

MSAD#56

Mathematics

K-12

Curriculum

July 2006

**MSAD # 56 Math Curriculum Committee
2005-2006**

This curriculum was based on the work of the MSAD #56 District Math Curriculum Committee who spent two years reviewing, aligning, identifying the grade level expectations, and attending conferences based on research, best practices, and mathematics instruction.

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MSAD#56 Vision for Mathematics K-12

We must provide an engaging standards-based learning environment that fosters student growth and achievement in mathematics. Six Principles for School Mathematics Education, identified by the National Council of Teachers of Mathematics (NCTM), are necessary for excellence in mathematics education. An exemplary program must include

- Equity:** All students can learn mathematics and all students are in high quality programs.
- Curriculum:** A well-articulated K-12 mathematics curriculum guides the depth of study warranted at particular times and provides benchmarks for specific skills and concepts.
- Teaching:** Effective mathematics teachers understand what students know and need to learn while challenging and supporting them.
- Learning:** Learning mathematics *with understanding* is essential to enable students to solve the problems they will inevitably face in the future. When students work hard to solve a difficult problem or understand a complex idea, they become confident, responsible, and persistent learners.
- Assessment:** Assessment supports the learning of mathematics and furnishes useful information to both teachers and students. Assessment, an integral part of mathematics instruction, contributes significantly to all students' mathematics learning. Effective assessment allows for multiple approaches, thus giving a detailed picture and allowing each student to show his or her best strengths.
- Technology:** The deliberate integration of technology into teaching and learning enhances instruction and enriches student learning. Every student uses technology to facilitate his or her mathematics learning under the guidance of a skillful teacher.

Everyday Mathematics

Everyday Mathematics (K-5) is a standards-based curriculum that was approved by the MSAD# 56 Board of Directors in 2005. The program introduces all the major mathematical content areas.

- **Number sense** - Students must have enough experience with numbers of various kinds and sizes to have a feeling for where they come from and what they mean. Number sense helps students check the accuracy of answers (mentally, with pencil and paper, with a calculator, or by other means.)
- **Algebra** - The language of algebra was invented so that people can communicate symbolically in an efficient way. It is also a core part of all computer languages.
- **Measurement** - Measurements are used everyday. Whether it is finding the length of something, area of a room, a cost estimate, elapsed time for travel, or the capacity of a container measurements are vitally important to our everyday life.
- **Geometry** - Geometry, the study of the properties and relationships of objects in space, should be a natural and deeply intuitive part of mathematics for children. The earliest records of geometric thinking, from the Egyptians, Babylonians, and Chinese, confirm that it revolved around solving problems- laying out fields, finding areas and volumes, and construction of buildings. Students investigate geometry through many hands-on experiences-manipulating pattern blocks; building shapes with straws, and so on.
- **Data analysis and Probability** - Understanding statistics and probability is more important now than ever before. In a world inundated with numbers, citizens and consumers need to understand claims about data and probabilities in journalism and advertising. Workers in everyday life need to know how to gather, display, and analyze data in order to work efficiently and effectively. Even many recreational activities are becoming involved with data and chance.

Everyday Mathematics help students move beyond acquiring basic arithmetic skills by nurturing higher-order and critical-thinking skills. It uses everyday, real-world problems and situations while building and maintaining skills including automatic fact recall (memorization). Students using Everyday Mathematics are expected to master a variety of mathematical skills and concepts.

Mathematical content is taught in a repeated fashion, beginning with concrete experiences, and later moving to abstract or isolated concepts. This allows the student to master these skills over a period of time, not the first time it is introduced. This also allows the student to revisit topics, concepts and skills already covered.

Everyday Mathematics assumes that virtually all students are capable of a much greater understanding of and proficiency in mathematics than has been traditionally expected.

The program establishes high expectations for all students and gives teachers the tools they need to help those students meet their goals.

Math Thematics

Math Thematics, another standards-based math program is used in grades 6-8. MathThematics is designed as a “spiraling curriculum.” When a concept is first introduced, it is introduced at a concrete, manipulative, or “hands-on” level. Competency is only expected to be at that level. In other words, students are only expected to be able to solve the problems using the manipulative methods, not necessarily the pencil-and-paper method. Later in the program, the concept will be reintroduced and a new level of expertise will be required of the students. Eventually, the student will be required to be able to solve problems at the symbolic level using equations and math symbols, rather than manipulative tools or pictures. Each strand and its concepts are revisited several times across several modules in more than one book. This means that students are actually spending more time on each topic in the long run than they would if they simply studied each topic separately each year and then moved on.

The MathThematics curriculum is more oriented toward problem solving than many of the traditional math programs. The content emphasizes critical thinking and reasoning over rote drill and memorization, and while the “elementary” math concepts of whole number operations are reviewed in the first module of the first book, they are then only referred to when being used to lead students into transferring those skills to new number concepts such as operations with integers, decimals or fractions.

Throughout the program, students are expected to communicate orally and in written form about the math they are learning, their ways of solving a problem, and their ways of thinking about the math. This strengthens their own knowledge, and allows both the teacher and the other students to understand how they came to their answers. This program provides many opportunities for students to work together to solve problems or discover new concepts. Some lesson activities are designed to be done in small groups, others in pairs, and still others as individuals. This is very important to students of this age for several reasons. The first is that this is a very social age, when what your friend thinks is often more important than what the teacher says. Secondly, when students discuss their math aloud, it reinforces the learning that is taking place, especially for those who are auditory learners, or those who have difficulty with composing answers on paper. Lastly, when students are allowed to incorporate talking about math ideas as part of the learning process, they are more engaged with the math, and they are more apt to explore other ways of thinking about problems, which can aid them in solving other problems later on.

SPECIFICS OF PROGRAM DESIGN

MODULES - Each grade level book is organized into 8 different modules. Each module is organized around a theme that connects the math to the real world. The theme is introduced on the opening pages of the module, along with the contents of the module and a description of the **Module Project** available for each module. **SECTIONS** - There are 4 to 6 sections in each module. Each section includes a "**Setting the Stage**" to help motivate students and get them talking about the situation involved in the math problems. There are then one to three **Explorations**, a **Key Concepts** page, and **Practice and Application Exercises**.

Explorations - The Explorations in each section serve to actively engage students in investigating math concepts, learning math skills, and solving problems. Each exploration has a **Goal Box** (found in the margin of the page) which lists what the objectives of the lesson are, along with the key vocabulary terms. In each lesson, there are **Checkpoint** questions which check to see that each student understands what has been done up to that point in the lesson. These checkpoints usually correspond directly to the various parts of the stated Goals for the Exploration.

Key Concepts page - This page in each section reviews the concepts that are the focus of the explorations, and also lists key vocabulary words for the section. It can be used to help students decide what to review for a quiz, and to help parents focus their students' learning when doing their homework

Practice and Application Exercises - This is the part of the section used for students' independent practice (homework). The entire body of homework for each Exploration is found here, although often teachers will pick and choose which problems will be done and when. These pages usually include some **Reflecting on the Section** questions, some **Challenge** level problems, one or two **Standardized Testing** style problems, and **Extension Activities**.

Extra Skill Practice - This page provides additional exercises that help assess understanding of important skills before starting the next section. **Study Skills** are also often included to give students some additional learning support if they are having difficulty.

Module Projects and Extended Exploration problems - These two additional opportunities for applying the math that students are learning may or may not be used by your student's teacher. They are designed to be done over a period of two weeks or more, and may be assigned as an independent assignment to be completed outside of the classroom.

Contemporary Mathematics in Context (Core-Plus)

Contemporary Mathematics in Context (Core-Plus) is a four-year unified curriculum that replaces the traditional Algebra-Geometry-Advanced Algebra/Trigonometry-Pre-Calculus

sequence used with grades 9-12. Courses each year feature interwoven strands of algebra and functions, statistics and probability, geometry and trigonometry, and discrete mathematics. By encountering mathematics every year from a more mathematically sophisticated point of view, students' understanding of the strands deepens across the four-year curriculum. Mathematical connections between strands and ways of thinking mathematically that are common across strands are emphasized.

The first three courses in the *Core-Plus* series provide a common core of broadly useful mathematics for all students. These courses were developed to prepare students for success in college, in careers, and in daily life in contemporary society. The four strands of mathematics covered are:

Algebra and Functions

The algebra and functions strand develops student ability to recognize, represent, and solve problems involving relations among variables. Central to the development is the use of functions as mathematical models. The key algebraic models in the curriculum are linear, exponential, power, polynomial, logarithmic, rational, and periodic functions. Each algebraic model is investigated in four linked representations - verbal, graphic, numeric, and symbolic - with the aid of technology. Attention is also given to modeling with systems of equations, both linear and nonlinear, and to symbolic reasoning and manipulation.

Geometry and Trigonometry

The primary goal of the geometry and trigonometry strand is to develop visual thinking and student ability to construct, reason with, interpret, and apply mathematical models of patterns in visual and physical contexts. The focus is on describing patterns with regard to shape, size, and location; representing patterns with drawings, coordinates, or vectors; predicting changes and invariants in shapes under geometric transformations; and organizing geometric facts and relationships through deductive reasoning.

Statistics and Probability

The primary role of the statistics and probability strand is to develop student ability to analyze data intelligently, to recognize and measure variation, and to understand the patterns that underlie probabilistic situations. The ultimate goal is for students to understand how inferences can be made about a population by looking at a sample from that population. Graphical methods of data analysis, simulations, sampling, and experience with the collection and interpretation of real data are featured.

Discrete Mathematics

The discrete mathematics strand develops student ability to model and solve problems involving enumeration, sequential change, decision making in finite settings, and relationships among a finite number of elements. Topics include matrices, vertex-edge graphs, recursion, models of social decision-making, and systematic counting methods. Key themes are discrete mathematical modeling, existence (*Is there a solution?*), optimization (*What is the best solution?*), and algorithmic problem solving (*Can you efficiently construct a solution?*).

ORGANIZATION OF THE CURRICULUM

The first three courses in the *Core-Plus* series provided a common core of broadly useful mathematics for all students. They were developed to prepare students for success in college, in careers, and in daily life in contemporary society. Course 4 formalizes and extends the core program, with a focus on the mathematics needed to be successful in college mathematics and statistics courses. Unit titles for the four-year curriculum are given in the following table.

-- STRANDS --	
Course 1	
Unit 1 Patterns in Data	Statistics & Probability
Unit 2 Patterns of Change	Algebra & Functions
Unit 3 Linear Models	Algebra & Functions
Unit 4 Graph Models	Discrete Mathematics
Unit 5 Patterns in Space & Visualization	Geometry & Trigonometry
Unit 6 Exponential Models	Algebra & Functions
Unit 7 Simulation Models	Statistics & Probability
Course 2	
Unit 1 Matrix Models	Algebra & Functions, Discrete Mathematics
Unit 2 Patterns of Location, Shape & Size	Algebra & Functions, Geometry & Trigonometry
Unit 3 Patterns of Association	Statistics & Probability
Unit 4 Power Models	Algebra & Functions
Unit 5 Network Optimization	Discrete Mathematics
Unit 6 Geometric Form & Its Function	Geometry & Trigonometry
Unit 7 Patterns in Chance	Statistics & Probability
Course 3	
Unit 1 Multiple-Variable Models	Algebra & Functions, Geometry & Trigonometry
Unit 2 Modeling Public Opinion	Statistics & Probability, Discrete Mathematics
Unit 3 Symbol Sense and Algebraic Reasoning	Algebra & Functions
Unit 4 Shapes & Geometric Reasoning	Geometry & Trigonometry
Unit 5 Patterns in Variation	Statistics & Probability
Unit 6 Families of Functions	Algebra & Functions, Geometry & Trigonometry

Items coded with **GLE** denote the State's Grade Level Expectations. The **GLE's in bold** denotes the **additional** grade level expectations that our students **will be tested** in the 2006-07 school year.

Grade Level Expectations K-12

Below are the grade level expectations for all students K-12 in the area of mathematics. Our goal was to have a seamless transition K-12 where overlaps were addressed and removed, if necessary and any gaps were also addressed. Students, parents, and teachers will all know what is expected of students K-12.

EVERYDAY MATHEMATICS
KINDERGARTEN SECURE SKILLS AND CONCEPTS

At the end of the school year, Kindergarten students will:

Number and Number Sense:

1. Know the facts of 0's and adding 1 to a number. **MLR – A₁**
 - Taking away all (i.e. $8 - 8 = 0$)
 - Taking away nothing (i.e. $8 - 0 = 8$) **Note teachers: Use the correct term of zero.**
 - Adding 1 to any number (i.e. $4 + 1 = 5$)
2. Verbally count 20 or more objects in a random arrangement. **MLR – A₁**
3. Perform interrupted verbal counting to 100. **MLR – A₁**
4. Count up and back by 1s, starting with any number up to and including 20. **MLR – A₁ Note for teachers: Counting backwards by 1's is the perfect connection for subtraction.**
5. Count by 2's to 10. **MLR – A₁**
6. Count by 5's to 100. **MLR – A₁**
7. Count by 10's to 100. **MLR – A₁**
8. Read any number, 100 or less. **MLR – A₃**
9. Write any number up to 31. **MLR – A₃**
10. Recognize many non-computational uses of numbers through daily experiences. Example: count snacks, children, or days until a special event; measure length, weight, elapsed time, or cost; and have experience with certain reference frames such as clocks, calendars, temperatures, or ordinal numbers. **MLR – A₂**

Computation:

11. Understand basic meanings of addition and subtraction in real situation, in children's own number stories, in oral problems, with concrete objects, and on number lines. **MLR – B₂**

Geometry:

12. Recognize and name basic plane and solid figures. **MLR E₁**

Measurement:

13. Identify the value of a penny, nickel, and dime. **MLR – F₂**
14. Estimate times on an analog clock to the hour hand. **MLR – F₃**

EVERYDAY MATHEMATICS
FIRST GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, First Grade students will:

Number and Number Sense:

1. Count by 5s beyond 100. **MLR – A₁**
2. Count by 2s to 50. **MLR – A₁**
3. Write numbers from 1 to 100. **MLR – A₃**
4. Compare pairs of numbers less than 100. **MLR – A₃**
5. Count backward from 21 or higher. **MLR – A₁**
6. Count up to 100 objects. **MLR – A₁**
7. Exchange pennies for nickels. **MLR – A₁**
8. Understand place value for tens and ones. **MLR – A₃**
9. Understand 2-digit numbers in terms of 10's and 1's. **MLR – A₃**
10. Recognize if a number is odd or even.

Computation:

11. Calculate and know the values of combinations of pennies, nickels, dimes, and quarters. **MLR – B₂, F₂**
12. Count up and back by 1s on the number grid and number line. **MLR – B₂** **Note to teachers: Work with number line is a pre-requisite to measuring.**
13. Solve addition and subtraction number stories using 1 digit number combinations. **MLR – B₂**
14. Identify and use patterns on the number grid. **MLR – B₂**
15. Know addition and subtraction facts (combinations up to 10).

Measurement:

16. Tell time to the nearest hour and half hour. **MLR – F₃**
17. Measure to the nearest inch.

EVERYDAY MATHEMATICS**SECOND GRADE SECURE SKILLS AND CONCEPTS**

At the end of the school year, Second Grade students will:

Number and Number Sense:

1. Identify place value in 2-digit and 3-digit numbers. **MLR – A₃**
2. Know and express automatically the values of digits in 2-, 3-, and 4-digit numbers. **MLR – A₃**
3. Read and write money amounts in decimal notation.
4. Read, write, and compare whole numbers up to 4 digits. **MLR – A₂**
5. Find equivalent names for numbers. **MLR – A₁, A₃, and H₂**

Computation:

6. Know all addition and subtraction facts (combinations up to 18).
7. Solve addition and subtraction number stories using 2 digit number combinations. **MLR – B₂**
8. Solve number-grid puzzles. **MLR – B₂**
9. Use a calculator to compute money amounts. **MLR – B₃**
10. Exchange pennies, nickels, dimes, and quarters. **MLR – B₃**
11. Use equivalent coins to show money amounts in different ways. **MLR – B₃, F₂**
12. Add three 1-digit numbers mentally
13. Multiply numbers with 0, 1, 2, 5, and 10 as a factor.

Geometry:

14. Draw line segments.
15. Identify 2-dimensional shapes. **MLR – E₁**

Patterns, Relations, and Functions:

16. Count by 2s, 5s, 10s and 100's and describe the patterns up to 1000. **MLR – G₁**
17. Use simple Frames-and-Arrows diagrams to solve problems. **MLR – G₁, K₁**
18. Add and subtract with multiples of 10. **MLR – G₁**
19. Find missing addends for the next multiple of 10. **MLR – G₂**
20. Know complements of 10.

Algebra Concepts:

21. Use the "What's My Rule?" tables to solve problems. **MLR – G₂, H₂**

EVERYDAY MATHEMATICS
SECOND GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Second Grade students will:

Mathematical Communications:

- 22. Construct fact families for addition and subtraction. **MLR – K₁**
- 23. Construct multiplication/division fact families.

Data Analysis and Statistics:

- 24. Make tallies and give the total. **MLR – C₂**
- 25. Plot data on a bar graph and compare quantities from a bar graph. **MLR – C₁**

Measurement:

- 26. Tell time to 5-minute intervals. **MLR – F₁**
- 27. Show “Penny,” “Nickel,” “Dime,” and “Quarter” for a given amount. Show the number of coins needed for a given amount. **MLR – F₂**
- 28. Measure to the nearest inch, half inch, and nearest centimeter. **MLR – F₁**
- 29. Use a ruler, tape measure, and meter/yardstick correctly. **MLR – F₃**
- 30. Demonstrate calendar concepts and skills (seconds, minutes, hours, days, weeks, months, year). **MLR – F₁**

EVERYDAY MATHEMATICS and MEA
THIRD GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, Third Grade students will:

Number and Number Sense:

1. Perform interrupted verbal counting up 10's and 100's up to 10,000. **MLR – A₃**
2. Apply place-value concepts in 4-digit numbers. **MLR – A₁**
3. Find equivalent names for numbers. **MLR – A₁**
4. Read, write, and compare whole numbers up to 5 digits. **MLR – A₁**
5. Identify place value in whole numbers up to 5 digits.
6. **Read, write, model**, and compare whole numbers using $<$, $>$, and $=$ and order numbers up to **9999** and classify numbers as odd or even for numbers up to **9,999**.
GLE, M1A1.3
7. Calculate the values of combinations of bills and coins and write the total in dollars-and-cents notation.
8. **Demonstrate understanding of the meaning of decimals through hundredths (in money contexts only)**. **GLE, M1A3.3**
9. Identify fractional parts of a region.
10. **Read, write, model, and compare simple fractions with denominators 2, 3, and 4**.
GLE, M1A2.3

Computation:

11. Know addition and subtraction facts (combinations up to 18). **MLR – B₄**
12. Use basic facts to solve fact extensions. **MLR – B₄**
13. Use the “What’s My Rule?” tables to solve problems. **MLR – B₄**
14. Solve addition and subtraction multi-digit number stories. **MLR – B₁**
15. Solve single and multi-step, real-life problems using addition and subtraction with whole numbers with no number greater than **9999**. **GLE, M1B1.3**
16. Add and subtract multi-digit numbers. **MLR – B₄**
17. Develop proficiency with the facts and algorithms of addition and subtraction on whole numbers using mental math and a variety of materials, strategies, and technologies with no number greater than **9999**. **GLE, M1B3.3**
18. Know multiplication facts having 2, 5, or 10 as a factor. **MLR – B₄**

EVERYDAY MATHEMATICS and MEA
THIRD GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Third Grade students will:

19. Know multiplication facts having 0 or 1 as a factor. **MLR – B₄**
20. Know multiplication and division facts (0, 1, 2, 3, 4, 5, 10). **MLR – B₄**
21. Solve equal grouping and equal sharing number stories. **MLR – B₂**

Data Analysis and Statistics:

22. Read, interpret, and make a frequency table/ tally chart. **MLR – C₂**
23. Reads and interprets displays of data: line plots, tables, tally charts, and bar graphs, identifying least frequent, most frequent (mode), reading, using, and comparing values. **GLE, M3C2.3**
24. Read, interpret, and make a bar graph. **MLR – C₂**
25. Read and interpret line plots.

Probability:

26. Recognize and describe the likelihood of the occurrence of an event using “always,” “impossible,” “likely,” “not likely,” or “equally likely.” **GLE, M3D2.3**

Geometry:

27. Identify right angles.
28. Identify and name 2-D and 3-D shapes. **MLR – E₁**
29. Use properties/attributes (limited to number of sides, number of angles) to identify, describe, and distinguish between triangles and rectangles and lengths of sides to identify squares as special rectangles. **GLE, M2E1.3**
30. Identify symmetric figures and draw lines of symmetry. **MLR – E₂**
31. Identify a line of symmetry for a given shape or answer questions about figures based on lines of symmetry, e.g. “which of the following shapes have one or more lines of symmetry?” **GLE, M2E2.3**

Measurement:

32. Tell and show times to the nearest minute. **MLR – F₁**
33. Measure to the nearest $\frac{1}{4}$ inch and nearest centimeter.
34. Solve and justify solutions to real-life problems involving the measurement of time, length, and temperature including using a ruler to measure length to the nearest inch and whole centimeter. **GLE, M2F1.3**

EVERYDAY MATHEMATICS and MEA
THIRD GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Third Grade students will:

35. Select appropriate tools and units to measure length, time, and temperature. **GLE, M2F2.3**

Patterns, Relations, and Functions:

36. Identify and use number patterns to solve problems. **MLR – G₁**
37. Complete fact and number families. **MLR – G₂**
38. Complete multiplication/division fact families. **MLR – G₂**
39. Determine the next term or missing terms in patterns with numbers or shapes. **GLE, M4G1.3**
40. Translate real-life situations into addition and subtraction sentences. **GLE, M4G2.3**

Discrete Mathematics:

41. Create and use organized lists and Venn diagrams. **GLE, M1I1.3**

Algebra Concepts:

42. Solve for a missing number or find the replacement for a symbol in addition and subtraction sentences using whole numbers. **GLE, M4H2.3**

Mathematical Communications:

43. Complete tables, bar graphs and pictorials. **GLE, M4K1.3**

EVERYDAY MATHEMATICS and MEA
FOURTH GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, Fourth Grade students will:

Number and Number Sense:

1. Read and write numerals to hundred-millions; give the value of the digits in numerals to hundred-millions.
2. Read, compare, order, classify, and explain whole numbers up to one million. **GLE, M1A1.4**
3. Find equivalent names for numbers. **MLR – A₁**
4. Compare large numbers. **MLR – A₁**
5. Identify the whole for fractions.
6. Identify fractional parts of a collection of objects and regions. **MLR – A₁**
7. Convert between hundredths-fractions, decimals, and percents. **MLR – A₁**
8. Use a calculator to rename any fraction as a decimal or percent.
9. Read, compare, order, classify, and explain simple fractions through tenths. **GLE, M1A2.4**
10. **Demonstrate knowledge of the meaning of decimals and integers and an understanding of how they may be used. GLE, M1A3.4**

Computation:

11. Know addition and subtraction facts (combinations up to 18) **MLR – B₄**
12. Know multiplication and division facts (0-12). **MLR – B₄**
13. Add and subtract multi-digit numbers. **MLR – B₄**
14. Solve addition and subtraction number stories, including ones with simple fractions. **MLR – B₁**
15. Estimate sums. **MLR – B₁**
16. Solve multi-step, real-life problems using the four operations with whole numbers. **GLE, M1B1.4**
17. Solve real-life problems involving addition and subtraction of simple fractions. **GLE, M1B2.4**
18. Develop proficiency with the facts and algorithms of the four operations on whole numbers using mental math and a variety of materials, strategies, and technologies. **GLE, M1B4.4**

Discrete Mathematics:

19. **Create and use organized lists, tree diagrams, Venn diagrams and networks. GLE, M1I1.4**

**EVERYDAY MATHEMATICS and MEA
FOURTH GRADE SECURE SKILLS AND CONCEPTS**

(Continued)

At the end of the school year, Fourth Grade students will:

Data Analysis and Statistics:

- 20. Display data with a line plot, bar graph, or tally chart. **MLR – C₂**
- 21. Use the statistical landmarks maximum and minimum. **MLR – C₁**
- 22. Read and interpret displays of data. **GLE, M3C2.4**

Geometry:

- 23. Name, draw, and label line segments, lines, rays, angles, triangles, and quadrangles/quadrilaterals. **Note to teachers: Quadrangles and quadrilaterals are the same. Use both terms.**
- 24. Identify and describe right angles, parallel lines, and line segments.
- 25. Use a transparent mirror to draw the reflection of a figure.
- 26. Identify lines of symmetry, lines of reflection, reflected figures, and figures with line symmetry.
- 27. Name and locate points specified by ordered number pairs on a coordinate grid. **MLR – E₃**
- 28. Identify acute, right, obtuse, straight, and reflex angles.
- 29. Make turns and fractions of turns; relate turns and angles.
- 30. Use a circular protractor and half-circle protractor to measure and draw angles. . **MLR – E₄**
- 31. Describe, model, and classify shapes and figures using applicable properties. . **GLE, M2E1.4**
- 32. Experiment with shapes and figures to make generalizations regarding congruence, symmetry, and similarity. **GLE, M2E2.4**
- 33. Use transformations such as slides, flips, and rotations. **GLE, M2E3.4**

Measurement:

- 34. Draw and measure line segments to the nearest centimeter.
- 35. Use dollars-and-cents notation
- 36. Find the area of a figure by counting unit squares and fractions of unit squares inside the figure. **MLR – F₁**
- 37. Solve and justify solutions to real-life problems involving the measurements of time, length, area, perimeter, weight, temperature, mass, and capacity/volume. **GLE, M2F1.4**
- 38. Select measuring tools and units of measurement that are appropriate for what is being measured. **GLE, M2F2.4**

EVERYDAY MATHEMATICS and MEA
FOURTH GRADE SECURE SKILLS AND CONCEPTS

(Continued)

At the end of the school year, Fourth Grade students will:

Patterns, Relations, and Functions:

- 39. Understand the relationship between multiplication and division. **MLR – G₂**
- 40. Use the patterns of numbers, geometry, and a variety of graphs to solve a problem. **GLE, M4G1.4**
- 41. Use variables and open sentences to express relationships. **GLE, M4G2.4**

Algebra Concepts:

- 42. Use rate tables, if necessary, to solve rate problems.
- 43. Develop and evaluate simple formulas in problem-solving contexts. **GLE, M4H1.4**
- 44. Find replacements for variables that make simple number sentences true. **GLE, M4H2.4**

Probability:

- 45. Estimate probability from a sample of observed outcomes and simulations. **GLE, M3D2.4**

Mathematical Communication:

- 46. Use simple tables and graphs to communicate ideas and information in a concise and clear manner. **GLE, M4K1.4**

EVERYDAY MATHEMATICS and MEA
FIFTH GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, Fifth Grade students will:

Number and Number Sense:

1. Use a divisibility test to determine if a number is divisible by another number. **MLR – A₁**
2. Use divisibility rules for 2, 5, and 10. **GLE, MIA3.5**
3. Identify prime and composite numbers.
4. Understand how square numbers and their square roots are related. **MLR – A₁**
5. Find the factors of numbers. **MLR – A₂**
6. Make magnitude estimates.
7. Know place value to billions and hundredths.
8. Identify place value in numbers to billions.
9. Find equivalent fractions. **MLR – A₁**
10. Convert between fractions, decimals, and percents. **MLR – A₁**
11. Read, compare, order, use, and represent simple fractions (halves, fourths, fifths, and tenths with all numerators) and decimals to hundredths. **GLE, MIA1.5**
12. Understand and apply exponential notation. **MLR – A₁**
13. Understand the function and placement of parentheses in number sentences. **MLR – A₂**
14. Compare and order integers.
15. Read, order, compare, use, and represent fractions and decimals to hundredths.
16. Convert between fractions and mixed or whole numbers. **MLR – A₁**
17. Solve ratio and rate number stories. **MLR – A₃, F₂**
18. Find the prime factorizations of numbers.

Computation:

19. Know all four operations; addition and subtraction (combinations up to 18) and multiplication and division facts (0-12). **MLR – B₁**

EVERYDAY MATHEMATICS and MEA
FIFTH GRADE SECURE SKILLS AND CONCEPTS

(Continued)

At the end of the school year, Fifth Grade students will:

20. Find the product of multi-digit whole numbers and decimals. **MLR – B₁**
21. Find the sum and difference of multi-digit whole numbers and decimals. **MLR – B₁**
22. Use an algorithm to add mixed numbers. **MLR – B₁**
23. Find common denominators.
24. Compare and model all four operations on whole numbers (1-digit divisor, 3-digit dividend) and addition and subtraction with simple fractions with common denominators and decimals to hundredths and do straight computation with these numbers and operations. **GLE, M1B1.5**
25. Create, solve, and justify the solution for multi-step, real-life problems involving all four operations on whole numbers (1-digit divisor, 3-digit divided) and addition and subtraction fractions with common denominators and decimals to hundredths. **GLE, M1B2.5**

Data Analysis and Statistics:

26. Identify and use the maximum, minimum, median, mode, mean, and range for a data set. **MLR – C₁**
27. Organize data to find mode, media, and range of a set of values. **GLE, M3C1.5**

Measurement:

28. Understand the concept of volume of a figure. **MLR – F₃**
29. Understand the concept of area of a figure. **MLR – F₃**
30. Use a formula to find the area of rectangles. **MLR – F₃**
31. Use formulas to find the volume of prisms and cylinders. **MLR – F₃**
32. Use formulas to find the area of polygons and circles. **MLR – F₃**
33. **Solve problems involving direct measures of length, distance, elapsed time, temperature, capacity, mass, and weight with measures limited to whole numbers (quarters for lengths) including using a ruler to measure length to the nearest quarter inch and whole centimeter. GLE, M2F2.5**

EVERYDAY MATHEMATICS and MEA
FIFTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Fifth Grade students will:

34. Find area and perimeter of rectangles with whole numbers (includes formula use) with correct units. **GLE, M2F3.5**

Geometry:

35. Estimate the measure of an angle.
36. Measure an angle to within 2° .
37. Identify types of angles and triangles.
38. Know properties of polygons.
39. Define and create tessellations.
40. Know the properties of geometric solids. **MLR – E₁**
41. Plot ordered pairs on a one-quadrant coordinate grid.
42. Plot non-negative values as points on a number line. **GLE, M2FE3.5**
43. Identify the base and height of triangles and parallelograms. **MLR – E₁**
44. Use a formula to find the area of triangles and parallelograms. **MLR – E₂**
45. Use properties/attributes (limited to number of sides, number of angles, and length of sides, and lines of symmetry) to classify polygons **and draw 2 – dimensional shapes.**
GLE, M2F2E1.5

Patterns, Relations, and Functions:

46. Draw arrays to model multiplication.
47. Translate real-life situations into addition, subtraction, multiplication, or division sentences. **GLE, M4G1.5**
48. Solve problems involving linear patterns in tables, graphs, words, or rules using whole numbers. **GLE, M4G3..5**

Probability:

49. Find the probabilities of simple events and represent them as fractions ($1/2, 1/3, 2/3, 1/4, 2/4, 3/4$ eligible). **GLE, M3D1.5**

EVERYDAY MATHEMATICS and MEA
FIFTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Fifth Grade students will:

Algebra Concepts:

50. Determine whether number sentences are true or false.
51. Solve one-step pan-balance problems.
52. Solve one-step equations using addition, subtraction, or multiplication with a variable.
Values for variables are limited to whole numbers. **GLE, M4H1.5**
53. **Evaluate formulas with no more than 2 variables using whole numbers. GLE, M4H1.6**

Mathematical Communication:

54. **Read and use statistics, tables, and graphs to communicate ideas and information. Data displays include frequency distributions, tables, line plots, histograms or bar graphs, and pie charts/circle graphs. GLE, M4K2.5**

MATH THEMATICS & MEA's
SIXTH GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, Grade 6 students will:

Algebra Concepts:

1. **Evaluate formulas/expressions with no more than 3 variables using the computation specified in M1B1.6** (Compute and model all four operations with whole numbers, common fractions and decimals to thousandths, and do straight computation with these numbers and operations. Division limited to 2-digit whole number divisors and 3-digit dividends. **GLE, M4H1.6**)
2. Solve one-step equations using whole numbers with all four operations. **GLE, M4H6.6**
3. Use an equation to find a missing dimension. - **MLR – H₁**

Mathematical Communications:

4. **Read and use statistics, tables, and graphs to communicate ideas and information. Data displays include frequency distributions, tables, line plots, histograms or bar graphs and pie charts/circle graphs.** **Note: Integrate Science and S. Studies.** – **GLE, M4K2.6**

Computations:

5. Follow the order of operations, using whole number operation and parenthesis. – **MLR – B₁**
6. Understand that exponents represent repeated multiplication. - **MLR – B₁**
7. Find a fractional part to find a whole. - **MLR – B₁**
8. Add and subtract decimals to thousandths. - **MLR – B₁**
9. Add and subtract mixed numbers with like denominators with renaming. - **MLR – B₁**
10. Multiply with fractions. - **MLR – B₁**
11. Use a reciprocal to divide a whole number by a fraction. - **MLR – B₁**
12. Use reciprocals to divide any combination of whole numbers or fractions. - **MLR – B₁**
13. Use a fraction and mental math to find the percent of a number. - **MLR – B₁**
14. Compute and model all four operations with whole numbers, common fractions and decimals to thousandths, and do straight computation with these numbers and operations. Division limited to 2-digit whole numbers divisors and 3-digit dividends. –**GLE, M1B1.6**

MATH THEMATICS & MEA's
SIXTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 6 students will:

15. Create, solve, and justify the solution for multi-step, real-life problems with whole numbers, common fractions and decimals to thousandths, with division limited to 2-digit whole number divisors and 3-digit dividends. – **GLE, M1B2.6**

Data Analysis & Statistics:

16. Interpret bar graphs with more than one set of data. - **MLR – C₃**
17. Organize data to find modes, medians, means and ranges for sets of data and displays: Data displays include frequency distributions, tables, line plots, or bar graphs (e.g., given a bar graph, determine the mode, median, range and mean). **GLE, M3C1.6**

Geometry:

18. Classify triangles by their angles and/or sides. - **MLR – E₁**
19. Identify quadrilaterals. - **MLR – E₁**
20. Use parallel line segments to identify figures. - **MLR – E₁**
21. Identify all lines of symmetry within a figure or a pattern. - **MLR – E₁**
22. Identify and name prisms. - **MLR – E₁**
23. Recognize cylinders. - **MLR – E₁**
24. Divide a figure into congruent parts. - **MLR – E₂**
25. Identify congruent figures. - **MLR – E₂**
26. Graph points with integer coordinates on a coordinate grid. - **MLR – E₃**
27. Perform a translation, a rotation, and a reflection. - **MLR – E₄**
28. Use transformations to make designs. - **MLR – E₄**
29. Use properties/attributes (limited to number of sides, number of angles, and length of sides, lines of symmetry, parallel sides, perpendicular sides, and angles relative to 90°) to classify polygons; and to compare and classify rectangular prisms, including cubes; and triangular prisms **and draw 2-dimensional shapes**. – **GLE, M2E1.6**
30. Use ordered pairs as coordinates of points in the first quadrant of a coordinate plane. – **GLE, M2E3.6**

MATH THEMATICS & MEA's
SIXTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 6 students will:

Mathematical Decision Making:

31. Organize data to find modes, medians, means and ranges for sets of data and displays: Data displays include frequency distributions, tables, line plots, or bar graphs (e.g. given a bar graph, determine the mode, median, range and mean) – **GLE, M3C1.6**

Mathematical Reasoning/Communication:

32. Determine which one is better to use: Mean, Median, Mode and make a table to organize your work. - **MLR – J/K**
33. Know and apply problem solving process: - **MLR – J/K**
- Learn the first step in a problem solving approach-understand the problem.
 - Make a plan to solve a problem.
 - Apply strategies such as try a simpler problem and make an organized list.
 - Carry out a plan to solve a problem.
 - Look back and reflect on the problem and the solution.
 - Use visual representations to help solve problems and explain solutions.

Measurement:

34. Use benchmarks to estimate customary length. (Customary System) - **MLR – F₁**
35. Use a ruler to measure in fractions of an inch. (Customary System) - **MLR – F₁**
36. Choose a customary unit or combination of units to measure a length. (Customary System) - **MLR – F₁**
37. Use benchmarks to estimate capacity in customary units. - **MLR – F₁**
38. Understand how to convert between square units in the same measurement system. (Customary and Metric Systems). - **MLR – F₁**
39. Use appropriate customary units to estimate and measure weight. (Customary System) - **MLR – F₁**
40. Estimate capacity in metric units. (Metric System) - **MLR – F₁**
41. Use ratio as a tool for investigating measurements. (Similarity) - **MLR – F₂**
42. Use benchmarks to estimate Celsius and Fahrenheit temperatures. (Temperature) - **MLR – F₂**
43. Add and subtract lengths measured in customary units. (L/P/C) - **MLR – F₃**

MATH THEMATICS & MEA's
SIXTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 6 students will:

44. **Perform conversions between inches, feet, and yards; seconds, minutes, and hours; pounds and ounces; and cups, pints, quarts, and gallons.** – GLE, M2F1.6
45. **Solve problems involving direct measures of length, distance, elapsed time, temperature, capacity, mass and weight.** – GLE, M2F2.6
46. Compute the area and perimeter of triangles and rectangles with whole numbers (formula use), and find the volume of rectangular solids using pictures of blocks or gridded diagram with correct units. –GLE, M2F3.6

Numbers and Number Sense:

47. Recognize equivalent fractions. (Fractions) - MLR – A₁
48. Find equivalent fractions. (Fractions) - MLR – A₁
49. Write a fraction in lowest terms. (Fractions) - MLR – A₁
50. Identify decimal place value. (Decimals) - MLR – A₁
51. Write numbers in tenths, hundredths, or thousandths using words, fractions, or decimals. (Decimals) - MLR – A₁
52. Compare fractions by writing equivalent fractions with a common denominator. (Fractions) - MLR – A₁
53. Interpret the quotient in division by a fraction. (Fractions) - MLR – A₁
 - Compare fractions by rewriting as decimals. (Fractions)
54. Apply the percent equivalents for thirds. – MLR – A₁
55. Recognize and write equivalent ratios. (Ratio/Rates) - MLR – A₁
56. Use compatible numbers to find sums or products mentally. - MLR – A₂
57. Find reciprocals. - MLR – A₂
58. Estimate answers by rounding whole numbers. - MLR – A₃
59. Use number sense to estimate when dividing with fractions. - MLR – A₃
60. Use number sense to compare fractions. - MLR – A₃
61. Estimate mixed number sums. - MLR – A₃

MATH THEMATICS & MEA's
SIXTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 6 students will:

62. Read, compare, order, use and represent fractions, (halves, thirds, fourths, fifths, sixths, eighths, and tenths with all numerators); and compare, order, use and represent decimals to thousandths and convert between decimals and percentages. – **GLE, M1A1.6**
63. Recognize and apply concepts of prime and composite numbers and use divisibility rules for 2, 3, 4, 5, 6, 9, and 10; and recognize and find factors and multiples of natural numbers. – **GLE, M1A3.6**

Patterns, Relations, and Functions:

64. Find a rule to extend a pattern. - **MLR – G₁**
65. Interpret and make a line graph. - **MLR – G₁**
66. Translate real-life situations into addition, subtraction, multiplication, and division sentences with whole numbers (mix of operations included). – **GLE, M4G1.6**
67. Solve problems involving linear patterns in the form of tables, graphs, words, rules and equations using whole numbers, decimals to hundredths and simple fractions. – **GLE, M4G3.6**

Probability:

68. Find the probabilities of simple events and represent them as fractions (simplest form not needed). - **GLE, M3D1.6**
69. Find the number of arrangements of 3 factors with no more than 4 choices per factor (e.g., tree diagram, organized list, pictures). - **GLE, M3D4.6**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, Grade 7 students will:

Algebra Concepts:

1. **Evaluate formulas with no more than 3 variables using the computation specified in M1B1.7** (Compute and model all four operations with whole numbers, Fractions (including mixed numerals), decimals, and percents applying order of operations and do straight computation with these numbers and operations. **GLE, M4H1.7**)
2. **Graph inequality statements on a number line.** **GLE, M4H4.7**
3. Solve two-step equations using integers and positive rational numbers. **GLE, M4H6.7**
4. Evaluate a variable expression involving integer addition and subtraction and whole number operations. - **MLR – H₁**
5. Use order of operations to evaluate numerical expressions involving fractions, decimals, and integers. - **MLR – H₁**
6. Solve addition equations using an algebra tile model. – **MLR – H₁**
7. Solve addition and subtraction equations with integer solutions using inverse operations, and check a solution of an equation by substitution. - **MLR – H₁**
8. Write an addition or subtraction equation to model a situation. - **MLR – H₁**
9. Solve one and two step equations with positive coefficients. - **MLR – H₁**
10. Write simple and combine inequalities and graph them on a number line. - **MLR – H₅**
11. Write inequalities to model situations. - **MLR – H₅**
12. Write simple inequalities. - **MLR – H₅**
13. Graph an inequality on a number line. - **MLR – H₅**
14. Write and solve multiplication and division equations with positive rational solutions using inverse operations. - **MLR – H₆**
15. Use formulas to find values and make graphs. – **MLR – H₆**

Communications:

16. **Read and use statistics, tables, and graphs to communicate ideas and information. Data displays include lists, tables, frequency distributions, line plots, bar graphs, stem and leaf plots or 1st quadrant scatter plots and line graphs and pie charts/circle graphs.** - **GLE, M4K2.7**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 7 students will:

Computations:

17. Use the order of operations to evaluate numerical expressions with grouping symbols and exponents using rational numbers. - **MLR – B₁**
18. Add and subtract fractions with different denominators. – **MLR – B₁**
19. Add mixed numbers with unlike denominators and with renaming. – **MLR – B₁**
20. Subtract mixed numbers with unlike denominators and with regrouping. – **MLR – B₁**
21. Multiply and divide decimals by powers of 10. – **MLR – B₁**
22. Multiply fractions and mixed numbers. – **MLR – B₁**
23. Divide fractions and mixed numbers. – **MLR – B₁**
24. Divide whole numbers, fractions, and mixed numbers. – **MLR – B₁**
25. Estimate decimal products using powers of 10 and multiply decimals. – **MLR – B₁**
26. Estimate decimal quotients using powers of 10 and divide decimals. – **MLR – B₁**
27. Add and subtract positive and negative integers. - **MLR – B₁**
28. Multiply and divide positive and negative integers. – **MLR – B₁**
29. Use ratios to compare quantities. – **MLR – B₂**
30. Find unit rates and use them to make predictions. – **MLR – B₂**
31. Recognize and write rates. – **MLR – B₂**
32. Use a proportion and mental math to write a rate as a unit rate. – **MLR – B₂**
33. Compute and model all four operations with whole numbers, fractions (including mixed numerals), decimals, and percents applying order of operations and do straight computation with these numbers and operations. – **GLE, M1B1.7**
34. Create, solve, and justify the solution for multi-step, real-life problems with whole numbers, fractions (including mixed numerals), decimals, and percents. – **GLE, M1B2.7**

Data Analysis & Statistics:

35. Find the mean, median, mode, and range of a data set. – **MLR – C₁**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 7 students will:

- 36. Make a table to represent a rate, and use patterns in the data to make predictions. – **MLR – C₃**
- 37. Interpret line graphs. – **MLR – C₃**

Geometry:

- 38. Describe a rotation by the angle and direction. – **MLR – E₁**
- 39. Create lines of symmetry in complex figure. – **MLR – E₁**
- 40. Identify all rotational symmetries of a figure. – **MLR – E₁**
- 41. Create a tessellation with any triangle or quadrilateral. – **MLR – E₁**
- 42. Identify complementary and supplementary angles. – **MLR – E₁**
- 43. Recognize similar figures. – **MLR – E₂**
- 44. Recognize similar and congruent figures and identify corresponding parts. – **MLR – E₂**
- 45. Sketch a net for a right prism. – **MLR – E₂**
- 46. Use coordinates to identify and plot points in a coordinate plane. – **MLR – E₃**
- 47. Model moves on a number line with integers. – **MLR – E₄**
- 48. Use a ruler and a compass to construct triangles with given side lengths. – **MLR – E₄**
- 49. Tell whether or not a transformation is a reflection. – **MLR – E₄**
- 50. Draw flat views and base planes for figures made of unit cubes. – **MLR – E₄**
- 51. Use properties/attributes limited to number of vertices, number of edges, number of faces, shapes of faces, and types of angles to identify and distinguish among 3 dimensional figures **and draw two-dimensional shapes and three-dimensional figures.** – **GLE, M2E1.7**
- 52. Use a coordinate system to define and locate position. – **GLE, M2E3.7**

Mathematical Decision Making :

- 53. Organize data and analyze patterns and trends in data using modes, medians, means and ranges for sets of data (emphasis on comparing sets begins). Data displays include lists, tables, frequency distributions, line plots, bar graphs or stem leaf plots. – **GLE, M3C1.7**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 7 students will:

Mathematical Reasoning/Communication:

54. Choose and apply problem-solving strategies.

Measurement:

55. Divide or multiply to convert among metric units of length. (Metric System) – **MLR – F₁**
56. Develop and use benchmarks to estimate lengths in metric units. (Metric System) – **MLR – F₁**
57. Convert among metric units of mass and among metric units of capacity. (Metric System) – **MLR – F₁**
58. Convert among customary units of capacity. (Customary system) – **MLR – F₁**
59. Recognize and find the measures of complementary and supplementary angles. (Angles) – **MLR – F₂**
60. Estimate the measure of an angle, including angles greater than 180 degrees. (Angles) – **MLR – F₂**
61. Find the volume of a cube. (Volume) – **MLR – F₃**
62. Use a calculator to find the circumference and diameter of a circle. (L/P/C) – **MLR – F₃**
63. Find the area of a parallelogram, a triangle, and of shapes composed of them. (Area) – **MLR – F₃**
64. Find the area of a circle. (Area) – **MLR – F₃**
65. Find the surface area of a rectangular or triangular prism. (Area) – **MLR – F₃**
66. Use the relationships among metric units for volume, capacity, and mass of water. (Relationships among) – **MLR – F₃**
67. Find the area of a trapezoid. (Area) – **MLR – F₃**
68. Find the surface areas of figures made of unit cubes. (Area) – **MLR – F₃**
69. Find volumes of figures made of unit cubes. (Volume) – **MLR – F₃**
70. Find the volume of a pyramid. (Volume) – **MLR – F₃**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 7 students will:

71. Find the volume of a cone and relate it to the volume of a cylinder. (Volume) – **MLR – F₃**
72. Perform conversions between inches, feet, yards and miles; millimeters, centimeters, meters, and kilometers; cups, pints, quarts, and gallons; millimeters and liters; ounces, pounds, and tons; grams and kilograms; seconds, minutes, hours, days, weeks, months, and years. – **GLE, M2F1.7**
73. **Solve problems involving unit price, speed and direct measures.** – **GLE, M2F2.7**
74. Given formulas from which to choose, find areas and perimeters of 2-D shapes (including circles), and volumes of rectangular solids with rational numbers with correct units. – **GLE, M2F3.7**

Numbers and Number Sense:

75. Use integers to represent real-life situations. (Ratio/Rates) – **MLR – A₁**
76. Compare integers. (Ratio/Rates) – **MLR – A₁**
77. Write decimals as fractions or mixed numbers in lowest terms. (Decimals) – **MLR – A₁**
78. Read and write numbers in scientific notation. (Scientific Notation) – **MLR – A₁**
79. Write a fraction as a decimal by dividing. (Fractions) – **MLR – A₁**
80. Estimate percents using common fraction/percent equivalents or a percent bar model. (Percent) – **MLR – A₁**
81. Write ratios in fraction, decimal, and percent forms. (Ratio/Rates) – **MLR – A₁**
82. Use mental math or “nice” fractions to write ratios as percents. (Ratio/Rates) – **MLR – A₁**
83. Interpret and use percents greater than 100%. (Percent) – **MLR – A₁**
84. Apply addition properties of 0 and opposites to integer addition. – **MLR – A₂**
85. Apply the commutative and associative properties to integer addition. – **MLR – A₂**
86. Subtract integers by writing a related addition problem. – **MLR – A₂**
87. Use the distributive property to multiply a mixed number by a whole number or fraction. – **MLR – A₂**
88. Apply the commutative and associative properties to multiplication. – **MLR – A₂**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 7 students will:

- 89. Understand the concept of percent. – **MLR – A₃**
- 90. Find all the factors of a number and write the prime factorization. – **MLR – A₃**
- 91. Read, compare, order, use and represent fractions, decimals, and percents and convert among different numeral forms (limited to terminating decimals for decimal to fraction conversion) and apply concepts of integers, absolute value and positive exponents. – **GLE, M1A1.7**
- 92. Apply concepts of ratios in practical or other mathematical situations. – **GLE, M1A3.7**

Patterns, Relations, and Functions :

- 93. Interpret line graphs. – **MLR – G₁**
- 94. Decide when to use a bar graph or a line graph to represent a set of data. – **MLR – G₁**
- 95. Make and interpret a scatter plot. – **MLR – G₁**
- 96. Sketch a fitted line to make predictions. – **MLR – G₁**
- 97. Use a proportion to find the whole amount when a part and a percent are given. – **MLR – G₁**
- 98. Make and interpret a circle graph. – **MLR – G₁**
- 99. Choose an appropriate graph. – **MLR – G₁**
- 100. Translate real-life linear situations into equations (limited to one step). – **GLE, M4G1.7**
- 101. Solve problems involving linear patterns in the form of tables, graphs, words, rules or equations using rational numbers (including signed values). – **GLE, M4G3.7**

Probability:

- 102. Identify outcomes of an experiment. – **MLR – D₁**
- 103. Find and use an experimental probability. – **MLR – D₁**
- 104. Find the theoretical probability of an event. – **MLR – D₁**
- 105. Compare the experimental and the theoretical probability of an event. – **MLR – D₁**
- 106. Use a tree diagram to find outcomes and probabilities. – **MLR – D₁**

MATH THEMATICS & MEA's
SEVENTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 7 students will:

- 107.** Use experimental probabilities represented as percents to make predictions. – **MLR – D₁**
- 108.** Find probabilities of complementary events. – **MLR – D₁**
- 109.** List and find the number of possible combinations in a situation. – **MLR – D₄**
- 110.** Find the probability of simple events and express the probability as a fraction or a percentage (percentages limited to multiples of 10% and 25%). – **GLE, M3D1.7**
- 111.** Apply the idea of permutation in a problem situation with 6 elements or fewer (e.g., how many ways can the four letters in the word “math” be arranged”). – **GLE, M3D4.7**

MATH THEMATICS & MEA's
EIGHTH GRADE SECURE SKILLS AND CONCEPTS

At the end of the school year, Grade 8 students will:

Algebra Concepts:

1. Find solutions for unknown quantities in linear equations and in simple equations and inequalities. **GLE, M4H6.8**
2. **Use concepts of variables and expressions.** **GLE, M4H1.8**
3. Analyze tables and graphs to identify properties and relationships in a practical context. **GLE, M4H3.8**
4. **Use graphs to represent two-variable equations.** - **GLE, M4H4.8**
5. Evaluate variable expressions involving fractions, decimals, or integers. - **MLR – H₁**
6. Write and solve equations with two operations involving integers, fractions, or decimals. **MLR – H₁**
7. Use an equation to find a percent. - **MLR – H₁**
8. Simplify expressions by combining like terms. - **MLR – H₁**
9. Use opposites to evaluate $-x$. - **MLR – H₁**
10. Graph linear equations and use the graphs to solve problems. - **MLR – H₁**
11. Use a line graph to compare rates of change over time. - **MLR – H₃**
12. Find the slope of any line. - **MLR – H₄**
13. Write equations to slope-intercept form. - **MLR – H₄**
14. Solve equations with fractional coefficients. - **MLR – H₆**
15. Solve equations with negative rational numbers. - **MLR – H₆**
16. Solve equations with variables on both sides or that involve simplifying. - **MLR – H₆**

Communications :

17. **Use statistics, tables, and graphs to communicate ideas and information in convincing presentations and analyze presentations of others for bias or deceptive presentation.** - **GLE, M4K2.8**

Computations :

18. Estimate a percent of a number. - **MLR – B₁**

MATH THEMATICS & MEA's
EIGHTH GRADE SECURE SKILLS AND CONCEPTS
 (Continued)

At the end of the school year, Grade 8 students will:

19. Find and apply percents of change. (Use with Health Unit) - **MLR – B₁**
20. Use the order of operations including radicals. – **MLR – B₁**
21. Find and estimate square root. – **MLR – B₁**
22. Multiply and divide negative rational numbers. – **MLR – B₁**
23. Use cross products to solve proportions. – **MLR – B₂**
24. Compute and model all four operations with whole numbers, fractions, decimals, sets of numbers, and percents, applying the proper order of operations.– **GLE, M1B1.8**
25. Create, solve, and justify the solution for multi-step, real-life problems including those with ratio and proportion. – **GLE, M1B2.8**

Data Analysis & Statistics :

26. Choose the best measure of central tendency. – **MLR – C₁**
27. Make and interpret a box-and-whisker pot. - **MLR – C₁**
28. Sketch a fitted line to make predictions. – **MLR – C₃**
29. Recognize how a graph might be misleading. – **MLR – C₃**
30. Visualize line of best fit on a scatter pot, use line to make predictions and recognize trends. – **MLR – C₃**

Discrete Math:

31. Make and use Venn diagrams to interpret statements using and, or, and not.– **MLR – I₂**

Geometry:

32. Understand and apply properties of similar figures including similar triangles.– **MLR – E₁**
33. Apply the triangle inequality rule. – **MLR – E₁**
34. Determine whether triangles are congruent by comparing their side length. (SSS) - **MLR – E₁**
35. Describe the rotational symmetries of a figure. – **MLR – E₁**

MATH THEMATICS & MEA's
EIGHTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 8 students will:

36. Determine whether two triangles are congruent by comparing two sides and the included angle. (SAS) – **MLR – E₂**
37. Perform translations in the coordinate plane. - **MLR – E₃**
38. Reflect an object over the x- or y- axis. – **MLR – E₃**
39. Identify and count faces, edges, and vertices of space figures. – **MLR – E₄**
40. Construct an angle bisector. – **MLR – E₄**
41. Compare, classify, and draw two-dimensional shapes and three-dimensional figures. – **GLE, M2E1.8**
42. Apply geometric properties to represent and solve real-life problems involving regular and irregular shapes. – **GLE, M2E2.8**
43. Use a coordinate system to define and locate position. – **GLE, M2E3.8**

Mathematical Decision Making :

44. Organize and analyze data using mean, median, mode, and range. - **GLE,**

Mathematical Reasoning/Communication:

45. Use a 4-step problem solving approach and apply various problem solving strategies.

Measurement:

46. Solve problems involving rates and unit rates. (Rate/Slopes) – **MLR – F₂**
47. Find positive slopes. (Rate/Slopes) – **MLR – F₂**
48. Solve indirect measurement problems. – **MLR – F₂**
49. Make a scale drawing. (Similarity) – **MLR – F₂**
50. Find volumes of cylinders. (Volume) – **MLR – F₃**
51. Find the surface area of a cylinder. (Area) – **MLR – F₃**
52. Find perimeters and areas of similar figures. (L/P/C) – **MLR – F₃**
53. Find the surface area of prisms and pyramids. (Area) – **MLR – F₃**

MATH THEMATICS & MEA's
EIGHTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 8 students will:

- 54. Demonstrate the structure and use of systems of measurements. - **GLE, M2F1.8**
- 55. Develop and use concepts that can be measured directly, or indirectly (e.g., the concept of rate) – **GLE, M2F2.8**
- 56. Demonstrate an understanding of length, area, volume, and the corresponding units, square units, and cubic units of measure – **GLE, M2F3.8**

Numbers and Number Sense:

- 57. Write and perform operations with numbers in decimal and scientific notation. (Scientific Notation) – **MLR – A₁**
- 58. Use the product and quotient of powers rules. (Ratio/Rates) – **MLR – A₁**
- 59. Use the distributive property. – **MLR – A₂**
- 60. Distinguish between prime and composite numbers. – **MLR – A₃**
- 61. Apply divisibility rules for 2, 3, 4, 5, 6, 9, and 10. – **MLR – A₃**
- 62. Find the GCF and LCM of two or more numbers. – **MLR – A₃**
- 63. Write decimals in words. – **MLR – A₃**
- 64. Compare and order decimals. – **MLR – A₃**
- 65. Find a percent using a proportion. – **MLR – A₃**
- 66. Use a proportion to find a percent of a number. – **MLR – A₃**
- 67. Use equivalent rates to effectively present information. – **MLR – A₃**
- 68. Use numbers in a variety of equivalent and interchangeable forms (e.g. integer, fraction, decimal, percent, exponential, and scientific notation) in problem-solving. - **GLE, M1A1.8**
- 69. Apply concepts of ratios, proportions, percents, and number theory (e.g. primes, factors, and multiples) in practical and other mathematical situations. – **GLE, M1A3.8**

Patterns, Relations, and Function:

- 70. Make and interpret a box-and-whisker plot. – **MLR – G₁**
- 71. Make and interpret a scatter plot. – **MLR – G₁**

MATH THEMATICS & MEA's
EIGHTH GRADE SECURE SKILLS AND CONCEPTS
(Continued)

At the end of the school year, Grade 8 students will:

- 72. Make and interpret a stem-and-leaf plot. – **MLR – G₁**
- 73. Use a line graph to compare rates of change over time. – **MLR – G₁**
- 74. Draw and interpret a histogram. – **MLR – G₁**
- 75. Choose an appropriate data display. – **MLR – G₁**
- 76. Visualize line of best fit on a scatter plot, use line to make predictions and recognize trends. – **MLR – C₂**
- 77. Use patterns and multiple representations to solve problems. – **GLE, M4G3.8**
- 78. Describe and represent relationships with tables, graphs, and equations. – **GLE, M4G1.8**

Probability:

- 79. Find geometric probabilities. – **MLR – D₁**
- 80. Find theoretical probabilities for multistage experiments. – **MLR – D₁**
- 81. Use tree diagrams to model the outcomes of an experiment and to find theoretical probabilities. – **MLR – D₃**

CORE PLUS MATH 1

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, ninth grade students will:

I. PATTERNS IN DATA

Exploring Data

1. Write responses to “describe,” “explain,” and “compare” questions.
2. Create and interpret stem-and-leaf plots and bar graphs (histograms).
3. Use tables and graphs of measurement data to find an association between two variables.

Shapes and Centers

4. Organize and interpret distributions of data using graphical representations such as stem-and-leaf plots, number line plots, and histograms (increase use of technology i.e., graphing calculators, computers)
5. Compute and understand the properties of different measures of center and when each is appropriate to use.
6. Use graphing calculators or computers for creating histograms and finding the measures of center.

Variability

7. Be able to define and explain variability.
8. Calculate and interpret percentiles, interquartile range, and mean absolute deviation as measures of variability. Use graphical displays such as histograms and box plots to help analyze variability.
9. Calculate and explain the effect of linear transformations on the mean and mean absolute deviation.

Relationships and Trends

10. Use the $y = x$ line to analyze data on a scatter plot.
11. Use scatter plots to find association between two variables, compare the information provided by various types of plots, and analyze plots over time.

II. PATTERNS OF CHANGE

Related Variable

12. Collect data that will suggest the pattern relating those variables.
13. Identify key variables in the situation to be modeled and make a table and graph the data to look for patterns.
14. Make predictions that go beyond the data (extrapolations and interpolations).

CORE PLUS MATH 1

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, ninth grade students will

What's Next

15. Find patterns of change in variables and calculate iterative or recursive change.
16. Write equations relating *NOW AND NEXT* that form linear and exponential models.
17. Introduce and utilize the iteration capabilities of the graphing calculators or computer software that model linear functions and exponential functions.

Variable and Rules

18. Develop student ability to summarize patterns relating variables using rules.
19. Utilize rules along with the graphing calculator or computer software and explain the power of a rule and its capabilities when used with a graphing calculator or computer software.

Linear and Nonlinear Patterns

20. Begin to understand and develop an appreciation for the power of technology-generated tables and graphs and the essential role of algebraic rules in providing directions to the calculator or computer software.
21. Recognize the connection between two-variable relationships and their graphs.

III. LINEAR MODELS

Predicting from Data

22. Organize and interpret sets of data from real-world situations using a table, graph, and equation.
23. Use a variety of methods to estimate the graph and equation of a line that fits a given set of data.
24. Draw and use a modeling line to predict the value of one variable given the value of the other and describe the rate at which one variable changes as the other changes.

Linear Graphs, Tables, and Rules

25. Construct a table of values from a given graph and examine these two representations for common patterns.
26. Write an equation of a line given its slope and y-intercept.

Linear Equations and Inequalities

27. Use the “undoing” and “balancing” methods to solve simple linear equations, explain how to do so, and interpret the meaning of the solution

CORE PLUS MATH 1

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, ninth grade students will:

in real-world contexts. Also, use the commutative property of addition and the distributive property of multiplication over addition to rewrite linear models in equivalent forms.

IV. GRAPH MODELS

Careful Planning

28. Explain the meaning of “efficient routes” – in this case, routes that use each edge exactly once.
29. Build graph models to represent situations involving efficient routes, to investigate criteria for existence of Euler circuits and paths and algorithms for finding them.

V. PATTERNS IN SPACE AND VISUALIZATION

The Shape of Things

30. Use plane- and space-shapes to model real-life situations and classify, construct, and sketch models of space-shapes.
31. Identify and explain different kinds of symmetry for plane- and space-shapes, use visualization to interpret and reason about plane and space situations, and develop an understanding of the essential characteristics of a space-shape that make it a prism or a pyramid.
32. Develop an understanding of cross-section and reflection (bilateral, plane) symmetry of space-shapes.

The Size of Things

33. Use geometric shapes and their properties to make sense of situations involving data, change, chance and discrete structures. Develop and use formulas to find perimeter, area, surface area, and volume of plane- or space-shapes. Use the Pythagorean Theorem to find lengths.

The Shapes of Plane Figures

34. Classify polygonal plane-shapes and identify parallelograms, trapezoids, rectangles, rhombuses, squares, kites, and isosceles triangles.
35. Recognize line and rotational symmetry in plane-shapes, identify regular polygons that will tile the plane, recognize a fundamental tiling pattern, and recognize and create translation and glide reflection symmetries.
36. Use isometric transformations to analyze and create symmetric patterns in the plane.

CORE PLUS MATH 1

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, ninth grade students will:

VI. EXPONENTIAL MODELS

Exponential Growth

37. Compare the tables and graphs of the exponential models above and also compare them to linear models.

Exponential Decay

38. Compare exponential decay models with exponential growth models (connection to science).
39. Compare exponential models of the form $y = a(b^x)$, where $0 < b < 1$, to linear models

Modeling Exponential Patterns in Data

40. Use the graphing calculator or computer software to determine exponential models for real-world data, modeling both increasing and decreasing exponential situations.
41. Understand the importance of exponential models in a world where change often occurs at an ever-increasing rate. (Connection to economics, i.e., inflation, and science, i.e., population growth, ozone depletion)

VII. SIMULATION MODELS

Simulating Chance Situations

42. Simulate when the probability of success is 0.5.
43. Display the results of a simulation in a frequency table and histogram, define an independent event, and understand that with a larger number of trials, the estimated probability tends to be closer to the true probability than with a smaller number of trials (The Law of Large Numbers).

Estimating Expected Values and Probabilities

44. Explain the nature of random digits.
45. Use single random digits to simulate probabilistic situations and compare shapes of probability distributions.

CORE PLUS MATH 2

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, tenth grade students will:

I. MATRIX MODELS (No secure items)

II. PATTERNS OF LOCATION, SHAPE AND SIZE

A Coordinate Model of a Plane

1. Use coordinate geometry and programming techniques as a tool to perform repetitive computations such as finding distance, slope, and midpoint coordinates.
2. Use coordinate geometry to model points, lines, geometric shapes and analyze their properties.
3. Write systems of linear equations that model real life situations, and solve the systems using graphing and linear combinations.

Coordinate Models of Transformations

4. Use coordinate geometry to investigate distance, angle measure, parallelism, and area under the four rigid motion transformations and size transformations individually and in combinations.
5. Use coordinate geometry and programming techniques for graphing calculators as a tool to model translations, rotations centered at the origin, line reflections, glide reflections, and size transformations centered at the origin.

III. PATTERNS OF ASSOCIATION

Correlation

6. Calculate the effects of outliers on the correlation coefficient.
7. Interpret Pearson's correlation coefficient as a measure of how closely points cluster about the regression line and understand that if two variables are correlated it does not necessarily mean that one of the variables *causes* the other.
8. Understand that a set of points may not follow a linear model even if the correlation is strong and that a linear model may be appropriate even if the correlation is weak.

IV. POWER MODELS

Inverse Variation

9. Determine and apply through tables and graphs, the inverse variation model, $y = 1/x$, i.e., representing the relationship between average speed on a trip and the time that trip takes.

CORE PLUS MATH 2

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, tenth grade students will:

Quadratic Models

10. Determine if the solutions of a quadratic equation are correct.

V. NETWORK OPTIMIZATION

Shortest Paths and Circuits

11. Find a shortest path from one vertex to another.
12. Find a shortest circuit that visits every vertex.
13. Solve a variety of real-world situations using shortest paths, for example the Traveling Salesperson Problem, and calculate the least amount of travel required between many cities.

VI. GEOMETRIC FORM AND ITS FUNCTION

Quadrilaterals and Similarity

14. Determine how quadrilaterals are used in the constructions of common mechanical devices.
15. Describe similar plane shapes, determine if plane shapes are similar and use the relationships among lengths, angles, and areas of similar shapes, i.e., setting up a pantograph to be used to generate a given scale factor.

Triangles and Trigonometric Ratios

16. Determine the sine, cosine, and tangent of an angle in a right triangle.
17. Solve indirect measurement problems.

The Power of the Circle

18. Sketch the graphs of the sine and cosine functions.

VII. PATTERNS IN CHANCE

Waiting - Times

19. Identify when trials are independent, determine the shape of a histogram of a waiting-time distribution, find the mean of a frequency distribution, and find the probabilities of events associated with rolling a pair of dice.

The Multiplication Rule

20. Use an area model to find the probability that two independent events both happen.
21. Decide if two events are independent and use the Multiplication Rule to find the probability that two independent events both happen.

CORE PLUS MATH 3

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, eleventh grade students will:

I. MULTIPLE-VARIABLE MODELS

Linked Variables

1. Calculate how changes in one variable affect the values of the other variable.
2. Find measures of sides and angles in right triangles from given information. Find measures of sides and angles in three triangles using the laws of sines and cosines.

Linked Equations

3. Model situations with algebraic equations and inequalities and solve systems of equations where two or more output variable are related to the same input variable.

Linear Programming

4. Solve systems of linear equations and graph inequalities or systems of inequalities in the form $ax + by \neq c$, $ax + by \leq c$, $y \neq a + bx$ or $y \leq a + bx$.
5. Solve Linear Programming problems.

II. MODELING PUBLIC OPINION (No secure items)

III. FUNCTIONS AND ALGEBRAIC REASONING

Algebra and Functions

6. Write algebraic rules as functions.
7. Describe the table and graph patterns expected, given an algebraic rule in function form.
8. Evaluate and interpret the meaning of expressions involving function notation.
9. Understand the meaning of *domain* and *range* and understand the relationship between those two sets and input and output values, respectively.
10. Determine practical and theoretical domains and ranges for various functions that model real-world situations.
11. Determine whether a relation is a function by inspecting its graph or table.

Algebraic Operations: Part 1

12. Determine the equivalence of different forms of symbolic rules by examining tables of values, by graphing, and by rewriting rules.
13. Recognize and apply the commutative and associative properties of addition and multiplication.

CORE PLUS MATH 3

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, eleventh grade students will:

14. Recognize and apply the distributive property of multiplication over addition (subtraction).

Algebraic Operations: Part 2

15. Determine, by simplifying algebraic rules, by examining tables of values, and by graphing, that different forms of symbolic rules can express the same relation between variables.
16. Recognize the relationship between the factors and the zeroes of a polynomial function.

Reasoning to Solve Equations and Inequalities

17. Solve linear equations and inequalities using algebraic reasoning.
18. Identify whether a quadratic function has 0, 1, or 2 zeroes and describe the graph of the function.
19. Solve quadratic equations and inequalities by using the quadratic formula.
20. Solve quadratic equations and inequalities by using the solve feature of a calculator or computer software.

Proof through Algebraic Reasoning

21. Prove the Pythagorean Theorem.

IV. SHAPES AND GEOMETRIC REASONING

Reasoned Arguments

22. Know and be able to use the angle relationship theorems that result from the intersection of two lines, know and be able to use the angle relationship theorems that result from two parallel lines being cut by a transversal and their converses, and know and be able to use the angle-sum theorem for triangles.

Solving Triangles and the Laws of Cosines and Sines

23. Use trigonometry to solve right triangles for an unknown. Know and be able to use the Law of Cosines and the Law of Sines to solve for an unknown in non-right triangles.

Reasoning about Similar and Congruent Triangles

24. Know and be able to use the three theorems used to prove triangles are similar: SSS, SAS, and AA, know and be able to use the four theorems used to prove triangles are congruent: SSS, SAS, AAS, and ASA, and be able to create a valid argument using previously proven theorems, for a given conjecture.

CORE PLUS MATH 3

GRADE LEVEL SECURE SKILLS AND CONCEPTS

At the end of the school year, eleventh grade students will:

Parallelograms: Necessary and Sufficient Conditions

25. Know and be able to use both necessary and sufficient conditions for parallelograms.
26. Know and be able to use properties unique to special parallelograms and know and be able to use the Midpoint Connector Theorems for Triangles and Quadrilaterals.

V. PATTERNS IN VARIATION

Measuring Variation with the Standard Deviation

27. Compute and interpret the standard deviation from a set of data and estimate the standard deviation from a histogram. Understand the number of standard deviations from the mean is a measure of location and recognize that the standard deviation is sensitive to extreme values.

Statistical Process Control

28. Recognize when the mean and standard deviation change on a plot over time.
29. Use control charts and the tests for out-of-control behavior.
30. Understand why it is best to watch a process for a while before trying to adjust it.
31. Compute the probability of a false alarm on a set of readings, that is, the probability that a test will give an out-of-control signal for a process that is under control.
32. Understand the Addition Rule for mutually exclusive events.

VI. FAMILIES OF FUNCTIONS

Function Models Revisited

33. Model and answer questions about contexts using linear, exponential, power, and trigonometric functions.
34. Describe the table and graph patterns expected for linear, exponential, power, trigonometric, and square root functions from the symbolic forms.

VII. DISCRETE MODELS OF CHANGE (no secure items)

STATE OF MAINE
Draft Grade Eleven Expectations for Mathematics
Developed from Maine's *Learning Results, 1997*
Page 1 of 4

CLUSTER 1 – NUMBER AND OPERATIONS

A. NUMBERS AND NUMBER SENSE

Students will understand and demonstrate a sense of what numbers mean and how they are used.

Students will be able to:

- M1A1.11 Describe the structure of the real number system and identify its appropriate applications and limitations.
Core Plus I-III in all units.

B. COMPUTATION

Students will understand and demonstrate computation skills. Students will be able to:

- M1B1.11 Approximate solutions, determine the reasonableness of answers, and justify the results.
Core Plus I-III in all units.

I. DISCRETE MATHEMATICS

Students will understand and apply concepts in discrete mathematics. Students will be able to:

- M1I2.11 Use networks to find solutions to problems.
Core Plus I – Unit 4
Core Plus II – Unit 5
- M1I4.11 Use matrices as tools to interpret and solve problems.
Core Plus II – Units 1 & 2

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May 31, 2006 DRAFT For Discussion Purposes Only

Items coded with **GLE** denote the State's Grade Level Expectations. The **GLE's in bold** denotes the **additional** grade level expectations that our students **will be tested** in the 2006-07 school year.

STATE OF MAINE

Draft Grade Eleven Expectations for Mathematics

Developed from Maine's *Learning Results, 1997*

Page 2 of 4

CLUSTER 2 – SHAPE AND SIZE

E. GEOMETRY

Students will understand and apply concepts from geometry. Students will be able to:

M2E1.11 Draw coordinate representations of geometric figures and their transformations.

Core Plus I – Unit 5 (transformation)

Core Plus II – Unit 2 (coordinate representations)

M2E2.11 Use inductive and deductive reasoning to explore and determine the properties of and relationships among geometric figures.

Core Plus I – Unit 5

Core Plus III – Units

M2E3.11 Apply trigonometry to problem situations involving triangles.

Core Plus II – Unit 6

Core Plus III – Unit 4

F. MEASUREMENT

Students will understand and demonstrate measurement skills. Students will be able to:

M2F1.11 Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.

Core Plus I – Unit 5

Core Plus II – Units 2, 4, and 6

Core Plus III – Units 1 & 3

M2F2.11 Derive and use formulas for area, surface area, and volume of many types of figures.

Core Plus I – Unit 5

Core Plus II – Unit 4 (Volume)

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CLUSTER 3 – MATHEMATICAL DECISION MAKING

C. DATA ANALYSIS AND STATISTICS

Students will understand and apply concepts of data analysis. Students will be able to:

M3C2.11 Predict and draw conclusions from charts, tables, and graphs that summarize data from practical situations.

[Core Plus I – Units 1 & 2](#)

[Core Plus II – Unit 3](#)

M3C3.11 Demonstrate an understanding of correlation and how it relates to data analysis.

[Core Plus I – Introduces this in Unit 1](#)

[Core Plus II – Unit 3](#)

M3C4.11 Demonstrate an understanding of the idea of random sampling and recognition of its role in statistical claims and designs for data collection.

[Core Plus I – Introduces this in Unit 2](#)

[Core Plus III – Unit 2](#)

D. PROBABILITY

Students will understand and apply concepts of probability. Students will be able to:

M3D1.11 Find the probability of compound events and make predictions by applying probability theory.

[Core Plus I – Unit 7](#)

[Core Plus II – Unit 7](#)

[Core Plus III – Unit 5](#)

M3D2.11 Create and interpret probability distributions in simple cases.

[Core Plus I – Unit 7](#)

[Core Plus II – Unit 7](#)

J. MATHEMATICAL REASONING

Students will understand and apply concepts of mathematical reasoning. Students will be able to:

M3J1.11 Analyze situations where more than one logical conclusion can be drawn from data presented.

Core Plus I – Unit 4 & Unit 7 (Introduction)

Core Plus II – Unit 7

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CLUSTER 4 – PATTERN

G. PATTERNS, RELATIONS, FUNCTIONS

Students will understand that mathematics is the science of patterns, relationships, and functions. Students will be able to:

M4G1.11 Create a graph to represent a real-life situation and draw inferences from it.

Core Plus I – Unit 2

M4G3.11 Model phenomena using linear, quadratic, and exponential functions.

Core Plus I – Unit 3 (linear) & Unit 6 (exponential function)

Core Plus II – Unit 4 (quadratics)

M4G4.11 Identify a variety of situations explained by the same type of function.

Core Plus I – Units 2, 3, and 6

Core Plus II – Introduces this in Unit 4

H. ALGEBRA CONCEPTS

Students will understand and apply algebraic concepts. Students will be able to:

M4H1.11 Use tables and graphs to interpret expressions, equations, and inequalities.

Core Plus I – III – in all units

M4H2.11 Recognize direct and inverse variation in equations, graphs and equations and

solve problems involving direct and inverse variation.

Core Plus II – Unit 4

M4H3.11 Formulate and solve equations and inequalities.

Core Plus I – Unit 3

Core Plus II – Unit 2

- M4H4.11 Analyze and explain situations using symbolic representations.
Core Plus I – Unit 2 & 3
Core Plus II – Unit 2

K. MATHEMATICAL COMMUNICATION

Students will reflect upon and clarify their understanding of mathematical ideas and relationships. Students will be able to:

- M4K1.11 Restate, create, and use definitions in mathematics to express understanding,
classify figures, and determine the truth of a proposition or argument.
Core Plus I – III – in all units.

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