Grade: 4   **FCPS 2023-2024 Math Unit 4 Framework**

Unit 4: Measurement, Patterns, Lines, Angles, & Shapes

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

Unit 4 Title: Measurement, Patterns, Lines, Angles, & Shapes	Estimated Time Frame: 30 days

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

Big Idea(s)   **CRA explanations for 4th grade Unit 4**

- Two dimensional figures can be classified by common characteristics.
- Students at this level will be given the equivalent measure of one unit when asked to determine
- equivalencies between units in the U.S. Customary and metric systems
- Points, lines, line segments, rays, and angles, including endpoints and vertices are fundamental components of noncircular geometric figures
- An angle is formed by two rays that share a common endpoint called the vertex. Angles are found wherever lines or line segments intersect.
- Perpendicular lines intersect at right angles. The symbol ⊥ is used to indicate that two lines are perpendicular. Parallel lines lie in the same plane and never intersect. Parallel lines are always the same distance apart and do not share any points. The symbol ∥ indicates that two or more lines are parallel.
- Students should have opportunities to investigate and discover, using manipulatives, the formulas for the area and perimeter of a square and/or rectangle.

Geometry Progressions document   Measurement Progressions document

Essential Question(s)	Common Preconceptions/Misconceptions:
- How can you convert from one unit to the other? - How can you be precise when solving math problems? - How do you use a rule or table to continue a	- Students may struggle to understand that points, rays and line segments are all parts of a line. - Students may confuse the terms line and line segment. - Students may struggle with writing the symbolic notation

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pattern?
- How can you use a repeating pattern to predict a shape?
- What are geometric terms? How can you measure angles?
- How can you classify quadrilaterals and triangles? What is symmetry?

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for ray because the first letter named should be the endpoint.
- Students may not realize that there are 3 ways to name an angle: 1 letter for the vertex, 3 letters in order (1 for vertex, 1 for a ray, 1 for the other ray), and a number inside of the rays of the angle.
- Students are often confused by the fact that perpendicular lines are a special case for intersecting lines because the lines must be 90 degree angles.
- Students may struggle with the difference between weight and mass. Mass is the amount of matter in an object, while weight is determined by the pull of gravity on an object. Mass is always the same, whereas weight changes depending on location.
- Students may struggle with whether they have to multiply or divide when solving problems involving measurement conversions.
- Students have a common misconception that changing the orientation of an object changes what shape it is.
- Students will frequently refer to a rotated square as a diamond. Clarification needs to be ongoing (e.g., a square is a square regardless of its location in space; there is no plane figure called a diamond)
- 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 4th grade Unit 4**	**Prerequisite Skills & Essential Vocabulary**	**Sample Learning Intentions* & Sample Success Criteria***
KY.4.MD.1 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.**	-Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Convert	I am learning to convert metric and customary units of measurement from one unit to another to recognize the relative size of different units so… ● I can convert different units

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c. Record measurement equivalents in a two-column table. MP.5, MP.6 **Two- column tables may include:** 	kg	g
---	---
1	1000
2	2000
3	3000 | | ft	in
---	---
1	12
2	24
3	36 | | lb	oz
---	---
1	16
2	32
3	48 | Coherence KY.4.MD.1→KY.5.MD.1	Conversion Length Grams Kilograms Pounds Ounces Feet Inches Yards Liter Milliliter Kilogram Centimeter Meter Millimeter Kilometer	of length. ● I can convert different units of mass. ● I can convert different units of weight. ● I can convert different units of time. ● I can convert different units of liquid volume. ● I can use a two column table to represent conversions.
KY.4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money. **a. Solve measurement problems involving whole number, simple fractions or decimals.** **b. Solve problems that require converting a given measurement from a larger unit to a smaller unit within a common measurement system, such as 2 km = 2,000 m.** **c. Visually display measurement quantities using representations such as number lines that feature a measurement scale. MP.1, MP.4**	-Measure and solve problems involving mass and liquid volume. a. Measure and estimate masses and liquid volumes of objects using standard units of grams (g), kilograms (kg) and liters (L). b. Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are	I am learning to solve word problems using the four operations that include different types of measurement so… ● I can solve distance word problems with converting and visual representations using the four operations.

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Note: grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100. Coherence KY.3.MD.2→KY.4.MD.2	given in the same units. Distance Volume Mass Elapsed	- I can solve elapsed time word problems with visual representations using the four operations. - I can solve mass word problems with converting and visual representations using the four operations. - I can solve money word problems with visual representations using the four operations. - I can solve liquid volume word problems with converting and visual representations using the four operations.

Attending to the Standards for Mathematical Practice 4.MD

Students know relative sizes of measurement units by actually measuring with the units and establishing a reference to an object. For example, recognizing a centimeter is about the width of their finger (MP.5). Students also measure objects using different units within the same system, such as meters and in centimeters (using a meter stick). Record the measurements in a table and notice relationships (MP.8). They explain why this pattern is true, arguing each meter has 100 centimeters, so 3 meters will have 300 centimeters and more generally explaining the smaller the unit the more units there will be when measuring the same object (MP.3). As students solve problems, they attend to and explain the attribute being measured (length or area), the unit being used to measure and make sense of the problem using drawings, tools, or strategies that make sense to them (MP.1, MP.3).

KY.4.MD.5 Recognize angles as geometric shapes that	-Understand a fraction	I am learning to recognize that an

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are formed wherever two rays share a common endpoint and understand concepts of angle measurement. MP.7 An angle that turns through $\frac{1}{360}$ of a circle is called a "one-degree angle," and can be used to measure angles. An angle that turns through n one-degree angles is said to have an angle measure of n degrees. Angles are measured in reference to a circle with the center at that common point.	$\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size 1 Line Angle Degrees	angle is formed by two rays that come together at a common endpoint and understand concepts of angle measurement so… ● I can identify that an angle is made up of two rays. ● I can describe a circle as a figure that has 360 degrees and an angle is a fraction of a circle. ● I can explain angle measurement in terms of degrees.
KY.4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. MP.5, MP.6 Coherence KY.4.MD.5→KY.4.MD.7.	Protractor Acute Angle Obtuse Angle Right Angle Straight Angle	I am learning to measure angles in whole number degrees using a protractor and sketch angles of specified measure so… ● I can read a protractor. ● I can use a protractor to measure angles. ● I can sketch angles given a specific measurement.
Attending to the Standards for Mathematical Practice 4.MD Students explore angle measures using tools (MP.5). For example, the white rhombus in a pattern block set or a cardboard cut-out is used as a 'unit' angle (a non-standard unit). Students use this tool to measure the size of other angles, noticing		

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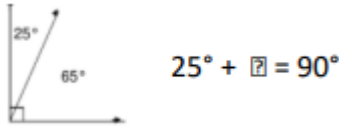|		
that angle measures are additive (MP.1). Building on concrete experiences, students explain $\frac{1}{360}$ of a circle, called a "one-degree angle," is the unit for measuring angles (MP.7). Students connect their concrete measuring experiences with a new tool, the protractor and use it to more precisely determine angle measures (MP.5, MP.6). When solving word problems involving angle measures, students use drawings and tools to make sense of the problem, recognizing non-overlapping angles can be added or subtracted to find missing angles (MP.1).		
KY.4.G.2 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. MP.7 **Coherence KY.3.G.1→KY.4.G.2→KY.5.G.3**	-Classify polygons by attributes. a. Recognize and classify polygons based on the number of sides and vertices (triangles, quadrilaterals, pentagons and hexagons). b. Recognize and classify quadrilaterals (rectangles, squares, parallelograms, rhombuses, trapezoids) by side lengths and understanding shapes in different categories may share attributes and the shared attributes can define a larger category. c. Identify shapes that do not belong to a given category or subcategory. Classify	I am learning to classify two-dimensional figures based on their characteristics of lines and angles so… ● I can classify a two dimensional shape based on the use of parallel and or perpendicular lines. ● I can classify a two dimensional shape based on the use of angles. ● I can identify a right triangle.

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	Two-dimensional shapes	
Supporting Standards:		
KY.4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. MP.1, MP.3 Students apply the area and perimeter formulas to real world problems with an unknown factor: Area = length × width (A = L × W) Perimeter = (2 x L)+ (2 x W) Coherence KY.3.MD.7 KY.3.MD.8→KY.4.MD.3→KY.5.MD.5	-Solve real world and mathematical problems involving perimeters of polygons. a. Find the perimeter given the side lengths of a polygon. b. Find an unknown side length, given the perimeter and some lengths. c. Draw rectangles with the same perimeter and different areas or with the same area and different perimeters. Area, Perimeter Length, Width	I am learning to use area and perimeter to solve real world problems so… ● I can use the formula for perimeter to solve real world problems. ● I can use the formula for area to solve real world problems.

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KY.4.MD.7 Recognize angle measure as additive. When an angle is into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems. MP.1, MP.4 For example, students use an equation with a symbol for $25° + ? = 90°$ the unknown angle measure. Coherence KY.4.MD.7→KY.7.G.5	Complementary angles Supplementary angles Adjacent angles	I am learning to use addition and subtraction to find the measurement of unknown angles so… ● I can recognize an angle's measurement as the sum of its two parts. ● I can use a diagram to find the measurement of an unknown angle. ● I can solve unknown angle measurement problems.
KY.4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern not explicit in the rule itself. MP.2, MP.3 For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. Coherence KY.3.OA.9→KY.4.OA.5→KY.5.OA.3	Pattern Generate Rule Features	I am learning to identify, extend, and generate patterns to follow a given rule so… ● I can identify the rule of a number or shape pattern. ● I can extend the number or shape pattern based on a given rule. I am learning to identify apparent features of the pattern not stated so… ● I can generate a number or shape pattern based on

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		a given rule. ● I can identify additional features of the pattern that are not stated in the rule itself.
Attending to the Standards for Mathematical Practice 4.OA Students analyze growing patterns and determine rules to describe the pattern (MP.2). Students know a pattern is a sequence that repeats the same rule over and over. Students generate their own rules and create an example using that rule, for example, they write 1, 3, 9, 27, 81, 243 for the rule "times 3". Students describe features of the pattern for example, all numbers are odd, or sums of the digits equal 9 and the rule for generating the next number, for example "times 3", as well as critique the reasonableness of features and rules they hear from others (MP.3).		
KY.4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse) and perpendicular and parallel lines. Identify these in two-dimensional figures. MP.5, MP.6 Coherence KY.3.G.1→KY.4.G.1	Points Lines Line segments Rays Angles Perpendicular lines Parallel lines Two-dimensional figures	I am learning to identify and draw points, lines, line segments, rays, angles, perpendicular, and parallel lines so… ● I can identify points, lines, line segments, rays, angles, perpendicular, and parallel lines in two dimensional figures. ● I can draw points, lines, line segments, rays, angles (right, acute, obtuse), perpendicular, and parallel lines.

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KY.4.G.3 Identify lines of symmetry. a. Recognize a line of symmetry for a two-dimensional figure. b. Identify line-symmetric figures and draw lines of symmetry. MP. 5, MP.7	Symmetry Line of symmetry	I am learning to identify and draw lines of symmetry so… ● I can identify lines of symmetry on two dimensional figures. ● I can draw lines of symmetry on two dimensional figures.
Attending to the Standards for Mathematical Practice 4.G Using technology, using straightedges and/or protractors, students draw points, lines, line segments, rays, angles and perpendicular and parallel lines (MP.5). Students reason about the possible relationship of two lines or line segments. For example, students might use technology, uncooked spaghetti, or lines drawn on two transparency strips, to arrange two lines in different ways to determine possible events (the two lines might intersect, might intersect and be perpendicular, or may be parallel) (MP.7). Students analyze, compare and sort polygons based on their sides, angles and symmetry, explaining whether an attribute is a defining characteristic of that shape (MP.7).		
***Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. These examples are not comprehensive.		
Practice Standards and Number Sense Resources:		

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Mathematics Practice Standards, Games and Routines *(Introduced in the first weeks 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 **4th grade Anchor charts** **-2ⁿᵈ Semester Teaching Tools** **4th grade number sense routines slides** (VA) *(use number routines 5-10 minutes daily all year in addition to math class time)* **Math Routines & Resources**	**2ⁿᵈ Semester Take-Home Games** -TheresaWills Games -EnVisionMathGames -Investigations Math Games -Investigations Math Words and Ideas -*KDE Family Math Games* Word Wall Cards -*4th grade HomeLetters* *4th grade additional practice* **4th grade Math FCPS Google Site of Resources** Additional: Number Routines used 5-10 minutes daily all year(MD) **51 Esti-Mysteries** **Splat**
Anchor Resources by enVision Topic	**Supplemental Resources by Standard**
enVision Topic Topic 13 – Measurement: Find Equivalence in Units of Measure 4.MD.1 4.MD.2 4.MD.3 *4.NF.4* Omit mixed number examples skip VisualLearn 13-1,13-3 & 13-6, skip Solve&Share 13-2 *(approximately two weeks)* *Use Hands-On or Online Manipulatives:* **Variety of Measurement tools & containers (**Possibly Combine tests 13-16) -Topic 13 Review What You Know Prerequisite Skills -Topic 13 Vocabulary Cards **Piles of Tiles** 3 act math task **Paper Cut** 3 act math task	Kendall Hunt Illustrative Measurement GA Measurement Unit **4th grade Geometry Measurement Folder tasks by standard** **4.MD.1** Measurement Concentration One Gallon Capacity Conversions Who is the tallest? **4.MD.2** Word Problems: Measurement Conversions Margie Buys Apples **4.MD.3** Designing a Zoo Enclosure Karl's Garden

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enVision Topic Topic 14 – Algebra: Generate and Analyze Patterns 4.OA.5 *combine 14-1&14-3* *(approximately one week)* *Use Hands-On or Online Manipulatives:* **Cubes, Shapes, grid paper** *Teaching Tools 9 & 10* *-Topic 14 Review What You Know Prerequisite Skills*	**4.OA.5** *Buttons* **Square Numbers** **Building Hexagons from Trapezoids Numerical Patterns Q-T** Kendall Hunt Illustrative Patterns
enVision Topic Topic 15 – Geometric Measurement: Understanding Concepts of Angles & Measurement 4.MD.5 4.MD.6 4.MD.7 *4.G.1* *Possibly omit lesson 15-5 & 15-6 May need additional days lessons 15-1 & 15-3* *(approximately two weeks)* *Use Hands-On or Online Manipulatives:* **Variety of Shapes (pattern blocks, shape sets), AngleRulers/Protractors** *Topic 15 Review What You Know Prerequisite Skills* *Topic 15 Vocabulary Cards* Virtual Protractor Protractor Game Mathigon Shapes and Protractor	Kendall Hunt Illustrative Angles **4th grade Geometry Measurement Folder tasks by standard** Shapes Angles Symmetry Concept Card Sort FAL GA Geometry Unit **4.MD.5** Angles in Circles **4.MD.6** Angle Barrier Game Measure and Draw Angles Measuring Angles **4.MD.7** Angle Measures Finding an unknown angle Measuring Angles

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enVision Topic Topic 16 – Lines, Angles, and Shapes **4.G.1 4.G.2 4.G.3** *Omit lesson 16-6 May need 2 days lessons 16-2 & 16-3 Combine lessons 16-4 16-5* *(approximately one week)* *Use Hands-On or Online Manipulatives:* **Variety of Shapes, mirror, MIRA** Topic 16 Review What You Know Prerequisite Skills -Topic 16 Vocabulary Cards ****For the Win** *3 act math task*	Kendall Hunt Illustrative Shapes **4th grade Geometry Measurement Folder tasks by standard** GA Geometry Unit **4.G.1** Name Geometry Geoboard Line Segments Lines, Rays & Line Segments The Geometry of Letters What's the Point? **4.G.2** Quadrilateral Criteria Classifying 2D Figures Tangram Explorations Are these right? Defining Attributes of Rectangles and Parallelograms Finding an unknown angle What shape am I? **4.G.3** Symmetry in Regular Polygons Symmetrical Designs Finding Lines of Symmetry Lines of symmetry for quadrilaterals Lines of symmetry for triangles
Topic 17 – Step Up to 5th grade	Open Middle Slides for Review/Enrichment

Summative Assessment
(Common Unit Assessment in ADAM) This unit assessment will focus on measurement, patterns, lines, angles and shapes….