Pike County School District Standards Mastery Document

5th Grade Mathematics Revised 2019



The Standards Mastery Document is designed for educators by educators as a resource and tool to help educators increase their depth of understanding of the Common Core Standards. This document will enable teachers to plan College & Career Ready curriculum and classroom instruction that promotes inquiry and higher levels of cognitive demand.

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education.

8 Mathematical Practices (MP):

- 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.

Table of Contents

Grade 5 Overview	 4
Reference Tables	 5
Operations and Algebraic Thinking	 10
Numbers Base Ten	 13
Numbers Fractions	 21
Measurement and Data	 30
Geometry	35

Kentucky Academic Standards for Mathematics: Grade 5 Overview

Operations and Algebraic Thinking (OA)	Number and Operations in Base Ten (NBT)	Number and Operations Fractions (NF)	Measurement and Data (MD)	Geometry (G)
 Write and interpret numerical expressions. Analyze patterns and relationships. 	 Understand the place value system. Perform operations with multi-digit whole numbers and with decimals to hundredths. 	 Use equivalent fractions as a strategy to add and subtract fractions. Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 	 Convert like measurement units within a given measurement system. Understand and apply the statistics process. Geometric measurement: understand concepts of volume and relate volume to multiplications and to addition. 	 Graph points on the coordinate plane to solve real-world and mathematical problems. Classify two- dimensional figures into categories based on their properties.

In grade 5, instructional time should focus on three critical areas:

1. In the Numbers and Operations - Fractions and Operations and Algebraic Thinking domains, students will:

- apply their knowledge of fractions and fraction models to illustrate the addition and subtraction of fractions with unlike denominators as
 equivalent calculations with like denominators;
- establish fluency in calculating sums and differences with fractions and make a reasonable estimate of those sums and differences;
 use the meaning of fractions, of multiplication and division, and the relationship between those operations to understand and explain why the procedures for multiplying and dividing fractions make sense.

(Note: This is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

2. In the Operations and Algebraic Thinking and Number and Operations in Base Ten, students will:

- develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations;
- · apply understandings of models for decimals, decimal notation and properties of operations to add and subtract decimals to hundredths;
- · develop fluency with decimal computations to hundredths and make reasonable estimates of their computation;
- use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers to understand and
 explain why the procedures for multiplying and dividing finite decimals make sense.

3. In the Measurement and Data and Geometry domains, students will:

- recognize volume as an attribute of three-dimensional space;
- understand that a 1-unit by 1-unit cube is the standard unit for measuring volume;
- understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps;
- choose appropriate units, strategies and tools for solving problems which involve estimating and measuring volume;
- decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes;
- measure attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Table 1 Common Addition and Subtraction Situations¹

	Result Unknown	Change Unknown	Start Unknown
Add To	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two?	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?
		2 + ? = 5	? + 3 = 5
Take From	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 - 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 - ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? - 2 = 3
	Total Unknown	Addend Unknown	Both Addends Unknown ³
Put Together/ Take Apart ²	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	Difference Unknown	Bigger Unknown	Smaller Unknown
Compare	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Lucy have than Julie?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?
	("How many fewer?" version):	(Version with "fewer"):	(Version with "fewer"):
	Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?	Lucy has three fewer apples than Julie. Lucy has two apples. How many apples does Julie have?	Lucy has three fewer apples than Julie. Julie has five apples. How many apples does Lucy have?
	2+:-3,3-2-:	2+3-;,3+2-:	5-5-;;;+5-5

Blue shading indicates the four Kindergarten problem subtypes. Students in grades 1 and 2 work with all subtypes and variants (blue and green). Yellow indicates problems that are the difficult four problem subtypes students in grade 1 work with but do not need to master until grade 2.

¹ Adapted from Box 2-4 of National Research Council (2009, op. cit., pp. 32, 33).

² These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help

children understand that the = sign does not always mean makes or results in but always does mean is the same number as.

³ Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation especially for small numbers less than or equal to 10.

⁴ For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using *more* for the bigger unknown and using *less* for the smaller unknown). The other versions are more difficult.

	Unknown Product	Group Size Unknown	Number of Groups Unknown
	3 × 6 = ?	3 × ? = 18 and 18 ÷ 3 = ?	? × 6 = 18 and 18 ÷ 6 = ?
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag?	If 18 plums are to be packed 6 to a bag, then how many bags are needed?
	Measurement example: you need 3 lengths of string, each 6 inches long. How much string	Measurement example: you have 18 inches of string which you will cut into 3 equal pieces.	Measurement example: you have 18 inches of
	will you need all together?	How long will each piece of string be?	string which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays ² Area ³	There are three rows of apples with 6 apples in each row. How many apples are there?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be?
	Area example: what is the area of a 3 cm by 6 cm triangle?	Area example: a rectangle has area of 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	Area example: a rectangle has area of 18 square centimeters. If one side is 6 cm long, how long is the side next to it?
Compare	A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?	A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost?	A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue?
	Measurement example: a rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	Measurement example: a rubber band is stretched to be 18 cm long and is 3 times as long as it was at first. How long was the rubber band at first?	Measurement example: a rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	a × b = ?	a × ? = p and p ÷ a = ?	? × b = p and p ÷ b = ?

Table 2 Common Multiplication and Division Situations¹

¹ The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

² The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: the apples in the grocery window are in 3

rows and 6 columns. How many apples are in there? Both forms are valuable.

³ Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

Table 3Properties of Operations

The variables *a*, *b* and *c* stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system and the complex number system.

Associative property of addition	(a + b) + c = a + (b + c)
Commutative property of addition	a+b=b+a
Additive identity property of 0	a + 0 = 0 + a = a
Existence of additive inverses	For every a there exists —a so that a + (-a) = (-a) + a = 0
Associative property of multiplication	$(a \times b) \times c = a x (b \times c)$
Commutative property of multiplication	$a \times b = b \times a$
Multiplicative identity property of 1	$a \times 1 = 1 \times a = a$
Existence of multiplicative inverses	For every $a \neq 0$ there exists 1/a so that $a \times 1/a = 1/a \times a = 1$
Distributive property of multiplication over addition	$a \times (b + c) = a \times b + a \times c$

Table 4 Properties of Equality

The variables *a*, *b* and *c* stand for arbitrary numbers in the rational, real or complex number systems.

Reflexive property of equality	a = a
Symmetric property of equality	If $a = b$, then $b = a$
Transitive property of equality	If $a = b$ and $b = c$, then $a = c$

Addition property of equality	If $a = b$, then $a + c = b + c$
Subtraction property of equality	If $a = b$, then $a - c = b - c$
Multiplication property of equality	lf a = b, then a x c = b x c
Division property of equality	If a = b and c ≠ 0, then a ÷ c = b ÷ c
Substitution property of equality	If a = b, then b may be substituted for a in any expression containing a.

Table 5 Properties of Inequality

The variables *a*, *b* and *c* stand for arbitrary numbers in the rational or real number systems.

Exactly one of the following is true: a < b, a = b, a > b
If a > b and b > c then a > c
If a > b, then b < a
If a > b, then –a < -b
If a > b, then a \pm c > b \pm c
If a > b and c > 0, then a x c > b x c
If a > b and c < 0, then a x c < b x c
If a > b and c > 0, then a ÷ c > b ÷ c
If a > b and c < 0, then a \div c < b \div c

Table 6Fluency Standards across All Grade Levels

Grade Coding	Fluency Standards
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к	KY.K.OA.5	Fluently add and subtract within 5.
1	KY.1.OA.6	Fluently add and subtract within 10.
2	KY.2.OA.2 KY.2.NBT.5	Fluently add and subtract within 20. Fluently add and subtract within 100.
3	KY.3.OA.7 KY.3.NBT.2	Fluently multiply and divide within 100. Fluently add and subtract within 1000.
4	KY.4.NBT.	Fluently add and subtract multi-digit whole numbers using an algorithm.
5	KY.5.NBT.5	Fluently multiply multi-digit whole numbers (not to exceed four-digit by two-digit multiplication) using an algorithm.
6	KY.6.NS.2 KY.6.NS.3 KY.6.EE.2	Fluently divide multi-digit numbers using an algorithm. Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation. Write, read and evaluate expressions in which letters stand for numbers.

Operations and Algebraic Thinking

Standard: 5.OA.1

Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them MP 3: Construct viable arguments and critique the reasoning of others

Know: What content does the	Do: What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Order of operations (PEMDAS)	
Add		Students work with the order of
	Solve problems and equations that	operations first evaluating terms in
Subtract	include parentheses.	parentheses, then brackets, [] and
		then braces, {}.
Multiply	Multiplication/Division are equal	
	operations and are completed	Solve problems and equations that
Divide	from left to right	employ order of operations. Ex: 3 X
		(5+2) -7
	Addition/Subtraction are equal	
	operations and are completed	Students solve equations that
	from left to right	require multiple operations
		Ex: [3x(8+2)-1] +30
	Grouping Symbols parentheses,	
	brackets, and braces	
		Explain their thinking as they use
	Associative/Distributive properties	the order of operations.
		Ex: Jon calculated the problem
		below as
		16. Is Jon correct? Explain your
		thinking.
		0
		5+3x2

Coherence KY.5.OA.1→ KY.6.EE.2

Operations and Algebraic Thinking

Standard: 5.0A.2

Write simple expressions with numbers and interpret numerical expressions without evaluating them.

Enduring Skills:

MP 2: Reason abstractly and quantitatively MP 7: Look for and make use of structure

Know: What content does the	<u>Do:</u> What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Identify attributes of numerical	
Order of operations	expressions	Students can write and interpret numerical expressions.
Mathematical operations	Given a mathematical expression in	
vocabulary EX: Sum, difference, product, and quotient	words, write the numerical expression. Ex: Four times seven added to eight would be written 8+ 4 x 7	Students translate numerical expressions to words and verbal expressions to numbers.
	Given a numerical expression, translate it into words. Ex: 15- (14/7) could be read as the quotient of 14 and 7 subtracted from 15.	Students translate from words "add eight and 7, then multiply by 2" to $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.
		Ex: 15- (14/7) could be read as the quotient of 14 and 7 subtracted from 15.

Coherence KY.4.OA.1 \rightarrow KY.5.OA.2 \rightarrow KY.6.EE.2 KY.6.EE3 KY.6.EE.4

Operations and Algebraic Thinking

Standard: 5.O.A.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

Enduring Skills:

MP 2: Reason abstractly and quantitatively

WP 4. WOUEI WITH	mathematics	
Know: What	Do: What skill must the student demonstrate?	Mastery: How does the
content does the		student demonstrate the
student need to	Students make a T-table and generate numerical	learning of the standard?
know to	patterns including problems with two rules or two	Make a table to solve
demonstrate this	patterns.	problems.
standard?		
	Identify relationships between two patterns	Describe patterns.
Recognize		
numerical patterns	Provide mathematical rules that require students to	Plot ordered pairs on the
	make a table and generate a sequence of numbers based	coordinate plane.
Add	on the rule.	
	EX: Rule: Double the number and add 1	Analyze the graphs
Subtract	Rule: Find ½ of the number	
		Describe the relationship
		between the corresponding
	Generate ordered pairs in a set of terms	terms in the graph.
	Complete understanding of the coordinate plane x and y	Ex: Given the rule "Add 3"
	axis.	and the starting number 0,
		and given the rule "Add 6"
	Facilitate student discussions describing patterns in the	and the starting number 0,
	tables/graphs	students generate terms in
		the resulting sequences
	Origin of the coordinate plane x and y intersect at (0,0).	(creating ordered pairs).
		Students observe the terms
	List ordered pairs from tables and plot points on the	in one sequence are twice
	coordinate grid.	the corresponding terms in
		the other sequence. Explain
	Dist and wains an a secondinate plane	informally why this is so.
	Plot ordered pairs on a coordinate plane	Graph the ordered pairs on
		a coordinate plane.

MP 4: Model with mathematics

Coherence KY.4.OA.5 \rightarrow KY.5.OA.3 \rightarrow KY.6.EE.9

Number Base Ten

Standard: 5.NBT.1

Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

Enduring Skills:

MP2: Reason abstractly and quantitatively

MP 7: Look for and make use of structure

student need to know to demonstrate? demonstrate the learning of the	е
demonstrate this standard? standard?	
Determine value of digits in	
Place value system different places-working from left Compare the value of digits bas	sed
to right and right to left. On their placement in a given	
Standard form number and explain their thinki	ing.
Determine decimal place value to	0
Expanded form the thousandths Use models, including a place	
value chart and base-ten blocks	s to
Expanded form with multiplication Compare and describe digits in compare value of digits.	
different places. For example: In	
Base ten the number 5 555 how does the 5 EX. In the number 55 55 each of	digit
in the hundreds place compare to is 5, but the value of each digit	is
Decimal place value to the the sin the 5 in the thousands place compare to different because of the	15
bundredths name and similar chouse of the si	
Describe the value of numbers	
The arrow points to is $1/10$ of t	ho T
Desimal place value to the	ine 5
the use of the sector of the s	Г I
thousandths than the 5 to the right. The 5 in	n the
ones place is 1/10 of 50 and 10)
times greater than five tenths.	

Coherence KY.4.NBT.1 → KY.5.NBT.1

Number Base Ten

Standard: 5.NBT.2

Multiply and divide by powers of 10

- Explain patterns in the number of zeros of the product when multiplying a number by powers of 10
- Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10
- Use whole-number exponents to denote powers of 10

Enduring Skills:

MP 3: Construct viable arguments and critique the reasoning of others MP 8: Look for and express regularity in repeated reasoning

Know: What content does the	Do: What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Introduce writing powers of 10	Multiply and Divide whole
Place value system	using notation with exponents	numbers and decimal numbers by
		powers of 10.
Standard form	Multiply and divide numbers by a	
	power of ten using concrete	Describe the patterns when
Expanded form	models, pictures, and words. Start	multiplying and dividing by powers
	with whole number place value	of ten.
Expanded form with multiplication	and move to decimal numbers to	
	the thousandths.	Explain why patterns work when
Place value chart		multiplying and dividing by powers
	Notation of exponents to express	of ten.
Base ten	powers of ten with the exponent	
	telling the number of times ten is	Students recognize when a
Decimal place value to the	used as a factor.	number is multiplied by 10, a zero
hundredths		is added to the end because each
		digit's value became 10 times
		larger. Students use the same
		reasoning to explain in the
		problem:
		 523 × 10³ = 523,000 The place value of 523 is increased by
		 5.223 × 10² = 522.3 The place value of 5.223 is increased by
		two places.
		 52.3 ÷ 10² = 5.23 The place value of 52.3 is decreased by one place.
		Note: grade 5 expectations in this domain
		are limited to decimals through the
		thousandths place.

Number Base Ten

Standard: 5.NBT.3.

Read, write and compare decimals to the thousandths. (a.) Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.

Enduring Skills:

MP 2: Reason abstractly and quantitatively MP 5: Use appropriate tools strategically MP 7: Look for and make use of structure

Know: What content does the	Do: What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Model and write base-ten numerals	
Place value system Whole	on a place value chart.	Recognize and name place values
numbers/Decimals		for base-ten numerals to the
	Write decimal numbers in	thousandths place using place value
Recognize place value after the	expanded notation with	charts and expanded form with
decimal ends in "ths" Example:	multiplication	multiplication. Ex: 347.392= 3 X
Tenths, hundredths, thousandths		$100 + 4 \times 10 + 7 \times 1 + 3 \times 1/10 + 9 \times 10^{-1}$
,	Read decimal numbers and write	1/100 + 2 x 1/1000
Standard form	decimal names in words.	_,,,,,,
		Demonstrate understanding of
Word form	Recognize decimal place names	decimal place values: tenths.
	(tenths, hundredths, thousandths)	hundredths, and thousandths.
Expanded form		
		Read and write decimals to
Expanded form with multiplication		thousandths using numerals, words,
		and expanded form
Greater than/Less than		
	l	l

KY.4.NBT.2 Coherence KY.4.NF.7→ KY.5.NBT.3

Number Base Ten

Standard: 5.NBT.3.

Read write and compare decimals to the thousandths

(b.) Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, < symbols to record the results of comparisons.

Enduring Skills:

MP 2: Reason abstractly and quantitatively

MP 5: Use appropriate tools strategically

MP 7: Look for and make use of structure

Know: What content does the	<u>Do:</u> What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Write equivalent decimals with	
Place value of whole	additional places Ex: 0.5= 0.50,	Students relate numbers they are
numbers/decimals	0.24=0.240	comparing back to common benchmarks of 0, 1 2 (0.5, 0.50 and
Understanding of decimal place	Compare numbers with like places	0.500) and 1. When comparing
values: tenths, hundredths, and	(that is tenths to tenths,	numbers, 0.35 and 0.12, students
thousand ths.	hundredths to hundredths, and	make the connection 0.35 > 0.12,
	thousandths to thousandths. Ex:	but also see the relationship of
Read and write decimals to	0.2>0.1, 3.52<3.54	0.12 < 0.35.
thousandths using numerals,		Note: grade 5 expectations in this
words, and expanded form.	Compare numbers with 1 decimal	domain are limited to decimals
	place to numbers with two decimal	through the thousandths place.
Greater than, less than, and equal	places using models, pictures, and	
to symbols	words. Ex: 0.5>0.45, 0.32<0.6	Read and write equivalent decimal
		numbers and fractions using tenth
	Find equivalent fractions of	and hundredth models.
	decimals using models for	
	example: 0.5 = 5/10 using tenth	Demonstrate understanding of
	and hundredth models.	equivalent decimal numbers with
		different place values Ex:
		0.4=0.40=0.400
		Compare decimals by comparing
		the digits in each decimal place.
		Compare decimal numbers using
		objects nictures numbers and
		words.

KY.4.NBT.2 Coherence KY.4.NF.7 → KY.5.NBT.3

Number Base Ten

Standard: 5.NBT.4

Use place value understanding to round decimals to any place.

Enduring Skills:

MP 5: Use appropriate tools strategically MP 7: Look for and make use of structure

Know: What content does the	Do: What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
Place value of whole numbers/decimals	Use place value and understanding and number line models to round decimals to a given place.	Round decimal numbers to a given place
Understanding of decimal place values: tenths, hundredths, and thousandths.	Use real-world examples in which students must round decimals to appropriate places.	Using a variety of real-world examples to determine where to round in a given situation.
Read and write decimals to thousandths using numerals, words, and expanded form.	Model using benchmark numbers to help students determine the location of a number on the number line. Ex: 12.73 to the	Explain the process of how to round a decimal number to a given place. Ex: The price of a gallon of gasoline
Compare place values of decimals to the thousandths	nearest tenth. 12.73 falls between 12.7 and 12.8. 12.75 is balfway between 12.7 and	is 1.5999. Jeremy thinks this is a strange way to write money. What would be the cost of gasoline
Round whole numbers	12.8 therefore 12.73 is closer to 12.7	rounding to the nearest cent (hundredth)? Justify your answer.

Coherence KY.4.NBT.3 → KY.5.NBT.4

Number Base Ten

Standard: 5.NBT.5

Fluently multiply multi-digit whole numbers (not to exceed four-digit by two-digit multiplication) using an algorithm

Enduring Skills:

MP 7: Look for and make use of structure MP 8: Look for and express regularity in repeated reasoning

Know: What content does the	<u>Do:</u> What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Multiply multi-digit whole	
Multiplication facts	numbers using efficient	Multiply multi-digit whole
	algorithms such as partial	numbers using an algorithm -
Place value whole numbers	products or by regrouping	partial product or regrouping
		Ex: 273
Estimation	Use area models to connect to	<u>X 52</u>
	an algorithm including finding	546 (2x273)
Factors	partial products or using	+ 13650(50x 273)
	regrouping in multiplication	14,196
Standard algorithm multiplication of		
multi-digit numbers	Explain reasoning when using an	300 B 20 B
	algorithm which should include	= 18,700
Distributive Property	use of the properties of	50 15,000 3,500 200
	multiplication and place value.	3 900 210 12 1997
		19,822
	Multiply multi-digit whole	
	numbers using the distributive	
	property of multiplication	

Coherence KY.4.NBT.5 \rightarrow KY.5.NBT.5 \rightarrow KY.6.NS.3

Number Base Ten

Standard: 5.NBT.6

Divide up to four-digit dividends by two-digit divisors

- a. Find whole-number quotients of whole numbers with up to four digit dividends two-digit divisors, using strategies based on place value, the properties of operations, the relationship between multiplication and division.
- b. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Enduring Skills:

MP 2: Reason abstractly and quantitatively

MP 3: Construct viable arguments and critique the reasoning of others

MP 4: Model with mathematics

Know: What content does	Do: What skill must the	Mastery: How does the student demonstrate the
the student need to know	student demonstrate?	learning of the standard?
to demonstrate this		
standard?	Connect previous	Using area models with compatible numbers, rounding,
	experience with dividing	and/or partial quotient method solve problems with up
Multiplication facts	by multiples of 10 using	to four digit dividends and two digit divisors.
	place value and	
Place value whole	estimation.	Solve problems that include various division situations
numbers		with/without remainders
	Develop strategies for	
Estimation	division by multiples of 10	Check quotients for accuracy: Quotient x divisor +
		remainder = dividend
Factors	Explain reasoning using	
	pictures, words, and	Students use an area model for 64 64 19984
Rounding	numbers.	division shown below. As the $-6400(100 \times 64)$
		student uses the area model, s/he 100 6400 3584 -3200 (50 x 64)
Area model with	Use rounding and	keeps track of how much of the 50 3200 384
compatible numbers	estimation to divide by any	9,984 is left to divide. 5 320 64
	two-digit number.	$1 \frac{520}{64} \frac{-64}{0}$
Partial products		
	Solve problems that	
Dividing with multiples of	include various division	
10	situations with/without	
	remainders.	

Coherence KY.4.NBT.6 \rightarrow KY.5.NBT.6 \rightarrow KY.6.NS.2

Number Base Ten

Standard: 5.NBT.7

Operations with decimals to the hundredths

a. Add, subtract, multiply and divide decimals to hundredths using:

- concrete models or drawings, strategies based on place value, properties of operations, the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used
 - b. Illustrate and explain the calculation by using equations, rectangular arrays and/or area models.

Enduring Skills:

MP 2: Reason abstractly and quantitatively

MP 3: Construct viable arguments and critique the reasoning of others

MP 5: Use appropriate tools strategically

Know: What content does	Do: What skill must the student	Mastery: How does the student demonstrate
the student need to know to	demonstrate?	the learning of the standard?
demonstrate this standard?		
	Use concrete models such as	Solve a variety of
Place value whole	base ten blocks and grid paper to	addition/subtraction/multiplication/division
numbers/decimal	add/subtract decimals.	problems involving decimal numbers to
		different place values
Addition/subtraction of	Describe place value patterns	
whole numbers	from multiplication examples	Explain their reasoning using concrete models,
	Ex: tenths x tenths equals a	pictures, words, and or numbers.
Composing and	product in the hundredths	
Decomposing numbers	tenths x hundredths equals a	2.4 ×1.3
	product in the thousandths	1.3 .60
Division of whole numbers		.40 +2.00 " ³ times ⁴ is ¹²
		2.4 3.12 10 10 100 3 time 0 is 6 as 60
Properties of	Provide division examples	Students describe the partial products
multiplication/division		displayed by the area model. For example, $1 \operatorname{group of} \frac{\pi}{10} \operatorname{is} \frac{\pi}{10} \operatorname{or} \frac{40}{100}$.
	examples to decimal examples	1 group of 2 is 2."
	describe place value patterns	Students dividing decimals for example could
	describe place value patterns.	applying the fair sharing model or separating
		decimals in to equal parts such as $2.4 \div 4 = 0.6 \ 0.6 \ 0.6 \ 0.6$
		0.6
		Describe place value patterns in division
		evamples
		1

Coherence KY.4.NBT.6 \rightarrow KY.5.NBT.7 \rightarrow KY.6.NS.3

Number Fractions

Standard: 5.NF.1

Efficiently add and subtract fractions with unlike denominators (including mixed numbers) by...

- Using reasoning strategies, such as counting up on a number line or creating visual fraction models
- Finding common denominators

Enduring Skills:

MP 2: Reason abstractly and quantitatively

MP 3: Construct viable arguments and critique the reasoning of others

Know: What content	Do: What skill must the student demonstrate?	Mastery: How does the student
does the student need to		demonstrate the learning of the standard?
know to demonstrate this	Make equivalent fractions by	
standard?	multiplying/dividing numerator and	Using common denominator $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$
	denominator by same factor	In general, $\frac{a}{b} + \frac{c}{c} = \frac{(ad+bc)}{b}$
Add and subtract		b d bd
fractions with like	Create visual representations using common	
denominators	denominators when adding and subtracting	Use a variety of visual representations to
	fractions.	deperimeters when adding and
Find equivalent		subtracting fractions (Use fraction
fractions	Find common denominators by multiplying two	tiles/hars)(Create models that
	denominators together and creating equivalent	demonstrate equivalent fractions)
Reduce to simplest	fractions	
form	Poname fractions	Find equivalent fractions using
	Rename fractions	multiplication and division
List multiples of two	Find least common denominator by listing	
numbers	multiples of two factors then finding equivalent	Apply understanding of equivalent
	fractions	fractions to change given fractions in an
		addition or subtraction example to
	Find Greatest Common Factor	fractions with like denominators. Ex: ½ +
		¼ change to 2/4 + ¼= ¾
	Solve a variety of problems using addition and	
	subtraction of fractions and mixed numbers.	Reduce answers to simplest form by
		finding the GCF of numerator and
	Reduce fractions to simplest form when adding	denominator Ex: 15/25 GCF=5 Simplest
	and subtracting fractions or mixed numbers	form =3/5
		Use reasoning to determine if answers
		make sense
		ווומועב אבוואב.

Number Fractions

Standard: 5.NF.2

- (a.) Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators
- (b.) Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

Enduring Skills:

MP 4: Model with mathematics			
Know: What content	<u>Do</u> : What skill must the student	Mastery: How does the student	
does the student need to	demonstrate?	demonstrate the learning of the	
know to demonstrate		standard?	
this standard?	Identify benchmark fractions 1/8, 1/4, 1/2		
Define numerator	Add and subtract fractions and mixed numbers with unlike denominators.	For example: Mary ate $\frac{1}{3}$ of the pizza. Tommy ate $\frac{1}{5}$ of the pizza. How much of the total pizza did they eat together? • making equivalent fractions to add/subtract fractions • using visual representations to add/subtract fractions • Area Model • Linear Model	
Define denominator		Use visual models including area	
Identify benchmark fractions	Create visual models to represent addition and subtraction of fractions. Example: Anna needs 3 cups of flour for the cookies she is making. She has already measured ¾ cup of flour. How much	models, fraction strips, and number lines to solve addition and subtraction problems. With fractions and mixed numbers.	
Define Mixed number	more flour does she need? Students would model 3-3/4=2 1/4	Explain their solution process using models, pictures, words, and numbers.	
Estimate sums using			
benchmark fractions	Analyze results using models and benchmark fractions to determine whether an answer is	Analyze results using models and benchmark fractions to determine	
Determine common	reasonable. Example: Jamie got the	whether an answer is reasonable.	
denominators	following addition problem wrong on his math quiz. Explain why Jamie's sum doesn't		
	make sense. 3/5 + 7/9 = 8/14	Recognize an incorrect result $\frac{2}{5} + \frac{1}{2} \equiv \frac{3}{7}$, by observing that $\frac{3}{7} < \frac{1}{2}$.	
Determine the least common denominator	Recognize an incorrect result $2/5 + \frac{1}{2} = \frac{3}{7}$, by observing that $3/7 < \frac{1}{2}$	Note: Estimation skills include identifying when estimation is appropriate, determining method of estimation and verifying solutions or determining the reasonableness of situations using various estimation strategies. The skill of estimating within context allows students to further develop their number sense.	

MP 1: Make sense of problems and persevere in solving them

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Number Fractions

Standard: 5.NF.3

Interpret a fraction as division of the numerator by the denominator $(a/b = a \div b)$. Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using visual fraction models or equations to represent the problem.

Enduring Skills:

MP 4: Model with mathematics

Know: What content	<u>Do:</u> What skill must the student	Mastery: How does the student
does the student need to	demonstrate?	demonstrate the learning of the
know to demonstrate		standard?
this standard?	Model and solve division problems in which	
	they interpret the remainder as a fraction	Explain their reasoning for
Determine how to	and explain their thinking.	interpreting the remainder as a
interpret the remainder:		fraction.
Example: Drop the	Solve word problems involving division of	
remainder, Add one to	whole numbers leading to answers in the	Example: Jared and Jenny are
the quotient and drop	form of fractions or mixed numbers. (Using	packing bags of cookies for the
the remainder, or	visual models and or equations.)	bake sale. They have 152 cookies
express the remainder as		and want to put one dozen
a fraction.	Solve a variety of division problems	cookies in each bag. How many
	determining what to do with the remainder.	bags can they fill? What part of
Interpret the meaning of	Explain their thinking.	the bag will be left?
a remainder when it's		
expressed as a fraction.	Model problems in which the divisor is	Solve problems in which the
-	greater than the dividend and share their	divisor is greater than the
Write a division problem	thinking about the quotient being a fraction.	dividend. For example, interpret ³ ⁄ ₄
as a fraction.		as the result of dividing 3 by 4.
	Explain their reasoning, connecting to a	noting that ³ / ₄ multiplied by 4
	generalization that a fraction is a type of	equals 3, and that when three
	division problem	wholes are shared equally among
		four neonle each nerson has a
		share of size 3/
		51101 C 01 512C /4.

MP 8: Look for and express regularity in repeated reasoning

Number Fractions

Standard: 5.NF.4

Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction

(a.) Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as a result of a sequence of operations a x q \div b. For example, use a visual fraction model to show (2/3) x 4= 8/, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. In general, (a/b) x (c/d) = (ac/bd)

Enduring Skills:

	problems and persevere r	
Know: What content	<u>Do</u> : What skill must the	Mastery: How does the student demonstrate the learning of
does the student need	student demonstrate?	the standard?
to know to		
demonstrate this		Connect multiplication of whole numbers to multiplication
standard?	Multiply a fraction by a	with fractions by giving students connected situations that
Understand that multiplying numerator by numerator and denominator by denominator results in the product of two fractions Convert mixed numbers to improper	whole number Multiply a fraction by a fraction Understand that when a fraction is multiplied by a fraction that the product is smaller than the factors. Multiply mixed numbers	they can model. Students use a visual fraction model to show $(\frac{2}{3}) \times 4 = \frac{a}{3}$ and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{a}{15}$. (In general, $(\frac{a}{b}) \times (\frac{2}{a})$ $= \frac{ac}{bd}$.) For example the shaded portion shows the rectangle with the appropriate unit fraction side lengths. Apply and understand what is happening when multiplying two fractions and why the product is smaller than the factors. Example: $\frac{1}{2} \times \frac{1}{8} = \frac{1}{8}$ the result will be smaller than the part they had at the beginning
Iractions		they had at the beginning.
Convert improper fractions to mixed numbers		Explore what happens when multiplying a whole number by a fraction by solving a variety of word problem contexts using models, pictures, words, and numbers. Example: Marcella made 4 gallons of punch. One-third of the punch was orange juice. How much orange juice did she use in the punch?
		Explore multiplication of a fraction by a fraction using models, pictures, words, and numbers. Example: The distance from Elsa house to her grandmother's is ¾ of a mile. She biked 1/3 of the way there and stopped to rest. How far did Elsa travel before her rest stop?

MP 1: Make sense of problems and persevere in solving them

Coherence KY.4.NF.4 \rightarrow KY.5.NF.4 \rightarrow KY. 6.G.1

Number Fractions

Standard: 5.NF.4

Apply and extend previous understanding of multiplication to multiply a fraction or whole number by a fraction

(b.) Find the area of a rectangle with fractional side lengths using different strategies. (e.g> tiling with unit squares of the appropriate unit fraction side lengths, multiplying side lengths.

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them

Know: What content does the	<u>Do:</u> What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Find the area of a rectangle with	
Find the area of a rectangle	fractional side lengths using	Using area models solve real world
	pictures and models (grid paper)	problems involving area of a
Area = Length x width		rectangle with fractional side
	Explain the measure of the pieces	lengths using grid paper.
Multiply fraction by a whole	they use to tile the rectangle	Examples: using grid paper have
number	determining what part of a unit	students model
	square each piece represents	³⁄4 x 5/6
Multiply fractions by fractions		34 x 2
	Solve area problems using	Students use a visual fraction model to
Multiply mixed numbers	different strategies including	show $\left(\frac{2}{3}\right) \times 4 = \frac{8}{3}$ and create a story
	models, pictures, words, and	context for this equation. Do the same
Create area models	numbers.	with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general, $(\frac{a}{b}) \times (\frac{c}{d})$
		$=\frac{ac}{bd}$.)
		Du 4

Coherence KY.4.NF.4 \rightarrow KY.5.NF.4 \rightarrow KY. 6.G.1

Number Fractions

Standard: 5.NF.5

Interpret multiplication as scaling (resizing), by:

(a.) Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

Enduring Skills:

MP 2: Reason abstractly and quantitatively

MP 6: Attend to precision

Know: What content does the	Do: What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
Determine factors of numbers Multiplication of whole numbers Multiplication of fractions	Compare their strategies with that of classmates to find similarities and differences in reasoning. Understand the relationship of the product to the factors.	 ¹/₄ x 7 is less than seven because seven is multiplied by a factor less than one so the product must be less than seven. ³/₄ of 7 Reason about the impact of scaling one or both factors on the size of a product before multiplying Justify their thinking using pictures and models. Solve real world situational problems involving scaling (resizing) Ex: Charlie's room is 15 feet by 12 feet. He has an awesome closet that is 3 feet by 12 feet wide. He wants to carpet the bedroom but tile the closet. How does the amount of carpet he needs to buy compare with the amount of tile he needs.

Coherence KY.4.OA.1 \rightarrow KY.5.NF.5 \rightarrow KY.6.RP.1

Number Fractions

Standard: 5.NF.5

Interpret multiplication as scaling (resizing) by:

(b.) Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than a given number (recognizing multiplication by whole numbers greater than 1 as a familiar case) explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (nxa)/(nxb) to the effect of multiplying a/b by 1.

Enduring Skills:

MP 2: Reason abstractly and quantitatively

Know: What content	Do: What skill must the student	Mastery: How does the student
does the student need to	demonstrate?	demonstrate the learning of the
know to demonstrate		standard?
this standard?	Explain that when multiplying a whole	standara.
	number greater than 1 by a fraction, the size	Draw a conclusion that multiplying
Equivalant Fractions-	of the product will be loss that the whole	a fraction greater than 1 will result
	of the product will be less that the whole	a fraction greater than 1 will result
one whole Example: 5/5,	number (because they are taking a part of	In a product greater than the given
4/4, 3/3	the whole number) and greater than the	number.
	fraction (because they have more than 1	Example: a given whole number
How to determine	group of the fraction).	by a fraction $5x \frac{1}{2}=5/2=2 \frac{1}{2}$
factors		
	Use visual representations including area	Example: a given fraction by a
Multiplication of	models, fraction strips, and number lines to	whole number: 1/3 x 5=5/3=1 2/3
fractions	support their thinking.	
		Example: a fraction by a fraction:
	Multiplying a fraction greater than one will	$1/3x \frac{1}{4} = 1/12$
	result in a product greater than the given	
	number	
	Multiplying a fraction by a fraction, the	
	and ust will be smaller than the sizes	
	product will be smaller than the given	
	number.	

Coherence KY.4.OA.1 \rightarrow KY.5.NF.5 \rightarrow KY.6.RP.1

Number Fractions

Standard: 5.NF.6

Solve real world problems involving multiplication of fractions and mixed numbers

Enduring Skills:

MP 4: Model with	n mathematics
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MP 5: Use appropriate tools strategically

Know: What content does	<u>Do:</u> What skill must the student demonstrate?	Mastery: How does the
the student need to know		student demonstrate the
to demonstrate this	Use a variety of strategies, including make a model,	learning of the standard?
standard?	draw a picture, make a table, look for a pattern, and	
	guess and check, to solve problems that provide a	Explain the reasonableness of
Multiply fractions by	context for multiplying fractions and mixed numbers.	solutions in terms of context
fractions and whole		and the numbers.
numbers	Create visual models and or equations to represent	Ask: Does my solution make
	real world situational problems involving	sense?
Multiply mixed numbers	multiplication of fractions and mixed numbers.	
		Explain the solution process
Convert mixed numbers	Solve real world problems using visual models or	using models, pictures, words,
to improper fractions	equations to represent the problem.	and numbers.
	Example 1: Louise ate ½ of the bunch of grapes that	
Convert improper	were in the fruit bowl. Her brother ate ¼ of the	
fractions to mixed	grapes that were left. What part of the bunch	
numbers	of grapes did Louise and her brother eat?	
Create Visual fraction	Example 2: Marty is training for the swim team. On	
models representing	Monday he swam 16 laps. On Tuesday he swam	
multiplication	1 ½ times as many laps. On Wednesday he	
	swam 1 ½ as many laps as Tuesday. How many	
	lans did Marty swim on those 3 days?	

KY.5.MD.2

Coherence KY.4.NF.4 → KY.5.NF.6

Number Fractions

Standard: 5.NF.7

Apply and extend previous understandings of division to divide unit fractions by whole numbers by unit fractions.

- (a.) Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
- (b.) Interpret division of a whole number by a unit fraction, and compute such quotients.
- (c.) Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g. by using visual fraction models and equations to represent the problem.

Enduring Skills:

- MP 1: Make sense of problems and persevere in solving them
- MP 4: Model with mathematics

MP 8: Look for and express regularity in repeated reasoning

	1	r
Know: What content	<u>Do:</u> What skill must the student	Mastery: How does the student demonstrate the
does the student need	demonstrate?	learning of the standard?
to know to		
demonstrate this	Explain work using pictures,	Solve problems involving division of a unit fraction
standard?	words, and numbers.	by a whole number using models and pictures.
		Example 1 : The snow plow has ¼ of a ton salt that
Define divisor	Connect visual representations	must be spread on 3 streets. If the driver wants to
	to writing division equations	use the same amount of salt on each street. how
Define dividend		much salt will he spread on each? Example 2 : $\frac{1}{2} \div 3$ =
	Look for connections between	$1/6$ so $3x 1/6 = \frac{1}{2}$ Example 3 : I have 3 guarts of
Define quotient	division with fractions and	lemonade Each cup holds ¼ of a quart How many
Denne quotient	multiplication with fractions	cups can L fill?
Understand	using previous experiences with	
multiplication and	the relationship between	Use visual fraction models and equations for
division are inverse	multiplication and division	
anorations	multiplication and division.	example:
operations		entire candy bar
	Determine the reciprocal of	
Division of whole	fractions	
numbers		$\frac{1}{2} \div 3$ 1/6 1/6 1/6 1/6 1/6 1/6
Multiplication of		
tractions		

Coherence KY.4.NF.4 \rightarrow KY.5.NF.7 \rightarrow KY.6.NS.1

Measurement and Data

Standard: 5.MD.1:

Convert among different size standard measurement units (mass, weight, liquid volume, length, time) within one system of units (metric system, U.S. standard system and time)

Enduring Skills:

MP 3: Construct viable arguments and critique the reasoning of others MP 8: Look for and express regularity in repeated reasoning

Know: What content does the	<u>Do</u> : What skill must the student	Mastery: How does the student
demonstrate this standard?		standard?
Convert like measurement units.	Word problems involving customary and standard	Within the same system convert measurements in a larger unit in
Specific vocabulary to convert measurements.	measurement conversions.	terms of a smaller unit and a smaller unit in terms of a larger
	Model vocabulary usage with	unit. Use these conversions in
	measurement terms.	solving multi-step, real world problems.
	Determine base-ten conversions	
	within the metric system, that is, 1 kilometer = 1,000 meters.	Accurately measure objects to convert different sized measurement units within the
	Solve multi-step, real world	same measurement system.
	problems that involve	Example: 3ft=36inches
	measurement conversions.	Example: 4quarts=1 gallon
	Solve multi-step problems relating to time	Solve multi-step real world problems relating to time

Coherence KY.4.MD.1 \rightarrow KY.5.MD.1 \rightarrow KY.6.RP.3

Measurement and Data

Standard: 5.MD.2:

Identify and gather data for statistical questions focused on both categorical and numerical data. Select an appropriate data display (bar graph, pictograph, dot plot). Make observations from the graph about the questions posed.

Enduring Skills:

- MP 4: Model with mathematics
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision

Know: What content does the	<u>Do:</u> What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Use statistical questions to identify	
Interpret word problems involving	and gather numerical data	Generate questions for which data
information presented in line		can be gathered and sort questions
plots.	Measure objects to one-eighth of a	that are categorical (Possible
	unit, including length, mass, and	question: What is your favorite
Use line plots to display data of	liquid volume.	afterschool activity?) and questions
objects measured in fractional		that are numerical (Possible
units.	Make a <mark>dot plot</mark> to display a data	question: How many times can you
	set of measurements in fractions	say/write your name in one minute?).
Measure objects to the nearest 1/3,	of a unit (1/2, 1/4, 1/8).	After gathering data on a question,
¼, and ½ inch.		students discuss which graphs are
	Solve problems using operations of	possible and which ones are not
Use specific vocabulary to describe	fractions from information	possible, and why. Students select
and analyze data of objects	presented in the dot plot.	one type of graph that fits the data
measured and displayed on line		gathered and create the graph, by
plots.	Use appropriate vocabulary when	hand or by using technology.
	working with dot plots and	
	fractional measurements.	Construct a dot plot with information
		gathered and display, analyze, and
		interpret <mark>dot plots</mark> .
		Solve problems involving information
		presented in dot plots of
		measurements such as, given
		different measurements of liquid in
		identical beakers, find the amount of
		liquid each beaker would contain if
		the total amount in all the beakers
		were redistributed equally.



Coherence KY.4.MD.4 \rightarrow KY.5.MD.2 \rightarrow KY.6.SP.4

Measurement and Data

Standard : 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 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.

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them

- MP 4: Model with mathematics
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision

MP 8: Look for and express regularity in repeated reasoning

Know: What content	<u>Do:</u> What skill must the student	Mastery: How does the student
does the student need	demonstrate?	demonstrate the learning of the
to know to demonstrate		standard?
this standard?	Students recognize volume as an attribute of	
	three-dimensional space.	
Multiplication		
	Recognize that a 1-unit by 1-unit by 1- unit	9
Recognize area = length	cube is the standard for measuring volume.	unit one cubic unit
x width		
	Determine volume by counting unit cubes	
Solve problems using		
area	Recognize volume is measured in cubic units	ĭ ĭ ₩
		\bigcirc \bigcirc \bigcirc
	Attend to precision with specific vocabulary	
	to describe the measurement of volume.	For example: Given a rectangular
		prism with a bottom layer of 10
	Use measurement vocabulary associated	cubes for the length and 5 cubes for
	with the concept of volume.	the width or 50 cubes for the
		bottom layer. Students determine
		there are four layers of 50 cubes or
		200 cubes in all or 200 cubic inches.
		Determine the volume of different
		size rectangular boxes using unit
		cubes

Measurement and Data

Standard: 5.MD.4

Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them

- MP 4: Model with mathematics
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision

MP 8: Look for and express regularity in repeated reasoning

Mar and Mile at a set and	Be white and all interest the extendent	Non-terminal large de section et al de set
<u>Know:</u> What content	DO: what skill must the student	<u>Iviastery:</u> How does the student
does the student need	demonstrate?	demonstrate the learning of the
to know to demonstrate		standard?
this standard?	Attend to precision with specific vocabulary	
	to describe the measurement of volume:	Measure volume by counting unit
Recognize volume as	Cubic cm	cubes, using cubic cm, cubic in, and
three-dimensional	Cubic in	cubic ft.
space	• Cubic ft	
	Improvised units	Example: Given a rectangular prism with a bottom layer of 10 cubes for the length and 5 cubes for the width
	Determine volume of a rectangular prism with whole number side lengths by packing it with unit cubes	or 50 cubes for the bottom layer. Students determine there are four layers of 50 cubes or 200 cubes in all or 200 cubic inches.
		Use measurement vocabulary when reporting answers associated with the concept of volume

Coherence KY.3.MD.6 \rightarrow KY.5.MD.4

Measurement and Data

Standard: 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.

(b.) Apply the formulas $V = I \times w \times h$ and $V = B \times h$ 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.

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them

- MP 4: Model with mathematics
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision

MP 8: Look for and express regularity in repeated reasoning

Know: What content	Do: What skill must the student	Mastery: How does the student
does the student need	demonstrate?	demonstrate the learning of the
to know to demonstrate	Determine volume answers by counting unit	standard?
this standard?	cubes and show that the volume is the same	Provide experiences for students to
	as would be found by multiplying using I x w	measure and compare a variety of
Multiplication	x h and b x h	objects by using all three dimensions
Recognize volume as	Solve real world and mathematical problems	Find the volume of a detergent box,
three-dimensional	involving volume.	cereal box, or a tissue box using V= I x
space		w x h and V= b x h.
	Apply the formulas V=I x w x h and V = b x h	
Attend to precision with	for rectangular prisms to find volumes of	For example, students determine the
specific vocabulary to	rectangular prisms with whole -number edge	volume of concrete needed to build
describe the	lengths as they solve real- world	the steps in the diagram below:
measurement of	mathematical problems	200
volume		10
		1.5 %

Coherence KY.4.MD.3 \rightarrow KY.5.MD.5 \rightarrow KY.6.G.2

Geometry

Standard: 5.G.1

Use a pair of 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 axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate)

Enduring Skills:

MP 4: Model with mathematics

MP 7: Look for and n	nake use of structure
Know: What content	Do: What skill must the student

Know: What content	<u>Do</u> : What skill must the student demonstrate?	Mastery: How does the student
does the student		demonstrate the learning of the
need to know to	Define the coordinate system	standard?
demonstrate this		
standard?	Identify the x- and y-axis	Given a coordinate plane plot ordered
		pairs in the first quadrant.
Perpendicular	Understand the first number of an ordered pair	у (3,5)
	indicates how far to travel from the origin in the	
Line	direction of one axis and the second number	(5.2)
	indicates how far to travel in the direction of the	low
Point	second axis	(0,0) • · · · · · · · · · · · · · · · · · ·
		Given a set of data x and y seordinates
	Locate the origin on the coordinate system	students can create ordered pairs using
		naronthosos and commas. Example:
	Identify and plot coordinates of a point on a	$\gamma_{-0.2,4,6,9}$
	coordinate system in the first quadrant (positive	X-0,2,4,0,8
	numbers)	Y=0,4,8,12,16
		(0,0), (2,4), (4,8), (6,12), (8,16)
	Use specific vocabulary and directions to explain	
	ordered pair locations. Example: Move three	Identify the origin on the coordinate
	units to the right and five units up. (3.5)	nland as being (0.0)
		plane as being (0,0)
		Evaluin the position of ordered pairs
		using the appropriate verse ulary for
		directions
		urections.
		Example :(5,2) Five units to the right, two
		units up.

Coherence KY.5.G.1 \rightarrow KY.6.NS.6

Geometry

Standard: 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.

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them MP 6: Attend to precision

Know: What content does the	<u>Do:</u> What skill must the student	Mastery: How does the student
student need to know to	demonstrate?	demonstrate the learning of the
demonstrate this standard?		standard?
	Identify the first quadrant of the	
Locate the origin on the coordinate plane	coordinate plane	For example, students use the coordinate grid, which ordered
	Use the first quadrant of a	pair represents locations of places
Identify the X and Y axis	coordinate grid to represent real-	or objects.
	world problems.	*************
Identify an ordered pair		9
	Find the relationship between x	7 Library
	and y coordinates on the	6
	coordinate grid.	4 School
	_	3 Park
	Correctly use ordered pairs	
		0 1 2 3 4 5 6 7 8 9 x
		Provide problems that show
		traveling distances on the
		coordinate grid. Have students
		create their own traveling distance
		problems.
		Students create graphs to
		represent real-world situational
		problems involving coordinate
		grids.

KY.6.NS.8 Coherence KY.5.G.2 → KY.6.G.3

Geometry

Standard: 5.G.3

Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

Enduring Skills:

MP 3: Construct viable arguments and critique the reasoning of others MP 6: Attend to precision

Know: What content does the	<u>Do:</u> What skill must the student demonstrate?	<u>Mastery</u> : How does the student demonstrate the learning of the standard?
student need to know to demonstrate this standard?	Define two dimensional shapes based on their specific attributes.	Recognize that some two-dimensional shapes can be classified into more than one category based on their attributes.
Shapes Polygons	Provide experiences for students to discuss the property of shapes.	Recognize if a two-dimensional shape is classified into a category, that it belongs to all subcategories of that category.
Sorting	Direct students to find examples of quadrilaterals and then classify them by their attributes.	Understand that attributes belonging to a category of two- dimensional figures also belong to all subcategories of that category. For example, all rectangles have 4 right angles and squares are rectangles so all squares have 4 right angles.
		Explain reasoning about the properties of shapes

Coherence KY.4.G.2 \rightarrow KY.5.G.3

Geometry

Standard: 5.G.4

Classify two-dimensional figures in a hierarchy based on properties.

Enduring Skills:

MP 1: Make sense of problems and persevere in solving them MP 7: Look for and make use of structure

Know: What content	Do: What skill must the	Mastery: How does the student demonstrate the learning of the	
does the student	student demonstrate?	standard?	
need to know to			
demonstrate this	Identify properties of	Figures from previous grades: polygons, rhombus/rhombi,	
standard?	polygons and reason about	rectangle, square, triangle quadrilateral, pentagon, hexagon, cube,	
	the attributes of shapes	trapezoid, half/quarter, circle. For example: • Polygon - a closed	
Shapes	including triangles.	plan figure formed from line segments that meet only at their	
		endpoints. • Quadrilateral - a four-sided polygon • Rectangle - a	
Polygons	Use graphic organizers such	quadrilateral with two pairs of congruent parallel sides and four	
	as flow charts to compare	right angles. • Rhombus - a parallelogram with all four sides equal	
Sorting	and contrast the attributes	in length • Square - a parallelogram with four congruent sides and	
	of geometric shapes.	four right angles.	
	Classify two-dimensional	Decognize the hierarchy of two dimensional shapes based on their	
	figures into categories	attributes	
	and/or sub-categories based		
	on their attributes.	Analyze properties of two-dimensional figures in order to place	
		into a hierarchy	
		Investigate properties of shapes by sorting and classifying two-	
		dimensional figures in a hierarchy based on properties.	
		Example:	
		Chana	
		Shape	
		Polygon	
		Quadrilateral Triangle	
		TROSCEIES	

Coherence KY.4.G.2 \rightarrow KY.5.G.4