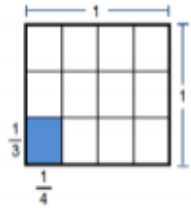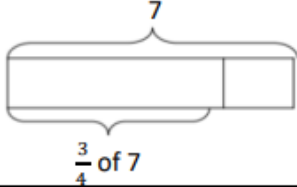**Grade: 5**   **FCPS 2022-2023 Math Unit Framework**

Unit 3 Fractions: Multiplying, Dividing, Adding & Subtracting and Data

KY 5th grade Math Standards   Unit 3 framework google link   5th grade Math Priority Content & Prerequisite Skills

Unit 3 Title: Fractions: Multiplying, Dividing, Adding & Subtracting and Data	Estimated Time Frame: 50 days

Essential Standards: 5.NF.4, 5.NF.5, 5.NF.6, 5.NF.3, 5.NF.7, 5.NF.1, 5.NF.2, Supporting Standards: 5.MD.2

Big Idea(s)   CRA explanations for 5th grade Unit 3

In real life, we use fraction operations everyday. We need to be able to determine which operation is appropriate when solving real world problems. Using visuals, models, and explaining our understanding will allow for deep comprehension. Fractions are used to describe parts of a whole or set, the result of division, as a ratio, as a measure or as an operator. We compare fractions using models, multiplication and division strategies.

We use a variety of representations and models to represent all the fraction operations, addition, subtraction, multiplication, and division. We use line plots to represent real world data including use of fractional amounts.

Fractions Progressions Document Data progressions document

Essential Question(s)	Common Preconceptions/Misconceptions:
-What does it mean to multiply whole numbers and fractions? How can fraction multiplication be shown using models and symbols? -How are fractions related to division? How can you divide with whole numbers and unit fractions? -How can sums and differences of fractions and mixed numbers be estimated? -What are the procedures for adding and subtracting fractions and mixed numbers with conceptual understanding? -How can line plots be used to represent data and answer questions?	-Students may misunderstand parts of a whole. -Students could transpose numerators and denominators. -Labeling the number line in equal parts can cause misconceptions. -When making equivalent fractions not multiplying the numerator and the denominator. -Confusing the procedures for the operations because of lack of conceptual understanding. -Adding the denominators when they are not common. -When modeling, ensure pieces refer to the same whole to compare. -The Problem with Key Words

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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 3**	**Prerequisite Skills & Essential Vocabulary**	**Sample Learning Intentions* & Sample Success Criteria***

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KY.5.NF.4 Apply and extend previous understanding of multiplication to multiply a fraction or whole number by a fraction. **a. Interpret the product ($\frac{a}{b}$) 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.** **b. Find the area of a rectangle with fractional side lengths by tiling it with squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas. MP.1** a. Students use a visual fraction model to show $(\frac{2}{3})$ x 4 = $\frac{8}{3}$ and create a story context for this equation. Do the same with $(\frac{2}{3})$ x $(\frac{4}{5})$ = $\frac{8}{15}$. (In general, $(\frac{a}{b})$ x $(\frac{c}{d})$ = $\frac{ac}{bd}$.) b. For example the shaded portion shows the rectangle with the appropriate unit fraction side lengths. Coherence KY.4.NF.4→ KY.5.NF.4→KY.6.G.1	-Apply and extend previous understandings of multiplication to multiply a fraction by whole number. a. Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$. b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$ and use this understanding to multiply a fraction by a whole number. c. Solve word problems involving multiplication of a fraction by a whole number. Partition Unit Fraction Factor, Product GCF Simplify Area	I am learning to multiply a fraction by a whole number so… ● I can multiply a whole number by a fraction using models, drawings, and equations. ● I can multiply a fraction by a whole number using models, drawings, and equations. I am learning to multiply a fraction by a fraction so… ● I can find the area of a rectangle with fractional side lengths.

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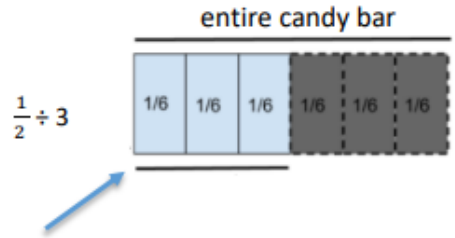
KY.5.NF.5 Interpret multiplication as scaling (resizing), by: **a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.** **b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{(n \times a)}{(n \times b)}$ to the effect of multiplying $\frac{a}{b}$ by 1. MP.2, MP.6** $\frac{1}{4} \times 7$ is less than 7 because 7 is multiplied by a factor less than 1 so the product must be less than 7. 7 $\frac{3}{4}$ of 7 Coherence KY.4.OA.1→ KY.5.NF.5→KY.6.RP.1	-Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. Numerator Denominator Mixed Number Fraction Scaling Product Factor Equivalent Greater Than Less Than	I am learning to use multiplication to scale or resize something so… • I can use multiplication to scale or resize something. • I can use multiplication to compare the size of a product. • I can explain why multiplication of fractions greater than 1 results in greater products. • I can explain why multiplication of fractions less than 1 results in smaller products.
KY.5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers. MP.4, MP.5 Coherence KY.4.NF.4→KY.5.NF.6 KY.5.MD.2	-Apply and extend previous understandings of multiplication to multiply a fraction by whole number. a. Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$.	I am learning to solve real world problems involving multiplication of fractions and mixed numbers so…

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	b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$ and use this understanding to multiply a fraction by a whole number. c. Solve word problems involving multiplication of a fraction by a whole number. Mixed Numbers	- I can multiply whole numbers and fractions in real world problems using models, drawings, and equations. - I can multiply fractions and fractions in real world problems using models, drawings, and equations. - I can multiply fractions and mixed numbers in real world problems using models, drawings, and equations.
KY.5.NF.3 Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b}$ = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using visual fraction models or equations to represent the problem. MP.4, MP.8 For example students interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3 and when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$.	Numerator Denominator Division Partition	I am learning to interpret the relationship between fractions of division so… I can understand how fractions are related to division. I am learning to solve real world problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers so…

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Coherence KY.5.NF.3→KY.6.RP.2		- I can solve word problems involving division with fractional answers using models and equations. - I can show quotients as fractions and mixed numbers.
KY.5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **a. Interpret division of a unit fraction by a non-zero whole number and compute such quotients.** **b. Interpret division of a whole number by a unit fraction and compute such quotients.** **c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions. MP.1, MP.4, MP.8** Students build upon the knowledge of division they gained in grades 3 and 4. Students connect previous understanding of division of whole numbers to divide whole numbers by unit fractions and unit fractions by whole numbers. Division of a fraction by a fraction is not a requirement at grade 5.	-Apply and extend previous understandings of multiplication to multiply a fraction by whole number. a. Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$. b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$ and use this understanding to multiply a fraction by a whole number. c. Solve word problems involving multiplication of a fraction by a whole number. Divide	I am learning to divide with whole numbers and unit fractions in order to solve real world problems so… - I can divide a non-zero whole number by a unit fraction. - I can divide a unit fraction by a non-zero whole number. - I can create a story context for dividing a fraction by a non-zero whole number and use a fraction model to show the quotient. - I can create a story context for dividing a

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a. Create a story context for $(\frac{1}{3}) \div 4$ and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(\frac{1}{3}) \div 4 = \frac{1}{12}$ because $(\frac{1}{12}) \times 4 = \frac{1}{3}$. b. Create a story context for $4 \div (\frac{1}{5})$ and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (\frac{1}{5}) = 20$, because $20 \times (\frac{1}{5}) = 4$. c. By using visual fraction models and equations to represent the problem. Each child will get one piece. Half to be shared with 3 students. Coherence KY.4.NF.4→ KY.5.NF.7→KY.6.NS.1	Unit Fraction Quotient Non-Zero Whole Number	non-zero whole number by a fraction and use a fraction model to show the quotient.

Attending to the Standards for Mathematical Practice 5.NF

Students look for repeated reasoning in order to understand the meaning of the operations (MP.8). Rather than memorize rules that do not make sense, students use mathematical representations to consider the relative size of their answers (MP.4). For example, students solve the classic "brownie sharing" problems, wherein brownies are shared equally with children. In considering how 4 children share 5 brownies. They use drawings of rectangles and partition to show each child will get $\frac{11}{4}$ brownies. As students continue to explore brownie sharing, they notice patterns. In this case, they see $5 \div 4$ means the same as $\frac{5}{4}$ (MP.4). Students reason quantitatively as they work on scaling problems in context (MP.2). For example, in $\frac{3}{4}$ of 16, students might reason the answer is less than 16. To solve it, they begin by thinking $\frac{1}{4}$ of

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16 is 4, then think 3 groups of 4 is 12. As students divide a problem such as $4 \div \frac{1}{8}$, $7 \div \frac{1}{8}$, $10 \div \frac{1}{8}$, they notice how many eighths in one whole and then multiply by how many wholes they have. This pattern leads to an understanding of why it looks like they are multiplying by the denominator (MP.8).

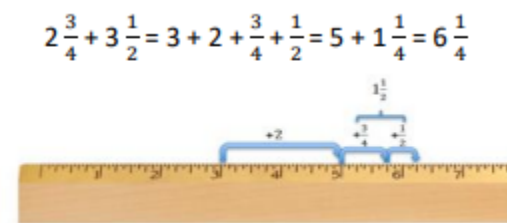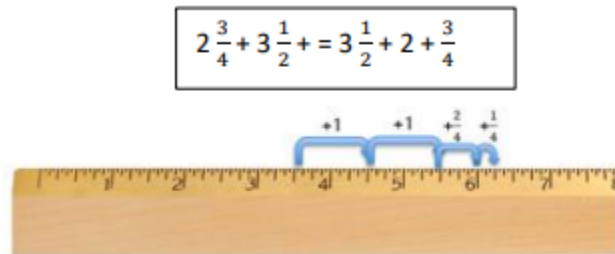|		
KY.5.NF.1 Efficiently add and subtract fractions with unlike denominators (including mixed numbers) by… ● **using reasoning strategies, such as counting up on a number line or creating visual fraction models** ● **finding common denominators MP.2, MP.3** Using common denominator $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$ In general, $\frac{a}{b} + \frac{c}{d} = \frac{(ad+bc)}{bd}$ Coherence KY.4.NF.1 KY.4.NF.3→ KY.5.NF.1→KY.6.EE.7	-Understand and generate equivalent fractions. a. Use visual fraction models to recognize and generate equivalent fractions that have different numerators/denominators even though they are the same size. b. Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$. Mixed Numbers Equivalent fractions Common denominator Mixed number Least Common Multiple	I am learning to add and subtract fractions with unlike denominators so… ● I can use models to find common denominators and equivalent fractions. ● I can add and subtract fractions and mixed numbers with unlike denominators using models, drawings, or a number line. ● I can use least common multiple to find common denominators and make equivalent fractions. ● I can add and subtract fractions and mixed numbers with unlike denominators using equivalent fractions.
KY.5.NF.2 Solve word problems involving addition and subtraction of fractions.	-Understand a fraction $\frac{a}{b}$ with a > 1 as a sum of	I am learning to solve word problems involving addition

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a. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. **b. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. MP.1, MP.4** a. For example: Mary ate $\frac{1}{3}$ of the pizza. Tommy ate $\frac{2}{5}$ of the pizza. How much of the total pizza did they eat together? ● making equivalent fractions to add/subtract fractions ● using visual representations to add/subtract fractions ○ Area Model ○ Linear Model b. Recognize an incorrect result $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, by observing that $\frac{3}{7} < \frac{1}{2}$. 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.4.NF.3→KY.5.NF.2	fractions $\frac{1}{b}$ a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decomposing a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions. c. Add and subtract mixed numbers with like denominators. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. Benchmark fraction Estimate Reasonableness	and subtraction of fractions so… ● I can estimate sums and differences of fractions and mixed numbers using benchmark fractions. ● I can solve word problems using addition and subtraction of fractions with unlike denominators using models, drawings, a number line, or equations.
Attending to the Standards for Mathematical Practice 5.NF As students add and subtract fractions, they make sense of situations in story problems, selecting and creating		

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representations of the situation such as partitioned rectangles or number lines (MP.1, 4). Students notice if the fractions in the problem can be solved using a reasoning strategy, or if it is more efficient to find common denominators (MP.2). For example, for the problem $2\frac{3}{4} + 3\frac{1}{2}$, students may mentally or physically refer to a ruler and use a counting up strategy:

$$2\frac{3}{4} + 3\frac{1}{2} + = 3\frac{1}{2} + 2 + \frac{3}{4}$$

$$2\frac{3}{4} + 3\frac{1}{2} = 3 + 2 + \frac{3}{4} + \frac{1}{2} = 5 + 1\frac{1}{4} = 6\frac{1}{4}$$

Or, students use a break apart strategy noticing $\frac{3}{4}$ is $\frac{1}{2} + \frac{1}{4}$ and therefore, reason there are 6 wholes and $\frac{1}{4}$ more, so $6\frac{1}{4}$ is the sum. Other students rewrite the fractions as $2\frac{3}{4} + 3\frac{2}{4}$ and add the whole numbers and fractions separately and then combine them. Students explain their reasoning strategies and students listen to others who solved the problem differently than they solved it and determine if the reasoning makes sense, if it is efficient and if the answer is correct (MP.3).

Supporting Standards:

KY.5.MD.2 Identify and gather data for statistical questions focused on both categorical and numerical data. Select an appropriate data display (bar graph, pictograph, dot plot). Make observations from the graph about the questions posed. MP.4, MP.5, MP.6 Generate questions for which data can be gathered and sort questions that are categorical (Possible question: What is your favorite after school activity?) and questions that are numerical (Possible question: How many times can you say/write your name in one minute?). After	-Use dot plots to analyze data to a statistical question. a. Identify a statistical question focused on numerical data. b. Make a dot plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$).	I am learning to identify and gather data for different data displays so… ● I can gather data and choose an appropriate data display. ● I can represent numerical data (with fractions) using the appropriate data

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gathering data on a question, students discuss which graphs are possible and which ones are not possible, and why. Students select one type of graph that fits the data gathered and create the graph, by hand or by using technology. Coherence KY.4.MD.4→ KY.5.MD.2→KY.6.SP.2 KY.6.SP.4	c. Solve problems involving addition and subtraction of fractions by using information presented in dot plots. Data Display, Line plot, Categorical Data, Numerical Data, Outlier, Bar Graph, Pictograph, Dot Plot	display. ● I can represent categorical data using the appropriate data display. ● I can generate and answer questions based on observations made from a data display.

Attending to the Standards for Mathematical Practice 5.MD

After gathering data on a question of interest, students recognize they have many data points and therefore, decide they will do a scaled graph (MP.4). In creating the graph, they decide to do a picture graph and pick a scale of 1 picture = 4 data points (MP.6). In another situation, students recognize they have numerical data and create a dot plot and decide to use a spreadsheet on the computer to create the graph (MP.5). Students compare how dot plots and bar graphs are similar and different, recognizing when to use each (MP.6).

*Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. These examples are not comprehensive.

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	*2nd 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

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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** Additional: Number Routines used 5-10 minutes daily all year (MD) **51 Esti-Mysteries** **Splat**	**2nd Semester Teaching Tools** **5th grade anchor charts** **5th grade Math FCPS Google Site of Resources**

Anchor Resources by enVision Topic	**Supplemental Resources by Standard**
enVision Topic Topic 8 – Apply Understanding of Multiplication to Multiply Fractions 5.NF.4 5.NF.5 5.NF.6 *Possibly combine 8-5 & 8-6, omit 8-9* *(approximately two weeks)* 5th grade anchor charts Use Hands-On or *Online Manipulatives*: ***Variety of Fraction Pieces, Fraction Strips & Circles** TT13 & 14, Number Line TT12, Decimal Grids TT7, Grids TT9* -***Use Patty Paper to model multiply fractions*** Topic 8 Review What You Know Prerequisite Skills Focus on Fractions number routines slides MathLearnCenterFractions Mathigon FractionBars Video: Fraction Multiplication Mathigon Fraction Multiplication Card Sort Lesson Where are the Cookies? - KDE Fractions Lesson Multiply & Divide Fractions Folder Interpreting Fractions Card Sort Lesson GA Fraction Operations Unit	Kendall Hunt Illustrative Multiply/Divide Fraction Part1 Part 2 **5.NF.4** Multiply Unit Fractions by Non-Unit Fractions Find a Fractional Part of a Group Find Areas of Rectangles Painting a Wall Connor and Makayla Discuss Multiplication Cornbread Fundraiser Cross Country Training Folding Strips of Paper Mrs. Gray's Homework Assignment Connecting the Area Model to Context Chavone's Bathroom Tiles New Park -MathAidsWordProblemsWorksheets -Khan Academy Lessons over multiplicity fractions videos problems -Multiplying Fractions Word Problems Kahoo **5.NF.5** Who Has the Longest Line? Calculator Trouble Comparing a Number and a Product Comparing Heights of Buildings Fundraising Grass Seedlings Reasoning about Multiplication Running a Mile Scaling Up and Down Mrs. Gray's Homework Assignment **5.NF.6** Mixed Number x Fraction Models Whole Number x Mixed Number Models Comparing Heights of Buildings Drinking Juice Half of a Recipe Making Cookies New Park Running to School To Multiply or not to multiply? To Multiply Or Not to Multiply2

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enVision Topic Topic 9 – Apply Understanding of Division to Divide Fractions 5.NF.3 5.NF.7 *Possibly omit lesson 9-8* *(approximately two weeks)* ***Hands-On or Online Manipulatives:*** ***Variety of Fraction Pieces, Fraction Strips & Circles*** *TT13 & 14, Number Line TT12, Grid Paper TT9&10* –Topic 9 Review What You Know Prerequisite Skills How Much Dew 3 act task The Kool Aid Kid 3 act task *The Water Boy 3 act task* *Let it Flow 3 act task* Mathigon FractionBars Video: Fraction Division Mathigon	Kendall Hunt Illustrative Multiply/Divide Fraction Part1 Part 2 **5.NF.3** Word Problems: Fractions and Mixed Number Quotients Converting Fractions of a Unit into a Smaller Unit How Much Pie? Sharing Lunches What is 23 ÷ 5? **5.NF.7** Divide a Unit Fraction by a Whole Number Divide a Whole Number by a Unit Fraction Divide a Whole Number by a Unit Fraction Divide Fractions & Whole Numbers Banana Pudding Dividing by One-Half How many servings of oatmeal? Painting a room Origami Stars How many marbles? Salad Dressing Standing in Line -Khan Academy Lessons dividing fractions videos problems -Dividing Fractions Word Problems Kahoot -MathAidsWordProblemsWorkSheets
enVision Topic Topic 7 – Use Equivalent Fractions to Add and Subtract Fraction 5.NF.1 5.NF.2 2 days for lesson 7-2, possibly omit lesson 7-12 (May need to review 4.NF.1 & 4.NF.3 equivalent fractions and add/subtract fractions common denominator) *(approximately four weeks)* ***Hands-On or Online Manipulatives:*** ***Variety of Fraction Pieces, Fraction Strips & Circles*** *TT13 & 14, Number Line TT12* Topic 7 Review What You Know Prerequisite Skills Topics 7-9 Vocabulary Cards Pizza with Friends - Number & Operations in Base Ten	Kendall Hunt Illustrative Add/Subtract Fractions **5.NF.1** Create Equivalent Fractions to Add Unlike Fractions Add and Compare: Mixed Numbers Subtract and Compare Build a Fraction Wall Making Fraction Strips Comparing Fractions Using Benchmarks Game Measuring Cups Egyptian Fractions Finding Common Denominators to Add Finding Common Denominators to Subtract Jog-A-Thon Making S'Mores Mixed Numbers with Unlike Denominators **5.NF.2** Do These Add Up? Salad Dressing Sharing Lunches Walkathon Literature Link: The Wishing Club Word Problems: Add and Subtract Fractions -KhanAcademy Lessons adding subtracting fractions videos

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Adding & Subtracting Fractions folder GA Fraction Operations Unit MathLearnCenterFractions Mathigon FractionBars Video: Adding Fractions with Mathigon	-Adding MathAidsWordProblemSheets -Subtracting MathAidsWordProblemSheets -Adding and Subtracting Word Problems Kahoot Interpreting Fractions slides -Pizza with Friends slides
enVision Topic Topic 12 – Represent and Interpret Data 5.MD.2 5.NF.2 5.NF.6 Possibly omit lesson 12-4 -Supplement: Question, Collect, Display, Analyze *(approximately one week)* *Hands-On or Online Manipulatives: Number Line TT12, Grids TT9&10, rulers (focus line plots with fractions –*Topic 12, 13 & 15 Vocabulary Cards –Topic 12 Review What You Know Prerequisite Skills	**5.MD.2** Fractions on a Line Plot Measuring Classroom Objects Line Plots with Fractional Data Add & Subtract Fractions on a Line Plot Lesson -Line Plot with Fractions Kahoot -Khan Academy Lessons interpreting data on line plots videos practice -Graph MathAidWorkSheets

Summative Assessment
(Common Unit Assessment in ADAM) This unit assessment will focus on using conceptual models to show multiplication, division addition and subtraction of fractions to solve problems. This assessment will be available on the ADAM platform.