Grade: 3   **FCPS 2023-2024 Math Unit 3 Framework**

Unit 3 Multiplication, Division and Area

KY 3rd grade Math Standards   Unit 3 framework google link   3rd grade Priority Math Content & Prerequisite Skills

Unit 3 Title: Multiplication, Division and Area	Estimated Time Frame: 40 days

Essential Standards: 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.6, 3.OA.7, 3.OA.8, 3.MD.7, Supporting Standards: 3.OA.9, 3.MD.8c

Big Idea(s)   **CRA explanations for 3rd grade Unit 3**

- There is a relationship between the divisor, the dividend, the quotient, and any remainder.
- Multiplication facts can be deduced from patterns.
- The distributive property of multiplication allows us to find partial products and then find their sum.
- Multiplication can be used to find the area of rectangles with whole numbers.
- Area covers a certain amount of space using square units.
- Area in measurement is equivalent to the product in multiplication.
- Area models can be used as a strategy for solving multiplication problems. Measurement Progressions document Operations and Algebraic Thinking Progressions document

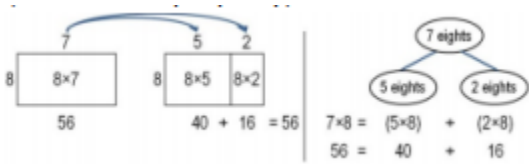| Essential Question(s)	Common Preconceptions/Misconceptions:
-How can unknown division facts be found using known multiplication facts? -What are strategies to solve multiplication and division facts? -How are multiplication and division alike and different? -How can multiplication and division be used to solve real world problems? -How is division an unknown factor problem? -What is area, and how can area be measured and found? -How is area related to both addition and multiplication?	- Students often consider multiplication and division to be separate rather than seeing the inverse relationship between the two operations. - Students may believe that the area is just multiplying the length by the width without understanding the product represents the number of unit squares that cover the figure. The Problem with Key Words

Unit 3 Multiplication, Division and Area

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 3rd grade Unit 3	Prerequisite Skills & Essential Vocabulary	Sample Learning Intentions* & Sample Success Criteria*
KY.3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays and measurement quantities, by using drawings and equations with a symbol for the unknown number to represent the problem. MP.1, MP.4 Students flexibly model or represent multiplication and	multiplication factors product array	I am learning to use various strategies to write, represent and solve problems with multiplication and division so…

Unit 3 Multiplication, Division and Area

division situations or context problems (involving products and quotients up to 100). Note: Drawings need not show detail, but accurately represent the quantities involved in the task. See Table 2 in Appendix A. (see page 12 below) Coherence KY.3.OA.3→KY.4.OA.2	area model	- I can represent a multiplication or division word problem with models, drawings, and equations. - I can write and solve math stories for multiplication and division problems.
KY.3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. MP.6, MP.7 Students determine the unknown number that makes the equation true in each of the equations 8 x ? = 48, 5 = □ ÷ 3, 6 x 6 = ?. Coherence KY.3.OA.4→KY.4.MD.3	equation unknown fact family related facts	I am learning to use a related fact to determine the unknown number in a problem so… - I can use multiplication and division factors to find unknown values in an equation. - I can use fact families to see how multiplication and division are related.
KY.3.OA.5 Apply properties of operations as strategies to multiply and divide. MP.3, MP.4 Students need not use formal terms for these properties. If 6 x 4 is known, then 4 x 6 = 24 is also known (Commutative property of multiplication). 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 = 30, or by 5 x 2 = 10,	Commutative (order) Property Multiplication Identity Property (one) of Multiplication Zero Property of	I am learning to explain and represent properties of operations for multiplication and division so… - I can use tools, models and properties to solve multiplication problems. - I can multiply factors in any

Unit 3 Multiplication, Division and Area

then 3 x 10 = 30 (Associative property of multiplication). Knowing that 8 x 5 = 40 and 8 x 2 =16, one can find 8 x 7 as 8 x (5+2) = (8 x 5) + (8 x 2) = 40 + 16 = 56 (Distributive property). Coherence KY.3.OA.5→KY.4.NBT.6, KY.4.NBT.5	Multiplication Associative (grouping) Property of Multiplication Distributive Property	order to solve multiplication problems. I am learning to use the Distributive Property and known facts to break apart unknown facts with 4, 6, 7 or 8 as factors so … ● I can use patterns and properties to multiply by 0 and 1. ● I can use strategies and patterns to multiply by 2, 5, 9 and 10. ● I can multiply 3 factors in any order to find a product. ● I can break apart unknown facts into known facts to solve multiplication problems
KY.3.OA.6 Understand division as an unknown-factor problem. MP.2 Find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8. Coherence KY.3.OA.6→KY.4.NBT.6	dividend divisor Quotient	I am learning to use patterns and known facts to find unknown multiplication and division facts so… ● I can use multiplication facts to divide.
Attending to the Standards for Mathematical Practice 3.OA.5-6 Students use strategies beyond skip counting to solve multiplication problems. They decide how to use known facts to solve facts like 6 x 9. Students use strategies like Adding a Group, thinking 5 groups of 9 (45) plus one more group (54) and		

Unit 3 Multiplication, Division and Area

Subtracting a Group, thinking 9 x 6 and reasoning 10 groups of 6 (60) minus one group of 6 (54) (MP.7). Students explain their selected reasoning strategy and listen and critique other students' strategies, considering which strategies make sense and are efficient (MP.3). Students think about 84 ÷ 4 as, "How many sets of 4 can be made from 84 items?" or "How many in a group, if there are 84 items and 4 groups?" and use this relationship to solve the problem (MP.2).

| **KY.3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. MP.2, MP.8**

Students determine multiplication and division strategies efficiently, accurately, flexibly and appropriately. Being fluent means students choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and explain their approaches and they produce accurate answers efficiently. Knowing 8 x 5 = 40, one knows 40 ÷ 5 = 8.
Note: Reaching fluency is an ongoing process that will take much of the year.
Coherence KY.3.OA.7→KY.4.OA.4 | Relationship

Properties | I am learning to solve contextual and mathematical problems by fluently multiplying and dividing using the relationship between multiplication and division or properties of operations so…

● I can use reasoning and the relationship between multiplication and division to find basic facts.
● I can use estimation or related facts to determine if answers are reasonable.
● I can use number sense, reasoning and strategies to solve word problems that involve multiplication and division. |

Attending to the Standards for Mathematical Practice 3.OA.7
By studying patterns and relationships in multiplication facts, students develop fluency for multiplication facts (MP.8). For

Unit 3 Multiplication, Division and Area

example, students notice 4 x 6 is equivalent to 2 x 2 x 6 (doubling strategy). They know 9 facts can be found by thinking of the other factor x 10 and subtracting one group. For example, recognizing 9 x 8 is equivalent to 10 x 8 – 8. For each fact, the student thinks, "What reasoning strategy can I use that is more efficient than skip counting?" (MP.2).

| **KY.3.OA.8 Use various strategies to solve two-step word problems using the four operations (involving only whole numbers with whole number answers). Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. MP.1, MP.4**

Students solve problems using models, pictures, words and numbers. Students explain how they solved the problem using accurate mathematical vocabulary and why their answer makes sense. Note: Estimation skills include identifying when estimation is appropriate, determining method of estimation and verifying solutions or determining the reasonableness of situations using various estimation strategies. The skill of estimating within context allows students to further develop their number sense.
Coherence KY.2.OA.1→KY.3.OA.8→ KY.4.OA.3 | -Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units by using drawings and equations with a symbol for the unknown number to represent the problem.

Equations
Reasonableness
Mental computation
Estimation strategies | I am learning to represent two-step word problems with equations and identify the correct operation so…

● I can write an equation with a letter for the unknown quantity to represent the word problem.
● I can identify the unknown quantities in a two-step word problem.
I am learning to represent two-step word problems with equations and solve for the unknown so…

● I can choose the correct operation(s) to solve for the unknown quantities.
● I can use various strategies to solve for the unknown quantities.
I am learning to solve two-step word problems and explain the reasonableness of my answer so…

● I can explain if my answer is |

Unit 3 Multiplication, Division and Area

		reasonable.

Attending to the Standards for Mathematical Practice 3.OA

Given a non-straightforward story situation about gathering apples and sharing them among 8 families, students decide on ways to make sense of the problem (MP.1). One student decides to use a bar diagram to make sense of the situation and then use the bar diagram to write equations and solve the problem (MP.4).

Maggie was picking apples from her three apple trees. She picked some from the first tree and realized she should count the rest of what she was picking. She picked 24 apples from the second tree and 40 apples from the third tree. She had enough apples to give 10 to each of eight families. How many apples did she pick from the first tree?

a	24	40
10 x 8 = 80 total apples		

$a + 24 + 40 =$ total apples and $10 \times 8 =$ total apples. There are 80 apples total.

$a + 64 = 80$

$a = 16$

Another student thinks of the situation differently and decides to figure out how many apples each family has from the known apples (MP.1). Other students use counters to model the problem and/or use trial and error. If their first approach doesn't work, students persevere by trying another strategy (MP.1). In each case, students check to see if the answer of 16 apples makes sense.

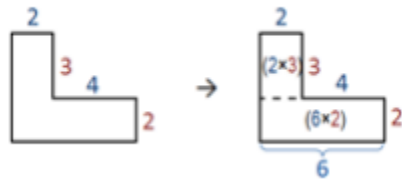| **KY.3.MD.7 Relate area to the operations of multiplication and addition.**
a. Find the area of a rectangle with whole-number side lengths by tiling it and show the area is the same as would be found by multiplying the side lengths.
b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real | Examples:
Length of 4 units
Width of 3 units
4x3=12 sq units would be covered with 12 sq units | I am learning to find the area using multiple strategies so…
● I can find the area by tiling to see how many squares will cover a figure and relating this total to multiplication.
I am learning that just as I can break |

Unit 3 Multiplication, Division and Area

world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning. **c. Use tiling to show in a concrete case the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.** **d. Recognize area as additive. Find areas of figures that can be decomposed into non-overlapping rectangles by adding the areas of the non-overlapping parts, applying this technique to solve real world problems. MP.1, MP.8** Coherence KY.3.MD.7→KY.4.MD.3→ KY.5.MD.5 72	To solve 7x8 I might solve 5x8 and add to 2x8. This works the same with a 5x8 rectangle would have 40sq units and a 2x8 rectangle would have 16sq units for a total of 40+16 or 56 sq units the same as 7x8. The figure shows how to add two rectangle areas of an irregular figure together: (2x3) + (6x2)= 6 + 12 = 18sq units.	a multiplication math fact into two smaller facts I can break a larger rectangle into two smaller rectangles with the same total area using the distributive property so… ● I can find the area of squares and rectangles by multiplying. I am learning to find areas of irregular shapes by finding the area of smaller rectangles inside the shape and adding those totals together so… ● I can use properties when multiplying to find the area of squares and rectangles. ● I can use properties to find the areas of irregular shapes by breaking the shape into smaller parts

Attending to the Standards for Mathematical Practice 3.MD.5-7

Students use 1 inch color tiles to cover a rectangle, understanding that color tile as a square inch (MP.5). As students place the tiles in repeated rows to fill the rectangle, they notice each row has the same number of tiles and the number of tiles that will fill a rectangle can be written as [number of tiles in one row] x [number of rows] (MP.8). They solve story problems that sometimes have the area as the unknown and sometimes have the number of rows or columns as the
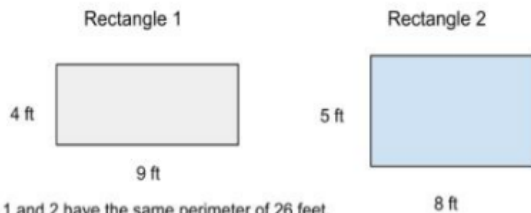
Unit 3 Multiplication, Division and Area

unknown and use their knowledge of area to solve the problem (MP.1).		

Supporting Standards:

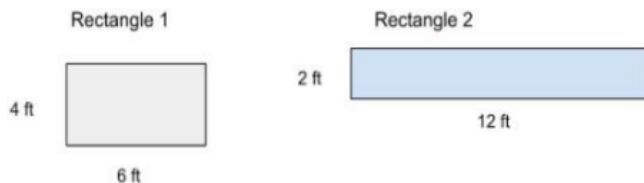|		
KY.3.MD.8 Solve real world and mathematical problems involving perimeters of polygons. c. Draw rectangles with the same perimeter and different areas or with the same area and different perimeters. MP.1, MP.4 Coherence KY.3.MD.8→KY.4.MD.3 **c.** **Rectangles with the Same Perimeter but Different Areas** Rectangle 1 Rectangle 2 4 ft 5 ft 9 ft Rectangle 1 and 2 have the same perimeter of 26 feet. Rectangle 1 has an area of 36 sq. ft, while Rectangle 2 has an area of 40 sq. ft. 8 ft **Rectangles with Different Perimeters, but Same Area** Rectangle 1 Rectangle 2 2 ft 4 ft 12 ft 6 ft Rectangle 1 and 2 have the same area of 24 sq. feet. Rectangle 1 has a perimeter of 20 ft., while Rectangle 2 has a perimeter of 28 ft.	-Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. Perimeter Length Width Polygon Equilateral triangle	I am learning to solve real world problems involving perimeters of polygons so… • I can understand the relationships of shapes with the same perimeter and different areas. • I can understand the relationships of shapes with the same area and different perimeters. • I can draw rectangles with the same perimeter and different areas. • I can draw rectangles with the same areas and different perimeters.

Attending to the Standards for Mathematical Practice 3.MD.8   Students recognize that perimeter is a measure of length and see perimeters of polygons as a collection of side lengths

Unit 3 Multiplication, Division and Area

added together to form the perimeter (MP.1). Therefore, they see if a side length is missing, it is like a missing addend problem and write an equation or draw a bar diagram to solve for the missing value (MP.4). Students recognize they can use a given perimeter (such as 16 inches) and form different rectangles (such as 4 x 4, 3 x 5, 2 x 6, 1 x 7) and that these rectangles have different areas (MP.1).

KY.3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. MP.3, MP.8 *(not an essential standard)* Students observe 4 times a number is always even and explain why 4 times a number can be decomposed into two equal addends. Coherence KY.2.OA.3→KY.3.OA.9→ KY.4.OA.5	-Determine whether a group of objects (up to 20) has an odd or even number of members; write an equation to express an even number as a sum of two equal addends. Students understand a number can be broken apart by pairing objects to see if there are leftovers (odd) or not (even). even number odd number pattern	I am learning to identify patterns and explain them using the properties of operations so… ● I can find and explain patterns for even and odd numbers. ● I can use structure and properties to explain patterns for multiplication facts.

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

Practice Standards and Number Sense Resources:	
Mathematics Practice Standards, Games and Routines	*1ˢᵗ Semester Take-Home Games* -TheresaWills Games

Unit 3 Multiplication, Division and Area

(Introduced in the first week and used throughout the year) -**Math Practices & Problem Solving Handbook** **3rd 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**	-EnVisionMathGames -*KDE Family Math Games* -Investigations Math Words and Ideas -Investigations Math Games -*3rd grade HomeLetters* Word Wall Cards *3rd grade additional practice* Problem Solving Organizer The Problem with Key Words Numberless Word Problem Example Three Reads Strategy **-1st Semester Teaching Tools** **3rd grade Math FCPS Google Site of Resources**
Anchor Resources by enVision Topic	**Supplemental Resources by Standard**
enVision Topic 3 – Apply Properties: Multiplication Facts for 3, 4, 6, 7 8 3.OA.3 **3.OA.5** *(approximately two weeks)* *Use Hands-On or Online Manipulatives:* ***Two color counters, Color tiles, Cubes*** *Teaching Tools: Cubes, Counter sheet 9, ColorTile sheet 8, Number lines 7, Grid 13 14, 100 Chart 10* **-Topic 3 Review What You Know Prerequisite Skills** **Multiplication Facts Card Sort Lesson from KDE	-Multiplication Sample Anchor Charts Area Model Multiplication video **3.OA.5** Valid Equalities? Jan's Pens Corn Seeds Alice's Multiplication Fact Water Balloons Multiplication Facts Card Sort Lesson slides Desmos Multiplication Arrays Activity Desmos Dot Areas Class Online Activity Desmos Multiplication Arrays Class Online Activity **Graham Fletchers Conceptual Multiplication Cards**
enVision Topic 4 – Use Multiplication to Divide: Division Facts **3.OA.3** **3.OA.4** **3.OA.5** **3.OA.6** *Possibly omit lessons 4-5 & 4-9* *(approximately two weeks)* *Use Hands-On or Online Manipulatives:* ***Two color counters, Color tiles, Cubes,*** *Teaching Tools: Counter sheet 9, Color Tile sheet 8, Number lines 7, Grid Paper 13 -14* **-Topic 4 Vocabulary Cards** **-Topic 4 Review What You Know Prerequisite Skills**	Area Model Introduction - Factors	Products	Area Model PhET Interactive Simulations (colorado.edu) **3.OA.3** Number Word Problems: Arrays **3.OA.4** Missing Numbers: Division Identify the Unknown Finding the Unknown in a Division Equation **3.OA.5** Turn Your Array Math Literature Link: Each Orange Had 8 Slices Valid Equalities? Multiplication Distributive Property Card Sort slides **3.OA.6** Division as an Unknown Factor (x5 & x10)

Unit 3 Multiplication, Division and Area

Multiplication Distributive Property Card Sort Lesson ******Peach Picker 3 Act Math Task **3.OA.3	*Lesson 4-7CenterGames* Seesaw 3 Act Math Task
enVision Topic 5 - Fluently Multiply and Divide within 100 **3.OA.3 3.OA.7 3.OA.9** *(approximately two or three weeks)* *Use Hands-On or Online Manipulatives:* ***Two color counters, Color tiles, Cubes,*** *Teaching tools: Counter sheet 9, Color Tile sheet 8,* *Number lines7, GridPaper 13 -14, Multiplication Chart 11* **-Topic 5 Review What You Know Prerequisite Skills** GA Patterns in Addition and Multiplication Unit ****Interpreting Multiplication and Division Card Sort Lesson** ******Knotty Rope 3 Act Math Task **3.OA.7** Desmos four-function calculator	**3.OA.3** Analyzing Word Problems Involving Multiplication Classroom Supplies Gifts from Grandma Two Interpretations of Division **3.OA.7** *Lesson5-5ReTeach* *Lesson5-5CenterGames* Kiri's Multiplication Matching Game Multiply It Fill the Grid Division Bump (divisors 2 - 5) Division Squares (divisors 3 & 6) Multiplication & Division Concept Card Sort Slides **3.OA.9** Addition Patterns Patterns in the multiplication table Making a ten Symmetry of the addition table Patterns in the Addition Table Roll a Rule Odd and Even Sums Odd and Even Products Times Tables Interactive online
Summative Assessment	
(Common Unit Assessment on ADAM) This unit assessment will focus on conceptual models of multiplication and division using various representations to solve problems including area models. It will also focus on finding area of shapes in square units……..	