Grade 5 - Unit B - Strategies for Multiplying and Dividing

Unit Focus

In this unit, students continue their study of multiplication and division strategies. The teacher formally introduces the standard multiplication algorithm after reviewing the area model and partial products. Students investigate a number of strategies that capitalize on their estimation and mental math skills that help them to continue to develop strong number sense. These include strategies that leverage the relationships between multiplication and division such as the fact that 5 is half of 10 and the process of doubling and halving. The connection is made between multiplication and division using the area model and ratio tables to help students develop a degree of comfort with division problems. Students are introduced to the partial quotients strategy for division problems. Throughout the unit, students continue to solve volume problems using their new multiplication and division strategies.

Stage 1: Desired Results - Key Understandings

Standard(s)

Standards

- Common Core
  - *Mathematics: 5*
    - Understand the place value system.
    - Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. *(CCSS.MATH.CONTENT.5.NBT.A.2)*
    - Perform operations with multi-digit whole numbers and with decimals to hundredths.
    - Fluently multiply multi-digit whole numbers using the standard algorithm. *(CCSS.MATH.CONTENT.5.NBT.B.5)*
    - Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.5.NBT.B.6)*
    - 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. *(CCSS.MATH.CONTENT.5.NBT.B.7)*
    - Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. *(CCSS.MATH.CONTENT.5.MD.C.5)*

Transfer

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

T1 Initiate a plan using a variety of methods/strategies appropriately, execute it, and evaluate the reasonableness and accuracy of the solution.

T2 Demonstrate fluency with mathematical computations and definitions.

Meaning

Understanding(s)

Students will understand that...

U1 Mathematicians work to make sense of the problem before trying to solve it.

U2 Mathematicians monitor progress while problem solving, change course if necessary and evaluate the reasonableness of their solution.

U3 Mathematicians calculate efficiently and accurately while using appropriate symbols and labels.

U4 Mathematicians communicate precisely and clearly using mathematical definitions.

Essential Question(s)

Students will keep considering...

Q1 What do effective problem solvers do when they get stuck?

Q2 How do I determine that my answer makes sense?

Q3 How do I check my work for accuracy and completeness?

Q4 What can I do to make my solution sufficiently clear?

Q5 How can I use mathematical definitions to better explain my solution?

Q6 How do operations relate to one another?

Q7 How can I decompose a number to make it easier to work with?

Stage 1: Desired Results - Key Understandings

- Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. *(CCSS.MATH.CONTENT.5.MD.C.5B)*
- Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. *(CCSS.MATH.CONTENT.5.MD.C.5C)*
- Mathematical Practices
- Make sense of problems and persevere in solving them. *(CCSS.MATH.MP.1)*
- Attend to precision. *(CCSS.MATH.MP.6)*

Madison Public Schools Profile of a Graduate

Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. *(POG.1.2)*

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
Students will know... **K1** how to use ratio tables to create solutions for multiplying and dividing **K2** how to solve multi-digit multiplication problems using standard algorithm, area model, and partial products. **K3** how to multiply and divide using mental math strategies. **K4** how to divide using the area model and partial quotient strategies **K5** Vocabulary: partial products, partial quotients, product, standard algorithm, equation, ratio table, estimation, factor, divisor, dividend, quotient, remainder, array, double/half, expression, **K6** how to calculate volume **K7** the representation and meaning of a whole number exponent.	*Students will be skilled at...* **S1** multiplying/dividing using mental math strategies **S2** multiplying using partial products and standard algorithm **S3** dividing using partial quotients **S4** identifying division vocabulary **S5** using ratio tables to solve multiplication and division **S6** calculating multiplication problems with decimals **S7** finding the volume of a rectangular prism **S8** denoting powers of 10 with whole number exponents.