07_Multiplication of a Fraction by a Whole Number; Measurement (con't)

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **5 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In Grade 4, instructional time should focus on three critical areas:

1. Developing understanding and fluency with multi-digit multiplication, and developing an understanding of dividing to find quotients involving multi-digit dividends;
2. Developing an understanding of fraction equivalence, addition, and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers;
3. Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Essential Questions:

- How can we visually represent and verify fractional computation?
- How can measurements be used to solve geometric problems?

Enduring Understandings:

Students will understand that:

- Multiplying a fraction by a whole number is conceptually the same as multiplying two whole numbers.
- Fractions are rewritten in various forms (equivalent fractions and expression) to execute operations.

STUDENT LEARNING TARGETS

Refer to the 'Procedural and Declarative Knowledge' sections.

Procedural Knowledge

Students will be able to:

- Convert between units of capacity when given the relationships between the units.
- Multiply a unit fraction by a whole number.
- Write fractions as multiples of unit fractions.
- Use drawings and multiplication equations to solve a distance problem.
- Multiply a mixed number by a whole number.
- Use the partial-quotients algorithm to divide 3-digit numbers by 1-digit numbers.
- Solve division number stories involving whole numbers of measured quantities.
- Continue and describe number patterns.
- Find the number of minutes in fractional parts of an hour.
- Find the total number of pounds using fraction addition or multiplication and convert between pounds and ounces.
- Convert monetary amounts to fractions with denominators 10 and 100.
- Complete a line plot based on given data and answer a question about the data.

Declarative Knowledge

Students will understand that:

- Non-unit fractions are multiples of unit fractions and can be written in the form a*(1/b).
- When multiplying a whole number and a non-unit fraction, rewrite the non-unit fraction as a multiple of a unit fraction and multiply the whole numbers.
- Fraction multiplication processes can be extended to multiply any fractions, including those greater than one.
- A fraction with a larger numerator than denominator can be written as a mixed number.
- Figurate numbers, such as square numbers, can be represented by a regular geometrical arrangement of equally spaced points.
- Rectangular numbers are the product of two consecutive numbers and can be represented by a rectangular array.

CONTENT AREA STANDARDS

4.OA

A. Use the four operations with whole numbers to solve problems

B. Gain familiarity with factors and multiples

C. Generate and analyze patterns

4.NBT

A. Generalize place value understanding for multi-digit whole numbers

B. Use place value understanding and properties of operations to perform multi-digit arithmetic

4.NF

A. Extend understanding of fractions equivalence and ordering

B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers

C. Understand decimal notation for fractions and compare decimal fractions

MA.4.OA.C.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
MA.4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
MA.4.NBT.B.6	Find whole-number quotients and remainders with up to four-digit dividends and one-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.
MA.4.NF.B.3	Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.
MA.4.NF.B.4a	Understand a fraction a/b as a multiple of $1/b$.
MA.4.NF.B.4b	Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number.
MA.4.NF.B.4c	Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.
MA.4.MD.A.1	Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.
MA.4.MD.B.4	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.

INTERDISCIPLINARY CONNECTIONS

Nutrition:

- Students will double or halve cookie/snack recipes and then discuss how multiplication scales ingredients up & down

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.SL.4.1.A	Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
LA.SL.4.1.B	Follow agreed-upon rules for discussions and carry out assigned roles.
LA.SL.4.1.C	Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
LA.SL.4.1.D	Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
CS.3-5.8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.
TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
TECH.9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
TECH.9.4.2.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
TECH.9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

EVIDENCE OF LEARNING

Refer to the 'Formative, Summative, and Benchmark Assessments' sections.

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Summative Assessments

- Unit 7 Progress Checks (1 & 2)

Formative Assessments

- Journal Pages
- Homelinks
- Math Boxes

Benchmark Assessments

- IXL Screener / Diagnostic Snapshot BOY
- Trimester 1 Benchmark Assessment
- IXL Diagnostic Snapshot MOY
- Trimester 2 Benchmark Assessment
- IXL Diagnostic Snapshot EOY
- Trimester 3 Benchmark Assessment

RESOURCES (Instructional, Supplemental, Intervention Materials)

Core Instructional Materials:

- Everyday Math Unit 7 Resources
    - Math Masters
    - Student Journal Volume 2
    - ConnectED

Supplemental Materials:

- IXL
- Illustrative Math Tasks
- Games
    - Fishing for Fractions, Subtraction (Lesson 7-2): Subtracting fractions
    - Multiplication Wrestling (Lesson 7-3): Multiplying 2-digit by 2-digit numbers
    - Angle Tangle (Lesson 7-4): Estimating and measuring angles and then finding the difference between estimates and measurements
    - Divide and Conquer (Lesson 7-5): Practicing extended division facts
    - Fraction Multiplication Top-It (Lessons 7-7, 7-13): Multiplying a whole number by a fraction
    - Fishing for Fractions, Addition (Lesson 7-8): Adding fractions
    - Decimal Top-It (Lesson 7-11): Making and identifying the largest possible decimal number
    - Angle Add-Up (Lesson 7-12): Adding angle measures

- Manipulatives
    - 25 centimeter cubes per student
    - One 10-sided die labeled 0-9
    - Fraction circles
    - Geometry Template
    - Half-circle protractor
    - Measuring cups
    - Measuring tools: cup, pint, quart, and gallon containers
    - Meterstick
    - Number cards 1-8, 1-9, 0-9 (4 of each)
    - Number line
    - Ruler
    - Scale
    - 10 pre-cut straws
    - Yardstick

Intervention Materials:

- Number Worlds
- Touch Math Now

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.