

Office of Assessments, Analytics, and Accountability

## **Grade 5 Mathematics**

Achievement Level Descriptors

## **Major Content**

The student solves problems involving the Major Content for the course with connections to the Standards for Mathematical Practice.

	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Addition and	Adds or subtracts two	Adds or subtracts two	Adds or subtracts two	Adds or subtracts (without	
Subtraction	decimals to hundredths	decimals to hundredths	decimals to hundredths	regrouping) two decimals to	
with	using concrete models,	using concrete models,	using concrete models,	hundredths using concrete	
Decimals	drawings, or strategies	drawings, or strategies	drawings, or strategies	models, drawings, or	
5.NBT.B.7	based on place value,	based on place value,	based on place value,	strategies based on place	
	properties of operations	properties of operations	properties of operations	value and/or the relationship	
	and/or the relationship	and/or the relationship	and/or the relationship	between addition and	
	between addition and	between addition and	between addition and	subtraction.	
	subtraction.	subtraction.	subtraction.		
	Relates the strategy to a	Relates the strategy to a			
	written method and explains	written method and explain			
	the reasoning used.	the reasoning used.			
Add and	Creates and solves word	Solves word problems	Solves word problems	Solves word problems	
Subtract	problems involving addition	involving addition and	involving addition and	involving addition and	
Fractions to	and subtraction of	subtraction of fractions,	subtraction of fractions,	subtraction of fractions	
Solve	fractions, referring to the	referring to the same whole	referring to the same whole	using benchmark fractions	
Problems	same whole in cases of	in cases of unlike	in cases of unlike	with unlike denominators,	
5.NF.A.2	unlike denominators by	denominators by using visual	denominators by using	referring to the same whole	
	using visual fraction	fraction models or equations.	visual fraction models or	by using visual fraction	
	models and equations.		equations.	models or equations.	

	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
	Assesses <b>and justifies</b> reasonableness using benchmark fractions and number sense of fractions.	Assesses reasonableness using benchmark fractions and number sense of fractions.			
Fractions with Unlike Denominators 5.NF.A.1	Adds and subtracts <b>more</b> <b>than three</b> fractions and mixed numbers with unlike denominators in such a way as to produce an equivalent sum or difference with like denominators.	Adds and subtracts <b>up to</b> <b>three</b> fractions and adds and subtracts two mixed numbers with unlike denominators in such a way as to produce an equivalent sum or difference with like denominators.	Adds <b>and</b> subtracts two fractions or mixed numbers with unlike denominators in such a way as to produce an equivalent sum or difference with like denominators.	Adds or subtracts two fractions or mixed numbers with unlike denominators using only fractions with denominators of 2, 4, 5 or 10 in such a way as to produce an equivalent sum or difference with like denominators.	
Multiplication and Division with Decimals 5.NBT.B.7	Multiplies tenths by tenths or tenths by hundredths and divides in problems involving tenths and/or hundredths using strategies based on place value, properties of operations and/or the relationship between addition and subtraction.	Multiplies tenths by tenths or tenths by hundredths and divides in problems involving tenths and/or hundredths using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship between addition and subtraction.	Multiplies tenths by tenths and divides in problems involving tenths using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship between addition and subtraction.	Multiplies tenths by tenths and divides in problems involving tenths using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship between addition and subtraction.	
	Relates the strategy to a written method.	Relates the strategy to a written method.	Relates the strategy to a written method.		
Multiply Whole Numbers 5.NBT.B.5	Fluently multiplies a three- digit by a <b>two</b> -digit whole number using the standard algorithm.	Fluently multiplies a three- digit by a one-digit whole number using the standard algorithm.	Multiplies <b>a three-digit by a one-digit whole number.</b>	Multiplies whole numbers.	

		Major Content		
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
Quotients and Dividends 5.NBT.B.6	Divides whole numbers up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to four-digit dividends and <b>two</b> - digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to four-digit dividends and one-digit divisors, where the dividend is a multiple of ten and uses strategies based on place value, the properties of operations and/or the relationship between multiplication and division.	Divides whole numbers up to three-digit dividends and one-digit divisors, where the dividend is a multiple of ten and uses strategies based on place value, the properties of operations and/or the relationship between multiplication and division.
	Illustrates and explains the calculations by using equations, rectangular arrays, and area models. Checks reasonableness of answers with multiplication or estimation.	Illustrates and explains the calculations by using equations, rectangular arrays, and area models. Checks reasonableness of answers with multiplication or estimation.		
	Identifies correspondences between approaches.			
Multiply and Divide Fractions to Solve Problems 5.NF.B.4 5.NF.B.6 5.NF.B.7	Solves real-world problems, by multiplying a mixed number by a fraction, a fraction by a fraction and a whole number by a fraction; dividing a fraction by a whole number and a whole number by a fraction using visual fraction models and creating context for the mathematics, including rectangular areas; and interpreting the product and/or quotient.	Solves real-world problems, by multiplying a mixed number by a fraction, a fraction by a fraction and a whole number by a fraction; dividing a fraction by a whole number and a whole number by a fraction using visual fraction models and creating context for the mathematics, including rectangular areas; and interpreting the product and/or quotient.	Multiplies a fraction or a whole number by a fraction and divides a fraction by a whole number or whole number by a fraction using visual fraction models <b>and</b> <b>creating context for the</b> <b>mathematics, including</b> <b>rectangular areas.</b>	Multiplies a fraction or a whole number by a fraction and divides a fraction by a whole number or whole number by a fraction using visual fraction models.

	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Interpret Fractions 5.NF.B.3	Solves word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.	Solves word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.	Solves word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.	Solves word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using manipulatives or visual models to identify between which two whole numbers the answer lies.	
	Interprets the fraction as division of the numerator by the denominator.	Interprets the fraction as division of the numerator by the denominator.	Interprets the fraction as division of the numerator by the denominator.		
	Creates a model representing the situation.	Identifies a simple model representing the situation.			
Recognize and Represent Volume 5.MD.C.3 5.MD.C.4	Recognizes volume as an attribute of solid figures and understands volume is measured using cubic units and can be found by packing a solid figure with unit cubes and counting them.	Recognizes volume as an attribute of solid figures and understands volume is measured using cubic units and can be found by packing a solid figure with unit cubes and counting them.	Recognizes volume as an attribute of solid figures and understands volume is measured using cubic units and can be found by packing a solid figure with unit cubes and counting them.	Recognizes volume as an attribute of solid figures and, <b>with a visual model</b> , understands volume is measured using cubic units and can be found by packing a solid figure with unit cubes and counting them.	
	Represents the volume of a solid figure as "n" cubic units.	Represents the volume of a solid figure as " <i>n</i> " cubic units.			
Determine Volume 5.MD.C.5b 5.MD.C.5c	Solves real-world and mathematical problems by applying the formulas for volume, relating volume to the operations of multiplication and addition, and recognizing volume is additive by finding the volume of solid figures of two non-overlapping parts.	Solves real-world and mathematical problems by applying the formulas for volume, relating volume to the operations of multiplication and addition, and recognizing volume is additive by finding the volume of solid figures of two non-overlapping parts.	Given a visual model, solves real-world and mathematical problems by applying the formulas for volume, relating volume to the operations of multiplication and addition, and recognizing volume is additive by finding the volume of solid figures of two non-overlapping parts.	Given a visual model and the formulas for finding volume, solves real-world and mathematical problems by applying the formulas for volume ( $V = l \times w \times h$ and $V = B \times h$ ).	

	Major Content			
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
Read, Write, and Compare Decimals 5.NBT.A.3 5.NBT.A.4	Reads, writes, and compares decimals to <b>any</b> <b>place</b> using numerals and symbols and rounds to any place and chooses appropriate context given a rounded number.	Reads, writes, and compares decimals to the <b>thousandths</b> using numerals, number names, expanded form and symbols (>, <, =) and rounds to any place.	Reads, writes, and compares decimals to the <b>hundredths</b> using numerals, number names, expanded form and symbols (>, <, =), and rounds to any place with scaffolding.	Reads, writes, and compares decimals to the <b>tenths</b> using numerals, number names, expanded form and symbols (>, <, =), and <b>rounds to any</b> <b>place with scaffolding</b> .
Place Value 5.NBT.A.1 5.NBT.A.2 LEAP.I.5.1	In any multi-digit number, recognizes 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, uses whole number exponents to denote powers of 10 and uses symbols to compare two powers of 10 expressed exponentially (compare 10 <sup>2</sup> to 10 <sup>5</sup> ).	In any multi-digit number, recognizes 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 and uses whole number exponents to denote powers of 10.	In any multi-digit number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right or 1/10 of what it represents in the place to its left <b>and uses</b> <b>whole number exponents to</b> <b>denote powers of 10.</b>	In any multi-digit number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right or 1/10 of what it represents in the place to its left <b>by using</b> <b>manipulatives or visual</b> <b>models.</b>
Multiplication Scaling 5.NF.B.5a	Interprets multiplication scaling by comparing the size of the product to the size of one factor on the basis of the size of the second factor without performing the indicated multiplication with <b>two</b> <b>fractions.</b>	Interprets multiplication scaling by comparing the size of the product to the size of one factor on the basis of the size of the second factor without performing the indicated multiplication, focusing on one factor being a fraction greater than or less than one.	Interprets multiplication scaling by comparing the size of a product to the size of one factor on the basis of the size of the second factor by performing the indicated multiplication where one factor is a fraction less than one.	Interprets multiplication scaling by comparing the size of a product to the size of one factor on the basis of the size of the second factor <b>by performing the indicated</b> <b>multiplication</b> where one factor is a fraction less than one <b>using manipulatives or</b> <b>visual models.</b>

## Additional & Supporting Content

The student solves problems involving the Additional & Supporting Content for the course with connections to the Standards for Mathematical Practice.

	Additional & Supporting Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Write and	Uses parentheses or	Uses parentheses or	Uses parentheses or	Uses parentheses or	
Interpret	brackets to write and	brackets to write <b>and/or</b>	brackets to write <b>or</b>	brackets to write simple	
Numerical	evaluate numerical	evaluate numerical	evaluate numerical	numerical expressions.	
Expressions	expressions.	expressions.	expressions.		
5.0A.A.1	Interprets numerical	Interprets numerical	Interprets simple numerical		
5.0A.A.2	expressions without	expressions without	expressions without		
	evaluating them.	evaluating them.	evaluating them.		
Coordinate	Represents real-world and	Represents real-world and	Represents real-world and	Represents real-world and	
Plane	mathematical problems by	mathematical problems by	mathematical problems by	mathematical problems by	
5.G.A.1	locating and graphing	locating and graphing points	locating <b>and</b> graphing	locating or graphing points	
5.G.A.2	points in the first quadrant	in the first quadrant of a	points in the first quadrant	in the first quadrant of a	
5.0A.B.3	of a coordinate plane and	coordinate plane <b>and</b>	of a coordinate plane.	coordinate plane.	
	interprets coordinate	interprets coordinate values			
	values of points in the	of points in the context of			
	context of the situation.	the situation.			
Two-	Classifies two-dimensional	Classifies two-dimensional	Classifies two-dimensional	Classifies two-dimensional	
Dimensional	figures in a hierarchy based	figures in a hierarchy based	figures <b>in a hierarchy</b> based	figures based on properties.	
Figures	on properties.	on properties.	on properties.		
5.G.B.3	Demonstrates that	Understands that attributes	Understands that shared		
5.G.B.4	attributes belonging to a	belonging to a category of	attributes categorize two-		
	category of two-	two-dimensional figures	dimensional figures.		
	dimensional figures also	also belong to all			
	belong to all subcategories	subcategories of that			
	of that category.	category.			
	Uses appropriate tools to				
	determine similarities and				
	differences between				
	categories and				
	subcategories.				

	Additional & Supporting Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Units and Conversion 5.MD.A.1	Converts among different- sized standard measurement units within a given measurement system and uses these conversions to solve real-world, multi- step problems.	Converts among different- sized standard measurement units within a given measurement system and uses these conversions to solve real-world, <b>multi-step</b> problems.	Converts among different- sized standard measurement units within a given measurement system and uses these conversions to solve real-world, one- step problems.	Converts among different- sized standard measurement units within a given measurement system and solves one-step problems by using manipulatives or visual models.	
	Chooses the appropriate measurement unit based on the given context.				
<b>Data Displays</b> 5.MD.B.2	Makes a line plot to display a data set of measurements in fractions of a unit with denominators limited to 2, 4, and 8, uses operations on fractions to solve problems involving information in line plots, and <b>interprets the solution</b> <b>in relation to the data.</b>	Makes a line plot to display a data set of measurements in fractions of a unit with denominators limited to 2, 4, and <b>8</b> , and uses operations on fractions to solve problems involving information in line plots.	Makes a line plot to display a data set of measurements in fractions of a unit with denominators limited to 2 and 4, and uses operations on fractions with denominators of 2 and 4 to solve problems involving information in line plots.	Makes a line plot to display a data set of measurements in fractions of a unit with denominators limited to 2 and 4, and uses operations on fractions with denominators of 2 and 4 to solve problems involving information in line plots.	

## Mathematical Reasoning & Modeling

In connection with course content, the student: expresses course-level appropriate mathematical reasoning by constructing viable arguments and critiquing the reasoning of others; attends to precision when making mathematical statements; solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses); engages in the modeling practice by using mathematics to solve problems arising in everyday scenarios; makes sense of problems and perseveres when solving them; uses appropriate tools strategically; and looks for and makes use of structure.

		Type II		
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
	In connection with the content knowledge and skills		In connection with the conten	t knowledge and skills
	described in Major Content, the	e student <b>clearly</b> constructs	described in Major Content, th	ne student constructs and
	and communicates a		communicates a	
LEAP.II.5.1	complete written response bas		written response based on pro	
LEAP.II.5.2	operations; the relationships b		relationships between addition	
LEAP.II.5.3	subtraction and between multi	•	between multiplication and di	ivision; and identification of
LEAP.II.5.4	identification of arithmetic pat		arithmetic patterns	
LEAP.II.5.5	well-organized and complete		response based on operations	
LEAP.II.5.6	using concrete referents such		such as diagrams, including n	
LEAP.II.5.7	lines, (whether provided in the		prompt) and connecting the d	iagrams to a written
LEAP.II.5.8		iagrams to a written (symbolic)	(symbolic) method	
LEAP.II.5.9	method			
	well-organized and complete	well-organized and complete	complete response by	response by presenting
	response by presenting and	response by presenting <b>and</b>	presenting solutions to	solutions to scaffolded two-
	defending solutions to multi-	defending solutions to multi-	multi-step problems as	step problems as valid
	step problems as valid chains	step problems as valid chains	valid chains of reasoning;	chains of reasoning; using
	of reasoning; using symbols	of reasoning; using symbols	using symbols	symbols appropriately;
	appropriately; <b>evaluating</b>	appropriately; distinguishing	appropriately;	distinguishing correct and
	reasoning; and presenting	correct and flawed	distinguishing correct and	flawed reasoning; and
	and defending corrected	reasoning; and identifying	flawed reasoning; and	identifying a flaw in
	reasoning	and describing a flaw in	identifying and <b>describing a</b>	reasoning
		reasoning or in solutions to	flaw in reasoning or	
		multi-step problems; and	solutions to multi-step	
		presenting corrected	problems; and presenting	
		reasoning	corrected reasoning	

	Type II				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
	Responses may include:				
	a logical/defensible approach based on a conjecture and/or stated assumptions, using mathematical connections	a logical/ <b>defensible</b> approach based on a conjecture and/or stated assumptions, <b>using</b> <b>mathematical connections</b>	a <b>logical</b> approach based on a conjecture and/or stated assumptions	an approach based on a conjecture and/or stated or faulty assumptions	
	an <b>efficient</b> and logical progression of steps <b>with appropriate justification</b>	a logical progression of steps	a <b>logical</b> , but incomplete, progression of steps	an incomplete or illogical progression of steps	
	precision of calculation	precision of calculation	minor calculation errors	an intrusive calculation error	
	fluent use of grade-level vocabulary, symbols, and labels	<b>fluent</b> use of grade-level vocabulary, symbols, and labels	limited use of grade-level vocabulary, symbols, and labels	limited use of grade-level vocabulary, symbols, and labels	
	justification of a conclusion	justification of a conclusion	partial justification of a conclusion based on calculations	partial justification of a conclusion based on calculations	
	determining whether an argument or conclusion is generalizable				
	evaluating, interpreting and critiquing the validity of responses, reasoning, and approaches, using mathematical connections and <b>providing a counter-</b> <b>example where applicable</b>	evaluating, <b>interpreting, and</b> <b>critiquing</b> the validity of responses, <b>reasoning,</b> and approaches <b>using</b> <b>mathematical connections</b>	evaluating the validity of responses, approaches, and conclusions		

	Type III					
	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic		
Content	In connection with the content knowledge, skills, and abilities described in Major Content, the student devises a plan and applies mathematics to solve multi-step, real-world contextual word problems by:					
LEAP.III.5.1 LEAP.III.5.2	using stated assumptions and approximations or making assumptions to simplify a real-world situation	using stated assumptions and approximations or <b>making assumptions</b> to simplify a real-world situation	using stated assumptions and approximations to simplify a real-world situation	using stated assumptions and approximations to simplify a real-world situation		
	analyzing and/or creating constraints, relationships, and goals					
	mapping relationships between quantities by selecting appropriate tools to create models	mapping relationships between quantities by selecting appropriate tools to create models	<b>illustrating relationships</b> <b>between quantities</b> by using provided tools to create models	identifying quantities by using provided tools to create models		
	analyzing relationships mathematically between quantities to draw conclusions	analyzing relationships mathematically between quantities to draw conclusions	analyzing relationships mathematically <b>between</b> <b>quantities</b> to draw conclusions	analyzing relationships mathematically to draw conclusions		
	justifying and defending models to lead to a conclusion					
	interpreting mathematical results in the context of the situation	interpreting mathematical results <b>in the context of the situation</b>	interpreting mathematical results in a simplified context			
	reflecting on whether results make sense	reflecting on whether results make sense	reflecting on whether results make sense			
	improving a model if it has not served its purpose	modifying <b>and/or improving</b> a model if it has not served its purpose	modifying a model if it has not served its purpose			
	writing a <b>concise</b> arithmetic expression or equation to describe a situation	writing an arithmetic expression or equation to describe a situation	writing an arithmetic expression or equation to describe a situation	writing an arithmetic expression or equation to describe a situation		