Assessment Development Guide
Educator Resource
Mathematics: Grade 3

This document is intended to describe how the Kansas assessments align to the Kansas standards. It illustrates how standards, evidence statements, performance level descriptors (PLDs), and depth of knowledge influence the Kansas summative assessment.

The 2017 Kansas mathematics standards serve as the foundation of the assessment. These standards are grouped into clusters, and the assessment mirrors these same groupings. By assessing at the cluster level, it is possible to highlight student mastery of the connected material contained in the standards. Emphasis on particular clusters captures the focus, coherence, and rigor of the standards. These content emphases guide the development of each assessment.

Suggested Uses

Educators can use this document to

- better understand the standards and the assessment.
- understand what is expected of students in order to achieve performance level 3.
- check the alignment of curriculum and learning activities.
- ensure that long-range instructional plans match the major emphases of the standards.
- apply standards at the level of rigor necessary to allow students to demonstrate success within a balanced assessment system.
- develop learning goals.
- build a greater understanding of student, grade-level, school, and district results and plan for future learning activities accordingly.
- provide professional development opportunities within a school or district, and for vertical team planning, grade-level planning, and professional learning communities.

Evidence Statements

Evidence statements are derived from the content standards and describe the knowledge and skills that an assessment item or task elicits from students.

Evidence statements are also designed to provide guidance for teachers in creating classroom learning opportunities that align with the expectations of the standards. Evidence statements should not be used as a checklist of student understanding, nor should they be used to limit instructional practices.

Performance Level Descriptors

To help educators and parents understand students' performance at each level, PLDs are available for each test. PLDs define the knowledge, skills, and processes that students likely demonstrate at different levels of proficiency within the reporting categories (1, 2, 3, 4). PLDs are not inclusive: they do not describe all possible skills students could demonstrate at each of the levels. PLDs should not be viewed as checklists of what students should know or be able to do.

These PLDs appear on Individual Student Reports and describe student performance on the assessment.

Level 1: A student at Level 1 shows a *limited* ability to understand and use the skills and knowledge needed for post-secondary readiness.

Level 2: A student at Level 2 shows a *basic* ability to understand and use the skills and knowledge needed for post-secondary readiness.

Level 3: A student at Level 3 shows an *effective* ability to understand and use the skills and knowledge needed for post-secondary readiness.

Level 4: A student at Level 4 shows an *excellen*t ability to understand and use the skills and knowledge needed for post-secondary readiness.

Detailed descriptions of performance levels for grade 3 mathematics are contained within this document.

Depth of Knowledge

The Kansas Assessment Program (KAP) uses Webb's depth of knowledge (DOK) framework to classify each assessment item based on the level of cognitive demand required by students. The four DOK levels **do not** directly correspond to the four performance levels of the KAP summative assessments.

DOK is a measure of cognitive complexity, not a measure of difficulty. Item difficulty is determined by the percentage of students who correctly respond to an item. It is possible for a DOK 2 item to be very difficult and for a DOK 3 item to be relatively easy.

Items within an assessment include a range of DOK levels and correspond to the levels of cognitive complexity required by the content standards. There are four DOK levels, as outlined below.

Level 1 Recall and Reproduction: Recall a fact, term, definition, principle, or concept; perform a simple procedure.

Level 2 Basic Application of Skills and Concepts: Apply conceptual knowledge; use provided information to select appropriate procedures for a task; perform two or more steps with decision points along the way; solve routine problems; organize or display data; interpret or use simple graphs.

Level 3 Strategic Thinking: Apply reasoning, using evidence, and developing a plan to approach or solve abstract, complex, or nonroutine problems; interpret information and provide justification when more than one approach is possible.

Level 4 Extended Thinking: Perform investigations or apply concepts and skills that require research and problem-solving across content areas or multiple sources.

Test Content Summary

The test summary provides general information related to the development and frequency of items on the summative assessment. The content emphases of the Kansas summative assessment reflect the instructional emphases outlined in the Kansas State Department of Education Grade Level Focus documents.

There are two groups of items that make up the summative assessment.

1. Skills and Concepts:
Items that assess Skills and Concepts align to one or more evidence statements within a single cluster and require students to perform operations, apply formulas, compare and classify information, and demonstrate conceptual understanding. These items involve applying knowledge of mathematical concepts and executing procedures to solve problems.

2. Strategic Thinking and Reasoning:
Items that assess Strategic Thinking and Reasoning align to one or more clusters and require students to use problem-solving and modeling strategies and to communicate their reasoning. These items involve analyzing complex mathematical and real-world problems, using problem-solving strategies and mathematical models to interpret and solve problems, constructing arguments to support the reasoning used, and critiquing the reasoning of others.

Table 1. Grade 3 Mathematics Test Summary

Skills and Concepts		Percentage of Assessment	Depth of Knowledge
Domains	Operations and Algebraic Thinking	75%–88%	1, 2
	Number and Operations in Base Ten		
	Number and Operations—Fractions		
	Measurement and Data		
	Geometry		
Strategic Thinking and Reasoning		**Percentage of Assessment**	**Depth of Knowledge**
	Problem-Solving and Modeling	12%–25%	2, 3
	Communicating Reasoning		

The remaining pages of this document are organized by cluster. The cluster descriptions include the cluster heading and a list of the standards within each cluster, as structured in the 2017 Kansas mathematics standards. Evidence statements and PLDs are shown below each cluster.

Cluster: 3.OA.A Represent and solve problems involving multiplication and division.

Standards: 3.OA.1, 3.OA.2, 3.OA.3, 3.OA.4

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student represents and interprets products of whole numbers and whole-number quotients of whole numbers in situations involving equal groups, arrays, and measurement quantities. 2. The student uses multiplication and division within 100 to solve one-step word problems in situations involving equal groups, arrays, and measurement quantities. 3. The student determines an unknown whole number in multiplication and division equations relating three whole numbers with single-digit factors within 100.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to use multiplication and division within the 10 × 10 multiplication table to solve one-step word problems using equal groups of objects.	Students should be able to use multiplication and division within the 10 × 10 multiplication table to solve one-step word problems using arrays; and represent and interpret products of two single-digit whole numbers.	Students should be able to use multiplication and division within the 10 × 10 multiplication table to solve problems involving measurement quantities; determine the unknown number in multiplication and division equations relating three whole numbers; and represent and interpret whole-number quotients of whole numbers.	Students should be able to extend previous understanding of multiplication and division to include products and quotients within 100 using a two-digit factor.

Cluster: 3.OA.B Understand properties of multiplication and the relationship between multiplication and division.

Standards: 3.OA.5, 3.OA.6

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student applies the properties of operations (commutative property of multiplication, associative property of multiplication, and distributive property) as strategies to multiply and divide within 100. 2. The student represents and solves division problems within 100 with an unknown-factor, using the relationship between multiplication and division.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
No descriptor	Students should be able to apply the commutative property of multiplication within the 10 × 10 multiplication table.	Students should be able to apply the commutative property of multiplication, the associative property of multiplication, and the distributive property within the 10 × 10 multiplication table; and represent and solve division problems with an unknown-factor, using the relationship between multiplication and division.	Students should be able to extend previous understanding of the commutative property of multiplication, the associative property of multiplication, and the distributive property to include multiplication within 100 using a two-digit factor.

Cluster: 3.OA.C Multiply and divide within 100 (basic facts up to 10 × 10).

Standard: 3.OA.7

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student multiplies factors within the 10 × 10 multiplication table. 2. The student divides within the 10 × 10 multiplication table.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to multiply one-digit numbers by 1, 2, and 5.	Students should be able to recall all products within the 10 × 10 multiplication table.	Students should be able to apply strategies to fluently (efficiently, accurately, and flexibly) multiply and divide within the 10 × 10 multiplication table.	No descriptor

Cluster: 3.OA.D Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Standards: 3.OA.8, 3.OA.9

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student uses the four operations to solve two-step word problems and assesses the reasonableness of answers. 2. The student represents two-step word problems using situation and solution equations with a letter or symbol standing for the unknown quantity. 3. The student identifies and explains arithmetic patterns in number lines, input/output models, addition tables, and multiplication tables.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to use addition and subtraction within 100 to solve one- and two-step word problems.	Students should be able to use the four operations to solve one- and two-step word problems; assess the reasonableness of answers; and identify addition patterns.	Students should be able to use the four operations and equations with a letter or symbol standing for an unknown quantity to solve and represent two-step word problems; identify multiplication patterns; and explain addition and multiplication patterns.	No descriptor

Cluster: 3.NBT.A Use place value understanding and properties of operations to perform multi-digit arithmetic.

Standards: 3.NBT.1, 3.NBT.2, 3.NBT.3

Grade Level Focus: ● Additional

Evidence Statements			
1. The student rounds two- and three-digit whole numbers to the nearest 10 or 100. 2. The student adds and subtracts within 1000, using strategies and algorithms based on place value understanding, properties of operations, and the relationship between addition and subtraction. 3. The student multiplies one-digit whole numbers by multiples of 10 in the range of 10–90, using strategies based on place value understanding and properties of operations.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to round two-digit whole numbers to the nearest 10; and add and subtract within 100 using strategies and algorithms based on place value understanding.	Students should be able to round whole numbers to the nearest 100; add and subtract within 1000, using strategies and algorithms based on place value understanding, properties of operations, and the relationship between addition and subtraction; and multiply one-digit whole numbers by multiples of 10 in the range of 10–90, using strategies based on place value understanding and properties of operations.	Students should be able to fluently (efficiently, accurately, and flexibly) add and subtract within 1000 using any strategy or algorithm based on place value understanding, properties of operations, and the relationship between addition and subtraction.	No descriptor

Cluster: 3.NF.A Develop understanding of fractions as numbers.

Standards: 3.NF.1, 3.NF.2, 3.NF.3

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student identifies a fraction $\frac{1}{b}$ as 1 part of a whole that is partitioned into *b* equal parts and $\frac{a}{b}$ as the quantity formed by *a* parts of size $\frac{1}{b}$. (Note: $\frac{a}{b}$ may be greater than, less than, or equal to 1.) 2. The student identifies and represents fractions on a number line, using the interval 0–1 as the whole, with or without partitioning. 3. The student recognizes and generates simple equivalent fractions and explains why the fractions are equivalent, including using visual models. 4. The student expresses whole numbers as fractions and recognizes fractions that are equivalent to whole numbers. 5. The student compares two fractions with the same numerator or the same denominator, records the result using >, <, =, or ≠ symbols, and justifies the result.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to understand fractions are numbers and identify fractions on a number line with partitioning in increments equal to the denominator.	Students should be able to identify a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; identify fractions on a number line with partitioning in increments not equal to the denominator; recognize simple equivalent fractions; and express whole numbers as fractions.	Students should be able to understand a fraction $\frac{a}{b}$ as the quantity formed by *a* parts of size $\frac{1}{b}$; represent fractions on a number line with partitioning; generate simple equivalent fractions; recognize when fractions are equivalent to whole numbers; compare two fractions with the same numerator or same denominator; and record fraction comparisons using symbols.	Students should be able to approximate the location of a fraction on a number line with no partitioning; explain why two fractions are equivalent; and justify fraction comparisons.

Cluster: 3.MD.A Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

Standards: 3.MD.1, 3.MD.2, 3.MD.3

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student tells and writes time to the nearest minute. 2. The student uses addition and subtraction to solve one-step word problems involving time intervals in minutes. 3. The student identifies measurements and uses the four operations to solve one-step word problems involving mass (g, kg) and liquid volume (L) that are given in the same units.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to tell and write time to the nearest five-minute interval; and solve one-step addition and subtraction problems involving 15-minute time intervals.	Students should be able to tell and write time to the nearest minute; solve one-step addition and subtraction problems involving five-minute time intervals; identify measurements of mass and liquid volume; and solve one-step addition and subtraction word problems involving mass and liquid volume.	Students should be able to solve one-step addition and subtraction problems involving time intervals in minutes; solve one-step problems using the four operations involving mass and liquid volume.	Students should be able to solve one-step addition and subtraction problems involving time intervals of hours and minutes.

Cluster: 3.MD.B Represent and interpret data.

Standards: 3.MD.4, 3.MD.5

Grade Level Focus: ◆ Supporting

Evidence Statements			
1. The student makes or identifies scaled picture graphs and bar graphs to represent data sets with up to four categories. 2. The student uses information presented in scaled bar graphs to solve one- and two-step "how many more" and "how many less" problems. 3. The student generates measurement data by measuring lengths using rulers marked with halves and fourths of an inch. 4. The student makes line plots to represent data sets where the horizontal scale is marked off in whole-unit, half-unit, or quarter-unit intervals.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to draw picture graphs and bar graphs to represent data sets with up to four categories; generate measurement data by measuring lengths using rulers marked with one-inch intervals; and make line plots to represent data sets where the horizontal scale is marked off in whole-unit intervals.	Students should be able to solve one-step "how many more" and "how many less" problems using information presented in scaled bar graphs; generate measurement data by measuring lengths using rulers marked with half-inch intervals; and make line plots with a horizontal scale marked in half-unit intervals.	Students should be able to draw scaled picture graphs and scaled bar graphs to represent data; solve two-step "how many more" and "how many less" problems using information presented in scaled bar graphs; generate measurement data by measuring lengths using rulers marked with quarter-inch intervals; and make line plots with a horizontal scale marked in quarter-unit intervals.	No descriptor

Cluster: 3.MD.C Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

Standards: 3.MD.6, 3.MD.7, 3.MD.8

Grade Level Focus: ▶ Major

Evidence Statements			
1. The student measures areas by counting unit squares. 2. The student determines the area of rectangles by tiling and shows that the area is the same as the product of the side lengths. 3. The student determines the area of rectangles in real-world and mathematical problems by multiplying the side lengths. 4. The student represents the area of rectangles using area models and the distributive property. 5. The student determines the area of rectilinear figures by decomposing into non-overlapping parts and adding them together.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to recognize area as an attribute of plane figures and recognize that a square with side lengths of one unit is called a unit square.	Students should be able to determine the area of rectangles and rectilinear figures by tiling and counting unit squares; show that the area of a rectangle is the same as the product of the side lengths; and determine the area of rectangles in mathematical problems.	Students should be able to determine the area of rectangles in real-world problems; represent the area of rectangles using the distributive property; and determine the area of rectilinear figures by decomposing into non-overlapping parts and adding them together.	Students should be able to determine the area of rectilinear figures in real-world problems.

Cluster: 3.MD.D Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

Standard: 3.MD.9

Grade Level Focus: ● Additional

Evidence Statements			
1. The student determines the perimeter of polygons, given the side lengths, in mathematical and real-world problems. 2. The student determines an unknown side length of polygons, given the perimeter, in mathematical and real-world problems. 3. The student distinguishes between area and perimeter of a rectangle.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to determine the perimeter of polygons, given the side lengths.	Students should be able to determine an unknown side length of polygons, given the perimeter.	Students should be able to identify rectangles with the same perimeter and different areas or with the same area and different perimeters.	Students should be able to solve real-world problems involving rectangles with the same perimeter and different areas or with the same area and different perimeters.

Cluster: 3.G.A Reason with shapes and their attributes.

Standards: 3.G.1, 3.G.2

Grade Level Focus: ◆ Supporting

Evidence Statements			
1. The student classifies shapes according to their attributes and recognizes that shared attributes can define a larger category. (Note: Shapes may include two-dimensional figures such as circles, triangles, squares, rectangles, trapezoids, parallelograms, kites, rhombuses, quadrilaterals, pentagons, and hexagons.) 2. The student partitions shapes into parts with equal areas and expresses the area of each part as a unit fraction of the whole.			
Performance Level Descriptors (PLDs)			
Level 1	**Level 2**	**Level 3**	**Level 4**
Students should be able to recognize shapes based on their attributes.	Students should be able to reason with the attributes of shapes to recognize squares, rectangles, and rhombuses, as examples of quadrilaterals; and partition shapes into parts with equal areas.	Students should be able to reason with the attributes of shapes to recognize trapezoids and kites as examples of quadrilaterals; create examples and nonexamples of quadrilaterals based on their attributes; understand that shapes in different categories may share attributes and that the shared attributes can define a larger category; and express the area of each part of a partitioned shape as a unit fraction of the whole.	No descriptor