Unit 2 Multiplying and Dividing Whole Numbers and Decimals, Convert in Metric

KY 5th grade Math Standards　　　　　Unit 2 framework google link　　　5th grade Math Priority Content & Prerequisite Skills

Unit 2 Title: Multiplying and Dividing Whole Numbers and Decimals, Convert in Metric　　**Estimated Time Frame: 47 days**
Essential Standards: 5.NBT.2, 5.NBT.5, 5.NBT.6, 5.NBT.7,   Supporting Standards: 5.MD.1
Big Idea(s)　　　　**CRA explanations for 5th grade Unit 2**
In real life, we use whole numbers and decimal computation every day. We need to be able to determine when it is appropriate to use mental math, paper and pencil or a calculator and use methods that make sense to ourselves and to others. Number Operations in Base Ten Progressions document

Essential Question(s):	**Common Preconceptions/Misconceptions:**
- What are efficient methods for finding products and quotients? How are the different methods related? How do you determine which strategy you want to use? How does the context of a problem situation determine how to represent a remainder in division? - How are operations with decimals similar to or different from operations used with whole numbers? - How is estimation used to check the reasonableness of the computation involved in solving a problem? - What strategies can be developed to estimate and compute products and quotients of numbers expressed as decimals?	-Students believe they must use "the standard traditional algorithm" when any algorithm that makes sense to them and always leads to a correct response is not only acceptable and many times preferred if it is based on place value instead of just memorizing a procedure. -Students confuse rules for lining up decimals for adding and subtracting with rules for multiplication and division, especially when there is a lack of understanding with what the decimals represent and the place value. -Students confuse expected size of products and quotients for decimals with whole numbers: -When multiplying whole numbers the product is larger, but when multiplying by a decimal less than one the product gets smaller; Likewise when dividing whole numbers the quotient gets smaller, but

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	when dividing by a decimal less than one the quotient gets larger. The Problem with Key Words
Standards for Mathematical Practice (**bolded** practices are emphasized in this unit) *Math Practice Standards Posters*	**Kentucky Interdisciplinary Literacy Practices (KILP)**
MP.1. Make sense of problems and persevere in solving them. **MP.2. Reason abstractly and quantitatively.** **MP.3. Construct viable arguments and critique the reasoning of others.** **MP.4. Model with mathematics.** **MP.5. Use appropriate tools strategically.** MP.6. Attend to precision. **MP.7. Look for and make use of structure.** **MP.8. Look for and express regularity in repeated reasoning**.	1. Recognize that text is anything that communicates a message. 2. Employ, develop, and refine schema to understand and create text. 3. View literacy experiences as transactional, interdisciplinary and transformational. 4. Utilize receptive and expressive language arts to better understand self, others, and the world. **5. Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks.** **6. Collaborate with others to create new meaning.** **7. Utilize digital resources to learn and share with others.** **8. Engage in specialized, discipline specific literacy practices.** **9. Apply high level cognitive processes to think deeply and critically about text.** 10. Develop a literacy identity that promotes lifelong learning.

Essential Standards: **KAS Content Standards** **CRA explanations for 5th grade Unit 2**	**Prerequisite Skills & Essential Vocabulary**	**Sample Learning Intentions* & Sample Success Criteria***
KY.5.NBT.2 Multiply and divide by powers of 10. **● Explain patterns in the number of zeros of the product when multiplying a number by powers of 10.**	exponent power	I am learning to explain the movement of the decimal when multiplying or dividing by powers

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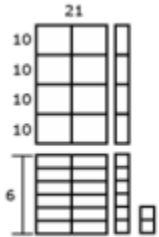
● **Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.** ● **Use whole-number exponents to denote powers of 10. MP.3, MP.8** Students recognize when a number is multiplied by 10, a zero is added to the end because each digit's value became 10 times larger. Students use the same reasoning to explain in the problem. ● $523 \times 10^3 = 523{,}000$ The place value of 523 is increased by 3 places. ● $5.223 \times 10^2 = 522.3$ The place value of 5.223 is increased by 2 places. ● $52.3 \div 10^1 = 5.23$ The place value of 52.3 is decreased by one place. Note: grade 5 expectations in this domain are limited to decimals through the thousandths place. Coherence KY.5.NBT.2→ KY.6.EE.1	base	of ten so… ● I can write numbers using exponents.
KY.5.NBT.5 Fluently multiply multi-digit whole numbers (not to exceed four-digit by two-digit multiplication) using an algorithm. MP.7, MP.8 Students make connections from previous work with multiplication, using models/representations to develop an efficient algorithm to multiply multi-digit whole numbers.	-Multiply whole numbers: -Up to four digit number by a one-digit number -Two-digit number by two-digit number Multiply using strategies based on place value and the properties of	I am learning to use visual models and equations to multiply whole numbers so… ● I can represent multiplication with base-10 blocks and with place value strategies such as partial products.

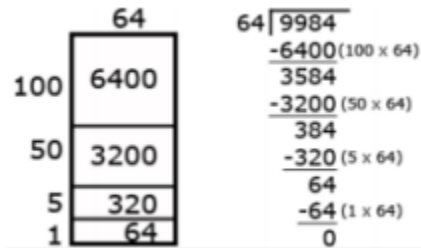Unit 2 Multiplying and Dividing Whole Numbers and Decimals, Convert in Metric

Coherence KY.4.NBT.5→ KY.5.NBT.5→KY.6.NS.3	operations. Illustrate and explain the calculation by using equations, rectangular arrays and/or area models. product factors partial products efficient algorithm	● I can use models and representations to solve problems with multiplication.
KY.5.NBT.6 Divide up to four-digit dividends by two-digit divisors. **a. 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** **● the relationship between multiplication and division** **b. Illustrate and explain the calculation by using equations, rectangular arrays and/or area models. MP.2, MP.3, MP.4** Students build upon the knowledge of division they gained in grades 3 and 4. Students connect previous understanding of partitive and measurement models for division to an algorithm, including partial quotients. Some examples include: 968 ÷ 21 = Students use base ten models by representing 962 and use the model to make an array with one dimension of 21. Students continue to	-Divide up to four-digit dividends by one-digit divisors. Find whole number quotients and remainders using: -strategies based on place value -the properties of operations -the relationship between multiplication and division Illustrate and explain the calculation by using equations, rectangular arrays and/or area models.	I am learning to use visual models and equations to divide whole numbers so… ● I can represent and explain division with base-10 blocks, area models, and with place value strategies such as partial quotients. ● I can use models and representations to solve problems with division.

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make arrays until no more groups of 21 can be made. Remainders are not part of the array. Students use an area model for division shown below. As the student uses the area model, s/he keeps track of how much of the 9,984 is left to divide. Students use expanded notation 2682 ÷ 25 = (2000 + 600 +80 + 2) ÷ 25. Students use his or her understanding of the relationship between 100 and 25, to think "I know 100 divided by 25 is 4 so 200 divided by 25 is 8 and 2000 divided by 25 is 80. Then 600 divided by 25 has to be 24. Since 3 × 25 is 75, I know that 80 divided by 25 is 3 with a remainder of 5. I can't divide 2 by 25 so 2 plus the 5 leaves a remainder of 7. 80 + 24 + 3 =107. So the answer is 107 with a remainder of 7." Students use an equation that relates division to multiplication, 25 × n = 2682, a student	dividend divisor quotient partial quotients	

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might estimate the answer to be slightly larger than 100 because s/he recognizes that 25 × 100 =2500. Coherence KY.4.NBT.6→ KY.5.NBT.6→KY.6.NS.2		
KY.5.NBT.7 Operations with decimals to hundredths. **a. Add, subtract, multiply and divide decimals to hundredths using…** **● concrete models or drawings** **● strategies based on place value** **● properties of operations** **● the relationship between addition and subtraction** **b. Relate the strategy to a written method and explain the reasoning used. MP.2, MP.3, MP.5** Students connect previous experiences with the meaning of multiplication and division of whole numbers to multiplication and division of decimals using estimation, models and place value structure. For example: 3 tenths subtracted from 4 wholes. The wholes must be divided into tenths The answer is 3 and $\frac{7}{10}$ or 3.7 Students describe the partial products displayed by the area model. For example,	-Fluently multiply and divide multi-digit whole numbers. Decimal .	I am learning to use visual models and equations to add, subtract, multiply, and divide decimals so… ● I can represent decimal operations: addition, subtraction, multiplication and division with base-10 blocks or grids. I am learning to add, subtract, multiply, and divide decimals to the hundredths place so… ● I can use place value strategies, estimation, and properties of operations with decimals to solve problems.

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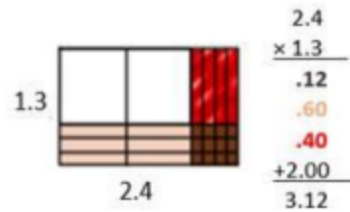
Students dividing decimals for example could find the number in each group or share by applying the fair sharing model or separating decimals in to equal parts such as 2.4 ÷ 4 = 0.6

$\frac{3}{10}$ times $\frac{4}{10}$ is $\frac{12}{100}$.

$\frac{3}{10}$ times 2 is $\frac{6}{10}$ or $\frac{60}{100}$.

1 group of $\frac{4}{10}$ is $\frac{4}{10}$ or $\frac{40}{100}$.

1 group of 2 is 2."
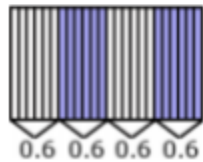
Coherence KY.4.NBT.6→ KY.5.NBT.7→KY.6.NS.3

Attending to the Standards for Mathematical Practice 5.NBT.5-7
Students understand when given a multiplication problem, they have a choice in how they solve it and select a way that makes sense for the values in the problem. For example, for 1234 x 12, they see the small numbers lend to a break apart strategy and solve the problem this way: 1234 x 10 = 12340 1234 x 2 = 2468 Then add the partial products to equal

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14,808 (MP.7). Other students may stack the two values and use an algorithm. Students recognize a rectangle is an effective model for ensuring all partial products are calculated, for both whole numbers and decimals (MP.4). As students explore problems with decimal values, they reason about the problem, rather than following rules devoid of meaning (count the number of decimal places). For example, when multiplying 4 x 1.5, they use a break apart strategy, as they have for whole numbers, noticing 4 x 1 = 4 and 4 x 0.5 = 2, so therefore, 4 x 1.5 = 6 (MP.2). They explain why this works and when they use this strategy (MP.3).

Supporting Standards:

KY.5.MD.1 Convert among different size measurement units (mass, weight, liquid volume, length, time) within one system of units (metric system, ~~U.S. standard system and time~~)(in later unit)*. MP.3, MP.8 Within the same system convert measurements in a larger unit in terms of a smaller unit and a smaller unit in terms of a larger unit. Use these conversions in solving multi-step, real world problems. Coherence KY.4.MD.1→ KY.5.MD.1→KY.6.RP.3 *(U.S. standard system and time will be in a later unit.)	-Know relative size of measurement units (mass, weight, liquid volume, length, time) within one system of units (metric system, U.S. standard system and time). a. Understand the relationship of measurement units within any given measurement system. b. Within any given measurement system, express measurements in a larger unit in terms of a smaller unit. c. Record measurement equivalents in a two-column table.	I am learning to relate decimal place value to converting in metric units in solving multi- step real world problems so… ● I can convert metric units of length. ● I can convert metric units of capacity. ● I can convert metric units of mass.

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	Meter Kilometer Centimeter Millimeter Liter Milliliter Gram Miligram Kilogram	

Attending to the Standards for Mathematical Practice
Students notice patterns about how units and measurements relate to each other (MP.8). For example, students measure various objects in meters and in centimeters (using a meter stick). As they measure their items, they record the measurements in a table. They notice the object that measures about 300 centimeters also measures about 3 meters (MP.8). They explain why this pattern is true, arguing each of the meters has 100 centimeters, so 3 meters will have 300 centimeters and more generally explaining the smaller the unit the more of unit there will be when measuring the same object (MP.3).

*Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. These examples are not comprehensive. (Sample Optional Unit 2 Assessment)

Practice Standards and Number Sense Resources:

Mathematics Practice Standards, Games and Routines *(Introduced in the first week and used throughout the year)* **Math Practices & Problem Solving Handbook** Problem Solving Organizer The Problem with Key Words Numberless Word Problem Example Three Reads Strategy	*1ˢᵗ **Semester Take-Home Games** -*TheresaWills Games -EnVisionMathGames -Investigations Math Words and Ideas -Investigations Math Games *-Family Math Games 5ᵗʰ grade Home Letters -5ᵗʰ grade additional practice* Word Wall Cards ***1st Semester Teaching Tools***

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5th grade number sense routines slides (VA) *(use number routines 5-10 minutes daily all year in addition to math class time)* **Math Routines & Resources Sample Daily Math Routines** Additional: **Number Routines used 5-10 minutes daily all year** (MD) **51 Esti-Mysteries Splat**	**5th grade Math FCPS Google Site of Resources** 5th grade decimal and fraction anchor charts
Anchor Resources by enVision Topic	**Supplemental Resources by Standard**
enVision Topic 3 – Fluently Multiply by Multi-digit Whole Numbers 5.NBT.2 5.NBT.5 *Possibly omit lesson 3-7 (May need to review 4.NBT.5 & 4.NBT.6 multi-digit multiplication)* **enVision Topic 11 – Convert Measurements (Metric only in this unit) 5.MD.1** only teach Metric lessons: 11-4 to 11-6 *(approximately two weeks)* Use Hands-On or *Online Manipulatives*: **Base-10 blocks, Place Value Chips,** Base-10 sheets Teaching Tool 4- 5, Place Value charts TT3 **5th grade anchor charts** **-Topic 3 Review What You Know Prerequisite Skills** **-Topic 3 Vocabulary Cards** ******Multi-Digit Multiplication Strategies Card Sort - Number & Operations Base Ten ******Egg Spangled Banner 3 Act Task Desmos four-function calculator	**5.NBT.2** Multiplying a Whole Number by a Power of 10 **5.NBT.5** How to teach Whole Numbers with Base 10 blocks Make the Largest Product (3 x 2-digit) Juice Box Mix-Up Marta's Multiplication Error Multiplying Decimals by 10 Elmer's Multiplication Error The Value of Education Area Model Multiplication Starting a Business PBL Review: Graham Fletchers Conceptual Multiplication Cards Bucky the Badger 3 Act Math Task The Factor Game online The Product Game online Multi Digit Multiplication Concept Card Sort slides Review: Factors and Multiples Number Puzzles - Operations & Algebraic Thinking One Grain of Rice Literature Link **5.MD.1** Compare Metric Units ******Measurement Card Sort - Metric Comparisons and Conversions
enVision Topic 4 – Use Models and Strategies to Multiply Decimals 5.NBT.2 5.NBT.7 *Possibly omit lesson 4-7 & 4-10*	5th grade decimal and fraction anchor charts **5.NBT.2** Multiplying a Decimal by a Power of 10 **5.NBT.7** How to teach Decimals with Base 10 blocks

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(approximately three weeks) ***Hands-On or*** *Online Manipulatives:* ***Base-10 blocks***, *Base-10 sheets Teaching Tool 4-5,* *Decimal Grids TT7- 9* **Topic 4 Review What You Know Prerequisite Skills** Desmos four-function calculator **Granny Smith's Skins 3 Act Math Task** **Sugar Cubes 3 Act Math Task**	Multiplying Tenths on a Grid Digital Activity Multiplying Decimals FAL Game Area Model Decimals - Multiplication | Decimals | Area Model - PhET Interactive Simulations (colorado.edu) Multiplying Decimals (Decimal x Decimal) Straighten Up 3 Act Math Task Coin Spiral 3 Act Math Task GA Multiplying and Dividing Decimals
enVision Topic 5 - Use Models and Strategies to Divide Whole Numbers 5.NBT.6 *Possibly omit lesson 5-6 & 5-8, Teach Calculator strategies* *(approximately two weeks)* ***Hands-On or*** *Online Manipulatives:* ***Base-10 blocks***, *Base-10 sheets Teaching Tool 4-5, Grid Paper TT9&10* **Topic 5 Review What You Know Prerequisite Skills** Desmos four-function calculator	**5.NBT.6** How to teach Whole Numbers with Base 10 blocks Division and Interpreting Remainders FAL - Number & Operations in Base Ten Division Strategy: Multiplying Up Water Relief Estimate the Quotient Minutes and Days Dividing with Remainders Formative Assessment Lesson The Multiply/Divide Range Game
enVision Topic 6 – Use Models and Strategies to Divide Decimals 5.NBT.2 5.NBT.7 *Possibly combine lessons 6-1 & 6-2 and 6-5 & 6-6 take 2 days for lesson 6-7, Possibly omit 6-9, Teach Calculator strategies* *(approximately two weeks)* ***Hands-On or*** *Online Manipulatives:* ***Base-10 blocks*** &	**5.NBT.2 5.NBT.7** *Lesson6-4Reteach Lesson6-6CenterGames* Dividing Decimals with Base Ten Blocks Modeling Decimal Division with Base Ten Blocks (digital) The Value of Education What is 23 ÷ 5? Multiplication and Division with Decimals Game - Number & Operations in Base Ten Hanging By a Hair Granny 3 Act Math Task

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Teaching Tool Base-10 sheets 4-5, Place Value chart TT6, Decimal Grids TT7-8, Grid Paper TT9&10, Focus on calculator understanding **Topic 6 Review What You Know Prerequisite Skills** ****Decimal Maze** (use with calculator) Tomato-Tomato 3 Act Math Task Desmos four-function calculator	Towers of Coins 3 Act Math Task Kendall Hunt Illustrative math decimals unit GA Multiplying and Dividing Decimals

Summative Assessment
(Common Unit Assessment on ADAM) This unit assessment will focus on conceptual models of multiplication and division of whole numbers and decimals using properties with various representations to solve problems……..