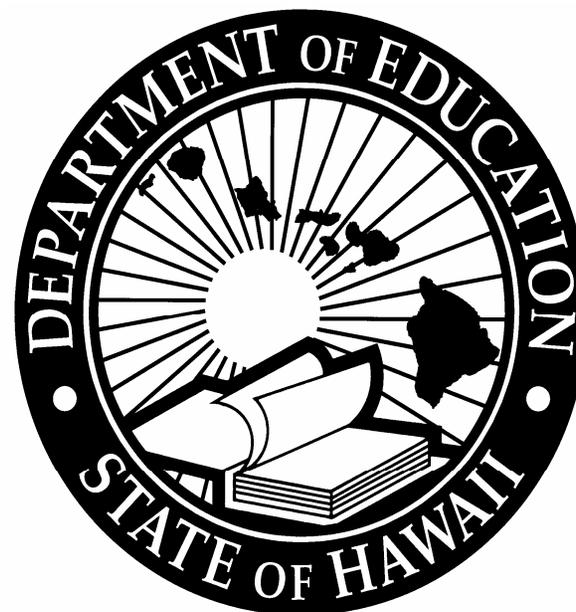# Hawaii Content and Performance Standards

for Mathematics K-12

Office of Curriculum, Instruction and Student Support /
Instructional Services Branch

Department of Education
State of Hawaii

August 2005

THE HAWAII STANDARDS SYSTEM

FOREWORD

The Hawaii Standards System supports standards-based education through curriculum, instruction and assessment components. The Hawaii Standards System supports school level implementation of standards-based education by:

- Identifying the targets for student learning such as the Vision of the Public School Graduate, General Learner Outcomes, the Hawaii Content and Performance Standards III, and other course standards;
- Providing curricular and behavioral support for students through direct services to students and their families; and
- Developing, acquiring, and assuring access to support for implementation of standards-based education for teachers, school leaders, and other academic staff.

An essential component of the Hawaii Standards System is the Hawaii Content and Performance Standards III (HCPS III) document which contains:

- Essential content and skills in *nine* content areas: Career and Technical Education, Fine Arts, Health, Language Arts, Math, Physical Education, Science, Social Studies, and World Languages;
- Standards that describe the educational expectations for ALL students in grades K-5;
- Essential standards for all required courses in the *four core* areas: Language Arts, Math, Science, and Social Studies; and
- Essential standards that can be met through elective courses chosen by secondary students to fulfill graduation requirements in the *five extended core* areas: Career and Technical Education, Fine Arts, Health, Physical Education, and World Languages.

Included in the Hawaii Standards System are standards for courses not found in this HCPS III document. These standards may be found in HCPS II and will be identified in a future version of the Approved Courses and Code Numbers (ACCN) course descriptions. Because ALL courses are standards-based, these specialized courses utilize:

- Industry or national standards that describe essential content and skills for elective courses in areas such as Career and Technical Education and Fine Arts; and
- Content area-specific standards found in HCPS II.

The system also provides student instructional support components such as Special Education and English for Second Language Learners. It also includes student and family support components such as Pihana Na Mamo and Parent Community Network Coordinators.

THE GENERAL LEARNER OUTCOMES

Equally important to learning academic content is developing the knowledge, skills and attitudes that all students need in order to lead full and productive lives. The six General Learner Outcomes serve as the essential, overarching goals for all of the content and performance standards. These Outcomes are

- The ability to be responsible for one's own learning
- The understanding that it is essential for human beings to work together
- The ability to be involved in complex thinking and problem solving
- The ability to recognize and produce quality performance and quality products
- The ability to communicate effectively
- The ability to use a variety of technology effectively and ethically

These Outcomes must be an integral part of teaching and learning and the heart of every Hawaii classroom. Teachers of all subjects in all grades must contribute to the development of the General Learner Outcomes while promoting the learning of subject matter as well.

The real test of the standards is their ability to improve student learning. Raising expectations is but the first step; it's what we do with the standards—how we realize them in all classrooms for all students—that will determine whether we can fulfill the Department's vision of graduating students who

- realize their individual goals and aspirations;
- possess the attitudes, knowledge and skills necessary to contribute positively and compete in a global society;
- exercise the rights and responsibilities of citizenship; and
- pursue post-secondary education and/or careers without need for remediation.

HAWAII CONTENT AND PERFORMANCE STANDARDS III

The publication of the report *A Nation at Risk* (National Commission on Excellence in Education, 1983) served as the impetus for the standards movement in American education. Subsequently national content area organizations developed standards in their respective areas. Nationally, standards serve three general purposes: 1) To clarify expectations for students, 2) To raise those expectations, and 3) To provide common targets that help assure equitable educational expectations, opportunities, and experiences for all students. These three purposes form the foundation of Hawaii's educational standards and standard-based education.

In Hawaii the effort to clarify and implement standards-based education is now in its third generation. The chronology below describes the evolution of the Hawaii Content and Performance Standards.

1991	The Hawaii State Legislature created the Hawaii Commission on Performance Standards. The commission is composed of community members as well as a few DOE staff members. Their mission is to: (1) set the performance standards of achievement expected of all public school students, (2) recommend the means to assess student attainment of these standards, and (3) develop a school-by-school implementation model.
1994	The Commission published the Hawaii Content and Performance Standards (commonly known as the "Blue Book").
1994	The Hawaii State Legislature created the Performance Standards Review Commission (PSRC) to be convened beginning in the 1997-98 school year and every four years thereafter to assess the effectiveness of Hawaii's standards-based education implementation. The Review Commission findings suggested that the number of standards might be unwieldy for teachers to implement and recommended that HCPS be reformatted to be more user friendly.
1998	The booklet "Making Sense of Standards" and the ten content area documents that constituted the HCPS II were the result of the Review Commission's recommendations of 1994
1999	The Council for Basic Education conducted a conference to identify the key issues related to the implementation of the Hawaii Content and Performance Standards in a standards-based system.
2002	The Review Commission was again convened to consider implementation of the standards and to review the quality of the standards themselves.
2003	In response to the Review Commission report and input from the teacher field, the Instructional Services Branch and McREL (Mid-continent Research for Education and Learning) worked to identify *essential* and *desirable* standards, benchmarks, and performance indicators.
2004	The DOE begins refinement of HCPS II. This new standards document will be known as HCPS III.
2005	Between April and August Hawaii Content and Performance Standards III for nine content areas were approved by the Board of Education.
2006-07	Full implementation of HCPS III. HCPS III will be used as the basis of standards-based large-scale assessments, standards-based report cards, and standards-based course descriptions.

GENERAL GUIDELINES AND PRINCIPLES FOR THE DEVELOPMENT
OF THE HAWAII CONTENT AND PERFORMANCE STANDARDS III

PURPOSES OF THE HAWAII CONTENT AND PERFORMANCE STANDARDS III
1. To assure equity by holding all students to the same expectations
2. To help schools improve student performance and meet Annual Yearly Progress
3. To define the content and skills that enable quality student performance
4. To reduce the number of standards to be more manageable and to clearly describe what ALL students should know and be able to do
5. To provide clearer focus on instructional targets by providing basic guidance in determining the quality of student work through benchmark rubrics
6. To provide a clear focus on assessment targets by providing sample performance assessments that can guide more specific assessment tasks at the classroom level

RATIONALE FOR REVISING
Recommendations for the revision of HCPS II came from many sources. As mentioned above, in 2002 the Hawaii State Performance Standards Review Commission cited the following major criticisms of the original HCPS:
- Too many standards
  - HCPS had 1544
  - HCPS II had only 139 standards but 3,960 benchmarks and grade level performance indicators
- Lack of a strong connection between the standards and their purpose—the General Learner Outcomes
- Lack of clarity and coherence in the wording of the standards
- Lack of classroom assessment models or a general plan for assessing the HCPS

Despite the fact that HCPS II reduced the number of standards from 1544 to 139 teachers still felt there were still too many benchmarks and grade level performance indicators to implement at the classroom level. This led to the involvement of the Mid-continent Research for Education and Learning (McREL). McREL is one of ten regional educational laboratories that make up the Regional Educational Laboratory System, which serves education agencies and schools across the nation. McREL staff have done extensive work with standards and are at the forefront of standards-based education. McREL worked with DOE curriculum specialists to:
- Calculate the time required to achieve standards and the identification of essential and desirable standards, benchmarks, and performance indicators. This activity was conducted with teachers in each content area and grade level.
- Consider the time available in the school day was also calculated based on the focus of the grade level cluster (such as developing literacy in the early grades) and the time allowed within required courses at the secondary levels when developing standards and particularly grade level benchmarks.

SPECIFICATIONS FOR HCPS III STANDARDS DEVELOPMENT

The following specifications were followed in the development of HCPS III standards. These principles guided each phase of the process and served to keep the focus on students. McREL staff analyzed the essential HCPS II standards against national and other state standards, and the DOE content specialists worked with teachers to assure the comprehensiveness of the standards. This was particularly important in areas where there were no other documents to use as comparison (such as Hawaiian history or native languages). The following were the guidelines used in developing the HCPS III standards, grade-level benchmarks, sample performance assessments, and rubric statements.

- Essential standards, benchmarks and performance indicators were used as the foundation for the HCPS III standards.
- As the new standards statements were developed, they were also compared against national standards and other highly regarded state's standards.
- Analysis of the standards led to the elimination of overlaps and/or redundancies within and between content areas.
- Consistent grain size (benchmarks that were of approximately the same instructional size)
- Standards, benchmarks, sample performance assessments, and rubrics were written in plain language, understandable to primary audience (teachers) and secondary audiences (students and parents).
- Benchmarks were written as describing "proficient." Attention was paid to the taxonomic level of the benchmarks so that they would appropriately scaffold and challenge students.
- Implementable—The benchmarks were written with consideration of the delivery of instruction (integrated elementary curriculum, required and elective courses at the secondary level)
- Benchmarks and sample performance assessments were written to be measurable through the examination of student work from which valid inferences about student learning could be made

HCPS III: STANDARDS FOR ALL STUDENTS

The Hawaii Content and Performance Standards III describe educational targets in all nine content areas for ALL students in grades K-5. All students, therefore, are expected to be given the opportunity to meet all of the K-5 HCPS III standards. At the secondary level, however, the standards describe different things in different content areas. For the four CORE content areas (Language Arts, Mathematics, Science and Social Studies) the standards describe expectations for all students, since all students are expected to take certain required courses in these areas. For the *extended core* (Health, Physical Education, Fine Arts, World Languages, and Career and Technical Education) they describe a continuum that should be expected by students who choose courses in these areas as electives. It should be emphasized that ALL courses, required or elective, are standards-based and are part of the *Hawaii Standards System*.

CHARACTERISTICS OF GRADES K-2: ACQUIRING THE FOUNDATIONAL SKILLS

In the primary grades (K-2) the standards identify foundational content and skills. Instruction supports the acquisition of these very important skills, knowledge, and content. Children at these grade levels should be exposed to meaningful activities that support language and vocabulary development. Scaffolding learning is essential. Creating many varied opportunities to learn, practice and demonstrate skills is the focus of early elementary education. Teaching is structured and learning takes place in a more controlled, systematic context. As they learn and mature, children become increasing independent of the teacher.

CHARACTERISTICS OF GRADES 3-5 STANDARDS: BUILDING UPON FOUNDATIONAL SKILLS AND KNOWLEDGE

At the upper elementary levels (grades 3-5) curriculum focuses on refining, broadening, enhancing, and applying skills and knowledge in more challenging and varied contexts. Students use the foundational skills, processes, and knowledge they gained in their early elementary experience to extend and apply in all the nine content areas.

CHARACTERISTICS OF GRADES 6-8 STANDARDS: EXPLORING AND DEVELOPING INTERESTS

At the middle school level standards are designed to allow students to explore a variety of content and skills. This exploration can serve to focus curricular choices students make at the high school and post-secondary levels. There is an emphasis on refining and applying skills to more challenging and varied content. Higher order thinking and the development of civic mindedness is supported though the curriculum as guided by the standards. Students are encouraged to explore specialized content through world languages, art, or music and to use increasingly sophisticated means of communicating their learning through various computer applications.

CHARACTERISTICS OF GRADES 9-12 STANDARDS: PREPARING FOR POST-SECONDARY CHOICES

Standards at the high school level prepare students to apply their learning in their post-secondary choices. They allow students to develop skills that will ensure their success in their adult lives including their participation in the larger global society. HCPS III standards of the CORE content areas (Language Arts, Math, Science, and Social Studies) describe the minimal content of courses that fulfill graduation requirements. HCPS III standards

of the Extended Core (Career and Technical Education, Fine Arts, Health, Physical Education, and World Languages) describe essential standards that can be fulfilled through elective courses of study. As students make elective course choices, they experience a well-rounded educational experience. HCPS Course Standards (to be described in another document) describe courses that some students may elect to take. These courses contain standards that allow students to develop knowledge and skills related to their interests, their talents, their post-secondary and/or career plans.

ORGANIZATION OF THE STANDARDS (GENERAL DESCRIPTION)

HCPS III standards are organized in a similar way for all nine content areas. Some of the content areas continue to organize their standards in grade level clusters. This is because, for content areas such as Physical Education, it is more developmentally appropriate to allow several years to achieve the benchmark, rather than to artificially break up physical skills into too discrete pieces that do not make sense instructionally. HCPS III are organized by and contain:

Strand=themes or "Big Ideas" that organize standards
Standard = a broad statement of what a student needs to know or be able to do
Topic = organizes the benchmarks into related ideas
Benchmark = a specific statement of what a student should know or be able to do (related to the topic) at a specific grade level or grade level cluster
Sample Performance Assessment = a generalized description of how a student might demonstrate significant aspects of the benchmark

The statement "No benchmark at this level" indicates that a grade level benchmark could not be created because it was either developmentally or instructionally inappropriate. The grade level/discipline at which a benchmark appears is where it may be assessed, but it is NOT the only grade level/discipline at which it should be taught. It is assumed, for example, that once content or a skill is taught it is reinforced and further developed in subsequent years. Benchmarks are not repeated.

THE STANDARDS NUMBERING SYSTEM

Each benchmark is assigned a code as an aid to identify quickly its place in relation to the entire document, and as a placeholder for database purposes. By convention, the code consists of three positions, each separated by a decimal point: E.g., **K.3.1**

Example: K.3.1

K.3.1 = Grade Level (Kindergarten) Clusters as appropriate (e.g., K-2.3.1)

K.**3**.1 = Content Standard Number (Standard #3)

K.3.**1** = Benchmark Number (1st listed benchmark)

Example: PS.7.3

PS.7.3 = Course Abbreviation (Physical Science)

PS.**7**.3 = Content Standard Number (Standard #7)

PS.7.**3** = Benchmark Number (3rd listed benchmark)

With the release of HCPS III, we continue the important journey begun a decade ago: to assure a quality education for every student in our public schools. This challenging task requires that we re-examine teaching and learning, that we reconsider curriculum, assessment, and instruction. To succeed in this task, we must implement HCPS III with both rigor and relevance, always keeping our ultimate goal firmly in mind: to improve student understanding.

MATHEMATICS INTRODUCTION

Our goal for mathematics education: **Mathematical Proficiency for ALL Students**

WHAT IS *MATHEMATICAL PROFICIENCY*?

Mathematical proficiency has five interwoven and interdependent components:

1. *Conceptual understanding*: Comprehending mathematical concepts, operations, and relations—knowing what mathematical symbols, diagrams, and procedures mean.

2. *Procedural fluency*: Carrying out mathematical procedures (such as adding, subtracting, multiplying, and dividing numbers) flexibly, accurately, efficiently, and appropriately.

3. *Strategic competence*: Being able to formulate problems mathematically and to devise strategies for representing and solving them using concepts and procedures appropriately.

4. *Adaptive reasoning*: Having the capacity for logical thought, reflection, explanation, and justification; using logic to explain and justify a solution to a problem or to extend from something known to something not yet known.

5. *Productive disposition*: Seeing mathematics as sensible, useful, doable, and worthwhile, coupled with a belief in diligence and one's own efficacy.

For all students to achieve success in learning mathematics, the five components must be developed concurrently, and not one at a time. For example, to develop procedural fluency without the other four components means that students are just performing procedures without understanding how or why they work and in what context they would apply this procedure; while these students may be able to perform the procedures for the moment, they lack the understanding to apply or adapt this skill to new situations.

At the same time the five components of mathematical proficiency are addressed, students will be simultaneously engaging the National Council of Teachers of Mathematics (NCTM) process standards, as well as the General Learner Outcomes (see table below). The process standards and the General Learner Outcomes were introduced in HCPS II, and continue to be emphasized in HCPS III, along with the components of mathematical proficiency. All three are linked together, and serve as the heart of standards-based mathematics instruction throughout all grade levels and mathematics courses.

Components of Mathematical Proficiency	The NCTM Process Standards	General Learner Outcomes
Conceptual understanding	• Communication	1. Self-Directed Learner
Procedural fluency	• Representation	2. Community Contributor
Strategic competence	• Reasoning and Proof	3. Complex Thinker
Adaptive reasoning	• Making Connections	4. Quality Producer
Productive disposition	• Problem Solving	5. Effective Communicator
		6. Effective and Ethical User of Technology

HOW DOES THE HAWAII CONTENT AND PERFORMANCE STANDARDS III (HCPS III) MATHEMATICS STANDARDS HELP TO DEVELOP *MATHEMATICAL PROFICIENCY* IN ALL STUDENTS?

The HCPS III Mathematics Standards identifies fourteen *content standards* that are broad statements of what students are expected to know and be able to do by the end of 12th grade. To help students develop proficiency of these content standards over time, grade-level and course *benchmarks* provide yearly targets for which students are expected to demonstrate proficiency. Each year students are in school, they ought to become increasingly proficient with both old and new content.

While the mathematics standards tell **what** all students across the state should know and be able to do, these standards alone are not the curriculum. The standards, however, are used to help teachers and schools design their curriculum, select appropriate materials and tools, and implement strategies that will help students meet proficiency.

With thoughtful planning and careful execution of a curriculum based on the HCPS III Mathematics Standards, teaching for proficiency also depends in large part on the instruction students receive. When planning for instruction, teachers must ask:
- What activities and materials can help students achieve the goals for the lesson?
- What knowledge do students bring with them to this lesson?
- How will students' understanding in this lesson build upon past lessons and set the stage for future lessons?
- How will this lesson help students develop and integrate the components of mathematical proficiency (and the NCTM process standards and Hawaii's General Learner Outcomes)?
- What informal and formal assessments will help to track students' progress and identify areas in which they need more support?

ABOUT THE MATHEMATICS STANDARDS

The expectations of what students should know and be able to do are stated as grade-level or course *benchmarks* and are organized in fourteen content standards under five content strands (see At-A-Glance). The nouns within a benchmark often indicate the content knowledge that is being developed. The verbs, which are equally important, tell what the students are expected to do with the content, and often allude to one or more of the five NCTM process standards that are incorporated within the benchmark.

There are several similarities between the HCPS II and III mathematics standards. Both sets of standards contain the same five content strands (Number and Operations; Measurement; Geometry and Spatial Sense; Patterns, Functions and Algebra; and Data Analysis, Statistics and Probability) and the same fourteen content standards (see At-A-Glance). In addition, both sets of standards incorporate the process standards within the benchmarks. The difference, and the biggest improvement, between HCPS II and III is in the organization of the benchmarks. In the refinement process for developing HCPS III, particular attention was paid to assuring that grade-level benchmarks were vertically aligned, meaning that the expectations of one grade-level built up the previous grade-levels, thus eliminating some of the redundancies that occurred in HCPS II. So over time, students are developing mathematical proficiency as they integrate prior knowledge with new concepts and skills.

MATHEMATICS PHILOSOPHY

We believe in the following principles set forth by the National Council of Teachers of Mathematics:

- *Equity*. Excellence in mathematics education requires equity—high expectations and strong support for all students.
- *Curriculum*. A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across grades.
- *Teaching*. Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.
- *Learning*. Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.
- *Assessment*. Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.
- *Technology*. Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.

THE HAWAII STATE ASSESSMENT FOR MATHEMATICS

The Hawaii State Assessment (HSA) for Mathematics tests students' understanding of the standards at the end of grades 3, 4, 5, 6, 7, 8, and 10. The HSA not only assesses proficiency in knowledge and skills, students must be adept in demonstrating the process standards, especially since the constructed-response items require students to solve problems, communicate a response in writing, provide sufficient explanations to justify the response, and support the response with appropriate representations (e.g., diagrams, pictures, graphs). The grade 10 test assesses proficiency of the Pre-algebra and Algebra I standards.

HCPS III MATHEMATICS (GRADES K TO 8):
GRADE LEVEL BENCHMARK COUNTS BY STANDARDS

Strand	Content Standards	Gr. K	Gr. 1	Gr. 2	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8
Number and Operations	**Standard 1:** NUMBER SENSE	2	3	3	4	3	3	2	4	3
	Standard 2: OPERATION SENSE	2	1	3	4	3	2	2	3	2
	Standard 3: COMPUTATION STRATEGIES	1	2	3	3	5	2	2	2	2
Measurement	**Standard 4:** FLUENCY WITH MEASUREMENT	4	4	6	6	5	6	3	3	4
Geometry and Spatial Sense	**Standard 5:** PROPERTIES AND RELATIONSHIPS	1	2	1	2	4	3	2	1	1
	Standard 6: TRANSFORMATIONS AND SYMMETRY	1	1	2	3	2	2	1	1	2
	Standard 7: VISUAL AND SPATIAL SENSE	0	0	0	0	1	1	2	0	1
	Standard 8: REPRESENTATIONAL SYSTEMS	1	1	1	1	1	1	2	1	1
Patterns, Functions and Algebra	**Standard 9:** PATTERNS AND FUNCTIONAL RELATIONSHIPS	1	1	3	3	2	2	2	2	3
	Standard 10: SYMBOLIC REPRESENTATION	1	1	1	2	3	3	3	3	4
Data Analysis, Statistics and Probability	**Standard 11:** FLUENCY WITH DATA	1	1	1	2	2	2	1	1	2
	Standard 12: STATISTICS	0	1	1	1	2	2	2	1	2
	Standard 13: DATA ANALYSIS	0	0	0	1	1	1	1	1	1
	Standard 14: PROBABILITY	0	0	0	1	1	2	1	1	1
TOTAL		**15**	**18**	**25**	**33**	**35**	**32**	**26**	**24**	**29**

HCPS III MATHEMATICS (GRADES K TO 8):
GRADE LEVEL BENCHMARK COUNTS BY STANDARDS

Strand	Content Standards	Pre-Alg	Alg I	Alg II	Geom	Trig	Anlyt Geom	Prob	Stat	Calc
Number and Operations	**Standard 1: NUMBER SENSE**	3	1	1	1	1	0	0	0	0
	Standard 2: OPERATION SENSE	2	0	2	0	1	1	0	0	0
	Standard 3: COMPUTATION STRATEGIES	3	3	1	1	1	0	0	0	0
Measurement	**Standard 4: FLUENCY WITH MEASUREMENT**	5	1	1	3	1	0	0	0	0
Geometry and Spatial Sense	**Standard 5: PROPERTIES AND RELATIONSHIPS**	2	0	0	6	8	0	0	0	0
	Standard 6: TRANSFORMATIONS AND SYMMETRY	3	0	0	1	0	0	0	0	0
	Standard 7: VISUAL AND SPATIAL SENSE	1	0	0	2	0	1	0	0	0
	Standard 8: REPRESENTATIONAL SYSTEMS	1	2	0	2	0	4	0	0	0
Patterns, Functions and Algebra	**Standard 9: PATTERNS AND FUNCTIONAL RELATIONSHIPS**	3	4	7	0	3	4	0	0	8
	Standard 10: SYMBOLIC REPRESENTATION	4	9	10	0	0	6	0	0	11
Data Analysis, Statistics and Probability	**Standard 11: FLUENCY WITH DATA**	2	0	0	0	0	0	0	6	0
	Standard 12: STATISTICS	2	2	1	0	0	0	0	4	0
	Standard 13: DATA ANALYSIS	1	0	0	0	0	0	0	2	0
	Standard 14: PROBABILITY	3	0	2	0	0	0	8	0	0
	TOTAL	**35**	**22**	**25**	**16**	**15**	**16**	**8**	**12**	**19**

HCPS III and II Mathematics Comparison

HCPS III	HCPS II
Standard 1: NUMBER SENSE Understand numbers, ways of representing numbers, relationships among numbers, and number systems	
Standard 2: OPERATION SENSE Understand the meaning of operations and how they relate to each other	
Standard 3: COMPUTATION STRATEGIES Use computational tools and strategies fluently and, when appropriate, use estimation	
Standard 4: FLUENCY WITH MEASUREMENT Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring	
Standard 5: PROPERTIES AND RELATIONSHIPS Analyze properties of objects and relationships among the properties	
Standard 6: TRANSFORMATIONS AND SYMMETRY Use transformations and symmetry to analyze mathematical situations	
Standard 7: VISUAL AND SPATIAL SENSE Use visualization and spatial reasoning to solve problems both within and outside of mathematics	**Content Standards in HCPS III remain the same as in HCPS II.**
Standard 8: REPRESENTATIONAL SYSTEMS Select and use different representational systems, including coordinate geometry	
Standard 9: PATTERNS AND FUNCTIONAL RELATIONSHIPS Understand various types of patterns and functional relationships	
Standard 10: SYMBOLIC REPRESENTATION Use symbolic forms to represent, model, and analyze mathematical situations	
Standard 11: FLUENCY WITH DATA Pose questions and collect, organize, and represent data to answer those questions	
Standard 12: STATISTICS Interpret data using methods of exploratory data analysis	
Standard 13: DATA ANALYSIS Develop and evaluate inferences, predictions, and arguments that are based on data	
Standard 14: PROBABILITY Understand and apply basic notions of chance and probability	

MATHEMATICS STANDARDS AT-A-GLANCE

STRAND	STANDARDS	• TOPICS
NUMBER AND OPERATIONS	**Standard 1: NUMBER SENSE** Understand numbers, ways of representing numbers, relationships among numbers, and number systems	• Numbers and Number Systems • Vectors
	Standard 2: OPERATION SENSE Understand the meaning of operations and how they relate to each other	• Operations • Operation Properties
	Standard 3: COMPUTATION STRATEGIES Use computational tools and strategies fluently and, when appropriate, use estimation	• Computational Fluency • Estimation • Vectors
MEASURE-MENT	**Standard 4: FLUENCY WITH MEASUREMENT** Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring	• Measurement Attributes and Units • Measurement Tools and Techniques • Measurement Formulas
GEOMETRY AND SPATIAL SENSE	**Standard 5: PROPERTIES AND RELATIONSHIPS** Analyze properties of objects and relationships among the properties	• Geometric Shapes and Their Properties and Relationships
	Standard 6: TRANSFORMATIONS AND SYMMETRY Use transformations and symmetry to analyze mathematical situations	• Transformation • Symmetry
	Standard 7: VISUAL AND SPATIAL SENSE Use visualization and spatial reasoning to solve problems both within and outside of mathematics	• Visualization and Spatial Reasoning • Geometric Modeling
	Standard 8: REPRESENTATIONAL SYSTEMS Select and use different representational systems, including coordinate geometry	• Coordinate Geometry
PATTERNS, FUNCTIONS, AND ALGEBRA	**Standard 9: PATTERNS AND FUNCTIONAL RELATIONSHIPS** Understand various types of patterns and functional relationships	• Patterns • Function
	Standard 10: SYMBOLIC REPRESENTATION Use symbolic forms to represent, model, and analyze mathematical situations	• Numeric and Algebraic Representations • Rates of Change

STRAND	STANDARDS	• TOPICS
DATA ANALYSIS, STATISTICS, AND PROBABILITY	**Standard 11: FLUENCY WITH DATA** Pose questions and collect, organize, and represent data to answer those questions	• Data Collection and Representations • Data Collection and Display
	Standard 12: STATISTICS Interpret data using methods of exploratory data analysis	• Data Interpretation
	Standard 13: DATA ANALYSIS Develop and evaluate inferences, predictions, and arguments that are based on data	• Predictions and Inferences
	Standard 14: PROBABILITY Understand and apply basic notions of chance and probability	• Probability

Summary of Standards for Mathematics, Kindergarten – 12th Grade

NUMBERS AND OPERATIONS

Standard 1: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

Standard 2: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

Standard 3: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

MEASUREMENT

Standard 4: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

GEOMETRY AND SPATIAL SENSE

Standard 5: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

Standard 6: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

Standard 7: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

Standard 8: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

PATTERNS, FUNCTIONS, AND ALGEBRA

Standard 9: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

Standard 10: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

DATA ANALYSIS, STATISTICS, AND PROBABILITY

Standard 11: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

Standard 12: STATISTICS—Interpret data using methods of exploratory data analysis

Standard 13: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

Standard 14: PROBABILITY—Understand and apply basic notions of chance and probability

Kindergarten

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.K.1.1 Count and compare groups of objects up to 30 according to the number of objects in each group	The student: Counts the number of objects in one group and the number of objects in a second group and indicates which group has more.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Count and compare groups of objects up to 30 according to the number of objects in each group, with accuracy	Count and compare groups of objects up to 30 according to the number of objects in each group, with no significant errors	Count and compare groups of objects up to 30 according to the number of objects in each group, with a few significant errors	Count and compare groups of objects up to 30 according to the number of objects in each group, with many significant errors
NUMBERS AND NUMBER SYSTEMS	MA.K.1.2 Represent whole numbers up to 30 in flexible ways (e.g., relating, composing, and decomposing numbers)	The student: Demonstrates a variety of ways that a number can be represented.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent whole numbers up to 30 in a variety of ways, using different forms of representation	Represent whole numbers up to 30 in a variety of ways, with no significant errors	Represent whole numbers up to 30 in one way, with no significant errors	Represent whole numbers up to 30 in one way, with significant errors

Kindergarten

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.K.2.1 Demonstrate addition as "putting together" or "combining sets"		The student: Counts the objects in each of two groups, combines the two sets of objects, and recounts the new group.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate addition as "putting together" or "combining sets" and determine the total, with accuracy	Demonstrate addition as "putting together" or "combining sets" and determine the total, with no significant errors	Demonstrate addition as "putting together" or "combining sets" and determine the total, with a few significant errors	Have difficulty demonstrating addition as "putting together" or "combining sets" and are unable to determine the total
OPERATIONS	MA.K.2.2 Demonstrate subtraction as "taking away," "separating sets," or "counting back"		The student: Removes some objects from a set, then recounts the remaining objects or counts backwards as each object is removed.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate subtraction as "taking away," "separating sets," or "counting back" and determine the difference, with accuracy	Demonstrate subtraction as "taking away," "separating sets," or "counting back" and determine the difference, with no significant errors	Demonstrate subtraction as "taking away," "separating sets," or "counting back" and determine the difference, with a few significant errors	Have difficulty demonstrating subtraction as "taking away," "separating sets," or "counting back" and are unable to determine the difference

Kindergarten

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.3.1 Use a variety of strategies (e.g., objects, fingers) to add and subtract single-digit whole numbers		The student: Shows how to add (or subtract) whole numbers using one strategy, then shows how to add (or subtract) using another method.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a variety of strategies to add and subtract single-digit whole numbers, with accuracy	Use a variety of strategies to add and subtract single-digit whole numbers, with no significant errors	Use a variety of strategies to add and subtract single-digit whole numbers, with a few significant errors	Use a variety of strategies to add and subtract single-digit whole numbers, with many significant errors

Kindergarten

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.K.4.1 Compare and order objects according to length, weight, capacity, area, and volume		The student: Compares objects, physically or virtually, to each other (e.g., places two objects side-by-side to determine which is longer; picks up two objects to determine which is heavier; fills a liquid from one container to another to determine which one has more capacity).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use and describe an appropriate method to compare and order objects according to length, weight, capacity, area, and volume, with accuracy	Compare and order objects according to length, weight, capacity, area, and volume, with no significant errors	Compare and order objects according to length, weight, capacity, area, and volume, with a few significant errors	Use an inappropriate method to compare and order objects according to length, weight, capacity, area, and volume
MEASUREMENT ATTRIBUTES AND UNITS	MA.K.4.2 Identify the value of pennies, nickels, and dimes and the equivalence among them (e.g., 5 pennies = 1 nickel)		The student: Chooses the correct coin(s) that is worth a given amount (e.g., "Which coin(s) is worth ten cents?").	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify the value of pennies, nickels, and dimes, and the equivalence among them, with accuracy	Identify the value of pennies, nickels, and dimes, and the equivalence among them, with no significant errors	Identify the value of pennies, nickels, and dimes, and the equivalence among them, with a few significant errors	Identify the value of pennies, nickels, and dimes, and the equivalence among them, with many significant errors

Kindergarten

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.K.4.3 Tell time to the hour		The student: Tells the time on an analog clock and on a digital clock when it displays a time on the hour.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently tell time to the hour correctly and explain how to tell time to the hour	Usually tell time to the hour correctly	Sometimes tell time to the hour correctly	Rarely tell time to the hour correctly
MEASUREMENT TOOLS AND TECHNIQUES	MA.K.4.4 Identify tools used to measure time (i.e., digital and analog clock, calendar)		The student: Chooses the correct tool when asked for a time-related measurement (e.g., points to the calendar when asked "Where would you be able to find what day it is?").	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently identify appropriate tools to measure time and describe what the tools measure	Usually identify appropriate tools to measure time	Sometimes identify appropriate tools to measure time	Rarely identify appropriate tools to measure time

Kindergarten

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.K.5.1 Identify common geometric shapes (e.g., circle, square, rectangle, triangle)		The student: Names the shapes in pictures (e.g., circles, rectangles, squares, triangles).
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently identify common geometric shapes and describe the shapes	Usually identify common geometric shapes	Sometimes identify common geometric shapes	Rarely identify common geometric shapes

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
TRANSFORMATION	MA.K.6.1 Use slides, flips, and turns to solve puzzles		The student: Puts together puzzles that require slides, flips, and turns.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use slides, flips, and turns to solve puzzles, with accuracy	Use slides, flips, and turns to solve puzzles, with no significant errors	Use slides, flips, and turns to solve puzzles, with a few significant errors	Use slides, flips, and turns to solve puzzles, with many significant errors

Kindergarten

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.K.8.1 Use positional words to describe an object's location (e.g., *up*, *down*, *above*, *under*, *inside*, *outside*)	The student: Describes a certain object's location in the class.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use a combination of positional words that are easy to follow to describe an object's location	Use positional words to describe an object's location	Use positional words that are difficult to follow to describe an object's location	Use positional words that inaccurately describe an object's location

Kindergarten

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.K.9.1 Demonstrate repeating patterns involving shapes, objects, sounds, and movements		The student: Copies a pattern (e.g., clap, clap, stomp pattern) that the teacher begins.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate repeating patterns involving shapes, objects, sounds, and movements, with accuracy	Demonstrate repeating patterns involving shapes, objects, sounds, and movements, with no significant errors	Demonstrate repeating patterns involving shapes, objects, sounds, and movements, with a few significant errors	Demonstrate repeating patterns involving shapes, objects, sounds, and movements, with many significant errors

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.K.10.1 Represent simple numerical situations with objects and number sentences		The student: Demonstrates a situation involving addition by using manipulatives and writing a number sentence.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent simple numerical situations with objects and number sentences, with accuracy	Represent simple numerical situations with objects and number sentences, with no significant errors	Represent simple numerical situations with either objects or number sentences, but not both	Have difficulty representing simple numerical situations with objects or number sentences

Kindergarten

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK	PERFORMANCE INDICATOR
DATA COLLECTION AND REPRESENTATION	MA.K.11.1 Sort objects or people according to stated attributes	The student: Selects an attribute and sorts a set of objects or people into separate groups according to the attribute (e.g., puts students wearing shoes in one group and students wearing slippers in another group).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Select attributes by which to sort objects or people, then sort the objects or people accordingly, with accuracy	Sort objects or people according to stated attributes, with no significant errors	Sort objects or people according to stated attributes, with a few significant errors	Sort objects or people according to stated attributes, with many significant errors

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Kindergarten

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Grade 1

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.1.1.1 Count whole numbers up to 100 in a variety of ways (e.g., skip counts by 2's, 5's, 10's)	The student: Counts out a certain number of objects in more than one way (e.g., puts 55 beads into groups of 5 and skip counts by 5).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Count whole numbers up to 100 in a variety of ways and selectively use strategies depending on the situation	Count whole numbers up to 100 in a variety of ways, with no significant errors	Count whole numbers up to 100 in a variety of ways, with a few significant errors	Have difficulty counting whole numbers up to 100 in a variety of ways

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.1.1.2 Identify representations of simple fractions (e.g., one-half, one-third, one fourth)	The student: Names the fraction that matches a picture that represents the fraction.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Consistently identify representations of simple fractions and provide representations of common fractions	Usually identify representations of simple fractions	Sometimes identify representations of simple fractions	Rarely identify representations of simple fractions

Grade 1

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.1.1.3 Represent whole numbers up to 100 in flexible ways (e.g., relating, composing, and decomposing numbers), including the use of tens as a unit		The student: Represents a two-digit number (e.g., 67) with different configurations of tens and ones units.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Accurately represent whole numbers up to 100 in a variety of ways and using different forms of representation, including the use of tens as a unit	Represent whole numbers up to 100 in a variety of ways, including the use of tens as a unit, with no significant errors	Represent whole numbers up to 100 in a variety of ways, including the use of tens as a unit, with a few significant errors	Have difficulty representing whole numbers up to 100 in a variety of ways, including the use of tens as a unit

Grade 1

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.1.2.1 Demonstrate that addition and subtraction of whole numbers can undo each other		The student: Shows how to get back to the original number of objects in a given set after a number of objects have been added to the set or taken away from the set.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate and explain how addition and subtraction of whole numbers can undo each other, with accuracy	Demonstrate that addition and subtraction of whole numbers can undo each other, with no significant errors	Demonstrate that addition and subtraction of whole numbers can undo each other, with a few significant errors	Have difficulty demonstrating that addition and subtraction of whole numbers can undo each other

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
COMPUTATIONAL FLUENCY	MA.1.3.1 Recall single-digit addition facts		The student: States memorized single-digit addition facts.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Recall single-digit addition facts, with accuracy	Recall single-digit addition facts, with no significant errors	Recall single-digit addition facts, with a few significant errors	Recall single-digit addition facts, with many significant errors

Grade 1

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.1.3.2 Use a variety of strategies to solve number problems involving addition and subtraction (e.g., comparing sets, counting on, counting backwards, doubles, doubles plus one)		The student: Shows how to add (or subtract) whole numbers using one strategy, then shows how to add (or subtract) using another method.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a variety of strategies to solve number problems involving addition and subtraction, with accuracy	Use a variety of strategies to solve number problems involving addition and subtraction, with no significant errors	Use a variety of strategies to solve number problems involving addition and subtraction, with a few significant errors	Use a variety of strategies to solve number problems involving addition and subtraction, with many significant errors

Grade 1

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT ATTRIBUTES AND UNITS	MA.1.4.1 Measure with multiple copies of standard (e.g., inch tiles, foot-long lengths of string) or non-standard (e.g., paper clips, pencils) units of the same size	The student: Reports how many of the same unit (standard or non-standard) it takes to span the length of an object.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Carefully measure with multiple copies of standard or non-standard units of the same size (avoiding gaps and overlaps), with accuracy	Measure with multiple copies of standard or non-standard units of the same size, with no significant errors	Measure with multiple copies of standard or non-standard units of the same size, with a few significant errors	Measure with multiple copies of standard or non-standard units of the same size, with many significant errors

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT ATTRIBUTES AND UNITS	MA.1.4.2 Identify the value of coins and count coin combinations (using like coins) to a dollar	The student: Counts the value of a pile of like coins (e.g., skip counts by fives to determine the value of 6 nickels as 30 cents).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Identify the value of coins and count coin combinations (using like coins) to a dollar, with accuracy	Identify the value of coins and count coin combinations (using like coins) to a dollar, with no significant errors	Identify the value of coins and count coin combinations (using like coins) to a dollar, with a few significant errors	Identify the value of coins and count coin combinations (using like coins) to a dollar, with many significant errors

Grade 1

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.1.4.3 Tell time to the half-hour and quarter-hour		The student: States the time on an analog clock and on a digital clock when it displays a time to the half-hour or quarter-hour.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently tell time to the half-hour and quarter-hour and explain how to tell time to the half-hour and quarter-hour	Usually tell time to the half-hour and quarter-hour	Sometimes tell time to the half-hour and quarter-hour	Rarely tell time to the half-hour and quarter-hour
MEASUREMENT TOOLS AND TECHNIQUES	MA.1.4.4 Identify measurement tools that could be used to measure length, capacity, and weight		The student: Identifies the appropriate tool to measure an object (e.g., chooses the picture of a scale when asked what he or she could use to weigh a watermelon).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify appropriate measurement tools to measure length, capacity, and weight, and describe how the tools are used	Identify appropriate measurement tools to measure length, capacity, and weight	Recognize which attribute (length, capacity, or weight) a measurement tool is designed to measure	Have difficulty recognizing which attribute (length, capacity, or weight) a measurement tool is designed to measure

Grade 1

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.1.5.1 Identify basic three-dimensional geometric solids (e.g., cube, sphere, rectangular prism)		The student: Gives the appropriate name when shown a geometric solid (e.g., cube, sphere, rectangular prism).
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Consistently identify basic three-dimensional geometric solids and describe the solids	Usually identify basic three-dimensional geometric solids	Sometimes identify basic three-dimensional geometric solids	Rarely identify basic three-dimensional geometric solids
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.1.5.2 Identify attributes and parts of common two- and three-dimensional shapes		The student: Identifies the attributes of a three-dimensional solid (e.g., number of faces, shapes of the faces).
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Identify attributes and parts of common two- and three-dimensional shapes, with accuracy	Identify attributes and parts of common two- and three-dimensional shapes, with no significant errors	Identify attributes and parts of common two- and three-dimensional shapes, with a few significant errors	Identify attributes and parts of common two- and three-dimensional shapes, with many significant errors

Grade 1

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
SYMMETRY	MA.1.6.1 Identify symmetrical shapes found in the real world	The student: Finds a symmetrical shape in the classroom and says why it is symmetrical.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Consistently identify symmetrical shapes found in the real world and explain why the shapes are symmetrical	Usually identify symmetrical shapes found in the real world	Sometimes identify symmetrical shapes found in the real world	Rarely identify symmetrical shapes found in the real world

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Grade 1

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COORDINATE GEOMETRY	MA.1.8.1 Use directional words to locate an object or place (e.g., *left*, *right*, *near*, *far*)		The student: Gives a set of directions to get from one location to another in the classroom.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a combination of directional words that makes it easy to locate an object or place	Use directional words to locate an object or place	Use directional words that are generally correct, but not enough to locate an object or place	Use directional words that lead away from locating an object or place

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.1.9.1 Extend, create, and describe repeating patterns		The student: Represents a repeating pattern with shapes, objects, sounds, or movement and states what generates the repeating pattern.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Extend, create, and describe repeating patterns, with accuracy	Extend, create, and describe repeating patterns, with no significant errors	Extend, create, and describe repeating patterns, with a few significant errors	Extend, create, and describe repeating patterns, with many significant errors

Grade 1

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.1.10.1 Use objects, pictures, words, and number sentences to represent and solve numerical problem situations involving addition and subtraction	The student: Reads a story/problem that involves addition (or subtraction), represents the situation with a picture or model, writes a number sentence for the picture or model, and states the solution to the problem.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use appropriate objects/pictures, clear and descriptive words, and accurate number sentences to represent and solve numerical problem situations involving addition and subtraction	Use objects, pictures, words, and number sentences to represent and solve numerical problem situations involving addition and subtraction, with no significant errors	Use objects, pictures, words, and number sentences to represent and solve numerical problem situations involving addition and subtraction, with a few significant errors	Use objects, pictures, words, and number sentences to represent and solve numerical problem situations involving addition and subtraction, with many significant errors

Grade 1

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions			
TOPIC	**BENCHMARK**		**PERFORMANCE INDICATOR**
DATA COLLECTION AND REPRESENTATION	MA.1.11.1 Collect and organize information using concrete objects and pictures		The student: Collects data about a group of people, organizes the data according to a stated attribute, and represents the sorted data with objects or pictures (e.g., draws a happy face to represent each student who likes carrots and draws a sad faces to represent each student who doesn't like carrots).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Collect and organize information using concrete objects and pictures, with accuracy	Collect and organize information using concrete objects and pictures, with no significant errors	Collect and organize information using concrete objects and pictures, with a few significant errors	Collect and organize information using concrete objects and pictures, with many significant errors

Grade 1

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis				
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA INTERPRETATION	MA.1.12.1 Interpret data using simple language (e.g., *more, less, fewer, equal*)		The student: Compares two groups of objects/people that are sorted by a certain attribute and makes a comparative statement (e.g., there are more students that like play sports than don't play sports).	
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Provide an accurate and insightful interpretation of the data	Interpret data using appropriate language, with no significant errors	Interpret data using appropriate language, with some significant errors	Unable to interpret data using appropriate language

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Grade 2

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.2.1.1 Represent whole numbers up to 1000 in flexible ways (e.g., relating, composing, and decomposing numbers), including the use of tens and hundreds as units	The student: Represents a three-digit number (e.g., 416) with different configurations of hundreds, tens, and ones units.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Accurately represent whole numbers up to 1000 in a variety of ways and using different forms of representation, including the use of tens and hundreds as units	Represent whole numbers up to 1000 in a variety of ways, including the use of tens and hundreds as units, with no significant errors	Represent whole numbers up to 1000 in a variety of ways, including the use of tens and hundreds as units, with a few significant errors	Have difficulty representing whole numbers up to 1000 in a variety of ways, including the use of tens and hundreds as units

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.2.1.2 Compare whole numbers up to 1000 using words (e.g., *greater than*, *less than*, *equal to*)	The student: Compares numbers to determine which number is greater in a pair.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Accurately order whole numbers up to 1000, and provide a rationale for the comparison	Compare and order whole numbers up to 1000, with no significant errors	Compare and order whole numbers up to 1000, with a few significant errors	Have difficulty comparing and ordering whole numbers up to 1000

Grade 2

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.2.1.3 Represent fractions with denominators no larger than ten using pictures, numbers, words, or models	The student: Draws a picture or makes a model to show what a given fraction, such as ¾, looks like.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Represent fractions with denominators no larger than ten using pictures, numbers, words, or models, with accuracy	Represent fractions with denominators no larger than ten using pictures, numbers, words, or models, with no significant errors	Represent fractions with denominators no larger than ten using pictures, numbers, words, or models, with a few significant errors	Represent fractions with denominators no larger than ten using pictures, numbers, words, or models, with many significant errors

Grade 2

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
OPERATIONS	MA.2.2.1 Recognize situations involving addition and subtraction and represent the situation with a number sentence		The student: Looks at a picture that depicts addition (or subtraction) and writes a number sentence to represent the situation.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe situations involving addition and subtraction and accurately represent the situation with a number sentence	Recognize situations involving addition and subtraction and represent the situation with a number sentence, with no significant errors	Recognize situations involving addition and subtraction and represent the situation with a number sentence, with significant errors	Have difficulty recognizing situations involving addition and subtraction and represent the situation; unable to represent the situation with a number sentence
OPERATIONS	MA.2.2.2 Demonstrate multiplication as repeated addition of equal groups		The student: Represents multiplication by arranging equal groups of objects and determining the total number of objects (e.g., shows 3 x 5 as three groups of 5 blocks and skip counts by 5 to arrive at the answer of 15).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate multiplication as repeated addition of equal groups and accurately determine the total number of objects	Demonstrate multiplication as repeated addition of equal groups and determine the total number of objects, with no significant errors	Demonstrate multiplication as repeated addition of equal groups and determine the total number of objects, with significant errors	Unable to demonstrate multiplication as repeated addition of equal groups

Grade 2

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
OPERATIONS	MA.2.2.3 Demonstrate division as "separating equal groups"	The student: Uses block to represent the dividend and separates the blocks into equal number of groups according to the divisor (e.g., For the expression 24 ÷ 6, separates 24 blocks into six equal groups).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate division as "separating equal groups" and accurately determine the number of equal groups	Demonstrate division as "separating equal groups" and determine the number of equal groups, with no significant errors	Demonstrate division as "separating equal groups" and determine the number of equal groups, with significant errors	Unable to demonstrate division as "separating equal groups"

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
COMPUTATIONAL FLUENCY	MA.2.3.1 Recall addition facts and their corresponding subtraction facts up to twenty	The student: Writes out the fact family for an addition sentence (e.g., 6 + 7 = 13, 7 + 6 = 13, 13 − 7 = 6, 13 − 6 = 7).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Recall addition facts and their corresponding subtraction facts up to twenty, with accuracy	Recall addition facts and their corresponding subtraction facts up to twenty, with no significant errors	Recall addition facts and their corresponding subtraction facts up to twenty, with a few significant errors	Recall addition facts and their corresponding subtraction facts up to twenty, with many significant errors

Grade 2

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
COMPUTATIONAL FLUENCY	MA.2.3.2 Use a variety of strategies to solve problems involving addition and subtraction of two-digit numbers		The student: Shows how to solve an addition (or subtraction) problem using one strategy, then solves another problem using a different strategy.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a variety of strategies to solve problems involving addition and subtraction of two-digit numbers, with accuracy	Use a variety of strategies to solve problems involving addition and subtraction of two-digit numbers, with no significant errors	Use a variety of strategies to solve problems involving addition and subtraction of two-digit numbers, with a few significant errors	Use a variety of strategies to solve problems involving addition and subtraction of two-digit numbers, with many significant errors
COMPUTATIONAL FLUENCY	MA.2.3.3 Estimate the solution of addition and subtraction problems		The student: Rounds the numbers in an addition (or subtraction) problem to estimate the answer.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently make reasonable estimates of the solution of addition and subtraction problems	Usually make reasonable estimates of the solution of addition and subtraction problems	Sometimes make reasonable estimates of the solution of addition and subtraction problems	Rarely make reasonable estimates of the solution of addition and subtraction problems

Grade 2

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
MEASUREMENT ATTRIBUTES AND UNITS	MA.2.4.1 Measure length using inches, feet, and centimeters	The student: Measures the length of his or her shoe to the nearest inch.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Measure length using inches, feet, and centimeters, with accuracy	Measure length using inches, feet, and centimeters, with no significant errors	Measure length using inches, feet, and centimeters, with a few significant errors	Measure length using inches, feet, and centimeters, with many significant errors
MEASUREMENT ATTRIBUTES AND UNITS	MA.2.4.2 Identify appropriate units for measuring length, area, capacity, and weight	The student: Matches the measuring attribute to the appropriate unit (e.g., length – inch, area – feet squared, capacity – cups, weight – pound).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify appropriate units for measuring length, area, capacity, and weight, with accuracy	Identify appropriate units for measuring length, area, capacity, and weight, with no significant errors	Identify appropriate units for measuring length, area, capacity, and weight, with a few significant errors	Identify appropriate units for measuring length, area, capacity, and weight, with many significant errors

Grade 2

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
MEASUREMENT ATTRIBUTES AND UNITS	MA.2.4.3 Estimate and measure temperature using standard units (e.g., Fahrenheit, Celsius)	The student: Estimates the current outdoor temperature, and then reads a thermometer outside the classroom to determine how close his or her prediction was.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Estimate and measure temperature using standard units, with accuracy	Estimate and measure temperature using standard units, with no significant errors	Estimate and measure temperature using standard units, with a few significant errors	Estimate and measure temperature using standard units, with many significant errors
MEASUREMENT ATTRIBUTES AND UNITS	MA.2.4.4 Tell time to the minute	The student: States the time to the minute on an analog clock and on a digital clock; draws the hour and minute hands on a blank clock face for a given time.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently tell time to the minute and explain how to tell time to the minute	Usually tell time to the minute	Sometimes tell time to the minute	Rarely tell time to the minute

Grade 2

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT ATTRIBUTES AND UNITS	MA.2.4.5 Represent a given monetary amount using a variety of combinations of coins and bills	The student: Shows how a given monetary amount can be represented with bills and coins, then shows another way that the same value can be represented; if the student hasn't already done so, then shows how to represent the value using the least amount of bills and coins.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Represent a given monetary amount using a variety of combinations of coins and bills, including indicating the way that uses the least amount of bills and coins	Represent a given monetary amount using a variety of combinations of coins and bills	Represent a given monetary amount using a variety of combinations of coins and bills, with a few significant errors	Represent a given monetary amount using a variety of combinations of coins and bills, with many significant errors

Grade 2

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT TOOLS AND TECHNIQUES	MA.2.4.6 Identify objects or visual benchmarks that could be used in place of standard units when estimating		The student: Finds objects around the classroom that are close to an inch, centimeter, foot, yard, and meter and lists other objects outside the classroom that might also serve as stand-ins.	
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Consistently identify appropriate objects or visual benchmarks that could be used in place of standard units when estimating	Usually identify appropriate objects or visual benchmarks that could be used in place of standard units when estimating	Sometimes identify appropriate objects or visual benchmarks that could be used in place of standard units when estimating	Rarely identify appropriate objects or visual benchmarks that could be used in place of standard units when estimating

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.2.5.1 Compare and sort two- and three-dimensional shapes according to selected attributes		The student: Sorts pattern blocks or attribute blocks into separate groups and describes the attribute shared by each group's shapes.	
	RUBRIC			
	Advanced	Advanced	Advanced	Advanced
	Compare and sort two- and three-dimensional shapes according to selected attributes, with accuracy	Compare and sort two- and three-dimensional shapes according to selected attributes, with no significant errors	Compare and sort two- and three-dimensional shapes according to selected attributes, with a few significant errors	Compare and sort two- and three-dimensional shapes according to selected attributes, with many significant errors

Grade 2

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
TRANSFORMATION	MA.2.6.1 Demonstrate flips, slides, and turns by moving shapes		The student: Traces a shape onto paper, performs the desired motion (flip, slide or turn), then traces the shape again in its new position.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate flips, slides, and turns by moving shapes, with accuracy	Demonstrate flips, slides, and turns by moving shapes, with no significant errors	Demonstrate flips, slides, and turns by moving shapes, with a few significant errors	Demonstrate flips, slides, and turns by moving shapes, with many significant errors
SYMMETRY	MA.2.6.2 Recognize line symmetry in plane figures and create pictures with line symmetry		The student: Uses mirrors and paper folding to discover and make pictures that have line symmetry.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Recognize line symmetry in plane figures and create pictures with line symmetry, with accuracy	Recognize line symmetry in plane figures and create pictures with line symmetry, with no significant errors	Recognize line symmetry in plane figures and create pictures with line symmetry, with a few significant errors	Have difficulty recognizing line symmetry in plane figures and creating pictures with line symmetry

Grade 2

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.2.8.1 Use cardinal directions that describe the location of an object or place (i.e., north, south, east, or west) on a coordinate map	The student: Points to the correct areas on a map when given directions (e.g., "Find the town that is east of the river.").

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use appropriate cardinal directions that are easy to follow that describe the location of an object or place on a coordinate map	Use cardinal directions that someone is able to follow that describe the location of an object or place on a coordinate map	Use cardinal directions that are difficult to follow that attempt to describe the location of an object or place on a coordinate map	Use cardinal directions that are impossible to follow that attempt to describe the location of an object or place on a coordinate map

Grade 2

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
PATTERNS	MA.2.9.1 Describe and create addition and subtraction number patterns (e.g., [20, 17, 14, …])		The student: Identifies and states how much is added on from one term to the next, then follows that rule and states what comes next.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe and create addition and subtraction number patterns, with accuracy	Describe and create addition and subtraction number patterns, with no significant errors	Describe and create addition and subtraction number patterns, with a few significant errors	Describe and create addition and subtraction number patterns, with many significant errors
PATTERNS	MA.2.9.2 Use different forms (e.g., concrete, pictorial, numerical) to represent the same basic pattern		The student: Makes several AAB pattern using different forms (e.g., red, red, purple; triangle, triangle, square; apple, apple, pickle).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a variety of different forms to represent the same basic pattern, with accuracy	Use a variety of different forms to represent the same basic pattern, with no significant errors	Use a variety different forms to represent the same basic pattern, with a few significant errors	Use a variety of different forms to represent the same basic pattern, with many significant errors

Grade 2

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships				
TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT
PATTERNS	MA.2.9.3 Demonstrate and explain the difference between repeating patterns and growing patterns			The student: Explains the difference between repeating and growing patterns and creates the two types of patterns to support the explanation.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate and explain the difference between repeating patterns and growing patterns, with accuracy	Demonstrate and explain the difference between repeating patterns and growing patterns, with no significant errors	Demonstrate and explain the difference between repeating patterns and growing patterns, with a few significant errors	Demonstrate and explain the difference between repeating patterns and growing patterns, with many significant errors

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations				
TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.2.10.1 Create a word/story problem for a given number sentence			The student: Looks at a number sentence, such as $5 - 1 = 4$, and makes up a story problem to go with it (e.g., "Tim had 5 frogs. One hopped away. How many frogs are left?").
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Create a word/story problem that represents a given number sentence, with accuracy	Create a word/story problem that represents a given number sentence, with no significant errors	Create a word/story problem that represents a given number sentence, with a few significant errors	Have difficulty creating a word/story problem that represents a given number sentence

Grade 2

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK		PERFORMANCE INDICATOR	
DATA COLLECTION AND REPRESENTATION	MA.2.11.1 Pose questions, collect data, and display the data using a graph (e.g., bar graphs, pictographs)		The student: Collects data to answer a specific question (e.g., "What color socks is everyone in my class wearing?") and makes a bar graph to display the responses.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Pose questions, collect data, and display the data using a graph, with accuracy	Pose questions, collect data, and display the data using a graph, with no significant errors	Pose questions, collect data, and display the data using a graph, with a few significant errors	Pose questions, collect data, and display the data using a graph, with many significant errors

Grade 2

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
DATA INTERPRETATION	MA.2.12.1 Interpret data displayed in a bar graph and describe how the important features of the data set are represented in a bar graph	The student: Makes interpretations about data based on the heights of the bars (e.g., explains that more people like bananas because that bar is the tallest).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Interpret data displayed in a bar graph and describe how the important features of the data set are represented in a bar graph, with accuracy	Interpret data displayed in a bar graph and describe how the important features of the data set are represented in a bar graph, with no significant errors	Interpret data displayed in a bar graph and describe how the important features of the data set are represented in a bar graph, with a few significant errors	Interpret data displayed in a bar graph and describe how the important features of the data set are represented in a bar graph, with many significant errors

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark at this level	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark at this level	

Grade 3

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.3.1.1 Represent place value from hundredths to ten-thousands flexibly	The student: Uses place value manipulatives or drawings to show different ways of representing a number (e.g., represents 0.20 with 2 tenths units or 20 hundredths units).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent place value from hundredths to ten-thousands in a variety of equivalent ways, with accuracy	Represent place value from hundredths to ten-thousands in a variety of equivalent ways, with no significant errors	Represent place value from hundredths to ten-thousands in a variety of equivalent ways, with a few significant errors	Have difficulty representing place value from hundredths to ten-thousands in a variety of equivalent ways
NUMBERS AND NUMBER SYSTEMS	MA.3.1.2 Categorize and justify a number as being odd or even	The student: Categorizes a number as odd or even and uses a drawing or model to justify the decision (e.g., counting out that many objects and seeing if they can be separated into two even groups, or by looking at the ones place and saying if it can be divided by two).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently categorize and justify a number as being odd or even and provide a general rule for determining whether a number is even or odd	Usually categorize and justify a number as being odd or even	Sometimes categorize and justify a number as being odd or even	Rarely categorize and justify a number as being odd or even

Grade 3

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.3.1.3 Compare and order fractions with denominators up to 12 (e.g., *greater than, less than, equal*)	The student: Represents fractions with fraction strips or tile to show which fraction is greater than the other.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Compare and order fractions with denominators up to 12, with accuracy	Compare and order fractions with denominators up to 12, with no significant errors	Compare and order fractions with denominators up to 12, with a few significant errors	Have difficulty comparing and ordering fractions with denominators up to 12

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.3.1.4 Use fractions with denominators up to 12 to solve problems	The student: Models the information in a problem with drawings or manipulative, then solves the problem.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use fractions with denominators up to 12 to solve problems, with accuracy	Use fractions with denominators up to 12 to solve problems, with no significant errors	Use fractions with denominators up to 12 to solve problems, with a few significant errors	Use fractions with denominators up to 12 to solve problems, with many significant errors

Grade 3

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.3.2.1 Recognize situations involving multiplication and division of whole numbers and represent the situation with a number sentence		The student: Writes a number sentence to represent a multiplication situation (e.g., "Sue had three boxes. She placed 4 toy cars in each of the boxes. How many toy cars did she have altogether? [4 + 4 + 4 = 12 or 4 x 3 =12]").
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe situations involving multiplication and division of whole numbers and accurately represent the situation with a number sentence	Recognize situations involving multiplication and division of whole numbers and represent the situation with a number sentence, with no significant errors	Recognize situations involving multiplication and division of whole numbers and represent the situation with a number sentence, with some significant errors	Have difficulty recognizing situations involving multiplication and division of whole numbers and representing the situation with a number sentence
OPERATIONS	MA.3.2.2 Select and apply various meanings and representations of multiplication and division		The student: Selects and demonstrates an appropriate strategy to represent multiplication (or division) and determine the answer.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently select and apply appropriate meanings and representations of multiplication and division	Usually select and apply appropriate meanings and representations of multiplication and division	Sometimes select and apply appropriate meanings and representations of multiplication and division	Rarely select and apply appropriate meanings and representations of multiplication and division

Grade 3

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.3.2.3 Demonstrate that multiplication and division of whole numbers can undo each other		The student: Writes down all the related multiplication and division problem starting with a given problem (e.g., 7 x 8 = 56, 8 x 7 = 56, 56 ÷ 8 = 7, 56 ÷ 7 = 8).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate and explain how multiplication and division of whole numbers can undo each other, with accuracy	Demonstrate that multiplication and division of whole numbers can undo each other, with no significant errors	Demonstrate that multiplication and division of whole numbers can undo each other, with a few significant errors	Have difficulty demonstrating that multiplication and division of whole numbers can undo each other
OPERATION PROPERTIES	MA.3.2.4 Use properties of addition of whole numbers (e.g., associative, commutative) to solve problems		The student: Uses a combination of commutative and associate property to make it easier to add whole numbers mentally (e.g., when adding 37 + 24 + 13, applies the properties [37 + 13] + 24 to make it easier to perform the computation mentally).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Strategically apply a combination of properties of addition of whole numbers to accurately solve problems	Use properties of addition of whole numbers to solve problems, with no significant errors	Use properties of addition of whole numbers to solve problems, with a few significant errors	Have difficulty using properties of addition of whole numbers to solve problems

Grade 3

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.3.3.1 Recall multiplication facts from 0 x 0 to 10 x 10		The student: States the single-digit multiplication facts.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Recall multiplication facts from 0 x 0 to 10 x 10, with accuracy	Recall multiplication facts from 0 x 0 to 10 x 10, with no significant errors	Recall multiplication facts from 0 x 0 to 10 x 10, with a few significant errors	Recall multiplication facts from 0 x 0 to 10 x 10, with many significant errors
COMPUTATIONAL FLUENCY	MA.3.3.2 Use a variety of strategies to solve problems involving addition and subtraction of two- and three-digit numbers		The student: Shows how to add (or subtract) using one strategy, then shows how to add (or subtract a different set of numbers using a different strategy (e.g., adds multiples of ten mentally [20 + 70 = 90] then adds the ones mentally [6 + 2 = 8] to arrive at the sum of 98 when adding 26 + 72).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a variety of strategies to solve problems involving addition and subtraction of two- and three-digit numbers, with accuracy	Use a variety of strategies to solve problems involving addition and subtraction of two- and three-digit numbers, with no significant errors	Use a variety of strategies to solve problems involving addition and subtraction of two- and three-digit numbers, with a few significant errors	Have difficulty using a variety of strategies to solve problems involving addition and subtraction of two- and three-digit numbers

Grade 3

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
ESTIMATION	MA.3.3.3 Estimate the results of whole-number computations	The student: Uses an estimation strategy to mentally determine an answer that should be reasonably close to the actual answer.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently make appropriate estimates of the results of whole-number computations using an estimation strategy	Usually make appropriate estimates of the results of whole-number computations using an estimation strategy	Sometimes make appropriate estimates of the results of whole-number computations using an estimation strategy	Rarely make appropriate estimates of the results of whole-number computations using an estimation strategy

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.3.4.1 Describe the concept of area and volume and the appropriate units for each	The student: Explains the difference between how area and volume are measured and describes the units that are used for each.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Effectively describe the concept of area and volume and the appropriate units for each, with accuracy	Describe the concept of area and volume and the appropriate units for each, with no significant errors	Describe the concept of area and volume and the appropriate units for each, with a few significant errors	Have difficulty describing the concept of area and volume and the appropriate units for each

Grade 3

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.3.4.2 Measure area and volume using standard and non-standard units (e.g., tiles, index cards, grids, cubes)		The student: Lays tiles on top of a figure then counts how many tiles it took to cover the figure; fills an object with cubes then counts how many cubes it took to fill the object.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Measure area and volume using standard and non-standard units, with accuracy	Measure area and volume using standard and non-standard units, with no significant errors	Measure area and volume using standard and non-standard units, with a few significant errors	Have difficulty measuring area and volume using standard and non-standard units
MEASUREMENT ATTRIBUTES AND UNITS	MA.3.4.3 Measure length, capacity, and weight in U.S. customary and metric units (e.g., pound, kilogram)		The student: Uses standard tools to measure length, capacity, and weight and compares his or her measurements to others to check for accuracy.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Measure length, capacity, and weight in U.S. customary and metric units, with accuracy	Measure length, capacity, and weight in U.S. customary and metric units, with no significant errors	Measure length, capacity, and weight in U.S. customary and metric units, with a few significant errors	Measure length, capacity, and weight in U.S. customary and metric units, with many significant errors

Grade 3

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.3.4.4 Estimate and determine the elapsed time between two events or times		The student: Guesses how long it would take for an event to occur (e.g., running the 50-yard dash), then uses a stopwatch to time the event; records the start time and end time of an event, then calculates the elapsed time.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Estimate and determine the elapsed time between two events or times, with accuracy	Estimate and determine the elapsed time between two events or times, with no significant errors	Estimate and determine the elapsed time between two events or times, with a few significant errors	Estimate and determine the elapsed time between two events or times, with many significant errors
MEASUREMENT TOOLS AND TECHNIQUES	MA.3.4.5 Select appropriate tools for measuring length, capacity, and weight		The student: Selects a tool to measure a desired attribute and explains why that tool was chosen over a different tool.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently select appropriate tools for measuring length, capacity, and weight, and justify the selection	Usually select appropriate tools for measuring length, capacity, and weight	Sometimes select appropriate tools for measuring length, measuring capacity, or measuring weight	Have difficulty selecting appropriate tools for measuring length, capacity, and weight

Grade 3

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT TOOLS AND TECHNIQUES	MA.3.4.6 Estimate and measure perimeter and area of common shapes and irregular (e.g., a house-shaped pentagon) shapes	The student: Measures each side of the shape and totals the lengths to determine the perimeter (or traces a length of string along the perimeter of the shape); traces the shape onto grid paper and counts the square units to determine the area.

	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Estimate and measure perimeter and area of common shapes and irregular shapes, with reasonable accuracy	Estimate and measure perimeter and area of common shapes and irregular shapes, with no significant errors	Estimate and measure perimeter and area of common shapes and irregular shapes, with a few significant errors	Have difficulty estimating and measuring perimeter and area of common shapes and irregular shapes

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.3.5.1 Compare the basic properties of isosceles, equilateral, and right triangles	The student: Compares and contrasts isosceles, equilateral, and right triangles and states the similarities and differences.

	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare the basic properties of isosceles, equilateral, and right triangles, with accuracy	Compare the basic properties of isosceles, equilateral, and right triangles, with no significant errors	Compare the basic properties of isosceles, equilateral, and right triangles, with a few significant errors	Compare the basic properties of isosceles, equilateral, and right triangles, with many significant errors

Grade 3

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.3.5.2 Classify shapes as congruent or similar		The student: Sorts shapes into groups that contain congruent or similar shapes.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Accurately classify shapes as congruent or similar, and justify the classification	Classify shapes as congruent or similar, with no significant errors	Classify shapes as congruent or similar, with a few significant errors	Incorrectly classify shapes as congruent or similar

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
TRANSFORMATION	MA.3.6.1 Predict and confirm the result of flipping, sliding, and turning shapes		The student: Traces a shape/figure onto paper, draws what he or she thinks the shape/figure will look like after a flip (or turn or slide), then flips the actual shape/figure and judges the accuracy of the prediction.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Predict and confirm the result of flipping, sliding, and turning shapes, with accuracy	Predict and confirm the result of flipping, sliding, and turning shapes, with no significant errors	Predict and confirm the result of flipping, sliding, and turning shapes, with a few significant errors	Predict and confirm the result of flipping, sliding, and turning shapes, with many significant errors

Grade 3

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
TRANSFORMATION	MA.3.6.2 Use flips, slides, and turns to show that a shape or design is symmetrical		The student: Identifies and uses the part of the shape/design that, when flipped, slid, or turned, forms the rest of the shape.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe and show how flips, slides, and turns can be used to show that a shape or design is symmetrical	Show that a shape or design is symmetrical by confirming symmetry using flips, slides, and turns	Recognize that a shape or design is symmetrical, but have difficulty using flips, slides, and turns to show that the shape or design is symmetrical	Unable to recognize symmetry in a shape or design
SYMMETRY	MA.3.6.3 Recognize rotational symmetry of plane figures		The student: Identifies simple figures that have rotational symmetry and explains why they have rotational symmetry.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize rotational symmetry of plane figures	Usually recognize rotational symmetry of plane figures	Sometimes recognize rotational symmetry of plane figures	Rarely recognize rotational symmetry of plane figures

Grade 3

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark at this level	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.3.8.1 Use coordinates to locate objects/locations on a grid	The student: Places an X or token on a grid at a named point.

	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use coordinates to locate objects/locations on a grid, with accuracy	Use coordinates to locate objects/locations on a grid, with no significant errors	Use coordinates to locate objects/locations on a grid, with a few significant errors	Use coordinates to locate objects/locations on a grid, with many significant errors

Grade 3

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
PATTERNS	MA.3.9.1 Create and describe growing numerical and spatial patterns and generalize a rule for the pattern	The student: Creates a growing numeric pattern (e.g., 2, 4, 6, 8) and explains the rule that is used to generate and continue the pattern.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Create and describe growing numerical and spatial patterns and generalize a rule for the pattern, with accuracy	Create and describe growing numerical and spatial patterns and generalize a rule for the pattern, with no significant errors	Create and describe growing numerical and spatial patterns and generalize a rule for the pattern, with a few significant errors	Create and describe growing numerical and spatial patterns and generalize a rule for the pattern, with many significant errors
PATTERNS	MA.3.9.2 Use patterns to solve problem situations involving related quantities in which one quantity changes as the other changes	The student: Analyzes a series of pictures (or a table of values) that shows one quantity changing as the other quantity changes and finds a pattern that he or she uses to solve a problem (e.g., "A price list shows that 2 donuts cost $0.60, 4 donuts cost $1.20, and 6 donuts cost $1.80. Show how much it would cost for 8 donuts, 10 donuts, and 12 donuts").		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use patterns to solve problem situations involving related quantities in which one quantity changes as the other changes, with accuracy	Use patterns to solve problem situations involving related quantities in which one quantity changes as the other changes, with no significant errors	Use patterns to solve problem situations involving related quantities in which one quantity changes as the other changes, with a few significant errors	Use patterns to solve problem situations involving related quantities in which one quantity changes as the other changes, with many significant errors

Grade 3

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.3.9.3. Identify and describe patterns in a hundreds chart		The student: Circles a row, column, or series of numbers on a hundreds chart and describes the pattern.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify and describe a variety of different patterns in a hundreds chart	Identify and describe patterns in a hundreds chart	Identify patterns in a hundreds chart, but have difficulty describing the patterns	Have difficulty identifying and describing patterns in a hundreds chart

Grade 3

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.3.10.1 Model situations that involve multiplication and division of whole numbers using objects/pictures and number sentences		The student: Reads a story/problem that involves multiplication (or division), represents the situation with a picture or model, writes a number sentence for the picture or model, and states the solution to the problem.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Model situations that involve multiplication and division of whole numbers using objects/pictures and number sentences, with accuracy	Model situations that involve multiplication and division of whole numbers using objects/pictures and number sentences, with no significant errors	Model situations that involve multiplication and division of whole numbers using objects/pictures and number sentences, with a few significant errors	Model situations that involve multiplication and division of whole numbers using objects/pictures and number sentences, with many significant errors
RATES OF CHANGE	MA.3.10.2 Identify situations involving change and describe the change numerically and verbally		The student: Records data (e.g., the temperature taken at 1-hour intervals throughout the school day) and describes how the data changes in numbers and words (e.g., it is 6° hotter at the end of the school day than at the beginning).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify situations involving change and describe the change numerically and verbally, with accuracy	Identify situations involving change and describe the change numerically and verbally, with no significant errors	Identify situations involving change and describe the change numerically and verbally, with a few significant errors	Have difficulty identifying situations involving change and describing the change numerically and verbally

Grade 3

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—**Pose questions and collect, organize, and represent data to answer those questions**

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND REPRESENTATION	MA.3.11.1 Pose questions, collect data using surveys, and organize the data into tables and graphs		The student: Asks classmates questions to collect data (e.g., "How many siblings do you have? What is your favorite sport?"), records the data in a table, and displays the data in a graph.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Pose meaningful questions, collect data using surveys, and effectively and accurately organize the data into tables and graphs	Pose questions, collect data using surveys, and organize the data into tables and graphs, with no significant errors	Pose questions, collect data using surveys, and organize the data into tables and graphs, with a few significant errors	Pose questions, collect data using surveys, and organize the data into tables and graphs, with many significant errors
DATA COLLECTION AND REPRESENTATION	MA.3.11.2 Organize and represent data in more than one way (e.g., tallies, chart, tables, bar graphs, line plots, line graphs)		The student: Displays data in at least two different ways and describes what each display tells/shows about the data.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Strategically and effectively organize data, and accurately represent data in more than one way	Organize and represent data in more than one way, with no significant errors	Organize and represent data in more than one way, with a few significant errors	Organize and represent data in more than one way, with many significant errors

Grade 3

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA INTERPRETATION	MA.3.12.1 Interpret data (e.g., tallies, chart, tables, bar graphs, line plots) and state what the representation shows about the set of data		The student: Reads displays of data and answers questions about the data (e.g., "Which group has more? Do you agree with most of your friends?").	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Interpret data and state what the representation shows about the set of data, with accuracy	Interpret data and state what the representation shows about the set of data, with no significant errors	Interpret data and state what the representation shows about the set of data, with a few significant errors	Interpret data and state what the representation shows about the set of data, with many significant errors

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PREDICTIONS AND INFERENCES	MA.3.13.1 Answer questions based on data represented in graphs		The student: Looks at a graph that shows the birth date of all the students in class and determines which month has the most birthdays.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Answer questions based on data represented in graphs, with accuracy, and effectively justify the answer	Answer questions based on data represented in graphs, with no significant error	Answer questions based on data represented in graphs, with a few significant errors	Answer questions based on data represented in graphs, with many significant errors

Grade 3

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
PROBABILITY	MA.3.14.1 Make reasonable predictions concerning the likelihood of an event occurring (e.g., certain, likely, unlikely, impossible)		The student: Predicts how likely it is for an event to occur and gives a reason for the prediction.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Make reasonable predictions concerning the likelihood of an event occurring and provide effective justification	Make reasonable predictions concerning the likelihood of an event occurring	Make questionable predictions concerning the likelihood of an event occurring	Make unreasonable predictions concerning the likelihood of an event occurring

Grade 4

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.4.1.1 Identify place value from ten-thousandths to millions	The student: Identifies the value of a digit in a number (e.g., identifies the value of each of the 7's in the number 7,370,892.871).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify place value from ten-thousandths to millions, with accuracy	Identify place value from ten-thousandths to millions, with no significant errors	Identify place value from ten-thousandths to millions, with a few significant errors	Identify place value from ten-thousandths to millions, with many significant errors
NUMBERS AND NUMBER SYSTEMS	MA.4.1.2 Identify and list factors, multiples, prime numbers, and composite numbers	The student: Lists all the factors of a number and identifies that number as prime or composite; lists the first ten multiples of a given number.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify and list factors, multiples, prime numbers, and composite numbers, with accuracy	Identify and list factors, multiples, prime numbers, and composite numbers, with no significant errors	Identify and list factors, multiples, prime numbers, and composite numbers, with a few significant errors	Identify and list factors, multiples, prime numbers, and composite numbers, with many significant errors

Grade 4

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
NUMBERS AND NUMBER SYSTEMS	MA.4.1.3 Identify equivalent forms of commonly used fractions and decimals		The student: Identifies the equivalent fraction for a common decimal and visa versa (e.g., ½ = 0.5).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently identify equivalent forms of commonly used fractions and decimals	Usually identify equivalent forms of commonly used fractions and decimals	Sometimes identify equivalent forms of commonly used fractions and decimals	Rarely identify equivalent forms of commonly used fractions and decimals

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.4.2.1 Describe situations involving addition and subtraction of fractions and decimals		The student: Creates a situation that involves the addition (or subtraction) of a fraction (and/or decimal).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe situations involving addition and subtraction of fractions and decimals, with accuracy	Describe situations involving addition and subtraction of fractions and decimals, with no significant errors	Describe situations involving addition and subtraction of fractions and decimals, with a few significant errors	Have difficulty describing situations involving addition and subtraction of fractions and decimals

Grade 4

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
PROPERTIES	MA.4.2.2 Use associative, commutative, and distributive properties as they apply to operations involving whole numbers		The student: OPERATION Manipulates number sentences using the distributive property, associate property, and commutative property to make it easier to perform calculation with whole numbers (e.g., notices that 27 x 8 can be represented as [20 + 7] x 8 which equals [20 x 8] + [7 x 8]).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Strategically use associative, commutative, and distributive properties as they apply to operations involving whole numbers, with accuracy	Use associative, commutative, and distributive properties as they apply to operations involving whole numbers, with no significant errors	Use associative, commutative, and distributive properties as they apply to operations involving whole numbers, with a few significant errors	Have difficulty using associative, commutative, and distributive properties as they apply to operations involving whole numbers
OPERATION PROPERTIES	MA.4.2.3 Apply the properties of zero and one as they relate to addition, subtraction, multiplication, and division		The student: Uses the properties of zero and one to make quick mental calculations in his or her head then states the answer.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the properties of zero and one as they relate to addition, subtraction, multiplication, and division, with accuracy	Apply the properties of zero and one as they relate to addition, subtraction, multiplication, and division, with no significant errors	Apply the properties of zero and one as they relate to addition, subtraction, multiplication, and division, with a few significant errors	Have difficulty applying the properties of zero and one as they relate to addition, subtraction, multiplication, and division

Grade 4

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.4.3.1 Recall all multiplication facts and the corresponding division facts up to 12 x 12		The student: Writes out the fact family for a multiplication sentence (e.g., 8 x 12 = 96, 12 x 8 = 96, 96 ÷ 8 = 12, 96 ÷ 12 = 8).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Recall all multiplication facts and the corresponding division facts up to 12 x 12, with accuracy	Recall all multiplication facts and the corresponding division facts up to 12 x 12, with no significant errors	Recall all multiplication facts and the corresponding division facts up to 12 x 12, with a few significant errors	Recall all multiplication facts and the corresponding division facts up to 12 x 12, with many significant errors
COMPUTATIONAL FLUENCY	MA.4.3.2 Select and use appropriate strategies and/or tools (e.g., mental math, calculators, paper/pencil, standard algorithms) for computing whole numbers		The student: Chooses the method he or she wants to use to compute whole numbers and explains whether the chosen method was the most appropriate method, or if another method would have been more appropriate to use.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Select appropriate strategies and/or tools for computing whole numbers, justify the selection, and apply the strategies, with accuracy	Select appropriate strategies and/or tools for computing whole numbers and apply the strategies, with no significant errors	Select appropriate strategies and/or tools for computing whole numbers and apply the strategies, with a few significant errors	Select inappropriate strategies and/or tools for computing whole numbers; or apply strategies, with many significant errors

Grade 4

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.4.3.3 Use a variety of strategies to add and subtract fractions with like and unlike denominators		The student: Shows how to add (or subtract) fractions using one strategy (e.g., fraction strips), then shows how to add (or subtract) another set of fractions using a different strategy.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a variety of strategies to add and subtract fractions with like and unlike denominators, with accuracy	Use a variety of strategies to add and subtract fractions with like and unlike denominators, with no significant errors	Use a variety of strategies to add and subtract fractions with like and unlike denominators, with a few significant errors	Use a variety of strategies to add and subtract fractions with like and unlike denominators, with many significant errors
COMPUTATIONAL FLUENCY	MA.4.3.4 Add and subtract decimals to 3 places		The student: Adds (or subtracts) decimals using appropriate strategy, and uses number sense to accurately place the decimal point in the answer).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Add and subtract decimals to 3 places, with accuracy	Add and subtract decimals to 3 places, with no significant errors	Add and subtract decimals to 3 places, with a few significant errors	Add and subtract decimals to 3 places, with many significant errors

Grade 4

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
ESTIMATION	MA.4.3.5 Determine the reasonableness of numerical solutions		The student: Solves a problem and provides a reasonable solution based on the context of the problem (e.g., for the problem, "How many buses should be reserved if each bus fits 48 students, and there are 570 students attending the field trip?" the student responds that 12 buses are needed, even though the answer to 570 ÷ 48 is 11.875).
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Consistently determine the reasonableness of numerical solutions	Usually determine the reasonableness of numerical solutions	Sometimes determine the reasonableness of numerical solutions	Rarely determine the reasonableness of numerical solutions

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT ATTRIBUTES AND UNITS	MA.4.4.1 Explain the need to use standard units for measuring		The student: Explains the need for standard units for measuring by describing a situation where standard units were not used.
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Explain, in great detail, the need to use standard units for measuring	Explain, in sufficient detail, the need to use standard units for measuring	Explain, in minimal detail, the need to use standard units for measuring	Insufficiently explain the need to use standard units for measuring

Grade 4

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.4.4.2 Select and apply appropriate customary and metric units and tools to measure length, perimeter, and area for the degree of accuracy needed		The student: Selects a unit for a specific task and explains why that unit was chosen over a different unit.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently select and apply appropriate customary and metric units and tools to measure length, perimeter, and area, for the degree of accuracy needed	Usually select and apply appropriate customary and metric units and tools to measure length, perimeter, and area, for the degree of accuracy needed	Sometimes select and apply appropriate customary and metric units and tools to measure length, perimeter, and area, for the degree of accuracy needed	Rarely select and apply appropriate customary and metric units and tools to measure length, perimeter, and area, for the degree of accuracy needed
MEASUREMENT ATTRIBUTES AND UNITS	MA.4.4.3 Classify right angles, acute angles, obtuse angles, and straight angles		The student: Sorts pictures of given angles into four categories: acute, obtuse, right, or straight.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Classify right angles, acute angles, obtuse angles, and straight angles, with accuracy	Classify right angles, acute angles, obtuse angles, and straight angles, with no significant errors	Classify right angles, acute angles, obtuse angles, and straight angles, with a few significant errors	Classify right angles, acute angles, obtuse angles, and straight angles, with many significant errors

Grade 4

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
MEASUREMENT TOOLS AND TECHNIQUES	MA.4.4.4 Estimate and measure surface area and volume using U.S. customary units and metric units	The student: Covers each side of a box with inch- or centimeter-grid paper and determines the area of each face; fills the box with inch or centimeter cubes and determines the volume of the box.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Estimate and measure surface area and volume using U.S. customary units and metric units, with accuracy	Estimate and measure surface area and volume using U.S. customary units and metric units, with no significant errors	Estimate and measure surface area and volume using U.S. customary units and metric units, with a few significant errors	Estimate and measure surface area and volume using U.S. customary units and metric units, with many significant errors
MEASUREMENT FORMULAS	MA.4.4.5 Use known measurements to calculate desired measurements of squares and rectangles (e.g., use the length of the square to calculate its area and perimeter)	The student: Applies a formula to determine the area and perimeter of a square (or rectangle) when its side lengths are given; determines the area of a square when its perimeter is given; determines the possible perimeters of a rectangle when its area is given.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use known measurements to calculate desired measurements of squares and rectangles, with accuracy	Use known measurements to calculate desired measurements of squares and rectangles, with no significant errors	Use known measurements to calculate desired measurements of squares and rectangles, with a few significant errors	Use known measurements to calculate desired measurements of squares and rectangles, with many significant errors

Grade 4

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.4.5.1 Classify different types of triangles and quadrilaterals according to their properties and identify the properties that define the classifications	The student: Identifies and justifies the class to which a two-dimensional shape belongs (e.g., puts a square and rhombus in group titled "equilateral quadrilateral").	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Classify different types of triangles and quadrilaterals according to their properties and identify the properties that define the classifications, with accuracy	Classify different types of triangles and quadrilaterals according to their properties and identify the properties that define the classifications, with no significant errors	Classify different types of triangles and quadrilaterals according to their properties and identify the properties that define the classifications, with a few significant errors	Classify different types of triangles and quadrilaterals according to their properties and identify the properties that define the classifications, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.4.5.2 Describe lines in the plane (i.e., parallel, perpendicular, intersecting)	The student: Describes and illustrates the difference between parallel, perpendicular, and intersecting lines.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe lines in the plane, with accuracy	Describe lines in the plane, with no significant errors	Describe lines in the plane, with a few significant errors	Describe lines in the plane, with many significant errors

Grade 4

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.4.5.3 Compare points, lines, line segments, and rays	The student: Explains the similarities and differences among points, lines, line segments, and rays.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare points, lines, line segments, and rays, with accuracy	Compare points, lines, line segments, and rays, with no significant errors	Compare points, lines, line segments, and rays, with a few significant errors	Compare points, lines, line segments, and rays, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.4.5.4 Predict and confirm the results of putting together and taking apart two- and three-dimensional shapes	The student: Selects a paper shape then draws the subdivided figure that he or she thinks will be made if the shape is subdivided; uses scissors to cut the shape into the shapes drawn.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Predict and confirm the results of putting together and taking apart two- and three-dimensional shapes, with accuracy	Predict and confirm the results of putting together and taking apart two- and three-dimensional shapes, with no significant errors	Predict and confirm the results of putting together and taking apart two- and three-dimensional shapes, with a few significant errors	Predict and confirm the results of putting together and taking apart two- and three-dimensional shapes, with many significant errors

Grade 4

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
TRANSFORMATION	MA.4.6.1 Use flips, slides, and turns to determine if two figures are congruent		The student: Copies a given figure from a worksheet, and through a series or flips, slides, and/or turns, determines if the figure is congruent to a second given figure that appears somewhere else on the same worksheet; the student then describes the motions that proved that the two figures are congruent.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use flips, slides, and turns to determine if two figures are congruent, with accuracy	Use flips, slides, and turns to determine if two figures are congruent, with no significant errors	Use flips, slides, and turns to determine if two figures are congruent, with a few significant errors	Use flips, slides, and turns to determine if two figures are congruent, with many significant errors
SYMMETRY	MA.4.6.2 Locate the plane of symmetry in three-dimensional objects		The student: Makes a three dimensional clay model then "cuts" it along the plane of symmetry using a string or dental floss.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain how to locate the plane of symmetry in three-dimensional objects	Locate the plane of symmetry in three-dimensional objects	Recognize if a plane is the plane of symmetry in three-dimensional objects	Unable to recognize if a plane is the plane of symmetry in three-dimensional objects

Grade 4

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
VISUALIZATION AND SPATIAL REASONING	MA.4.7.1 Predict the three-dimensional object that will result from folding a two-dimensional net of the object and justify the prediction		The student: Predict the three-dimensional figure that will result from folding a given two-dimensional net of the figure and uses characteristics of the net to justify the prediction.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Predict the three-dimensional object that will result from folding a two-dimensional net of the object and justify the prediction, with accuracy	Predict the three-dimensional object that will result from folding a two-dimensional net of the object and justify the prediction, with no significant errors	Predict the three-dimensional object that will result from folding a two-dimensional net of the object and justify the prediction, with a few significant errors	Predict the three-dimensional object that will result from folding a two-dimensional net of the object and justify the prediction, with many significant errors

Grade 4

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COORDINATE GEOMETRY	MA.4.8.1 Use ordered pairs to plot points on a coordinate grid		The student: Plots points on a coordinate grid using a list of ordered pairs.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use ordered pairs to plot points on a coordinate grid, with accuracy	Use ordered pairs to plot points on a coordinate grid, with no significant errors	Use ordered pairs to plot points on a coordinate grid, with a few significant errors	Use ordered pairs to plot points on a coordinate grid, with many significant errors

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.4.9.1 Extend, create, and generalize growing and shrinking numeric and geometric patterns (including multiplication patterns)		The student: Describes how the pattern changes from one term to the next, states a general rule for the pattern, and extends the pattern by giving the next three terms.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Extend, create, and generalize growing and shrinking numeric and geometric patterns, with accuracy	Extend, create, and generalize growing and shrinking numeric and geometric patterns, with no significant errors	Extend, create, and generalize growing and shrinking numeric and geometric patterns, with a few significant errors	Extend, create, and generalize growing and shrinking numeric and geometric patterns, with many significant errors

Grade 4

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.4.9.2 Represent the relationship between quantities in a variety of forms (e.g., manipulatives, tables, pictures, symbols)	The student: Represents the relationship between two quantities (e.g., total number of cars and total number of wheels) in a variety of ways and describes how each representation helps someone to understand the relationship between the two quantities.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent the relationship between quantities in a variety of forms and describe the effectiveness of the representations	Represent the relationship between quantities in a variety of forms	Represent the relationship between quantities in one or two forms	Have difficulty representing the relationship between quantities

Grade 4

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.4.10.1 Use symbols to represent unknown quantities in open sentences and determine the unknown quantities	The student: Places a symbol (e.g., a box or a star) in a numeric sentence in place of an unknown quantity (e.g., $71 + \square = 91$) and shows how he or she determined the unknown quantity.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use symbols to represent unknown quantities in open sentences and determine the unknown quantities, with accuracy	Use symbols to represent unknown quantities in open sentences and determine the unknown quantities, with no significant errors	Use symbols to represent unknown quantities in open sentences and determine the unknown quantities, with a few significant errors	Use symbols to represent unknown quantities in open sentences and determine the unknown quantities, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.4.10.2 Represent the commutative, associative, and distributive properties symbolically	The student: Shows a representation of the associative property (or commutative or distributive property) using shapes (e.g., $[\,☼ + ☺\,] + ♣ = ☼ + [\,☺ + ♣\,]$).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent the commutative, associative, and distributive properties symbolically, with accuracy	Represent the commutative, associative, and distributive properties symbolically, with no significant errors	Represent the commutative, associative, and distributive properties symbolically, with a few significant errors	Represent the commutative, associative, and distributive properties symbolically, with many significant errors

Grade 4

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
RATES OF CHANGE	MA.4.10.3 Describe the rate of change numerically and verbally based on data recorded in a table or graph	The student: Analyzes a data table or graph, states the rate of change using appropriate units and explains how he or she determined the rate of change (e.g., analyzes the data and states that the water from the leaky faucet dripped 12 mL per minute).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Describe the rate of change numerically and verbally based on data recorded in a table or graph, with accuracy	Describe the rate of change numerically and verbally based on data recorded in a table or graph, with no significant errors	Describe the rate of change numerically and verbally based on data recorded in a table or graph, with a few significant errors	Describe the rate of change numerically and verbally based on data recorded in a table or graph, with many significant errors

Grade 4

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND REPRESENTATION	MA.4.11.1 Pose questions, collect data using observations and experiments, and organize the data into tables or graphs	The student: Records outcomes from an experiment (e.g., rolling two number cubes) and organizes the data (e.g., the sum of the two number cubes) in a table and bar graph.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Pose questions, collect data using observations and experiments, and organize the data into tables or graphs, with accuracy	Pose questions, collect data using observations and experiments, and organize the data into tables or graphs, with no significant errors	Pose questions, collect data using observations and experiments, and organize the data into tables or graphs, with a few significant errors	Pose questions, collect data using observations and experiments, and organize the data into tables or graphs, with many significant errors
DATA COLLECTION AND REPRESENTATION	MA.4.11.2 Label the parts of a graph (e.g., axes, scale, legend, title)	The student: Selects an appropriately descriptive title for the graph, labels the axes with the proper units, and includes a scale and legend when necessary.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Effectively label the parts of a graph	Sufficiently label the parts of a graph	Label the parts of a graph, with a few omissions or errors	Label the parts of a graph, with significant omissions or errors

Grade 4

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
DATA INTERPRETATION	MA.4.12.1 Compare related data sets (e.g., height of 4th grade boys vs. height of 4th grade girls) with an emphasis on how the data are distributed	The student: Compares two sets of data by analyzing the distribution of the data, and reports similarities and differences between them.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare related data sets with an emphasis on how the data are distributed, with accuracy	Compare related data sets with an emphasis on how the data are distributed, with no significant errors	Compare related data sets with an emphasis on how the data are distributed, with a few significant errors	Compare related data sets with an emphasis on how the data are distributed, with many significant errors
DATA INTERPRETATION	MA.4.12.2 Analyze important features in the shape of the graph of a data set	The student: Analyzes the shape of a graph and the distribution of data and proposes possible explanations for these features (e.g., notices on a line plot that the marks form a bell-shape, and explains that as you get closer to the peak of the "bell" the outcome is more likely to happen, but as you move away from the peak of the "bell" the outcome is less likely to happen).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Analyze, in great detail, important features in the shape of the graph of a data set	Analyze, in sufficient detail, important features in the shape of the graph of a data set	Analyze, in minimal detail, important features in the shape of the graph of a data set	Unable to analyze, even in minimal detail, important features in the shape of the graph of a data set

Grade 4

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
PREDICTIONS AND INFERENCES	MA.4.13.1 Propose and justify conclusions/predictions based on data	The student: Explains the conclusion that he or she drew from a data set and supports the conclusion with information from a graphical representation.

	RUBRIC		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Propose and effectively justify conclusions or predictions based on data	Propose and sufficiently justify conclusions or predictions based on data	Propose and justify, in minimal detail, conclusions or predictions based on data	Propose implausible conclusions or predictions based on data

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
PROBABILITY	MA.4.14.1 Predict the probability of outcomes of simple experiments (e.g., coin toss, 4-colored spinner) and test the predictions	The student: Makes a prediction about the chance of an event occurring in a simple experiment and supports the prediction with valid data or theoretical probability.

	RUBRIC		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Make and justify reasonable predictions about the probability of outcomes of simple experiments and test the predictions	Make reasonable predictions about the probability of outcomes of simple experiments and test the predictions	Make reasonable predictions about the probability of outcomes of simple experiments without testing the predictions	Make unreasonable predictions about the probability of outcomes of simple experiments

Grade 5

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.5.1.1 Represent percent and ratio using pictures or objects	The student: Colors a portion of a 10 x 10 square grid to represent percent (e.g., 20% would have 20 of the 100 squares colored) or draws pictures that models a given percent.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent percent and ratio using pictures or objects, with accuracy	Represent percent and ratio using pictures or objects, with no significant errors	Represent percent and ratio using pictures or objects, with a few significant errors	Represent percent and ratio using pictures or objects, with many significant errors
NUMBERS AND NUMBER SYSTEMS	MA.5.1.2 Use equivalent forms of whole numbers, fractions, ratios, decimals, and percents to solve problems	The student: Converts among number forms (e.g., percents, decimals, fraction, ratio, whole number) to make solving problems easier.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use equivalent forms of whole numbers, fractions, ratios, decimals, and percents to solve problems, with accuracy	Use equivalent forms of whole numbers, fractions, ratios, decimals, and percents to solve problems, with no significant errors	Use equivalent forms of whole numbers, fractions, ratios, decimals, and percents to solve problems, with a few significant errors	Use equivalent forms of whole numbers, fractions, ratios, decimals, and percents to solve problems, with many significant errors

Grade 5

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.5.1.3 Use models, benchmarks, and equivalent forms to judge the size of fractions and order them		The student: Indicates which fraction is larger (e.g., 5/8 or 2/3) and shows or explains the means of comparison.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use models, benchmarks, and equivalent forms to judge the size of fractions and order them, with accuracy	Use models, benchmarks, and equivalent forms to judge the size of fractions and order them, with no significant errors	Use models, benchmarks, and equivalent forms to judge the size of fractions and order them, with a few significant errors	Use models, benchmarks, and equivalent forms to judge the size of fractions and order them, with many significant errors

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
OPERATIONS	MA.5.2.1 Apply the inverse relationship between addition and subtraction, and multiplication and division, to solve problems		The student: Solves a multiplication problem involving a missing factor (e.g., 8 x $\square$ = 89) by using division; solves an addition problem involving a missing addend (e.g., 45 + $\square$ = 67) by using subtraction.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the inverse relationship between addition and subtraction, and multiplication and division, to solve problems, with accuracy	Apply the inverse relationship between addition and subtraction, and multiplication and division, to solve problems, with no significant errors	Apply the inverse relationship between addition and subtraction, and multiplication and division, to solve problems, with a few significant errors	Have difficulty applying the inverse relationship between addition and subtraction, and multiplication and division, to solve problems

Grade 5

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
OPERATIONS	MA.5.2.2 Describe situations involving multiplication and division of fractions and decimals		The student: Creates a situation that involves the multiplication (or division) of decimals (or fractions).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe situations involving multiplication and division of fractions and decimals, with accuracy	Describe situations involving multiplication and division of fractions and decimals, with no significant errors	Describe situations involving multiplication and division of fractions and decimals, with a few significant errors	Have difficulty describing situations involving multiplication and division of fractions and decimals

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.5.3.1 Multiply decimals up to 3 places and divide decimals by whole numbers		The student: Multiplies (or divides) decimals using appropriate strategy, and uses number sense to know that the placement of the decimal point in the answer is correct.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Multiply decimals up to 3 places and divide decimals by whole numbers, with accuracy	Multiply decimals up to 3 places and divide decimals by whole numbers, with no significant errors	Multiply decimals up to 3 places and divide decimals by whole numbers, with a few significant errors	Multiply decimals up to 3 places and divide decimals by whole numbers, with many significant errors

Grade 5

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COMPUTATIONAL FLUENCY	MA.5.3.2 Use a variety of strategies to multiply and divide fractions	The student: Shows how to multiply (or divide) fractions using one strategy, then shows how to multiply (or divide) using a different strategy.

	RUBRIC		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use a variety of strategies to multiply and divide fractions, with accuracy	Use a variety of strategies to multiply and divide fractions, with no significant errors	Use a variety of strategies to multiply and divide fractions, with a few significant errors	Have difficulty using more than one strategy to multiply and divide fractions

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT ATTRIBUTES AND UNITS	MA.5.4.1 Convert simple units within a system of measurement (e.g., millimeters to centimeters, feet to yard, quarts to gallons, gram to kilogram, minutes to hours, days to weeks)	The student: Uses equivalent units to make conversions (e.g., 7 days = 1 week: multiply by 7 to convert weeks to days and divide by 7 to convert days to weeks).

	RUBRIC		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Convert simple units within a system of measurement, with accuracy	Convert simple units within a system of measurement, with no significant errors	Convert simple units within a system of measurement, with a few significant errors	Convert simple units within a system of measurement, with some significant errors

Grade 5

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
MEASUREMENT ATTRIBUTES AND UNITS	MA.5.4.2 Select and apply appropriate customary and metric units and tools to measure angles	The student: Selects an appropriate tool (e.g., protractor, angle ruler) to measure an angle, and explains why the tool was chosen as opposed to some other tool.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently select and apply appropriate customary and metric units and tools to measure angles	Usually select and apply appropriate customary and metric units and tools to measure angles	Sometimes select and apply appropriate customary and metric units and tools to measure angles	Rarely select and apply appropriate customary and metric units and tools to measure angles
MEASUREMENT TOOLS AND TECHNIQUES	MA.5.4.3 Use map scales to measure the distance between locations and make simple scale drawings	The student: Uses the map scale as a unit, uses that unit to measure the distance between two points on a map, and uses the map scale to convert from the measured distance to the real distance.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use map scales to measure the distance between locations and make simple scale drawings, with accuracy	Use map scales to measure the distance between locations and make simple scale drawings, with no significant errors	Use map scales to measure the distance between locations and make simple scale drawings, with a few significant errors	Use map scales to measure the distance between locations and make simple scale drawings, with many significant errors

Grade 5

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT TOOLS AND TECHNIQUES	MA.5.4.4 Estimate and measure the size of an angle	The student: Uses benchmark angles (e.g., 90° angle, 45° angle) to estimate the measure of a given angle, then uses a protractor (or angle ruler) to measure the angle.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Estimate and measure the size of an angle, with accuracy	Estimate and measure the size of an angle, with no significant errors	Estimate and measure the size of an angle, with a few significant errors	Estimate and measure the size of an angle, with many significant errors

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT FORMULAS	MA.5.4.5 Use known measurements (e.g., base and height) to calculate desired measurements (e.g., area) of triangles, parallelograms, and trapezoids	The student: Applies a formula to determine the area and perimeter of a triangle (or parallelogram or trapezoid) when its base, height, and side lengths are given; determines the height of a parallelogram (or triangle) when its area and base length are given; determines the possible dimensions of a triangle (or parallelogram or trapezoid) when its area is known.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use known measurements to calculate desired measurements of triangles, parallelograms, and trapezoids, with accuracy	Use known measurements to calculate desired measurements of triangles, parallelograms, and trapezoids, with no significant errors	Use known measurements to calculate desired measurements of triangles, parallelograms, and trapezoids, with a few significant errors	Use known measurements to calculate desired measurements of triangles, parallelograms, and trapezoids, with many significant errors

Grade 5

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT FORMULAS	MA.5.4.6 Use known measurements (e.g., length, width, and height) to calculate desired measurements (e.g., surface area and volume) of rectangular solids	The student: Uses the given dimensions of each face of a rectangular sold to calculate its surface and volume; determines the possible dimensions of a rectangular solid when its volume is given; determines the possible volume of a rectangular solid when its surface area is given.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use known measurements to calculate desired measurements of rectangular solids, with accuracy	Use known measurements to calculate desired measurements of rectangular solids, with no significant errors	Use known measurements to calculate desired measurements of rectangular solids, with a few significant errors	Use known measurements to calculate desired measurements of rectangular solids, with many significant errors

Grade 5

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.5.5.1 Describe the properties that define classifications of three-dimensional shapes (e.g., cylinders have two bases that are circles)	The student: Sorts three-dimensional figures into separate groups and describes the properties shared by each group's shapes.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe all the properties that define classifications of three-dimensional shapes	Describe the most significant properties that define classifications of three-dimensional shapes	Describe some properties that define classifications of three-dimensional shapes, but is missing the most significant properties	Have difficulty describing properties that define classifications of three-dimensional shapes
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.5.5.2 Apply the understanding that the sum of the measures of the angles in any triangle is 180•	The student: Finds the measure of the unknown angle of a triangle when two of the angle measures are known.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the understanding that the sum of the measures of the angles in any triangle is 180•, with accuracy	Apply the understanding that the sum of the measures of the angles in any triangle is 180•, with no significant errors	Apply the understanding that the sum of the measures of the angles in any triangle is 180•, with a few significant errors	Apply the understanding that the sum of the measures of the angles in any triangle is 180•, with many significant errors

Grade 5

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.5.5.3 Classify angles (no larger than 180°) as acute, right, obtuse, or straight		The student: Classifies an angle as a right angle, acute angle, obtuse, or straight angle.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Classify angles (no larger than 180°) as acute, right, obtuse, or straight, with accuracy	Classify angles (no larger than 180°) as acute, right, obtuse, or straight, with no significant errors	Classify angles (no larger than 180°) as acute, right, obtuse, or straight, with a few significant errors	Classify angles (no larger than 180°) as acute, right, obtuse, or straight, with many significant errors

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
TRANSFORMATION	MA.5.6.1 Predict and confirm the results of combinations of flips, turns, and slides		The student: Draws his or her prediction of the result of a shape after a series of motions (e.g., if it is flipped left to right and turned 90°).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Predict and confirm the results of combinations of flips, turns, and slides, with accuracy	Predict and confirm the results of combinations of flips, turns, and slides, with no significant errors	Predict and confirm the results of combinations of flips, turns, and slides, with a few significant errors	Predict and confirm the results of combinations of flips, turns, and slides, with many significant errors

Grade 5

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
SYMMETRY	MA.5.6.2 Identify three-dimensional objects that have rotational symmetry and locate the rotational axis	The student: Finds a three-dimensional object that has rotational symmetry and sticks a bamboo skewer through the object to represent the rotational axis.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Consistently identify three-dimensional objects that have rotational symmetry and locate the rotational axis	Usually identify three-dimensional objects that have rotational symmetry and locate the rotational axis	Sometimes identify three-dimensional objects that have rotational symmetry and locate the rotational axis	Rarely identify three-dimensional objects that have rotational symmetry and locate the rotational axis

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
VISUALIZATION AND SPATIAL REASONING	MA.5.7.1 Use two-dimensional nets of rectangular solids to solve surface area problems	The student: Uses the two-dimensional net of a rectangular solid to determine its surface area.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use two-dimensional nets of rectangular solids to solve surface area problems, with accuracy	Use two-dimensional nets of rectangular solids to solve surface area problems, with no significant errors	Use two-dimensional nets of rectangular solids to solve surface area problems, with a few significant errors	Use two-dimensional nets of rectangular solids to solve surface area problems, with many significant errors

Grade 5

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.5.8.1 Determine the distance between points along horizontal and vertical lines of a coordinate system	The student: Subtracts the x or y values of points along horizontal and vertical lines of a coordinate system to find the distance (e.g., if two points have ordered pairs [2, 7] and [2, 1] they line up horizontally and he or she subtracts the y values to determine the points are 6 units apart).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Determine the distance between points along horizontal and vertical lines of a coordinate system, with accuracy	Determine the distance between points along horizontal and vertical lines of a coordinate system, with no significant errors	Determine the distance between points along horizontal and vertical lines of a coordinate system, with a few significant errors	Determine the distance between points along horizontal and vertical lines of a coordinate system, with many significant errors

Grade 5

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.5.9.1 Analyze patterns and functions and use generalizations to make reasonable predictions		The student: Analyzes the data in a table and makes predictions based on the trend revealed by the data.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Analyze patterns and functions and use generalizations to make reasonable predictions, with accuracy	Analyze patterns and functions and use generalizations to make reasonable predictions, with no significant errors	Analyze patterns and functions and use generalizations to make reasonable predictions, with a few significant errors	Analyze patterns and functions and use generalizations to make reasonable predictions, with many significant errors
FUNCTION	MA.5.9.2 Describe situations in which the relationship between two quantities vary directly or inversely		The student: Creates a problem situation that involves one quantity getting larger as the second quantity gets smaller (e.g., the more knots you tie on a rope, the length of the rope shortens).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe situations in which the relationship between two quantities vary directly or inversely, with accuracy	Describe situations in which the relationship between two quantities vary directly or inversely, with no significant errors	Describe situations in which the relationship between two quantities vary directly or inversely, with a few significant errors	Describe situations in which the relationship between two quantities vary directly or inversely, with many significant errors

Grade 5

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.5.10.1 Use a variety of strategies to solve number sentences with unknowns	The student: Represents a situation with a number sentence with an unknown and solves for the unknown value, then shows another way to solve for the unknown value (e.g., substitutes the number of students in class for the symbol "S" that represents students in the equation to find out how many brownies the class needs if everyone gets three [3 x S = total brownies]).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use a variety of strategies to solve number sentences with unknowns, with accuracy	Use a variety of strategies to solve number sentences with unknowns, with no significant errors	Use a variety of strategies to solve number sentences with unknowns, with a few significant errors	Have difficulty using more than one strategy to solve number sentences with unknowns

Grade 5

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
AND ALGEBRAIC REPRESENTATIONS	MA.5.10.2 Model problem situations with objects or manipulatives and use representations (e.g., graphs, tables, equations) to draw conclusions	The student: Makes a table or graph to model a problem situation and interprets the trend in the data.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Model problem situations with objects or manipulatives and use representations to draw conclusions, with accuracy	Model problem situations with objects or manipulatives and use representations to draw conclusions, with no significant errors	Model problem situations with objects or manipulatives and use representations to draw conclusions, with a few significant errors	Model problem situations with objects or manipulatives and use representations to draw conclusions, with many significant errors
RATES OF CHANGE	MA.5.10.3 Describe situations with constant or varying rates (e.g., miles per hour, items per box)	The student: Distinguishes between situations with a constant rate of change (e.g., $3 per ticket, or $1.50 per can of spam) versus situations with a varying rate of change (e.g., your walking rate going up a hill and then coming down the hill) and gives examples of each.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe situations with constant or varying rates, with accuracy	Describe situations with constant or varying rates, with no significant errors	Describe situations with constant or varying rates, with a few significant errors	Describe situations with constant or varying rates, with many significant errors

Grade 5

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions			
TOPIC	**BENCHMARK**		**PERFORMANCE INDICATOR**
DATA COLLECTION AND REPRESENTATION	MA.5.11.1 Collect and display data in circle graphs		The student: Collects data that can be appropriately represented in a circle graph, converts data into points or percentages, and designs the circle graph with appropriately sized sections.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Collect and display data in circle graphs, with accuracy	Collect and display data in circle graphs, with no significant errors	Collect and display data in circle graphs, with a few significant errors	Collect and display data in circle graphs, with many significant errors
DATA COLLECTION AND REPRESENTATION	MA.5.11.2 Recognize the difference in representing numeric data and categorical data and select appropriate representations to display each type of data		The student: Identifies specific data as either categorical or numerical and chooses an appropriate graph for that type of data.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize the difference in representing numeric data and categorical data and select appropriate representations to display each type of data	Usually recognize the difference in representing numeric data and categorical data and select appropriate representations to display each type of data	Sometimes recognize the difference in representing numeric data and categorical data and select appropriate representations to display each type of data	Rarely recognize the difference in representing numeric data and categorical data and select appropriate representations to display each type of data

Grade 5

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
DATA INTERPRETATION	MA.5.12.1 Determine the range, median, mode, and mean for a data set		The student: Determines the range and mode of a data set; determines the median of a data set with an odd number of data and with an even number of data; calculates the mean using the add-and-divide method when appropriate; and determines the mean using the "leveling off" or "equal distribution" method when appropriate (e.g., for the data set {94, 95, 95, 95, 96} the student notices that the mean is 95 because when 1 is taken away from 96 and added to the 94, all the values become 95).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Determine the range, median, mode, and mean for a data set, with accuracy	Determine the range, median, mode, and mean for a data set, with no significant errors	Determine the range, median, mode, and mean for a data set, with a few significant errors	Determine the range, median, mode, and mean for a data set, with many significant errors

Grade 5

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
DATA INTERPRETATION	MA.5.12.2 Compare different representations of the same data and evaluate how well each representation shows important aspects of the data	The student: Uses two different representations to display the same data, explains what both representations reveal about the data, and explains how one of the representations is more helpful in understanding the data than the other.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare different representations of the same data and effectively explain how well each representation shows the important and subtle aspects of the data	Compare different representations of the same data and sufficiently explain how well each representation shows the important aspects of the data	Compare different representations of the same data and minimally explain how well each representation shows the important aspects of the data	Compare different representations of the same data, but is unable to explain how well each representation shows the important aspects of the data

Grade 5

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PREDICTIONS AND INFERENCES	MA.5.13.1 Design studies to further investigate the conclusion/predictions made based on data		The student: Designs a new study to test the conclusions he or she made from data collected.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Design meaningful and insightful studies to further investigate the conclusion or predictions made based on data	Design studies to further investigate the conclusion or predictions made based on data	Design follow-up studies that are loosely based on data	Design follow-up studies that are not based on data

Grade 5

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
PROBABILITY	MA.5.14.1 Use fractions, decimals, and percents to indicate the probability of events	The student: Represents the probability of an event occurring as a fraction or decimal from 0 to 1, or a percent from 0% to 100%.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use fractions, decimals, and percents to indicate the probability of events, with accuracy	Use fractions, decimals, and percents to indicate the probability of events, with no significant errors	Use fractions, decimals, and percents to indicate the probability of events, with a few significant errors	Use fractions, decimals, and percents to indicate the probability of events, with many significant errors
PROBABILITY	MA.5.14.2 Determine all possible outcomes of a simple compound event	The student: Uses a strategy (e.g., tree diagram, organized list, area model) to systematically determine all possibilities of two events occurring (e.g. two coins tossed, a spinner being spun twice).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Uses a logical strategy to systematically determine all possible outcomes of a simple compound event	Determine all possible outcomes of a simple compound event	Determine at least half of the possible outcomes of a simple compound event	Determine less than half of the possible outcomes of a simple compound event

Grade 6

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.6.1.1 Compare and order fractions, decimals, and percents	The student: Finds the approximate location of a fraction, decimal, and percent on a number line.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare and order fractions, decimals, and percents, with accuracy, and justify the comparisons	Compare and order fractions, decimals, and percents, with no significant errors	Compare and order fractions, decimals, and percents, with a few significant errors	Compare and order fractions, decimals, and percents, with a many significant errors
NUMBERS AND NUMBER SYSTEMS	MA.6.1.2 Explain and give examples of number theory concepts (e.g., prime factorization, common factors, greatest common factor, common multiples, least common multiple, divisibility)	The student: Draws a factor tree to find the prime factorization of a number; shows a process for finding the greatest common factor and least common multiple of two or more numbers.	
	RUBRIC		
	Advanced	**Advanced**	**Advanced**	**Advanced**
	Effectively explain and give examples of number theory concepts, with accuracy	Sufficiently explain and give examples of number theory concepts, with no significant errors	Minimally explain and give examples of number theory concepts, with a few significant errors	Have difficulty explaining and giving examples of number theory concepts

Grade 6

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
OPERATION	MA.6.2.1 Apply the order of operations when calculating with whole numbers	The student: Follows the rules for the order of operation when solving whole number problems.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the order of operations when calculating with whole numbers, with accuracy	Apply the order of operations when calculating with whole numbers, with no significant errors	Apply the order of operations when calculating with whole numbers, with a few significant errors	Apply the order of operations when calculating with whole numbers, with many significant errors
OPERATION PROPERTIES	MA.6.2.2 Use the operation properties to simplify computations with fractions, decimals, and percents	The student: Decomposes (using the distributive property) and rearranges (using the commutative and/or associate properties) the numbers in order to put "friendly" numbers together to make it easier to perform the computations.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Strategically use the operation properties to simplify computations with fractions, decimals, and percents, with accuracy	Use the operation properties to simplify computations with fractions, decimals, and percents, with no significant errors	Use the operation properties to simplify computations with fractions, decimals, and percents, with a few significant errors	Use the operation properties to simplify computations with fractions, decimals, and percents, with many significant errors

Grade 6

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
ESTIMATION	MA.6.3.1 Use estimation prior to computing with fractions and decimals and compare the estimation to the actual result		The student: Uses an appropriate estimation strategy to mentally determine an answer, then performs the actual computation and compares the result to the estimation.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently use estimation prior to computing with fractions and decimals and compare the estimation to the actual result	Usually use estimation prior to computing with fractions and decimals and compare the estimation to the actual result	Sometimes use estimation prior to computing with fractions and decimals and compare the estimation to the actual result	Rarely use estimation prior to computing with fractions and decimals and compare the estimation to the actual result
ESTIMATION	MA.6.3.2 Recognize situations in which it is more appropriate to estimate than to compute an exact answer		The student: Selects from a list problems that require an estimate or an accurate answer and solves the problem accordingly.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently determine situations in which it is more appropriate to estimate than to compute an exact answer, and provide justification	Usually determine situations in which it is more appropriate to estimate than to compute an exact answer	Sometimes determine situations in which it is more appropriate to estimate than to compute an exact answer	Rarely determine situations in which it is more appropriate to estimate than to compute an exact answer

Grade 6

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.6.4.1 Estimate the circumference and area of a circle (with no reference to a formula)		The student: Traces a circle onto centimeter grid paper and counts the squares and partial squares to estimate its area; places string along the circumference and measures it determine the circumference.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use and clearly explain a strategy to make reasonable estimates of the circumference and area of a circle (with no reference to a formula)	Use appropriate strategies to make reasonable estimates of the circumference and area of a circle (with no reference to a formula)	Incompletely or incorrectly apply appropriate strategies to make reasonable estimates of the circumference and area of a circle (with no reference to a formula)	Use inappropriate strategies to make reasonable estimates of the circumference and area of a circle (with no reference to a formula)
MEASUREMENT ATTRIBUTES AND UNITS	MA.6.4.2 Construct angles with a given degree measure		The student: Uses a protractor (or angle ruler) to draw an angle with ±1° precision.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Construct angles with a given degree measure, with accuracy	Construct angles with a given degree measure, with no significant errors	Construct angles with a given degree measure, with a few significant errors	Construct angles with a given degree measure, with many significant errors

Grade 6

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT FORMULAS	MA.6.4.3 Apply strategies and formulas to solve area and perimeter problems involving polygons (e.g., regular hexagons) and complex shapes (i.e., shapes composed of two or more common shapes)		The student: Decomposes complex shapes into common shapes, logically determines measurements that can be derived from the known measurements, and pieces together the area of each part to determine the total area.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply strategies and formulas to solve area and perimeter problems involving polygons and complex shapes, with accuracy	Apply strategies and formulas to solve area and perimeter problems involving polygons and complex shapes, with no significant errors	Apply strategies and formulas to solve area and perimeter problems involving polygons and complex shapes, with a few significant errors	Apply strategies and formulas to solve area and perimeter problems involving polygons and complex shapes, with many significant errors

Grade 6

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.6.5.1 Analyze and describe the relationships among the angles, side lengths, perimeters, and areas of similar geometric figures	The student: Compares the ratio of side lengths to area of a variety of similar shapes (e.g., determines the ratio of the areas of two similar rectangles whose lengths have a 2:1 ratio).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Analyze and describe, in great detail, the relationships among the angles, side lengths, perimeters, and areas of similar geometric figures	Analyze and describe, in sufficient detail, the relationships among the angles, side lengths, perimeters, and areas of similar geometric figures	Analyze and describe, in some (but not enough) detail, the relationships among the angles, side lengths, perimeters, and areas of similar geometric figures	Analyze and describe, in insufficient detail, the relationships among the angles, side lengths, perimeters, and areas of similar geometric figures
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.6.5.2 Create arguments for proving that two shapes are congruent	The student: States the measures that are needed to prove that two triangles are congruent.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Create compelling and logical arguments for proving that two shapes are congruent	Create convincing arguments for proving that two shapes are congruent	Create arguments that are generally on the right track for proving that two shapes are congruent	Create insufficient or incorrect arguments for proving that two shapes are congruent

Grade 6

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
SYMMETRY	MA.6.6.1 Use line symmetry and rotational symmetry to describe classifications of shapes (e.g., squares have 4 lines of symmetry and 90° rotational symmetry)	The student: Sorts shapes into separate groups based on line and/or rotational symmetry and describes the properties shared by each group's shapes.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use line symmetry and rotational symmetry to describe classifications of shapes, with accuracy	Use line symmetry and rotational symmetry to describe classifications of shapes, with no significant errors	Use line symmetry and rotational symmetry to describe classifications of shapes, with a few significant errors	Use line symmetry and rotational symmetry to describe classifications of shapes, with many significant errors

Grade 6

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
VISUALIZATION AND SPATIAL REASONING	MA.6.7.1 Construct a two-dimensional representation from different angles of a three-dimensional object	The student: Looks at an object from different views and draws a two-dimensional picture of the top, left, right, and front view.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Construct a two-dimensional representation from different angles of a three-dimensional object, with accuracy	Construct a two-dimensional representation from different angles of a three-dimensional object, with no significant errors	Construct a two-dimensional representation from different angles of a three-dimensional object, with a few significant errors	Construct a two-dimensional representation from different angles of a three-dimensional object, with many significant errors
VISUALIZATION AND SPATIAL REASONING	MA.6.7.2 Draw two-dimensional shapes with specified properties	The student: Draws a shape from specific instructions (e.g., draws a quadrilateral that has two pairs of parallel sides).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Draw two-dimensional shapes with specified properties, with accuracy	Draw two-dimensional shapes with specified properties, with no significant errors	Draw two-dimensional shapes with specified properties, with a few significant errors	Draw two-dimensional shapes with specified properties, with many significant errors

Grade 6

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
COORDINATE GEOMETRY	MA.6.8.1 Predict the shape that is formed by connecting the points represented by given coordinates	The student: Predicts the shape that will form from a set of given coordinates and use the coordinates to justify the prediction.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Accurately identify the shape that is formed by connecting the points represented by given coordinates, and use the coordinates to justify the shape	Make reasonable predictions about the shape that is formed by connecting the points represented by given coordinates and use the coordinates to justify the prediction	Make somewhat reasonable predictions about the shape that is formed by connecting the points represented by given coordinates, but has difficulty justifying the prediction	Make unreasonable predictions about the shape that is formed by connecting the points represented by given coordinates
COORDINATE GEOMETRY	MA.6.8.2 Use coordinate geometry to represent and analyze properties of geometric shapes	The student: Determines and justifies the coordinates of a vertex of a shape (e.g., parallelogram) when all but one of the vertices is given.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Effectively and accurately use coordinate geometry to represent, analyze, and describe properties of geometric shapes	Use coordinate geometry to represent and analyze properties of geometric shapes, with no significant errors	Use coordinate geometry to represent and analyze properties of geometric shapes, with a few significant errors	Use coordinate geometry to represent and analyze properties of geometric shapes, with many significant errors

Grade 6

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
PATTERNS	MA.6.9.1 Represent visual and numerical patterns with tables and graphs and generalize the "rule" using words and symbols		The student: Expresses the rule for a numerical pattern in words and symbols.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Represent visual and numerical patterns with tables and graphs and generalize the "rule" using words and symbols, with accuracy	Represent visual and numerical patterns with tables and graphs and generalize the "rule" using words and symbols, with no significant errors	Represent visual and numerical patterns with tables and graphs and generalize the "rule" using words and symbols, with a few significant errors	Represent visual and numerical patterns with tables and graphs and generalize the "rule" using words and symbols, with many significant errors

Grade 6

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
FUNCTIONS	MA.6.9.2 Describe simple one-step functions using words and symbols when given a table of "input" and "output" values	The student: Fills in missing data in a table of "input" and "output" values and describes a rule for the table using words or symbols. Example:

Input	0	1	2	5	10		
Output	4	5	6	9		200	53

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Describe simple one-step functions using words and symbols when given a table of "input" and "output" values, with accuracy	Describe simple one-step functions using words and symbols when given a table of "input" and "output" values, with no significant errors	Have difficulty describing simple one-step functions using words and symbols when given a table of "input" and "output" values, but can determine other values in the table with no significant errors	Have difficulty describing simple one-step functions using words and symbols when given a table of "input" and "output" values, and determine other values in the table with many significant errors

Grade 6

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.6.10.1 Interpret and solve problem situations involving two different variables	The student: Recognizes that a problem requires two variables (e.g., "What could be the dimensions of a rectangle with a perimeter of 36?"), finds several solutions for the two variables, and if possible, makes a general statement that describes all the possible solutions (e.g., the length and the width must be greater than zero and have a sum of 18).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Interpret and solve problem situations involving two different variables, with accuracy	Interpret and solve problem situations involving two different variables, with no significant errors	Interpret and solve problem situations involving two different variables, with a few significant errors	Interpret and solve problem situations involving two different variables, with many significant errors

Grade 6

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.6.10.2 Use fact families to solve for an unknown in an open sentence		The student: Writes the fact family for an open sentence so that the variable is left alone on one side (e.g., to solve the equation x – 8 = 19, rewrite the equation as 19 + 8 = x).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use fact families to solve for an unknown in an open sentence, with accuracy	Use fact families to solve for an unknown in an open sentence, with no significant errors	Use fact families to solve for an unknown in an open sentence, with a few significant errors	Use fact families to solve for an unknown in an open sentence, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.6.10.3 Evaluate algebraic expressions		The student: Substitutes a variable in an algebraic expression for a given value, then simplifies the expression (e.g., evaluates 6x + 5 for x = 8 by substituting 8 in place of x, and finding the 6[8] + 5 simplifies to 53).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Evaluate algebraic expressions, with accuracy	Evaluate algebraic expressions, with no significant errors	Evaluate algebraic expressions, with a few significant errors	Evaluate algebraic expressions, with many significant errors

Grade 6

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND REPRESENTATION	MA.6.11.1 Analyze how data collection methods and sample size can affect the results of data sets		The student: Compares the results of a survey where a small group of people were asked questions and the results of the same survey when a large number of people were asked the questions.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Effectively explain, in great detail, how data collection methods and sample size can affect the results of data sets	Explain, in sufficient detail, how data collection methods and sample size can affect the results of data sets	Explain, in some (but not enough) detail, how data collection methods and sample size can affect the results of data sets	Explain, in insufficient detail, how data collection methods and sample size can affect the results of data sets

Grade 6

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
DATA INTERPRETATION	MA.6.12.1 Determine and interpret the measures of center (mean, median, mode) of a data set and explain what each measure indicates about the data set	The student: Determines the mean, median, and mode of a data set, compares these measures, and explains what the measures say about the data (e.g., when the mean, median and mode are the same, the student recognizes that the data is symmetrically distributed; when the mean is significantly greater than the median, the student recognizes that data is skewed toward the high end).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Determine and interpret the measures of center (mean, median, mode) of a data set and explain what each measure indicates about the data set, with accuracy	Determine and interpret the measures of center (mean, median, mode) of a data set and explain what each measure indicates about the data set, with no significant errors	Determine and interpret the measures of center (mean, median, mode) of a data set and explain what each measure indicates about the data set, with a few significant errors	Determine and interpret the measures of center (mean, median, mode) of a data set and explain what each measure indicates about the data set, with many significant errors

Grade 6

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
DATA INTERPRETATION	MA.6.12.2 Use a stem-and-leaf plot to analyze a set of data		The student: Uses the shape of the data in a stem-and-leaf plot to describe the data, and determines the mean, median, and mode and uses these measures to describe the data.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use a stem-and-leaf plot to analyze a set of data, with accuracy	Use a stem-and-leaf plot to analyze a set of data, with no significant errors	Use a stem-and-leaf plot to analyze a set of data, with a few significant errors	Use a stem-and-leaf plot to analyze a set of data, with many significant errors

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
PREDICTIONS AND INFERENCES	MA.6.13.1 Make inferences about a population based on the interpretation of a sample data set		The student: Analyzes a sample data set and uses that information to make a generalization that applies to the population.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently make reasonable inferences about a population based on the interpretation of a sample data set	Usually make reasonable inferences about a population based on the interpretation of a sample data set	Sometimes make reasonable inferences about a population based on the interpretation of a sample data set	Rarely make reasonable inferences about a population based on the interpretation of a sample data set

Grade 6

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
PROBABILITY	MA.6.14.1 Compute probabilities of simple compound events (e.g., rolling two dice, using two different spinners at the same time)		The student: Uses a strategy (e.g., tree diagram, organized list, area model) to systematically determine all of possibilities of two events occurring (e.g. two coins tossed, a spinner being spun twice), and states the probability of the outcomes occurring.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Accurately compute probabilities of simple compound events, and demonstrates an effective strategy	Compute probabilities of simple compound events, with no significant errors	Compute probabilities of simple compound events, with a few significant errors	Compute probabilities of simple compound events, with many significant errors

Grade 7

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.7.1.1 Solve problems using fractions, decimals, and percents		The student: Uses representations, models, equivalent forms, or other appropriate strategies to solve problems that involve fractions, decimals, or percents.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Follow and communicate appropriate strategies to solve problems using fractions, decimals, and percents, with accuracy	Solve problems using fractions, decimals, and percents, with no significant errors	Solve problems using fractions, decimals, and percents, with a few significant errors	Solve problems using fractions, decimals, and percents, with many significant errors
NUMBERS AND NUMBER SYSTEMS	MA.7.1.2 Identify situations that require the use of large numbers and represent them using scientific notation		The student: Converts between standard notation and scientific notation when solving problems that involve large numbers.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify problem situations that require the use of large numbers, represent them using scientific notation, and accurately solve the situation	Identify situations that require the use of large numbers, and represent them using scientific notation, with no significant errors	Identify situations that require the use of large numbers, and represent them using scientific notation, with some significant errors	Identify situations that require the use of large numbers, and is unable to represent them using scientific notation

Grade 7

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMBERS AND NUMBER SYSTEMS	MA.7.1.3 Describe and solve situations represented by integers and absolute value	The student: Creates a problem involving integers in which the concept of absolute value is applied.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe and solve situations represented by integers and absolute value, with accuracy	Describe and solve situations represented by integers and absolute value, with no significant errors	Describe and solve situations represented by integers and absolute value, with a few significant errors	Describe and solve situations represented by integers and absolute value, with many significant errors
NUMBERS AND NUMBER SYSTEMS	MA.7.1.4 Apply number theory concepts to solve problems	The student: Shows or explains how his or her understanding of a number theory concept helped to solve a problem (e.g., explains how the concept of least common multiples can be used to find out the fewest packages of 10 hotdogs and packages of 8 buns it would take to have exactly one hotdog for each bun with none left over).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Select and apply appropriate number theory concepts to accurately solve problems	Apply number theory concepts to solve problems, with no significant errors	Apply number theory concepts to solve problems, with a few significant errors	Apply number theory concepts to solve problems, with many significant errors

Grade 7

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
OPERATIONS	MA.7.2.1 Describe situations involving arithmetic operations with integers	The students: Creates a situation that involves calculating with positive and negative integers.	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Describe situations involving arithmetic operations with integers, with accuracy	Describe situations involving arithmetic operations with integers, with no significant errors	Describe situations involving arithmetic operations with integers, with a few significant errors	Have difficulty describing situations involving arithmetic operations with integers

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
OPERATIONS	MA.7.2.2 Apply the order of operations when calculating with rational number, excluding exponents	The student: Expands his or her use of the order of operations from whole numbers to rational numbers, excluding exponents and applies the order of operations in the correct sequence when simplifying numeric expressions that involve rational numbers (i.e., fractions, decimals, integers).	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Apply the order of operations when calculating with rational number, excluding exponents, with accuracy	Apply the order of operations when calculating with rational number, excluding exponents, with no significant errors	Apply the order of operations when calculating with rational number, excluding exponents, with a few significant errors	Apply the order of operations when calculating with rational number, excluding exponents, with many significant errors

Grade 7

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.7.2.3 Apply the inverse relationship between addition and subtraction, and between multiplication and division, to solve one-step equations		The student: Uses the inverse operation to isolate a variable on one side of an equation (e.g., [x + 8 = 15] can be changed by [x + 8 - 8 = 15 - 8] to become y = 7).
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the inverse relationship between addition, and subtraction and between multiplication and division, to solve one-step equations, with accuracy	Apply the inverse relationship between addition, and subtraction and between multiplication and division, to solve one-step equations, with no significant errors	Apply the inverse relationship between addition, and subtraction and between multiplication and division, to solve one-step equations, with a few significant errors	Have difficulty applying the inverse relationship between addition, and subtraction and between multiplication and division, to solve one-step equations

Grade 7

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
COMPUTATIONAL FLUENCY	MA.7.3.1 Add, subtract, multiply, and divide integers		The student: Uses a model (e.g., number line or red/black chips) to add (or subtract) integers; multiplies (or divides) integers and knows whether the answer is positive or negative.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Add, subtract, multiply, and divide integers, with accuracy	Add, subtract, multiply, and divide integers, with no significant errors	Add, subtract, multiply, and divide integers, with a few significant errors	Add, subtract, multiply, and divide integers, with many significant errors
ESTIMATION	MA.7.3.2 Determine the reasonableness of a solution by comparing the answer to an estimate		The student: Rounds the answer, then compares it to his or her calculation to judge if it is correct (e.g., rounds the solution to "3,784 x 82 to 4,000 x 80").
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently determine the reasonableness of a solution by comparing the answer to an estimate	Usually determine the reasonableness of a solution by comparing the answer to an estimate	Sometimes determine the reasonableness of a solution by comparing the answer to an estimate	Rarely determine the reasonableness of a solution by comparing the answer to an estimate

Grade 7

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
MEASUREMENT ATTRIBUTES AND UNITS	MA.7.4.1 Determine how measurements, such as perimeter and area, of common shapes (e.g., squares, rectangles, parallelograms, triangles, circles) are affected when one of the attributes is changed in some way	The student: Determines the new area and perimeter of a shape when one of its dimensions is doubled in length.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain and provide supporting examples of how measurements of common shapes are affected when one of the attributes is changed in some way	Determine how measurements of common shapes are affected when one of the attributes is changed in some way, with no significant errors	Determine how measurements of common shapes are affected when one of the attributes is changed in some way, with a few significant errors	Determine how measurements of common shapes are affected when one of the attributes is changed in some way, with many significant errors
MEASUREMENT TOOLS AND TECHNIQUES	MA.7.4.2 Uses ratios and proportions to relate a scale drawing to the actual object	The student: Selects an appropriate ratio and uses proportions to make a scale drawing of an object.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Uses ratios and proportions to relate a scale drawing to the actual object, with accuracy	Uses ratios and proportions to relate a scale drawing to the actual object, with no significant errors	Uses ratios and proportions to relate a scale drawing to the actual object, with a few significant errors	Uses ratios and proportions to relate a scale drawing to the actual object, with many significant errors

Grade 7

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT FORMULAS	MA.7.4.3 Use known measurements (e.g., radius) to calculate desired measurements (e.g., circumference and area) of circles		The student: Applies a formula to calculate the area of a circle when its radius is given; first determines the radius, then calculates the area when its diameter is given; determines the radius when the circumference is given.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use known measurements to calculate desired measurements of circles, with accuracy	Use known measurements to calculate desired measurements of circles, with no significant errors	Use known measurements to calculate desired measurements of circles, with a few significant errors	Use known measurements to calculate desired measurements of circles, with many significant errors

Grade 7

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.7.5.1 Apply the concept of similarity to solve problems		The student: Uses the concept of similarity to determine an unknown measurement (e.g., the height of a tall flagpole) using other known measurements (e.g., compares the length of the shadow of a small stick and the shadow of the flagpole and uses the ratio of the shadows to calculate the height of the flagpole from the height of the stick).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the concept of similarity to solve problems, with accuracy	Apply the concept of similarity to solve problems, with no significant errors	Apply the concept of similarity to solve problems, with a few significant errors	Apply the concept of similarity to solve problems, with many significant errors

Grade 7

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
TRANSFORMATION	MA.7.6.1 Describe changes in size between a given figure and its dilation	The student: Provides examples of the application of the concept of dilation (e.g., overhead projectors, the enlargement feature on a copy machine).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe changes in size between a given figure and its dilation, with accuracy	Describe changes in size between a given figure and its dilation, with no significant errors	Describe changes in size between a given figure and its dilation, with a few significant errors	Describe changes in size between a given figure and its dilation, with many significant errors

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark at this level	

Grade 7

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.7.8.1 Use coordinate geometry to determine the change in size of a figure that is dilated by a scale factor	The student: Uses the differences in the ordered pair of the corresponding vertices of a figure to determine the scale factor by which the figure was dilated.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use coordinate geometry to determine the change in size of a figure that is dilated by a scale factor, with accuracy	Use coordinate geometry to determine the change in size of a figure that is dilated by a scale factor, with no significant errors	Use coordinate geometry to determine the change in size of a figure that is dilated by a scale factor, with a few significant errors	Use coordinate geometry to determine the change in size of a figure that is dilated by a scale factor, with many significant errors

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
PATTERNS	MA.7.9.1 Create a pattern or function for a rule given in symbolic form	The student: Creates a table of values or draws a series of pictures that represents a given rule in symbolic form, such as N + 7.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Create a pattern or function for a rule given in symbolic form, with accuracy	Create a pattern or function for a rule given in symbolic form, with no significant errors	Create a pattern or function for a rule given in symbolic form, with a few significant errors	Create a pattern or function for a rule given in symbolic form, with many significant errors

Grade 7

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
FUNCTIONS	MA.7.9.2 Describe multi-step functions using words and symbols when given a table of "input" and "output" values and use the rule for the function to determine other input and output values	The student: Finds the rule for given table of values and uses the rule to find other missing values in the table. Example: Describe the rule for this function and fill in the missing values.

Input	0	1	2	5	10	100	
Output	3	5	7	13		203	53

RUBRIC

Advanced	Proficient	Partially Proficient	Novice
Describe multi-step functions using words and symbols when given a table of "input" and "output" values and use the rule for the function to determine other input and output values, with accuracy	Describe multi-step functions using words and symbols when given a table of "input" and "output" values and use the rule for the function to determine other input and output values, with no significant errors	Describe multi-step functions using words and symbols when given a table of "input" and "output" values and use the rule for the function to determine other input and output values, with a few significant errors	Describe multi-step functions using words and symbols when given a table of "input" and "output" values and use the rule for the function to determine other input and output values, with many significant errors

Grade 7

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.7.10.1 Analyze the relationship among tables, graphs (including graphing technology when available), and equations of linear functions, paying particular attention to the meaning of intercept and slope	The student: Shows or explains how slope and y-intercept are represented in a table, graph, and equation.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Effectively explain, in great detail, the relationships among tables, graphs, and equations of linear functions, paying particular attention to the meaning of intercept and slope	Explain, in sufficient detail, the relationships among tables, graphs, and equations of linear functions, paying particular attention to the meaning of intercept and slope	Explain, in some (though not enough) detail, the relationships among tables, graphs, and equations of linear functions, paying particular attention to the meaning of intercept and slope	Explain, in insufficient detail, the relationships among tables, graphs, and equations of linear functions, paying particular attention to the meaning of intercept and slope
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.7.10.2 Use symbolic algebra to represent situations involving linear relationships	The student: Writes an equation to represent a linear relationship and defines what each variable represents.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use symbolic algebra to represent situations involving linear relationships, with accuracy	Use symbolic algebra to represent situations involving linear relationships, with no significant errors	Use symbolic algebra to represent situations involving linear relationships, with a few significant errors	Have difficulty using symbolic algebra to represent situations involving linear relationships

Grade 7

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.7.10.3 Solves linear equations and inequalities with one variable using algebraic methods, manipulatives, or models	The student: Solves a given equation or inequality for the unknown value and explains/shows how he or she determined the unknown value.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve linear equations and inequalities with one variable using algebraic methods, manipulatives, or models, with accuracy, and show/explain how to determine the unknown value	Solve linear equations and inequalities with one variable using algebraic methods, manipulatives, or models, with no significant errors	Solve linear equations and inequalities with one variable using algebraic methods, manipulatives, or models, with a few significant errors	Solves linear equations and inequalities with one variable using algebraic methods, manipulatives, or models, with many significant errors

Grade 7

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK		PERFORMANCE INDICATOR	
DATA COLLECTION AND REPRESENTATION	MA.7.11.1 Design a study, collect data, and select the appropriate representation (line graph, bar graph, circle graph, histogram, stem and leaf plot, box and whisker plot) to display the data		The student: Selects a representation that supports the desired purpose of the study and is appropriate for the type of data being displayed (e.g., chooses to display data about what he or she spends his or her allowance on in a circle graph to emphasize the percentages that the data represents).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Design a meaningful and insightful study, collect data, and select the appropriate representation to display the data, with accuracy	Design a study, collect data, and select the appropriate representation to display the data, with no significant errors	Design a study, collect data, and select the appropriate representation to display the data, with a few significant errors	Design a study, collect data, and select the appropriate representation to display the data, with many significant errors

Grade 7

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
DATA INTERPRETATION	MA.7.12.1 Relate the spread of a data set to a box-and-whisker plot		The student: Relates the distribution of data within each quartile to the shape of the box and the length of the whiskers in a box-and-whisker plot.
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Effectively and accurately explain how the spread of a data set is related to a box-and-whisker plot	Relate the spread of a data set to a box-and-whisker plot, with no significant errors	Relate the spread of a data set to a box-and-whisker plot, with a few significant errors	Relate the spread of a data set to a box-and-whisker plot, with many significant errors

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
PREDICTIONS AND INFERENCES	MA.7.13.1 Formulate new questions that arise from previous conclusions or conjectures and plan a new study to answer them		The student: Plans a study to answer new questions that arise based on conjectures that he or she made from a previous study.
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Formulate new questions that arise from previous conclusions or conjectures and plan a new study to answer them, with accuracy	Formulate new questions that arise from previous conclusions or conjectures and plan a new study to answer them, with no significant errors	Formulate new questions that arise from previous conclusions or conjectures and plan a new study to answer them, with a few significant errors	Formulate new questions that arise from previous conclusions or conjectures and plan a new study to answer them, with many significant errors

Grade 7

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
PROBABILITY	MA.7.14.1 Relate theoretical probability to experimental results		The student: Uses theoretical probability to support conjectures about the results of an experiment or simulation.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Effectively and accurately explain how theoretical probability relates to experimental results	Relate theoretical probability to experimental results, with no significant errors	Relate theoretical probability to experimental results, with a few significant errors	Relate theoretical probability to experimental results, with many significant errors

Grade 8

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.8.1.1 Identify situations represented by square roots and cube roots	The student: Provides examples of situations that use square roots and cube roots (e.g., explains that the length of the hypotenuse of a right triangle may be represented by a square root).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Describe and provide examples of situations represented by square roots and cube roots	Identify situations represented by square roots and cube roots	Recognize whether situations involve square roots or cube roots	Have difficulty recognizing whether situations involve square roots or cube roots

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.8.1.2 Compare and order rational numbers and square roots	The student: Orders a set of rational numbers and square roots on the number line.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Accurately order rational numbers and square roots, and justify the comparison	Compare and order rational numbers and square roots, with no significant errors	Compare and order rational numbers and square roots, with a few significant errors	Have difficulty comparing and ordering rational numbers and square roots

Grade 8

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMBERS AND NUMBER SYSTEMS	MA.8.1.3 Use ratios and proportions to represent the relationship between two quantities	The student: Describes a situation that involves two related quantities in the form of a ratio (e.g., if Katie shoots 3 baskets out of 8 attempts, represents her score:miss ratio as 3:5).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use ratios and proportions to represent the relationship between two quantities, with accuracy	Use ratios and proportions to represent the relationship between two quantities, with no significant errors	Use ratios and proportions to represent the relationship between two quantities, with a few significant errors	Use ratios and proportions to represent the relationship between two quantities, with many significant errors

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
OPERATIONS	MA.8.2.1 Apply the order of operations when calculating with rational numbers	The student: Expands his or her use of the order of operations to include exponents and applies the order of operations in the correct sequence when simplifying numeric expressions that involve rational numbers (i.e., fractions, decimals, integers).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the order of operations when calculating with rational numbers, with accuracy	Apply the order of operations when calculating with rational numbers, with no significant errors	Apply the order of operations when calculating with rational numbers, with a few significant errors	Apply the order of operations when calculating with rational numbers, with many significant errors

Grade 8

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
OPERATIONS	MA.8.2.2 Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots		The student: Finds the area of a square whose side length is a square root (e.g., $[\sqrt{7}]^2 = 7$).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with accuracy	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with no significant errors	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with a few significant errors	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with many significant errors

Grade 8

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.8.3.1 Add, subtract, multiply, and divide numbers with whole number exponents		The student: Uses arithmetic properties (e.g., associative, commutative, distribute, identity properties) and the Law of Exponents to calculate numbers that have whole number exponents (e.g., 4^2 x 4^4 = 4^6), and when appropriate, use the properties to make it easier to perform the calculations (e.g., instead of multiplying 3 x 3 x 3 x 3 to calculate 3^4, the student represents 3^4 as 3^2 x 3^2 which becomes 9 x 9 which can be more easily computed with mental math).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Add, subtract, multiply, and divide numbers with whole number exponents, with accuracy	Add, subtract, multiply, and divide numbers with whole number exponents, with no significant errors	Add, subtract, multiply, and divide numbers with whole number exponents, with a few significant errors	Add, subtract, multiply, and divide numbers with whole number exponents, with many significant errors
ESTIMATION	MA.8.3.2 Estimate a reasonable range (i.e., upper and lower limit) for the solution to a problem		The student: Uses appropriate estimation strategies to state upper and lower bounds of the estimated answer (e.g., estimates that the $\sqrt{31}$ must be between 5 and 6, since the $\sqrt{25}$ = 5 and the $\sqrt{36}$ = 6).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently estimate a reasonable range for the solution to a problem, and provide rationale	Usually estimate a reasonable range for the solution to a problem	Sometimes estimate a reasonable range for the solution to a problem	Rarely estimate a reasonable range for the solution to a problem

Grade 8

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.8.4.1 Select and use appropriate units to measure the surface area and volume of solids		The student: Selects a unit based on the desired level of precision, and explains why that unit was chosen rather than a different unit.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently select and use appropriate units to measure the surface area and volume of solids, and justify the choice of units	Usually select and use appropriate units to measure the surface area and volume of solids	Sometimes select and use appropriate units to measure the surface area and volume of solids	Rarely select and use appropriate units to measure the surface area and volume of solids
MEASUREMENT TOOLS AND TECHNIQUES	MA.8.4.2 Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems		The student: Measures two quantities that are related (e.g., the capacity of water that comes out of a water fountain in 10 seconds), expresses the quantities as a ratio (rate), and uses it to solve a problem (e.g., "How long would it take to fill a gallon of water from a water fountain?").	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with accuracy	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with no significant errors	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with a few significant errors	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with many significant errors

Grade 8

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT FORMULAS	MA.8.4.3 Use ratios and proportions to solve measurement problems		The student: Uses ratios and proportions to determine an unknown measurement when given known measurements (e.g., a student uses her height, the length of her shadow, and the length of a flagpole's shadow to determine the flagpole's height).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use ratios and proportions to solve measurement problems, with accuracy	Use ratios and proportions to solve measurement problems, with no significant errors	Use ratios and proportions to solve measurement problems, with a few significant errors	Use ratios and proportions to solve measurement problems, with many significant errors
MEASUREMENT FORMULAS	MA.8.4.4 Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids		The student: Applies the formula for the volume of prisms (or cylinders) when the necessary measurements are given; decomposes a prism (or cylinder or pyramid) into its different faces/bases, and applies strategies or formulas to determine their areas.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with accuracy	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with no significant errors	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with a few significant errors	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with many significant errors

Grade 8

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.8.5.1 Apply the Pythagorean theorem to solve problems involving right triangles		The student: Uses the Pythagorean theorem to find an unknown length in a problem involving a right triangle (e.g., finds the height of the ladder needed to wash a window that is 25 feet above the ground if the ladder is placed 4 feet from the side of the house).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the Pythagorean theorem to solve problems involving right triangles, with accuracy	Apply the Pythagorean theorem to solve problems involving right triangles, with no significant errors	Apply the Pythagorean theorem to solve problems involving right triangles, with a few significant errors	Apply the Pythagorean theorem to solve problems involving right triangles, with many significant errors

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
TRANSFORMATION	MA.8.6.1 Perform a transformation (reflection, rotation, translation) when given a figure and necessary parameters		The student: Reflects a given figure over a given line of symmetry; rotates a given figure by a given angle around a given center of rotation; translates a given figure in a given direction by a given distance.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Perform a transformation when given a figure and necessary parameters, with precision and accuracy	Perform a transformation when given a figure and necessary parameters, with no significant errors	Perform a transformation when given a figure and necessary parameters, with a few significant errors	Perform a transformation when given a figure and necessary parameters, with many significant errors

Grade 8

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
TRANSFORMATION	MA.8.6.2 Describe the size, position, and orientation of shapes under transformations and compositions of transformations	The student: Describes the size, position, and orientation of a given shape after it has been reflected over one line of reflection, and the resulting image has been reflected over a second line of reflection.

	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe the size, position, and orientation of shapes under transformations and compositions of transformations, with accuracy	Describe the size, position, and orientation of shapes under transformations and compositions of transformations, with no significant errors	Describe the size, position, and orientation of shapes under transformations and compositions of transformations, with a few significant errors	Describe the size, position, and orientation of shapes under transformations and compositions of transformations, with many significant errors

Grade 8

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
VISUALIZATION AND SPATIAL REASONING	MA.8.7.1 Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures	The student: Uses the two-dimensional net of a cylinder to determine its surface area.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Strategically use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with accuracy	Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with no significant errors	Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with a few significant errors	Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with many significant errors

Grade 8

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.8.8.1 Use coordinate geometry to represent transformations in the coordinate plane	The student: Determines the coordinates of a figure after it has been transformed (e.g., uses the coordinates of a given figure and its distance from the line of symmetry to locate the coordinates of its reflection).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use coordinate geometry to represent transformations in the coordinate plane, with accuracy	Use coordinate geometry to represent transformations in the coordinate plane, with no significant errors	Use coordinate geometry to represent transformations in the coordinate plane, with a few significant errors	Use coordinate geometry to represent transformations in the coordinate plane, with many significant errors

Grade 8

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.8.9.1 Represent a variety of patterns (including recursive patterns) with tables, graphs (including graphing technology when available), words, and when possible, symbolic rules		The student: Identifies the rule that generates a recursive sequence, describes the pattern in words, and gives the next four numbers in the sequence (e.g., 1, 1, 2, 3, 5, 8, 13, __, __, __, __).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with accuracy	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with no significant errors	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with a few significant errors	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with many significant errors
FUNCTIONS	MA.8.9.2 Use linear relationships with two variables to solve problems		The student: Organizes data about the two variables into a table and/or graph, and uses the pattern or rule that defines the linear relationship to make predictions about data not in the original set.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use linear relationships with two variables to solve problems, with accuracy	Use linear relationships with two variables to solve problems, with no significant errors	Use linear relationships with two variables to solve problems, with a few significant errors	Use linear relationships with two variables to solve problems, with many significant errors

Grade 8

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTIONS	MA.8.9.3 Identify functions as linear or nonlinear and contrast their properties from tables, graphs (including graphing technology when available), or equations		The student: Uses the data in a table to determine if the data represents a linear or nonlinear function, and justifies the decision.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify functions as linear or nonlinear, and explain and provide examples of how their properties are contrasted in tables, graphs, and equations	Identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations	Identify functions as linear or nonlinear and attempt to contrast their properties	Have difficulty identifying functions as linear or nonlinear

Grade 8

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.8.10.1 Translate among tables, graphs (including graphing technology when available), and equations involving linear relationships	The student: Uses the information in a table to make a graph and equation; uses the information in a graph to make a table and equation; and uses a linear equation to make a table and graph.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Translate fluently among tables, graphs, and equations involving linear relationships, with accuracy	Translate among tables, graphs, and equations involving linear relationships, with no significant errors	Translate among tables, graphs, and equations involving linear relationships, with a few significant errors	Translate among tables, graphs, and equations involving linear relationships, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.8.10.2 Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models	The student: Solves a given equation or inequality for the unknown values and shows/explains how he or she determined the unknown values.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with accuracy	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with no significant errors	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with a few significant errors	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with many significant errors

Grade 8

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.8.10.3 Use tables and graphs to represent and compare linear relationships	The student: Translates the information from a problem or equation into tables and graphs, and compares the tables (and graphs) of each relationship, paying particular attention to the point of intersection and the values leading up to the point of intersection and the values leading away from the point of intersection (e.g., Determine which is the better video rental plan if Plan A is represented by the equation C = 5V and Plan B is represented by the equation C = 2V + 20 where C is the cost in dollars and V is the number of videos rented).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use tables and graphs to represent and compare linear relationships, with accuracy	Use tables and graphs to represent and compare linear relationships, with no significant errors	Use tables and graphs to represent and compare linear relationships, with a few significant errors	Use tables and graphs to represent and compare linear relationships, with many significant errors

Grade 8

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
RATES OF CHANGE	MA.8.10.4 Use the slope of a line to describe a constant rate of change	The student: Determines the slope of a line and uses that information to indicate the rate of change (e.g., finds the constant speed of a train by determining the slope of a distance-time graph of the train's movement).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use the slope of a line to describe a constant rate of change, with accuracy	Use the slope of a line to describe a constant rate of change, with no significant errors	Use the slope of a line to describe a constant rate of change, with a few significant errors	Use the slope of a line to describe a constant rate of change, with many significant errors

Grade 8

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
DATA COLLECTION AND REPRESENTATION	MA.8.11.1 Design a study that compares two samples, collect data, and select the appropriate representation (e.g., double bar graph, back-to-back stem and leaf plot, parallel box and whisker plots, scatter plot) to compare the sets of data	The student: Selects a representation that supports the desired purpose of the study and shows a visual comparison of the data sets (e.g., in studying the relationship between an 8th grader's height and arm span, the student displays chooses to represent the data in a scatter plot since scatter plots are designed to determine if correlations between two variables exist).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with accuracy	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with no significant errors	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with a few significant errors	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with many significant errors

Grade 8

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND REPRESENTATION	MA.8.11.2 Judge the validity of data based on the data collection method		The student: Explains that the results of an experiment or survey may be questionable because the data collection method or the way the sample was chosen is questionable.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently make reasonable judgments about the validity of data based on the data collection method	Usually make reasonable judgments about the validity of data based on the data collection method	Sometimes make reasonable judgments about the validity of data based on the data collection method	Rarely make reasonable judgments about the validity of data based on the data collection method

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA INTERPRETATION	MA.8.12.1 Recognize situations appropriate for scatter plots		The student: Chooses to use a scatter plot when determining if a correlation exists between two variables (e.g., comparing the height of students to their arm spans).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize situations appropriate for scatter plots, and create situations that involve using scatter plots	Usually recognize situations appropriate for scatter plots	Sometimes recognize situations appropriate for scatter plots	Rarely recognize situations appropriate for scatter plots

Grade 8

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
DATA INTERPRETATION	MA.8.12.2 Analyze different representations of the same data to describe how representations can be used to skew a person's interpretation of the data		The student: Adjusts the intervals or scale on a graph to change the appearance of the graph and describes how the changes that were made affect a person's interpretation of the data.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Analyze different representations of the same data to describe, in great detail, how representations can be used to skew a person's interpretation of the data	Analyze different representations of the same data to describe, in sufficient detail, how representations can be used to skew a person's interpretation of the data	Analyze different representations of the same data to describe, in some (but not enough) detail, how representations can be used to skew a person's interpretation of the data	Analyze different representations of the same data to describe, in insufficient detail, how representations can be used to skew a person's interpretation of the data

Grade 8

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
PREDICTIONS AND INFERENCES	MA.8.13.1 Make conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots	The student: Analyzes a scatter plot and makes a conjecture based on the presence or absence of an approximate line of best fit.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Make reasonable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots, and justify the conjecture	Make reasonable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots	Make questionable conjectures (though somewhat justifiable) about possible relationships between two characteristics of a sample based on interpretations of scatter plots	Make unjustifiable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots

Advanced	Proficient	Partially Proficient	Novice
Make reasonable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots, and justify the conjecture	Make reasonable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots	Make questionable conjectures (though somewhat justifiable) about possible relationships between two characteristics of a sample based on interpretations of scatter plots	Make unjustifiable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots

Grade 8

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
PROBABILITY	MA.8.14.1 Judge the validity of conjectures that are based on experiments or simulations	The student: Refers to the theoretical probability, sample size, and data collection techniques to support the validity of a conjecture that is based on experiments or simulations with predictable outcomes.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Make reasonable judgments on the validity of conjectures that are based on experiments or simulations, and provides effective justification for the judgment	Make reasonable judgments on the validity of conjectures that are based on experiments or simulations	Make plausible judgments on the validity of conjectures that are based on experiments or simulations	Make unreasonable judgments on the validity of conjectures that are based on experiments or simulations

Pre-Algebra

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMBERS AND NUMBER SYSTEMS	MA.PA.1.1 Identify situations represented by square roots and cube roots	The student: Provides examples of situations that use square roots and cube roots (e.g., explains that the length of the hypotenuse of a right triangle may be represented by a square root).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe and provide examples of situations represented by square roots and cube roots	Identify situations represented by square roots and cube roots	Recognize whether situations involve square roots or cube roots	Have difficulty recognizing whether situations involve square roots or cube roots
NUMBERS AND NUMBER SYSTEMS	MA.PA.1.2 Compare and order rational numbers and square roots	The student: Orders a set of rational numbers and square roots on the number line.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Accurately order rational numbers and square roots, and justify the comparison	Compare and order rational numbers and square roots, with no significant errors	Compare and order rational numbers and square roots, with a few significant errors	Have difficulty comparing and ordering rational numbers and square roots

Pre-Algebra

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMBERS AND NUMBER SYSTEMS	MA.PA.1.3 Use ratios and proportions to represent the relationship between two quantities	The student: Describes a situation that involves two related quantities in the form of a ratio (e.g., if Katie shoots 3 baskets out of 8 attempts, represents her score: miss ratio as 3:5).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use ratios and proportions to represent the relationship between two quantities, with accuracy	Use ratios and proportions to represent the relationship between two quantities, with no significant errors	Use ratios and proportions to represent the relationship between two quantities, with a few significant errors	Use ratios and proportions to represent the relationship between two quantities, with many significant errors

Pre-Algebra

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
OPERATIONS	MA.PA.2.1 Apply the order of operations when calculating with rational numbers	The student: Expands his or her use of the order of operations to include exponents and applies the order of operations in the correct sequence when simplifying numeric expressions that involve rational numbers (i.e., fractions, decimals, integers).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the order of operations when calculating with rational numbers, with accuracy	Apply the order of operations when calculating with rational numbers, with no significant errors	Apply the order of operations when calculating with rational numbers, with a few significant errors	Apply the order of operations when calculating with rational numbers, with many significant errors
OPERATIONS	MA.PA.2.2 Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots	The student: Finds the area of a square whose side length is a square root (e.g., $[\sqrt{7}]^2 = 7$).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with accuracy	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with no significant errors	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with a few significant errors	Demonstrate the inverse relationship between square numbers and square roots, and cubes and cubed roots, with many significant errors

Pre-Algebra

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COMPUTATIONAL FLUENCY	MA.PA.3.1 Add, subtract, multiply, and divide numbers with whole number exponents	The student: Uses arithmetic properties (e.g., associative, commutative, distribute, identity properties) and the Law of Exponents to calculate numbers that have whole number exponents (e.g., 4^2 x 4^4 = 4^6), and when appropriate, use the properties to make it easier to perform the calculations (e.g., instead of multiplying 3 x 3 x 3 x 3 to calculate 3^4, the student represents 3^4 as 3^2 x 3^2 which becomes 9 x 9 which can be more easily computed with mental math).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Add, subtract, multiply, and divide numbers with whole number exponents, with accuracy	Add, subtract, multiply, and divide numbers with whole number exponents, with no significant errors	Add, subtract, multiply, and divide numbers with whole number exponents, with a few significant errors	Add, subtract, multiply, and divide numbers with whole number exponents, with many significant errors

Pre-Algebra

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
ESTIMATION	MA.PA.3.2 Estimate a reasonable range (i.e., upper and lower limit) for the solution to a problem		The student: Uses appropriate estimation strategies to state upper and lower bounds of the estimated answer (e.g., estimates that the $\sqrt{31}$ must be between 5 and 6, since the $\sqrt{25} = 5$ and the $\sqrt{36} = 6$).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently estimate a reasonable range for the solution to a problem	Usually estimate a reasonable range for the solution to a problem	Sometimes estimate a reasonable range for the solution to a problem	Rarely estimate a reasonable range for the solution to a problem
ESTIMATION	MA.PA.3.3 Explain that rounding answers in certain real-world situations may lead to major problems		The student: Describes problems that could occur in real-world situations if answers were rounded (e.g., rocket missing the moon, a bridge collapsing, automobile brakes not working).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain, in great detail, that rounding answers in certain real-world situations may lead to major problems	Explain, in detail, that rounding answers in certain real-world situations may lead to major problems	Explain, in some detail, that rounding answers in certain real-world situations may lead to major problems	Explain, in minimal detail, that rounding answers in certain real-world situations may lead to major problems

Pre-Algebra

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT ATTRIBUTES AND UNITS	MA.PA.4.1 Select and use appropriate units to measure the surface area and volume of solids		The student: Selects a unit based on the desired level of precision, and explains why that unit was chosen rather than a different unit.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently select and use appropriate units to measure the surface area and volume of solids	Usually select and use appropriate units to measure the surface area and volume of solids	Sometimes select and use appropriate units to measure the surface area and volume of solids	Rarely select and use appropriate units to measure the surface area and volume of solids
MEASUREMENT TOOLS AND TECHNIQUES	MA.PA.4.2 Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems		The student: Measures two quantities that are related (e.g., the capacity of water that comes out of a water fountain in 10 seconds), expresses the quantities as a ratio (rate), and uses it to solve a problem (e.g., "How long would it take to fill a gallon of water from a water fountain?").	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with accuracy	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with no significant errors	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with a few significant errors	Express rates of change as a ratio of two different measures, where units are included in the ratio, and use the derived rate to solve problems, with many significant errors

Pre-Algebra

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT FORMULAS	MA.PA.4.3 Use ratios and proportions to solve measurement problems		The student: Uses ratios and proportions to determine an unknown measurement when given known measurements (e.g., a student uses her height, the length of her shadow, and the length of a flagpole's shadow to determine the flagpole's height).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use ratios and proportions to solve measurement problems, with accuracy	Use ratios and proportions to solve measurement problems, with no significant errors	Use ratios and proportions to solve measurement problems, with a few significant errors	Use ratios and proportions to solve measurement problems, with many significant errors
MEASUREMENT FORMULAS	MA.PA.4.4 Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids		The student: Applies the formula for the volume of prisms (or cylinders) when the necessary measurements are given; decomposes a prism (or cylinder or pyramid) into its different faces/bases, and applies strategies or formulas to determine their areas.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with accuracy	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with no significant errors	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with a few significant errors	Use formulas to determine the surface area and volume of selected prisms, cylinders, and pyramids, with many significant errors

Pre-Algebra

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT FORMULAS	MA.PA.4.5 Use the right triangle relationships (e.g., trigonometric ratios: cosine, sine, and tangent) to solve problems	The student: Uses an angle measurement in a right triangle (other than the right angle) and the length of one of the sides to determine the lengths of the other two sides.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use the right triangle relationships to solve problems, with accuracy	Use the right triangle relationships to solve problems, with no significant errors	Use the right triangle relationships to solve problems, with a few significant errors	Use the right triangle relationships to solve problems, with many significant errors

Pre-Algebra

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.PA.5.1 Apply the Pythagorean theorem to solve problems involving right triangles	The student: Uses the Pythagorean theorem to find an unknown length in a problem involving a right triangle (e.g., finds the height of the ladder needed to wash a window that is 25 feet above the ground if the ladder is placed 4 feet from the side of the house).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the Pythagorean theorem to solve problems involving right triangles, with accuracy	Apply the Pythagorean theorem to solve problems involving right triangles, with no significant errors	Apply the Pythagorean theorem to solve problems involving right triangles, with a few significant errors	Apply the Pythagorean theorem to solve problems involving right triangles, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.PA.5.2 Evaluate conjectures about classes of two- and three-dimensional shapes/objects	The student: Provides examples and logical reasons that supports a conjecture that was made about two- and three-dimensional shapes/objects (e.g., all quadrilaterals with perpendicular diagonals are squares), or provides counterexamples that refutes the conjecture.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Evaluate conjectures about classes of two- and three-dimensional shapes/objects, with accuracy	Evaluate conjectures about classes of two- and three-dimensional shapes/objects, with no significant errors	Evaluate conjectures about classes of two- and three-dimensional shapes/objects, with a few significant errors	Evaluate conjectures about classes of two- and three-dimensional shapes/objects, with many significant errors

Pre-Algebra

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
TRANSFORMATION	MA.PA.6.1 Perform a transformation (reflection, rotation, translation) when given a figure and necessary parameters		The student: Reflects a given figures over a given line of symmetry; rotates a given figure by a given angle around a given center of rotation; translates a given figure in a given direction by a given distance.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Perform a transformation when given a figure and necessary parameters, with precision and accuracy	Perform a transformation when given a figure and necessary parameters, with no significant errors	Perform a transformation when given a figure and necessary parameters, with a few significant errors	Perform a transformation when given a figure and necessary parameters, with many significant errors
TRANSFORMATION	MA.PA.6.2 Describe the size, position, and orientation of shapes under transformations and compositions of transformations		The student: Describes the size, position, and orientation of a given shape after it has been reflected over one line of reflection, and the resulting image has been reflected over a second line of reflection.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, the size, position, and orientation of shapes under transformations and compositions of transformations	Describe, in detail, the size, position, and orientation of shapes under transformations and compositions of transformations	Describe, in some detail, the size, position, and orientation of shapes under transformations and compositions of transformations	Describe, in minimal detail, the size, position, and orientation of shapes under transformations and compositions of transformations

Pre-Algebra

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations				
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
TRANSFORMATION	MA.PA.6.3 Describe three-dimensional shapes that are formed by rotating two-dimensional figures about an axis		The student: Illustrates/shows/names the image that is formed when a two-dimensional figure is rotated (spun) quickly around an axis, and describes how features of the image correspond to the original figure.	
	RUBRIC			
	Advanced	Proficient	Advanced	Proficient
	Describe, in great detail, three-dimensional shapes that are formed by rotating two-dimensional figures about an axis	Describe, in detail, three-dimensional shapes that are formed by rotating two-dimensional figures about an axis	Describe, in some detail, three-dimensional shapes that are formed by rotating two-dimensional figures about an axis	Describe, in minimal detail, three-dimensional shapes that are formed by rotating two-dimensional figures about an axis

Pre-Algebra

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
VISUALIZATION AND SPATIAL REASONING	MA.PA.7.1 Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures		The student: Uses the two-dimensional net of a cylinder to determine its surface area.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Strategically use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with accuracy	Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with no significant errors	Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with a few significant errors	Use two-dimensional representations of pyramids, prisms, and cylinders to solve problems involving these figures, with many significant errors

Pre-Algebra

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
COORDINATE GEOMETRY	MA.PA.8.1 Use coordinate geometry to represent transformations in the coordinate plane	The student: Determines the coordinates of a figure after it has been transformed (e.g., uses the coordinates of a given figure and its distance from the line of symmetry to locate the coordinates of its reflection).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use coordinate geometry to represent transformations in the coordinate plane, with accuracy	Use coordinate geometry to represent transformations in the coordinate plane, with no significant errors	Use coordinate geometry to represent transformations in the coordinate plane, with a few significant errors	Use coordinate geometry to represent transformations in the coordinate plane, with many significant errors

Pre-Algebra

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.PA.9.1 Represent a variety of patterns (including recursive patterns) with tables, graphs (including graphing technology when available), words, and when possible, symbolic rules		The student: Identifies the rule that generates a recursive sequence, describes the pattern in words, and gives the next four numbers in the sequence (e.g., 1, 1, 2, 3, 5, 8, 13, __, __, __, __).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with accuracy	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with no significant errors	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with a few significant errors	Represent a variety of patterns with tables, graphs, words, and when possible, symbolic rules, with many significant errors
FUNCTIONS	MA.PA.9.2 Use linear relationships with two variables to solve problems		The student: Organizes data about the two variables into a table and/or graph, and uses the pattern or rule that defines the linear relationship to make predictions about data not in the original set.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use linear relationships with two variables to solve problems, with accuracy	Use linear relationships with two variables to solve problems, with no significant errors	Use linear relationships with two variables to solve problems, with a few significant errors	Use linear relationships with two variables to solve problems, with many significant errors

Pre-Algebra

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTIONS	MA.PA.9.3 Identify functions as linear or nonlinear and contrast their properties from tables, graphs (including graphing technology when available), or equations		The student: Uses the data in a table to determine if the data represents a linear or nonlinear function, and justifies the decision.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Identify functions as linear or nonlinear, and explain and provide examples of how their properties are contrasted in tables, graphs, and equations	Identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations	Identify functions as linear or nonlinear and attempt to contrast their properties	Have difficulty identifying functions as linear or nonlinear

Pre-Algebra

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.PA.10.1 Translate among tables, graphs (including graphing technology when available), and equations involving linear relationships	The student: Uses the information in a table to make a graph and equation; uses the information in a graph to make a table and equation; and uses a linear equation to make a table and graph.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Translate fluently among tables, graphs, and equations involving linear relationships, with accuracy	Translate among tables, graphs, and equations involving linear relationships, with no significant errors	Translate among tables, graphs, and equations involving linear relationships, with a few significant errors	Translate among tables, graphs, and equations involving linear relationships, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.PA.10.2 Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models	The student: Solves a given equation or inequality for the unknown values and shows/explains how he or she determined the unknown values.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with accuracy	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with no significant errors	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with a few significant errors	Solve linear equations and inequalities with two variables using algebraic methods, manipulatives, or models, with many significant errors

Pre-Algebra

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.PA.10.3 Use tables and graphs to represent and compare linear relationships	The student: Translates the information from a problem or equation into tables and graphs, and compares the tables (and graphs) of each relationship, paying particular attention to the point of intersection and the values leading up to the point of intersection and the values leading away from the point of intersection (e.g., Determine which is the better video rental plan if Plan A is represented by the equation C = 5V and Plan B is represented by the equation C = 2V + 20 where C is the cost in dollars and V is the number of videos rented).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use tables and graphs to represent and compare linear relationships, with accuracy	Use tables and graphs to represent and compare linear relationships, with no significant errors	Use tables and graphs to represent and compare linear relationships, with a few significant errors	Use tables and graphs to represent and compare linear relationships, with many significant errors

Pre-Algebra

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
RATES OF CHANGE	MA.PA.10.4 Use the slope of a line to describe a constant rate of change	The student: Determines the slope of a line and uses that information to indicate the rate of change (e.g., finds the constant speed of a train by determining the slope of a distance-time graph of the train's movement).

	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Use the slope of a line to describe a constant rate of change, with accuracy	Use the slope of a line to describe a constant rate of change, with no significant errors	Use the slope of a line to describe a constant rate of change, with a few significant errors	Use the slope of a line to describe a constant rate of change, with many significant errors

Pre-Algebra

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
DATA COLLECTION AND REPRESENTATION	MA.PA.11.1 Design a study that compares two samples, collect data, and select the appropriate representation (double bar graph, back-to-back stem and leaf plot, parallel box and whisker plots, scatter plot) to compare the sets of data		The student: Selects a representation that supports the desired purpose of the study and shows a visual comparison of the data sets (e.g., in studying the relationship between an 8th grader's height and arm span, the student displays chooses to represent the data in a scatter plot since scatter plots are designed to determine if correlations between two variables exist).
	RUBRIC			
	Advanced	Proficient	Partially Proficient	Novice
	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with accuracy	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with no significant errors	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with a few significant errors	Design a study that compares two samples, collect data, and select the appropriate representation to compare the sets of data, with many significant errors

Pre-Algebra

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND REPRESENTATION	MA.PA.11.2 Judge the validity of data based on the data collection method		The student: Explains that the results of an experiment or survey may be questionable because the data collection method or the way the sample was chosen is questionable.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently make reasonable judgments about the validity of data based on the data collection method	Usually make reasonable judgments about the validity of data based on the data collection method	Sometimes make reasonable judgments about the validity of data based on the data collection method	Rarely make reasonable judgments about the validity of data based on the data collection method

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA INTERPRETATION	MA.PA.12.1 Recognize situations appropriate for scatter plots		The student: Chooses to use a scatter plot when determining if a correlation exists between two variables (e.g., comparing the height of students to their arm spans).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize situations appropriate for scatter plots and create situations that involve using scatter plots	Usually recognize situations appropriate for scatter plots	Sometimes recognize situations appropriate for scatter plots	Rarely recognize situations appropriate for scatter plots

Pre-Algebra

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
DATA INTERPRETATION	MA.PA.12.2 Analyze different representations of the same data to describe how representations can be used to skew a person's interpretation of the data		The student: Adjusts the intervals or scale on a graph to change the appearance of the graph and describes how the changes that were made affect a person's interpretation of the data.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Analyze different representations of the same data to describe, in great detail, how representations can be used to skew a person's interpretation of the data	Analyze different representations of the same data to describe, in sufficient detail, how representations can be used to skew a person's interpretation of the data	Analyze different representations of the same data to describe, in some (but not enough) detail, how representations can be used to skew a person's interpretation of the data	Analyze different representations of the same data to describe, in insufficient detail, how representations can be used to skew a person's interpretation of the data

Pre-Algebra

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PREDICTIONS AND INFERENCES	MA.PA.13.1 Make conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots		The student: Analyzes a scatter plot and makes a conjecture based on the presence or absence of an approximate line of best fit.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Make reasonable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots, and justify the conjecture	Make reasonable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots	Make questionable conjectures (though somewhat justifiable) about possible relationships between two characteristics of a sample based on interpretations of scatter plots	Make unjustifiable conjectures about possible relationships between two characteristics of a sample based on interpretations of scatter plots

Pre-Algebra

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
PROBABILITY	MA.PA.14.1 Judge the validity of conjectures that are based on experiments or simulations	The student: Refers to the theoretical probability, sample size, and data collection techniques to support the validity of a conjecture that is based on experiments or simulations with predictable outcomes.	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Make reasonable judgments on the validity of conjectures that are based on experiments or simulations, and provides effective justification for the judgment	Make reasonable judgments on the validity of conjectures that are based on experiments or simulations	Make plausible judgments on the validity of conjectures that are based on experiments or simulations	Make unreasonable judgments on the validity of conjectures that are based on experiments or simulations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
PROBABILITY	MA.PA.14.2 Calculate probabilities for simple events under different relationships (e.g., inclusion, disjoint, complementary, independent, dependent, with replacement, without replacement)	The student: Calculates the probability of an event (or a combination of events) and shows/explains how the probability was determined.	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Calculate probabilities for simple events under different relationships, with accuracy	Calculate probabilities for simple events under different relationships, with no significant errors	Calculate probabilities for simple events under different relationships, with a few significant errors	Calculate probabilities for simple events under different relationships, with many significant errors

Pre-Algebra

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
PROBABILITY	MA.PA.14.3 Use the fundamental counting principle to calculate combinations and permutations	The student: Shows/describes/determines all the possible combinations (or permutations) of events (e.g., uses an organized list, a tree diagram, chart, illustration).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the fundamental counting principle to calculate combinations and permutations, with accuracy	Use the fundamental counting principle to calculate combinations and permutations, with no significant errors	Use the fundamental counting principle to calculate combinations and permutations, with a few significant errors	Use the fundamental counting principle to calculate combinations and permutations, with many significant errors

Algebra I

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.AI.1.1 Recognize situations that can be represented by matrices		The student: Decides if the information in a problem can be represented in a matrix, and if it can, shows how to input the data into a matrix.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize situations that can be represented by matrices, and create situations that involve using matrices	Usually recognize situations that can be represented by matrices	Sometimes recognize situations that can be represented by matrices	Rarely recognize situations that can be represented by matrices

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra I	

Algebra I

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COMPUTATIONAL FLUENCY	MA.AI.3.1 Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers	The student: Applies one property, or a combination of properties, to simplify radical expressions (e.g., when adding the radicals $\sqrt{18} + \sqrt{8}$, uses a combination of properties to write the equivalent expression, $3\sqrt{2} + 2\sqrt{2}$, then adds the radicals to get $5\sqrt{2}$).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with accuracy	Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with no significant errors	Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with a few significant errors	Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with many significant errors

Algebra I

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COMPUTATIONAL FLUENCY	MA.AI.3.2 Apply the laws of exponents to perform operations on expressions with integral exponents		The student: Applies the law of exponents to make it easier to simplify expressions that include integral exponents; in the case of negative exponents, the student rewrites the expression using positive exponents and simplifies (e.g., $3^{-2} = 1/3^2 = 1/9$).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the laws of exponents to perform operations on expressions with integral exponents, with accuracy	Apply the laws of exponents to perform operations on expressions with integral exponents, with no significant errors	Apply the laws of exponents to perform operations on expressions with integral exponents, with a few significant errors	Apply the laws of exponents to perform operations on expressions with integral exponents, with many significant errors
COMPUTATIONAL FLUENCY	MA.AI.3.3 Use addition, subtraction, and scalar multiplication of matrices to solve problems		The student: Represents the information in a problem with matrices, and then performs the appropriate operation on the matrices to solve the problem.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use addition, subtraction, and scalar multiplication of matrices to solve problems, with accuracy	Use addition, subtraction, and scalar multiplication of matrices to solve problems, with no significant errors	Use addition, subtraction, and scalar multiplication of matrices to solve problems, with a few significant errors	Use addition, subtraction, and scalar multiplication of matrices to solve problems, with many significant errors

Algebra I

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
MEASUREMENT FORMULAS MEASUREMENT FORMULAS	MA.AI.4.1 Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement	The student: Evaluates a formula to solve for a specific measure (e.g. after finding the temperature in Celsius, uses the formula, $F = 9/5C + 32$ to convert the temperature into Fahrenheit).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with accuracy	Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with no significant errors	Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with a few significant errors	Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with many significant errors

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Algebra I	

Algebra I

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Algebra I	

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Algebra I	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry				
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**	
COORDINATE GEOMETRY	MA.AI.8.1 Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques		The student: Shows/explains how to graph a line when the slope and y-intercept are known; shows/explains how to graph a line using the slope and one point on the line; shows/explains how to graph a line using the x- and y-intercepts.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Show and explain how to graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with accuracy	Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with no significant errors	Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with a few errors	Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with many significant errors

Algebra I

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
COORDINATE GEOMETRY	MA.AI.8.2 Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line	The student: Shows/explains how to finds the slope of a line using two points on the line (or when given the graph of a line, or when given the equation of the line).

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Show and explain how to determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with accuracy	Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with no significant errors	Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with a few significant errors	Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with many significant errors

Algebra I

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.AI.9.1 Determine if a linear pattern exists in a set of data and represent the data algebraically and graphically		The student: Uses an organized table of the data and/or a graph of the data to justify whether a linear pattern exists or not.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Show and explain how to determine if a linear pattern exists in a set of data, and represent the data algebraically and graphically, with accuracy	Determine if a linear pattern exists in a set of data, and represent the data algebraically and graphically, with no significant errors	Determine if a linear pattern exists in a set of data, and represent the data algebraically and graphically, with a few significant errors	Have difficulty determining if a linear pattern exists in a set of data, and is unable to represent the data algebraically and graphically
PATTERNS	MA.AI.9.2 Compare and contrast the concepts of direct and inverse variation of a relation		The student: Finds a relation that is a direct variation and represents it on a graph.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare and contrast, in great detail, the concepts of direct and inverse variation of a relation	Compare and contrast, in sufficient detail, the concepts of direct and inverse variation of a relation	Compare and contrast, in some (but not enough) detail, the concepts of direct and inverse variation of a relation	Compare and contrast, in insufficient detail, the concepts of direct and inverse variation of a relation

Algebra I

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
FUNCTIONS	MA.AI.9.3 Determine the zeros of a linear or quadratic function algebraically and graphically	The student: Shows/explains how to use an algebraic method (or graph, or graphing calculator) to find the zeros of a function.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Show and explain how to determine the zeros of a linear or quadratic function algebraically and graphically, with accuracy	Determine the zeros of a linear or quadratic function algebraically and graphically, with no significant errors	Determine the zeros of a linear or quadratic function algebraically and graphically, with a few significant errors	Determine the zeros of a linear or quadratic function algebraically and graphically, with many significant errors
FUNCTIONS	MA.AI.9.4 Compare and contrast the properties of linear functions and exponential functions	The student: Graphs several linear functions and several exponential functions to compare the shape of the graphs.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare and contrast, in great detail, the properties of linear functions and exponential functions	Compare and contrast, in sufficient detail, the properties of linear functions and exponential functions	Compare and contrast, in some (but not enough) detail, the properties of linear functions and exponential functions	Compare and contrast, in insufficient detail, the properties of linear functions and exponential functions

Algebra I

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.1 Solve linear equations and inequalities in one variable using a variety of strategies (e.g., algebraically, by graphing, by using a graphing calculator)		The student: Shows/explains how to solve for the variable in a linear equation or inequality using a selected strategy (e.g., algebraic method, graphing, or using graphing technology), and shows how find the solution using a different strategy.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve linear equations and inequalities in one variable using a variety of strategies, with accuracy	Solve linear equations and inequalities in one variable using a variety of strategies, with no significant errors	Solve linear equations and inequalities in one variable using a variety of strategies, with a few significant errors	Solve linear equations and inequalities in one variable using a variety of strategies, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.2 Translate between verbal mathematical situations and algebraic expressions and equations		The student: Represents mathematical situations algebraically and determines a situation that could be represented by an algebraic expression or equation.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Translate between verbal mathematical situations and algebraic expressions and equations, with accuracy	Translate between verbal mathematical situations and algebraic expressions and equations, with no significant errors	Translate between verbal mathematical situations and algebraic expressions and equations, with a few errors	Translate between verbal mathematical situations and algebraic expressions and equations, with many significant errors

Algebra I

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.3 Justify the steps used in simplifying expressions and solving equations and inequalities		The student: Uses concrete objects, pictorial representations, and the properties of real numbers to justify the steps used to simplify expressions and solve equations and inequalities.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Justify, in great detail, the steps used in simplifying expressions and solving equations and inequalities	Justify, in sufficient detail, the steps used in simplifying expressions and solving equations and inequalities	Justify, in some (but not enough) detail, the steps used in simplifying expressions and solving equations and inequalities	Justify, in insufficient detail, the steps used in simplifying expressions and solving equations and inequalities
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.4 Determine the equation of a line when given the graph of the line, the slope and a point on the line, or two points on the line		The student: Shows/explains how to determine the equation of a line when given the graph of a line, the slope and a point on a line, or two points on a line.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Show and explain how to determine the equation of a line when given the graph of the line, the slope and a point on the line, or two points on the line, with accuracy	Determine the equation of a line when given: the graph of the line, the slope and a point on the line, or two points on the line, with no significant errors	Determine the equation of a line when given: the graph of the line, the slope and a point on the line, or two points on the line, with a few significant errors	Determine the equation of a line when given: the graph of the line, the slope and a point on the line, or two points on the line, with many significant errors

Algebra I

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.5 Solve systems of two linear equations in two variables algebraically and graphically	The student: Uses an algebraic strategy (e.g., elimination, substitution), solve a system of two linear equations in two variables, and uses a graph or graphing technology to show how to find the solution graphically.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve systems of two linear equations in two variables algebraically and graphically, with accuracy	Solve systems of two linear equations in two variables algebraically and graphically, with no significant errors	Solve systems of two linear equations in two variables algebraically and graphically, with a few significant errors	Solve systems of two linear equations in two variables algebraically and graphically, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.6 Factor first- and second-degree binomials and trinomials in one or two variables	The student: Selects and applies an appropriate technique to completely factor polynomials (e.g., using techniques such as finding a common factor in all terms, the difference of two squares, and the perfect squares of binomials, reverse FOIL).		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Factor first- and second-degree binomials and trinomials in one or two variables, with accuracy	Factor first- and second-degree binomials and trinomials in one or two variables, with no significant errors	Factor first- and second-degree binomials and trinomials in one or two variables, with a few significant errors	Factor first- and second-degree binomials and trinomials in one or two variables, with many significant errors

Algebra I

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.7 Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology	The student: Solves quadratic equations by factoring algebraically (e.g., completing the square, using the quadratic formula), or by locating the intersection point(s) of the quadratic function and the x-axis on a graph.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with accuracy	Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with no significant errors	Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with a few significant errors	Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.8 Select and use a variety of strategies (e.g., concrete objects, pictorial representations, algebraic manipulation) to perform operations on polynomials	The student: Adds (or subtracts or multiplies) polynomials (or divides polynomials by monomials) by selecting and applying appropriate strategies.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Select and use a variety of strategies to perform operations on polynomials, with accuracy	Select and use a variety of strategies to perform operations on polynomials, with no significant errors	Select and use a variety of strategies to perform operations on polynomials, with a few significant errors	Select and use a variety of strategies to perform operations on polynomials, with many significant errors

Algebra I

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AI.10.9 Analyze transformations of lines and understand how the transformation are represented in equations	The student: Writes the equation of a line before and after undergoing a transformation, and explains how the transformation is represented by the altered part of the equation.

	RUBRIC		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Analyze transformation of lines and show how the transformations are represented in equations, with accuracy	Analyze transformations of lines and show how the transformations are represented in equations, with no significant errors	Analyze transformations of lines and show how the transformations are represented in equations, with a few significant errors	Analyze transformations of lines and show how the transformations are represented in equations, with many significant error

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra I	

Algebra I

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
DATA INTERPRETATION	MA.AI.12.1 Compare data sets using statistical techniques (e.g., measures of central tendency, standard deviation, range, stem-and-leaf plots, and box-and-whisker graphs)	The student: Selects a representation that supports the desired purpose of the study and shows a visual comparison of the data sets (e.g., in studying the relationship between an 11th grader's height and arm span, the student displays chooses to represent the data in a scatter plot since scatter plots are designed to determine if correlations between two variables exist).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Compare data sets selectively using appropriate statistical techniques, and justify the choice of technique	Compare data sets using appropriate statistical techniques	Compare data sets using suggested statistical techniques	Have difficulty comparing data sets using statistical techniques
DATA INTERPRETATION	MA.AI.12.2 Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists)	The student: Sketches bivariate data in a scatter plot and determines the line of best fit.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with accuracy	Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with no significant errors	Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with a few significant errors	Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with many significant errors

Algebra I

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra I	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra I	

Algebra II

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.AII.1.1 Use the complex number system, the notation for complex numbers, and the definition of "*i*" to solve problems		The student: Writes solutions to problems in complex (a + b*i*) notation when the solution calls for this type of answer.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the complex number system, the notation for complex numbers, and the definition of "*i*" to solve problems, with accuracy	Use the complex number system, the notation for complex numbers, and the definition of "*i*" to solve problems, with no significant errors	Use the complex number system, the notation for complex numbers, and the definition of "*i*" to solve problems, with a few significant errors	Use the complex number system, the notation for complex numbers, and the definition of "*i*" to solve problems, with many significant errors

Algebra II

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
OPERATION PROPERTIES	MA.AII.2.1 Add, subtract, multiply, and divide complex numbers	The student: Applies arithmetic properties to perform operations on complex numbers, and writes the final answer in simplest form.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Add, subtract, multiply, and divide complex numbers, with accuracy	Add, subtract, multiply, and divide complex numbers, with no significant errors	Add, subtract, multiply, and divide complex numbers, with a few significant errors	Add, subtract, multiply, and divide complex numbers, with many significant errors
OPERATION PROPERTIES	MA.AII.2.2 Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic problems	The student: Translates between exponential form and logarithmic form.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic problems, with accuracy	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic problems, with no significant errors	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic problems, with a few significant errors	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic problems, with many significant errors

Algebra II

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
COMPUTATIONAL FLUENCY	MA.AII.3.1 Use matrix operations (i.e. multiplication and inverse) to solve problems		The student: Solves problems involving systems of equations by representing the information in a matrix, and performing the appropriate operation on the matrices to solve the problem.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Select and use appropriate matrix operations to solve problems, with accuracy	Use matrix operations to solve problems, with no significant errors	Use matrix operations to solve problems, with a few significant errors	Use matrix operations to solve problems, with many significant errors

Algebra II

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT FORMULAS	MA.AII.4.1 Use advanced formulas or functions to solve problems dealing with determining a measurement based on another derived or given measure		The student: Evaluates a formula to solve for a specific measure (e.g., determines at what times an arrow shot into the air will reach its maximum height if the height is determined by the function: $h(t) = -16t^2 + 72t + 5$).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Select and use advanced formulas or functions to solve problems dealing with determining a measurement based on another derived or given measure, with accuracy	Use advanced formulas or functions to solve problems dealing with determining a measurement based on another derived or given measure, with no significant errors	Use advanced formulas or functions to solve problems dealing with determining a measurement based on another derived or given measure, with a few significant errors	Use advanced formulas or functions to solve problems dealing with determining a measurement based on another derived or given measure, with many significant errors

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra II	

Algebra II

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra II	

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra II	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra II	

Algebra II

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
PATTERNS	MA.AII.9.1 Apply the properties of arithmetic and geometric sequences and series to solve problems		The student: Finds the *n*th term for an arithmetic and geometric sequences and series.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the properties of arithmetic and geometric sequences and series to solve problems, with accuracy	Apply the properties of arithmetic and geometric sequences and series to solve problems, with no significant errors	Apply the properties of arithmetic and geometric sequences and series to solve problems, with a few significant errors	Apply the properties of arithmetic and geometric sequences and series to solve problems, with many significant errors
FUNCTION	MA.AII.9.2 Use exponential functions to solve problems involving exponential growth and decay		The student: Shows/explains how to solve problems involving exponential growth or decay (e.g., finds the annual compound interest using an exponential function).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use exponential functions to solve problems involving exponential growth and decay, with accuracy	Use exponential functions to solve problems involving exponential growth and decay, with no significant errors	Use exponential functions to solve problems involving exponential growth and decay, with a few significant errors	Use exponential functions to solve problems involving exponential growth and decay, with many significant errors

Algebra II

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.AII.9.3 Use the properties of many types of functions (e.g., polynomial, step, absolute value, step, exponential, and logarithmic) to identify the function's graph		The student: Recognizes the kind of function that a graph represents by analyzing the graph's features; uses the properties of a certain type of function to graph the function.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain how to use the properties of many types of functions to identify the function's graph, and accurately identify the function's graph	Use the properties of many types of functions to identify the function's graph, with no significant errors	Use the properties of many types of functions to identify the function's graph, with a few significant errors	Use the properties of many types of functions to identify the function's graph, with many significant errors
FUNCTION	MA.AII.9.4 Use the appropriate terminology and notation to define functions and their properties (e.g., domain, range, function composition, inverses, zeros)		The student: Defines a variety of functions using the correct terminology and notation.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently use the appropriate terminology and notation to define functions and their properties	Usually use the appropriate terminology and notation to define functions and their properties	Sometimes use the appropriate terminology and notation to define functions and their properties	Rarely use the appropriate terminology and notation to define functions and their properties

Algebra II

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.AII.9.5 Determine the zeros of a function algebraically or graphically		The student: Finds the zeros of a function, using graphing technology when available.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Show and explain how to determine the zeros of a function algebraically or graphically, with accuracy	Determine the zeros of a function algebraically or graphically, with no significant errors	Determine the zeros of a function algebraically or graphically, with a few significant errors	Determine the zeros of a function algebraically or graphically, with many significant errors
FUNCTION	MA.AII.9.6 Describe the relationship among relations and functions		The student: Provides an example of a function and an example of a relation that is not a function and explains the difference; explains whether or not a given relation is a function.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, the relationship among relations and functions	Describe, in sufficient detail, the relationship among relations and functions	Describe, in some (but not enough) detail, the relationship among relations and functions	Describe, in insufficient detail, the relationship among relations and functions

Algebra II

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
FUNCTION	MA.AII.9.7 Determine the domain and range of a relation given a graph or a set of points	The student: Uses a graph (or other representation, including graphing technology) of a relation to identify the domain and range.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Show and explain how to determine the domain and range of a relation given a graph or a set of points, with accuracy	Determine the domain and range of a relation given a graph or a set of points, with no significant errors	Determine the domain and range of a relation given a graph or a set of points, with a few significant errors	Have difficulty determining the domain and range of a relation given a graph or a set of points

Algebra II

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.1 Solve equations and inequalities involving absolute values	The student: Applies absolute value properties to solve absolute value equations and inequalities, and represents the solution numerically and graphically.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Solve equations and inequalities involving absolute values, with accuracy	Solve equations and inequalities involving absolute values, with no significant errors	Solve equations and inequalities involving absolute values, with a few significant errors	Solve equations and inequalities involving absolute values, with many significant errors

Algebra II

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.2 Solve systems of linear equations and inequalities in two or three variables using a variety of strategies (e.g., substitution, graphing, matrices, technology)		The student: Selects and applies an appropriate strategy (e.g., substitution, graphing, computer software, matrices) to solve systems of linear equations and inequalities in two or three variables, and represents the solution numerically or graphically.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve systems of linear equations and inequalities in two or three variables using a variety of strategies, with accuracy	Solve systems of linear equations and inequalities in two or three variables using a variety of strategies, with no significant errors	Solve systems of linear equations and inequalities in two or three variables using a variety of strategies, with a few errors	Solve systems of linear equations and inequalities in two or three variables using a variety of strategies, with many errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.3 Solve equations containing radical and exponents		The student: Applies properties of real numbers to solve equations.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve equations containing radical and exponents, with accuracy	Solve equations containing radical and exponents, with no significant errors	Solve equations containing radical and exponents, with a few significant errors	Solve equations containing radical and exponents, with many significant errors

Algebra II

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.4 Factor polynomials representing perfect squares, the difference in squares, perfect square trinomials, the sum and difference of cubes, and general trinomials			The student: Selects and uses an appropriate strategy to factor a polynomial completely.	
	RUBRIC				
	Advanced	**Proficient**	**Partially Proficient**		**Novice**
	Factor polynomials representing perfect squares, the difference in squares, perfect square trinomials, the sum and difference of cubes, and general trinomials, with accuracy	Factor polynomials representing perfect squares, the difference in squares, perfect square trinomials, the sum and difference of cubes, and general trinomials, with no significant errors	Factor polynomials representing perfect squares, the difference in squares, perfect square trinomials, the sum and difference of cubes, and general trinomials, with a few significant errors		Factor polynomials representing perfect squares, the difference in squares, perfect square trinomials, the sum and difference of cubes, and general trinomials, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.5 Apply quadratic equations to real-world situations			The student: Represents an applicable situation with a quadratic equation, and shows/explains to solve the equation.	
	RUBRIC				
	Advanced	**Proficient**	**Partially Proficient**		**Novice**
	Apply quadratic equations to real-world situations, with accuracy	Apply quadratic equations to real-world situations, with no significant errors	Apply quadratic equations to real-world situations, with a few significant errors		Apply quadratic equations to real-world situations, with many significant errors

Algebra II

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.6 Solve quadratic equations in the complex number system		The student: Selects and uses an appropriate strategy (e.g., graphing calculator) to solve quadratic equations in the complex number system.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve quadratic equations in the complex number system, with accuracy	Solve quadratic equations in the complex number system, with no significant errors	Solve quadratic equations in the complex number system, with a few significant errors	Solve quadratic equations in the complex number system, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.7 Use the binomial theorem to expand binomial expression		The student: Shows/explains how to expand binomial expressions raised to positive integer powers with the binomial theorem.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the binomial theorem to expand binomial expression, with accuracy	Use the binomial theorem to expand binomial expression, with no significant errors	Use the binomial theorem to expand binomial expression, with a few significant errors	Use the binomial theorem to expand binomial expression, with many significant errors

Algebra II

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.8 Add, subtract, multiply, divide, and simplify rational expressions, radical expressions containing positive rational numbers, and expressions containing rational exponents			The student: Shows/explains how to perform operations on and simplify: rational expressions, radical expressions containing positive rational numbers, and expressions containing rational exponents.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Add, subtract, multiply, divide, and simplify rational expressions, radical expressions containing positive rational numbers, and expressions containing rational exponents, with accuracy	Add, subtract, multiply, divide, and simplify rational expressions, radical expressions containing positive rational numbers, and expressions containing rational exponents, with no significant errors	Add, subtract, multiply, divide, and simplify rational expressions, radical expressions containing positive rational numbers, and expressions containing rational exponents, with a few significant errors	Add, subtract, multiply, divide, and simplify rational expressions, radical expressions containing positive rational numbers, and expressions containing rational exponents, with many significant errors

Algebra II

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.9 Translate between the equations of conic sections (e.g., circle, ellipse, parabola, hyperbola) and their graphs	The student: Graphs a conic section when given the equation in (h, k) form.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Translate between the equations of conic sections and their graphs, with accuracy	Translate between the equations of conic sections and their graphs, with no significant errors	Translate between the equations of conic sections and their graphs, with a few significant errors	Translate between the equations of conic sections and their graphs, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.AII.10.10 Analyze translations and dilations for graphs of absolute value functions, parabolas, and circles, and understand how the transformations are represented in equations	The student: Writes the equation for a circle (or absolute value function or parabola) before and after it is dilated (or translated) and explains how the transformation is represented in the equation.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Analyze translations and dilations for graphs of absolute value functions, parabolas, and circles, and understand how the transformations are represented in equations, with accuracy	Analyze translations and dilations for graphs of absolute value functions, parabolas, and circles, and understand how the transformations are represented in equations, with no significant errors	Analyze translations and dilations for graphs of absolute value functions, parabolas, and circles, and understand how the transformations are represented in equations, with a few significant errors	Analyze translations and dilations for graphs of absolute value functions, parabolas, and circles, and understand how the transformations are represented in equations, with many significant errors

Algebra II

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra II		

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
DATA INTERPRETATION	MA.AII.12.1 Identify trends in bivariate data and find functions that model the data		The student: Determines what function, if any, models a bivariate data set.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently apply appropriate strategies to identify trends in bivariate data and find functions that model the data, with reasonable accuracy	Usually apply appropriate strategies to identify trends in bivariate data and find functions that model the data, with reasonable accuracy	Sometimes apply appropriate strategies to identify trends in bivariate data and find functions that model the data, with reasonable accuracy	Rarely apply appropriate strategies to identify trends in bivariate data and find functions that model the data

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Algebra II		

Algebra II

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
PROBABILITY	MA.AII.14.1 Use the fundamental counting principles for combinations and permutations to determine probability	The student: Uses permutations and combinations to find the probability of application problems.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the fundamental counting principles for combinations and permutations to determine probability, with accuracy	Use the fundamental counting principles for combinations and permutations to determine probability, with no significant errors	Use the fundamental counting principles for combinations and permutations to determine probability, with a few significant errors	Use the fundamental counting principles for combinations and permutations to determine probability, with many significant errors
PROBABILITY	MA.AII.14.2 Calculate probabilities of events under different relationships (e.g., inclusion, disjoint, complementary, independent, dependent, with replacement, without replacement)	The student: Determines the kind of relationship that exists between two events, and shows/explains how to calculate the probability.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Calculate probabilities of events under different relationships, with accuracy	Calculate probabilities of events under different relationships, with no significant errors	Calculate probabilities of events under different relationships, with a few significant errors	Calculate probabilities of events under different relationships, with many significant errors

Geometry

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
VECTORS	MA.G.1.1 Recognize situations that can be represented by vectors	The student: Decides if the information in a problem can be represented with vectors, and if it can, shows how to use the vectors.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Consistently recognize situations that can be represented by vectors, and use vectors to solve the situation	Usually recognize situations that can be represented by vectors	Sometimes recognize situations that can be represented by vectors	Rarely recognize situations that can be represented by vectors

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Geometry

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
VECTORS	MA.G.3.1 Use vector addition, subtraction, and scalar multiplication to solve problems		The student: Represents the information in a problem with vectors, and performs the appropriate operation(s) numerically and geometrically to solve the problem.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use vector addition, subtraction, and scalar multiplication to solve problems, with accuracy	Use vector addition, subtraction, and scalar multiplication to solve problems, with no significant errors	Use vector addition, subtraction, and scalar multiplication to solve problems, with a few significant errors	Use vector addition, subtraction, and scalar multiplication to solve problems, with many significant errors

Geometry

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT FORMULAS	MA.G.4.1 Use right triangle trigonometric ratios to solve for an unknown length of a side or the measure or an angle	The student: Uses sine, cosine, and tangent to find the length of a side of a right triangle.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use right triangle trigonometric ratios to solve for an unknown length of a side or the measure or an angle, with accuracy	Use right triangle trigonometric ratios to solve for an unknown length of a side or the measure or an angle, with no significant errors	Use right triangle trigonometric ratios to solve for an unknown length of a side or the measure or an angle, with a few significant errors	Use right triangle trigonometric ratios to solve for an unknown length of a side or the measure or an angle, with many significant errors
MEASUREMENT FORMULAS	MA.G.4.2 Solve problems using the formulas for perimeter, circumference, area, and volume of two- and three- dimensional figures and solids	The student: Selects and applies the appropriate formula to solve surface area and volume problems (e.g., calculates the volume of a cone shaped vase to determine the amount of water needed to fill it).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve problems using the formulas for perimeter, circumference, area, and volume of two- and three- dimensional figures and solids, with accuracy	Solve problems using the formulas for perimeter, circumference, area, and volume of two- and three- dimensional figures and solids, with no significant errors	Solve problems using the formulas for perimeter, circumference, area, and volume of two- and three- dimensional figures and solids, with a few significant errors	Solve problems using the formulas for perimeter, circumference, area, and volume of two- and three- dimensional figures and solids, with many significant errors

Geometry

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
MEASUREMENT FORMULAS	MA.G.4.3 Determine the effect of dimension changes to perimeter, area, and volume for common geometric figures and solids	The student: Alters the measure of one of the attributes of a 3-D shape, then determines how that change affected the original shape's surface area and volume (e.g., finds how the volume changes if the length of a cylinder is doubled).

RUBRIC

Advanced	Proficient	Partially Proficient	Novice
Determine the effect of dimension changes to perimeter, area, and volume for common geometric figures and solids, provide examples of the effect, and explain general rules that apply to the effect	Determine the effect of dimension changes to perimeter, area, and volume for common geometric figures and solids, and provide examples of the effect	Determine the effect of dimension changes to perimeter, area, and volume for common geometric figures and solids, and provide examples of the effect, with some errors	Have difficulty determining the effect of dimension changes to perimeter, area, and volume for common geometric figures and solids

Geometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.G.5.1 Use inductive and deductive reasoning to create and defend geometric conjectures	The student: Writes a logically sound proof (e.g., two-column, paragraph form) to defend conjectures.	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use inductive and deductive reasoning to create and defend geometric conjectures, with logical and compelling rationale	Use inductive and deductive reasoning to create and defend geometric conjectures, with sufficient rationale	Use inductive and deductive reasoning to create and defend geometric conjectures, with rationale that is difficult to follow, but is on the right track	Use inductive and deductive reasoning to create and defend geometric conjectures, with insufficient rationale

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.G.5.2 Use the concept of corresponding parts to prove that triangles, and other polygons, are congruent or similar	The student: Identifies enough corresponding parts to determine if two shapes are congruent.	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use the concept of corresponding parts to prove that triangles, and other polygons, are congruent or similar, with logical and easy-to-follow rationale	Use the concept of corresponding parts to prove that triangles, and other polygons, are congruent or similar, with sufficient rationale	Use the concept of corresponding parts to prove that triangles, and other polygons, are congruent or similar, with rationale that is difficult to follow, but is on the right track	Use the concept of corresponding parts to prove that triangles, and other polygons, are congruent or similar, with insufficient rationale

Geometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.G.5.3 Explain properties and characteristics of angle bisectors, perpendicular bisectors, and parallel lines	The student: Uses a straight edge and compass to construct angle bisectors, perpendicular bisectors, and parallel lines.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain properties and characteristics of angle bisectors, perpendicular bisectors, and parallel lines, with accuracy	Explain properties and characteristics of angle bisectors, perpendicular bisectors, and parallel lines, with no significant errors	Explain properties and characteristics of angle bisectors, perpendicular bisectors, and parallel lines, with some significant errors	Explain properties and characteristics of angle bisectors, perpendicular bisectors, and parallel lines, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.G.5.4 Use the relationship between pairs of angles (e.g., complementary, supplementary, vertical, exterior, interior) to determine unknown angle measures or definitions of properties	The student: Uses complementary, supplementary, vertical, exterior, and interior angles formed when two parallel lines are cut by a transversal to find the measure of an unknown angle.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the relationship between pairs of angles to determine unknown angle measures or definitions of properties, with accuracy	Use the relationship between pairs of angles to determine unknown angle measures or definitions of properties, with no significant errors	Use the relationship between pairs of angles to determine unknown angle measures or definitions of properties, with a few significant errors	Use the relationship between pairs of angles to determine unknown angle measures or definitions of properties, with many significant errors

Geometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT		
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.G.5.5 Apply the concepts of special right triangles to real-world situations	The student: Recognizes if a right triangle is "special" (45-45-90 or 30-60-90) and applies the appropriate concepts to find the length of an unknown side.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the concepts of special right triangles to solve real-world situations, with accuracy	Apply the concepts of special right triangles to solve real-world situations, with no significant errors	Apply the concepts of special right triangles to solve real-world situations, with a few significant errors	Apply the concepts of special right triangles to solve real-world situations, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.G.5.6 Use the relationships among properties of circles (e.g., chords, secants, tangents, arcs, circumference, radius, diameter, inscribed polygons) to solve problems	The student: Uses properties of circles to find the length of the chords of an inscribed regular hexagon.		
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the relationships among properties of circles to solve problems, with accuracy	Use the relationships among properties of circles to solve problems, with no significant errors	Use the relationships among properties of circles to solve problems, with a few significant errors	Use the relationships among properties of circles to solve problems, with many significant errors

Geometry

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
TRANSFORMATION	MA.G.6.1 Describe three-dimensional figures that are formed by translating two-dimensional figures		The student: Illustrates (or uses graphing technology to show) the three-dimensional figure that is produced by sliding a shape along a given axis by a given distance (e.g., a cylinder can be created by sliding a circle along the z-axis).
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, three-dimensional figures that are formed by translating two-dimensional figures	Describe, in sufficient detail, three-dimensional figures that are formed by translating two-dimensional figures	Describe, in some (but not enough) detail, three-dimensional figures that are formed by translating two-dimensional figures	Describe, in insufficient detail, three-dimensional figures that are formed by translating two-dimensional figures

Geometry

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
VISUALIZATION AND SPATIAL REASONING	MA.G.7.1 Draw cross-sections, truncations, and compositions/decompositions of three-dimensional objects		The student: Sketches (or uses computer software to show) two-dimensional drawings of different views, truncations, and cross-sections of a three-dimensional solid.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Draw cross-sections, truncations, and compositions/decompositions of three-dimensional objects, with accuracy	Draw cross-sections, truncations, and compositions/decompositions of three-dimensional objects, with no significant errors	Draw cross-sections, truncations, and compositions/decompositions of three-dimensional objects, with a few significant errors	Draw cross-sections, truncations, and compositions/decompositions of three-dimensional objects, with many significant errors
GEOMETRIC MODELING	MA.G.7.2 Use concrete objects, pictorial representations, computer software, or graphing calculators to solve geometric problems		The student: Selects an appropriate representation/strategy to solve a geometric problem and shows or explains how the representation/strategy aided in solving the problem.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use concrete objects, pictorial representations, computer software, or graphing calculators to solve geometric problems, with accuracy	Use concrete objects, pictorial representations, computer software, or graphing calculators to solve geometric problems, with no significant errors	Use concrete objects, pictorial representations, computer software, or graphing calculators to solve geometric problems, with a few significant errors	Use concrete objects, pictorial representations, computer software, or graphing calculators to solve geometric problems, with many significant errors

Geometry

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COORDINATE GEOMETRY	MA.G.8.1 Use coordinate geometry to produce formulas and prove theorems for the midpoint of a line segment, the distance formula, and forms of equations of lines and circles		The student: Illustrates on a coordinate grid and explains how to find the midpoint of a line segment the distance between two points.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use coordinate geometry to produce formulas and prove theorems for the midpoint of a line segment, the distance formula, and forms of equations of lines and circles, with accuracy	Use coordinate geometry to produce formulas and prove theorems for the midpoint of a line segment, the distance formula, and forms of equations of lines and circles, with no significant errors	Use coordinate geometry to produce formulas and prove theorems for the midpoint of a line segment, the distance formula, and forms of equations of lines and circles, with a few significant errors	Use coordinate geometry to produce formulas and prove theorems for the midpoint of a line segment, the distance formula, and forms of equations of lines and circles, with many significant errors
COORDINATE GEOMETRY	MA.G.8.2 Describe the concept of rigid motion on figures in the coordinate plane, including rotation, translation, and reflection		The student: Identifies figures that have been transformed multiple times.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, the concept of rigid motion on figures in the coordinate plane, including rotation, translation, and reflection	Describe, in sufficient detail, the concept of rigid motion on figures in the coordinate plane, including rotation, translation, and reflection	Describe, in some detail (but not enough), the concept of rigid motion on figures in the coordinate plane, including rotation, translation, and reflection	Describe, in insufficient detail, the concept of rigid motion on figures in the coordinate plane, including rotation, translation, and reflection

Geometry

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Geometry

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Geometry	

Trigonometry

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMBERS AND NUMBER SYSTEMS	MA.T.1.1 Express complex numbers in standard and polar form, and convert from one to another		The student: Converts a complex number from standard form into polar form, and vice versa.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Express complex numbers in standard and polar form, and convert from one to another, with accuracy	Express complex numbers in standard and polar form, and convert from one to another, with no significant errors	Express complex numbers in standard and polar form, and convert from one to another, with a few significant errors	Express complex numbers in standard and polar form, and convert from one to another, with many significant errors

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
OPERATIONS	MA.T.2.1 Add, subtract, multiply, divide, and find powers of complex numbers in polar form		The student: Uses DeMoivre's theorem to find powers of complex numbers in polar form.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Add, subtract, multiply, divide, and find powers of complex numbers in polar form, with accuracy	Add, subtract, multiply, divide, and find powers of complex numbers in polar form, with no significant errors	Add, subtract, multiply, divide, and find powers of complex numbers in polar form, with a few significant errors	Add, subtract, multiply, divide, and find powers of complex numbers in polar form, with many significant errors

Trigonometry

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
VECTORS	MA.T.3.1 Use vector operations, the law of sines, and the law of cosines to solve problems		The student: Selects the appropriate trigonometric law (law of sines or law of cosines) and applies it to solve a problem.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use vector operations, the law of sines, and the law of cosines to solve problems, with accuracy	Use vector operations, the law of sines, and the law of cosines to solve problems, with no significant errors	Use vector operations, the law of sines, and the law of cosines to solve problems, with a few significant errors	Use vector operations, the law of sines, and the law of cosines to solve problems, with many significant errors

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
MEASUREMENT FORMULAS	MA.T.4.1 Calculate linear and angular velocity		The student: Uses radians to calculate the angular velocity of a rotating object.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Calculate linear and angular velocity, with accuracy, and shows/explains the process	Calculate linear and angular velocity, with no significant errors	Calculate linear and angular velocity, with a few significant errors	Calculate linear and angular velocity, with many significant errors

Trigonometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.1 Find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position		The student: Defines the six trigonometric functions of an angle in standard position.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position, with accuracy	Find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position, with no significant errors	Find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position, with a few significant errors	Find the sine, cosine, tangent, cotangent, secant, and cosecant of an angle in standard position, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.2 Use the relationship among the six trigonometric functions to translate among them (i.e., know that given one of the functions the value of the other five can be found)		The student: Shows how to find the value of the other five trigonometric functions when one of the functions is given.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the relationship among the six trigonometric functions to translate among them, with accuracy and fluency	Use the relationship among the six trigonometric functions to translate among them, with no significant errors	Use the relationship among the six trigonometric functions to translate among them, with a few significant errors	Use the relationship among the six trigonometric functions to translate among them, with many significant errors

Trigonometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.3 Recognize the trigonometric functions of benchmark angles (e.g., 0, π/2, π, 3π/2)			The student: Recalls the trigonometric value of cosine, sine, and tangent on the unit circle for given benchmark angles such as 0, π, $\pi/2$, $3\pi/2$.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize the trigonometric functions of benchmark angles, and apply the functions to solve problems	Usually recognize the trigonometric functions of benchmark angles	Sometimes recognize the trigonometric functions of benchmark angles	Rarely recognize the trigonometric functions of benchmark angles
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.4 Translate between radians and degrees			The student: Convert from radians to degrees and degrees to radians.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Translate between radians and degrees, with accuracy	Translate between radians and degrees, with no significant errors	Translate between radians and degrees, with a few significant errors	Translate between radians and degrees, with many significant errors

Trigonometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.5 Find the value of any trigonometric function and inverse trigonometric function, and solve trigonometric equations		The student: Uses a calculator or graphing technology to find the values of trigonometric functions and inverse trigonometric functions.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find the value of any trigonometric function and inverse trigonometric function, and solve trigonometric equations, with accuracy	Find the value of any trigonometric function and inverse trigonometric function, and solve trigonometric equations, with no significant errors	Find the value of any trigonometric function and inverse trigonometric function, and solve trigonometric equations, with a few significant errors	Find the value of any trigonometric function and inverse trigonometric function, and solve trigonometric equations, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.6 Use the fundamental trigonometric identities, including the sum and difference formulas, double-angle formulas, and half-angle formulas to solve problems		The student: Applies the fundamental trigonometric identities to translate between equivalent trigonometric functions (e.g., uses the appropriate trigonometric identity to find $\sin\left(\frac{\pi}{12}\right)$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the fundamental trigonometric identities to solve problems, with accuracy	Use the fundamental trigonometric identities to solve problems, with no significant errors	Use the fundamental trigonometric identities to solve problems, with a few significant errors	Use the fundamental trigonometric identities to solve problems, with many significant errors

Trigonometry

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.7 Verify trigonometric identities		The student: Verifies trigonometric identities using other trigonometric identities.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Verify trigonometric identities, with logical and easy-to-follow rationale	Verify trigonometric identities, with sufficient rationale	Verify trigonometric identities, with rationale that is difficult to follow, but is on the right track	Verify trigonometric identities, with insufficient rationale
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.T.5.8 Solve trigonometric equations and inverse trigonometric equations that include all solutions or solutions with restricted domains		The student: Shows an algebraic method, or uses graphing technology, to find all solutions of a trigonometric equation.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Solve trigonometric equations and inverse trigonometric equations that include all solutions or solutions with restricted domains, with accuracy	Solve trigonometric equations and inverse trigonometric equations that include all solutions or solutions with restricted domains, with no significant errors	Solve trigonometric equations and inverse trigonometric equations that include all solutions or solutions with restricted domains, with a few significant errors	Solve trigonometric equations and inverse trigonometric equations that include all solutions or solutions with restricted domains, with many significant errors

Trigonometry

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Trigonometry	

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Trigonometry	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Trigonometry	

Trigonometry

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.T.9.1 Use the trigonometric functions in the form $y = A\sin(Bx+C) + D$ to determine various properties of the function (e.g., domain, range, period, phase shift, amplitude)		The student: Sketches the graph of the trigonometric function using the information that can be obtained from a function in the form of $y = A\sin(Bx+C) + D$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the trigonometric functions in the form $y = A\sin(Bx+C) + D$ to determine various properties of the function, with accuracy	Use the trigonometric functions in the form $y = A\sin(Bx+C) + D$ to determine various properties of the function, with no significant errors	Use the trigonometric functions in the form $y = A\sin(Bx+C) + D$ to determine various properties of the function, with a few significant errors	Use the trigonometric functions in the form $y = A\sin(Bx+C) + D$ to determine various properties of the function, with many significant errors
FUNCTION	MA.T.9.2 Identify real-world phenomena that can be represented by a trigonometric function in the form $y = A\sin(Bx + C) + D$		The student: Finds a trigonometric function of the form $y = A\sin(Bx + C) + D$ to model a given phenomenon or pattern.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe and provide examples of real-world phenomena that can be represented by a trigonometric function in the form $y = A\sin(Bx + C) + D$	Identify real-world phenomena that can be represented by a trigonometric function in the form $y = A\sin(Bx + C) + D$	Recognize real-world phenomena that can be represented by a trigonometric function in the form $y = A\sin(Bx + C) + D$	Have difficulty identifying or recognizing real-world phenomena that can be represented by a trigonometric function in the form $y = A\sin(Bx + C) + D$

Trigonometry

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
FUNCTION	MA.T.9.3 Explain the relationship between trigonometric functions and their inverse		The student: Identifies the restricted domain and range of an inverse trigonometric function and shows/explains how it differs from the domain and range of the original trigonometric function.

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Explain, in great detail, the relationship between trigonometric functions and their inverse	Explain, in sufficient detail, the relationship between trigonometric functions and their inverse	Explain, in some (but not enough) detail, the relationship between trigonometric functions and their inverse	Explain, in insufficient detail, the relationship between trigonometric functions and their inverse

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Trigonometry	

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Trigonometry	

Trigonometry

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Trigonometry	

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Trigonometry	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Trigonometry	

Analytical Geometry

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems	
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Analytical Geometry	

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
OPERATIONS	MA.AG.2.1 Use the sum, difference, scalar multiplication, dot product, and cross product of vectors to solve problems	The student: Solves vector problems by selecting and applying the appropriate operation on the vectors.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the sum, difference, scalar multiplication, dot product, and cross product of vectors to solve problems, with accuracy	Use the sum, difference, scalar multiplication, dot product, and cross product of vectors to solve problems, with no significant errors	Use the sum, difference, scalar multiplication, dot product, and cross product of vectors to solve problems, with a few significant errors	Use the sum, difference, scalar multiplication, dot product, and cross product of vectors to solve problems, with many significant errors

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation	
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Analytical Geometry	

Analytical Geometry

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring			
Topic	**Benchmark**	**Sample Performance Assessment**
	No benchmark for Analytical Geometry	

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties			
Topic	**Benchmark**	**Sample Performance Assessment**
	No benchmark for Analytical Geometry	

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations			
Topic	**Benchmark**	**Sample Performance Assessment**
	No benchmark for Analytical Geometry	

Analytical Geometry

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
VISUALIZATION AND SPATIAL REASONING	MA.AG.7.1 Recognize conic sections and describe their characteristics		The student: Models the conic sections (e.g., circle, parabola, ellipse, hyperbola) with the cross sections of a cone.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Recognize conic sections and describe their characteristics in great detail	Recognize conic sections and describe their characteristics in sufficient detail	Recognize conic sections and describe their characteristics in some (but not enough) detail	Recognize conic sections and describe their characteristics in insufficient detail

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COORDINATE GEOMETRY	MA.AG.8.1 Use formulas involving division of a line segment and angles between two lines		The student: Illustrates on a coordinate grid and explains how to determine the coordinates of a point one-third of the way on a line segment.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use formulas involving division of a line segment and angles between two lines, with accuracy	Use formulas involving division of a line segment and angles between two lines, with no significant errors	Use formulas involving division of a line segment and angles between two lines, with a few significant errors	Use formulas involving division of a line segment and angles between two lines, with many significant errors

Analytical Geometry

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
COORDINATE GEOMETRY	MA.AG.8.2 Use the relationship between the slope of a line and the angle of inclination to solve problems		The student: Finds the slope of a line using the angle of inclination of the line.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the relationship between the slope of a line and the angle of inclination to solve problems, with accuracy	Use the relationship between the slope of a line and the angle of inclination to solve problems, with no significant errors	Use the relationship between the slope of a line and the angle of inclination to solve problems, with a few significant errors	Use the relationship between the slope of a line and the angle of inclination to solve problems, with many significant errors
COORDINATE GEOMETRY	MA.AG.8.3 Use the polar coordinate system to graph		The student: Plots polar coordinates.
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the polar coordinate system to graph, with accuracy	Use the polar coordinate system to graph, with no significant errors	Use the polar coordinate system to graph, with a few significant errors	Use the polar coordinate system to graph, with many significant errors

Analytical Geometry

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
COORDINATE GEOMETRY	MA.AG.8.4 Use the relationship between polar and rectangular form to convert back and forth		The student: Converts from polar form to rectangular form and back.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the relationship between polar and rectangular form to convert back and forth, with accuracy	Use the relationship between polar and rectangular form to convert back and forth, with no significant errors	Use the relationship between polar and rectangular form to convert back and forth, with a few significant errors	Use the relationship between polar and rectangular form to convert back and forth, with many significant errors

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.AG.9.1 Use the relationship among the properties of conic sections (e.g., asymptotes, center of a conic, directrix, eccentricity, focus, major and minor axis, vertex) and graph conic sections using the standard form of the equations		The student: Identifies the appropriate properties of a conic section given in standard form (e.g., asymptotes, center, directrix, eccentricity, focus, vertex, major and minor axis) and shows how to apply the properties to make a graph of the conic section.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the relationship among the properties of conic sections and graph conic sections using the standard form of the equations, with accuracy	Use the relationship among the properties of conic sections and graph conic sections using the standard form of the equations, with no significant errors	Use the relationship among the properties of conic sections and graph conic sections using the standard form of the equations, with a few significant errors	Use the relationship among the properties of conic sections and graph conic sections using the standard form of the equations, with many significant errors

Analytical Geometry

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.AG.9.2 Use properties (e.g., domain, range, intercepts, symmetry, asymptotes) to graph polynomial, rational, and radical equations in two variables	The student: Identifies the properties of a given polynomial (or rational or radical) equation and shows how to apply the properties to make a graph.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use properties to graph polynomial, rational, and radical equations in two variables, with accuracy	Use properties to graph polynomial, rational, and radical equations in two variables, with no significant errors	Use properties to graph polynomial, rational, and radical equations in two variables, with a few significant errors	Use properties to graph polynomial, rational, and radical equations in two variables, with many significant errors
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.AG.9.3 Use properties (e.g., symmetry, tangents at the origin, excluded values, intercepts) to graph polar equations	The student: Uses symmetry, intercepts, and tangents at the origin to graph polar equations.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use properties to graph polar equations, with accuracy	Use properties to graph polar equations, with no significant errors	Use properties to graph polar equations, with a few significant errors	Use properties to graph polar equations, with many significant errors

Analytical Geometry

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
GEOMETRIC SHAPES AND THEIR PROPERTIES AND RELATIONSHIPS	MA.AG.9.4 Use addition of ordinates to graph sums and differences of functions		The student: Shows/explains how to graph the sums of a function from the ordinates.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Use addition of ordinates to graph sums and differences of functions, with accuracy	Use addition of ordinates to graph sums and differences of functions, with no significant errors	Use addition of ordinates to graph sums and differences of functions, with a few significant errors	Use addition of ordinates to graph sums and differences of functions, with many significant errors

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATION	MA.AG.10.1 Explain that a vector equation can represent a plane		The student: Describes how vector equations can be used to represent a plane; represents a plane with a vector equation.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Explain, in great detail, that a vector equation can represent a plane	Explain, in sufficient detail, that a vector equation can represent a plane	Explain, in some (but not enough) detail, that a vector equation can represent a plane	Explain, in insufficient detail, that a vector equation can represent a plane

Analytical Geometry

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATION	MA.AG.10.2 Translate between parametric representations of curves and equations using rectangular coordinates			The student: Shows/explains how to convert an equation that is given in rectangular form into parametric form.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Translate between parametric representations of curves and equations using rectangular coordinates, with accuracy	Translate between parametric representations of curves and equations using rectangular coordinates, with no significant errors	Translate between parametric representations of curves and equations using rectangular coordinates, with a few significant errors	Translate between parametric representations of curves and equations using rectangular coordinates, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATION	MA.AG.10.3 Use the concept of the distance from a point to a plane, distance between points, and the angle between two planes in three-dimensions to solve problems			The student: Shows/explains how to find the distance between a point and a plane, two points, and the angle between two planes.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the concept of the distance from a point to a plane, distance between points, and the angle between two planes in three-dimensions to solve problems, with accuracy	Use the concept of the distance from a point to a plane, distance between points, and the angle between two planes in three-dimensions to solve problems, with no significant errors	Use the concept of the distance from a point to a plane, distance between points, and the angle between two planes in three-dimensions to solve problems, with a few significant errors	Use the concept of the distance from a point to a plane, distance between points, and the angle between two planes in three-dimensions to solve problems, with many significant errors

Analytical Geometry

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATION	MA.AG.10.4 Determine the intersection of polar equations algebraically and graphically, including using graphing technology when available		The student: Shows/explains how to use algebraic and graphical methods to determine the intersection of polar equations.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Determine the intersection of polar equations algebraically and graphically, with accuracy	Determine the intersection of polar equations algebraically and graphically, with no significant errors	Determine the intersection of polar equations algebraically and graphically, with a few significant errors	Determine the intersection of polar equations algebraically and graphically, with many significant errors
NUMERIC AND ALGEBRAIC REPRESENTATION	MA.AG.10.5 Convert between parametric equations and their graphs		The student: Graphs parametric equations.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Convert between parametric equations and their graphs, with accuracy	Convert between parametric equations and their graphs, with no significant errors	Convert between parametric equations and their graphs, with a few significant errors	Convert between parametric equations and their graphs, with many significant errors

Analytical Geometry

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
NUMERIC AND ALGEBRAIC REPRESENTATION	MA.AG.10.6 Determine the intersection of curves algebraically and graphically, including using graphing technology when available	The student: Shows/explains how to use the graph of two curves (or algebraic methods) to find the intersection.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Determine the intersection of curves algebraically and graphically, with accuracy	Determine the intersection of curves algebraically and graphically, with no significant errors	Determine the intersection of curves algebraically and graphically, with a few significant errors	Determine the intersection of curves algebraically and graphically, with many significant errors

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Analytical Geometry	

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Analytical Geometry	

Analytical Geometry

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Analytical Geometry	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Analytical Geometry	

Probability

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems	
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other	
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation	
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring	
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Probability

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Probability

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Probability	

Probability

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**
	No benchmark for Probability	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
PROBABILITY	MA.P.14.1 Describe the relationship among events (e.g., inclusive, disjoint, complementary, independent, dependent)	The student: Provides an example of inclusive, disjoint, complementary, independent, and dependent events.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, the relationship among events	Describe, in sufficient detail, the relationship among events	Describe, in some (but not enough) detail, the relationship among events	Describe, in insufficient detail, the relationship among events
PROBABILITY	MA.P.14.2 Calculate the probability of two events under union and intersection	The student: Determines the probability of two events that are intersections and two events that are unions.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Calculate the probability of two events under union and intersection, with accuracy	Calculate the probability of two events under union and intersection, with no significant errors	Calculate the probability of two events under union and intersection, with a few significant errors	Calculate the probability of two events under union and intersection, with many significant errors

Probability

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
PROBABILITY	MA.P.14.3 Differentiate between theoretical and experimental probability	The student: Compares the theoretical probability to the experimental probability of an experiment and analyzes the difference between them.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain, in great detail, the difference between theoretical and experimental probability	Explain, in sufficient detail, the difference between theoretical and experimental probability	Explain, in some (but not enough) detail, the difference between theoretical and experimental probability	Explain, in insufficient detail, the difference between theoretical and experimental probability
PROBABILITY	MA.P.14.4 Explain the difference between probability and odds and convert from one to the other	The student: Expresses the change of an event occurring as a probability and as odds, and describes how the representations reflect the events.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Explain, in great detail, the difference between probability and odds, and convert from one to the other, with accuracy	Explain, in sufficient detail, the difference between probability and odds, and convert from one to the other, with no significant errors	Explain, in some (but not enough) detail, the difference between probability and odds, and convert from one to the other, with a few significant errors	Explain, in insufficient detail, the difference between probability and odds, and convert from one to the other, with many significant errors

Probability

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**
PROBABILITY	MA.P.14.5 Calculate the probability of an outcome for an experiment with and without replacement		The student: Shows/explains how to find the probability of events occurring with and without replacement.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Calculate the probability of an outcome for an experiment with and without replacement, with accuracy	Calculate the probability of an outcome for an experiment with and without replacement, with no significant errors	Calculate the probability of an outcome for an experiment with and without replacement, with a few significant errors	Calculate the probability of an outcome for an experiment with and without replacement, with many significant errors
PROBABILITY	MA.P.14.6 Apply discrete random variables to solve for the probability of experimental outcomes		The student: Shows/explains how to apply discrete random variables to solve for probability of experimental outcomes (e.g., determines the probability of rolling three 4's in nine rolls of a number cube).
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply discrete random variables to solve for the probability of experimental outcomes, with accuracy	Apply discrete random variables to solve for the probability of experimental outcomes, with no significant errors	Apply discrete random variables to solve for the probability of experimental outcomes, with a few significant errors	Apply discrete random variables to solve for the probability of experimental outcomes, with many significant errors

Probability

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
PROBABILITY	MA.P.14.7 Estimate and calculate expected values	The student: Shows/explains how to calculate the expected values of an experiment.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Estimate and calculate expected values, with accuracy	Estimate and calculate expected values, with no significant errors	Estimate and calculate expected values, with a few significant errors	Estimate and calculate expected values, with many significant errors
PROBABILITY	MA.P.14.8 Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events	The student: Uses permutations (or combinations) to determine the total number of possible outcomes and the total number of intended outcomes, and then represents the values as a ratio and simplifies.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with accuracy	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with no significant errors	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with a few significant errors	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with many significant errors

Statistics

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Statistics

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Statistics

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions			
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND DISPLAY	MA.S.11.1 Develop a hypothesis for an investigation or experiment	The student: Develops and defends a hypothesis for an investigation.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Develop a reasonable hypothesis for an investigation or experiment, and provide convincing rationale to support the hypothesis	Develop a reasonable hypothesis for an investigation or experiment, and provide sufficient rationale to support the hypothesis	Develop a hypothesis for an investigation or experiment, and provide some (but not enough) rationale to support the hypothesis	Develop a hypothesis for an investigation or experiment, and provide insufficient rationale to support the hypothesis

Statistics

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
DATA COLLECTION AND DISPLAY	MA.S.11.2 Recognize the variables and controls in an experiment or investigation		The student: Identifies the variable in an investigation or experiment, sets a control, and explains the need for a control.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Design an experiment or investigation and identify the variables and controls	Recognize the variables and controls in an experiment or investigation	Recognize either the variables or the controls (but not both) in an experiment or investigation	Have difficulty recognizing the variables and controls in an experiment or investigation
DATA COLLECTION AND DISPLAY	MA.2.11.3 Select appropriate display for a data set (e.g., frequency table, histogram, line graph, bar graph, stem-and-leaf plot, box-and-whisker plot, scatter plot)		The student: Chooses an appropriate display for a data set and explains why it is an appropriate choice.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Select an appropriate display for a data set, and justify the choice of display	Select an appropriate display for a data set	Select a display for a data set that is functional, but not appropriate for the data	Have difficulty selecting an appropriate display for a data set

Statistics

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions

TOPIC	BENCHMARK			SAMPLE PERFORMANCE ASSESSMENT
DATA COLLECTION AND DISPLAY	MA.S.11.4 Recognize features of representations of data that can produce misleading interpretations			The student: Explains how a data display was made to produce misleading interpretations.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize features of representations of data that can produce misleading interpretations, and explain how to produce misleading interpretation	Usually recognize features of representations of data that can produce misleading interpretations	Sometimes recognize features of representations of data that can produce misleading interpretations	Rarely recognize features of representations of data that can produce misleading interpretations
DATA COLLECTION AND DISPLAY	MA.S.11.5 Recognize sampling, randomness, bias, and sampling size in data collection and interpretation			The student: Considers possible biases or sampling errors when interpreting data, and proposes options to correct the errors.
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize sampling, randomness, bias, and sampling size in data collection and interpretation, and use these ideas as part of justifying a conclusion	Usually recognize sampling, randomness, bias, and sampling size in data collection and interpretation	Sometimes recognize sampling, randomness, bias, and sampling size in data collection and interpretation	Rarely recognize sampling, randomness, bias, and sampling size in data collection and interpretation

Statistics

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions				
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**	
DATA COLLECTION AND DISPLAY	MA.S.11.6 Describe the purpose and function of a variety of data collection methods (e.g., census, sample surveys, experiment, observation)		The student: Explains the differences between data collection methods.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, the purpose and function of a variety of data collection methods	Describe, in sufficient detail, the purpose and function of a variety of data collection methods	Describe, in some (but not enough) detail, the purpose and function of a variety of data collection methods	Describe, in insufficient detail, the purpose and function of a variety of data collection methods

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis				
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**	
DATA INTERPRETATION	MA.S.12.1 Use measures of central tendency and spread to interpret data		The student: Interprets a data set based on the mean and the standard deviation.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use measures of central tendency and spread to interpret data, with accuracy	Use measures of central tendency and spread to interpret data, with no significant errors	Use measures of central tendency and spread to interpret data, with a few significant errors	Use measures of central tendency and spread to interpret data, with many significant errors

Statistics

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis			
TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT
DATA INTERPRETATION	MA.S.12.2 Interpret data based on the correlation coefficient of two variables		The student: Identifies a data set that has a positive correlation and makes an interpretation based on that trend.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Interpret data based on the correlation coefficient of two variables, with accuracy	Interpret data based on the correlation coefficient of two variables, with no significant errors	Interpret data based on the correlation coefficient of two variables, with a few significant errors	Interpret data based on the correlation coefficient of two variables, with many significant errors
DATA INTERPRETATION	MA.S.12.3 Describe the effect of sample size and transformation on the shape, center, and spread of data		The student: Explains the effect on shape, center, and spread of data, if the unit of measure is changed.
	RUBRIC		
	Advanced	Proficient	Partially Proficient	Novice
	Describe, in great detail, the effect of sample size and transformation on the shape, center, and spread of data	Describe, in sufficient detail, the effect of sample size and transformation on the shape, center, and spread of data	Describe, in some (but not enough) detail, the effect of sample size and transformation on the shape, center, and spread of data	Describe, in insufficient detail, the effect of sample size and transformation on the shape, center, and spread of data

Statistics

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis				
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**	
DATA INTERPRETATION	MA.S.12.4 Use the line or curve of best fit to interpret data		The student: Draws the line (or curve) of best fit on a graph and uses it to describe any trends that exist.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use the line or curve of best fit to interpret data, with accuracy	Use the line or curve of best fit to interpret data, with no significant errors	Use the line or curve of best fit to interpret data, with a few significant errors	Use the line or curve of best fit to interpret data, with many significant errors

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data				
TOPIC	**BENCHMARK**		**SAMPLE PERFORMANCE ASSESSMENT**	
PREDICTIONS AND INFERENCES	MA.S.13.1 Recognize that some data can be represented algebraically (e.g., linear, quadratic, exponential, sinusoidal)		The student: Identifies data that is linear (e.g., sales tax), quadratic (e.g., height of a bouncing ball), exponential (e.g., growth of certificate of deposit), or sinusoidal (e.g., number of daylight hours throughout the year).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize that some data can be represented algebraically	Usually recognize that some data can be represented algebraically	Sometimes recognize that some data can be represented algebraically	Rarely recognize that some data can be represented algebraically

Statistics

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data			
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
PREDICTIONS AND INFERENCES	MA.S.13.2 Use interpolation and extrapolation to make predictions and inferences about data	The student: Analyzes the trend in a data set and make interpolations and extrapolations based on the trend.	

RUBRIC			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Use interpolation and extrapolation to make predictions and inferences about data, with accuracy	Use interpolation and extrapolation to make predictions and inferences about data, with no significant errors	Use interpolation and extrapolation to make predictions and inferences about data, with a few significant errors	Use interpolation and extrapolation to make predictions and inferences about data, with many significant errors

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Statistics	

Calculus

Standard 1: Numbers and Operations: NUMBER SENSE—Understand numbers, ways of representing numbers, relationships among numbers, and number systems		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 2: Numbers and Operations: OPERATION SENSE—Understand the meaning of operations and how they relate to each other		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 3: Numbers and Operations: COMPUTATION STRATEGIES—Use computational tools and strategies fluently and, when appropriate, use estimation		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 4: Measurement: FLUENCY WITH MEASUREMENT—Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Calculus

Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS—Analyze properties of objects and relationships among the properties		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY—Use transformations and symmetry to analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE—Use visualization and spatial reasoning to solve problems both within and outside of mathematics		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS—Select and use different representational systems, including coordinate geometry		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Calculus

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.C.9.1 Find the derivatives of functions, including polynomial, rational, trigonometric, logarithmic, inverse, composite, and exponential functions		The student: Differentiates a variety of functions, such as the function $f(x) = x^4 \sin 2x$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find the derivatives of functions, with accuracy	Find the derivatives of functions, with no significant errors	Find the derivatives of functions, with a few significant errors	Find the derivatives of functions, with many significant errors
FUNCTION	MA.C.9.2 Find the derivatives of implicitly-defined functions		The student: Shows/explains how to find the derivative of implicitly-defined functions (e.g., uses finds dy/dx when for $x^2 + y^2 = 1$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find the derivatives of implicitly-defined functions, with accuracy	Find the derivatives of implicitly-defined functions, with no significant errors	Find the derivatives of implicitly-defined functions, with a few significant errors	Find the derivatives of implicitly-defined functions, with many significant errors

Calculus

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.C.9.3 Find points of inflection of functions		The student: Shows/explains how to determine the inflection point(s) for functions such as $f(x) = x^3$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find points of inflection of functions, with accuracy	Find points of inflection of functions, with no significant errors	Find points of inflection of functions, with a few significant errors	Find points of inflection of functions, with many significant errors
FUNCTION	MA.C.9.4 Use implicit differentiation to find the derivative of an inverse function		The student: Shows/explains how to find the derivative of the inverse of the functions such as $f(x) = x^3 + 2x – 5$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use implicit differentiation to find the derivative of an inverse function, with accuracy	Use implicit differentiation to find the derivative of an inverse function, with no significant errors	Use implicit differentiation to find the derivative of an inverse function, with a few significant errors	Use implicit differentiation to find the derivative of an inverse function, with many significant errors

Calculus

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.C.9.5 Use integration by substitution (or change of variable) to evaluate integrals		The student: Shows/explains how to use substitution to integrate $\int \sin(3x+5)dx$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use integration by substitution (or change of variable) to evaluate integrals, with accuracy	Use integration by substitution (or change of variable) to evaluate integrals, with no significant errors	Use integration by substitution (or change of variable) to evaluate integrals, with a few significant errors	Use integration by substitution (or change of variable) to evaluate integrals, with many significant errors
FUNCTION	MA.C.9.6 Use Riemann sums, the trapezoidal rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, or by tables of values		The student: Identifies and uses the necessary information, along with computer technology, to approximate the integral of functions with Riemann sums, such as $f(x) = 4 - x^{2.}$ on [-2, 2].	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use Riemann sums, the trapezoidal rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, or by tables of values, with accuracy	Use Riemann sums, the trapezoidal rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, or by tables of values, with no significant errors	Use Riemann sums, the trapezoidal rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, or by tables of values, with a few significant errors	Use Riemann sums, the trapezoidal rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, or by tables of values, with many significant errors

Calculus

Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS—Understand various types of patterns and functional relationships

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
FUNCTION	MA.C.9.7 Find specific antiderivatives using initial conditions, including finding velocity functions from acceleration functions, finding position functions from velocity functions, and applications to motion along a line		The student: Shows/explains how to find specific antiderivatives when given initial conditions (e.g., Finds the formula for position from the velocity equation: $v(t) = t^2 + 6t + 3$ When $s(0) = 1$).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find specific antiderivatives using initial conditions, with accuracy	Find specific antiderivatives using initial conditions, with no significant errors	Find specific antiderivatives using initial conditions, with a few significant errors	Find specific antiderivatives using initial conditions, with many significant errors
FUNCTION	MA.C.9.8 Use definite integrals to find the area between a curve and the *x*-axis, the average value of a function over a closed interval, and the volume of a solid with known cross-sectional area		The student: Shows/explains how to use the definite integrals to determine the volume of a solid (e.g., a sphere of radius *r*).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Use definite integrals to find the area between a curve and the *x*-axis, the average value of a function over a closed interval, and the volume of a solid with known cross-sectional area, with accuracy	Use definite integrals to find the area between a curve and the *x*-axis, the average value of a function over a closed interval, and the volume of a solid with known cross-sectional area, with no significant errors	Use definite integrals to find the area between a curve and the *x*-axis, the average value of a function over a closed interval, and the volume of a solid with known cross-sectional area, with a few significant errors	Use definite integrals to find the area between a curve and the *x*-axis, the average value of a function over a closed interval, and the volume of a solid with known cross-sectional area, with many significant errors

Calculus

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.C.10.1 Recognize limits from graphs and tables	The student: Estimates limits from graphs and tables of values.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Consistently recognize limits from graphs and tables, and explain how to recognize the limits from graphs and tables	Usually recognize limits from graphs and tables	Sometimes recognize limits from graphs and tables	Rarely recognize limits from graphs and tables
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.C.10.2 Find limits of sums, differences, products, quotients, and rational functions	The student: Selects and uses an appropriate strategy (such as substitution) and shows/explains how to apply the strategy to find limits of sums, differences, products, quotients, and rational functions (e.g., finds the limit of: $\displaystyle\lim_{x\to3}\frac{5x^2-8x-13}{x^2-5}$).	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find limits of sums, differences, products, quotients, and rational functions, with accuracy	Find limits of sums, differences, products, quotients, and rational functions, with no significant errors	Find limits of sums, differences, products, quotients, and rational functions, with a few significant errors	Find limits of sums, differences, products, quotients, and rational functions, with many significant errors

Calculus

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.C.10.3 Understand continuity in terms of limits and functions	The student: Determines if a function, such as $f(x) = \dfrac{\sin(x)}{x}$ is continuous and provides justification.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Demonstrate an understanding of continuity in terms of limits and functions, with accuracy	Demonstrate an understanding of continuity in terms of limits and functions, with no significant errors	Demonstrate an understanding of continuity in terms of limits and functions, with a few significant errors	Have difficulty demonstrating continuity in terms of limits and functions
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.C.10.4 Apply the intermediate value theorem and extreme value theorem on a function over a closed interval	The student: Shows/explains how to apply the intermediate value theorem and extreme value theorem on a function over a closed interval.	
	RUBRIC		
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the intermediate value theorem and extreme value theorem on a function over a closed interval, with accuracy	Apply the intermediate value theorem and extreme value theorem on a function over a closed interval, with no significant errors	Apply the intermediate value theorem and extreme value theorem on a function over a closed interval, with a few significant errors	Apply the intermediate value theorem and extreme value theorem on a function over a closed interval, with many significant errors

Calculus

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations			
TOPIC	**BENCHMARK**	**SAMPLE PERFORMANCE ASSESSMENT**	
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.C.10.5 Apply the fundamental theorem of calculus; i.e., interpret a definite integral of the rate of change of a quantity over an interval as the change of the quantity over the interval, that is $$\int_a^b f'(x)dx = f(b) - f(a)$$	The student: Shows/explains how to apply the Fundamental Theorem of Calculus to problem situations (e.g., finds the velocity function from this position function: $x_3(t) = (1/2)at^2 + C$ using the Fundamental Theorem of Calculus).	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Apply the fundamental theorem of calculus, with accuracy	Apply the fundamental theorem of calculus, with no significant errors	Apply the fundamental theorem of calculus, with a few significant errors	Apply the fundamental theorem of calculus, with many significant errors

Calculus

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
NUMERIC AND ALGEBRAIC REPRESENTATIONS	MA.C.10.6 Use the properties of definite integrals	The student: Uses the following properties of definite integrals to evaluate definite integrals: $$\int_a^b [f(x) + g(x)]dx = \int_a^b f(x)dx + \int_a^b g(x)dx$$ $$\int_a^b k \cdot f(x)dx = k \int_a^b f(x)dx$$ $$\int_a^a f(x)dx = 0$$ $$\int_a^b f(x)dx = - \int_b^a f(x)dx$$ $$\int_a^b f(x)dx + \int_b^c f(x)dx = \int_a^c f(x)dx$$ If $f(x) \le g(x)$ on $[a, b]$, then $\int_a^b f(x)dx \le \int_a^b g(x)dx$

RUBRIC			
Advanced	Proficient	Partially Proficient	Novice
Use the properties of definite integrals, with accuracy	Use the properties of definite integrals, with no significant errors	Use the properties of definite integrals, with a few significant errors	Use the properties of definite integrals, with many significant errors

Calculus

Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations

TOPIC	BENCHMARK		SAMPLE PERFORMANCE ASSESSMENT	
RATES OF CHANGE	MA.C.10.7 Describe the concept of a derivative geometrically, numerically, analytically, and verbally		The student: Interprets the derivative as a rate of change.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Describe, in great detail, the concept of a derivative geometrically, numerically, analytically, and verbally	Describe, in detail, the concept of a derivative geometrically, numerically, analytically, and verbally	Describe, in some detail, the concept of a derivative geometrically, numerically, analytically, and verbally	Describe, in minimal detail, the concept of a derivative geometrically, numerically, analytically, and verbally
RATES OF CHANGE	MA.C.10.8 Find second derivatives and derivatives of higher order		The student: Finds the second derivative of the functions such as $f(x) = 5x^3 - 5x^2 + 4x - 8$.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Find second derivatives and derivatives of higher order, with accuracy	Find second derivatives and derivatives of higher order, with no significant errors	Find second derivatives and derivatives of higher order, with a few significant errors	Find second derivatives and derivatives of higher order, with many significant errors
RATES OF CHANGE	MA.C.10.9 Prove the mean value theorem		The student: Proves the mean value theorem using Rolle's theorem.	
	RUBRIC			
	Advanced	**Proficient**	**Partially Proficient**	**Novice**
	Prove the mean value theorem, with accuracy	Prove the mean value theorem, with no significant errors	Prove the mean value theorem, with a few significant errors	Prove the mean value theorem, with many significant errors

Calculus

<table>
<tr>
<td colspan="5">Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION—Use symbolic forms to represent, model, and analyze mathematical situations</td>
</tr>
<tr>
<td>TOPIC</td>
<td colspan="2">BENCHMARK</td>
<td colspan="2">SAMPLE PERFORMANCE ASSESSMENT</td>
</tr>
<tr>
<td>RATES OF CHANGE</td>
<td colspan="2">MA.C.10.10 Find average and instantaneous rates of change</td>
<td colspan="2">The student:
Finds the average rate of change of a function on a closed interval and a point in that interval where the instantaneous rate of change equals the average rate of change.</td>
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<tr>
<td></td>
<td colspan="4">RUBRIC</td>
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<td>Advanced</td>
<td>Proficient</td>
<td>Partially Proficient</td>
<td>Novice</td>
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<tr>
<td></td>
<td>Find average and instantaneous rates of change, with accuracy</td>
<td>Find average and instantaneous rates of change, with no significant errors</td>
<td>Find average and instantaneous rates of change, with a few significant errors</td>
<td>Find average and instantaneous rates of change, with many significant errors</td>
</tr>
<tr>
<td>RATES OF CHANGE</td>
<td colspan="2">MA.C.10.11 Use first and second derivatives to describe the behavior of functions</td>
<td colspan="2">The student:
Uses local extrema and points of inflection to sketch a graph of the first and second derivatives.</td>
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<tr>
<td></td>
<td colspan="4">RUBRIC</td>
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<td>Advanced</td>
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<td>Partially Proficient</td>
<td>Novice</td>
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<tr>
<td></td>
<td>Use first and second derivatives to describe the behavior of functions, with accuracy</td>
<td>Use first and second derivatives to describe the behavior of functions, with no significant errors</td>
<td>Use first and second derivatives to describe the behavior of functions, with a few significant errors</td>
<td>Use first and second derivatives to describe the behavior of functions, with many significant errors</td>
</tr>
</table>

Calculus

Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA—Pose questions and collect, organize, and represent data to answer those questions		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 12: Data Analysis, Statistics, and Probability: STATISTICS—Interpret data using methods of exploratory data analysis		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS—Develop and evaluate inferences, predictions, and arguments that are based on data		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY—Understand and apply basic notions of chance and probability		
TOPIC	BENCHMARK	SAMPLE PERFORMANCE ASSESSMENT
	No benchmark for Calculus	

APPENDIX A: RESOURCES

Hawai'i Department of Education. *Mathematics Content Standards, 1999 Final Draft*. Hawai'i Department of Education, 1999.

National Council of Teachers of Mathematics. *Principles and Standards for School Mathematics*. National Council of Teachers of Mathematics, 2000.

National Research Council. *Helping Children Learn Mathematics*. National Academy Press, 2002.

National Research Council. *How Students Learn: Mathematics in the Classroom*. The National Academies Press, 2005.

APPENDIX B: MATHEMATICS – GLOSSARY

Back-to-back stem-and-leaf plot: a plot drawn with two stem-and-leaf plots that share the same stem in order to compare two sets of data; for example, the following data sets are being compared:

Data set 1: 7, 10, 11, 14, 16, 16, 18, 20, 21, 21, 21, 23, 25, 28,28, 29, 30, 32, 32, 33, 41
Data set 2: 12, 15, 16, 18, 20, 23, 25, 26, 26, 27, 27, 27, 29, 29, 30, 30, 31, 31, 34, 37, 39, 40, 48

```
          7 | 0 |
     866410 | 1 | 2 5 6 8
  988531110 | 2 | 0 3 5 6 6 7 7 7 9 9
       3220 | 3 | 0 0 1 1 4 7 9
          1 | 4 | 0 8
```

Bivariate data: data in two variables

Cardinal direction (also **Cardinal point)**: compass points of north, south, east, and west

Composing numbers: adding two or more numbers; bringing together the objects used to represent two or more numbers

Composing shapes: combining two or shapes to form a single shape

Composition of transformations: a combination of transformations performed one after the other

Congruent: when two figures have the exact same shape and size

Counting on: a strategy for adding two numbers in which the counter uses one of the numbers as a starting point and continues counting by the amount stated by the second number (e.g., to find the sum of 6 + 5, the counter will start from "6" then add 5 by counting, "7, 8, 9, 10, 11")

Cross-section: the plane figure obtained by cutting a plane through a three-dimensional object (e.g., the cross-section obtained by cutting a plane parallel to the base of a cone is a circle)

Customary units: Unites States standard units of measure (i.e. inch, foot, ounce, pound…)

Decomposing numbers: representing a number with two or more of its addends (e.g., the number 35 can be decomposed into $20 + 10 + 5$); representing a number with objects, then separating the objects into two or more groups

Decomposing shapes: subdividing a shape into two or more shapes

Describe a pattern: explain how to replicate or continue the pattern

Dilation: a proportional shrinking or enlargement of a figure

Extend a pattern: continue a pattern by applying its rule to determine what comes next

Fact family: a set of four related equations involving addition and subtraction (or multiplication and division) that use the same three numbers (e.g., $3 + 4 = 7$, $4 + 3 = 7$, $7 - 4 = 3$, and $7 - 3 = 4$ make up a fact family; $5 \times 2 = 10$, $2 \times 5 = 10$, $10 \div 2 = 5$, $10 \div 5 = 2$ make up a fact family)

Flexible: able to switch from one form of representation to another

Flip: see *Reflection*

Fundamental Counting Principle: if an action can be performed in a ways and then, for each of these ways, another action can be performed in b ways, the two actions can be performed in
$a \times b$ ways

Generalize a rule for a pattern: state a rule that can be used to determine any term (such as the 100th, 1000th, or n^{th} term) in the sequence

Graphing technology: technology, such as graphing calculators or computers, that allows users to create, explore, and analyze graphs

Irregular shapes: shapes that do not have common names due to their unique designs

Line of symmetry: a line that divides a figure into two congruent halves which are mirror images of each other

Line symmetry: a property of a plane figure in which two halves of the figure are mirror images of each other

Mental math: calculations that can be done without writing it down or using any tools

Net: surface of a three-dimensional solid drawn in two dimensions, with indicated edge lines where folding could occur

Open sentence: an equation or inequality with at least one unknown quantity

Parallel box-and-whisker plots: two or more box-and-whisker plots drawn one above the other and sharing the same scale in order to compare sets of data

Plane figure: a two-dimensional figure

Plane of symmetry: a plane that divides a three-dimensional figure into two congruent halves which are mirror images of each other

Recursive Pattern: a pattern in which each succeeding term is formulated from one or more previous terms (e.g., Each number in the Fibonacci sequence, 1, 1, 2, 3, 5, 8, 13, …, is the sum of the two previous terms)

Reflection (**Flip**): a transformation creating a mirror image of a figure on the opposite side of a given line

Rotation (**Turn**): a transformation in which a figure is turned a given angle and direction around a given point

Rotational symmetry: a property of a plane figure in which the figure can be rotated less than 360° and appear as if it had not been turned (e.g., most pinwheels have rotational symmetry)

Similar: when two shapes have corresponding angles that are equiangular and the ratio of corresponding side lengths are the same

Sinusoidal data: data that repeats itself in regular intervals (e.g., the tides; sine function)

Slide: see *Translation*

Standard algorithms: set rules or procedures that are followed to perform calculations

Translate among tables, graphs, and equations: to switch back-and-forth between different representations; to use one representation to make another

Translation (**Slide**): a transformation that moves every point on a figure a given distance in a given direction

Truncation: the remaining three-dimensional object when part of the three-dimensional object is removed

Turn: see *Rotation*

Vary directly: when one variable (quantity, value) increases the other increases proportionally.

Vary inversely: when one variable (quantity, value) increases the other decreases proportionally.

Appendix C: Acknowledgements

The following groups and individuals contributed to the development and refinement of the HCPS III Mathematics Standards:

The Mid-Continental Regional Education Laboratory (McREL)

Hawai'i educators who participated in the following refinement sessions:
- Focus group meeting, OCISS Annex, 1/15/2005
- HCPS III Elementary Forum, Hawai'i Convention Center, 2/23/2005
- HCPS III Secondary Forum, Hawai'i Convention Center, 2/24/2005
- Instructional Services Branch Standards Retreat, 3/16/2005

Ms. Patricia Young, Instructional Services Branch

Mr. Wesley Yuu, Instructional Services Branch