Beginning to Problem Solve with I Notice, I Wonder
15. The Progression of Addition and Subtraction
16. Accountable Talk Moves
17. Contribution Checklist
18. Sentence Frames that Can Build Metacognitive Thinking
19. Sample Language Frames for Mathematics
20. Building a Mathematical Mindset Community
21. Teacher/Student Actions
22. Fletcher Three Act Tasks
23. Vocabulary Development Frayer Model – Elementary and secondary video and resources.

Suggestions for Differentiation, Scaffolding and Intervention

Differentiation/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

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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 facts

- 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
- 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

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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

- Have students choose groups of pieces (they may be different sized) that are close to: one half, one fourth, to a whole or more. Explain how the pieces were chosen.
- Ask the students to make figures like airplanes, houses, stars, rockets, wheels, boats, and other objects. Then ask what types of shapes they see within the rubber band versions of these objects.
- Bridges Work Place Sentence Frames (Advanced)
- Many activities in the K-5 resources linked in Math Teaching Practice Resources can be utilized for differentiation and/or intervention.

Interdisciplinary Connections

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

#The Greedy Triangle by Marilyn Burns
#A Clock for the Dreamer by Aileen Friedman
**Sweet Clara and the Freedom Quilt* by Deborah Hopkinson
The Patchwork Quilt by Valerie Flournoy
Shape by Shape by Suse MacDonald
The Warlord's Puzzle by Virginia Pilegard
Fraction Action by Loreen Leedy
Grandfather Tang's Story by Ann Tompert
If You Were a Quadrilateral by Molly Blaisdell
**The Josephina Story Quilt* by Eleanor Coerr
**The Tortilla Quilt Story* by Jane Tenorio-Coscarelli
**Sam Johnson and the Blue Ribbon Quilt* by Lisa Campbell Ernst

Social Studies
Explore historical quilts from Connecticut

Art

Design Quilts
Create artwork with shapes

ELA
CCSS.ELA-LITERACY.SL.2.1
Participate in collaborative conversations with diverse partners about *grade 2 topics and texts* with peers and adults in small and larger groups.
CCSS.ELA-LITERACY.SL.2.1.A
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.2.1.B
Build on others' talk in conversations by linking their comments to the remarks of others.
CCSS.ELA-LITERACY.SL.2.1.C
Ask for clarification and further explanation as needed about the topics and texts under discussion