

Winchester Math Curriculum Grade 5

Subject	Mathematics
Grade/Course	Grade Five
Unit of Study	Unit Three - Place Value and Decimals
Pacing	November / December
Unit Summary	In this unit, students study skills and concepts related to place value, from reading, writing, and comparing decimals to rounding and examining the decimal patterns of multiplying and dividing numbers by 10. Students use their place value understandings to convert within a measurement system, and they use both whole number strategies and place value understanding to add and subtract decimals to hundredths. Division is the focus of Module 4, in which students model, solve, and pose long division problems.
<u>Overarching Mathematical Practices</u>	
<p>5.MP.1 Make sense and persevere in solving problems.</p> <p>5.MP.2 Reason abstractly and quantitatively.</p> <p>5.MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>5.MP.4 Model with mathematics.</p> <p>5.MP.5 Use appropriate tools strategically.</p> <p>5.MP.6 Attend to precision.</p> <p>5.MP.7 Look for and make use of structure.</p> <p>5.MP.8 Look for and express regularity in repeated reasoning.</p>	
<u>Unit CT Core Content Standards</u>	
<p><u>5.NBT.A.1</u> Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.</p> <p><u>5.NBT.A.2</u> Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p> <p><u>5.NBT.A.3.A</u> Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.</p> <p><u>5.NBT.A.3.B</u> Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p><u>5.NBT.A.4</u> Use place value understanding to round decimals to any place.</p>	

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5.NBT.B.6

Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

5.NBT.B.7

Add, subtract, multiply, and divide decimals to hundredths, 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 and explain the reasoning used.

5.NF.A.1

Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

5.MD.A.1

Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

“Unwrapped” Standards

Skills	Content
Recognize	<ul style="list-style-type: none">• a digit in one place represents 10 times as much as it represent in the place to its right and 1/10 of what it represents to its left
Explain	<ul style="list-style-type: none">• patterns in the product when multiplying by powers of 10• patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10
Use	<ul style="list-style-type: none">• whole number exponents to denote powers of 10• place value understanding to round decimals• measurement conversions in solving multi-step real world problems
Read and write	decimals to the thousandths
Compare	two decimals to the thousandths
Record	results of comparisons
Find	whole number quotients up to four digit dividends and two digit divisors using strategies
Illustrate and Explain	division calculations using equations, rectangular arrays, and/or area models
Add, subtract, multiply, divide	decimals to hundredths using concrete models, drawings, or strategies

Relate	A strategy used to a written method and explain the reasoning
Add and subtract	fractions with unlike denominators by replacing with equivalent fractions
Convert	different sized standard measurement units within a given measurement system.

Essential Questions	Corresponding Big Ideas
<ol style="list-style-type: none"> How does understanding the structure of the number system help you solve problems? How does the place value system work? Why do we need to look for and make use of structure? 	<ol style="list-style-type: none"> A rich understanding of numbers, their meanings and their relationship to one another allows you to compare, decompose and compose, find equivalent representations that provide access to strategies for solving problems. A place value system is one in which the position of a digit in a number determines its value. In the standard system, called base ten, each place represents ten times the value of the place to its right. You can think of this as making groups of ten of the smaller unit and combining them to make a new unit. Mathematical representations share common structures and we look for these structures to identify and generalize relationships and patterns that can be used to help reason and solve problems efficiently.

Evidence of Learning - Assessment

Pre/Post Assessment	Interim Assessment	Additional Evidence of Learning
<ul style="list-style-type: none"> Unit 3 Pre-Assessment - Module 1, Session 1 Unit 3 Post-Assessment - Module 4, Session 4 	<ul style="list-style-type: none"> Decimals Equivalencies Work Sample - M2, S3 Decimal Place Value Checkpoint 1 - M2, S4 Decimal Place Value Checkpoint - M3, S1 	<p>Options</p> <ul style="list-style-type: none"> Exit Tickets <p>Observational Assessments</p> <ul style="list-style-type: none"> Beat the Calculator: Fractions - M1, S2 Draw and Compare Decimals - M2, S2 Round and Add Tenths - M2, S3 Target One - M2, S4 Division Showdown - M4, S3

Smarter Balanced Interim Assessment

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[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.

Unit-aligned Smarter Balanced Interim Assessment Block (IAB)*:

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

- IAB - Performance Task - Turtle Habitat

· **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 Corner → **Problem + Investigations** → **Work Places** → **Math Forum*** → **Daily Practice or Home Connection**

Bridges Number Corner - The focus areas of Number Corner Aligned to Unit 3 are:

Triangles

- Examine side lengths and angles
- Classify triangles
- Name ordered pairs of coordinates to identify location of triangles vertices
- Describe how triangles translate, rotate, or reflect.

Measurement

- Build familiarity with meters
- Convert between centimeters, decimeters, meters, and kilometers (connecting to place value)

Computational Fluency

- Interpret numerical expression without evaluating
- Write and evaluate numerical expressions

Fractions

- Solve problems

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- Use logical reasoning as an approach to solving problems
- Subtract unit and non-unit fractions with unlike denominators

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

Module 1	Module 2	Module 3	Module 4
Problem + Investigation <ul style="list-style-type: none"> ● Sessions 3-5 Problem String <ul style="list-style-type: none"> ● Session 1,2 Work Place <ul style="list-style-type: none"> ● Sessions 2,3 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 1-7 Problem String <ul style="list-style-type: none"> ● Session 1,6,7 Work Place <ul style="list-style-type: none"> ● Sessions 2-6 Math Forum <ul style="list-style-type: none"> ● None Daily Practice <ul style="list-style-type: none"> ● Sessions 1-7 Home Connection <ul style="list-style-type: none"> ● Sessions 1,3,5,7 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1-4 Problem String <ul style="list-style-type: none"> ● None Work Place <ul style="list-style-type: none"> ● Sessions 4 Math Forum <ul style="list-style-type: none"> ● Session 2 Daily Practice <ul style="list-style-type: none"> ● Sessions 1-4 Home Connection <ul style="list-style-type: none"> ● Sessions 2, 4 	Problem + Investigation <ul style="list-style-type: none"> ● Sessions 1,2 Problem String <ul style="list-style-type: none"> ● None Work Place <ul style="list-style-type: none"> ● Sessions 3,4 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 2,3,4

Possible Misconceptions

1. Students can get confused with the language describing the relationship between place values for whole numbers and decimals. For example, When moving from ones to tens (one place to the left), the value is ten times greater, not ten greater or ten more. When moving from tenths to hundredths (one place to the right), the value is 1/10 the value and not ten less than.
2. It is of major importance that students understand the relationship between the number of zeros in the power of ten, or the exponent, and the number of zeros in the product beyond just noticing that they are the same. For example, when multiplying 62×100 , students should be able to justify that the product represents 62 groups of 100, which is written 6,200. This understanding is critical as students move to multiplying by decimals.
3. As students begin to work with exponents they must understand that the exponent tells them the number of times the base

Teacher Moves

1. Working with concrete models and pictorial representations and practicing with appropriate language will help students avoid confusion.
2. The use of concrete materials and pictorial representations will help students to make these important connections.
3. Students need a variety of experiences including concrete and pictorial representations connected to skill practice

<p>(in this case 10) is used as a factor. Some students may think of addition ($10^2 = 10 + 10$ instead of 10×10).</p> <ol style="list-style-type: none"> 4. It is imperative that students read decimal numbers correctly to reinforce the meaning of the decimal and its place value. For example, 1.12 should be read as “one and twelve hundredths” and <u>not</u> “one point twelve” 5. When comparing two decimals with different place values, students may have the misconception that $0.345 > 0.57$ because 345 is greater than 57 without considering the value of each place after the decimal point. 6. Students who are taught to round decimals by using a rule rather than place value understanding have difficulty determining places when rounding up or down. This is true with both whole numbers and decimals. For example, when rounding to the nearest tenth, a student might round 15.28 to 15.38. 7. Student misconceptions when working with decimal numbers are usually based on place value. Simply telling students to line up the decimal points when adding and subtracting decimals does not build the important understanding that similar place values are to be added or subtracted and can lead to errors such as the following: 	<p>to build understanding and skill working with exponential notation.</p> <ol style="list-style-type: none"> 4. Teachers should model this and the expectations should be clear. This not only reinforces the value of the decimal number but also explicitly connects decimal numbers to fraction numbers. 5. Modeling these numbers using drawings or base ten blocks will help students to see that 0.57 is greater because there are more tenths. They should have many opportunities to use models and drawing and explain their thinking. Once students demonstrate understanding using concrete materials, they should begin to explore why 0.57 is equivalent to 0.570 using models, place value understanding, and previous experience with equivalent fractions. If both decimal numbers have the same number of places, thousandths for example, students can then compare the number of thousandths in each decimal number to determine which is greater and which is less. 6. Using a number line model, students need to determine the numbers that the given number falls between. In the misconception case it would be between 15.2 to 15.3. Using benchmark numbers such as 15.25, which falls exactly in the middle, will help students determine the closest tenth. By plotting the given point on the number line, students can determine to which tenth it is closer. Scaffold examples for students who are struggling with this concepts. 7. Building on whole numbers experiences using concrete materials and place value charts will help students to relate previous work with composing and decomposing whole numbers to composing and decomposing decimals.
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$\begin{array}{r} 2.5 \\ - 1.75 \\ \hline 0.85 \end{array}$ <p>8. Since the rules for multiplication and division of decimals are much easier to teach than developing place value understanding, we are often tempted to provide students with these rules at some point. Don't do it!</p>	<p>8. Students need time to see the structure of multiplication and division of decimals and how it relates to whole number multiplication and division. Without this foundation, students may move decimal points when it is convenient rather than when it is necessary. Place value understanding also allows students to determine whether answers are reasonable. It is far more meaningful to students when they generalize rules after many experiences and good questions from the teacher.</p>
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Vocabulary and Representations

Tier 2 (Academic Vocabulary)	Tier 3 (Domain Specific Vocabulary)
<p>digit* dimension expression* model* order round/rounding* removal unknown</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>	<p>base ten numeral (standard form) byte centimeter (cm)* decimal* decimeter dividend* divisor* expanded form* exponent exponential notation fractions* gigabyte gram (g)* hundredth* kilobyte kilogram (kg)* kilometer (km)* liter (l)* megabyte meter (m)* metric system* milligram (mg)* milliliter (ml)* millimeter (mm)* number name place value* powers of 10 quotient* sum*</p>

tenth
ten-thousandth
thousandth

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.
 - additional resources will be able to be linked with the purchase of Bridges.
2. [Developing Positive \(Growth Mindset\) Norms in the Classroom](#)
3. [Mistakes are Powerful](#) - Resource to develop students' perseverance through mistakes
4. [Grade 5 Standards + Practices Examples and Explanations](#)
5. [Math Practices Teacher Question Starters](#)
6. [Implementing the Standards of Mathematics Practice](#)
7. [Illustrating the Standards of Mathematical Practice](#)
8. [Math Practice Standards Posters Gr. 4-5](#)
9. [Number Talks Matter - Number Talks at a Glance](#) and Fluency without Fear
10. [Three Act Math Tasks](#)
11. [Standards + Mathematical Practices - Examples and Explanations](#) - Grade 5
12. [Open Middle](#)
13. Bridges - [Interactive Math Manipulatives](#)
14. [National Library of Virtual Manipulatives](#)
15. [Journal Prompts for Math](#)
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. [Bridging Practices - UCONN](#) – Training and a Task Repository to develop and support student capacity for argumentation in mathematics
22. Learn Zillion
 - [Practice Problems](#) - Illustrative Math
 - [Understand the Value of a Digit using a Place Value Chart](#)
 - [Determine the Value of a Digit in the Thousandths Place](#)
 - [Understand the Value of a Digit in a Decimal Number](#)
 - [Explain Patterns in Zeros when Multiplying by a Power of Ten](#)
 - [Round Decimals to the Nearest Tenth](#)
 - [Round Decimals to the Nearest Hundredth](#)
 - [Represent Decimal Value to the Thousandth using Base Ten Blocks](#)
 - [Solve Real World Problems by Adding, Subtracting, or Multiplying Decimals](#)

Suggestions for Differentiation, Scaffolding and Intervention

Differentiation or Intervention

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

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

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- [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.
- 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.
- 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 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

- [Gas Price Dilemma](#) - Students will analyze data regarding regular grade fuel prices from 1992 to the present in order to identify patterns and infer possible reasons for changes in fuel prices. [Activity Sheet](#)
- [Bicycle Dilemma](#) - This activity requires that students have an understanding of the impact ($\times 10/\div 10$) the movement of a decimal left or right has on a quantity. Students explore the standard algorithm for multiplication of decimal numbers as they begin the task by solving various equations that utilize the same digits, which elicits the same digits for a product. The second part of the task involves analysis of a calculation error when adding sales tax. [Task Sheet](#)

Interdisciplinary Connections

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

*Big Numbers by Edward Packard

*Can You Count to a Googol? by Robert E. Wells

*On Beyond a Million by David M. Schwartz

*Ten Times Better by Richard Michelson

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ELA

CCSS.ELA-LITERACY.SL.5.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.5.1.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.5.1.B

Follow agreed-upon rules for discussions and carry out assigned roles.

CCSS.ELA-LITERACY.SL.5.1.C

Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

CCSS.ELA-LITERACY.SL.5.1.D

Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions