OSTP Mathematics Data Interpretation Guidebook
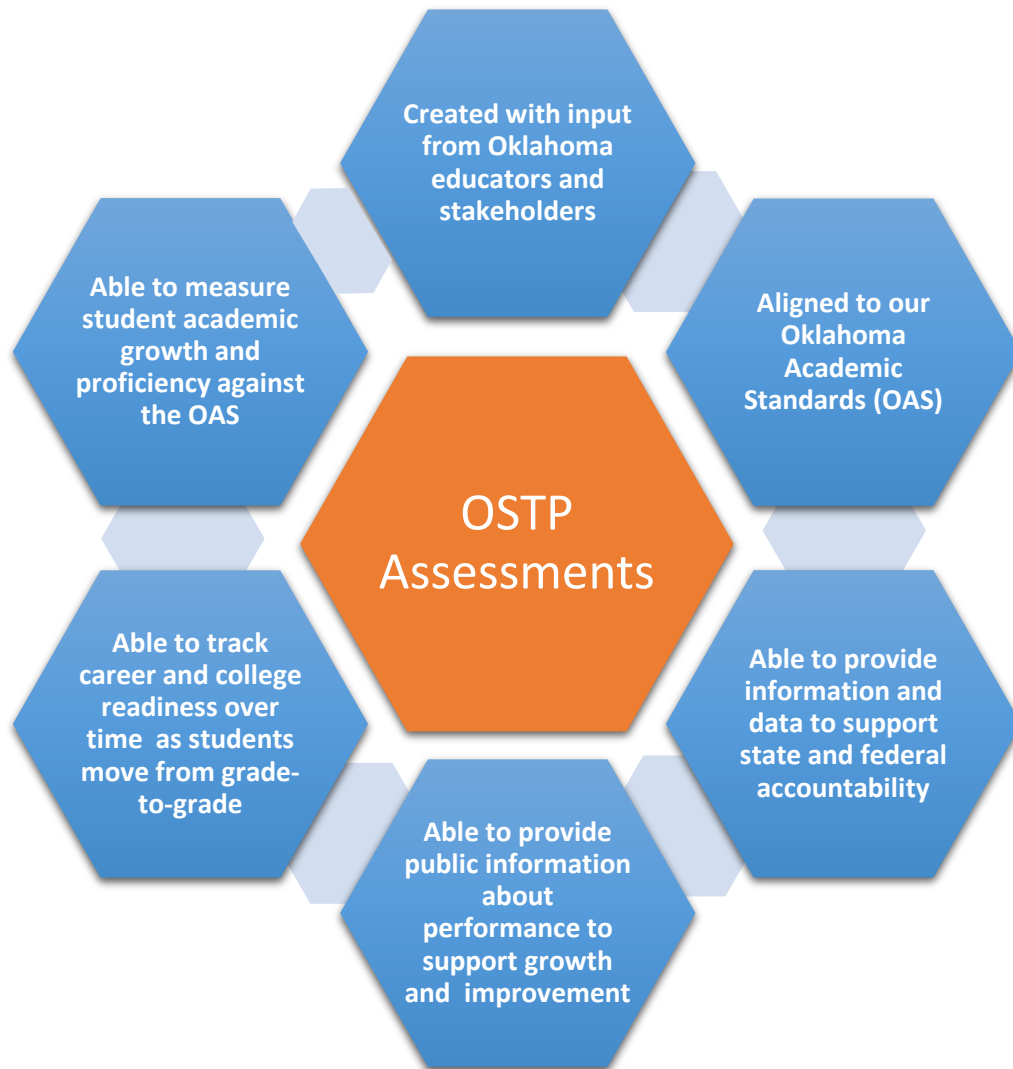
OKLAHOMA EDGE

OKLAHOMA STATE DEPARTMENT OF EDUCATION
CHAMPION EXCELLENCE

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Introduction

We believe that **all students can grow and all schools can improve** and are committed to ensuring that state testing in Oklahoma is both effective and meaningful to families, districts, educators, and members of the community. Assessments within the Oklahoma School Testing Program (OSTP) are:

Created with input from Oklahoma educators and stakeholders

Able to measure student academic growth and proficiency against the OAS

Aligned to our Oklahoma Academic Standards (OAS)

OSTP Assessments

Able to track career and college readiness over time as students move from grade-to-grade

Able to provide information and data to support state and federal accountability

Able to provide public information about performance to support growth and improvement

It is important to note that, while annual state assessments do not capture everything our students are capable of or learn in school, state assessments are the most reliable way to objectively measure student performance across the state. Statewide data allows educators and community leaders to see gaps in learning among student groups as compared to other students across the state. These assessments also provide evidence that can inform local educators and school and district leaders on the changes needed to strengthen student outcomes in their district.

Oklahoma recognizes that a **robust assessment system** is tied closely to students' learning and teachers' instructional practices by valuing and promoting **local, classroom-based formative assessments** that help make **student learning visible**. At the same time, that system should provide a **strong summative assessment** program that fits as a component within a multifaceted state, district and school accountability system. *Oklahoma ESSA Plan pp 48-49*
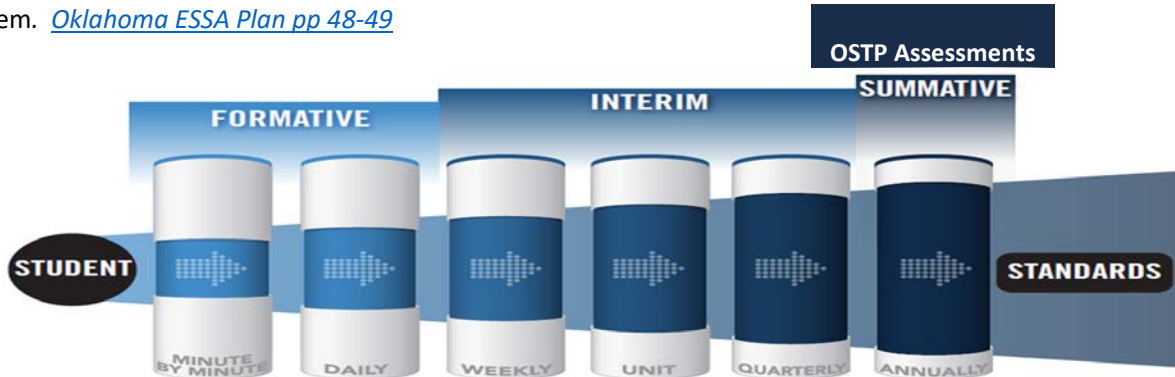
The **OSTP** consists of Oklahoma's grade-level and Career- and College-Ready (CCR) summative assessments in English Language Arts (ELA), math, and science. OSTP assessments tell us how well our students are growing in the knowledge, skills, and abilities outlined in the Oklahoma Academic Standards (OAS) by supporting criterion-referenced interpretations at appropriate levels and grain size (e.g., grade, student group, teacher, building/district administrator, state). OSTP results support state and federal accountability and allow the public to know how their local schools are performing compared to others around the state.

The **OSTP** development process is an extensive, ongoing process that ensures our state assessments are valid and appropriate measures of student knowledge, skills, and abilities. The Oklahoma State Department of Education (OSDE) works with groups of Oklahoma educators through our contract with Measured Progress to develop the state tests as shown in the graphic below.

OSTP Development Process
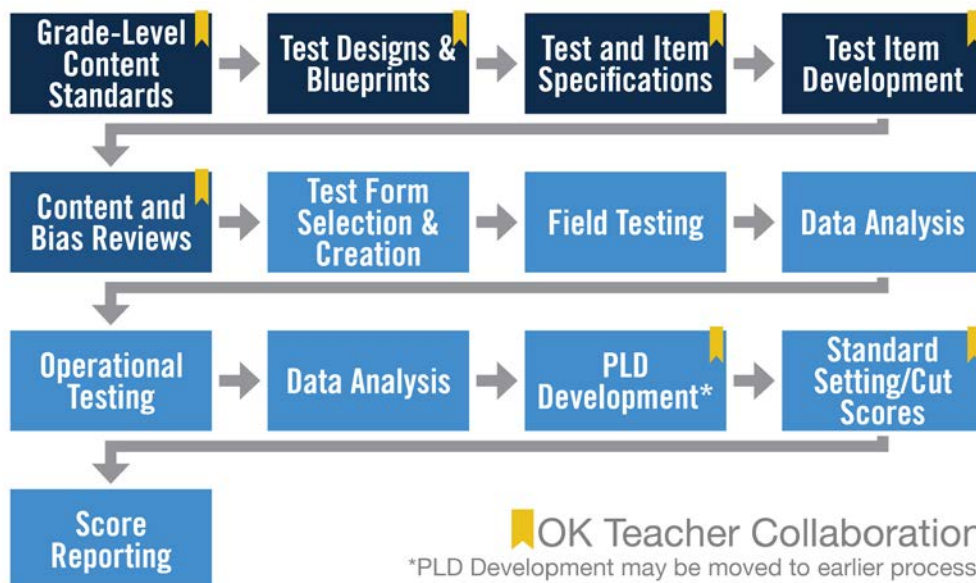
About OSTP Data

Data from state summative assessments serve as a point-in-time snapshot of what students know and are able to do relative to the standards being assessed. Measuring real-world skills like problem solving and critical thinking, the assessments are aligned to the standards so that teachers are able to teach the standards and do not have to "teach to the test." The Oklahoma Academic Standards for Mathematics are developed around four main content strands. Each strand provides the focus to deliver a clear, comprehensive, coherent, and developmentally appropriate set of standards for grades K-12 to guide curricular decisions.

Math Content Strand	About this Strand
Number and Operations (N)	This strand provides focus on the importance of a students' understanding of numbers, ways of representing numbers, relationships among numbers, relationships among number systems, and meanings of operations and how they relate to one another. A focus on number and operations is the cornerstone of a strong mathematics program.
Algebraic Reasoning and Algebra (A)	This strand provides focus for the PK-7 and Pre-Algebra standards around the notion that algebra is more than moving symbols around. It is about understanding patterns, relations and functions, representing and analyzing mathematical situations and structures using algebraic symbols, using mathematical models to represent and understand quantitative relationships, and analyzing change in various contexts.
Geometry and Measurement (GM)	This strand provides focus for the PK-7 and Geometry standards around the notion that geometry and measurement help students understand and represent ideas and solve problems they will encounter in their daily lives.
Data and Probability (D)	A focus on data and probability should enable all students to formulate questions that can be addressed with data and to collect, organize, and display relevant data to answer them. Students should select and use appropriate statistical methods to analyze data, develop and evaluate inferences and predictions that are based on data, and understand and apply basic concepts of probability.

In addition to the content standards, the process standards are defined as the Mathematical Actions and Processes and are comprised of the skills and abilities students should develop and be engaged in throughout their PK-12 mathematics education. The process and content standards work in concert to create clear, concise, and rigorous mathematics standards and expectations for Oklahoma students with the aim of helping them be career and college ready.

Mathematical Actions and Processes
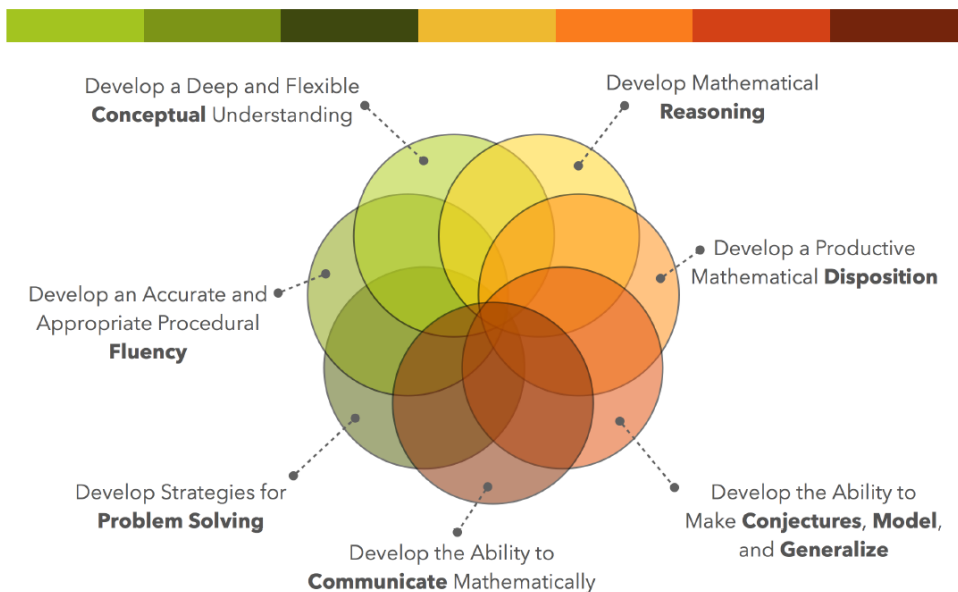
While state summative assessments are only one measure of what students know and can do, having Oklahoma students take standardized math assessments provides reliable data that can be compared across schools and districts. Data from state assessment provide evidence in the form of an instructionally useful claim that serves to support evaluation and enhancement of curriculum and programs while meeting state and federal accountability requirements.

Claims made by the Oklahoma School Testing Program (OSTP) are reported out at three different grain sizes- *Performance Level, Oklahoma Performance Index Score, and Reporting Category Indicator*.

Performance Level (PL)- Are we on track?

- Reported as one of four levels: **Advanced, Proficient, Basic (Limited Knowledge), or Below Basic (Unsatisfactory)**
- Relates what a typical student at each level should know and be able to do relative to the **Oklahoma Academic Standards (OAS)** as described in the **Performance Level Descriptors (PLDs)**
- Provides a **broad view** of whether a student, program, or group is **on-track** with the grade level-expectations needed to be career and college ready (**CCR**)

Oklahoma Performance Index Scores (OPI)- Are we growing?

- Reported as a number between **200-399**
- Built on a **comparable** scale from **200-399** related to the Performance Level wherein **300** is always **Proficient**
- Provides a more specific data point that can be used **to measure gro**wth from year to year and determine where a student or program is in relation to grade-level expectations.

Reporting Category Indicators- Where are our strengths?

- Identified on the OSTP Test Blueprints and reported out as one of three indicators: **Above Standard, At/Near Standard, or Below Standard**
- Determined by comparing student performance on items associated with each reporting category against the expectations of Proficiency; communicates confidence regarding student ability to demonstrate the Proficient knowledge, skills, and abilities.
- Provides point-in-time data about student or program strengths and gaps

OSTP data can be accessed through the Measured Progress portal; however, a username and password are needed.

OSTP Performance Level Data: Are we on track?

Reported as one of four levels (***Advanced, Proficient, Basic, or Below Basic,*** performance levels provide a **broad view** of whether a student, program, or group is **on track** with grade level expectations needed to be career and college ready (**CCR**).

Below Basic	Basic	Proficient	Advanced
Students have not performed at least at the basic level	**S**tudents demonstrate partial mastery of the **essential knowledge and skills** that are foundational for proficient work at their grade level or course and that students are **not on track** to be career and college ready (CCR)	Students demonstrate mastery over challenging **grade-level subject matter**, can analyze and apply such knowledge to real-world situations, are ready for the next grade, course, or level, and are **on-track** to be career and college ready (CCR)	Students demonstrate superior performance on challenging subject matter

Source: Senate Bill 1197

Performance levels were determined by Oklahoma educators using grade-level OAS to identify the knowledge, skills and abilities (KSAs) students should demonstrate based on their command of grade-level standards. The resulting Performance Level Descriptors (PLDs) and 2017 OSTP test results were used during the standard setting process to determine the "cut scores" for each performance band. The range of scores for each performance level band varies by grade as shown in the table below. The table communicates the range of index scores in each performance band and the percentage of Oklahoma students that scored at each level.

Math Performance Bands and % of OK Students Scoring at Band by Grade Level (2017-18)

Grade	Unsatisfactory	% at Band	Limited Knowledge	% at Band	Proficient	% at Band	Advanced	% at Band
Gr 3	200-273	24%	274-299	35%	300-320	26%	321-399	15%
Gr 4	200-272	27%	273-299	37%	300-321	25%	322-399	11%
Gr 5	200-265	25%	266-299	45%	300-320	20%	321-399	10%
Gr 6	200-266	29%	267-299	43%	300-329	23%	330-399	5%
Gr 7	200-278	34%	279-299	32%	300-328	26%	329-399	8%
Gr 8	200-276	52%	277-299	28%	300-315	10%	316-399	10%
2018 Performance Level Look-Up Table used to determine performance level bands in the table								

Performance Level claims inform stakeholders of how to interpret student test scores in relation to the **OAS** by indicating the **readiness** of students to move to the next grade, course, or level of education through the Performance Level Descriptor (PLD).

Performance level claims serve as a **starting point** for discussions and analysis related to the **overall performance** of programs, students, and groups of students.

State, District, Site, Teacher Level Insights

- Where students are as a whole
- Equity gaps across student groups
- Patterns or trends across groups of students and/or grade levels
- Vertical alignment across grade levels
- Horizontal alignment across teachers or student groups
- Comparison to the state
- How data from local assessments compares
- How other evidence of student learning fits

Student Level Considerations

Performance level data tells only part of the student's story and other relevant information should be considered when making student level decisions.

- Other relevant information includes:
    - Student work samples
    - Course grades
    - Teacher observations

Oklahoma Performance Index Scores (OPI): Are we growing?

OPI scores supplement performance-level data by providing more specific information about a student, program, or group performance relative to readiness for the next grade, course, or level.
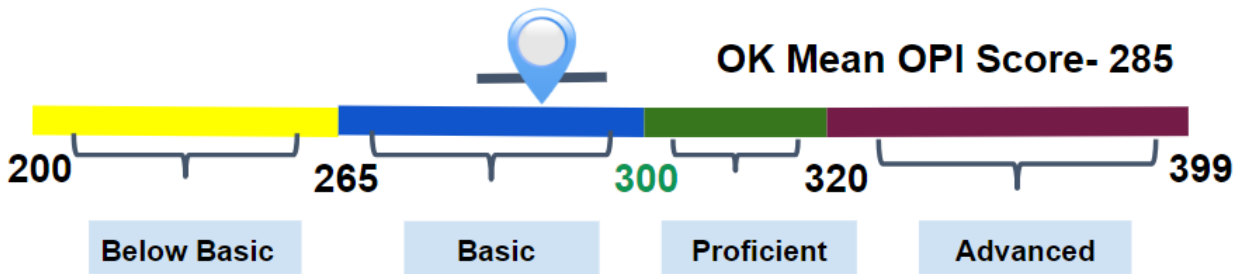
Because they are built on a comparable scale from 200-399 wherein 300 is always proficient, OPI Scores can be used to look at cohort growth from year- to- year.

Grade	2017 Mean OPI	2018 Mean OPI	Cohort Change
3	295	293	
4	293	289	-6
5	288	285	-8
6	287	282	-6
7	287	287	No change
8	276	275	-12

> Cohort change is calculated by finding the difference in Mean OPIs for the same group of students from one year to the next.

OPI scores are obtained by statistically adjusting and converting raw scores onto a common scale to account for differences in difficulty across different assessment forms. This allows for consistency in score interpretation. When combined across a student population, mean OPI scores can be used to describe state, district, and school level changes in performance, as well as identify gaps in achievement among different groups of students.

Also referred to as an average, the mean OPI score is calculated by adding all the individual student scores and dividing by the number of total scores and communicates the average performance for a group of students.

Performance index scores add information to the conversation started with performance levels by **pin-pointing** where a student, grade, or student group is **relative to the next level** along a continuum.

State, District, Site, Teacher Insights

- Changes in achievement gaps overtime
- Changes in student growth from year to year
- Equity gaps across student groups
- Trends and patterns across groups of students and/or grade levels
- Alignment across grade levels
- Comparison to state and other districts
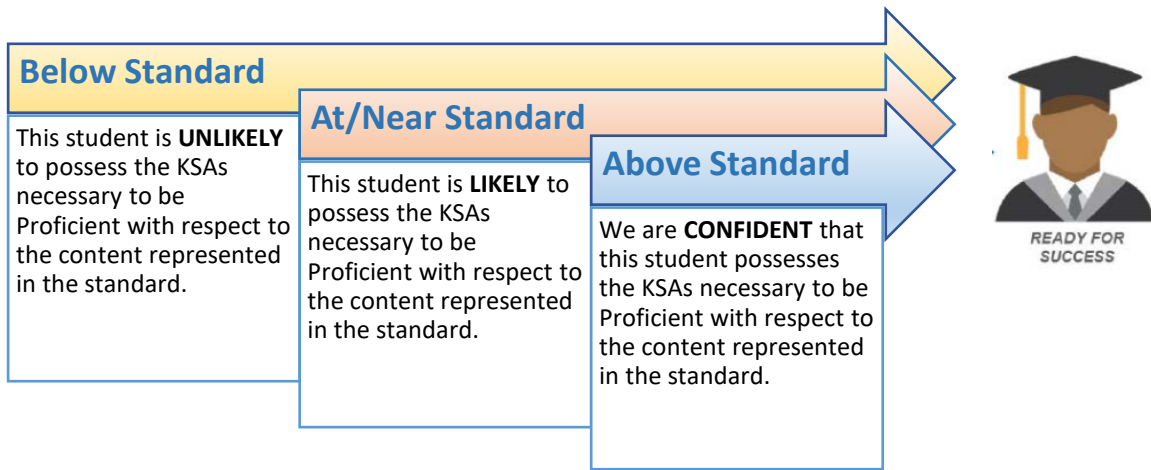- Relation to local level evidence of learning

Student Level Considerations

Performance level data tells only part of the student's story and other relevant information should be considered when making student level decisions.

- Other relevant information includes:
  - Student work samples
  - Course grades
  - Teacher observations

OSTP Reporting Category Indicators: Where are our strengths?

Oklahoma Academic Standards measured by the OSTP assessment are communicated on the OSTP Blueprints. Each OSTP math assessment has four reporting categories. Reporting categories represent groups of similar student skills assessed within each grade level and subject area. Reporting Category Performance is reported with an indicator that represents a confidence level of the student's likelihood of being able to demonstrate the proficient level **Knowledge, Skills, and Abilities (KSAs)** found in the Performance Level Descriptor (PLD) and assessed through at least five items. Indicators include *Below Standard, At/Near Standard, and Above Standard.*

Below Standard

This student is **UNLIKELY** to possess the KSAs necessary to be Proficient with respect to the content represented in the standard.

At/Near Standard

This student is **LIKELY** to possess the KSAs necessary to be Proficient with respect to the content represented in the standard.

Above Standard

We are **CONFIDENT** that this student possesses the KSAs necessary to be Proficient with respect to the content represented in the standard.

READY FOR SUCCESS

Reporting category indicators are based on a subset of items aligned to each strand within the overall assessment and can therefore provide more detailed information to help you gauge the effectiveness of your curriculum or program.

2017-18 Mathematics Reporting Categories by Grade Level and Indicator

Strand- Number and Operations (N)	3rd	4th	5th	6th	7th	8th
➤ Below Standard	40%	53%	57%	56%	44%	57%
➤ At/Near Standard	38%	20%	22%	31%	36%	27%
➤ Above Standard	22%	27%	21%	13%	19%	16%
Strand- Algebraic Reasoning and Algebra (A)	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
➤ Below Standard	27%	46%	45%	44%	47%	63%
➤ At/Near Standard	44%	37%	32%	33%	31%	22%
➤ Above Standard	29%	17%	23%	23%	22%	15%
Strand- Geometry and Measurement (GM)	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
➤ Below Standard	41%	44%	54%	38%	40%	58%
➤ At/Near Standard	33%	33%	22%	49%	41%	23%
➤ Above Standard	26%	23%	23%	13%	19%	19%
Strand- Data and Probability (D)	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
➤ Below Standard	31%	27%	38%	51%	46%	48%
➤ At/Near Standard	38%	62%	45%	20%	34%	45%
➤ Above Standard	31%	12%	17%	29%	20%	6%

Reporting category indicator claims have the **smallest grain size** and can provide an additional piece of evidence to inform instructional and programmatic decisions by **bringing to the surface** what is working and what may need to change relative to the standards.

As with all OSTP data, other relevant information such as student work samples and local level standards-based assessments should be considered when making decisions.

State, District, Site, and Teacher Level Insights

- Where strengths and gaps may exist in the curriculum

- Equity gaps across student groups

- Effectiveness of differentiation

- Needs for enhancement

- Alignment across grade levels

- Comparison to state and other districts

Student Level Considerations

Performance level data tells only part of the student's story and other relevant information should be considered when making student level decisions.

- Other relevant information includes:
    - Student work samples
    - Course grades
    - Teacher observations

Reporting Category Analysis: Grade 3 Mathematics

Reporting Category indicator claims can best be interpreted by linking the Oklahoma Academic Standards measured on the assessment with the on track level knowledge, skills, and abilities described in the grade three-performance level descriptor (PLD). PLDs reflect the standards but should not be the emphasis of instruction.

*Click on each standard to show the full breadth and depth that should be included to focus instruction.

GR 3- NUMBER AND OPERATIONS (N)	On Track Knowledge, Skills, and Abilities
3.N.1 Number Sense- Compare and represent whole numbers up to 100,000 with an emphasis on place value and equality **3.N.2 Number Operations**- Add and subtract multi-digit whole numbers; multiply with factors up to 10; represent multiplication and division in various ways; solve real-world and mathematical problems through the representation of related operations **3.N.3 Fractions**- Understand meanings and uses of fractions in real-world and mathematical situations **3.N.4 Money**- Determine the value of a set of coins or bills	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ compare and order whole numbers ➢ complete addition, subtraction, and multiplication problems ➢ recognize the relationship between multiplication and division ➢ read and write fractions ➢ construct and compare fractions using models ➢ determine the value of a set of coins or bills ➢ select the fewest number of coins for a given amount of money
Gr 3- ALGEBRAIC REASONING AND ALGEBRA (A)	**On Track Knowledge, Skills, and Abilities (KSAs)**
3.A.1 Numerical and Geometric Patterns- Describe and create representations of numerical and geometric patterns **3.A.2 Equations**- Use number sentences involving multiplication and unknowns to represent and solve real-world and mathematical problems	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ determine rules to describe basic patterns ➢ determine unknowns in equations and apply number properties
Gr 3- GEOMETRY AND MEASUREMENT (GM)	**On Track Knowledge, Skills, and Abilities (KSAs)**
3.GM.1 Describe and Create Shapes- Use geometric attributes to describe and create shapes in various contexts **3.GM.2 Measurement**- Understand measurable attributes of real-world and mathematical objects using various tools **3.GM.3 Time**- Solve problems by telling time to the nearest 5 minutes	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ identify right angles ➢ classify angles ➢ sort three-dimensional figures ➢ determine the perimeter of polygons ➢ determine the area of two-dimensional figures ➢ read and write time from a digital clock ➢ choose an appropriate instrument to measure an object ➢ read and analyze length, temperature, and time
Gr 3- DATA AND PROBABILITY (D)	**On Track Knowledge, Skills, and Abilities (KSAs)**
3.D.1 Data Analysis- Summarize, construct, and analyze data *Note: KSAs aligned to this strand are connected with those in Numbers and Operations and Algebraic Reasoning and Algebra.*	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ summarize a data set ➢ analyze the data to solve problems ➢ solve real-world problems and employ problem-solving strategies of identifying and using appropriate information

In addition, on track 3rd grade students actively utilize the mathematical processes needed to be mathematically literate and can:

Develop a Deep and Flexible Conceptual Understanding		Build upon the knowledge they have and applying it in more complex mathematical contexts. For example, students use their place value knowledge when rounding numbers and estimating. They also recognize the relationships between addition and subtraction / multiplication and division to help determine which operation and strategy to use when solving word problems. They recognize connections in math that help them further their understanding of a concept and make sense of it (ex: skip counting by 5's when telling time or recognizing fraction patterns on a number line and ruler).
Develop Accurate and Appropriate Procedural Fluency		Distinguish when to use certain operations, strategies, and/or properties to solve a problem most efficiently. Students develop mastery of basic math facts in addition, subtraction, and multiplication and then apply that knowledge when solving multi-digit equations. They also learn to use tools that are important to everyday life, such as rulers, thermometers, and clocks.
Develop Strategies for Problem Solving		Develop a toolbox of strategies for problem solving. They apply these strategies when finding solutions to real world problems. They analyze the problem, select a strategy to solve, and check their answers. Students recognize that there can be multiple ways to justify an answer with numbers, words, pictures, symbols, charts, graphs, etc; if their representation does not make sense, they reevaluate and try another strategy.
Develop Mathematical Reasoning		Defend their thinking based on logical strategies. They ask questions such as "Does this make sense?" and "How did you get that?" when participating in mathematical discourse with peers. They use their reasoning to evaluate the validity of an answer and if there is a better way to solve the problem. They apply their mathematical reasoning in many contexts, such as analyzing function machines and tables, classifying shapes, estimating lengths and values, and determine logical combinations of coins to represent a given amount.
Develop a Productive Mathematical Disposition		Recognize that math skills such as telling time, paying with money, and finding measurements are evident in everyday life. They begin to see the usefulness of mathematics in other contexts as well. They also understand that problem solving can lead to frustration, but continue to work through in order to find accurate solutions.
Develop the Ability to Make Conjectures, Model, and Generalize		Use tables, graphs, pictures, manipulatives, symbols and words to solve problems efficiently and accurately. They notice patterns and relationships in their representations that help them draw conclusions when analyzing data, finding missing values, and continuing numerical and geometric sequences. Students begin to predict solutions based on previous problems and are able to form generalizations that are helpful in other mathematical situations.
Develop the Ability to Communicate Mathematically		Describe their process of problem solving using appropriate vocabulary. They justify their answers, but also listen and consider other students' strategies. Students discuss mathematics as a way of further understanding the content and eliminating misconceptions. Communicating during the problem solving process is a powerful way for students to evaluate if their answers make sense and determine if they need to readjust their thinking.
Source: Grade 3 Math Frameworks- The OSDE frameworks are curricular tools and resources developed by Oklahoma teachers that may be helpful to educators as they evaluate, select and implement instruction, curriculum and local-level classroom assessments aligned to standards.		

Reporting Category Analysis: Grade 4 Mathematics

Reporting Category indicator claims can best be interpreted by linking the Oklahoma Academic Standards measured on the assessment with the on track level knowledge, skills, and abilities described in the grade four-performance level descriptor (PLD). PLDs reflect the standards but should not be the emphasis of instruction.

*Click on each standard to show the full breadth and depth that should be included to focus instruction.

Gr 4- NUMBER AND OPERATIONS (N)	On Track Knowledge, Skills, and Abilities (KSAs)
4.N.1 Number Operations- Solve real-world and mathematical problems using multiplication and division **4.N.2 Rational Numbers**- Represent and compare fractions and decimals in real-world and mathematical situations; use place value to understand how decimals represent quantities **4.N.3 Money**- Determine the value of coins in order to solve monetary transactions	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➤ estimate and solve mathematical problems ➤ use models to determine equivalent fractions, compare and order whole numbers and fractions, add and subtract fractions, and decompose fractions ➤ read and write decimals make connections between decimals and fractions ➤ determine change using whole dollars and coins
Gr 4- ALGEBRAIC REASONING AND ALGEBRA (A)	**On Track Knowledge, Skills, and Abilities (KSAs)**
4.A.1 Numerical Patterns- Use multiple representations of patterns to solve real-world and mathematical problems **4.A.2 Equations**- Use multiplication and division with unknowns to create number sentences representing a given problem situation	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➤ determine rules and extend patterns ➤ determine unknown values in mathematical problems
Gr 4- GEOMETRY AND MEASUREMENT (GM)	**On Track Knowledge, Skills, and Abilities (KSAs)**
4.GM.1 Polygons and Polyhedra- Name, describe, classify and construct polygons, and three- dimensional figures **4.GM.2 Measurement**- Understand angle, length, and area as measurable attributes of real- world and mathematical objects. Use various tools to measure angles, length, area, and volume **4.GM.3 Time**-Determine elapsed time and convert between units of time	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➤ identify quadrilaterals and determine the area of simple polygons ➤ describe parts of geometrical figures and identify similarities in three-dimensional figures ➤ decompose and determine the area of polygons ➤ identify appropriate units and tools to measure ➤ solve measurement problems
Gr 4- DATA AND PROBABILITY (D)	**On Track Knowledge, Skills, and Abilities (KSAs)**
4.D.1 Data Analysis- Collect, organize, and analyze data *Note: KSAs aligned to this strand are connected with those in Numbers and Operations and Algebraic Reasoning and Algebra*	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➤ represent data sets and solve problems involving the data ➤ solve real-world problems and employ problem-solving strategies of identifying and using appropriate information

In addition, on track 4th grade students actively utilize the mathematical processes needed to be mathematically literate and can:

Develop a Deep and Flexible Conceptual Understanding		Continue to build upon previous knowledge of basic multiplication and begin applying it to division, multi-digit multiplication and later, long division. They will apply their knowledge of operations to real world situations, establishing when a specific operation is appropriate. Students will make connections between fractions and decimals using number lines and manipulatives. They will also dive deeper into geometry, exploring angles, line segments, rays, and lines, as well as quadrilaterals
Develop Accurate and Appropriate Procedural Fluency		Recall basic multiplication and division facts with factors up to 12. They will appropriately and accurately solve real world problems using both basic and multi-digit equations including addition, subtraction, multiplication, and division. Students will identify quadrilaterals and their properties. They will also read and write fractions and decimals up to hundredths
Develop Strategies for Problem Solving		Predict, check, and justify their answers with real world problems including, but not limited to, decimals, fractions, multi-digit multiplication, and long division. Students will recognize multiple entry points and identify logical steps when solving multi-step equations.
Develop Mathematical Reasoning		Monitor their own work and make adjustments as needed to reach a logical solution. They will evaluate other students work and critique or defend the work. Students will also be able to question another's work as well as answer questions about their own reasoning.
Develop a Productive Mathematical Disposition		Recognize the importance of decimals, fractions, and geometric patterns as part of their everyday life. They will view struggle as part of the problem solving process, understanding the importance of perseverance and active engagement.
Develop the Ability to Make Conjectures, Model, and Generalize		Use graphs, tables, pictures, words, and symbols to strategize and solve real world problems. Make generalizations about the powers of 10 and use them to help estimate and reason. Create input/output tables and other graphs and charts to recognize patterns and express them in writing as well as verbally.
Develop the Ability to Communicate Mathematically		Appropriately use vocabulary regarding time, decimals, money, fractions, multi-digit multiplication and division, when solving problems and defending their answer. Students will strategically solve problems by listening and responding to their peers.
Source: Grade 4 Math Frameworks- The OSDE frameworks are curricular tools and resources developed by Oklahoma teachers that may be helpful to educators as they evaluate, select and implement instruction, curriculum and local-level classroom assessments aligned to standards.		

Reporting Category Analysis: Grade 5- Mathematics

Reporting Category indicator claims can best be interpreted by linking the Oklahoma Academic Standards measured on the assessment with the on track level knowledge, skills, and abilities described in the grade five-performance level descriptor (PLD). PLDs reflect the standards but should not be the emphasis of instruction.

Click on each standard to understand the full breadth and depth that should be used to focus instruction.

Gr 5- NUMBER AND OPERATIONS	On Track Knowledge, Skills, and Abilities (KSAs)
5.N.1 Division of Multi-digit Numbers- Divide multi-digit numbers and solve real-world and mathematical problems using arithmetic **5.N.2 Fractions and Decimals-** Read, write, represent, and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations **5.N.3 Add and Subtract Rational Numbers**- Add and subtract fractions with like and unlike denominators, mixed numbers and decimals to solve real-world and mathematical problems	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ *estimate and solve division problems with remainders* ➢ *recognize basic equivalent decimals and fractions, represent whole numbers, and compare and order fractions or decimals* ➢ *generate equivalent decimals and fractions, represent whole numbers or decimals, and compare fractions and decimals, including mixed numbers* ➢ *estimate, add, and subtract decimals and fractions*
Gr 5- ALGEBRAIC REASONING AND ALGEBRA	**On Track Knowledge, Skills, and Abilities (KSAs)**
5.A.1 Numerical Patterns and Graphs- Describe and graph patterns of change created through numerical patterns **5.A.2 Equations and Inequalities**- Understand and interpret expressions, equations, and inequalities involving variables and whole numbers, and use them to represent and evaluate real-world and mathematical problems	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ *describe patterns of change and identify ordered pairs on a coordinate plane* ➢ *describe patterns of change and graph these patterns as ordered pairs on a coordinate plane* ➢ *evaluate expressions, equations, and inequalities*
Gr 5- GEOMETRY AND MEASUREMENT	**On Track Knowledge, Skills, and Abilities (KSAs)**
5.GM.1 Polygons and Polyhedra- Describe, classify, and draw representations of two- and three-dimensional figures **5.GM.2 Volume and Surface Area**- Understand how the volume of rectangular prisms and surface area of shapes with polygonal faces are determined by the dimensions of the object and that shapes with varying dimensions can have equivalent values of surface area or volume **5.GM.3 Angles/Length**- Understand angle and length as measurable attributes of real-world and mathematical objects. Use various tools to measure angles and lengths	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ *describe and classify geometric figures* ➢ *determine reasonable values for the perimeter of shapes with curves* ➢ *solve volume and perimeter problems and simple surface area problems* ➢ *compare angles* ➢ *choose an appropriate instrument to measure objects and read and analyze the length of objects* ➢ *read and analyze the measure of angles* ➢ *recognize relationships within a measurement system*
Gr 5- DATA AND PROBABILITY (D)	**On Track Knowledge, Skills, and Abilities (KSAs)**
5.D.1 Data Analysis- Display and analyze data to find the range and measures of central tendency (mean, median, and mode). *Note: KSAs aligned to this strand are connected with those in Numbers and Operations and Algebraic Reasoning and Algebra*	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ➢ determine the mean, median, mode, and range of a data set and analyze simple graphs ➢ solve real-world problems and employ problem-solving strategies of identifying and using appropriate information with numbers and operations & algebraic reasoning and algebra

In addition, on track 5th grade students will actively utilize the mathematical processes needed to be mathematically literate and can:

Develop a Deep and Flexible Conceptual Understanding		Pull from prior experiences and knowledge to choose strategies and procedures to access real world math problems involving fractions and decimals and other grade work content. They solve problems involving decimals and fractions by applying their understanding of operations with whole numbers. They strategize and problem solve when engaging in real world explorations of volume and graphing patterns. They also use prior knowledge to predict what kind of solution to expect in order to evaluate the reasonableness of their answers. They ask themselves probing questions while problem-solving to check their thinking and understanding
Develop Accurate and Appropriate Procedural Fluency		Draw upon their conceptual understanding to choose strategies and procedures that are appropriate for the mathematical situation. Fifth grade students apply their understanding of fractions and fraction models to represent addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions and make reasonable estimates of them. Students also use the meaning of fractions, addition, and subtraction, and the relationship between addition and subtraction to understand and explain why the procedures for adding and subtracting fractions make sense.
Develop Strategies for Problem Solving		Make and test predictions in varied real-world mathematical problems. They will recognize when an adaptation is needed, and check and justify their solution. They may problem solve by drawing pictures, guessing and checking, acting out, working backward or utilizing other invented strategies. They will routinely be able to develop and test more than one strategy to find solutions, and will identify when multiple solutions to a real world problem are possible. They may check their thinking by asking themselves, "What is the most efficient way to solve the problem?", "Does this make sense?", and "Can I solve the problem in a different way?"
Develop Mathematical Reasoning		Identify efficient methods to find solutions to problems where no clear-cut strategy is evident and ask questions to deepen understanding. They extend their understanding from whole numbers to their work with fractions and decimals. They actively examine the work of peers, asking clarifying questions in order to constructively critique the strategies. They will engage in and create real world mathematical problems and recognize when particular strategies, methods, and algorithms will aid in a solution.
Develop a Productive Mathematical Disposition		Recognize that math is evident in everyday life and apply mathematical thinking and problem solving in other areas of academics and outside of the classroom. They actively engage in critical thinking and view struggle as part of the process. They are willing to take chances, adapt, revise plans and persevere, until at least one solution is found. When composing and decomposing numbers and shapes and working within grade level content, they investigate, describe and draw logical conclusions aiding in the development of a bank of strategies to utilize when embarking on the problem-solving process.
Develop the Ability to Make Conjectures, Model, and Generalize		Connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers and perform all operations with decimals to hundredths. They explore operations with fractions with visual models and begin to formulate generalizations. Fifth graders explore representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making charts, lists, or graphs, and creating equations. They use these models to recognize patterns and structures in order to formulate rules and generalizations.
Develop the Ability to Communicate Mathematically		Actively listen and communicate when collaborating with peers. They are able to defend their thinking when solving real world problems involving three-digit division, rational numbers, geometrical solids, data and other grade level concepts. While collaborating they respectfully critique others' strategies, ideas and solutions by asking questions like "How did you get that"" and "Why is that true?"
Source: Grade 5 Math Frameworks- The OSDE frameworks are curricular tools and resources developed by Oklahoma teachers that may be helpful to educators as they evaluate, select and implement instruction, curriculum and local-level classroom assessments aligned to standards.		

Reporting Category Analysis: Grade 6 Mathematics

Reporting Category indicator claims can best be interpreted by linking the Oklahoma Academic Standards measured on the assessment with the on track level knowledge, skills, and abilities described in the grade five-performance level descriptor (PLD). PLDs reflect the standards but should not be the emphasis of instruction.

Click on each standard to understand the full breadth and depth that should be used to focus instruction.

Gr 6- NUMBER AND OPERATIONS	On Track Knowledge, Skills, and Abilities (KSAs)
6.N.1 *Number Sense of Integers and Rational Numbers*- Read, write, and represent integers and rational numbers expressed as fractions, decimals, percents, and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations. **6.N.2 *Addition and Subtraction of Integers*-** Add and subtract integers in order to solve real-world and mathematical problems **6.N.3 *Ratios*-** Understand the concept of ratio and its relationship to fractions and percents and to the multiplication and division of whole numbers. Use ratios to solve real-world and mathematical problems. **6.N.4 *Multiplication and Division of Rational Numbers*-** Multiply and divide decimals, fractions, and mixed numbers; solve real-world and mathematical problems with rational numbers**.**	*Students receiving **At/Near or Above Standard** indicators are likely to be able to* ✓ read, order, represent, and explain rational numbers expressed as fractions, decimals, percents, and ratios ✓ write positive integers as products of factors ✓ estimate, illustrate, and simplify the addition and subtraction of integers and assess the reasonableness of an answer ✓ multiply and divide non-negative rational numbers ✓ identify and compare quantities, determine unit rates, and find equivalent fractions and percents ✓ solve ratio and unit rate problems ✓ estimate and illustrate the multiplication and division of non-negative rational numbers
Gr 6- ALGEBRAIC REASONING AND ALGEBRA	**On Track Knowledge, Skills, and Abilities (KSAs)**
6.A.1 *Algebraic Representations*- Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, tables, graphs and rules to solve real-world and mathematical problems. **6.A.2 *Algebraic Expressions*-** Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving positive rational numbers. **6.A.3 *Equations and Inequalities*-** Use equations and inequalities to represent real-world and mathematical problems and use the idea of maintaining equality to solve equations. Interpret solutions in the original context.	*Students receiving **At/Near or Above Standard** indicators are likely to be able to* ✓ graph ordered pairs in all quadrants ✓ represent reflective relationships between varying quantities ✓ evaluate the validity of the value of a variable ✓ evaluate the value of a variable in expressions, equations, and inequalities ✓ generate expressions, equations, and inequalities ✓ use number sense and properties of operations to solve equations and graph the solution ✓ interpret the solution of an equation and assess the reasonableness of the solution
Gr 6- GEOMETRY AND MEASUREMENT	**On Track Knowledge, Skills, and Abilities (KSAs)**
6.GM.1 *Area of Parallelograms and Triangles*- Calculate area of squares, parallelograms, and triangles to solve real-world and mathematical problems. **6.GM.2 *Angle Relationships on Intersecting Lines*-** Understand and use relationships between angles in geometric figures **6.GM.3 *Units of Measurement and Unit Conversions*-** Choose appropriate units of measurement and use ratios to convert within measurement systems to solve real-world and mathematical problems. **6.GM.4 *Congruency and Symmetry of Transformations*-** Use translations, reflections, and rotations to establish congruency and understand symmetries.	*Students receiving **At/Near or Above Standard** indicators are likely to be able to* ✓ determine the area of polygons and composite figures ✓ identify angle relationships by name ✓ use relationships between angles and the triangle sum theorem to solve problems ✓ estimate and solve problems requiring unit conversion ✓ identify and display the effect of transformations ✓ predict transformations, analyze lines of symmetry, and use the distance between points and transformations to solve problems involving congruent figures

Gr 6- DATA AND PROBABILITY (D)	On Track Knowledge, Skills, and Abilities (KSAs)
6.D.1 Data Analysis- Display and analyze data **6.D.2 Probability**- Use probability to solve real-world and mathematical problems; represent probabilities using fractions and decimals. *Note: KSAs aligned to this strand are connected with those in Numbers and Operations and Algebraic Reasoning and Algebra*	*Students receiving **At/Near or Above Standard** indicators are likely to be able to* ✓ calculate measures of central tendency, determine the sample space of simple experiments, and identify possible outcomes ✓ explain and justify which measure of central tendency provides the most descriptive information for a data set ✓ create and analyze box-and-whisker plots ✓ explain and compare possible outcomes of simple experiments ✓ solve real-world problems and employ problem-solving strategies of identifying and using appropriate information

In addition, on track 6th grade students will actively utilize the mathematical processes needed to be mathematically literate and can:

Develop a Deep and Flexible Conceptual Understanding		Continue to explore the relationships between real-world situations and mathematical expressions, equations and inequalities involving variables and rational numbers through the use of inverse operations, the associative, commutative, and distributive properties, and visual representations on number lines or a coordinate plane. They define equivalence using substitution, variables, congruency, and conversion between fractions, decimals, and percents. They use deconstruction to determine the area of polygons and create prime factorizations.
Develop Accurate and Appropriate Procedural Fluency		Choose appropriate algorithms to add and subtract integers or multiply and divide fractions, decimals, and mixed numbers. They use exponents to represent prime factorizations, and follow the order of operations when solving expressions or equations. They choose the most appropriate representation of a quantity including formulas for area of rectangles, parallelograms, and triangles.
Develop Strategies for Problem Solving		Recognize relationships, apply rules or formulas, use known information to find missing values, break problems into smaller components, and make connections to real world situations. Students construct models, use manipulatives, and select appropriate tools to enhance their understanding of the problem or formulate appropriate questions. They are aware of their thinking patterns and processes as they work through problems individually or in groups, recognizing that there may be more than one approach to reaching an acceptable solution.
Develop Mathematical Reasoning		Use estimation to assess reasonableness of answers. They express why they have chosen the strategy, algorithm, or representation as the best fit for mathematical situations. They make predictions of the effects of translations, rotations, and reflections. They determine similarities/differences, whether a substitution results in a true or false inequality or equation, and relate measures of central tendency to real-world data sets and probability to real-world sample spaces.
Develop a Productive Mathematical Disposition		Make personal connections between math and things beyond the classroom. They develop discipline to write each step when solving expressions and equations or when making conversions while focusing on the process and reasons behind the algorithm or strategy. They are willing to work collaboratively, take risks, and revise thinking or processes as needed, building confidence on their successes.
Develop the Ability to Make Conjectures, Model, and Generalize		Write an expression, equation, or inequality that represents a real world situation or apply math rules beyond the classroom. They represent varying quantities in multiple ways, graph solutions, and model concepts such as area, congruency, and distance. Students make predictions about experimental outcomes using probability. They understand that multiplicative and additive properties work the same for fractions, decimals, and percents as they do with whole numbers.
Develop the Ability to Communicate Mathematically		Communicate effectively with peers and teacher using appropriate vocabulary in writing, through discussions in pairs or small groups, and by presenting to the class. Students translate words into mathematical sentences and vice versa. They explain differences, rules, procedures, and how to apply each state while providing the reason for choosing the particular strategy or representation over other options. They describe mathematical situations and how these relate to the real world. They generate purposeful questions to further their knowledge, reframing ideas presented by others to identify gaps in their understanding.
Source: Grade 6 Math Frameworks- The OSDE frameworks are curricular tools and resources developed by Oklahoma teachers that may be helpful to educators as they evaluate, select and implement instruction, curriculum and local-level classroom assessments aligned to standards.		

Reporting Category Analysis: Grade 7 Mathematics

Reporting Category indicator claims can best be interpreted by linking the Oklahoma Academic Standards measured on the assessment with the on track level knowledge, skills, and abilities described in the grade seven-performance level descriptor (PLD). PLDs reflect the standards but should not be the emphasis of instruction.

Click on each standard to understand the full breadth and depth that should be used to focus instruction.

Gr 7- NUMBER AND OPERATIONS	On Track Knowledge, Skills, and Abilities (KSAs)
7.N.1 Representation and Comparison of Rational Numbers- Read, write, represent, and compare rational numbers, expressed as integers, fractions, and decimals **7.N.2 Number Operations and Absolute Value -** Calculate with integers and rational numbers, with and without positive integer exponents, to solve real- world and mathematical problems; explain the relationship between absolute value of a rational number and the distance of that number from zero	*Students receiving At/Near or Above Standard indicators are likely to be able to* ✓ recognize, compare, and order rational numbers ✓ create equivalent representations of rational numbers ✓ calculate and model mathematical problems involving rational numbers and exponents ✓ calculate the absolute value of a rational number ✓ estimate solutions of problems involving rational numbers and assess the reasonableness of the solutions
Gr 7- ALGEBRAIC REASONING AND ALGEBRA (A)	**On Track Knowledge, Skills, and Abilities (KSAs)**
7.A.1 Proportional Relationships-Understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships **7.A.2 Proportions, Rates and Ratios-**Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols, and graphs; solve problems involving proportional relationships and interpret results in the original context. **7.A.3 Linear Equations and Inequalities-** Represent and solve linear equations and inequalities **7.A.4 Order of Operations-** Use order of operations and properties of operations to generate equivalent numerical and algebraic expressions containing rational numbers and grouping symbols; evaluate such expressions	*Students receiving At/Near or Above Standard indicators are likely to be able to* ✓ describe and identify a proportional relationship ✓ differentiate between proportional and inversely proportional relationships and identify the constant of proportionality ✓ represent proportional relationships in a variety of ways ✓ identify and solve problems involving ratios and unit rates ✓ use representations to identify and compare unit rates ✓ solve problems involving proportional relationships and assess the reasonableness of solutions ✓ represent, solve, and write equations ✓ evaluate expressions using the order of operations ✓ solve simple inequalities ✓ generate and evaluate equivalent expressions with justification of steps
Gr 7- GEOMETRY AND MEASUREMENT	**On Track Knowledge, Skills, and Abilities (KSAs)**
7.GM.1 Surface Area and Volume of Rectangular Prisms- Develop and understand the concept of surface area and volume of rectangular prisms **7.GM.2 Trapezoids and Composite Figures-**Determine the area of trapezoids and area and perimeter of composite figures **7.GM.3 Circles-** Use reasoning with proportions and ratios to determine measurements, justify formulas, and solve real-world and mathematical problems involving circles and related geometric figures **7.GM.4 Transformations-**Analyze the effect of dilations, translations, and reflections on the attributes of two-dimensional figures on and off the coordinate plane	*Students receiving At/Near or Above Standard indicators are likely to be able to* ✓ determine the surface area and volume of rectangular prisms ✓ calculate the area and perimeter of trapezoids ✓ calculate the circumference and area of circles ✓ describe and apply the effect of dilations and transformations

Gr 7- DATA AND PROBABILITY (D)	On Track Knowledge, Skills, and Abilities (KSAs)
7.D.1 Data Analysis- Display and analyze data in a variety of ways **7.D.2 Probability**- Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems. *Note: KSAs aligned to this strand are connected with those in Numbers and Operations and Algebraic Reasoning and Algebra*	*Students receiving **At/Near** or **Above Standard** indicators are likely to be able to* ✓ calculate the measures of central tendencies and range and determine appropriate data displays ✓ calculate theoretical probability ✓ interpret theoretical probability and draw conclusions ✓ solve real-world problems and employ problem-solving strategies of identifying and using appropriate information

In addition, on track 7th grade students will actively utilize the mathematical processes needed to be mathematically literate and can:

Develop a Deep and Flexible Conceptual Understanding		Continue to apply mathematical concepts to their everyday lives. They will apply the concept of proportionality to the real-world to understand and explain the relationship between tables, graphs, symbols, and verbal descriptions. Comparisons and links between unit rates, proportions, rates of change, and slope are front and center as students move between multiple representations. Students are able to flow freely between percents, decimals, and fractions
Develop Accurate and Appropriate Procedural Fluency		Begin to build algorithms and functionally applying them to their conceptual knowledge. Formulas and procedures are discovered and developed to determine areas of trapezoids, find area and perimeter of composite figures, and calculate circumference and area of circles so that students can make sense of how these concepts apply to real life. As students begin using symbols to solve mathematical situations, they will apply an understanding of properties of operations and how they allow building of equivalent expressions as well as order of operations. This ensures the ability to check for reasonableness when using technological tools like calculators.
Develop Strategies for Problem Solving		Use concepts and procedures to make decisions on how to approach challenging real-world situations. They determine reasonableness of different approaches of problem solving and judge the efficiency of multiple modes. Students begin designing experiments, collecting data, and making predictions about measures of central tendency, scale representations, and probability. They are using a variety of tools in mathematics and can determine when it is useful and necessary to use technology and tools to deal with data.
Develop Mathematical Reasoning		Develop sound abilities to explain real world situations mathematically using words, symbols, graphical representations, and tables. They apply proportional reasoning to assess whether solutions are mathematically sound.
Develop a Productive Mathematical Disposition		Understand that math is useful and worthwhile. They will be able to use strategies and reason to overcome mathematical obstacles as they continue to apply the idea of proportionality to everyday life. Tables, graphs, symbols, and verbal descriptions find their place in students' lives as they understand the usefulness of each in different situations.
Develop the Ability to Make Conjectures, Model, and Generalize		Begin to develop algorithms and procedures through the actions of identifying patterns, making tables, predicting how identified information will apply to unknown situations, and then establishing future processes. Measures of central tendency and graphic representations help students to draw conclusions and apply their findings to rationalize the real world.
Develop the Ability to Communicate Mathematically		Use mathematical terminology to describe their surroundings and real life situations. They are able to communicate effectively with peers and teachers as well as those without a thorough mathematical background to explain their understanding of mathematical concepts. Students should be provided with opportunities to engage in explorations and discussion on a regular basis both orally and in writing.

Source: Grade 7 Math Frameworks- The OSDE frameworks are curricular tools and resources developed by Oklahoma teachers that may be helpful to educators as they evaluate, select and implement instruction, curriculum and local-level classroom assessments aligned to standards.

Reporting Category Analysis: Grade 8- Pre-Algebra

Reporting Category indicator claims can best be interpreted by linking the Oklahoma Academic Standards measured on the assessment with the on track level knowledge, skills, and abilities described in the grade eight-performance level descriptor (PLD). PLDs reflect the standards but should not be the emphasis of instruction.

Click on each standard to understand the full breadth and depth that should be used to focus instruction.

Gr 8- NUMBER AND OPERATIONS	On Track Knowledge, Skills, and Abilities (KSAs)
PA.N.1 Real Number Operations- **Read, write, compare, classify, and represent real numbers and use them to solve problems in various contexts**	*Students receiving At/Near or Above Standard indicators are likely to be able to* ✓ identify and compare real numbers ✓ simplify and generate simple equivalent expressions, including expressions in scientific notation ✓ generate, simplify, and evaluate equivalent expressions, including expressions in scientific notation ✓ classify and explain operational closure of rational and irrational numbers
Gr 8- ALGEBRAIC REASONING AND ALGEBRA (A)	**On Track Knowledge, Skills, and Abilities (KSAs)**
PA.A.1 Linear and Non-Linear Functions- Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions *PA.A.2 Linear Function Representations and Problem Solving*- Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols, and graphs; solve problems involving linear functions and interpret results in the original context *PA.A.3 Algebraic Expressions-* Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions *PA.A.4 Equations and Inequalities*- Represent real-world and mathematical problems using equations and inequalities involving linear expressions. Solve and graph equations and inequalities symbolically and graphically. Interpret solutions in the original context	*Students receiving At/Near or Above Standard indicators are likely to be able to* ✓ recognize if a graph represents a linear function ✓ distinguish between a linear and nonlinear function ✓ identify intercepts and slope from the graph of a line ✓ identify independent and dependent variables ✓ identify the effect on the graph of a linear function when characteristics are changed ✓ solve and graph equations and inequalities ✓ describe, analyze, and represent linear functions with two variables and translate between representations
Gr 8- GEOMETRY AND MEASUREMENT	**On Track Knowledge, Skills, and Abilities (KSAs)**
PA.GM.1 Pythagorean Theorem **-** Solve problems involving right triangles using the Pythagorean Theorem. *PA.GM.2 Surface Area and Volume*- Calculate surface area and volume of three-dimensional figures	*Students receiving At/Near or Above Standard indicators are likely to be able to* ✓ use the Pythagorean Theorem to identify right triangles and to find the length of the hypotenuse ✓ use and apply the Pythagorean Theorem ✓ calculate the surface area and volume of solids

Gr 8- DATA AND PROBABILITY (D)	On Track Knowledge, Skills, and Abilities (KSAs)
PA.D.1 Data Analysis and Scatter Plots- Display and interpret data in a variety of ways, including using scatterplots and approximate lines of best fit. Use line of best fit and average rate of change to make predictions and draw conclusions about data **PA.D.2 Probability**- Calculate experimental probabilities and reason about probabilities to solve real-world and mathematical problems *Note: KSAs aligned to this strand are connected with those in Numbers and Operations and Algebraic Reasoning and Algebra*	*Students receiving **At/Near or Above Standard** indicators are likely to be able to* ✓ identify the outliers of a data set ✓ identify the line of best fit from a given scatterplot and determine if the rate of change is positive or negative ✓ calculate the experimental probability of single events, identify sample spaces, and classify events as independent or dependent ✓ describe the impact on central tendencies of a data set with an outlier and when inserting or deleting a data point ✓ interpret a scatterplot, determine the rate of change, and use a line of best fit to make predictions ✓ calculate, interpret, and predict experimental probability and generalize samples to populations ✓ solve real-world problems and employ problem-solving strategies of identifying and using appropriate information

In addition, on track 8th grade students will actively utilize the mathematical processes needed to be mathematically literate and can:

Develop a Deep and Flexible Conceptual Understanding		Expand applications both algebraically and geometrically of linear equations, functions and inequalities. Tools such as models, manipulatives, symbols, number lines, tables and coordinate grids aid in exploration and analysis of exponents, irrational numbers, 2-D and 3-D geometric figures, data collections, and real world tasks. The depth that these topics are covered in this course establish a conceptual foundation for future algebra, geometry, and statistics courses.
Develop Accurate and Appropriate Procedural Fluency		Develop multiple methods for solving expressions, equations, functions and inequalities with exponents and square roots. Emphasis should be focused on justification of steps used in their solutions, imploring a variety of methods to represent their solutions with context when applicable to real life situations, and checking work using substitution, graphing and estimation. Students should be developing skills to fluently apply and calculate the geometric formulas of the Pythagorean theorem, Surface Area and Volume.
Develop Strategies for Problem Solving		Use a variety of strategies to solve high-quality tasks and activities that have real world applications. The majority of problems in this course work towards creating, analyzing or applying expressions, linear equations, inequalities or formulas that model the situation presented. Students should be encouraged to persevere to formulate a strategy/strategies that fit the problem, recognize when an adaptation is needed, and then check and justify their solution using context and appropriate vocabulary.
Develop Mathematical Reasoning		Work to solidify methods of creating, solving, representing and applying multi-step equations, inequalities, and functions both algebraically and graphically in a variety of contexts. As this occurs, they should look for shared relationships between these three concepts by making justifiable conjectures and be able to explain what happens algebraically and graphically in context when changes occur.
Develop a Productive Mathematical Disposition		Recognize mathematical concepts in daily life, but are grappling with abstract ideas that do not have common familiarity for them. As more sophisticated algebraic ideas are bridged using real world examples, applications and discussions, they begin to see how they are using their prior and newly gained knowledge to use mathematics for analysis, efficiency, and reasoning. They begin to make formal conjectures, be challenged to make sense of other methods, understand that in some cases more than one answer is justifiable and ultimately realize that productive struggle is necessary for growth.
Develop the Ability to Make Conjectures, Model, and Generalize		Apply and analyze changes to multi-step equations, functions and inequalities in real world contexts. Students should be given a variety of opportunities to make predictions of what changes would look like algebraically and/or graphically. From their prediction, a formal conjecture is made with reasoning supported by data, models, and fundamental ideas to work towards a generalization that is defendable
Develop the Ability to Communicate Mathematically		Use oral and written communication of ideas and concepts. Students should be given multiple venues to share their ideas with their class from whole class discussions to collaborative real world group tasks to projects with the potential of further reaching impact. Communication of ideas should be valued and repeatedly fine-tuned to capture the essence of the concept or solution with appropriate mathematical vocabulary, context, proof and efficiency.
Source: Grade 8 Math Frameworks- The OSDE frameworks are curricular tools and resources developed by Oklahoma teachers that may be helpful to educators as they evaluate, select and implement instruction, curriculum and local-level classroom assessments aligned to standards.		

criterion-referenced test: An assessment that allows its users to make score interpretations of a student's performance in relation to specified performance standards or criteria, rather than in comparison to the performances of other test takers. See also **performance standard/level**.

cut score: Selected points on the score scale of a test. The points are used to determine whether a particular test score is sufficient for some purpose. For example, student performance on a test maybe classified into one of several categories, such as unsatisfactory, limited knowledge, proficient or advanced on the basis of cut scores.

mean: The quotient obtained by dividing the sum of a set of scores by the number of scores; also called the "average." Mathematicians call it the "arithmetic mean."

Oklahoma Performance Index (OPI): The Oklahoma Performance Index (OPI) is a scaled score resulting from the mathematical transformation of the true score, which is associated with each of the raw scores. The OPI score is used to place students in one of four performance levels.

performance level: A level of performance on a test, established by education experts, as a goal of student attainment. It may also refer to a description of the knowledge, skills, and abilities typically held by students within a performance level.

performance level descriptors (PLD): Descriptors that convey the degree of student achievement in a given achievement level. Taken together with grade- and content-specific PLDs and threshold scores, they convey to educators, parents, student, and the public the meaning of assessment results relative the Oklahoma Academic Standards

performance-level score range: A range of scale scores that corresponds to one of the four performance levels: Advanced, Proficient, Below Basic, and Basic.

raw score: The number of correct answers on a test

reporting category: Groups of similar student skills or content standards assessed within each grade and subject and are communicated on the OSTP test blueprints.

reporting category Indicators: Smallest grain-size OSTP data that relates student performance on a subset of items associated with a reporting category with an indicator, rather than with scale scores. These indicators are Below Standard, At/Near Standard, and Above Standard.

scale scores: Scores on a single scale with intervals. The scale can be applied to all groups taking a given test, regardless of group characteristics or time of year, making it possible to compare scores from different groups of students. Scale scores are appropriate for various statistical purposes. For example, they can be added, subtracted, and averaged across test levels. Such computations permit educators to make direct comparisons among examinees or compare individual scores to groups in a way that is statistically valid. This cannot be done with percentiles or grade equivalents.

standardized test: A test that is given in exactly the same way to all children taking the test. The items are the same, the instructions are the same, the timing is the same, the method of determining correctness is the same, and the scoring is the same. No variations are allowed.