Grade 4 - Unit B - Multiplicative Thinking

Unit Focus

This unit focuses on developing concepts related to multiplication and division through models (open number line, tile arrays, area model and the ratio table), strategies for multiplication facts and multiplicative comparisons. Students continue to transition from additive to multiplicative thinking, a process begun in third grade, by studying multiplicative comparisons presented in story problems involving both multiplication and division. The first lessons set the tone for the year with community building and introduce expectations for problem strings and math forums. This unit also establishes expectations for working cooperatively on learning tasks.

Stage 1: Desired Results - Key Understandings

Standard(s)

Standards

- Common Core
  - *Mathematics: 4*
    - Use the four operations with whole numbers to solve problems.
    - Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. *(CCSS.MATH.CONTENT.4.OA.A.1)*
    - Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.1 *(CCSS.MATH.CONTENT.4.OA.A.2)*
    - Gain familiarity with factors and multiples.
    - Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite. *(CCSS.MATH.CONTENT.4.OA.B.4)*
    - Generate and analyze patterns.
    - 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. For example, given the rule Add 3 and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. *(CCSS.MATH.CONTENT.4.OA.C.5)*
    - Use place value understanding and properties of operations to perform multi-digit arithmetic.

Transfer

Students will be able to independently use their learning to...

T1 Apply models to solve problems.
T2 Demonstrate fluency with mathematical computations and definitions.
T3 Identify and generalize patterns and structure in numbers, expressions, data and objects.

Meaning

Understanding(s)

Students will understand that...

U1 Mathematicians calculate efficiently and accurately while using appropriate symbols and labels.
U2 Mathematicians create or use models to generalize, represent, and solve problems.
U3 Mathematicians see patterns to make generalizations about structures and relationships.
U4 Mathematicians communicate precisely and clearly using mathematical definitions.

Essential Question(s)

Students will keep considering...

Q1 What model best represents this problem?
Q2 What generalizations can be made from this pattern?
Q3 How can I decompose a number to make it easier to work with?
Q4 How do operations relate to one another?

Acquisition of Knowledge and Skill

Knowledge

Students will know...

K1 there are a variety of strategies for multiplying fluently

Skill(s)

Students will be skilled at...

S1 finding factors and multiples of number to 100

Stage 1: Desired Results - Key Understandings

▪ 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. *(CCSS.MATH.CONTENT.4.NBT.B.5)* ▪ 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. *(CCSS.MATH.CONTENT.4.NBT.B.6)* ▪ Mathematical Practices ▪ Model with mathematics. *(CCSS.MATH.MP.4)* ▪ Attend to precision. *(CCSS.MATH.MP.6)* ▪ Look for and make use of structure. *(CCSS.MATH.MP.7)* **Madison Public Schools Profile of a Graduate** o Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. *(POG.3.1)* o Product Creation: Effectively use a medium to communicate important information. *(POG.3.2)*	**K2** multiplication and division are inverse relationships **K3** Interpreting multiplication equations as statements of multiplicative comparison **K4** Vocabulary: product, factor, dividend, divisor, quotient, multiple, prime, composite, multiplicative comparison **K5** how to identify features of a pattern	**S2** determining if a number is prime or composite **S3** using a number line, ratio table and area model to solve a multiplication or division problem **S4** translating comparative situations for multiplication and division into equations with unknown product, group size unknown, or number of groups unknown **S5** solving multiplication and division problems with single digit factors and divisors within 100 **S6** create a number or shape pattern that follows a given rule