

Winchester Math Curriculum Grade 2

Subject	Mathematics
Grade/Course	Grade Two
Unit of Study	Unit 8- Measurement, Data & Multi-Digit Computation with Marble Rolls
Pacing	May / June
Unit Summary	This unit provides a review of place value through and beyond 1000 and three-digit addition and subtraction to deepen their understandings, correct misconceptions, solidify strategies, and develop increasingly efficient, number-based ways of approaching these computation situations. Then the focus is on data collection and analysis. Second graders are introduced to projects in which they make cardboard ramps of different kinds to investigate some of the factors that cause marbles to roll farther and faster. Explorations occur and then they conduct formal experiments to test several different variables. They generate data by measuring marble rolls distances multiple times, pool their data, and enter it on line plots to better see, understand, and analyze how manipulating the different variables affects the outcomes. This unit concludes with student-conducted surveys, in which students generate questions on topics of their choosing, gather, organize, and analyze the data, and share their findings with others.
<u>Overarching Mathematical Practices</u>	
<p>2.MP.1 Make sense of problems and persevere in solving them.</p> <p>2.MP.2 Reason abstractly and quantitatively.</p> <p>2.MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>2.MP.4 Model with mathematics.</p> <p>2.MP.5 Use appropriate tools strategically.</p> <p>2.MP.6 Attend to precision.</p> <p>2.MP.7 Look for and make use of structure.</p> <p>2.MP.8 Look for and express regularity in repeated reasoning.</p>	
<u>Unit CT Core Content Standards</u>	
<p><u>2.MD.A.1-</u> Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.</p> <p><u>2.MD.A.3-</u> Estimate lengths using units of inches, feet, centimeters, and meters.</p> <p><u>2.MD.A.4-</u> Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.</p> <p><u>2.MD.B.5-</u> Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.</p> <p><u>2.MD.B.6-</u> Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.</p> <p><u>2.MD.D.9-</u> Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.</p> <p><u>2.NBT.A.4-</u> Compare two three-digit numbers based on meanings of the hundreds, tens, and ones</p>	

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digits, using $>$, $=$, and $<$ symbols to record the results of comparisons.

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.

***Note: Although regrouping (composing hundreds from tens and tens from ones) when adding two 3-digit numbers and (decomposing from hundreds to tens and tens to ones) when subtracting two 3-digit numbers is included in this standard, it is appropriate for students to use physical models for these examples and explain their reasoning. Explicit connections to written equations will help students make the transition from concrete and pictorial representations to symbolic notations.**

2.NBT.B.8- Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.

2.NBT.B.9 -Explain why addition and subtraction strategies work, using place value and the properties of operations.1 1.(Explanations may be supported by drawings or objects.)

“Unwrapped” Standards

Skills	Content
Measure	<ul style="list-style-type: none"> ● length ● to determine how much longer one object is than another
Use	appropriate tools
Estimate	lengths
Express	length differences in standard length units
Represent	<ul style="list-style-type: none"> ● unknown with a symbol ● whole number lengths on a number line diagram ● whole number sums and differences on number line diagram
Solve	length word problems (addition and subtraction to 100)
Equally space	points on number line diagrams
Generate	measurement data
Show	measurements by making a line plot
Mark	horizontal scale on line plot in whole number units
Compare	two three-digit numbers using $<$, $>$, $=$
Record	results of comparisons
Add and Subtract	within 1000 using models, drawings, and strategies
Relate	computation strategy to written method
Understand	adding and subtracting hundreds from hundreds, tens from tens, and ones from ones.
Mentally Add or Subtract	10 or 100 to or from a given number 100-900
Explain	why addition and subtraction strategies work using

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	place value and properties. (explanation can be supported with drawings)	
Essential Questions	Corresponding Big Ideas	
<ol style="list-style-type: none"> How do operations affect numbers? What is the purpose of measurement? Why do we estimate? 	<ol style="list-style-type: none"> Operations involve combining and taking apart numbers using a variety of approaches to arrive at a new number result. Measurement is used to describe and understand the world around us with more precision. We use estimation as a problem solving strategy tool. There are many reasons why we estimate. We estimate to approximate a measure, to check the reasonableness of an answer, and detect possible errors. 	
Evidence of Learning - Assessment		
Pre/Post Assessment	Interim Assessment	Additional Evidence of Learning
<ul style="list-style-type: none"> Unit 8 Pre-Assessment - Module 1, Session 2 Unit 8 Post Assessment - Module 3, Session 5 May - Number Corner Checkup 4 June - Comprehensive Growth Assessment 	<ul style="list-style-type: none"> N/A 	<p>Options</p> <ul style="list-style-type: none"> Exit tickets <p>Observational Assessments</p> <ul style="list-style-type: none"> Sum It Up - M 1, S 4 Roll and Subtract One Thousand - M 1, S 6
Smarter Balanced Interim Assessment		
<p>Smarter Balanced General Scoring Rubrics - 4 Rubrics included - Score Pt 4 to Score Pt 1</p> <p style="text-align: center;">Smarter Balanced Interim Blocks</p> <ul style="list-style-type: none"> 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. <p>Interim Assessment Block - access through CSDE Assessment Portal</p> <ul style="list-style-type: none"> 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 		

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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 8 are:

Computational Fluency

- Adding and subtracting 10 and 100 from any 3-digit number using number grids and lines as models to support student thinking
- Quick facts routine to master addition facts to 20

Measurement

- Measure and compare height
- Label rectangles with their dimensions
- Begin to develop intuitions about the connection between the dimensions of a rectangle and its area

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

Module 1	Module 2	Module 3	Module 4
Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-3, 5, 6 Work Place <ul style="list-style-type: none"> ● Sessions 1, 3, 4, 5, 6 Assessment <ul style="list-style-type: none"> ● Session 2 Home Connection <ul style="list-style-type: none"> ● Sessions 1, 3, 5 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-5 Work Place <ul style="list-style-type: none"> ● Sessions 4, 5 Home Connection <ul style="list-style-type: none"> ● Session 1, 3, 5 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-6 Work Place <ul style="list-style-type: none"> ● Sessions 1-4 Assessment <ul style="list-style-type: none"> ● Session 5 Home Connection <ul style="list-style-type: none"> ● Sessions 2, 4 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-3 Work Place <ul style="list-style-type: none"> ● Sessions 1-5 Home Connection <ul style="list-style-type: none"> ● Sessions 1, 3

Possible Misconceptions

1. Students may not measure accurately.
2. Some students may mark Xs on the line plot as different sizes, some small and some large.

Teacher Moves

1. Provide numerous experiences to develop this skill. For example, students can measure five to eight different sizes of sharpened pencils.
2. Talk with students to help them understand that different sizes of Xs on the plot may make it difficult to analyze and interpret.

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<p>3. Watch for students who can read and write three-digit numbers but do not understand that the position of the digit determines its value.</p> <p>4. Students who say, for example, that 78 is greater than 125 because 7 and 8 are greater than 1, 2 or 5.</p> <p>5. Students are often confused or do not completely understand the meaning of the symbols; < and >.</p> <p>6. Students who do not know basic facts may be inaccurate in computation within 1000.</p>	<p>3. These students need more experience with concrete representations and may need to begin with review of the value of places in two-digit numbers. Students should relate numerals to their concrete representations, determining the greater or lesser number-based on explicit work with concrete representations, beginning in the greatest place value and, if necessary, moving to tens and ones.</p> <p>4. These students need more work with comparing physical models emphasizing the value of each place.</p> <p>5. It is important for students to associate the symbols < and > with their real meaning. Rather than use aids such as alligators or Pac Man, it may help students who confuse the symbols to remember that the open end of the symbol is always closest to the greater number and the closed end is always closer to the lesser number.</p> <p>6. Although those students should continue to work on facts, physical models will help in accurate addition and subtraction. Be sure that all students have ample experience with adding physical models on place value charts, using benchmark numbers (hundreds, tens, ones) on an open number line. Make explicit connections from written physical models and strategies to written formats.</p>
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Vocabulary and Representations

Tier 2 (Academic Vocabulary)	Tier 3 (Domain Specific Vocabulary)
attributes choice classify collect compare compose decompose diagram difference* digits* distance	analyze data bar graph* centimeter (cm)* data* equation* foot (ft)* height hundreds* inch (in)* inequality statement + length*

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<p>estimate*</p> <p>experiment</p> <p>experimental setup +</p> <p>hypothesis +</p> <p>information</p> <p>interview</p> <p>legend</p> <p>plan</p> <p>problem</p> <p>question</p> <p>results</p> <p>ruler</p> <p>sample size</p> <p>strategy</p> <p>survey</p> <p>total</p> <p>unknown</p> <p>value</p>	<p>line plot*</p> <p>mass*</p> <p>measuring tape</p> <p>measurement units</p> <p>meter (m)*</p> <p>number line*</p> <p>ones*</p> <p>place value</p> <p>tens*</p> <p>thousands*</p> <p>subtraction</p> <p>sum*</p> <p>variable +</p> <p>yard stick</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 at this grade level, 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. Select additional instructional resources from the resources tab in Bridges units.
3. [Math Practices Teacher Question Starters](#)
4. [Implementing the Standards of Mathematics Practice](#)
5. [Illustrating the Standards of Mathematical Practice](#)
6. Grade 2 - [Standards + Practices - Explanations and Examples](#)
7. [Exploring the Math Practice Standard: Precision](#)
8. [Beginning to Problem Solve with I Notice, I Wonder](#)
9. [Number Talks Matter - Number Talks at a Glance](#) and Fluency without Fear
10. K-5 Math Resources:
 - [Measuring Paths](#)
 - [Measuring with a Meter Stick](#)
 - [Comparing Lengths in Centimeters](#)
 - [Gummy Worm Stretch](#)
 - [Length Word Problems](#)
 - [Measurement Line Plot](#)
 - [Button Bar Graph](#)
11. [Illustrative Math – Grade 2](#) - Resources and activities for the grade aligned by standard.

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- 12.
13. Howard County Math Resources
 - [Structures for Mathematics Class](#)
14. [Journal Prompts for Math](#)
15. [Bridges Interactive Math Manipulatives](#)
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 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.

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- 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 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.

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- 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 ten different objects to measure and then plot the measurements on a line plot. Then the students can interpret and summarize the data.
- Students make up and solve 3-digit addition story problems using a mileage map.
- 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.

Interdisciplinary Connections

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

Ants Rule - The Long and Short of It by Bob Barner

Length (Math Count Series) by Henry Pluckrose

Inch by Inch by Leo Lionni

How Long Is It? by Donna Loughran

Measuring Penny by Loreen Leedy

Is the Blue Whale the Biggest Thing There Is? By Robert E. Wells

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

Science

- Provide opportunities for students to use measurement, if applicable, for observable properties of materials in order to analyze and classify different materials.
- Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

Social Studies

- Read and use mileage maps to calculate distance between important locations.