GRADE 5 UNIT 4 – FRACTION MULTIPLICATION BY A WHOLE NUMBER AND SCALING

Established Goals:	
Standards **5.NF.4a** Interpret the product (*a/b*) x *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a x q ÷ b*. *For example, use a visual fraction model to show (2/3) x 4 = 8/3 and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general (a/b) x (c/d) = ac/bd.)* **5.NF.4b** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as it would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **5.NF.5a** Interpret multiplication as scaling (resizing) by comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **5.NF.5b** Interpret multiplication as scaling (resizing) by explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers as a familiar case); explaining why multiplying a given number less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b = (n x a)/(n x b)* to the effect of multiplying *a/b* by 1. **5.NF.6** Solve real world problems involving multiplication of fractions and mixed numbers, e.g. by using visual fraction models or equations to represent the problem.	**Transfer** *Students will be able to:* • Multiply fractions by whole numbers and draw visual models or create story contexts. Interpret the product (*a/b*) x *q* as *a* parts of a whole partitioned into *b* equal parts added *q* times. In general, if *q* is a fraction *c/d*, then (*a/b*) *x* (*c/d*) = a(*1/b*) × c(*1/d*) = *ac* × (*1/b*)(*1/d*) = *ac*(*1/bd*) = *ac/bd*. • Find the area of a rectangle with fractional side lengths by tiling unit squares and multiplying side lengths. • Explain how a product is related to the magnitude of the factors. • Solve real world problems involving multiplication of fractions (including mixed numbers), using visual fraction models or equations to represent the problem. • Divide a unit fraction by a non-zero whole number and interpret by creating a story context or visual fraction model. • Divide a whole number by a unit fraction and interpret by creating a story context or visual fraction model. • Solve real world problems involving division of unit fractions by whole numbers or whole numbers by unit fractions. **Meaning** | ENDURING UNDERSTANDING	ESSENTIAL QUESTIONS
• The product of a whole number and a fraction can be interpreted I different ways. On interpretation is repeated addition. Multiplying a whole number by a fraction involves division as well as multiplication. The product is a fractions of the whole number. • The relative size of the factors can be used to determine the relative size of the product. • Rounding and compatible numbers can be used to estimate the product of fractions or mixed numbers. • A unit square can be used to show the area meaning of fraction multiplication. When you multiply two fractions that are both less than 1, the product is smaller than either fraction. To multiply fractions, write the product of the numerators over the product of the denominators. • One way to find the product of mixed numbers is to change the calculation to an equivalent one involving improper fractions. • Some problems can be solved by first finding and solving a sub-problem(s) and then using that answer(s) to solve the original problem. • A fraction describes the division of a whole into equal parts, and it can be interpreted in more than one way depending on the whole to be divided. • One way to find the quotient of a whole number divided by a fraction is to multiply the whole number by the reciprocal of the fraction.	• How can you multiply fractions and whole numbers? • How does multiplying by a fraction change the second factor? • How can you use compatible numbers to estimate with fractions? • How can you multiply fractions? • How can you find the area of a rectangle? • How can you multiply mixed numbers? • How can you solve multiple step problems? • How are fractions related to division? • How do you divide a whole number by a fraction? • How can you divide a fraction by a whole number?	

5.NF.7a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3. **5.NF.7b** Interpret division of a whole number by a unit fraction, and compute such quotients. **5.NF.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.	• The inverse relationship between multiplication and division can be used to divide with fractions. • Information in a problem can often be shown with a diagram and used to solve the problem. • Some problems can be solved by writing and completing a number sentence or equation.	

Acquisition	
KNOWLEDGE	SKILLS
Students will know how to…	*Students will be skilled at…*
• Find a fraction of a whole number. • Use multiplication to scale or resize something. • Use compatible numbers to estimate the product of a fraction and a whole number. • Find a fraction of a fraction. • Find the areas of rectangles with fractional side lengths by drawing them on grid paper and multiplying the fractions. • Solve problems with hidden questions. • Divide circles to find how fractions are related to division. • Divide a whole number by a fraction. • Divide a unit fraction by a whole number.	• Multiplying a fraction by a whole number. • Comparing the size of the product to the size of one factor without multiplying. • Using compatible numbers and rounding to estimate with fractions. • Giving the product of two fractions. • Finding the area of rectangles. • Multiplying mixed numbers. • Solving multiple-step word problems with fractions. • Dividing fractions. • Divide whole numbers by fractions. • Using the inverse relationship to divide fractions by whole numbers. • Dividing fractions by whole numbers. • Use diagrams and write equations to solve problems.

Vocabulary	Instruction and Pacing	
resizing scaling area numerator denominator reciprocal inverse	**Multiplying Fractions and Whole Numbers**	**1 week**
	Multiplication as Scaling	**1 week**
	Estimating Products	**1 week**
	Area Models	**1 week**
	Multiplying Mixed Numbers	**1 week**
	Dividing Fractions	**2 weeks**
Resources		
Common Core Standards, New Jersey Model Curriculum Envisions Math Program Suggested Topics • Topic 11 Multiplying and Dividing Fractions and Mixed Numbers		

Differentiation and Accommodations
Provide graphic organizers Provide manipulatives Provide additional examples and opportunities for additional problems for repetition Provide tutoring opportunities Provide retesting opportunities after remediation (up to teacher and district discretion) Teach for mastery not test Teaching concepts in different modalities Adjust pace and homework assignments
ELL Modifications   •

21st Century Skills	Critical Thinking, Creative Thinking, Collaborating, Communicating, and Technology Literacy

Instructional Strategies	Fairfield Township School recognizes the importance of the varying methodologies that may be successfully employed by teachers within the classroom and, as a result, identifies a wide variety of possible instructional strategies that may be used effectively to support student achievement. These may include, but not be limited to, strategies that fall into categories identified by the Framework for Teaching by Charlotte Danielson:
	    • Communicating with students
	    • Using questioning and discussion techniques
	    • Engaging students in learning
	    • Using assessment in instruction
	    • Demonstrating Flexibility and Responsiveness

Interdisciplinary Connections	Science, Technology, ELA

Common Misconceptions	Proper Conceptions
Students may believe that multiplication always results in a larger number.	Using models when multiplying with fractions will enable students to see that the results will be smaller.
Students may believe that division always results in a smaller number.	Using models when dividing with fractions will enable students to see that the results will be larger.

Performance Task

Andy has 3 cats that love to use a cat door to go in and out of the house. Yesterday, the cat door was used 100 times. Mittens used the door ¼ of the time. Puffball used the door 3/10 of the time.

1) How many times did Mittens use the cat door? Show your work
2) How many times did Puffball use the cat door? Show your work
3) How many times did Andy's 3rd cat, Mooshi, use the door? Show your work and explain how you found that out.

Rubric

1 point for each correct bullet

ASSESSMENTS

Suggested Formative Assessment

Problem of the Day

Lesson Quizzes

Exit Ticket

Anecdotal Records (Topic Observation Checklist)

Suggested Summative Assessment

Grade level developed Unit/Envisions Topic Tests

Ed-Connect Express Tests /State Unit Benchmark Assessment/Performance Task