Grade: 5 **FCPS 2023-2024 Math Unit 4 Framework** Unit 1 Unit 2 Unit 3 Unit 4

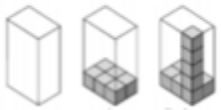
Unit 4 Volume, Customary Measurement, 2D Figures, Coordinate Graphing & Algebraic Relationships

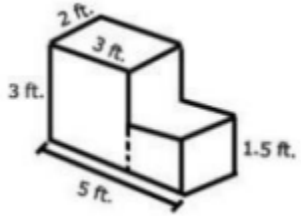
KY 5th grade Math Standards Unit 4 framework google link 5th grade Math Priority Content & Prerequisite Skills

Unit 4 Title: Volume, Customary Measures, 2D Figures, Coordinate Graphing & Algebraic Relationships	**Estimated Time Frame: 30 days**
Essential Standards: 5.MD.3, 5.MD.4, 5.MD.5, 5.G.2, 5.G.4, Supporting Standards: 5.MD.1, 5.OA.3, 5.G.1, 5.G.3	
Big Idea(s) **CRA explanations for 5th grade Unit 4**	
In real life, we estimate and measure weight, capacity, length, mass, time, temperature, area and volume every day. We also look for patterns to make sense of situations and solve problems. Geometry Progressions document Measurement Progressions document	
Essential Question(s)	**Common Preconceptions/Misconceptions:**
• What is the meaning of volume of a solid? • How can the volume of a rectangular prism be found? • What are customary measurement units and how are they related? • How can triangles and quadrilaterals be described, classified and named? • How are points plotted and relationships shown on a coordinate grid? • How can number patterns be analyzed, graphed and used to solve problems?	-Students often fail to realize that when they are given the length of one side of a square or the length and width of a rectangle that they can determine the perimeter and area of the given shape. -Students often confuse the fact that perimeter is a linear measurement whereas area is a two-dimensional measure. Students lack the basic understanding that perimeter is one dimensional, area is 2 dimensional and volume is 3 dimensional -Volume of a Solid Figure vs. Liquid Volume -Students may confuse growing patterns with repeating patterns and if not given many opportunities to explore patterns using concrete materials and calculators, they may may struggle finding an unknown term in a pattern when it is not the very next item. The Problem with Key Words

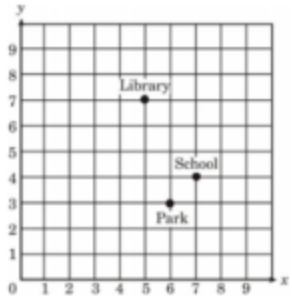
Unit 4 Volume, Customary Measurement, 2D Figures, Coordinate Graphing & Algebraic Relationships

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 4	**Prerequisite Skills & Essential Vocabulary**	**Sample Learning Intentions* & Sample Success Criteria***
KY.5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume and can be used**	-Recognize area as an attribute of plane figures and understand concepts of area measurement.	I am learning to measure the volume of a solid figure so…

to measure volume. **b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. MP.6** a.  one cubic unit  b. Coherence KY.3.MD.5→ KY.5.MD.3	Unit cube Volume Cubic Solid Figure Area Area of Base Rectangular Prism	• I can use unit cubes to measure the volume of a solid figure by packing the figure without gaps or overlaps.
KY.5.MD.4 Measure volumes by counting unit cubic cm, cubic in, cubic ft. and improvised units. MP.5, MP.6 Coherence KY.3.MD.6→ KY.5.MD.4	-Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	I am learning to measure volume with unit cubes so… • I can find the volume of a solid figure by counting the unit cubes.
KY.5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **a. Find the volume of a right rectangular prism with whole number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes.**	-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). Unit cube Volume	I am learning to find the volume of a rectangular prism by using unit cubes to develop the volume formula so…

b. Apply the formulas V= l x w x h and V = B x h for rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. **c. 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. MP.1, MP.4, MP.8** For example, students determine the volume of concrete needed to build the steps in the diagram below.  Coherence KY.4.MD.3→ KY.5.MD.5→KY.6.G.2	Cubic Solid Figure Area Area of Base Rectangular Prism	• I can use cubes to find the side lengths of a solid figure and apply the lengths to find the area of the Base (length x width) and multiply by the height (number of layers). I am learning to find the volume of a rectangular prism by using the formulas for volume so… • I can represent the volume of a figure using unit cubes and find the side lengths to apply to the volume formula (length x width x height). I am learning to find the volume of a solid figure by adding the volumes of two non-overlapping prisms so…

		• I can find the total volume of two solid non-overlapping right rectangular prisms by adding the volumes together.
Attending to the Standards for Mathematical Practice 5.MD Students use cubes to cover a bottom layer of a rectangular prism, understanding a cube as a unit cube (MP.5). As students place the cubes in layers to fill the rectangular solid, they notice the number of cubes in each layer can be found by multiplying [number of cubes in one row] x [number of rows] and this product (the base) can be multiplied by how many layers to determine how many unit cubes will fill the container (MP.8). Students connect this idea to the formulas for volume and use these formulas to solve problems (MP.4). When a three-dimensional shape is not a single rectangular solid, students analyze the shape and its measurements to determine how to decompose the shape and find the volume of each prism (MP.1).		
KY.5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation. MP.1, MP.6 For example, students use the coordinate grid, which ordered pair represents locations of places or objects.	Coordinate plane Quadrant Coordinate values Ordered pair	I am learning to graph points in the first quadrant of the coordinate plane that represent real world situations so… • I can graph a point in the first quadrant of the coordinate plane and explain how the point relates to the context of a real world situation.

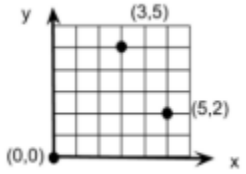
 Coherence KY.5.G.2→KY.6.G.3 KY.6.NS.8		
KY.5.G.4 Classify two-dimensional figures in a hierarchy based on properties. MP.1, MP.7 Figures from previous grades: polygons, rhombus/rhombi, rectangle, square, triangle quadrilateral, pentagon, hexagon, cube, trapezoid, half/quarter, circle. For example: -Polygon - a closed plane figure formed from line segments that meet only at their endpoints. -Quadrilateral - a four-sided polygon Rectangle - a quadrilateral with two pairs of congruent parallel sides and four right angles. -Rhombus - a parallelogram with all four sides equal in length -Square - a parallelogram with four congruent sides and four right angles. Coherence KY.4.G.2→ KY.5.G.4	-Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles. Right angle Obtuse angle Acute Angle Side	I am learning to create a hierarchy to classify two-dimensional figures based on properties so… • I can classify two-dimensional figures by attributes based on slides and angles.
Attending to the Standards for Mathematical Practice 5.G		

As they have done in grade 3, students describe attributes they notice for a particular type of quadrilateral, focusing on side lengths and angles (MP.6). They compare the lists of defining attributes across shapes to notice what they have in common and what is different. (MP.7). They explain some types of quadrilaterals (parallelograms) are also rectangles because all the attributes of a parallelogram are also attributes of a rectangle (MP.3). They use this analysis to build an understanding of a rectangle as a special case of a parallelogram (a parallelogram with 90 degree angles) and use these understandings to create a hierarchy of quadrilaterals (MP.1).

Supporting Standards:

KY.5.OA.3 Generate numerical patterns for situations. a. Generate a rule for growing patterns, identifying the relationship between corresponding terms (x, y). b. Generate patterns using one or two given rules (x, y). c. Use tables, ordered pairs and graphs to represent the relationship between the quantities. MP.2, MP.4 Given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, students generate terms in the resulting sequences (creating ordered pairs). Students observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so. Graph the ordered pairs on a coordinate plane. Coherence KY.4.OA.5→ KY.5.OA.3→KY.6.EE.9	-Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern not explicit in the rule itself. Numerical Patterns Corresponding Terms Table Ordered Pairs Origin Axis	I am learning to generate a rule for a pattern or a pattern when given a rule and use tables, ordered pairs and graphs to represent the relationship between the quantities so… • I can generate a rule for a growing pattern. • I can generate a numerical pattern given a rule. • I can use tables, ordered pairs and graphs to represent the relationship between quantities.

Attending to the Standards for Mathematical Practice 5.OA Students notice when they apply a rule, like add 3, several patterns emerge. The explicit pattern is the new value is 3 more than the original value. But, as they explore they notice if they pick an input that is 5 more than the last input, then the output is also 5 more. They reason about this contextually, for example thinking of people ages in three years. So, if they have a sibling that is 5 years older now, in three years, they will still be 5 years older (MP.2). They represent these patterns on graphs and use the graphs to make sense of the situation (MP.4)

KY.5.G.1 Use a pair perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis and the second number indicates how far to travel in the direction of the second. MP.4, MP.7 This standard pertains to the first quadrant only which limits to positive ordered pairs only  Coherence KY.5.G.1→KY.6.NS.6	-Draw points, lines, line segments, rays, angles (right, acute, obtuse) and perpendicular and parallel lines. Identify these in two-dimensional figures. Coordinate system Coordinate plane Quadrant Ordered pairs X-axis Y-axis Origin	I am learning to understand the first quadrant in the coordinate plane and how to graph ordered pairs so… • I can identify the x-axis and y-axis in the first quadrant of a coordinate plane and plot points (graph ordered pairs) in this quadrant. • I can use the x-coordinate and y-coordinate to plot a point (x,y) with positive ordered pairs in the coordinate plane.

Attending to the Standards for Mathematical Practice 5.G
Students notice a coordinate axis, is in fact, coordinating a horizontal number line with a vertical number line (MP.7). These two lines need a title, scale and a label in order to be understood by a reader (MP.6). Students record data in their graph

from exploring a pattern and gain insights about the pattern. For example, students graph data from a two-column table that shows the cost of buying pineapples (one pineapple costs $2, three pineapples costs $6) and use the coordinate axis to explain what they notice about the relationship between the number of pineapples and the cost of pineapples (MP.1).		
KY.5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. MP.3, MP.6 For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles. Coherence KY.4.G.2→ KY.5.G.3	Attributes Two-dimensional Equilateral Triangle Isosceles Triangle Scalene Triangle Right Triangle Parallelogram Trapezoid Square Rectangle Rhombus	I am learning to determine attributes of two-dimensional figures so… • I can identify the attributes of a two-dimensional figure. • I can place two-dimensional shapes in a category or subcategory based on their attributes.
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). 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	-Understand the relationship of measurement units within any given measurement system. Within any given measurement system, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.	I am learning to convert among different size measurement units in the customary system so… • I can convert customary units of length. • I can convert customary units of capacity. • I can convert customary units of weight.

	Inches, Foot, Yard, Mile Ounce, Cup, Pint, Quart Gallon, Ounces, Pound Ton, Second, Minute Hour, Measurement Mass, Volume, Capacity	• I can convert customary units of time.

Attending to the Standards for Mathematical Practice 5.MD
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.

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 Examples Three Reads Strategy **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 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 **5th grade Math FCPS Google Site of Resources** ***2nd Semester Teaching Tools*** **5th grade anchor charts**

Anchor Resources by enVision Topic	Supplemental Resources by Standard
enVision Topic 10 – Understand Volume Concepts **5.MD.3** **5.MD.4** **5.MD.5** *Possibly spend 2 days on lesson 10-1 to develop concept of volume with cubes, omit 10-6 (approximately two weeks)* Use Hands-On or *Online Manipulatives*: ***cubes (link cubes and/or cm cubes),*** *volume TT19, Grids TT9&10* Cubes online Topic 10 Review What You Know Prerequisite Skills Topic 10 Vocabulary Cards KDE Measurement and Data: Card Sort Volume **Packing Sugar** 3-Act Math Task **Overflow** 3-Act Math Task	**5.MD.3** Build a Cubic Meter **5.MD.4** Build Rectangular Prisms What's the Volume? **5.MD.5** Exploring Volume Roll a Rectangular Prism Find the Volume Comparing Volumes of Cereal Boxes Breaking Apart Composite Solids You Can Multiply Three Numbers in Any Order Using Volume to Understand the Associative Property of Multiplication Cari's Aquarium **Volume Concept Card Sort Slides** Fish Tank 3-Act Math Task Got Cubes 3-Act Math Task GA Volume Unit **5th grade Geometry/Measurement Folder** Kendall Hunt Illustrative Volume
enVision Topic 11 – Convert Measurements **5.MD.1** ***Customary only 11-1 to 11-3*** *Help students learn real world benchmarks for measurements (approximately one week)* ***Hands-On or*** *Online Manipulatives*: ***Variety of Measurement tools/ containers, rulers,*** *Grids TT9&10* Topic 11 Review What You Know Prerequisite Skills Topic 11 Vocabulary Cards	**5.MD.1** Compare Metric Units Minutes and Days Converting Fractions of a Unit into a Smaller Unit Kendall Hunt Illustrative Conversions

enVision Topic 16 – Geometric Measurement: Classify Two-Dimensional Figures ***5.G.3*** ***5.G.4*** *possibly omit lesson 16-4, Combine 16-2&16-3* *(approximately one weeks)* Hands-On or *Online Manipulatives*: ***Variety of Shapes (pattern blocks), rulers, AngleRulers/ Protractors*** –Topic 16 Review What You Know Prerequisite Skills –Topic 16 Vocabulary Cards	**5.G.3:** Triangles on the Geoboard Naming Quadrilaterals Quadrilateral Criteria Classify Quadrilaterals Always, Sometimes, Never MathigonPolypad shapes **5.G.4:** Quadrilateral Hierarchy -Review Shapes Angles Symmetry Concept Card Sort Slides GA 2D Figures Unit Kendall Hunt Illustrative 2D Shapes
enVision Topic Topic 14 – Graph Points on a Coordinate **5.G.1** **5.G.2** *omit lesson 14-4* *(approximately one week)* Hands-On or Online Manipulatives: **Coordinate Grids** TT20, Grids TT9&10 Topic 14 Review What You Know Prerequisite Skills Topic 14 Vocabulary Cards	**5.G.1:** Coordinate Grid Geoboards Coordinate Grid Tangram The Fly on the Ceiling Battle Ship Using Grid Paper **5.G.2:** How Many Equivalent Fractions? How Many Pages? Mystery Pictures 10A-11B GA Coordinate Plane Unit Kendall Hunt Illustrative Coordinate Plane
enVision Topic 15 – Algebra: Analyze Patterns and Relationships **5.OA.3** **5.G.2** *omit lesson 15-4, possibly combine 15-1 to 15-3)* *(approximately one week)* Hands-On or Online Manipulatives: **Coordinate Grids** TT20, Grids TT9, Shapes for patterns –Topic 15 Review What You Know Prerequisite Skills	**5.OA.3** **5.G.2** hexagons in a row Sidewalk Patterns Patterns on the Coordinate Plane Task Cards (A-D) Kendall Hunt Illustrative Patterns

Topic 17 – Step Up to 6th grade	Open Middle Slides for Review/Enrichment
Summative Assessment	
(Unit Assessment) This unit assessment will focus on conceptual models of volume, characteristics of 2D shapes, customary measurement, graphing in the coordinate plane and algebraic relationships……..	