MATHEMATICS COMMON CORE CURRICULUM UNIT #3, Grade 4*
North Smithfield School Department

TITLE OF UNIT: **Properties of operations with multi-digit arithmetic and addition/subtraction with fractions** **GRADE 4**

DATE PRESENTED: **DATE DUE:** **LENGTH OF TIME:** Several weeks, quarter, semester

OVERVIEW OF UNIT:

Students will create and analyze patterns and rules and solve measurement problems requiring conversion. Students will extend their knowledge of fractions to include addition and subtraction of fractions. Students will perform multi-digit arithmetic and apply those skills to problem solving.

ESSENTIAL QUESTION

How are patterns and rules related?
What models and strategies can you use to order and compare fractions?
How can we add and subtract fractions with like denominators?
Why does "What we measure" influence "How we measure"?
What does a remainder represent? How are addition, subtraction, multiplication, and division related?

STANDARDS: Common Core Math Standards – Grade level domains K-5

Counting and Cardinality CC	Operations and Algebraic Thinking OA	Number and Operations in Base Ten NBT	Number and Operations – Fractions NF	Measurement and Data MD	Geometry G
☐	☐ 4.OA.5	☐ 4.NBT.4	☐ 4.NF.2	☐ 4.MD.1	☐
☐	☐ 4.OA.3	☐	☐ 4.NF.3	☐	☐

STANDARDS: Mathematical Practices grades K-12

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

FOCUS MATHEMATICS STANDARDS:

- ☐ Generate and analyze patterns. 4.OA.5
- ☐ Extend understanding of fraction equivalence and ordering. 4.NF.2
- ☐ Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers 4.NF.3
- ☐ Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. 4.MD.1
- ☐ Use the four operations with whole numbers to solve problems. 4.OA.3
- ☐ Use place value understanding and properties of operations to perform multi-digit arithmetic. 4.NBT.4

Applied Learning Standards:

problem solving communication critical thinking research reflection/ evaluation

Expectations for Student Learning (High School only):

ENDURING UNDERSTANDING:

Students will understand fraction equivalents, ordering fractions with a denominator of 2, 3, 4, 5, 6, 8, 10, 12, and 100, and adding and subtracting fractions. Students will apply their knowledge of the place value system to perform the four operations with whole numbers in order to solve problems.

PRIOR KNOWLEDGE:

Students solved two-step word problems using the four operations, identified arithmetic patterns (including patterns in addition and multiplication table), added and subtracted fluently within 1000, and mastered multiplication and division facts through 12. Students also measured time and time intervals in minutes, as well as liquid volume and masses in grams, kilograms, and liters and developed conceptual knowledge of what a fraction is, how to represent fractions on a number line, and how to compare some fractions.

*Referenced templates from *Common Core Curriculum Maps, English Language Arts* and *The Understanding By Design Guide to Creating High Quality Units*

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STUDENT OBJECTIVES, SKILLS and/or NEW KNOWLEDGE:

- A pattern is a sequence that repeats the same process over and over based on a rule.
- Given a pattern you can generate a rule; given a rule you can generate a pattern.
- Visual fraction models can illustrate a principle for generating equivalent fractions. Attention must be paid to how the number and size of the parts differ even though the fractions are the same size.
- Fractions can be compared by using benchmark fractions, and by creating common denominators or common numerators.
- Comparisons are only valid when the two fractions refer to the same whole.
- Adding and subtracting fractions is the process of joining or separating parts that refer to the same whole.
- Fractions, with the exception of unit fractions, can be decomposed into the sum of fractions with the same denominator in more than one way.
- A mixed number is a whole number plus a fraction smaller than one.
- Fractions with like denominators can be added and subtracted by using properties of operations and the relationship between addition and subtraction.
- There are two distinct systems of measurement with unique units of measure for each one, Metric and Customary (sometimes referred to as U.S. Customary).
- Units of measure can be expressed as whole numbers, decimals and fractions, (e.g., one inch equals 1/12th of a foot, 1 gram is .01 kilogram).
- Measurements can be converted into different sized standard unit measurements within a given measurement system (i.e. cm to m)
- To determine what the remainder represents you must understand the context of the problem.
- There is a relationship between the four operations.
- Efficient procedures and strategies to find products, quotients, sums, and differences, involve the use of properties of operations (commutative, associative, distributive and identity properties), place value understanding, and/or flexibility with numbers.

SUGGESTED PROBLEMS:

4.OA.5
- http://www.illustrativemathematics.org/illustrations/487

Hands-On Activity:
- http://www.k-5mathteachingresources.com/support-files/square-numbers.pdf

4.NF.2 Basic
- http://www.k-5mathteachingresources.com/support-files/birthday-fractions-4nf2.pdf (Activity Cards: see additional cards on same website)

4.NF.2 Advanced
- http://www.illustrativemathematics.org/illustrations/811

4.NF.3 Basic
- http://www.illustrativemathematics.org/illustrations/837
- http://www.k-5mathteachingresources.com/support-files/sense-or-nonsense.pdf
- http://www.k-5mathteachingresources.com/support-files/decomposingfractions4nf3b.pdf
- http://www.k-5mathteachingresources.com/support-files/mixed-numbers-word-problems-same-denominator.pdf

4.MD.1 Basic
- http://www.k-5mathteachingresources.com/support-files/conversionwordproblems.pdf
- http://www.k-5mathteachingresources.com/support-files/measurementconcentration4thgd.pdf (game)

4.OA.3 Basic
- http://www.illustrativemathematics.org/illustrations/1289
- http://www.k-5mathteachingresources.com/support-files/4oa3multistepwordproblems.pdf

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- http://www.k-5mathteachingresources.com/support-files/aremainderofone.pdf (test resource)

4.OA.3 Advanced

- http://www.illustrativemathematics.org/illustrations/1289
- http://www.illustrativemathematics.org/illustrations/1289

4.NBT.4 Basic

- http://www.illustrativemathematics.org/illustrations/1189

4.NBT.4 Advanced

- http://www.illustrativemathematics.org/illustrations/1189

ACTIVITIES, PRODUCTS, PERFORMANCE, and ASSESSMENTS: see curriculum introduction

1. Application to real world problems
2. Creating charts/collecting data
3. Collaboration - interpersonal
4. Conferencing
5. Exhibits
6. Graphic organizers
7. Graphing
8. Interviews
9. Journals
10. KWL charts
11. Mathematical Practices
12. Modeling ★
13. Oral presentations
14. Problem/Performance based/common tasks
15. Real-life applications involving graphing
16. Represent numbers
17. Rubrics/checklists (mathematical practice, modeling)
18. Technology
19. Summarizing and note-taking
20. Tests and quizzes
21. Writing genres
    Arguments/ opinion
    Informative

HIGHER ORDER THINKING SKILLS: Web's Depth of Knowledge 2 – 4 or Bloom's Taxonomy

Web's Depth of Knowledge

- skill/conceptual understanding
- strategic reasoning
- extended reasoning

Bloom's Taxonomy

- apply
- analyze
- synthesize/create
- evaluate

ADDITIONAL RESOURCES: see curriculum for specifics

enVisionMath, lessons:

- 4.OA.5
  - 3-2, 6-2, 6-3, 9-7
- 4.NF.2
  - 10-5A, 10-7, 10-8, 10-9
- 4.NF.3
  - 11-1A, 11-1, 11-4
- 4.NF.3a
  - 11-1
- 4.NF.3b
  - 11-1A
- 4.NF.3d
  - 11-1
- 4.MD.1
  - 16-1, 16-3, 16-4, 16-6, 16-7, 16-8, 16-9
- 4.OA.3
  - 2-1, 2-2, 5-2, 5-4, 6-1, 6-4, 7-2, 7-3A, 7-7, 8-2, 8-3A, 8-3, 8-10, 16-12, 18-1, 18-2, 18-3, 18-5
- 4.NBT.4
  - 2-4, 2-5, 2-6, 2-7

VOCABULARY

- Additive comparison
- Algorithm
- Array
- Base ten
- Benchmark fraction
- Centimeter
- Commutative property of multiplication
- Conversation table
- Convert
- Decimal points
- Degree
- Denominator
- Distributive property
- Dividend
- Divisor
- Equation
- Equivalent fraction
- Estimate
- Factors
- Foot/feet
- Fraction number line
- Fractional part
- Gram
- Hour
- Inch
- Inverse operation
- Kilogram
- Length
- Liter
- Milliliter
- Minute
- Mixed Numbers
- Multiplicative comparison
- Numerator
- Operation
- Ounce
- Partition
- Patterns
- Pound
- Products
- Quotient
- Remainder
- Rounding
- Second
- Unit fraction
- Variable
- Width

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LESSON PLAN for UNIT _____

LESSONS

- **Lesson # 1 Summary:**
- **Lesson #2 Summary:**
- **Lesson #3 Summary:**

OBJECTIVES for LESSON # _____

- **Materials/Resources:**
- **Procedures:**
  - **Lead –in**
  - **Step by step**
  - **Closure**
- **Instructional strategies:** see curriculum introduction
- **Assessments:** see curriculum introduction
  - **Formative**
  - **Summative**

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