Winchester Math Curriculum Grade 5

Subject	Mathematics
Grade/Course	Grade Five
Unit of Study	Unit 2: Adding and Subtracting Fractions
Pacing	October
Unit Summary	In this unit, students add and subtract fractions with unlike denominators, using a variety of strategies to find common denominators. In Module 1, money and clocks serve to help students develop intuitions about finding common denominators in order to compare, add, and subtract fractions. In Module 2, students are introduced to the use of double number lines and tables to rewrite fractions with common denominators. In Module 3, they extend these strategies and models to solving a variety of story problems, and make generalizations about finding common denominators. Module 4 gives students more explicit experience with greatest common factors and least common multiples as they find common denominators and learn to simplify fractions.

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.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.NF.A.2
Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

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.A

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* × *q* ÷ *b*.

"Unwrapped" Standards	
Skills	**Content**
Add, subtract, multiply and divide	decimals to hundredths using models and/or strategies
Relate	strategies to written method and explain reasoning
Add and subtract	fractions with unlike denominators, including mixed numbers
Replace	given fractions with equivalent fractions
Solve	- word problems involving addition and subtraction of fractions referring to same whole, including cases of unlike denominators - word problems involving division of whole numbers leading to answers in the form of fractions
Use	- visual fraction models or equations to represent problems - benchmark fractions to estimate mentally and assess the reasonableness of answers
Interpret	- a fraction as division of the numerator by the denominator. - the product (a/b)xq as a parts of partition of q into b equal parts
Essential Questions	**Corresponding Big Ideas**
1. Why express quantities in different ways?	1. The ability to express quantities in different ways allows for the precision necessary in the context of the situation. For example, fractions or decimals quantities express with greater precision with measurements.
2. How do we construct an argument in mathematics?	2. Math arguments are constructed by analyzing a problem situation and/or results, making a claim or conjecture, and supporting the claims/conjectures with facts, definitions, previously established results, and evidence in objects, drawings, and actions.
3. How are operations with fractions similar to and different from operations with whole numbers?	3. Operations with fractions have the same meaning as operations with whole numbers, but the process is different

	because you must understand and use numerators and denominators accurately when computing with fractions. (Students can provide more in-depth understanding of each operation in their response)

Evidence of Learning - Assessment

Pre/Post Assessment	Interim Assessment	Additional Evidence of Learning
- Unit 2 Pre-Assessment and Student Reflection Sheet - Module 1, Session 2 - Unit 2 Post-Assessment and Student Reflection Sheet - Module 2, Session 6 - Number Corner Checkup 1	- Fraction Addition and Subtraction Checkpoint - M2, S6 - Working with Fractions Checkpoint - M3, S3	Options - Exit tickets Observational Assessments - Clock Fractions M1, S4 - Fraction Work Sample - M1, S5 - Racing Fractions - M2, S2 - Target Fractions - M2, S5

Smarter Balanced Interim Assessment

Smarter Balanced General Scoring Rubrics - 4 Rubrics included - Score Pt 4 to Score Pt 1

·   **Smarter Balanced Interim Blocks**

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

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

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

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

Interim Assessment Block - access through CSDE Assessment Portal

●   IAB - Fractions

·   *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.*

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 2 are:
Measurement and Data
- Three Dimensional Structures and Volume
- Numeric Patterns
- Data Collection
- Measuring Mass and Tracking Changes on a Double Line Graph
Computation
- Writing and Evaluating Expressions that include Parentheses
- Adding and Subtracting Decimals
Problem Solving
- Finding and Extending Patterns
- Making Organized Lists
- Problem Solving Strategies
- Add units and Non-Unit Fractions with Unlike Denominators using Money and Clock Models
Bridges - Whole Group, Small Group and Independent Problem Centered Activities

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

Possible Misconceptions	Teacher Moves
1. A common error when adding and subtracting fractions with unlike denominators is to add or subtract the numerators and denominators.	1. Use benchmark fractions to reason about the value of fractions will help students realize that if they add or subtract denominators their answer will not be reasonable. Using appropriate models including area models, fraction bars, and the number line will help students to develop efficient strategies for adding and subtracting fractions and mixed numbers.
2. Watch for students who have a surface understanding of the necessity for finding	2. Consistent practice in the form of number talks or using formative assessment tasks

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common denominators when adding and subtracting fractions and mixed numbers.

coupled with student explaining their thinking and considering the reasonableness of their solutions helps students to see the importance of thinking about the value of the numbers rather than using random calculations.

3. Two areas that should be explicit in providing meaningful situations to assist in developing a deeper understanding necessary for accurate computation with fractions.

3. These areas include considering the size of the pieces (that is, how many pieces make one whole or the denominator) and that the fractions must refer to the same size whole. Students must always consider that adding ½ of a small candy bar with ½ of a large candy bar will not produce one whole candy bar.

4. These students need more experience with the problem situations for addition and subtraction. (Addition and Subtraction Problem Situation Types)

4. Students who struggle to determine the appropriate operation to solve a problem.

   a. The students need to act it out, draw a picture, write an equation, or make a model to determine how to best approach a problem.

   b. Give students opportunities to explain their thinking as they read the problem and use models to determine the correct operation.

   c. Make connections to earlier experiences with whole numbers that will help students to think of addition and subtraction in a particular situation.

   d. Once students determine the correct operation, they can use fractions and mixed numbers to solve the problem.

5. Students may initially think that you cannot divide a numerator by a denominator because they think you cannot divide a "smaller number by a bigger number" since this will be a new situation for them to consider.

5. Provide them good opportunities to explore with models so that they are developing conceptual understanding. It is important that they understand this concept in a way that makes sense to them rather than be shown how to do it. The role of the teacher is to provide sensible problem situations, ask supporting questions, and facilitate conversations in which the students are making sense of the situation and why their answers make sense.

6. Students who struggle interpreting the remainder of division examples.	6. These students need more experiences solving problems using concrete models so they understand how a remainder tells what part of a group is left over. Ask questions such as, "How many are left?" and "How many would it take to make another full group?" and modeling what part of a full group is left over will help them understand the meaning of the remainder when it is expressed as a fraction.
7. Students may see the pattern and see that to multiply fractions you "simply" multiply the numerators and multiply the denominators.	7. This is the correct algorithm or procedure. HOWEVER, only references to real-life situations and using models and visual representations will help students develop a conceptual understanding of what is actually happening when they multiply fractions.

Vocabulary and Representations

Tier 2 (Academic Vocabulary)	Tier 3 (Domain Specific Vocabulary
benchmark factor* model* multiple* product* simplify - (change terminology to finding an equivalent fraction that matches the situation) table* *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 at this grade level, however they should have some understanding of the mathematical concept.	common denominator decimal* decimal fraction decimal notation denominator* double number line equivalent fraction* fraction* greatest common factor hundredth* improper fraction least common denominator least common multiple like denominator mixed number* numerator* ratio table - (A table of equivalent ratios) tenth 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. [Benchmark Fraction Information](#)
11. [Models to Show Fraction Equivalence](#)
12. [Accountable Talk Moves](#)
13. [Contribution Checklist](#)
14. [Sentence Frames that Can Build Metacognitive Thinking](#)
15. [Sample Language Frames for Mathematics](#)
16. [Building a Mathematical Mindset Community](#)
17. [Three Act Math Tasks](#)
18. [Standards + Mathematical Practices - Examples and Explanations](#) - Grade 5
19. [Open Middle](#)
20. [Journal Prompts for Math](#)
21. [Fraction Progression Videos](#)
    - Addition of Fractions
    - Multiplication of Fractions Part 1 and 2
    - Dividing Fractions
22. [Bridging Practices - UCONN](#) – Training and a Task Repository to develop and support student capacity for argumentation in mathematics
23. Bridges - [Interactive Math Manipulatives](#)
24. [National Library of Virtual Manipulatives](#)
25. [Illustrative Math – Grade 5 -](#) Resources and activities for the grade aligned by standard.
    - [Egyptian Fractions](#)
    - [Mixed Numbers with Unlike Denominators](#)
    - [Finding Common Denominators to Add](#)
    - [Jog-a-thon](#)
    - [Finding Common Denominators to Subtract](#)
    - [Making S'mores](#)
    - [Do These Add Up](#)
    - [Sharing Lunches](#)
    - [What is 23 ÷ 5?](#)
    - [How Much Pie?](#)
26. LearnZillion
    - [Add and Subtract Fractions with Unlike Denominators using Number Lines](#)
    - [Add Fractions with Unlike Denominators by Creating Area Model](#)s
    - [Subtract Fractions with Unlike Denominators using Area Models](#)
    - [Understand Fractions as Division](#)

Suggestions for Differentiation, Scaffolding and Intervention

Differentiation or Intervention

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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)
- 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.
- 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.
- 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.
- 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
- Fraction Menu Project Task - Rubric -Student Self-Evaluation Rubric
- Ways to Extend the Learning with a Fraction Unit
- Have students author word problems using various operations with fractions.
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Interdisciplinary Connections

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

Sir Cumference and the Fraction Faire by Cindy Neuschwander
The Wishing Club: A Story About Fractions by Donna Jo Napoli
The Hershey's Milk Chocolate Fractions Book by Jerry Pallotta
Fraction Fun by David A. Adler
Fraction Action by Loreen Leedy
Fractions in Disguise : A Math Adventure by Edward Einhorn

Music
Relate fractions to musical notes

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.

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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