Winchester Math Curriculum Grade 5

Subject	Mathematics
Grade/Course	Grade Five
Unit of Study	Unit 7: Division and Decimals
Pacing	April
Unit Summary	Students extend their understanding of base ten number and operations. They investigate division, including multi-digit division with whole numbers and decimals and fraction division. Students will continue to review and extend their thinking about the effects of multiplying and dividing by powers of 10. They also review and extend strategies for solving contextual and non-contextual problem situations.

Overarching Mathematical Practices

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

Unit CT Core Content Standards

5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
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.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
5.NF.B.4a Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.
5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]
5.NF.B.7a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
5.NF.B.7b Interpret division of a whole number by a unit fraction, and compute such quotients.

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5.NF.B.7c **Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.**

[1] Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.

"Unwrapped" Standards	
Skills	**Content**
Find	Whole number quotients
Use	- Place value strategies - Properties of operations - Relationship between multiplication and division - Visual models - Equations
Illustrate and explain	Calculations with equations, rectangular arrays, and/or area models
Add, subtract, multiply, and divide	Decimals to hundredths using concrete models, drawings and strategies.
Relate	Strategy to written method and explain reasoning
Interpret	- A fraction as division of numerator by denominator - The product $(a/b) \times q$ - Division of a unit fraction by a whole number - Division of a whole number by a unit fraction
Solve	- Word problems for division of whole numbers leading to answers as fractions. - Real world problems involving divisions of unit fractions by whole numbers and whole numbers by unit fraction
Apply and Extend	Understanding of multiplication and division to multiply or divide fractions.
Compute	Quotients

Essential Questions	Corresponding Big Ideas
1. How do we become good problem solvers?	1. Problem solvers review the problem, identify a solution pathway, and apply a variety of strategies and methods to solve problem situations and communicate their reasoning.
2. How do we represent mathematical ideas?	2. Representing mathematical ideas involves using a variety of representations such as, concrete models, visual models, diagrams, pictures, equations, numbers, words, graphs, etc…
3. How do operations affect numbers?	3. Operations create relationships between numbers that are acted upon by using

	mathematical procedures to calculate and determine a new value.

Evidence of Learning - Assessment		
Pre/Post Assessment	**Interim Assessment**	**Additional Evidence of Learning**
● Unit 7 Pre-Assessment Module 1, Session 1 ● Unit 7 Post-Assessment Module 4, Session 4	● Division Checkpoint Module 1, Session 6 ● Fraction Division Checkpoint Module 2, Session 4 ● Powers of Ten Checkpoint Module 4, Session 1	Options ● Exit Tickets Observational Assessment ● Roll Five - M1, S3 ● Quotient Race to One Hundred - M2, S4 ● Division Problems, Work Sample - M2, S2

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.
· **Unit-aligned Smarter Balanced Interim Assessment Block (IAB)*:**
Interim Assessment Block - access through CSDE Assessment Portal
● IAB - N/A

· *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 of Number Corner for Unit 7 are:
- Fractions:- Number Corner for April
    - Addition and subtraction of fractions, including mixed numbers
    - Multiplication of fractions
    - Division of a whole number by a unit fraction
    - Division of a unit fraction by a whole number
    - Fraction multiplication modeled using an array
    - Division with unit fractions and whole numbers represented using a bar model
    - Problem situations to add, subtract, multiply, and divide fractions
- Decimals - Number Corner for April
    - Addition and subtraction of decimals
    - Equivalence of decimals and fraction
    - Multiplication and division of decimals to hundredths

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

Module 1	Module 2	Module 3	Module 4
Problem + Investigation ● Sessions 4 Problem String ● Sessions 2,3,5,6 Work Place ● Session 1 - 4 Math Forum ● Session 5 Daily Practice ● Sessions 1-6 Home Connection ● Sessions 2,4,6	Problem + Investigation ● Sessions 1,5,6 Problem String ● Sessions 1,3,4,5 Work Place ● Session 3,4,6 Math Forum ● Session 2 Daily Practice ● Sessions 1-6 Home Connection ● Sessions 2,4,6	Problem + Investigation ● Sessions 2-4 Problem String ● Session 1 Work Place ● Session 1 Math Forum ● None Daily Practice ● Sessions 1-4 Home Connection ● Sessions 2 + 4	Problem + Investigation ● Sessions 1-3 Problem String ● None Work Place ● Session 1 - 4 Math Forum ● None Daily Practice ● Sessions 1-4 Home Connection ● Sessions 2 + 3

Possible Misconceptions	**Teacher Moves**
1. Students who depend on following rote steps and cannot determine whether their answer is reasonable.	1. Emphasize using place value strategies and connections to multiplication will help students develop a deeper understanding of division. All division experience should be developed in the context of asking questions such as "How many groups of 20 can you make from 700?" and then allowing students to estimate and identify the number objects (for example, if I make

	30 groups of 20 that would be 600, and if I make 40 groups that would be 800, and that is too high). Such reasoning will help students to hone in on a good estimate and use partial products to determine the exact quotient.
2. Students misconception with decimals are usually based on their lack of understanding of place value.	2. Build on whole number experiences using concrete materials and place value charts to help student relate previous work with composing and decomposing whole number to composing and decomposing decimals.
3. Lack of understanding of place value in the multiplication and division of decimals.	3. Students need time to see the structure of place value connected to multiplication and division of decimals and how it relates to whole number multiplication and divisions.
4. Students may initially think that you cannot divide a "smaller number by a bigger number" since this is a new situation for them to consider.	4. Provide them with good problems to solve and give them many opportunities to explore with models so that they are developing the conceptual understanding. It is important they understand this concept in a way that makes sense to them rather than be shown how to do it.
5. Students who struggle with interpreting the remainder of division examples.	5. Provide them with more experiences solving problems using concrete models.
6. Dividing a fraction by a whole number is likely to cause students initial confusion around understanding how you can possibly divide a fraction by a whole number.	6. Connect to work with earlier standards in this domain in which students interpreted a fraction suchs as ¾ to also mean 3 divided by 4. It is important to give student many opportunities to solve problems with visual representations to develop understanding that this is the same as the sharing situations they used when dividing whole numbers.
7. Watch for students who are having difficulty identifying what operation to use in solving problems in fractions.	7. Have students model the problem using pictures and ask supporting questions, such as "What do you know?, What do you want to find out?, How can you show that in a picture?".

Vocabulary and Representations	
Tier 2 (Academic Vocabulary)	**Tier 3 (Domain Specific Vocabulary**
dimension dividend*	area model* decimal*

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estimate*	decimal number
equivalent*	decimal point
expression*	divisor*
grouping*	equation*
hundredth*	equivalent*
operation	equivalent ratio
parentheses	exponent
partitive	fraction*
rate*	mile
remainder*	multiplier
sharing	partial products*
	partial quotient*
	powers of 10
*Smarter Balanced Vocabulary is focused on major mathematical concepts. (Not all possible words have been identified by SBAC)	quotient*
	ratio*
	ratio table
+ Students are not responsible for these vocabulary words at this grade level, however they should have some understanding of the mathematical concept.	tenth*
	ten-thousandth*
	thousandth*
	unit fraction*

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. 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. LearnZillion
     - Solve problems involving multiplication of fractions and mixed numbers
     - Divide whole numbers by unit fractions and unit fractions by whole numbers
     - Use an area model for division of 4-digit dividends by 2-digit divisors
     - Use area model to multiply decimals by decimals
     - Practice connecting fractions and division
14. Fraction Progression Videos
     - Addition of Fractions
     - Multiplication of Fractions Part 1 and 2
     - Dividing Fractions
1. Illustrative Math – Grade 5 - Tasks
15. Connecting Decimals and Fractions

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16. [Georgia Unit](#)
17. [Journal Prompts for Math](#)
18. Bridges [Interactive Math Manipulatives](#)
19. [Bridging Practices - UCONN](#) – Training and a Task Repository to develop and support student capacity for argumentation in mathematics
20. [Accountable Talk Moves](#)
21. [Contribution Checklist](#)
22. [Sentence Frames that Can Build Metacognitive Thinking](#)
23. [Sample Language Frames for Mathematics](#)
24. [Building a Mathematical Mindset Community](#)
25. [Teacher/Student Actions](#)
26. [National Library of Virtual Manipulatives](#)
27. [Math Games](#)

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.

- [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.
- Construct human number lines that represent decimal numbers, Initially the number lines must be from 0-1 and divided into tenths, and then into hundredths so that children can understand for example, that 0.45 is between 0.4 (0.40) and 0.5 (0.50).
- Decimal squares are a good model to use for conceptual development and can be downloaded
- Have children show a fraction using a decimal square or a flat from base-ten blocks. Ask questions such as:
  - How many units are represented here? How many are shaded?
  - Is this fraction more or less than ½?....
  - .than ⅔?...than ¾?
  - How can this fraction be represented as a decimal?
- Use a number line as a guide in estimating decimals.
- Have students solve contextual problems and write contextual problems.
- Continue to use concrete materials along with pictorial and abstract representations.
- Provide number lines with fractional markings for students who still need support to visualize the placement of fractions.
- The added complexity of finding a fraction of a quantity that is not a multiple of the denominator may require a return to the use of concrete materials. Provide access to materials that can be folded and cut.
- Students can act out problems that they are struggling to understand.
- Use Work Place Sentence Frames to assist students in math discourse. (Bridges resource)

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

Strategies for EL
- [Colorin Colorado](#) – A Bilingual site for educators and families of English learners
- [Stanford University - Principles for Mathematics Instruction of EL](#)
- [CT State Dept. Of Education English Learner Standards and Resource](#)
- 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.
- 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."
- http://www.cal.org/siop/lesson-plans/
- For EL or students who need to review the relative size of fractional units. folding square paper into various units of halves, thirds, fourths, and eighths can be beneficial. Allow students time to fold, cut, label, and compare the units in relation to the whole and each other.
- Provide support to assist in explaining thinking with sentence starters and work banks.
- Pre-teach vocabulary in ways that connect to students prior knowledge.
- Display posters of graphic representations of vocabulary words.
- Use Work Place Sentence Frames to assist students in math discourse. (Bridges resource)

Extension
- Challenge students to make conversions between fractions of gallons to pints or cups or fractions of a day to minutes or seconds.
- Students can produce screencasts explaining the more complex concepts such as, fraction by fraction multiplication.
- Have children select a special recipe and have the half, double, triple, etc..

Interdisciplinary Connections

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

You Can Count on Monsters by Richard Evan Swartz   *Fraction Action by Loreen Leedy
The Multiplying Menace Divides by Pam Calvert   *17 Kings and 42 Elephants by Margaret Mahy
Fractions, Decimals, and Percents by David Adler
*The Wishing Club: A Story About Fractions by Donna Jo Napoli
*Fractions in Disguise: A Math Adventure by Edward Einhorn
*Anno's Mysterious Multiplying Jar by Anno and Anno
Spaghetti and Meatball for All by Marilyn Burns

Technology

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Students can produce screencasts explaining the more complex concepts such as, fraction by fraction multiplication.

Social Studies
Interested students can investigate the history of decimal notation.

Music
Make explicit connections between fractional notes and the study of fractional numbers.