WYOMING MATHEMATICS
CONTENT AND PERFORMANCE STANDARDS

WYOMING STATE BOARD OF EDUCATION

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Pathway to 2014
Preamble to the Standards

Wyoming State Board of Education
February 20, 2008

At no time in human history has change been as rapid as we see today. Young people in Wyoming who are students in our schools will live in a world we may not be able to imagine at this point in our history. As stewards of our public education system, the State Board of Education believes it is important to provoke our institutions to think deeply about the knowledge, skills, abilities and habits of the mind that will prepare students for a world in which rapid change will be the norm and where people will have to be highly adaptable.

Our institutions, leaders, and communities must have the courage to develop and implement processes and programs through which schools deliver effective learning. Children must not only be prepared to enter the work force. They must be prepared to contribute as participants and members of the social and political democracies in which they live. To this end, we must more effectively define the components and rigor necessary for their success.

The Wyoming State Board of Education believes that as stewards it is our responsibility to frame the political dialogue in a way that challenges policy makers, educational institutions and the public in general to examine the educational goals, practices, and results in the neighborhoods, communities, and the state. This must be an ongoing political dialogue that begins with our review of the Wyoming State Standards but must not end there.

In accordance with Wyoming State Statute 21-2-304 (a) (iii) the State Board of Education (Board) in consultation and coordination with local school districts (LEA) will "prescribe uniform student content and performance standards for the common core of knowledge and the common core of skills specified under W.S. 21-9-101(b). . . ." Under W.S. 21-2-304(c) the Board is directed to evaluate and review the uniformity and quality of the educational program standards at least every five (5) years. This was last done in 2003 and will be undertaken in November 2008.

The Board directs the Wyoming Department of Education (WDE) working in consultation and coordination with local school districts to formulate and implement a process to evaluate and review the uniformity and quality of both the standards and the implementation of those standards developed in 2008.

Specifically, the Board directs this review to develop answers through analysis to the following questions and to make recommendations in consultation and coordination with LEA's for improvement of the standards and/or the implementation of the standards over time. This review should include recommendations for what should and can be

accomplished this year, what needs to be accomplished in two to three years and what Wyoming should set as a goal to accomplish prior to 2014.

1. The Board believes that content standards should be written to facilitate each student's success in life.

    - What evidence exists that the standards as written are driving improvement of learning and preparation of children to successfully participate in life?

    - What improvements are needed in each content area and why/how will the recommendations improve the status and growth in learning?

2. The Board believes that standards and supporting documents should be written in ways that are accessible and so that students, parents, teachers and citizen leaders will have a common understanding and measurement of success.

    - What recommendation(s) should be considered by the SBE to accomplish this goal?

3. The Board believes that the standards and supporting documents should be written so that there is uniformity and consistency across content areas.

    - What improvements are needed?

    - How best do we accomplish these improvements?

4. The Board believes that each district must incorporate the common core of skills into its Body of Evidence.

    - What evidence is there that the standards and supporting documents facilitate the learning of knowledge, skills, and behaviors that are necessary for the success of our students in life?

    - What improvements are needed?

5. The Board is not convinced that the current common core of knowledge and the common core of skills are sufficient for the future success of our students.

    - What else should we be doing to facilitate student success?

    - How best can we accomplish these successes?

6. The Board believes that the standards should be implemented with fidelity and that Body of Evidence should be an important component of this fidelity.

   - What evidence is there that the standards of each content area are assessed and proficiencies determined with uniformity in the district?

   - What improvements are needed?

7. The Board believes that the standards and supporting documents should align with current knowledge about the development of the brain and learning.

   - What evidence is there that the standards and supporting documents are written so that there is alignment with current knowledge around the cognitive development and learning in the standards and the implementation of the standards?

   - What improvements are needed?

8. The Board believes that more meaningful and robust learning happens when young people are appropriately challenged to think in more cognitively complex ways.

   - What evidence is there that the more cognitively complex components of the standards are being taught and assessed?

   - What improvements are needed? Is teaching structured to facilitate interdisciplinary and multidisciplinary use of the knowledge, skills and abilities learned in our schools?

9. The Board believes that motivation and engagement are critical to learning.

   - What evidence is there that the aspects of self-system thinking and metacognition as defined by Robert Marzano and John Kendall or other higher order thinking and self-governing of learning skills are being implemented and accessed?

   - What improvements are needed?

While the immediate task might be focused upon a periodic review of the standard, the Wyoming State Board of Education believes that such a review capitalizes on the resources that will be necessary for the work best when the longer view of our standards and for our children are used to guide the work. We believe that the focus must be on what is learned, rather than what is taught. We believe that what is learned today must improve the lives our children will have in the future. We believe that current needs must be addressed in ways that lays a foundation that supports and frames the future.

WYOMING MATHEMATICS
CONTENT AND PERFORMANCE STANDARDS

RATIONALE

The Mathematics State Standards Committee recognizes that mathematics is a universal language. While mathematics has content of its own, it is used for analyzing data and looking for relationships and patterns in almost any real-world endeavor. Integrated within the standards designated by the committee are essential content, processes, and skills students need to master to succeed in school and at work.

The basic skills essential to successful mathematics instruction are embedded at all benchmark levels. Realistic uses of these skills require their application with the higher-level thinking skills of reasoning and problem solving. Further proficiency in mathematics requires fluency in mental mathematics and employment of technology. Students must master the discipline of mathematics and apply that discipline to a variety of complex tasks.

Problem-solving has been integrated throughout the content strands. The development of problem-solving skills should be a major goal of the mathematics program in every strand at every grade level. Instruction in the process of problem solving will need to be integrated early and continuously into each student's mathematics education. Students must be helped to develop a wide range of skills and strategies for solving problems.

In addition, mathematics has a specific vocabulary and syntax that is crucial to a student's understanding of the content and his ability to communicate with others about mathematical pursuits. The National Council of Teachers of Mathematics (NCTM) Standards document stresses the need for students to communicate in mathematical terminology. Students should be encouraged to use mathematical language with care and precision in communicating concepts, skills, symbols, and vocabulary used in the standards. This goal could be accomplished by having students write about problems and solutions in mathematics, explaining how they interpret a problem, and arrive at a solution. This experience also helps students to understand and internalize their own problem-solving strategies by encouraging the development of metacognitive thinking skills. In addition, an examination of the student's writing may help the teacher determine what fallacy occurred in the student's strategies resulting in problems.

Finally, teachers are encouraged to instruct students in calculator use and computer applications. The incorporation of technology in instruction enables teachers to use problems containing actual numbers from existing situations rather than numbers to facilitate hand calculations. However, students must also understand quantitative concepts and relationships and demonstrate a proficiency in basic computation using calculators as an aid rather than a crutch. This proficiency contributes to the fluency necessary to the development of a wide range of mathematical skills and strategies for solving a variety of problem types.

ORGANIZATION OF STANDARDS

Standards specify what students must master. They are not instructional curricula or technical documents used by teachers to guide day-to-day instruction. Teachers ensure students achieve standards by using a variety of instructional strategies, based on their students' needs. Content and performance standards are identified for benchmark grade levels kindergarten through eight, and eleven. These terms are used in this document to mean the following:

Content Standards: These statements define what students are expected to know and be able to do by the time they graduate.

Benchmark Standards: These statements specify what students are expected to know and be able to do at the end of each of the benchmark grade levels, in this document, grades kindergarten through eight, and eleven. These benchmark standards specify the skills and content students must master along the way in order to reach the content standards by the time they graduate.

Performance Level Descriptors: These statements describe how well students must perform the benchmark standards. The "proficient" level is required to meet the standards. The level descriptors help teachers judge where students are performing in relation to the standards. A general definition of each level is provided below.

> **Advanced:** Students who perform at the advanced level use their knowledge of mathematics in complex and abstract situations and can communicate, argue, and articulate their work.

> **Proficient:** Students who perform at the proficient level use concepts and skills to solve problems using appropriate strategies and to communicate meaning as required by the standards.

> **Basic:** Students who perform at the basic level use knowledge and skills, with direction, to complete routine problems and well-defined tasks and communicate meaning in a rudimentary fashion.

> **Below Basic:** Students who perform at the below basic level sometime use knowledge and skills to attempt problems and well-defined tasks and communicate meaning with lack of direction or understanding.

The committee recognizes course sequences tend to vary widely after the eighth grade. However, the skills identified at eleventh grade are intended for all students regardless of the sequence or type of mathematics courses taken. Therefore, districts will need to ensure their various course sequences will enable students to demonstrate mastery of the designated culminating skills not later than the end of eleventh grade. For advanced students, such mastery should occur sooner than eleventh grade. For a few students, such mastery will constitute a significant challenge. However, these are the skills deemed essential as reflected in local district standards, regional

standards, and many national standards. District, University, and business participants agree the standards reflect necessary skills for success in study and work that need to be accomplished no later than the end of eleventh grade. The study of mathematics beyond the eleventh grade, and for some students before eleventh grade, will be more specific to preparation for college and career, and thus more advanced or more focused upon a particular area of interest.

Kindergarten through eighth grade teachers, parents, and students work toward the achievement of grade-level benchmarks. Ninth grade through eleventh grade teachers, parents, and students work toward the achievement of the eleventh grade benchmarks. Success at each benchmark level requires the effort and commitment of all who prepare for that level.

Teachers, parents, and students should be aware of the requirements at the next level, even as they prepare for the current level, so prerequisite skills are introduced and experienced over time. They must also be aware of the requirements at the previous level so they continue to practice and apply the skills that have already been mastered.

INTRODUCTION TO THE STANDARDS

As described in the general introduction, these standards represent a consensus of the local district standards. In 1997-1998, representatives from each of the districts participated in regional groups along with community college, University, students, and business representatives. A district representative was selected by each of the regional groups to participate on state committees. The state committee then drafted standards that represented a consensus of the regional groups. In reviewing and refining the resulting standards, several national and state standards documents were referenced to establish that the rigor of Wyoming standards was consistent with these documents, and adjustments were made as deemed appropriate by the state committees. These documents are listed below:

- National Council of Teachers of Mathematics, <u>Curriculum and Evaluation Outcomes for School Mathematics</u>.
- National Center on Education and the Economy, <u>New Standards Performance Standards</u>.
- Colorado, <u>Model Content Standards for Mathematics</u>.
- <u>Standards of Learning for Virginia Public Schools</u>.

In 2002-2003, writing committees were convened to review and revise these standards. The previous standards included benchmarks at grades four, eight, and eleven. These benchmarks are now extended to include grades kindergarten through eight and eleven.

In 2008, consistent with its responsibility to evaluate and review the uniformity and quality of the standards at least every five years, the Wyoming State Board of Education Board directed the Wyoming Department of Education (WDE), working in consultation and coordination with local school districts, to formulate and implement a process to evaluate and review the uniformity and quality of the standards by November, 2008.

In order to accomplish the goal of reviewing the standards, a steering committee was convened to guide the review process. It met in early 2008 to develop the process to be used by Content

Review Committees in each content area with representation from as many Wyoming school districts as possible. Members of the Standards Review Steering Committee nominated 8-12 expert educators in each of the 10 content areas represented in the Standards. These committees were balanced geographically and represented pre-school, elementary, secondary, special education, and higher education teachers.

The reviewers who agreed to serve on a committee met in spring, 2008 to participate in a systematic evaluation of the uniformity and quality of the standards in their content area. Among the aspects of the Standards reviewed were:

a. The cognitive complexity of the standards
b. The degree of integration of the Common Core of Skills, 21st Century Skills, and Technology in the standards
c. How Wyoming Standards compare to national curriculum standards and other state standards
d. How the format of standards documents might be improved to make them more uniform, more understandable, and more useful.
e. How urgent the need for substantive revision of the standards is in each content area

The 2008 standards reflect formatting rather than substantive changes. Substantive revisions to standards in all content areas will be recommended based on conclusions from the 2008 standards review and continuing work by content review committees and other stakeholder groups between 2008 and 2013.

STANDARDS

There are five standards: number operations and concepts, geometry, measurement, algebraic concepts and relationships, data analysis and probability. A brief rationale is provided for each of these standards.

Number Operations and Concepts: All information - and the amount of it impacting us increases by the moment - can be categorized as qualitative or quantitative. Quantitative information cannot be communicated without numbers, their related concepts and operations. Traditionally, we associate numbers with the field of arithmetic. Indeed, many mistakenly think of mathematics and arithmetic as synonymous. Because we have new technology to ease our way through calculations does not mean that we have less need to understand numerical relationships and the properties of operations. Given the speed with which computers and calculators can take us, it is more critical than ever that students are smart managers of numbers, operations and related concepts.

Geometry: We are born into the world of geometry. We move within and among an infinity of shapes and sizes. As we go about our work and play, we are constantly identifying, comparing, contrasting, and categorizing two- and three-dimensional figures. We analyze the properties of geometric figures as we build our first backyard fort, buy our family home, choose our kitchen wallpaper, or don the cap of the engineer. Geometry's presence in our lives provides a natural environment in which we develop our ability to think logically. Geometry provides useful

models for the study of arithmetic through calculus and beyond. To understand the workings of the world of geometry is to be in control of possibly our greatest natural resource - the space in which we live.

Measurement: Time passes. Roads roll on ahead. Grain extends in amber waves. Mountains rise and basins fill. While these descriptions may be sufficient for the poet, our lives require that we apply numbers to such concepts as time, distance, area, volume - we must adopt and understand measurement systems. How long before…? How long since…? How much will it cost to drive to…? What is the cost of planting and harvesting…? Will the reservoir serve the growing community…? Such questions dominate our lives. Clocks, rulers, scales - measuring devices of all sorts - are common tools we all must use confidently and routinely, and we must be able to reason with the measurements we make. Few decisions, major or minor, personal or professional, can be justified without reference to relative measurements.

Algebraic Concepts and Relationships: Algebra is a language. It has a vocabulary and a syntax, it is concise and precise, and it can describe innumerable relationships. Simple and complex patterns can be described using algebra. Relations and functions are virtually invisible without the structure of algebra. Without algebra, vast collections of problems are left unsolved. Algebra applies readily to all the other strands listed here. It is critical for students to be able to generalize in mathematics, and couching relationships in the terms of algebra allows that to happen. Students cannot travel the land of mathematics effectively and enjoyably without a command of its primary language.

Data Analysis and Probability: In contrast to the other strands which deal with "what is," probability investigates "what might be, could be, and should be." It takes the lead in promoting the kind of thinking that analyzes our chances of success or failure given a wide range of variables. More than the study of coin flips or dice rolls, probability helps us make sense of research studies, examine the truth of politicians' claims, make wise personal insurance decisions, and much more. Data analysis, the close cousin of probability, addresses the interpretation of data we need to help us think probabilistically. Today, via the Internet and other media, we are inundated with information that our students need to turn into knowledge. Students lacking the fundamentals of probability and the ability to think with data analysis are sorely handicapped in today's world.

MATHEMATICS PERFORMANCE LEVEL DESCRIPTORS FOR THE BODY OF EVIDENCE

The mathematics descriptors for the Body of Evidence are consistent across the grade levels. The depth of understanding, consistency with which students understand, the level of mathematical connections among the concepts, skills, and strategies will vary by grade level. The differentiating factor for each grade level is the developmental appropriateness of the knowledge. For example, a fourth grader would appropriately understand the relationship between addition and multiplication of whole numbers. At grade 11, that same child would be expected to have a deeper understanding of the relationships between the operations played out over the set of rational numbers.

Grades K-12

Advanced: Students at the advanced level utilize or synthesize information to make complex mathematical connections. They apply concepts, skills, strategies, and tools/technology to efficiently solve problems. Students provide valid and convincing evidence that justifies the procedures, solutions, and inferences. They communicate reasoning and solutions using coherent and clear mathematical language.

Proficient: Students at the proficient level utilize information to make relevant connections among mathematical ideas. They apply concepts, skills, strategies, and tools/technology to solve problems. Students provide evidence to justify procedures and solutions. They communicate their reasoning using mathematical language.

Basic: Students at the basic level utilize information to make connections among mathematical ideas. They apply concepts, skills, strategies, and tools/technology to solve simple problems. Students provide partial evidence to justify their solutions. They communicate their reasoning with limited success.

Below Basic: Students at the below basic level sometimes use information to make superficial connections among mathematical ideas. They attempt to apply concepts, skills, strategies, and tools/technology to solve problems with limited success. Their communication of reasoning has a lack of direction or understanding.

WYOMING MATHEMATICS
CONTENT AND PERFORMANCE STANDARDS

GRADE K

<table>
<tr><td colspan="2" style="text-align:center">CONTENT STANDARD
1. <u>NUMBER OPERATIONS AND CONCEPTS</u>
Students use numbers, number sense, and number relationships in a problem-solving situation.</td></tr>
<tr><td colspan="2">NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.</td></tr>
<tr><td>CODE</td><td>GRADE K BENCHMARKS</td></tr>
<tr><td>MAK.1.1</td><td>Students read and represent numbers up to 9.</td></tr>
<tr><td>MAK.1.2</td><td>Students recognize the larger of two sets. (Which set has more or less?)</td></tr>
<tr><td>MAK.1.3</td><td>Students recognize and name penny, nickel, dime, and quarter using real coins.</td></tr>
<tr><td>MAK.1.4</td><td>Students count with understanding up to 21 objects to solve problems.</td></tr>
<tr><td>MAK.1.5</td><td>Students act out or use objects as strategies to solve problems.</td></tr>
</table>

GRADE K PERFORMANCE LEVEL DESCRIPTORS
1: <u>NUMBER OPERATIONS AND CONCEPTS</u>

ADVANCED PERFORMANCE

Kindergarten students performing at an advanced level make complex connections using number sense. Students use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

Kindergarten students performing at a proficient level make relevant connections using number sense. Students use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations. They may make minor errors.

BASIC PERFORMANCE

Kindergarten students performing at a basic level make simple connections using number sense. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

Kindergarten students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

	NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.
CODE	GRADE K BENCHMARKS
MAK.2.1	Students recognize, name, compare, and sort geometric shapes (circle, square, triangle and rectangle).
MAK.2.2	Students select, use, and communicate organizational methods in a problem - solving situation using geometric shapes.

GRADE K PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

Kindergarten students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students describe, name, compare, and sort, geometric objects using coherent and clear mathematical language. They justify (orally and/or written form) problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

Kindergarten students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students recognize, name, compare, and sort geometric objects using mathematical language with minor errors. They communicate (orally and/or written form) problem-solving methods with sound reasoning.

BASIC PERFORMANCE

Kindergarten students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students recognize, compare, and sort geometric objects using minimal or incorrect mathematical language. They communicate (orally and/or in written form) their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

Kindergarten students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
3. <u>MEASUREMENT</u>

Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE K BENCHMARKS
MAK.3.1	Students apply estimation and measurement of length to content problems using non-standard units up to 9 units.

GRADE K PERFORMANCE LEVEL DESCRIPTORS

3. <u>MEASUREMENT</u>

<u>ADVANCED PERFORMANCE</u>

Kindergarten students performing at an advanced level make complex connections among measurement concepts accurately. They estimate and measure using a variety of non-standard units. They use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

<u>PROFICIENT PERFORMANCE</u>

Kindergarten students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure using a variety of non-standard units. They use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

<u>BASIC PERFORMANCE</u>

Kindergarten students performing at a basic level make simple connections among measurement concepts. They measure using a variety of non-standard units. They use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

<u>BELOW BASIC PERFORMANCE</u>

Kindergarten students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE K BENCHMARKS
MAK.4.1	Students recognize, describe, and create three-element patterns by using manipulatives.

GRADE K PERFORMANCE LEVEL DESCRIPTORS

4. ALGEBRA

ADVANCED PERFORMANCE

Kindergarten students performing at an advanced level make complex connections among algebraic concepts accurately. They create patterns using manipulatives and graphic representations. They use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

Kindergarten students performing at a proficient level make relevant connections among algebraic concepts with minor errors. They create patterns using manipulatives. Students use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

Kindergarten students performing at a basic level make simple connections among algebraic concepts. They copy patterns using manipulatives. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

Kindergarten students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE K BENCHMARKS
MAK.5.1	Students sort real objects to create graphs.
MAK.5.2	Students communicate conclusions from a set of data. (Which set has more or less?)

GRADE K PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE

Kindergarten students performing at an advanced level make complex connections from data. They organize and represent information, and compare results about data accurately. Students use coherent and clear mathematical language (orally and/or written form) to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

Kindergarten students performing at a proficient level make relevant connections from data. They organize and represent information, and report results about data with minor errors. They use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

Kindergarten students performing at a basic level make simple connections from data. They use real objects to sort data. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

Kindergarten students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 1

CONTENT STANDARD
1. NUMBER OPERATIONS AND CONCEPTS
Students use numbers, number sense, and number relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE 1 BENCHMARKS
MA1.1.1	Students use the concept of place value to read and represent numbers up to 99.
MA1.1.2	Students use sets of objects to compare values and order numerals.
MA1.1.3	Students use coins (penny, nickel, dime, and quarter) to compare values (more/less).
MA1.1.4	Students demonstrate computational fluency with basic facts (add to 10).
MA1.1.5	Students make a picture or *use objects* as strategies to solve problems.
MA1.1.6	Students communicate their choice of appropriate grade level procedures and results when performing operations in a problem-solving situation.

GRADE 1 PERFORMANCE LEVEL DESCRIPTORS

1. NUMBER OPERATIONS AND CONCEPTS

ADVANCED PERFORMANCE

1st grade students performing at an advanced level make complex connections using number sense and place value. They demonstrate computational fluency accurately. Students use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

1st grade students performing at a proficient level make relevant connections using number sense. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

1st grade students performing at a basic level make simple connections using number sense. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

1st grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 1 BENCHMARKS
MA1.2.1	Students recognize, name, compare, and sort 2- and 3-dimensional geometric objects.
MA1.2.2	Students select, use, and communicate organizational methods in a problem-solving situation using 2- and 3- dimensional geometric objects.

GRADE 1 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

1st grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students describe, name, compare, and sort geometric objects using coherent and clear mathematical language. They justify (orally and/or written form) problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

1st grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students recognize, name, compare, and sort geometric objects using mathematical language with minor errors. They communicate (orally and/or written form) problem-solving methods with sound reasoning.

BASIC PERFORMANCE

1st grade students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students recognize, name, compare, and sort geometric objects using minimal or incorrect mathematical language. They communicate (orally and/or in written form) their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

1st grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

	CONTENT STANDARD
	3. <u>MEASUREMENT</u>

Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE 1 BENCHMARKS
MA1.3.1	Students apply estimation and measurement of length to content problems using non-standard units up to 99 units.
MA1.3.2	Students apply estimation and measurement of capacity to content problems using non-standard units.
MA1.3.3	Students tell time, using both analog and digital clocks to the nearest half-hour.

GRADE 1 PERFORMANCE LEVEL DESCRIPTORS

3. <u>MEASUREMENT</u>

<u>ADVANCED PERFORMANCE</u>

1st grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate and measure using a variety of non-standard units. Students tell time to the nearest five minutes. They use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

<u>PROFICIENT PERFORMANCE</u>

1st grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure using a variety of non-standard units. Students tell time to the nearest half-hour. They use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

<u>BASIC PERFORMANCE</u>

1st grade students performing at a basic level make simple connections among measurement concepts. They measure using a variety of non-standard units. Students tell time to the nearest hour. They use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

<u>BELOW BASIC PERFORMANCE</u>

1st grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 1 BENCHMARKS
MA1.4.1	Students recognize, create, and describe four-element patterns by using manipulatives and graphic representations.
MA1.4.2	Students apply knowledge of repeating patterns when solving problems.

GRADE 1 PERFORMANCE LEVEL DESCRIPTORS
4. ALGEBRA

ADVANCED PERFORMANCE

1st grade students performing at an advanced level make complex connections among algebraic concepts accurately. They create extended patterns using manipulatives and graphic representations. They use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

1st grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. They recognize, create, and describe patterns using manipulatives and graphic representations. Students use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

1st grade students performing at a basic level make simple connections among algebraic concepts. They copy patterns using manipulatives. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

1st grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 1 BENCHMARKS
MA1.5.1	Students collect and classify information to create graphs with pictures and report data in problem-solving situations.
MA1.5.2	Students communicate conclusions about a set of data using graphs with pictures.
MA1.5.3	Students perform and record (with tally marks) simple probability experiments.

GRADE 1 PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE

1st grade students performing at an advanced level make complex connections from data and probability. They organize and represent information, and compare results about data accurately. Students perform and record simple probability experiments with multiple representations. Students use coherent and clear mathematical language (orally and/or written form) to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

1st grade students performing at a proficient level make relevant connections from data and probability. They organize and represent information, and report results about data with minor errors. Students perform and record simple probability experiments. They use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

1st grade students performing at a basic level make simple connections from data and probability. They use real objects to collect and represent data. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

1st grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 2

CONTENT STANDARD
1. NUMBER OPERATIONS AND CONCEPTS
Students use numbers, number sense, and number relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 2 BENCHMARKS
MA2.1.1	Students use the concept of place value to read and write designated numbers up to 999.
MA2.1.2	Students compare and order whole numbers up to 999.
MA2.1.3	Students use coins to compare the values and make combinations up to one dollar.
MA2.1.4	Students demonstrate computational fluency with basic facts (add to 20, subtract from 10).
MA2.1.5	Students use mental math (fact families) and estimation strategies (referent to a group of 10) to solve problems.
MA2.1.6	Students look for patterns and use guess and check as strategies to solve problems.
MA2.1.7	Students communicate their choice of appropriate grade level procedures and results when performing operations in a problem-solving situation.

GRADE 2 PERFORMANCE LEVEL DESCRIPTORS
1. NUMBER OPERATIONS AND CONCEPTS

ADVANCED PERFORMANCE
2nd grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency accurately. Students use coherent and clear mathematical language to justify (orally and/or in written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
2nd grade students performing at a proficient level make relevant connections using number sense, place value, and estimation. They demonstrate computational fluency with minor errors. Students communicate (orally and/or in written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE
2nd grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students communicate (orally and/or in written form) their thinking in problem-solving situations inconsistently or incorrectly.

BELOW BASIC PERFORMANCE
2nd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

	NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.
CODE	**GRADE 2 BENCHMARKS**
MA2.2.1	Students name, classify, and describe 2- and 3-dimensional geometric objects.
MA2.2.2	Students identify lines of symmetry in various geometric objects.
MA2.2.3	Students select, use, and communicate organizational methods in problem- solving situations with 2- and 3- dimensional objects.

GRADE 2 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

2nd grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students classify, describe, and compare geometric objects using coherent and clear mathematical language. They justify (orally and/or written form) problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

2nd grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students name, classify, and describe geometric objects using mathematical language with minor errors. They communicate (orally and/or written form) problem-solving methods with sound reasoning.

BASIC PERFORMANCE

2nd grade students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students name and classify geometric objects using minimal or incorrect mathematical language. They communicate (orally and/or written form) their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

2nd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
3. MEASUREMENT
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 2 BENCHMARKS
MA2.3.1	Students apply estimation and measurement of length to content problems using standard units to the nearest inch.
MA2.3.2	Students apply estimation and measurement of weight to content problems using non-standards units.
MA2.3.3	Students tell time, using both analog and digital clocks to the nearest five minutes.

GRADE 2 PERFORMANCE LEVEL DESCRIPTORS
3. MEASUREMENT

ADVANCED PERFORMANCE
2nd grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate and measure using a variety of non-standard units. Students tell time to the nearest minute. They use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
2nd grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure using a variety of standard and non-standard units. Students tell time to the nearest five minutes. They use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE
2nd grade students performing at a basic level make simple connections among measurement concepts. They measure using a variety of non-standard units. Students tell time to the nearest hour or half hour. They use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE
2nd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA
Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

	NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.
CODE	GRADE 2 BENCHMARKS
MA2.4.1	Students recognize, describe, create, and extend patterns by using manipulatives and graphic representations.
MA2.4.2	Students apply knowledge of appropriate grade-level patterns when solving problems.

GRADE 2 PERFORMANCE LEVEL DESCRIPTORS

4. ALGEBRA

ADVANCED PERFORMANCE

2nd grade students performing at an advanced level make complex connections among algebraic concepts accurately. They create and extend patterns using manipulatives, numbers, and graphic representations. They use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

2nd grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. They create and extend patterns using manipulatives and graphic representations. Students use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

2nd grade students performing at a basic level make simple connections among algebraic concepts. They copy and/or produce repeating patterns using manipulatives. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

2nd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE 2 BENCHMARKS
MA2.5.1	Students collect, organize, and report data using graphs and Venn diagrams.
MA2.5.2	Students communicate conclusions about a set of data using graphs and Venn diagrams.
MA2.5.3	Students perform and record results of simple probability experiments using equally and unequally divided spinners.

GRADE 2 PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE

2nd grade students performing at an advanced level make complex connections about data and probability. They organize and represent information, and compare results in data and probability experiments accurately. Students predict reasonable outcomes in simple probability experiments. Students use coherent and clear mathematical language to justify (orally and/or written form) reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

2nd grade students performing at a proficient level make relevant connections about data and probability. They organize and represent information, and report results in data and probability experiments with minor errors. Students perform and record simple probability experiments. They use mathematical language to communicate (orally and/or written form) sound reasoning in problem-solving situations.

BASIC PERFORMANCE

2nd grade students performing at a basic level make simple connections about data and probability. They collect and represent information inaccurately in data and probability experiments. Students use minimal or incorrect mathematical language to communicate (orally and/or written form) their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

2nd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 3

CONTENT STANDARD
1. NUMBER OPERATIONS AND CONCEPTS
Students use numbers, number sense, and number relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 3 BENCHMARKS
MA3.1.1	Students use the concept of place value to read and write designated numbers up to 9,999.
MA3.1.2	Students compare and order whole numbers up to 9,999.
MA3.1.3	Students use coins and bills to compare the values and make combinations up to five dollars.
MA3.1.4	Students demonstrate computational fluency with basic facts (add to 20 and subtract from 20).
MA3.1.5	Students add and subtract two- and three-digit numbers with and without regrouping.
MA3.1.6	Students make an organized list and break problems into parts as strategies to solve problems.
MA3.1.7	Students use estimation strategies (rounding to the nearest 10 or 100, or front-end loading) to solve problems.
MA3.1.8	Students communicate their choice of procedures and results when performing number operations in a problem-solving situation.

GRADE 3 PERFORMANCE LEVEL DESCRIPTORS

1. NUMBER OPERATIONS AND CONCEPTS

ADVANCED PERFORMANCE
3rd grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency accurately. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
3rd grade students performing at a proficient level make relevant connections using number sense, place value, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE
3rd grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE
3rd grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 3 BENCHMARKS
MA3.2.1	Students recognize, name, compare, and sort 2- and 3-dimensional geometric objects.
MA3.2.2	Students describe and compare various geometric objects using congruency and lines of symmetry.
MA3.2.3	Students select, use, and communicate organizational methods in a problem-solving situation using 2- and 3- dimensional geometric objects.

GRADE 3 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE
3rd grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students classify, describe, and compare geometric objects using coherent and clear mathematical language. They justify problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE
3rd grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students classify, describe, and compare geometric objects using mathematical language with minor errors. They communicate problem-solving methods with sound reasoning.

BASIC PERFORMANCE
3rd grade students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students classify and describe geometric objects using minimal or incorrect mathematical language. They communicate their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE
3rd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
3. <u>MEASUREMENT</u>
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 3 BENCHMARKS
MA3.3.1	Students apply estimation and measurement of length to content problems using actual measuring devices and express the results in U.S. customary units (inches, feet, and yards).
MA3.3.2	Students apply estimation and measurement of capacity in problem-solving situations using actual measuring devices and express the results in U.S. customary units (cups, quarts, and gallons).
MA3.3.3	Students demonstrate relationships within the U.S. customary units in problem-solving situations.
MA3.3.4	Students determine perimeter of rectangles and squares using models in problem solving situations.
MA3.3.5	Students tell time, using both analog and digital clocks, to the nearest minute using A.M. and P.M.

GRADE 3 PERFORMANCE LEVEL DESCRIPTORS

3. <u>MEASUREMENT</u>

<u>ADVANCED PERFORMANCE</u>

3rd grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate and measure using a variety of tools in U.S. customary units. They provide valid and convincing evidence when determining the area and perimeter of rectangles and squares. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

<u>PROFICIENT PERFORMANCE</u>

3rd grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure using a variety of tools in U.S. customary units. Students tell time. They determine the perimeter of rectangles and squares. Students use mathematical language to communicate sound reasoning in problem-solving situations.

<u>BASIC PERFORMANCE</u>

3rd grade students performing at a basic level make simple connections among measurement concepts. They measure using a variety of tools in U.S. customary units in large increments. Students tell time to the nearest five minutes. They use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

<u>BELOW BASIC PERFORMANCE</u>

3rd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 3 BENCHMARKS
MA3.4.1	Students recognize, describe, create, and extend patterns by using manipulatives, numbers, and graphic representations.
MA3.4.2	Students apply knowledge of appropriate grade level patterns when solving problems.

GRADE 3 PERFORMANCE LEVEL DESCRIPTORS
4. ALGEBRA

ADVANCED PERFORMANCE

3rd grade students performing at an advanced level make complex connections among algebraic concepts accurately. They create growing or extended patterns using manipulatives, numbers, and graphic representations. Students generalize pattern concepts (such as 4, 7, 10,_,_,_). They use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

3rd grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. They create and extend patterns using manipulatives, numbers, and graphic representations. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

3rd grade students performing at a basic level make simple connections among algebraic concepts. They copy and/or produce repeating patterns using manipulatives and graphic representations. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

3rd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. <u>DATA ANALYSIS AND PROBABILITY</u>
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE 3 BENCHMARKS
MA3.5.1	Students collect, organize, and compare data using graphs and Venn diagrams.
MA3.5.2	Students communicate conclusions about a set of data by interpreting information using graphs and Venn diagrams.
MA3.5.3	Students predict, perform, and record likely results of simple probability experiments.

GRADE 3 PERFORMANCE LEVEL DESCRIPTORS
5. <u>DATA ANALYSIS AND PROBABILITY</u>

<u>ADVANCED PERFORMANCE</u>

3rd grade students performing at an advanced level make complex connections about data and probability. They organize and represent information, compare, and defend results in data and probability experiments accurately. Students predict reasonable outcomes in probability experiments. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

<u>PROFICIENT PERFORMANCE</u>

3rd grade students performing at a proficient level make relevant connections about data and probability. They organize and represent information, compare, and interpret results in data and probability experiments with minor errors. Students predict reasonable outcomes of simple probability experiments. They use mathematical language to communicate sound reasoning in problem-solving situations.

<u>BASIC PERFORMANCE</u>

3rd grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information inaccurately in data and probability experiments. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

<u>BELOW BASIC PERFORMANCE</u>

3rd grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 4

CONTENT STANDARD
1. <u>NUMBER OPERATIONS AND CONCEPTS</u>
Students use numbers, number sense, and number relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 4 BENCHMARKS
MA4.1.1	Students use the concept of place value to read and write whole numbers up to 999,999 in words, standard, and expanded form.
MA4.1.2	Students compare and order whole numbers.
MA4.1.3	Students use coins and bills to compare the values, make combinations up to $10.00, and make change from amounts up to $5.00.
MA4.1.4	Students demonstrate computational fluency with basic facts (add to 20, subtract from 20, multiply by 0-10).
MA4.1.5	Students add and subtract to thousands and multiply hundreds by a single digit.
MA4.1.6	Students explain their choice of problem-solving strategies and justify their results when performing whole number operations in problem-solving situations.
MA4.1.7	Students recognize commonly used fractions (halves, thirds, fourths) as parts of a whole using an area model.
MA4.1.8	Students use estimation strategies to solve problems.

GRADE 4 PERFORMANCE LEVEL DESCRIPTORS
1. <u>NUMBER OPERATIONS AND CONCEPTS</u>

ADVANCED PERFORMANCE
4th grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency, regardless of number size. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
4th grade students performing at a proficient level make relevant connections using number sense, place value, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE
4th grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE
4th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.
They may use tools/technology to support learning.

CODE	GRADE 4 BENCHMARKS
MA4.2.1	Students classify and describe 2- and 3- dimensional geometric objects by their attributes (sides, edges, vertices, and faces).
MA4.2.2	Students understand the images resulting from reflections (flips).
MA4.2.3	Students select, use, and communicate organizational methods in problem-solving situations appropriate to grade level.
MA4.2.4	Students know characteristics of lines (parallel, perpendicular, and intersecting).

GRADE 4 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

4th grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students classify, describe, and compare geometric objects using coherent and clear mathematical language. They justify problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

4th grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students classify, describe, and compare geometric objects using mathematical language with minimal errors. They communicate problem-solving methods with sound reasoning.

BASIC PERFORMANCE

4th grade students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students classify and describe geometric objects using minimal or incorrect mathematical language. They communicate their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

4th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

	CONTENT STANDARD 3. <u>MEASUREMENT</u> Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE 4 BENCHMARKS
MA4.3.1	Students select and apply appropriate U.S. customary units (half inch, quarter inch, feet, and yards) to the estimation and measurement of length in real-world problems using actual measuring devices.
MA4.3.2	Students select and apply appropriate U.S. customary units (ounces and pounds) to the estimation and measurement of weight in real-world problems using actual measuring devices.
MA4.3.3	Students select and apply appropriate U.S. customary units (teaspoons, tablespoons, cups, pints, quarts, and gallons) to the estimation and measurement of capacity in real-world problems using actual measuring devices.
MA4.3.4	Students demonstrate relationships within the U.S. customary system, given an equivalence chart, in problem-solving situations.
MA4.3.5	Students determine area and perimeter of rectangles and squares using models in problem-solving situations.
MA4.3.6	Students use time, in problem-solving situations to: • compare relationships among seconds, minutes, and hours; • use elapsed time to the nearest minute.

GRADE 4 PERFORMANCE LEVEL DESCRIPTORS
3. <u>MEASUREMENT</u>

<u>ADVANCED PERFORMANCE</u>

4th grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate and measure using a variety of tools in U.S. customary units. They provide valid and convincing evidence when determining the area and perimeter of rectangles, squares, and triangles. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

<u>PROFICIENT PERFORMANCE</u>

4th grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure using a variety of tools in U.S. customary units. Students apply the concept of elapsed time. They determine the area and perimeter of rectangles and squares. Students use mathematical language to communicate sound reasoning in problem-solving situations.

<u>BASIC PERFORMANCE</u>

4th grade students performing at a basic level make simple connections among measurement concepts. They measure using a variety of tools in U.S. customary units in large increments. Students tell time to the nearest minute. They determine the area or perimeter of squares and rectangles. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

<u>BELOW BASIC PERFORMANCE</u>

4th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems.

They may use tools/technology to support learning.

CODE	GRADE 4 BENCHMARKS
MA4.4.1	Students recognize, describe, extend, create, and generalize patterns by using manipulatives, numbers, and graphic representations.
MA4.4.2	Students apply knowledge of appropriate grade level patterns when solving problems.
MA4.4.3	Students explain a rule given a pattern or sequence.

GRADE 4 PERFORMANCE LEVEL DESCRIPTORS

4. ALGEBRA

ADVANCED PERFORMANCE

4th grade students performing at an advanced level make complex connections among algebraic concepts. They create complex growing or extended patterns using manipulatives, numbers, and graphic representations accurately. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

4th grade students performing at a proficient level make relevant connections among algebraic concepts. They create growing and extended patterns using manipulatives, numbers, and graphic representations with minor errors. They generalize pattern concepts (such as 4,7,10,_,_,_). Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

4th grade students performing at a basic level make simple connections among algebraic concepts. They copy and/or produce repeating patterns. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

4th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 4 BENCHMARKS
MA4.5.1	Students collect, organize, and compare data in graphs, Venn diagrams, tables, and charts.
MA4.5.2	Students communicate conclusions about a set of data by interpreting information using graphs, Venn diagrams, tables, and charts.
MA4.5.3	Students predict, perform, and record results of probability experiments.
MA4.5.4	Students predict all possible outcomes of a given situation or event.

GRADE 4 PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE
4th grade students performing at an advanced level make complex connections about data and probability. They organize and represent information, compare, and defend results in data and probability experiments accurately. Students predict reasonable outcomes in probability experiments. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
4th grade students performing at a proficient level make relevant connections about data and probability. They organize and represent information, compare, and interpret results in data and probability experiments with minor errors. Students predict reasonable outcomes in probability experiments. They use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE
4th grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information in data and probability experiments. They predict outcomes of simple probability experiments with limited success. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE
4th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 5

CONTENT STANDARD
1. NUMBER OPERATIONS AND CONCEPTS
Students use numbers, number sense, and number relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 5 BENCHMARKS
MA5.1.1	Students use the concept of place value to read and write whole numbers (in words, standard, and expanded form) and decimals (10ths and 100ths).
MA5.1.2	Students demonstrate computational fluency with basic facts for all four operations, including identifying multiples and factors of designated numbers up to 100.
MA5.1.3	Students demonstrate an understanding of whole number operations by: ▪ explaining the relationships between the operations of addition, subtraction, multiplication, and division; and ▪ multiplying by two-digit whole numbers and dividing by single-digit whole numbers.
MA5.1.4	Students explain their choice of estimation or problem-solving strategies and justify results when performing number operations in problem-solving situations.
MA5.1.5	Students add and subtract decimals to hundredths and solve problems in the context of money.
MA5.1.6	Students demonstrate an understanding of fractions as parts of wholes.
MA5.1.7	Students order, compare, add, and subtract fractions with like denominators.

GRADE 5 PERFORMANCE LEVEL DESCRIPTORS
1. NUMBER OPERATIONS AND CONCEPTS

ADVANCED PERFORMANCE
5th grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency regardless of number size. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
5th grade students performing at a proficient level make relevant connections using number sense, place values, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE
5th grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE
5th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.	
CODE	**GRADE 5 BENCHMARKS**
MA5.2.1	Students describe, draw, and classify two-dimensional geometric figures such as triangles, quadrilaterals, and circles.
MA5.2.2	Students describe, identify, and classify three-dimensional geometric figures such as cylinders, cones, pyramids, rectangular prisms, and spheres.
MA5.2.3	Students describe and compare various geometric objects using congruency and lines of symmetry appropriate to grade level.
MA5.2.4	Students select, use, and communicate organizational methods in problem-solving situations appropriate to grade level.

GRADE 5 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

5th grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. They identify, classify, describe, and compare geometric objects using coherent and clear mathematical language. Students justify problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

5th grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. They identify, classify, describe, and compare geometric objects using mathematical language with minimal errors. Students communicate problem-solving methods with sound reasoning.

BASIC PERFORMANCE

5th grade students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. They identify and describe geometric objects using minimal or incorrect mathematical language. Students communicate their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

5th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
3. MEASUREMENT
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 5 BENCHMARKS
MA5.3.1	Students apply estimation and measurement of length to content problems using actual measuring devices and express the results in U.S. customary units (parts of inch-halves/fourths, eights inches, feet, yards, and miles).
MA5.3.2	Students apply estimation and measurement of weight to content problems using actual measuring devices and express the results in U.S. customary units (ounces and pounds).
MA5.3.3	Students apply estimation and measurement of capacity in real-world problem-solving situations using actual measuring devices and express the results in U.S. customary units (teaspoons, tablespoons, cups, pints, quarts, and gallons).
MA5.3.4	Students demonstrate relationships within the U.S. customary units, given an equivalence chart, in problem-solving situations appropriate to grade level.
MA5.3.5	Students determine area and perimeter of triangles, rectangles, and squares using models in problem-solving situations using appropriate units.
MA5.3.6	Students use time, in problem-solving situations to: • compare relationships among seconds, minutes, hours, and days, and • use elapsed time to the nearest minute.

GRADE 5 PERFORMANCE LEVEL DESCRIPTORS

3. MEASUREMENT

ADVANCED PERFORMANCE

5th grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate, measure, and calculate using a variety of tools. Students provide valid and convincing evidence when determining the area and perimeter with and without models. They use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

5th grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure, using a variety of tools. Students use mathematical language to communicate sound reasoning in a problem-solving situation.

BASIC PERFORMANCE

5th grade students performing at a basic level make simple connections among measurement concepts. They inconsistently estimate and measure, using a variety of tools. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

5th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

<table>
<tr><td colspan="2">

CONTENT STANDARD
4. <u>ALGEBRA</u>
Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

</td></tr>
<tr><td colspan="2">NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.</td></tr>
<tr><td>CODE</td><td>GRADE 5 BENCHMARKS</td></tr>
<tr><td>MA5.4.1</td><td>Students recognize, describe, extend, create, and generalize patterns by using manipulatives, numbers, and graphic representations, including charts and graphs.</td></tr>
<tr><td>MA5.4.2</td><td>Students apply knowledge of patterns when solving problems appropriate to grade level.</td></tr>
<tr><td>MA5.4.3</td><td>Students represent the idea of a variable as an unknown quantity, a letter, or a symbol within addition and subtraction sentences using whole numbers.</td></tr>
</table>

GRADE 5 PERFORMANCE LEVEL DESCRIPTORS

4. <u>ALGEBRA</u>

<u>ADVANCED PERFORMANCE</u>

5th grade students performing at an advanced level make complex connections among algebraic concepts accurately. They create complex growing or extended patterns using manipulatives, numbers, and graphic representations. Students are able to generalize pattern concepts and use coherent and clear mathematical language to justify reasoning in problem-solving situations.

<u>PROFICIENT PERFORMANCE</u>

5th grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. They create growing and extended patterns using manipulatives, numbers, and graphic representations. Students are able to generalize pattern concepts and use mathematical language to communicate sound reasoning in problem-solving situations.

<u>BASIC PERFORMANCE</u>

5th grade students performing at a basic level make simple connections among algebraic concepts. They copy and/or produce repeating patterns. Students sometimes generalize pattern concepts and use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

<u>BELOW BASIC PERFORMANCE</u>

5th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 5 BENCHMARKS
MA5.5.1	Students systematically collect, organize, and describe/represent categorical data using bar graphs.
MA5.5.2	Students find and interpret mode for data sets in a problem-solving setting appropriate to grade level. Students communicate their findings.
MA5.5.3	Students predict and record outcomes of probability experiments or simulations.

GRADE 5 PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE

5th grade students performing at an advanced level make complex connections about data and probability. They collect, organize, and represent information, describe, interpret and defend results in data and probability experiments accurately. Students predict reasonable outcomes in probability experiments. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

5th grade students performing at a proficient level make relevant connections about data and probability. They collect, organize, and represent information, describe and interpret results in data and probability experiments with minor errors. Students predict reasonable outcomes in probability experiments. They use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

5th grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information in data and probability experiments. They predict outcomes of simple probability experiments with limited success. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

5th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 6

<table>
<tr><td colspan="2">
<p align="center">CONTENT STANDARD
1. <u>NUMBER OPERATIONS AND CONCEPTS</u></p>
Students use numbers, number sense, and number relationships in a problem-solving situation.
</td></tr>
<tr><td colspan="2">NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.</td></tr>
<tr><td>CODE</td><td>GRADE 6 BENCHMARKS</td></tr>
<tr><td>MA6.1.1</td><td>Students use the concept of place value to read and write decimals (to 1000ths) in words, standard, and expanded form.</td></tr>
<tr><td>MA6.1.2</td><td>Students multiply decimals (10ths & 100ths) and divide whole numbers by 2-digit divisors and divide decimals by whole numbers.</td></tr>
<tr><td>MA6.1.3</td><td>Students represent the number line using integers.</td></tr>
<tr><td>MA6.1.4</td><td>Students explain their choice of estimation and problem solving strategies and justify results when performing number operations with fractions and decimals in problem-solving situations.</td></tr>
<tr><td>MA6.1.5</td><td>Students identify prime and composite numbers and apply prime factorization to numbers less than 100.</td></tr>
<tr><td>MA6.1.6</td><td>Students demonstrate an understanding of fractions and decimals by:

representing fractions as division of whole numbers;
converting between mixed numbers and improper fractions;
simplifying fractions and mixed numbers;
writing fractions in equivalent forms;
using parts of a set;
rounding decimal numbers to 10ths, 100ths, and whole numbers (units) place; and
converting between decimals (from .01 to .99), fractions and representing percentages.
</td></tr>
<tr><td>MA6.1.7</td><td>Students add and subtract mixed numbers with like denominators.</td></tr>
<tr><td>MA6.1.8</td><td>Students represent repeated multiplication in exponential form.</td></tr>
</table>

Wyoming Mathematics Content and Performance Standards   *Adopted 11/19/08*
43

GRADE 6 PERFORMANCE LEVEL DESCRIPTORS
1. NUMBER OPERATIONS AND CONCEPTS

ADVANCED PERFORMANCE

6th grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency regardless of number size. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

6th grade students performing at a proficient level make relevant connections using numbers, number sense, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

6th grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

6th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

<table>
<tr><td colspan="2" style="text-align:center">

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

</td></tr>
<tr><td colspan="2">

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

</td></tr>
<tr><td>**CODE**</td><td style="text-align:center">**GRADE 6 BENCHMARKS**</td></tr>
<tr><td>MA6.2.1</td><td>Students classify, describe, compare, and draw representations of 1- and 2-dimensional objects and angles.</td></tr>
<tr><td>MA6.2.2</td><td>Students identify and classify congruent objects by properties appropriate to grade level.</td></tr>
<tr><td>MA6.2.3</td><td>Students communicate the reasoning used in identifying geometric relationships in problem-solving situations appropriate to grade level.</td></tr>
</table>

GRADE 6 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

6th grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students identify, classify, describe, and compare geometric objects using coherent and clear mathematical language. They justify problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

6th grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students identify, classify, describe, and compare geometric objects using mathematical language with minimal errors. They communicate problem-solving methods with sound reasoning.

BASIC PERFORMANCE

6th grade students performing at a basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students identify and describe geometric objects using minimal or incorrect mathematical language. They communicate their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

6th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
3. MEASUREMENT
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 6 BENCHMARKS
MA6.3.1	Students apply estimation and measurement of length to content problems and express the results in metric units (centimeters and meters).
MA6.3.2	Students apply estimation and measurement of weight to content problems and express the results in U.S. customary units (ounces, pounds, and tons).
MA6.3.3	Students apply estimation and measurement of capacity to content problems and express the results in U.S. customary units (teaspoons, tablespoons, cups, pints, quarts, gallons).
MA6.3.4	Students demonstrate relationships within the U.S. customary units for weight and capacity and within the metric system (centimeters to meters) in problem-solving situations.
MA6.3.5	Students determine the area and perimeter of regular polygons and the area of parallelograms, with and without models.

GRADE 6 PERFORMANCE LEVEL DESCRIPTORS
3. MEASUREMENT

ADVANCED PERFORMANCE
6th grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate, measure, and calculate using a variety of tools. Students provide valid and convincing evidence when determining area and perimeter. They use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
6th grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate and measure using a variety of tools with and without models. Students use mathematical language to communicate sound reasoning in problem- solving situations.

BASIC PERFORMANCE
6th grade students performing at a basic level make simple connections among measurement concepts. They inconsistently estimate and measure using a variety of tools with models. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE
6th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA
Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 6 BENCHMARKS
MA6.4.1	Students recognize, describe, extend, create, and generalize patterns, such as numeric sequences, by using manipulatives, numbers, graphic representations, including charts and graphs.
MA6.4.2	Students apply their knowledge of patterns to describe a constant rate of change when solving problems.
MA6.4.3	Students represent the idea of a variable as an unknown quantity, a letter, or a symbol within any whole number operation.

GRADE 6 PERFORMANCE LEVEL DESCRIPTORS
4. ALGEBRA

ADVANCED PERFORMANCE

6th grade students performing at an advanced level make complex connections among algebraic concepts accurately. They apply and describe patterns in a problem-solving situation accurately. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

6th grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. They apply and describe patterns in a problem-solving situation with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

6th grade students performing at a basic level make simple connections among algebraic concepts. They sometimes apply and describe patterns in a problem-solving situation with errors. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

6th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 6 BENCHMARKS
MA6.5.1	Students systematically collect, organize, and describe/represent numeric data using line graphs.
MA6.5.2	Students, given a scenario, recognize and communicate the likelihood of events using concepts from probability (i.e., impossible, equally likely, certain) appropriate to grade level.

GRADE 6 PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE

6th grade students performing at an advanced level make complex connections about data and probability. They collect, organize, and represent information, describe, interpret and defend results in data and probability experiments accurately. Students predict reasonable outcomes using concepts from probability. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

6th grade students performing at a proficient level make relevant connections about data and probability. They collect, organize, and represent information, describe and interpret results in data and probability experiments with minor errors. Students predict reasonable outcomes using concepts from probability. They use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

6th grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information in data and probability experiments. They predict outcomes using concepts from probability with limited success. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

6th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 7

<table>
<tr><td colspan="2">

CONTENT STANDARD
1. <u>NUMBER OPERATIONS AND CONCEPTS</u>
Students use numbers, number sense, and number relationships in a problem-solving situation.

</td></tr>
<tr><td colspan="2">NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.</td></tr>
<tr><td>CODE</td><td>GRADE 7 BENCHMARKS</td></tr>
<tr><td>MA7.1.1</td><td>Students represent and order rational numbers that are greater than or equal to 0 in a variety of equivalent forms in problem-solving situations.</td></tr>
<tr><td>MA7.1.2</td><td>Students use basic operations with integers in problem-solving situations.</td></tr>
<tr><td>MA7.1.3</td><td>Students divide decimal numbers by decimal numbers.</td></tr>
<tr><td>MA7.1.4</td><td>Students explain their choice of estimation and problem- solving strategies and justify results when performing number operations with fractions and decimals in problem-solving situations appropriate to grade level. Students add and subtract fractions and mixed numbers.</td></tr>
<tr><td>MA7.1.5</td><td>Students multiply and divide fractions and mixed numbers.</td></tr>
<tr><td>MA7.1.6</td><td>Students evaluate whole numbers expressed in exponential form.</td></tr>
<tr><td>MA7.1.7</td><td>Students apply the order of operations (whole numbers including grouping symbols and operations, excluding roots and powers) in problem-solving situations.</td></tr>
</table>

GRADE 7 PERFORMANCE LEVEL DESCRIPTORS

1. <u>NUMBER OPERATIONS AND CONCEPTS</u>

ADVANCED PERFORMANCE

7th grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency regardless of number size. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

7th grade students performing at a proficient level make relevant connections using numbers, number sense, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

7th grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

7th grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
2. GEOMETRY
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 7 BENCHMARKS
MA7.2.1	Students classify and describe one- and two-dimensional geometric objects, including: • lines, rays, segments, and angles; • parallel and perpendicular relationships; and • regular polygon types.
MA7.2.2	Students make conjectures about geometric figures based on knowledge of congruence and similarity.
MA7.2.3	Students communicate the reasoning used in identifying geometric relationships in problem-solving situations appropriate to grade level.

GRADE 7 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

7th grade students performing at an advanced level make complex connections with geometric objects and attributes with or without using tools/technology. Students classify and describe geometric objects using coherent and clear mathematical language. They justify problem-solving methods with valid and convincing evidence.

PROFICIENT PERFORMANCE

7th grade students performing at a proficient level make relevant connections with geometric objects and attributes with or without using tools/technology. Students classify and describe geometric objects using mathematical language with minimal errors. They communicate problem-solving methods with sound reasoning.

BASIC PERFORMANCE

7th grade students performing at the basic level make simple connections with geometric objects and attributes with or without using tools/technology. Students classify and describe geometric objects using minimal or incorrect mathematical language. They communicate their problem-solving methods with limited success.

BELOW BASIC PERFORMANCE

7th grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
3. MEASUREMENT
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 7 BENCHMARKS
MA7.3.1	Students apply estimation and measurement of length to content problems and convert within the U.S. customary (in, ft, yd, mi) and within the metric system (mm, cm, m, km).
MA7.3.2	Students apply estimation and measurement of weight to content problems expressing the results in metric units (g, kg).
MA7.3.3	Students apply estimation and measurement of capacity to content problems expressing the results in metric units (liters).
MA7.3.4	Students determine the circumference of a circle using models.
MA7.3.5	Students calculate the areas of triangles and trapezoids.
MA7.3.6	Students measure angles with a protractor.

GRADE 7 PERFORMANCE LEVEL DESCRIPTORS

3. MEASUREMENT

ADVANCED PERFORMANCE

7th grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate, measure, and calculate using a variety of tools. Students provide valid and convincing evidence when determining the circumference of a circle. They use coherent and clear mathematical language to justify reasoning in a problem-solving situation.

PROFICIENT PERFORMANCE

7th grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate, measure, and calculate using a variety of tools and models. Students use mathematical language to communicate sound reasoning in a problem-solving situation.

BASIC PERFORMANCE

7th grade students performing at a basic level make simple connections among measurement concepts. They inconsistently estimate, measure, and calculate using a variety of tools and models. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

7th grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA
Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 7 BENCHMARKS
MA7.4.1	Students translate word phrases, which involve addition and subtraction, into mathematical expressions.
MA7.4.2	Students solve one-step linear equations.
MA7.4.3	Students evaluate algebraic expressions and formulas, using order of operations, given positive integer values for variables.
MA7.4.4	Students understand and use basic concepts of the coordinate system, including plotting points in all four quadrants.

GRADE 7 PERFORMANCE LEVEL DESCRIPTORS

4. ALGEBRA

ADVANCED PERFORMANCE

7th grade students performing at an advanced level make complex connections among **E** algebraic concepts accurately. Students evaluate algebraic expressions and formulas and use the coordinate system accurately. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

7th grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. Students evaluate with minor errors algebraic expressions and formulas and use the coordinate system. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

7th grade students performing at a basic level make simple connections among algebraic concepts. Students inconsistently and with errors evaluate algebraic expressions and formulas and use the coordinate system. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

7th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.	
CODE	**GRADE 7 BENCHMARKS**
MA7.5.1	Students systematically collect, organize, describe, and analyze data using histograms.
MA7.5.2	Students calculate mean, median, mode, and range for data sets and use in real world setting.
MA7.5.3	Students predict, compare, and report as ratios probable outcomes of experiments or simulations (i.e., impossible, equally likely, certain).

GRADE 7 PERFORMANCE LEVEL DESCRIPTORS

5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE

7th grade students performing at an advanced level make complex connections about data and probability. They collect, organize and represent information, describe, interpret and defend results in data and probability experiments accurately. Students predict reasonable outcomes using concepts from probability. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

7th grade students performing at a proficient level make relevant connections about data and probability. They collect, organize and represent information, describe and interpret results in data and probability experiments with minor errors. Students predict reasonable outcomes using concepts from probability. They use mathematical language to communicate sound reasoning in problem-solving situations

BASIC PERFORMANCE

7th grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information in data and probability experiments. They predict outcomes using concepts from probability with limited success. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

7th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 8

<table>
<tr><td colspan="2" style="text-align:center">

CONTENT STANDARD
1. <u>NUMBER OPERATIONS AND CONCEPTS</u>
Students use numbers, number sense, and number relationships in a problem-solving situation.

</td></tr>
<tr><td colspan="2">NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.</td></tr>
<tr><td>CODE</td><td>GRADE 8 BENCHMARKS</td></tr>
<tr><td>MA8.1.1</td><td>Students represent and apply numbers in a variety of equivalent forms (such as changing from percent to decimal to fraction, etc.) and in a problem-solving context:
prime factors, factors, and multiples;
rational numbers and proportions; and
square roots and powers.</td></tr>
<tr><td>MA8.1.2</td><td>Students extend understanding and use of basic arithmetic operations on rational numbers.
Simplify numerical expressions using the order of operations;
Order rational numbers expressed in a variety of forms</td></tr>
<tr><td>MA8.1.3</td><td>Students explain their choice of estimation and problem- solving strategies and justify results of solutions in problem-solving situations involving rational numbers.</td></tr>
<tr><td>MA8.1.4</td><td>Students understand properties of operations with rational numbers.</td></tr>
</table>

GRADE 8 PERFORMANCE LEVEL DESCRIPTORS

1. <u>NUMBER OPERATIONS AND CONCEPTS</u>

ADVANCED PERFORMANCE

8th grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency regardless of number size. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

8th grade students performing at a proficient level make relevant connections using numbers, number sense, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

8th grade students performing at a basic level make simple connections using number sense, place value and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

8th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

CONTENT STANDARD
2. <u>GEOMETRY</u>
Students apply geometric concepts, properties, and relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 8 BENCHMARKS
MA8.2.1	Students classify and describe one-, two-, and three-dimensional geometric objects, including: • lines, rays, segments, and angles; • parallel and perpendicular relationships; • circles and spheres; • regular polygon types; • right prisms, cylinders, cones, and pyramids.
MA8.2.2	Students make conjectures about geometric objects based on knowledge of geometric transformations, congruence, and similarity.
MA8.2.3	Students use geometric formulas including the Pythagorean Theorem.
MA8.2.4	Students communicate the reasoning used in identifying geometric relationships in problem-solving situations appropriate to grade level.
MA8.2.5	Students represent geometric figures using a rectangular coordinate plane.

GRADE 8 PERFORMANCE LEVEL DESCRIPTORS

2. <u>GEOMETRY</u>

<u>ADVANCED PERFORMANCE</u>

8th grade students performing at an advanced level create models and explain the concepts involving geometric objects to solve problems. Given similar and congruent objects, students make conjectures about relationships and justify the reasons for their conjectures. Students use the appropriate strategy, tools, and units of measure in a problem-solving situation. Students analyze the relationships among basic geometric transformations. They justify problem-solving methods with valid and convincing evidence.

<u>PROFICIENT PERFORMANCE</u>

8th grade students performing at a proficient level classify and describe geometric objects to explain concepts with minimal errors. Given similar and congruent objects, students make conjectures about relationships. Students use the appropriate strategies (given a formula bank), tools, and units of measure in a problem-solving situation. Students recognize the relationships among basic geometric transformations. They communicate problem-solving methods with sound reasoning.

<u>BASIC PERFORMANCE</u>

8th grade students performing at a basic level sometimes explain the concepts involving geometric objects given the models. Students recognize similar and congruent objects. Students may use the appropriate strategies tools and units of measure in a problem-solving situation.

They communicate their problem-solving methods with limited success.

CONTENT STANDARD
3. MEASUREMENT
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 8 BENCHMARKS
MA8.3.1	Students apply estimation and measurement of weight/mass to content problems and convert within U.S. customary and within metric units (mg, g, kg).
MA8.3.2	Students apply estimation and measurement of capacity/volume to content problems and convert within metric units (ml, l).
MA8.3.3	Students select and use the appropriate methods, tools, and units to solve problems involving angle measure, perimeter, circumference, area (including circles), and volume of rectangular solids.

GRADE 8 PERFORMANCE LEVEL DESCRIPTORS
3. MEASUREMENT

ADVANCED PERFORMANCE

8th grade students performing at an advanced level make complex connections among measurement concepts accurately. They estimate, measure, and calculate using a variety of tools. Students provide valid and convincing evidence when determining the circumference of a circle. They use coherent and clear mathematical language to justify reasoning in a problem-solving situation.

PROFICIENT PERFORMANCE

8th grade students performing at a proficient level make relevant connections among measurement concepts with minor errors. They estimate, measure, and calculate using a variety of tools and models. Students use mathematical language to communicate sound reasoning in a problem-solving situation.

BASIC PERFORMANCE

8th grade students performing at a basic level make simple connections among measurement concepts. They inconsistently estimate, measure, and calculate using a variety of tools and models. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

8th grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
4. ALGEBRA

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 8 BENCHMARKS
MA8.4.1	Students translate word phrases, which involve the four basic operations to mathematical expressions.
MA8.4.2	Students solve one- and two- step linear equations each with an integer coefficient and integer solutions.
MA8.4.3	Students evaluate algebraic expressions and formulas given integer values for variables.
MA8.4.4	Using simple linear equations, students create a table, and graph the solutions on the coordinate system.

GRADE 8 PERFORMANCE LEVEL DESCRIPTORS

4. ALGEBRA

ADVANCED PERFORMANCE

8th grade students performing at an advanced level make complex connections among algebraic concepts accurately. Students evaluate algebraic expressions and formulas and use the coordinate system accurately. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

8th grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. Students evaluate with minor errors algebraic expressions and formulas and use the coordinate system. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE

8th grade students performing at a basic level make simple connections among algebraic concepts. Students inconsistently and with errors evaluate algebraic expressions and formulas and use the coordinate system. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

8th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

<table>
<tr><td colspan="2">

CONTENT STANDARD
5. <u>DATA ANALYSIS AND PROBABILITY</u>
Students use data analysis and probability to analyze given situations and the results of experiments.

</td></tr>
</table>

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 8 BENCHMARKS
MA8.5.1	Students systematically collect, organize, describe, analyze, and represent data using tables, charts, diagrams, and graphs.
MA8.5.2	Students calculate mean, median, mode, and range for data sets and use in a real-world setting appropriate to grade level.
MA8.5.3	Students predict, compare, and calculate probable outcomes of experiments or simulations.
MA8.5.4	Students communicate about the likelihood of events using concepts from probability such as impossible, equally likely and certain appropriate to grade level.

GRADE 8 PERFORMANCE LEVEL DESCRIPTORS
5. <u>DATA ANALYSIS AND PROBABILITY</u>

ADVANCED PERFORMANCE

8th grade students performing at an advanced level make complex connections about data and probability. They collect, organize and represent information, describe, interpret and defend results in data and probability experiments accurately. Students predict, compare, and calculate probable outcomes using concepts from probability. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

8th grade students performing at a proficient level make relevant connections about data and probability. They collect, organize and represent information, describe and analyze results in data and probability experiments with minor errors. Students predict, compare, and calculate probable outcomes using concepts from probability. They use mathematical language to communicate sound reasoning in problem-solving situations.

BELOW BASIC PERFORMANCE

8th grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information in data and probability experiments. They predict probable outcomes using concepts from probability with limited success. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

8th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

GRADE 11

CONTENT STANDARD
1. <u>NUMBER OPERATIONS AND CONCEPTS</u>

Students use numbers, number sense, and number relationships in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 11 BENCHMARKS
MA11.1.1	Students represent and apply real numbers in a variety of forms.
MA11.1.2	Students apply the structure and properties of the real number system.
MA11.1.3	Students explain their choice of estimation and problem solving strategies and justify results of solutions in problem-solving situations involving real numbers.
MA11.1.4	Students use proportional reasoning to solve problems.

GRADE 11 PERFORMANCE LEVEL DESCRIPTORS

1. <u>NUMBER OPERATIONS AND CONCEPTS</u>

ADVANCED PERFORMANCE

11th grade students performing at an advanced level make complex connections using number sense, place value, and estimation. They demonstrate computational fluency regardless of number size. Students use coherent and clear mathematical language to justify support reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

11th grade students performing at a proficient level make relevant connections using numbers, number sense, and estimation. They demonstrate computational fluency with minor errors. Students use mathematical language to communicate and support sound reasoning in problem-solving situations.

BASIC PERFORMANCE

11th grade students performing at a basic level make simple connections using number sense, place value, and estimation. They demonstrate limited computational skills. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

11th grade students performing at a below basic level require extensive support or provide little or no evidence in meeting the standard.

<table>
<tr><td colspan="2" style="text-align:center">

CONTENT STANDARD
2. GEOMETRY

Students apply geometric concepts, properties, and relationships in a problem-solving situation.

</td></tr>
<tr><td colspan="2">NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.</td></tr>
<tr><td>CODE</td><td style="text-align:center">GRADE 11 BENCHMARKS</td></tr>
<tr><td>MA11.2.1</td><td>Students use transformations, congruency, symmetry, similarity, perpendicularity, parallelism, and the Pythagorean Theorem to solve problems.</td></tr>
<tr><td>MA11.2.2</td><td>Students communicate, using mathematical language, to:
▪ Interpret, represent, or create geometric figures;
▪ Draw or build figures from a mathematical description;
▪ Analyze properties and determine attributes of 2- and 3- dimensional objects.</td></tr>
<tr><td>MA11.2.3</td><td>Students communicate the reasoning used in identifying geometric relationships in problem-solving situations.</td></tr>
<tr><td>MA11.2.4</td><td>Students solve problems involving the coordinate plane such as the distance between two points, the midpoint, and slope.</td></tr>
<tr><td>MA11.2.5</td><td>Students connect geometry with other mathematical topics.</td></tr>
</table>

GRADE 11 PERFORMANCE LEVEL DESCRIPTORS

2. GEOMETRY

ADVANCED PERFORMANCE

11th grade students performing at an advanced level consistently select and use a variety of appropriate methods, units, and/or formulas (given a formula bank), to analyze and accurately solve problems. Students explain, apply, and validate linear, planar, and spatial relationships. They communicate reasoning and solutions using coherent and clear mathematical language in a problem-solving situation.

PROFICIENT PERFORMANCE

11th grade students performing at a proficient level select and use appropriate methods, units, and/or formulas (given a formula bank), to solve problems with minor errors. They explain, and apply linear, planar, and spatial relationships. Students use mathematical language to communicate sound reasoning in a problem-solving situation.

BASIC PERFORMANCE

11th grade students performing at a basic level select and use a limited range of methods, units, and/or formulas (given a formula bank) to solve problems. They attempt to explain and apply linear, planar, and spatial relationships. Students communicate their thought processes with limited success in a problem-solving situation.

BELOW BASIC PERFORMANCE

11th grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
3. MEASUREMENT
Students use a variety of tools and techniques of measurement in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 11 BENCHMARKS
MA11.3.1	Students apply estimation and measurement using the appropriate methods and units to solve problems involving length, weight/mass, area, surface area, volume, and angle measure.
MA11.3.2	Students demonstrate an understanding of both metric and U. S. customary systems. Students are able to convert within each system.
MA11.3.3	Students identify and apply scale, ratios, and proportions in solving measurement problems.
MA11.3.4	Students solve problems of angle measure including those involving polygons or parallel lines cut by a transversal.
MA11.3.5	Students solve indirect measurement problems.

GRADE 11 PERFORMANCE LEVEL DESCRIPTORS
3. MEASUREMENT

ADVANCED PERFORMANCE
11th grade students performing at an advanced level consistently select and use a variety of appropriate methods, units, and/or formulas (given a formula bank), to analyze and solve problems. Students apply relationships between units of measure and scale in solving real world problems. They determine perimeter/circumference, area, and volume for geometric shapes and solids explaining and justifying solutions. Students communicate reasoning and solutions using coherent and clear mathematical language in problem-solving situations.

PROFICIENT PERFORMANCE
11th grade students performing at a proficient level select and use appropriate methods, units, and/or formulas (given a formula bank), to solve problems. Students apply relationships between units of measure and scale in solving real world problems. They determine perimeter/circumference, area, and volume for geometric shapes and solids. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BASIC PERFORMANCE
11th grade students performing at a basic level select and use a limited range of methods, units, and/or formulas (given a formula bank), to solve problems. Students attempt to apply relationships between units of measure and scale in solving real world problems. They determine perimeter/circumference, area, and volume for geometric shapes and solids with limited success. Students use minimal or incorrect mathematical language to communicate their thought processes in problem-solving situations.

CONTENT STANDARD
4. ALGEBRA

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 11 BENCHMARKS
MA11.4.1	Students use algebraic concepts, symbols, and skills to represent and solve real-world problems.
MA11.4.2	Students write, model, and evaluate expressions, functions, equations, and inequalities.
MA11.4.3	Students graph linear equations and interpret the results in solving algebraic problems.
MA11.4.4	Students solve, graph, or interpret systems of linear equations.
MA11.4.5	Students connect algebra with other mathematical topics.

GRADE 11 PERFORMANCE LEVEL DESCRIPTORS

4. ALGEBRA

ADVANCED PERFORMANCE

11th grade students performing at an advanced level make complex connections among algebraic concepts accurately. Students consistently utilize algebraic skills to interpret and solve algebraic problems accurately. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE

11th grade students performing at a proficient level make relevant connections among algebraic concepts with minor errors. Students utilize algebraic skills to interpret and solve algebraic problems with minor errors. Students use mathematical language to communicate sound reasoning in problem-solving situations.

BELOW BASIC PERFORMANCE

11th grade students performing at a basic level make simple connections among algebraic concepts. Students inconsistently and with errors utilize algebraic skills to interpret and solve algebraic problems. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

BELOW BASIC PERFORMANCE

11 grade students performing at a below basic level require extensive support or provide little or

no evidence in meeting the standard.

CONTENT STANDARD
5. DATA ANALYSIS AND PROBABILITY
Students use data analysis and probability to analyze given situations and the results of experiments.

NOTE: Students communicate the reasoning used in solving these problems. They may use tools/technology to support learning.

CODE	GRADE 11 BENCHMARKS
MA11.5.1	Students apply knowledge of mean, median, mode, and range to interpret and evaluate information and data.
MA11.5.2	Students draw reasonable inferences from statistical data and/or correlation/best fit line to predict outcomes.
MA11.5.3	Students communicate about the likelihood of events using concepts from probability. • sample space • evaluate simple probabilities • evaluate experimental vs. theoretical
MA11.5.4	Students determine, collect, organize, and analyze relevant data needed to make conclusions.

GRADE 11 PERFORMANCE LEVEL DESCRIPTORS
5. DATA ANALYSIS AND PROBABILITY

ADVANCED PERFORMANCE
11th grade students performing at an advanced level make complex connections about data and probability. They interpret, evaluate, and make conclusions from information and data and defend results accurately. Students accurately predict, compare, and calculate probable outcomes using concepts from probability. Students use coherent and clear mathematical language to justify reasoning in problem-solving situations.

PROFICIENT PERFORMANCE
11th grade students performing at a proficient level make relevant connections about data and probability. They interpret, evaluate, and make conclusions from information and data with minor errors. Students predict, compare, and calculate probable outcomes using concepts from probability. They use mathematical language to communicate sound reasoning in problem-solving situations.

BELOW BASIC PERFORMANCE
11th grade students performing at a basic level make simple connections about data and probability. They collect, represent, and report information in data and probability experiments with errors. They predict probable outcomes using concepts from probability with limited success. Students use minimal or incorrect mathematical language to communicate their thinking in problem-solving situations.

GLOSSARY

Wyoming Mathematics Content and Performance Standards

The glossary is intended to clarify selected terms and phases used in the content standard, benchmarks, and performance standards that may not be familiar to all readers. Please consult appropriate reference materials for further clarification and definitions of other terms with which you are unfamiliar.

Absolute value of a real number is its distance from zero on a number line.

Accuracy in measurement means that the measurement is correct or true to a specified decimal place.

Advanced performance is exhibited by students who use their knowledge of mathematics in complex and abstract situations and can communicate, argue, and articulate their work. It is understood that these students have met the proficient level.

Algebra is the branch of mathematics in which symbols are used to represent numbers, variables, or entities, either as a means of expressing general relationships or to indicate quantities satisfying particular conditions.

Algebraic methods encompass the ways in which operations are applied to algebraic symbols, e.g., letters representing numbers and operation symbols.

Basic performance is exhibited by students who use knowledge and skills, with limited success to complete problems, well-defined tasks, and communicate meaning in a rudimentary fashion.

Basic facts of arithmetic at the fourth grade level, includes the operation on whole numbers of addition and subtraction through 20 and multiplication from 0 through 10. This also includes the informal understanding that addition and subtraction are inverses and multiplication and division are inverses.

Below Basic is the classification for students who perform at the Below Basic level sometimes use knowledge and skills to attempt problems and well-defined tasks and communicate meaning with lack of direction or understanding.

Categorical data is non-numerical data.

Coherent and Clear is the quality of logical connection and orderly relationship of parts.

Commonly used fractions are those often seen in measurement, with denominator 2,3,4,5,8, and 10.

Complex Connections are connections that go beyond the grade level and across several concepts. For example, using an odd/even pattern to explain computation.
Complex problems are those that require multiple steps to solve.

Computational fluency is a connection between conceptual understanding and computation proficiency. Conceptual understanding of computation is grounded in mathematical foundations such as place value, operational properties, and number relationships. Computation proficiency is characterized by accurate, efficient, and flexible use of computation for multiple purposes.

Conceptual understanding is knowledge that is rich in relationships and conceptions. A student with conceptual understanding would know what to do and why.

Congruent figures have the same size and shape.

Conjectures might be called educated guesses. They are formulated based on experience and connections between the specific of a new problem and previously solved problems. The ability to make reasoned mathematical conjectures depends heavily on content knowledge.

Coordinate system in this document refers to the 2-dimensional Euclidean coordinate system. It is used to represent points, lines, and geometric figures. Each point is referenced by a pair of axes that meet at right angles. The horizontal axis is often called the x-axis and the vertical is often called the y-axis. Consequently, a representative point has x- and y-coordinates. It is written as the ordered pair (x,y). The origin refers to the special location where the axes intersect. It is written (0,0).

Developmentally appropriate is instruction suitable for a specific grade or age.

Efficiently solve problems is the process of solving problems using only those steps necessary using developmentally appropriate expectations.

Elapsed time is the time that has passed since the starting time.

Equivalent forms are different forms of numbers that represent the same quantity (e.g., fraction, decimal, percent as ½ , 0.5, 50%).

Estimation of a quantity is the process of approximating its value. Typically, this process involved informal thinking rather than precise rules. One might estimate the square root of any number to the nearest integer, but one would compute it systematically using a rule for extracting roots. An estimated answer is not intended to be exact.

Expanded form of a number shows that number as a sum of multiple powers of 10. It is typically used to generalize place value. For example: 307.08 has the expanded forms: 3 X 100 + 0 X 10 + 7 X 1 + 0 X 1/10 + 8 X 1/100 and $3 \text{ X } 10^2 + 0 \text{ X } 10^1 + 7 \text{ X } 10^0 + 0 \text{ X } 10^{-1} + 8 \text{ X } 10^{-2}$.

Exponent is a number used to tell how many times a number or variable is used as a factor. When the exponent is a natural number, (2^4), it represents the number of factors represented by the expression (2·2·2·2).

Front end loading is an estimation strategy in which one uses the left most digits to compute an approximate solution.

Function is an association of exactly one object from one set (the range) with each object from another set (the domain).

Geometry in this document refers to two- and three-dimensional Euclidean geometry. Euclidean geometry is a branch of mathematics that deals with the measurement, properties, and relationships of points, lines, and angles, for two- and three-dimensional figures.

Integers are any of the numbers {...–4,–3,–2,–1, 0, 1,2,3,4...}.

Linear function is a function whose graph is a straight line.

Limited success would include making multiple errors that affect understanding.

Manipulatives are tools typically used to represent mathematical concepts. A wide variety of objects, depending on their classroom use, fall into this category. For example, pattern blocks, unifix cubes, Mira Boards, algebra tiles, dice, fraction bars, etc.

Mathematical language is anything that conveys mathematical thoughts or ideas. This includes words, symbols, pictures, graphs, equations, models, etc.

Measures of central tendency are numbers that in some sense communicate the "average" of a set of data. The mean, median, and mode of statistical data are all measures of central tendency.

Minor errors are errors that do not take away from the understanding of the concept.

Model means to make or construct a physical or mathematical representation.

Number sense is an understanding of numbers including number meanings, number relationships, number size, and the relative effect of operations on numbers.

Patterns are regularities in situations such as those in nature, events, shapes, designs, and sets of numbers. For example, spirals on a pineapple, snowflakes, geometric designs on quilts or wallpaper, and number sequences {0, 4, 8, 12, 16…}.

Place value is the value given to a digit by virtue of the place it occupies in the number relative to the units place. This is a critical concept.

Prime number is a counting number that is evenly divisible by only two numbers, the number one and itself. Six is not prime; eleven is a prime number. By agreement, one is neither a prime nor composite (factorable) number.

Probability is the likelihood or chance of an event occurring. A probability is expressed as a fraction between 0 and 1. If an event is certain to occur, it has a probability of 1; if an event is impossible, its probability is 0.

Problem solving situation is the context in which problems are presented that apply mathematics to practical situations.

Proficient performance is exhibited by students who use concepts and skills to solve problems using appropriate strategies and to communicate meaning as required by the standards.

Rational numbers are numbers that can be expressed in the form a/b, where when $a \div b$ the result repeats or terminates with fewer than b digits (e.g., 2/3, 1/5, respectively). Every integer is a rational number, since it can be expressed in the form *a/b*, for example, 5 = 5/1. Rational numbers may be expressed as fractional or decimal numbers, for example, 3/4 or .75. Finite decimals, repeating decimals, and mixed numbers all represent rational numbers.

Real numbers comprise the set of all rational and irrational numbers. Typical numbers would include pi, square root of 2, square root of 3, and the square root of 5 to meet the 11th grade standards.

Real-world problems are quantitative and special problems that arise from a wide variety of human experiences and applications to various careers. These do not have to be highly complex ones and can include such things as making change, figuring sale prices, or comparing payment plans.

Reasonableness is the quality of a solution that it is not extreme or excessive.

Relevant information is information that is pertinent to solving the problem.

Scientific notation is a shorthand way of writing very large or very small numbers. A number expressed in scientific notation is expressed as a decimal number, n, such that $1 \leq n < 10$, multiplied by a power of 10. For example, $4.53 \times 10^3 = 4350$.

Similar figures are polygonal figures whose corresponding angles are equal and whose corresponding sides are in proportion.

Simple problems are single step problems or process memorized problems.

Sound reasoning is a logical solid argument.

Statistics is the branch of mathematics that studies methods of collecting, organizing, and interpreting data. The data are collected on samples from various populations, such as people, animals, or products. A common characteristic of statistical studies is to draw conclusions about large populations by studying small samples of those populations.

Tools and technology include calculator, computer technology, and appropriate manipulatives. It also includes algebraic, geometric, and other mathematical concepts and processes that one uses to solve problems.

Transformational geometry for the purposes of this document includes translations, reflections, rotations, and dilations (scaling).

Understanding is the ability to employ knowledge wisely, fluently, flexibly, and aptly in particular and diverse context.

Variable is a symbol used to represent an unspecified member of some set. In the equation $2x + y = 9$, x and y are variables.

Volume is the measure of the capacity of a three-dimensional figure. Some units for measuring volume are cubic units (cm^3, in^3) or liters, gallons, and bushels.

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Carol Mueller, Goshen #1

Carol Perry, Sheridan #3

Terry Richardson, Natrona #1

Ruth Robbins, Uinta #6

John Russell, Natrona #1

Deb Schmidt, Weston #7

Rhonda Skar, Hot Springs #1

Sue Stevens, Laramie #2

Mike Struiksma, Washakie #1

Ryan Thomas, Uinta #1

Sue Tlustos, Carbon #2

Cynthia Triplett, Big Horn #1

Wendy Tucker, Uinta #4

Anita Troudt, Niobrara #1

Ted Wambeke, Park #6

Steve Weller, Laramie #2

Linda Werbelow, Campbell #1

Bonnie West, Sheridan #2

Judy West, Platte #1

Bonnie Willhelm, Fremont #1

Jim Willis, Big Horn #4

Jane Woods, Weston #1

Mathematics 8th Grade

Judy Adams, Albany #1
Marty Barnum, Natrona #1
Jon Burnham, Hot Springs #1
Alma Courtney, Fremont #2
Kay Dooley, Goshen #1
Barb Ferris, Fremont #25
Ingrid Foust, Fremont #21
Tony Fuller, Platte #1
Renee Gomendi, Fremont #6
Marlitt Halstead, Park #1
Kathy Heigh, Lincoln #1
Matt House, Fremont #38
Ronny Hyde, Lincoln #2
Gordon Knopp, Laramie #1
Jim Krudener, Washakie #2
Mark Kuhlman, Converse #2
Paul Legerski, Sweetwater #1
Judy Ludemann, Weston #
Jane Lynn, Fremont #1
Marv Majeros, Johnson #1
Jim Malin, Washakie #1
Jamie Marak, Niobrara #1
Karen McMillan, Campbell #1

Nancy Merrill, Sheridan #1
David Moore, Teton #1
Cindy Moravek, Fremont #24
Robert Munger, Weston #1
Kirk Norman, Fremont #14
Carol Perry, Sheridan #3
Dennis Publow, Converse #1
Pat Reilly, Crook #1
Terry Richardson, Natrona #1
John Russell, Natrona #1
Elden Sanders, Big Horn #1
Sally Shambaugh, Platte #2
Lynn Snowden, Sheridan #2
Steve Weller, Laramie #2
Rudy Stevens, Uinta #1
Sue Stevens, Laramie #2
Mike Struiksma, Washakie #1
Stan Stryke, Park #6
Andy Trumble, Sweetwater #2
Steve Weller, Laramie #2
Judy West, Platte #1
Bonnie Willhelm, Fremont #1
Jim Witt, Uinta #6

Mathematics 11th Grade

Bill Adkins, Park #6
Kerry Bailey, LCCC
Jennifer Banks, Uinta #4
Judie Blair, Blair Hotels
Bob Bohac, NWCC
Mike Christensen, LCCC
Bob Codner, Uinta #1
Willard Cook, Ford Motor
Lee Corey, CWC
Rick Costello, Sublette #9
Shane Costello, Sublette #1
Anna Denardi, Platte #2
Susan Dewey, Sweetwater #2
Dr. Joe Dolan, CWC
John Ellis, Carbon #2
Lonna Forister, Sheridan #2
Bruce Fritz, Big Horn #4
Jerry Fullmer, Niobrara #1
Renee Gomendi, Fremont #6
Doug Graslie, Johnson #1
Mel Hamburger, LCCC
Tom Hansen, Big Horn #1
Kathy Heigh, Lincoln #1
Julie Her Many Horses, Fremont #14
Kent Hessenthaler, Hot Springs #1
Tim Hoard, Crook #1
Carol Jahn, Campbell #1
Rich Johnson, Fremont #2
Carol Kabeiseman, LCCC
Deb Kellam,
Mike Kitchen, Big Horn #2
Kathy Kjellgren, Sweetwater #1
Lonnie Koch, Big Horn #3
Kerry Kosh, Uinta #6
Tom Kraner, Laramie #1
Jim Krudener, Washakie #2

Warren Lemerich, LCCC
Linda Lieb, Fremont #9
Jerry Loader, Converse #1
Jane Lynn, Fremont #1
Dr. Leslie Madden, Platte #1
Carolyn Manka, Inberg-Miller Engineers
Jim Meachem, Teton #1
Nancy Merrill, Sheridan #1
David Metz, WWC
Thom Miller, Park #1
Ann Murray, LCCC
Rich Peiper, Lincoln #2
Elaine Parks, LCCC
Chuck Perkins, Park #16
Carol Perry, Sheridan #3
Scott Quayle, Fremont #25
Cheryl Raboin
Cindy Reynders, Albany #1
Bill Ruoff, SF Phosphates
Bruce Sinner, Goshen #1
Sue Stevens, Laramie #2
Michelle Stewart, Fremont #14
Mike Struiksma, Washakie #1
Deborah W. Theriault, Western Business
   Resources
Don Vail, Washakie #1
Hanna VanMark, Homesteaders Quilting
Jack Webb, Converse #2
Brett Weaver, Weston #1
Judy West, Platte #1
Bill Wiggins, Carbon #1
Pete Wildman
Bob Willis, Weston #7
Dr. Jerry Winter, NECC
Bob Zent, Fremont #24