



3rd GRADE

MATHEMATICS

CURRICULUM

Aligned to:

Kentucky Academic Standards

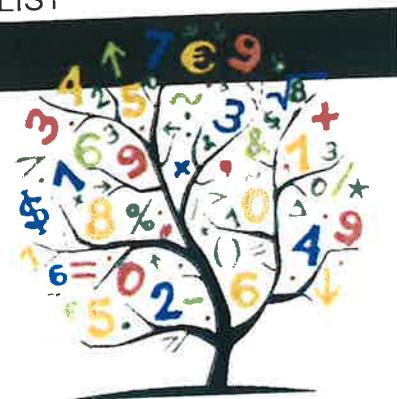
iReady Classroom Mathematics

KASC ACADEMIC STANDARDS CHECKLIST

MATHEMATICS

User's Name:

Use the columns as a checkoff or a place to take notes to track any curriculum issue. For instance, you might list the unit or marking period in which a standard was mastered, the areas where teachers want additional professional development opportunities, or any issue you need to analyze as you work to enhance your students' performance. See the folder labeled Ideas for Usage for further suggestions on ways to use the checklists and cards.



THIRD GRADE

Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division

3.OA.1	Interpret and demonstrate products of whole numbers.	
3.OA.2	Interpret and demonstrate whole-number quotients of whole numbers, where objects are partitioned into equal shares.	
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.	
3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	
3.OA.5	Apply properties of operations as strategies to multiply and divide.	
3.OA.6	Understand division as an unknown-factor problem.	

Multiply and divide within 100

3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.	
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Solve problems involving the four operations and identify and explain patterns in arithmetic

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.	
3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.	

Numbers and Operations in Base Ten

Use place value understanding and properties of operations to perform multi-digit arithmetic.

Note: A range of algorithms may be used

3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	
3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction.	
3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range of 10–90 using strategies based on place value and properties of operations.	

Numbers and Operations Fractions

Develop understanding of fractions as numbers. Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.

3.NF.1	Understand a fraction $\frac{1}{b}$ 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 $\frac{1}{b}$. <small>Understand a fraction as a number on the number line, represent fractions on a number line.</small>	
3.NF.2	a. Represent a fraction $\frac{1}{b}$ (unit fraction) on a number line by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. • Recognize each part has size $\frac{1}{b}$. • a unit fraction, $\frac{1}{b}$, is located $\frac{1}{b}$ of a whole unit from 0 on the number line. b. Represent a non-unit fraction a/b on a number line by marking off lengths of $\frac{1}{b}$ (unit fractions) from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the non-unit fraction $\frac{a}{b}$ on the number line	
3.NF.3	Explain equivalence of fractions in special cases and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or same point on a number line. b. Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent through writing or drawing. c. Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions.	

Measurement and Data

Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects

3.MD.1	Tell and write time to the nearest minute and measure elapsed time intervals in minutes. Solve word problems involving addition and subtraction of time intervals within and across the hour in minutes.	
3.MD.2	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 given in the same units.	

Understand and apply the statistics process

3.MD.3	Investigate questions involving categorical data. a. Identify a statistical question focused on categorical data and gather data; b. Create a scaled pictograph and a scaled bar graph to represent a data set (using technology or by hand); c. Make observations from the graph about the question posed, including "how many more" and "how many less" questions.	
3.MD.4	Investigate questions involving numerical data. a. Identify a statistical question focused on numerical data; b. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. c. Show the data by making a dot plot where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters. d. Make observations from the graph about the question posed, including questions about the shape of the data and compare responses.	

Measurement and Data cont.

Geometric measurement: understanding concepts of area and relate area to multiplication and to addition

	3.MD.5	Recognize area as an attribute of plane figures and understand concepts of area measurement.	
	3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	
	3.MD.7	<p>Relate area to the operations of multiplication and addition.</p> <p>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.</p> <p>b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning.</p> <p>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 $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.</p> <p>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.</p>	

Geometric measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures

	3.MD.8	<p>Solve real world and mathematical problems involving perimeters of polygons.</p> <p>a. Find the perimeter given the side lengths of a polygon.</p> <p>b. Find an unknown side length, given the perimeter and some lengths.</p> <p>c. Draw rectangles with the same perimeter and different areas or with the same area and different perimeters.</p>	
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Geometry

Reason with shapes and their attributes

	3.G.1	<p>Classify polygons by attributes.</p> <p>a. Recognize and classify polygons based on the number of sides and vertices (triangles, quadrilaterals, pentagons and hexagons).</p> <p>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.</p> <p>c. Identify shapes that do not belong to a given category or subcategory.</p>	
	3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.	

Embrace the Pace

**Grade****3**

Use this Instructional Day Tracker to monitor the days as you teach each unit in i-Ready Classroom.

Mathematics. Each space on the tracker represents one 45- to 60-minute session of teaching in the program.

The number of instructional days are approximate because we know your students may need more or less time depending on the content, and you will adjust your instruction to best meet their needs.

You will see which Priority Topics are addressed in each of the units.

The Priority Topics for Grade 3 are:

- ① Add and subtract within 1,000 using concepts of place value.
- ② Develop an understanding of multiplication and division, and use strategies to multiply and divide within 100.
- ③ Develop an understanding of the structure of rectangular arrays and the concept of area.
- ④ Develop an understanding of fractions including unit fractions, or fractions with a numerator of 1.

Unit 1 Three-Digit Numbers: Place Value, Addition, and Subtraction

Priority Topic 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Unit 2 Multiplication and Division: Concepts, Relationships, and Patterns

Priority Topic 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Unit 3 Multiplication: Finding Area, Solving Word Problems, and Using Scaled Graphs

Priority Topic 3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Unit 4 Fractions: Equivalence and Comparison, Measurement, and Data

Priority Topic 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Unit 5 Measurement: Time, Liquid Volume, and Mass

Priority Topic 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Unit 6 Shapes: Attributes and Categories, Perimeter and Area, and Partitioning

Priority Topic 6

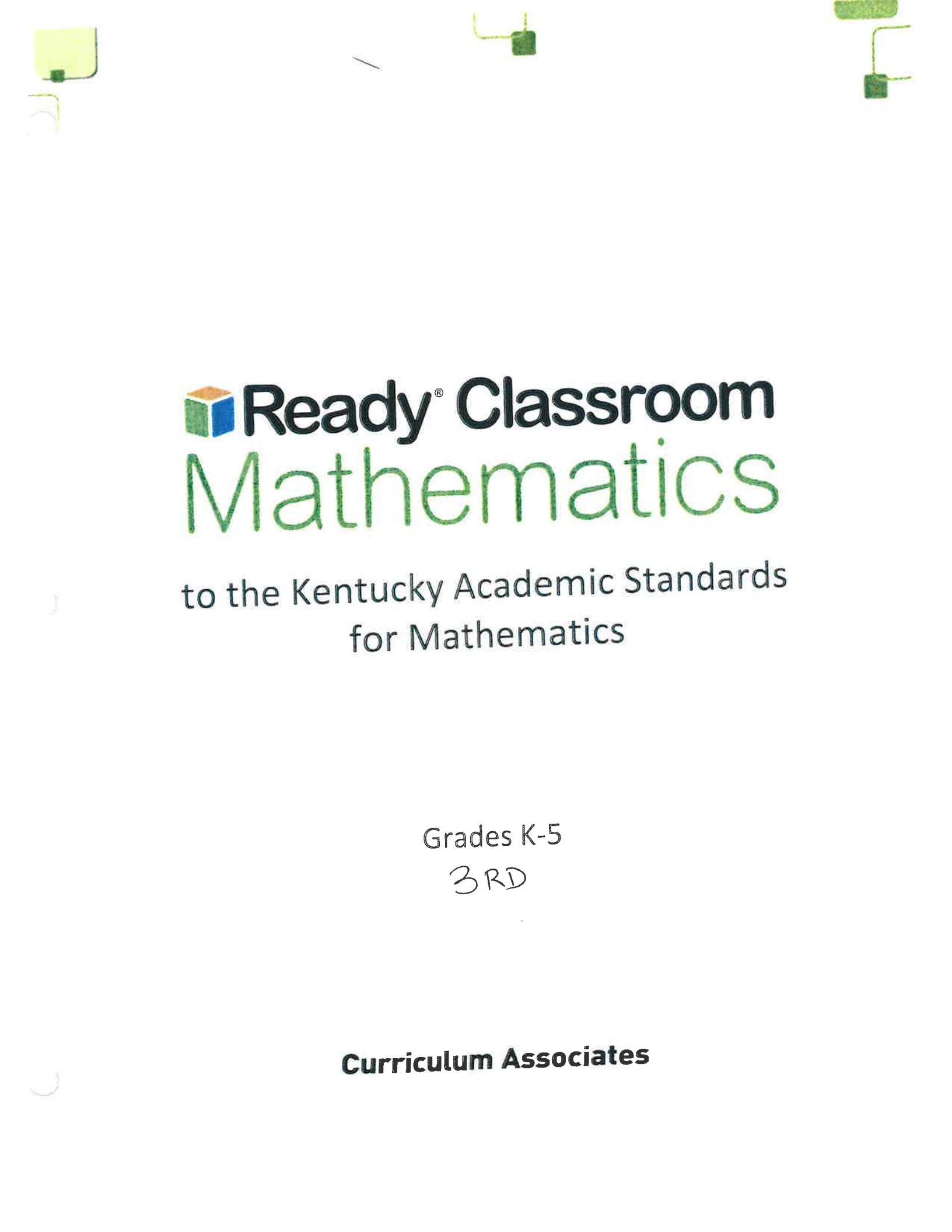
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Additional Days Bank

Priority Topics 7-10

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

You can use these additional instructional days to support your students as you see fit. To determine how many additional days you have available, please check with your school or district calendar.



Ready[®] Classroom Mathematics

to the Kentucky Academic Standards
for Mathematics

Grades K-5

3 RD

Curriculum Associates

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
GRADE 3		
KY.3.OA	Operations and Algebraic Thinking	
Represent and solve problems involving multiplication and division.		
KY.3.OA.1	Interpret and demonstrate products of whole numbers.	<p>Lesson 4: Understand the Meaning of Multiplication</p> <p>Additional Content: Lesson 8: Use Order and Grouping to Multiply; Lesson 9: Use Place Value to Multiply; Lesson 19: Scaled Graphs</p>
KY.3.OA.2	Interpret and demonstrate whole-number quotients of whole numbers, where objects are partitioned into equal shares.	Lesson 10: Understand the Meaning of Division
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.	<p>Lesson 5: Multiply with 0, 1, 2, 5, and 10 Lesson 6: Multiply with 3, 4, and 6 Lesson 7: Multiply with 7, 8, and 9 Lesson 17: Solve One-Step Word Problems Using Multiplication and Division</p> <p>Additional Content: Lesson 4: Understand the Meaning of Multiplication; Lesson 8: Use Order and Grouping to Multiply; Lesson 12: Multiplication and Division Facts; Lesson 15: Multiply to Find Area; Lesson 16: Add Areas; Lesson 18: Solve Two-Step Word Problems Using the Four Operations; Lesson 19: Scaled Graphs; Lesson 28: Liquid Volume; Lesson 29: Mass; Lesson 32: Area and Perimeter of Shapes</p>

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	<p>Lesson 12: Multiplication and Division Facts</p> <p>Additional Content: Lesson 17: Solve One-Step Word Problems Using Multiplication and Division; Lesson 18: Solve Two-Step Word Problems Using the Four Operations</p>
Understand properties of multiplication and the relationship between multiplication and division.		
KY.3.OA.5	Apply properties of operations as strategies to multiply and divide.	<p>Lesson 5: Multiply with 0, 1, 2, 5, and 10 Lesson 6: Multiply with 3, 4, and 6 Lesson 7: Multiply with 7, 8, and 9 Lesson 8: Use Order and Grouping to Multiply</p> <p>Additional Content: Lesson 9: Use Place Value to Multiply; Lesson 10: Understand the Meaning of Division; Lesson 12: Multiplication and Division Facts; Lesson 16: Add Areas</p>
KY.3.OA.6	Understand division as an unknown-factor problem.	<p>Lesson 11: Understand How Multiplication and Division Are Connected</p> <p>Additional Content: Lesson 12: Multiplication and Division Facts; Lesson 17: Solve One-Step Word Problems Using Multiplication and Division</p>

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
Multiply and divide within 100.		
KY.3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.	<p>Lesson 5: Multiply with 0, 1, 2, 5, and 10 Lesson 6: Multiply with 3, 4, and 6 Lesson 7: Multiply with 7, 8, and 9 Lesson 12: Multiplication and Division Facts</p> <p>Additional Content: Lesson 9: Use Place Value to Multiply; Lesson 17: Solve One-Step Word Problems Using Multiplication and Division; Lesson 18: Solve Two-Step Word Problems Using the Four Operations; Lesson 28: Liquid Volume; Lesson 29: Mass; Lesson 32: Area and Perimeter of Shapes</p>
Solve problems involving the four operations and identify and explain patterns in arithmetic.		
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.	Lesson 18: Solve Two-Step Word Problems Using the Four Operations
KY.3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.	Lesson 13: Understand Patterns
KY.3.NBT Number and Operations in Base Ten Use place value understanding and properties of operations to perform multi-digit arithmetic. Note: A range of algorithms may be used.		
KY.3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	<p>Lesson 1: Use Place Value to Round Numbers</p> <p>Additional Content: Lesson 2: Add Three-Digit Numbers; Lesson 3: Subtract Three-Digit Numbers; Lesson 18: Solve Two-Step Word Problems Using the Four Operations</p>

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction.	<p>Lesson 2: Add Three-Digit Numbers Lesson 3: Subtract Three-Digit Numbers</p> <p>Additional Content: Lesson 18: Solve Two-Step Word Problems Using the Four Operations; Lesson 28: Liquid Volume; Lesson 29: Mass</p>
KY.3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10-90 using strategies based on place value and properties of operations.	Lesson 9: Use Place Value to Multiply
KY.3.NF Number and Operations—Fractions		Develop understanding of fractions as numbers. Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.
KY.3.NF.1	Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.	<p>Lesson 20: Understand What a Fraction Is</p> <p>Additional Content: Lesson 21: Understand Fractions on a Number Line; Lesson 22: Understand Equivalent Fractions; Lesson 24: Understand Comparing Fractions; Lesson 33: Partition Shapes into Parts with Equal Areas</p>
KY.3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line.	<p>Lesson 21: Understand Fractions on a Number Line</p> <p>Additional Content: Lesson 22: Understand Equivalent Fractions; Lesson 23: Find Equivalent Fractions; Lesson 24: Understand Comparing Fractions; Lesson 25: Use Symbols to Compare Fractions; Lesson 26: Measure Length and Plot Data on Line Plots</p>

Kentucky Academic Standards for Mathematics Grades K-5	Ready Classroom Mathematics Lessons Grades K-5
KY.3.NF.2.a Represent a fraction $1/b$ (unit fraction) on a number line by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts.	<p>Lesson 21: <i>Understand Fractions on a Number Line</i></p> <p>Additional Content: Lesson 22: <i>Understand Equivalent Fractions</i>; Lesson 23: <i>Find Equivalent Fractions</i>; Lesson 24: <i>Understand Comparing Fractions</i>; Lesson 25: <i>Use Symbols to Compare Fractions</i>; Lesson 26: <i>Measure Length and Plot Data on Line Plots</i></p>
KY.3.NF.2.a. 1 Recognize each part has size $1/b$.	<p>Lesson 21: <i>Understand Fractions on a Number Line</i></p> <p>Additional Content: Lesson 22: <i>Understand Equivalent Fractions</i>; Lesson 23: <i>Find Equivalent Fractions</i>; Lesson 24: <i>Understand Comparing Fractions</i>; Lesson 25: <i>Use Symbols to Compare Fractions</i>; Lesson 26: <i>Measure Length and Plot Data on Line Plots</i></p>
KY.3.NF.2.a. 2 A unit fraction, $1/b$ is located $1/b$ of a whole unit from 0 on the number line.	<p>Lesson 21: <i>Understand Fractions on a Number Line</i></p> <p>Additional Content: Lesson 22: <i>Understand Equivalent Fractions</i>; Lesson 23: <i>Find Equivalent Fractions</i>; Lesson 24: <i>Understand Comparing Fractions</i>; Lesson 25: <i>Use Symbols to Compare Fractions</i>; Lesson 26: <i>Measure Length and Plot Data on Line Plots</i></p>

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.NF.2.b	Represent a non-unit fraction a/b on a number line by marking off a lengths of $1/b$ (unit fractions) from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the non-unit fraction a/b on the number line.	<p>Lesson 21: Understand Fractions on a Number Line</p> <p>Additional Content: Lesson 22: Understand Equivalent Fractions; Lesson 23: Find Equivalent Fractions; Lesson 24: Understand Comparing Fractions; Lesson 25: Use Symbols to Compare Fractions; Lesson 26: Measure Length and Plot Data on Line Plots</p>
KY.3.NF.3	Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.	<p>Lesson 22: Understand Equivalent Fractions</p> <p>Lesson 23: Find Equivalent Fractions</p> <p>Lesson 24: Understand Comparing Fractions</p> <p>Lesson 25: Use Symbols to Compare Fractions</p> <p>Additional Content: Lesson 33: Partition Shapes into Parts with Equal Areas</p>
KY.3.NF.3.a	Understand two fractions as equivalent (equal) if they are the same size, or same point on a number line.	<p>Lesson 22: Understand Equivalent Fractions</p> <p>Additional Content: Lesson 23: Find Equivalent Fractions</p>
KY.3.NF.3.b	Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent through writing or drawing.	<p>Lesson 23: Find Equivalent Fractions</p> <p>Additional Content: Lesson 25: Use Symbols to Compare Fractions; Lesson 33: Partition Shapes into Parts with Equal Areas</p>
KY.3.NF.3.c	Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers.	Lesson 23: Find Equivalent Fractions

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.NF.3.d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions.	Lesson 24: Understand Comparing Fractions Lesson 25: Use Symbols to Compare Fractions <u>Additional Content:</u> Lesson 33: Partition Shapes into Parts with Equal Areas
KY.3.MD Measurement and Data		
Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects.		
KY.3.MD.1	Tell and write time to the nearest minute and measure elapsed time intervals in minutes. Solve word problems involving addition and subtraction of time intervals within and across the hour in minutes.	Lesson 27: Time
KY.3.MD.2	Measure and solve problems involving mass and liquid volume.	Lesson 28: Liquid Volume Lesson 29: Mass
KY.3.MD.2.a	Measure and estimate masses and liquid volumes of objects using standard units of grams (g), kilograms (kg) and liters (L).	Lesson 28: Liquid Volume Lesson 29: Mass
KY.3.MD.2.b	Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units	Lesson 28: Liquid Volume Lesson 29: Mass <u>Additional Content:</u> Lesson 9: Use Place Value to Multiply; Lesson 17: Solve One-Step Word Problems Using Multiplication and Division; Lesson 18: Solve Two-Step Word Problems Using the Four Operations

**Kentucky Academic Standards for Mathematics
Grades K-5**

**Ready Classroom Mathematics Lessons
Grades K-5**

Understand and apply the statistics process.

KY.3.MD.3	Investigate questions involving categorical data.	<p>Lesson 19: Scaled Graphs</p> <p><i>See Grade 2:</i> Lesson 4: Draw and Use Bar Graphs and Picture Graphs</p>
KY.3.MD.3.a	Identify a statistical question focused on categorical data and gather data;	<p>Lesson 19: Scaled Graphs</p> <p>Lesson 26: Measure Length and Plot Data on Line Plots</p> <p><i>See Grade 2:</i> Lesson 4: Draw and Use Bar Graphs and Picture Graphs</p>
KY.3.MD.3.b	Create a scaled pictograph and a scaled bar graph to represent a data set (using technology or by hand);	<p>Lesson 19: Scaled Graphs</p>
KY.3.MD.3.c	Make observations from the graph about the question posed, including “how many more” and “how many less” questions.	<p>Lesson 19: Scaled Graphs</p> <p>Lesson 26: Measure Length and Plot Data on Line Plots</p> <p><i>See Grade 2:</i> Lesson 4: Draw and Use Bar Graphs and Picture Graphs</p>
KY.3.MD.4	Investigate questions involving numerical data.	<p>Lesson 26: Measure Length and Plot Data on Line Plots</p>
KY.3.MD.4.a	Identify a statistical question focused on numerical data;	<p>Lesson 26: Measure Length and Plot Data on Line Plots</p>
KY.3.MD.4.b	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.	<p>Lesson 26: Measure Length and Plot Data on Line Plots</p>

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.MD.4.c	Show the data by making a dot plot where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.	Lesson 26: Measure Length and Plot Data on Line Plots
KY.3.MD.4.d	Make observations from the graph about the question posed, including questions about the shape of the data and compare responses.	Lesson 26: Measure Length and Plot Data on Line Plots
Geometric measurement: understanding concepts of area and relate area to multiplication and to addition.		
KY.3.MD.5	Recognize area as an attribute of plane figures and understand concepts of area measurement.	Lesson 14: Understand Area
KY.3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	Lesson 14: Understand Area
KY.3.MD.7	Relate area to the operations of multiplication and addition.	Lesson 15: Multiply to Find Area Lesson 16: Add Areas <u>Additional Content:</u> Lesson 17: Solve One-Step Word Problems Using Multiplication and Division; Lesson 32: Area and Perimeter of Shapes
KY.3.MD.7.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.	Lesson 15: Multiply to Find Area <u>Additional Content:</u> Lesson 16: Add Areas; Lesson 17: Solve One-Step Word Problems Using Multiplication and Division; Lesson 32: Area and Perimeter of Shapes

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.MD.7.b	Multiply side lengths to find areas of rectangles with wholenumber side lengths in the context of solving real world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning.	<p>Lesson 15: Multiply to Find Area</p> <p>Additional Content: Lesson 16: Add Areas; Lesson 17: Solve One-Step Word Problems Using Multiplication and Division; Lesson 32: Area and Perimeter of Shapes</p>
KY.3.MD.7.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 $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.	Lesson 16: Add Areas
KY.3.MD.7.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.	Lesson 16: Add Areas
Geometric measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.		
KY.3.MD.8	Solve real world and mathematical problems involving perimeters of polygons.	Lesson 32: Area and Perimeter of Shapes
KY.3.MD.8.a	Find the perimeter given the side lengths of a polygon.	Lesson 32: Area and Perimeter of Shapes
KY.3.MD.8.b	Find an unknown side length, given the perimeter and some lengths.	Lesson 32: Area and Perimeter of Shapes

Kentucky Academic Standards for Mathematics Grades K-5		Ready Classroom Mathematics Lessons Grades K-5
KY.3.MD.8.c	Draw rectangles with the same perimeter and different areas or with the same area and different perimeters.	
KY.3.G	Geometry Reason with shapes and their attributes.	
KY.3.G.1	Classify polygons by attributes.	<p>Lesson 30: Understand Categories of Shapes Lesson 31: Classify Quadrilaterals</p> <p>Additional Content: Lesson 32: Area and Perimeter of Shapes</p>
KY.3.G.1.a	Recognize and classify polygons based on the number of sides and vertices (triangles, quadrilaterals, pentagons and hexagons).	<p>Lesson 30: Understand Categories of Shapes Lesson 31: Classify Quadrilaterals</p> <p>Additional Content: Lesson 32: Area and Perimeter of Shapes</p>
KY.3.G.1.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.	<p>Lesson 30: Understand Categories of Shapes Lesson 31: Classify Quadrilaterals</p> <p>Additional Content: Lesson 32: Area and Perimeter of Shapes</p>
KY.3.G.1.c	Identify shapes that do not belong to a given category or subcategory.	<p>Lesson 30: Understand Categories of Shapes Lesson 31: Classify Quadrilaterals</p> <p>Additional Content: Lesson 32: Area and Perimeter of Shapes</p>
KY.3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.	<p>Lesson 33: Partition Shapes into Parts with Equal Areas</p> <p>Additional Content: Lesson 20: Understand What a Fraction Is</p>

Kentucky Academic Standards for Mathematics: Grade 3 Overview

Operations/Algebraic Thinking (OA)	Number and Operations in Base Ten (NBT)	Number and Operations Fractions (NF)	Measurement and Data (MD)	Geometry (G)
<ul style="list-style-type: none"> Represent and solve problems involving multiplication and division. Understand properties of multiplication and the relationship between multiplication and division. Multiply and divide within 100. Solve problems involving the four operations and identify and explain patterns in arithmetic. 	<ul style="list-style-type: none"> Use place value understanding and properties of operations to perform multi-digit arithmetic. Note: A range of algorithms may be used. 	<ul style="list-style-type: none"> Develop understanding of fractions as numbers. Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, 8. 	<ul style="list-style-type: none"> Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects. Understand and apply the statistics process. Geometric measurement: <ul style="list-style-type: none"> understand concepts of area and relate area to multiplication and to addition. Geometric measurement: <ul style="list-style-type: none"> recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. 	<ul style="list-style-type: none"> Reason with shapes and their attributes.

In grade 3, instructional time should focus on four critical areas:

1. In the **Operations and Algebraic Thinking domain, students will:**
 - develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size;
 - use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors; and
 - compare a variety of solution strategies to learn the relationship between multiplication and division.
2. In the **Number Sense and Operations—Fractions domain, students will:**
 - develop an understanding of fractions, beginning with unit fractions;
 - view fractions in general as being built out of unit fractions and use fractions along with visual fraction models to represent parts of a whole;
 - understand that the size of a fractional part is relative to the size of the whole. Use fractions to represent numbers equal to, less than and greater than one; and
 - solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

3. In the Measurement and Data domain, students will:

- recognize area as an attribute of two-dimensional regions;
- measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps; a square with sides of unit length being the standard unit for measuring area; and
- understand that rectangular arrays can be decomposed into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication and justify using multiplication to determine the area of a rectangle.

4. In the Geometry domain, students will:

- compare and classify shapes by their sides and angles; and
- relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

Note: Multiplication, division and fractions are the most important developments in grade 3.

Operations and Algebraic Thinking

Standards for Mathematical Practice

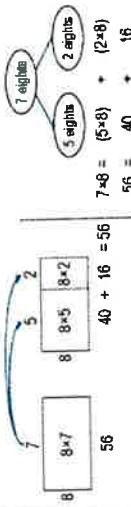
- MP.1.** Make sense of problems and persevere in solving them.
MP.2. Reason abstractly and quantitatively.
MP.3. Construct viable arguments and critique the reasoning of others.
MP.4. Model with mathematics.
MP.5. Use appropriate tools strategically.
MP.6. Attend to precision.
MP.7. Look for and make use of structure.
MP.8. Look for and express regularity in repeated reasoning.

Cluster: Represent and solve problems involving multiplication and division.

Standards	Clarifications
KY.3.OA.1 Interpret and demonstrate products of whole numbers. MP.2, MP.5	Students use models for multiplication situations. For example, students interpret 5×7 as the total number of objects in 5 groups of 7 objects each. Coherence KY.2.OA.4 → KY.3.OA.1 → KY.4.OA.1
KY.3.OA.2 Interpret and demonstrate whole-number quotients of whole numbers, where objects are partitioned into equal shares. MP.2, MP.5	Students use models for division situations. For example, students interpret $56 \div 8$ as the number of 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 object each. Coherence KY.3.OA.1 → KY.3.OA.2 → KY.5.NF.3
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 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. Coherence KY.3.OA.3 → KY.4.OA.2
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 $8 \times ? = 48$, $5 = \square \div 3$, $6 \times 6 = ?$. Coherence KY.3.OA.4 → KY.4.MD.3

Attending to the Standards for Mathematical Practice

Students recognize the numbers and symbols in an equation such as $5 \times 8 = 40$ are related to a context using groups or arrays (**MP.2**). For example, a student analyzes this equation and tells a story about walking 8 blocks round-trip to and from school each day, connecting to the equation by saying: 5 days \times 8 blocks each day is 40 total blocks walked. To represent the problem, they show 5 jumps of 8 on an open number line or show five 8-unit long Cuisenaire Rods (**MP.5**). When reading story situations, students seek to make sense of the story and its quantities (**MP.1**). They do not just lift numbers out or use keywords. To help make sense of the problem, students decide to write an equation or use a number line. In other words they ‘mathematize’ the situation (**MP.4**). In missing value problems, students attend to what value is unknown and what operation is represented (**MP.6**) and use this information to determine what value will result in both sides of the equations being equal (**MP.7**).

Operations and Algebraic Thinking	
Standards for Mathematical Practice	
<u>MP.1.</u> Make sense of problems and persevere in solving them. <u>MP.2.</u> Reason abstractly and quantitatively. <u>MP.3.</u> Construct viable arguments and critique the reasoning of others. <u>MP.4.</u> Model with mathematics.	<u>MP.5.</u> Use appropriate tools strategically. <u>MP.6.</u> Attend to precision. <u>MP.7.</u> Look for and make use of structure. <u>MP.8.</u> Look for and express regularity in repeated reasoning.
Cluster: Understand properties of multiplication and the relationship between multiplication and division.	
Standards	Clarifications
KY.3.OA.5 Apply properties of operations as strategies to multiply and divide. MP.3, MP.4	<p>Students need not use formal terms for these properties. If 6×4 is known, then $4 \times 6 = 24$ is also known (Commutative property of multiplication). $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$ (Associative property of multiplication). Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5+2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ (Distributive property).</p>  $ \begin{array}{r} & 7 \\ & \\ 8 & \times 7 = 56 \end{array} \quad \begin{array}{r} & 2 \\ & \\ 8 & \times 5 = 40 \\ + & 8 \times 2 = 16 \\ \hline 56 \end{array} \quad 7 \times 8 = (5+2) \times 8 = (2 \times 8) + (2 \times 8) $
KY.3.OA.6 Understand division as an unknown-factor problem.	<u>KY.4.NBT.5</u> <u>KY.4.NBT.6</u> <u>KY.4.NBT.5</u> → <u>KY.4.NBT.6</u> <u>KY.3.OA.5</u> → <u>KY.4.NBT.6</u> <u>KY.3.OA.6</u> → <u>KY.4.NBT.6</u>
MP.2	<p>Find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.</p> <p>At attending to the Standards for Mathematical Practice</p> <p>Students use strategies beyond skip counting to solve multiplication problems. They decide how to use known facts to solve facts like 6×9. Students use strategies like Adding a Group, thinking 5 groups of 9 (45) plus one more group (54) and Subtracting a Group, thinking 9 × 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 $84 \div 4$ as, "How many sets of 4 can be made from 84 items?" or "How many in a group, if there 84 items and 4 groups?" and use this relationship to solve the problem (MP.2).</p>

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Operations and Algebraic Thinking

Standards for Mathematical Practice

<p>MP.1. Make sense of problems and persevere in solving them.</p> <p>MP.2. Reason abstractly and quantitatively.</p> <p>MP.3. Construct viable arguments and critique the reasoning of others.</p> <p>MP.4. Model with mathematics.</p>	<p>MP.5. Use appropriate tools strategically.</p> <p>MP.6. Attend to precision.</p> <p>MP.7. Look for and make use of structure.</p> <p>MP.8. Look for and express regularity in repeated reasoning.</p>
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Cluster: Multiply and divide within 100.

Standards

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

Clarifications

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 $8 \times 5 = 40$, one knows $40 \div 5 = 8$.

Note: Reaching fluency is an ongoing process that will take much of the year.

Coherence KY.3.OA.7 → KY.4.OA.4

Attending to the Standards for Mathematical Practice

By studying patterns and relationships in multiplication facts, students develop fluency for multiplication facts (**MP.8**). For example, students notice 4 \times 6 is equivalent to $2 \times 2 \times 6$ (doubling strategy). They know 9 facts can be found by thinking of the other factor $\times 10$ and subtracting one group. For example, recognizing 9×8 is equivalent to $10 \times 8 - 8$. For each fact, the student thinks, “What reasoning strategy can I use that is more efficient than skip counting?” (**MP.2**).

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Operations and Algebraic Thinking

Standards for Mathematical Practice	
<p>MP.1. Make sense of problems and persevere in solving them.</p> <p>MP.2. Reason abstractly and quantitatively.</p> <p>MP.3. Construct viable arguments and critique the reasoning of others.</p> <p>MP.4. Model with mathematics.</p>	<p>MP.5. Use appropriate tools strategically.</p> <p>MP.6. Attend to precision.</p> <p>MP.7. Look for and make use of structure.</p> <p>MP.8. Look for and express regularity in repeated reasoning.</p>

Cluster: Solve problems involving the four operations and identify and explain patterns in arithmetic.

Standards

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

Students observe 4 times a number is always even and explain why 4 times a number can be decomposed into two equal addends.

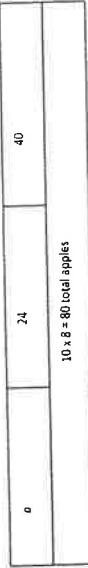
Coherence KY.2.OA.3 → KY.3.OA.9 → KY.4.OA.5

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

Attending to the Standards for Mathematical Practice

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**).



$$\begin{aligned} a + 24 + 40 &= \text{total apples and } 10 \times 8 = \text{total apples. There are 80 apples total.} \\ a + 64 &= 80 \\ a &= 16 \end{aligned}$$

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?

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.

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Numbers and Operations in Base Ten

Standards for Mathematical Practice

- 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.

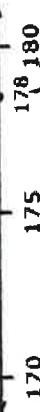
Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic. Note: A range of algorithms may be used.

Standards

KY.3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

MP.7

On a number line, students determine 178 rounded to nearest 10 is 180.



Clarifications Coherence KY.2.NBT.1 → KY.3.NBT.1 → KY.4.NBT.3

KY.3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction.

MP.2, MP.3

Students determine addition and subtraction strategies efficiently, accurately, flexibly and appropriately. Being fluent means students are able to choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and are able to explain their approaches and they are able to produce accurate answers efficiently.

Note: Reaching fluency is an ongoing process that will take much of the year.

KY.2.NBT.5

Coherence KY.2.NBT.7 → KY.3.NBT.2 → KY.4.NBT.4

KY.3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range of 10–90 using strategies based on place value and properties of operations.

MP.7, MP.8

To solve 8×60 , students interpret this as 8 groups of 6 tens, which is 480.

KY.3.OA.5

Coherence KY.2.NBT.1 → KY.3.NBT.3 → KY.4.NBT.5

Attending to the Standards for Mathematical Practice

Students look at the numbers in a problem and consider which strategy they will use to solve the given problem (**MP.2**). For example, for the problem $405 - 381$, a student notices these values are close to each other, so rather than take away 381, they find the difference. They count up to 400 (19) and add on 5 more to equal 24. For the problem $425 - 98$, the student notices 98 is close to 100, so chooses to take away 100 and add 2 more back on to equal 327. Students share the strategy they used, why it works and why they chose it (**MP.3**).

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Numbers and Operations-Fractions

Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.

Standards for Mathematical Practice

- 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.

Cluster: Develop understanding of fractions as numbers. Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.

Standards

KY.3.NF.1 Understand a fraction $\frac{1}{b}$ 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 $\frac{1}{b}$.

MP.2, MP.7

Coherence KY.2.G.3 → KY.3.NF.1 → KY.4.NF.3

Clarifications

Students name parts of the whole using fractions and explain the fraction is made up of unit fractions. Students describe the numerator and the denominator using pictures, numbers and words.

$$\frac{4}{6} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$$

Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.

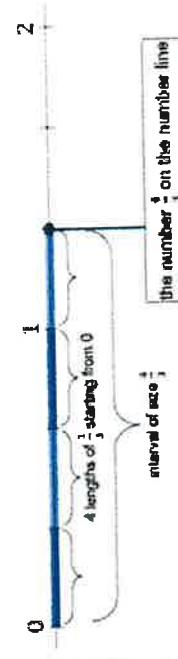
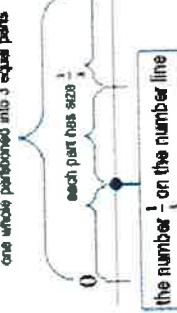
Coherence KY.2.G.3 → KY.3.NF.1 → KY.4.NF.3

KY.3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line.

- a. Represent a fraction $\frac{1}{b}$ (unit fraction) on a number line by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts.

- Recognize each part has size $\frac{1}{b}$.
 - a unit fraction, $\frac{1}{b}$ is located $\frac{1}{b}$ of a whole unit from 0 on the number line.
- Represent a non-unit fraction $\frac{a}{b}$ on a number line by marking off a lengths of $\frac{1}{b}$ (unit fractions) from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the non-unit fraction $\frac{a}{b}$ on the number line.

MP.4



Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.

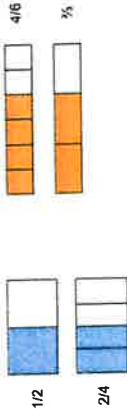
Coherence KY.2.MD.6 → KY.3.NF.2 → KY.4.NF.3

Standards

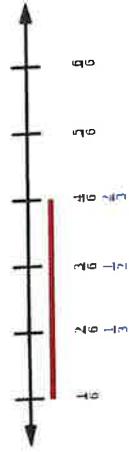
KY.3.NF.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.

- Understand two fractions as equivalent (equal) if they are the same size, or same point on a number line.
- Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent through writing or drawing.
- Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers.
- Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions.

MP.2, MP.3



When working with the same whole, students can see that $\frac{1}{2} = \frac{2}{4}$, and $\frac{4}{8} = \frac{1}{2}$.



$$\frac{3}{6} \text{ is greater than } \frac{3}{8} \text{ or } \frac{3}{6} > \frac{3}{8}$$

Note: grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.

KY.4.NF.1

Coherence KY.3.NF.3 → KY.4.NF.5

Attending to the Standards for Mathematical Practice

Students use the number line to reason about the relative size of a fraction (MP.4). They locate $\frac{5}{6}$ on a number line by accurately partitioning the line into 6 equal-length segments. They explain that $\frac{5}{6}$ means five segments that are each one-sixth of a unit in length, for example counting, “One-sixth, two-sixths, three-sixths, four-sixths, five-sixths.” (MP.7). As they partition the line in other ways, they recognize three-sixths is half of the distance to 1 whole, as is $\frac{2}{4}$, $\frac{1}{2}$, and $\frac{4}{8}$, and reason these fractions are equivalent (MP.2). Similarly, they can generate other illustrations or justifications to explain why two fractions are equivalent or not (MP.3).

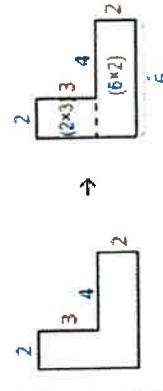
The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Measurement and Data	
	Standards for Mathematical Practice
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.	<p>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.</p>
Cluster: Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects.	<p>Standards</p> <p>KY.3.MD.1 Tell and write time to the nearest minute and measure elapsed time intervals in minutes. Solve word problems involving addition and subtraction of time intervals within and across the hour in minutes.</p> <p>MP.4, MP.6, MP.1, MP.4</p> <p>KY.3.MD.2 Measure and solve problems involving mass and liquid volume.</p> <p>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 given in the same units.</p> <p>MP.1, MP.6</p>
	<p>Clarifications</p> <p>Students solve elapsed time problems using strategies and tools such as clock models and number lines (seeing a clock as a number line).</p> <p>Coherence KY.2.MD.7 → KY.3.MD.1 → KY.4.MD.2</p> <p>a. Students have multiple opportunities to weigh classroom objects and fill containers to help them develop a basic understanding of the size and weight of a liter, a gram and a kilogram.</p> <p>b. See Table 2 in Appendix A.</p> <p>Coherence KY.2.MD.5 → KY.3.MD.2 → KY.4.MD.1</p>
	<p>Attending to the Standards for Mathematical Practices</p> <p>Students solve story situations using a model to support their reasoning (MP.4). For example, a student solves a task such as: you try to run for 15 minutes without stopping. When you look at the clock, the time is 2:52. What time will it say when you have reached 15 minutes? On an open number line, they show a jump from 2:52 to 3:00 as 8 minutes and then jump 7 minutes more to 3:07. Students estimate and then measure objects using standard units. For example, how many grams might balance with a selected item (MP.6)?</p>

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Measurement and Data													
Standards for Mathematical Practice													
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<p>Cluster: Understand and apply the statistics process.</p>	<p>Standards</p>												
<p>KY.3.MD.3 Investigate questions involving categorical data.</p> <ol style="list-style-type: none"> Identify a statistical question focused on categorical data and gather data; Create a scaled pictograph and a scaled bar graph to represent a data set (using technology or by hand); Make observations from the graph about the question posed, including “how many more” and “how many less” questions. <p>MP.3, MP.5, MP.6</p> <p>KY.3.MD.4 Investigate questions involving numerical data.</p> <ol style="list-style-type: none"> Identify a statistical question focused on numerical data; Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a dot plot where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters. Make observations from the graph about the question posed, including questions about the shape of the data and compare responses. <p>MP.1, MP.3, MP.6</p>	<p>Clarifications</p> <p>Students select a question of interest (how many pets does each classmate have), gather data and create a bar graph (each square in the bar graph might represent 2 pets).</p> <p>Coherence KY.2.MD.10 → KY.3.MD.3</p> <p>Students measure objects in their desk to the nearest $\frac{1}{2}$ or $\frac{1}{4}$ of an inch, display data collected on a dot plot and analyze the data.</p> <p>Objects in my Desk</p> <table border="1"> <caption>Measurements in inches</caption> <thead> <tr> <th>Measurement</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>0 $\frac{1}{4}$</td> <td>1</td> </tr> <tr> <td>0 $\frac{1}{2}$</td> <td>2</td> </tr> <tr> <td>1 $\frac{1}{4}$</td> <td>3</td> </tr> <tr> <td>1 $\frac{1}{2}$</td> <td>2</td> </tr> <tr> <td>2 $\frac{1}{4}$</td> <td>1</td> </tr> </tbody> </table> <p>Coherence KY.2.MD.9 → KY.3.MD.4 → KY.4.MD.4</p>	Measurement	Count	0 $\frac{1}{4}$	1	0 $\frac{1}{2}$	2	1 $\frac{1}{4}$	3	1 $\frac{1}{2}$	2	2 $\frac{1}{4}$	1
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Attending to the Standards for Mathematical Practice
 Students understand the purpose of creating a graph is to make sense of data related to a question (**MP.1**). They look at the data they have collected and decide on how to set up a graph to best communicate the data (**MP.6**). Students determine if the scale on a dot plot should be in whole numbers, halves or fourths, based on the data gathered. For example, if they measured the length of each person’s pencil to the nearest fourth inch, the related dot plot would be created using fourths (**MP.6**).

Measurement and Data	
Standards for Mathematical Practice	
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Cluster: Geometric measurement: understanding concepts of area and relate area to multiplication and to addition.	Clarifications
<p>KY.3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.</p> <p>MP.5</p>	<p>A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area and can be used to measure area.</p>  <p>A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.</p> 
<p>KY.3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).</p> <p>MP.5, MP.6</p>	<p>Coherence KY.3.MD.5→KY.5.MD.3</p> <p>Students use grid paper of varying square units to count the number of unit squares in a figure.</p> <p>Coherence KY.2.G.2→KY.3.MD.6→KY.5.MD.4</p>
<p>KY.3.MD.7 Relate area to the operations of multiplication and addition.</p> <ol style="list-style-type: none"> 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. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning. 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 $a \times b$ 	 <p>Coherence KY.3.MD.7→KY.4.MD.3→KY.5.MD.5</p>

Standards

and $a \times c$. 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.

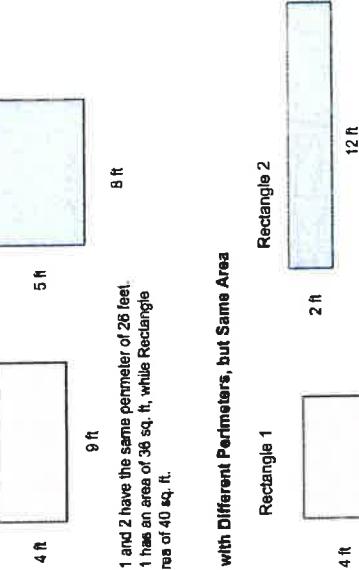
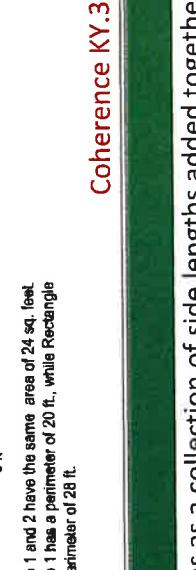
MP.1, MP.8

Attending to the Standards for Mathematical Practice

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] \times [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 unknown and use their knowledge of area to solve the problem (**MP.1**).

Clarifications

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Measurement and Data	
Standards for Mathematical Practice	
<u>MP.1.</u> Make sense of problems and persevere in solving them. <u>MP.2.</u> Reason abstractly and quantitatively. <u>MP.3.</u> Construct viable arguments and critique the reasoning of others. <u>MP.4.</u> Model with mathematics.	<u>MP.5.</u> Use appropriate tools strategically. <u>MP.6.</u> Attend to precision. <u>MP.7.</u> Look for and make use of structure. <u>MP.8.</u> Look for and express regularity in repeated reasoning.
Cluster: Geometric measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	Clarifications
Standards	<p>KY.3.MD.8 Solve real world and mathematical problems involving perimeters of polygons.</p> <ol style="list-style-type: none"> Find the perimeter given the side lengths of a polygon. Find an unknown side length, given the perimeter and some lengths. Draw rectangles with the same perimeter and different areas or with the same area and different perimeters. <p>MP.1, MP.4</p>
	<p>C. Rectangles with the Same Perimeter but Different Areas</p>  <p>Rectangle 1 4 ft 9 ft</p> <p>Rectangle 2 5 ft 8 ft</p> <p>Rectangles 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.</p> <p>Rectangles with Different Perimeters, but Same Area</p>  <p>Rectangle 1 4 ft 6 ft</p> <p>Rectangle 2 2 ft 12 ft</p> <p>Rectangles 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.</p>
	<p>Coherence KY.3.MD.8 → KY.4.MD.3</p>

Attending to the Standards for Mathematical Practice

Students recognize perimeter is a measure of length and see perimeters of polygons as a collection of side lengths 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 4×4 , 3×5 , 2×6 , 1×7) and that these rectangles have different areas (**MP.1**).

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Geometry	
Standards for Mathematical Practice	
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.
Cluster: Reason with shapes and their attributes.	
Standards Clarifications	
KY.3.G.1 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.	Students describe, analyze and compare properties of two-dimensional shapes. Coherence KY.2.G.1 → KY.3.G.1 → KY.4.G.2
MP.6, MP.7 KY.3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. MP.2, M.5	Partitioned parts should be halves, thirds, fourths, sixths, eighths. Students partition a shape into 6 parts with equal areas and describe the area of each part as $\frac{1}{6}$ of the area of the shape. KY.3.NF.1 Coherence KY.2.G.3 → KY.3.G.2
Attending to the Standards for Mathematical Practice	
Students describe attributes they notice for a particular type of quadrilateral, focusing on side lengths and angles (MP.6). They explain what different types of quadrilaterals have in common and can distinguish between what are defining attributes (such as having four sides) and what are not defining (such as its size or color) (MP.3). Students use a variety of tools and drawings to show fractional parts (MP.5) and they reason if a shape is partitioned into four equal-sized parts (even if they are not the same shape), each part represents one-fourth of the whole shape (MP.2).	

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Mathematics Blueprint

The purpose of this blueprint is to outline the percentage of items that will be assessed within the domains of the *Kentucky Academic Standards (KAS) for Mathematics*. The *KAS for Mathematics* emphasizes the balance between the Standards for Mathematical Practices and the Standards for Mathematical Content. The blueprint is designed to create an assessment that measures students' abilities to make sense and persevere when solving problems (MP.1), use quantities appropriately (MP.2), communicate and critique mathematical thinking (MP.3), model with mathematics (MP.4), strategically use tools (MP.5), attend to precision (MP.6), and to look for and apply structure (MP.7) and patterns (MP.8) to solve problems within grade-level content. The Standards for Mathematical Content are a balanced combination of conceptual understanding, procedural skills/fluency and application. Additionally, for K-8, the percent allocations for content items are based on grade-level domains (as described in the Overview for each grade in the *KAS for Mathematics*). For high school, the percent allocations for content items are based on conceptual categories (as described on the [High School Mathematics Matrix Standards by Course](#)).

For more in-depth information on the *KAS for Mathematics*, please visit
https://kystandards.org/content_area/math/.

Grades 3, 4, and 5

Domain	Target %		
	Grade 3	Grade 4	Grade 5
Operations and Algebraic Thinking	30-35	15-20	15-20
Number and Operations in Base Ten	15-20	25-30	25-30
Number and Operations -- Fractions	20-25	25-30	25-30
Measurement and Data	15-20	10-15	10-15
Geometry	10-15	10-15	10-15

Assessments at Grades 3, 4 and 5 will consist of 60-70% items that are Non-Calculator.

All test items will be aligned to the Standards for Mathematical Practice.