

The Maine Department of Education has developed this 30 minute audio supported PowerPoint as a tool for assisting educators throughout Maine to understand the process of the Maine Learning Results review and (second slide in) the content standards for Mathematics.

Topics Addressed

- What are the Maine Learning Results (MLR)?
- How were the Maine Mathematics Learning Results developed?
- How are 2007 Maine Learning Results in Mathematics different from the 1997 Maine Learning Results?

This presentation will address three questions: “What are the Maine Learning Results (often identified in this presentation as MLR) and where do they fit into Maine’s broader education policy landscape?”, “How were the Maine Mathematics Learning Results developed?”, and “How are the 2007 Maine Learning Results in Mathematics different from the 1997 Maine Learning Results?”

MLR Goals and Purposes

- Identify knowledge and skills essential to prepare Maine students for post-secondary education, career, and citizenship
- Express what students should know and be able to do at various checkpoints across a PreK – Diploma continuum
- Define learning appropriate to all students regardless of their specific career and academic plans
- Inform educators, parents, students and community

Revised Maine Learning Results: Parameters for Essential Instruction 3

In the broadest sense, The Learning Results: Parameters for Essential Instruction, (first slide in) provides Maine educators with a comprehensive description of the essential knowledge and skills needed to prepare students to succeed in the 21st century. Students should graduate prepared for post-secondary education, career entry, and productive citizenship (second slide) The Learning Results describes a continuum of learning across the content areas expressing what students should know and be able to do at various checkpoints (grade span or grade level depending on the content area) PreK to the earning of a high school diploma ; . (Third slide in) The Maine Learning Results describes a common body of knowledge and skills for ALL Maine students regardless of their future career and academic plans. And finally, the Maine Learning Results serves as a tool to inform parents, educators, students and the broader community of Maine's expectations for student learning.

Where the Revised MLRs fit in the Overall Framework Ensuring All Students are Career, Post-secondary and Citizenship Ready

- Parameters for Essential Instruction
- Partnership for 21st Century
- Best Instructional Practices
- Environments for Learning (CH 125)
- Assessments and Graduation Requirements (CH 127)

Maine's standards document, describes the essential knowledge and skills required for career, post-secondary education, and citizenship in the 21st century. This document is just one part of an educational system that seeks to integrate 21st century standards, effective instructional practices, environments that fostering student learning (described in Maine Chapter 125), and as described in Chapter 127 assessment programs that measure and support student achievement and graduation requirements.

MLR Support the Goals Outlined in the Guiding Principles

- Clear and effective communicators
- Self-directed lifelong learners
- Creative and practical problem solvers
- Integrative, informed thinkers
- Responsible citizens

The learning goals described in the Maine Learning Results support student growth across the content areas. These broader goals are Maine's "Guiding Principles." Students learn to become clear and effective communicators, self-directed lifelong learners, creative and practical problem solvers, integrative, informed thinkers and responsible citizens.

MLR Development Resources

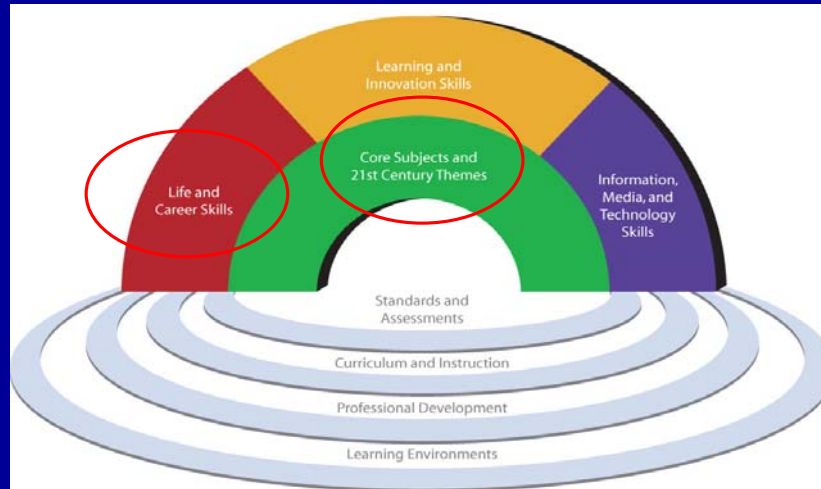
- Maine Learning Results Review Advisory Committee
- Content Area Panels – Maine Educators
- National Consultants
- Research on Learning
- State, National and International Standards
- 21st Century Partnership Framework

Revised Maine Learning Results: Parameters for Essential Instruction 6

The list of content resources shown here reveals the diversity of resources that informed the development of the Learning Results: Parameters for Essential Instruction. The list includes the expertise of Maine teachers and other Maine educators, national consultants, multiple standards documents, and research on learning. These resources were referenced and analyzed to ensure that the knowledge and skills identified in the Maine Learning Results are a solid foundation for student learning in Maine, that supports student success at the state, national and global levels.

Partnership for 21st Century Framework Informs the Revised MLR

www.21stcenturyskills.org



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From the beginning the Maine Learning Results Review process integrated the ideas found in the Partnership for 21st Century Learning Framework. The Maine Learning Results focuses on those parts of the Framework related to the Core Subjects and 21st Century Themes, and Life and Career Skills. More information about the Partnership for 21st Century Skills and Maine's activities as a 21st Century Partner state can be found at www.21stcenturyskills.org.

US Standards Referenced

- NCTM Principles and Standards of School Mathematics
<http://standards.nctm.org/>
- NCTM Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics
http://www.nctm.org/standards/focalpoints.aspx?id=282&emense=c580fa7b_10_48_282_7
- AAAS Benchmarks for Science Literacy (especially chapters 3,9, 12 and 15)
<http://www.project2061.org/publications/bsl/online/bolintro.htm>
- University of Maine System Statement on College Readiness for Mathematics
<http://www.maine.edu/pdf/mathuniversitybooklet.pdf>

The initial draft of the Mathematics section of the 2007 Maine Learning Results was informed by Irish and United Kingdom mathematics standards, Japanese mathematics curricula and the work of Achieve. As the draft developed, the standards documents on this slide were instrumental as the MLR Mathematics Panel worked to produce the final document. The National Council of Teachers of Mathematics Principles and Standards are as close to a national consensus as exists for mathematics education, the NCTM produced the Focal Points (released in 2007) to support curriculum development as states moved from grade-span to grade-level standards. NCTM's desire to provide greater focus on topics central to mathematics was well aligned with Maine's goals for mathematics. The American Association for the Advancement of Science Benchmarks for Science Literacy include mathematics. This document had a tighter focus on big ideas and provided valuable information about student learning and cross-content area connections. Alignment of the PK-Diploma standards with the University of Maine System Statement on College Readiness for Mathematics strengthens the Maine's PK-20 educational system.

Mathematics Content Resources Research on Learning

- Donovan and Bransford (ed) **How Students Learn Mathematics in the Classroom**
http://www.nap.edu/catalog.php?record_id=11101
- **How People Learn: Brain, Mind, Experience, and School**
http://www.nap.edu/catalog.php?record_id=9853

Two reports from the National Academies of Science, *How Students Learn Mathematics in the Classroom* and *How People Learn: Brain, Mind, Experience, and School* were especially helpful in making decisions about learning progressions and identifying central ideas. These documents are freely available online at the links shown.

More Resources

- External Mathematics Reviewers
- Online Survey
- Review by the International Center for Leadership in Education
- Business Community

In addition to the resources already described, the mathematics review incorporated feedback from nationally respected external reviewers; formal and informal feedback from Maine educators, primarily comments collected through an online survey; review by Bill Dagget's International Center for Leadership in Education, and input from Maine's business community.

How the MLRs Have Changed

- Clearer, more coherent, and more manageable
- More focused and essential
- Structure
- Content

Using this varied input and feedback the Content Panels constructed what many educators have described as clearer, more coherent, and more focused standards. The document is also structurally different. The 2007 Maine Learning Results describes progressions of learning for significant topics across grade spans. In Mathematics the progressions are described across the PreK-2 and 9-Diploma grade spans and at grade levels 3,4,5,6,7, and 8. Overall the 2007 Learning Results differs most from the 1997 Learning Results because it describes deeper knowledge in fewer topics. This is an important step away from “inch deep and mile wide” standards.

Math Content Area Overview

OUTLINE OF MATHEMATICS STANDARDS AND SECTIONS

A. Number

- Whole Number
- Rational Number
- Real Number

B. Data

- Measurement and Approximation
- Data Analysis
- Probability

C. Geometry

- Geometric Figures
- Geometric Measurement
- Transformations

D. Algebra

- Symbols and Expressions
- Equations and Inequalities
- Functions and Relations

This view illustrates how Mathematics is organized at the standard level. The content area Mathematics is divided into content standards. Each content standard is a heading identified by a capital letter. Each standard has three areas which are used as organizational headings for the performance indicators in each standard. We'll now look a little more closely.

Mathematics Standards

- **A. Number**

Whole Number

Rational Number

Real Number

Content Standard A, titled “Number” includes concepts of number and operations. As students progress through the grades, the sets of numbers they use and compute with progress from whole numbers to rational numbers (expanding the set of numbers to include fractions, decimals, percentages and signed numbers) and finally to the set of real numbers.

Mathematics Standards

- **B. Data**

Measurement and Approximation

Data Analysis

Probability

Content Standard B, titled “Data” includes:

Measurement and Approximation, dealing with measurements other than length, area, and volume (geometric measurement in the next standard) and general concepts about measurement including estimation, accuracy and precision

Data Analysis dealing with the reading and construction of data displays and finding and using statistical descriptions of data, and

Probability

Mathematics Standards

- **C. Geometry**

Geometric Figures

Geometric Measurement

Transformations

Content Standard C, titled “Geometry” includes performance indicators about describing, creating and reasoning about Geometric Figures Geometric Measurement (length, area, and volume) and Geometric Transformations.

Mathematics Standards

- **D. Algebra**

Symbols and Expressions

Equations and Inequalities

Functions and Relations

Content Standard D, “Algebra” is organized around symbols and expressions, equations and inequalities, and functions and relations. Algebra includes using symbols to model the world as well as solving equations and manipulating symbols.

Grade Spans and Grade Levels

Whole Number

Pre-K-2 Performance Indicators & Descriptors

- 1 Students *understand* and use number notation and place value to 1000 in numerals.
 - a. Read and write numbers to 1000 using numerals.
 - b. Recognize the place values of digits in numbers (hundreds, tens, and ones).
 - c. Compare and order one-digit, two-digit, and three-digit numbers.
- 2 Students *understand* and use procedures to add and subtract whole numbers with one and two digits.
 - a. Use and explain multiple strategies for computation.
 - b. Use an operation appropriate to a given situation.

Real Number

9-Diploma Performance Indicators & Descriptors

- 1 Students *know how to represent and use real numbers*.
 - a. Use the concept of n^{th} root.
 - b. *Estimate* the value(s) of roots and use technology to approximate them.
 - c. Compute using laws of exponents.
 - d. Multiply and divide numbers expressed in scientific notation.
 - e. *Understand* that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations.

Unlike most other content areas, Mathematics includes grade level as well as grade span standards. This is primarily a response to federal legislation, the No Child Left Behind Act, requiring grade level standards and testing in mathematics in grades 3-8. In the document, the PK-2 and 9-Diploma sections run across the width of the page. The grade span label appears in the gray bar running across the page.

Grade Spans and Grade Levels

Measurement and Approximation					
Performance Indicators & Descriptors					
3	4	5	6	7	8
<p>1 Students <i>understand</i> and use measurement of time and temperature.</p> <p>a. Select appropriate tools and <i>units</i> for these measures.</p> <p>b. <i>Solve</i> and <i>justify</i> problems with these measures.</p>	<p>1 Students <i>understand</i> and use measurement of time, capacity, and temperature.</p> <p>a. Select appropriate tools and <i>units</i> for these measures.</p> <p>b. <i>Solve</i> and <i>justify</i> problems with these measures.</p>	<p>1 Students <i>understand</i> and use measures of elapsed time, temperature, capacity, mass, and use measures of mass and weight.</p> <p>a. Select and use appropriate tools and <i>units</i> (mass in grams, weight in pounds) for these measures.</p> <p>b. <i>Solve</i> and <i>justify</i> problems with these measures.</p>	<p>1 Students convert within measurement systems.</p> <p>a. <i>Solve</i> problems where different <i>units</i> are used within the metric and traditional systems of measurement.</p>	<p>No performance indicator.</p> <p>Although no performance indicators are stated at this level, it is expected that students continue to use prior concepts and skills in new and familiar concepts.</p>	<p>1 Students <i>understand</i> and use <i>derived measures</i> (measurements expressed as rates).</p> <p>a. Calculate measures using multiple attributes including speed (distance per time).</p> <p>b. <i>Solve</i> for an unknown component of a measure including finding time given average speed and distance.</p>

For grades 3-8 the performance indicators and descriptors are arranged in columns. In this view the standard area, “Measurement and Approximation” of the “Data” standard runs across the page, but the performance indicators for each grade are organized in columns across the page. The grade level is indicated at the top of each column in the highlighted bar. It is important to note that there are not performance indicators in all areas for all grades. For example, the red circle highlights the statement indicating that there is no Measurement and Approximation performance indicator in the Data content standard for grade 7 students.

Performance Indicator

A. **NUMBER:** Students use numbers in everyday and mathematical contexts to quantify or describe phenomena, develop concepts of operations with different types of numbers, use the structure and properties of numbers with operations to *solve* problems, and perform mathematical computations. Students develop number sense related to magnitude, estimation, and the effects of mathematical operations on different types of numbers. It is expected that students use numbers flexibly, using forms of numbers that best match a situation. Students compute efficiently and *accurately*. *Estimation* should always be used when computing with numbers or solving problems.

Whole Number

Pre-K-2 Performance Indicators & Descriptors

1. Students *understand* and use number notation and place value to 1000 in numerals.

- Read and write numbers to 1000 using numerals.
- Recognize the place values of digits in numbers (hundreds, tens, and ones).
- Compare and order one-digit, two-digit, and three-digit numbers.

2. Students *understand* and use procedures to add and subtract whole numbers with one and two digits.

- Use and explain multiple strategies for computation.
- Use an operation appropriate to a given situation.

Looking at Standard A. Number, the statement for the content standard is highlighted in orange. There are two performance indicators in the “Whole Number” section. These are circled in red. The word “understand” is in blue. This indicates that the special meaning of “understand” for the Mathematics content area is in the MLR Glossary.

Descriptors

A. **NUMBER:** Students use numbers in everyday and mathematical contexts to quantify or describe phenomena, develop concepts of operations with different types of numbers, use the structure and properties of numbers with operations to *solve* problems, and perform mathematical computations. Students develop number sense related to magnitude, estimation, and the effects of mathematical operations on different types of numbers. It is expected that students use numbers flexibly, using forms of numbers that best match a situation. Students compute efficiently and *accurately*. *Estimation* should always be used when computing with numbers or solving problems.

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 - c. Compare and order one-digit, two-digit, and three-digit numbers.
- 2 Students *understand* and use procedures to add and subtract whole numbers with one and two digits.
 - a. Use and explain multiple strategies for computation.
 - b. Use an operation appropriate to a given situation.

Descriptors, circled here in red, help to further describe each performance indicator. Simply put, descriptors describe the depth and breadth of the central knowledge and skills contained in the performance indicator. This does not mean, however, that teachers need to limit the study of the mathematics for this performance indicator to these topics.

Performance Indicators & Descriptors

Rational Number					
Performance Indicators & Descriptors					
3	4	5	6	7	8
4 Students recognize, name, compare, illustrate, and use simple fractions. a. Recognize, name, and illustrate fractions with denominators from two to ten. b. Recognize, name, and illustrate parts of a whole. c. Compare and order fractions with like numerators or with like denominators.	4 Students <i>understand</i> , name, compare, illustrate, combine, and use fractions. a. Add and subtract fractions with like denominators and use repeated addition to multiply a unit fraction by a whole number. b. List equivalent fractions. c. Represent fractions greater than one as mixed numbers and mixed numbers as	4 Students <i>understand</i> , name, compare, illustrate, compute with, and use fractions. a. Add and subtract fractions with unlike denominators. b. Multiply a fraction by a whole number. 5 Students <i>understand</i> and use number notation and place value in numbers with three decimal places.	2 Students express fractions greater than 0 as decimals and compare positive numbers that are written as fractions and decimals and place them on the number line. 3 Students add, subtract, multiply, and divide numbers expressed as fractions and as decimals including mixed numbers.	1 Students use negative and positive rational numbers expressed as integers, fractions, and decimals. a. Recognize rational numbers as quotients of integers with a non-zero denominator and recognize that rational numbers can be negative or positive. b. Compare signed rational numbers	1 Students express or <i>interpret</i> numbers using scientific notation from real-life contexts. a. Use positive and negative integer exponents for powers of ten. b. Convert between standard and scientific notation forms and compare the relative size of numbers including the <i>interpretation</i> of numbers as

For grades 3-8, a similar format is followed. The performance indicators are printed in bold face type and numbered. The descriptors are indented, printed in normal type, and lettered. In grade 5, for the Rational Number section of the Number standard, performance indicator 4 states, “Students understand, name, compare, illustrate, compute with, and use fractions. The descriptors, circled in red, describe the expectations for “computes with.” Students will a) add and subtract fractions with unlike denominators and b) multiply a fraction by a whole number.

You have probably noticed that some parts of the documents are highlighted in salmon and some are not. The next few slides will explain the reason for this formatting.

Maine Learning Results Rules

- Maine Department of Education Regulation 132
 - Learning Results: Parameters for Essential Instruction
 - All eight content area including standards, performance indicators, and descriptors

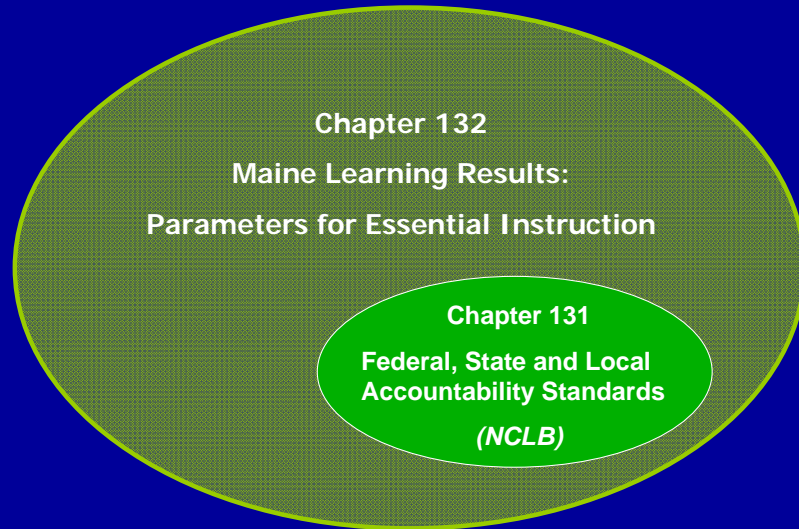
The Maine Learning Results are described in two Maine Department of Education Regulations. The broader of these is Maine Department of Education Regulation 132 – Learning Results: Parameters for Essential Instruction, also called Chapter 132. It contains the standards, performance indicators and descriptors for all eight content areas. These standards are routine technical rules and require approval by the State Board of Education.

Maine Learning Results Rules

- Maine Department of Education Regulation 131
 - The Maine Federal, State and Local Accountability Standards
 - NCLB
 - Mathematics, Reading, and Standard D and E of Science and Technology

The second of these, Maine Department of Education Regulation 131 the Maine Federal, State and Local Accountability Standards, also called Chapter 131, is a subset of Chapter 132. Chapter 131 is limited to the standards and performance indicators for Mathematics, Reading, and the part of Science and Technology that the State has chosen for accountability under the No Child Left Behind Act. Chapter 131 does not contain any of the descriptors for these content areas. The Maine Educational Assessment in mathematics and Maine High School Assessment in mathematics is aligned to these standards and performance indicators. These standards are major substantive rules and require approval by the full Legislature.

Chapter 131 & Chapter 132



As shown here, Maine Department of Education Regulation 131 is a subset of Maine Department of Education Regulation 132. Chapter 132 is the entire set of the Learning Results- all content areas, all standards, all performance indicators, and all descriptors. Chapter 131 is just those standards and performance indicators chosen for federal, state, and local accountability purposes.

Chapter 131 & Chapter 132 Mathematics

Chapter 132

Maine Learning Results:

Parameters for Essential Instruction

PK-2

Indicators

Chapter 131

Federal, State and Local
Accountability Standards
grades 3-8 and span 9-D

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For mathematics, the portion of the content area from Chapter 132 in Chapter 131 is much larger. All content standards and all performance indicators for grades 3,4,5,6,7,8 and grade span 9-Diploma are included in Chapter 131. Only the indicators for PK-2 are not included in Chapter 131. Note that the descriptors are NOT included in Chapter 131. These statements describing the depth and breadth of the performance indicators describe what is expected, but are not legislated.

Shown by Salmon Shading

Rational Number					
Performance Indicators & Descriptors					
3	4	5	6	7	8
<p>4 Students recognize, name, compare, illustrate, and use simple fractions.</p> <p>a. Recognize, name, and illustrate fractions with denominators from two to ten.</p> <p>b. Recognize, name, and illustrate parts of a whole.</p> <p>c. Compare and order fractions with like numerators or with like denominators.</p>	<p>4 Students <i>understand</i>, name, compare, illustrate, combine, and use fractions.</p> <p>a. Add and subtract fractions with like denominators and use repeated addition to multiply a unit fraction by a whole number.</p> <p>b. List equivalent fractions.</p> <p>c. Represent fractions greater than one as mixed numbers and mixed numbers as</p>	<p>4 Students <i>understand</i>, name, compare, illustrate, compute with, and use fractions.</p> <p>a. Add and subtract fractions with unlike denominators.</p> <p>b. Multiply a fraction by a whole number.</p> <p>5 Students <i>understand</i> and use number notation and place value in numbers with three decimal places.</p>	<p>2 Students express fractions greater than 0 as decimals and compare positive numbers that are written as fractions and decimals and place them on the number line.</p> <p>3 Students add, subtract, multiply, and divide numbers expressed as fractions and as decimals including mixed numbers.</p>	<p>1 Students use negative and positive rational numbers expressed as integers, fractions, and decimals.</p> <p>a. Recognize rational numbers as quotients of integers with a non-zero denominator and recognize that rational numbers can be negative or positive.</p> <p>b. Compare signed rational numbers</p>	<p>1 Students express or <i>interpret</i> numbers using scientific notation from real-life contexts.</p> <p>a. Use positive and negative integer exponents for powers of ten.</p> <p>b. Convert between standard and scientific notation forms and compare the relative size of numbers including the <i>interpretation</i> of numbers as</p>

The text of Chapter 131 Federal, State and Local Accountability Standards is clearly highlighted in salmon within Chapter 132 Maine Learning Results: Parameters for Essential Instruction. The standards for all grade spans and levels are highlighted as are the performance indicators for grades 3, 4, 5, 6, 7, 8 and the performance indicators for the 9-Diploma span. Since the federal government does not require testing at the PK-2 level, the performance indicators for that grade span are not part of Chapter 131 so the PK-2 performance indicators are not highlighted.

The descriptors are not included in Chapter 131 (although they are used as guidance when designing assessment items) and are not highlighted.

Content Differences between the 2007 and the 1997 MLR

- **For all content areas**
 - Identification of grade level and grade span “big ideas” – the performance indicators
 - Clarification of expectations – the descriptors
 - Greater depth of knowledge in those content areas
 - Greater alignment to national standards and the body of knowledge on learning

In contrast to the 1997 Maine Learning Results, the 2007 standards (slide in) more clearly identify big ideas that develop across grade spans, (slide in) provide clarification with the descriptors, (slide in) describe a greater depth of student understanding within these Ideas, (slide in) and provide greater alignment to national standards and the body of knowledge related to student learning.

Differences in Mathematics “by the Numbers”

- 11 Standards to 4 Standards
- 4 Grade Spans to 2 Grade Spans and 6 Grade Levels
- 117 Performance Indicators to 111 Performance Indicators

The overall organization of the Mathematics section of the Learning Results is different from the 1997 Learning Results. The revised Learning Results: Parameters for Essential Instruction includes dramatic decreases in the number of standards. This will reduce the need for “cluster” organization of standards for assessment purposes. The change from grade span to grade level organization as required by federal law in grades 3-8 has resulted in a much more prescribed learning progression across these grades. Even though there are twice as many levels, the number of performance indicators has dropped from 117 to 111.

Mathematics Content Differences

What's Missing?

- Topics in discrete mathematics have been removed.
- Reasoning and Communication, while still VERY important, no longer have their own standards and performance indicators.

In addition to the changes in overall organization, some content was removed from the Learning Results: Parameters for Essential Instruction in favor of a deeper focus on essential content.

Topics in discrete mathematics have been removed, and recognizing that mathematical communication and reasoning only happen in the context of doing mathematics content, there is an expectation across standards and performance indicators that student reason and communicate mathematically. There are no longer separate standards and separate performance indicators for these aspects of mathematics independent of content.

Mathematics Content Differences

Standard A Number

- Includes content from 1997 standards A. Numbers and Number Sense and B. Computation
- The organization is by type of number rather than a separation of number and computation.
- Some content has been removed.

Standard A includes content from 1997 standards A. Numbers and Number Sense and B. Computation

The organization is by type of number rather than a separation of number and computation.

Some content has been removed, for example computations in other bases that used to appear in the high school standards.

Mathematics Content Differences

Standard B Data

- Includes content from 1997 standards F. Measurement (non-geometric), C. Data Analysis and Statistics D. Probability and K. Mathematical Communication (grades 3-8)
- Some differences in sequencing, notably the delay of probability requirements until grade 7 and the grade 7 focus on data display and interpretation.

Standard B Data includes content from 1997 standards F. Measurement (non-geometric), C. Data Analysis and Statistics, D. Probability, and K. Mathematical Communication (grades 3-8 where interpreting and creating graphs was included). There are some differences in sequencing, notably the delay of probability requirements until grade 7 and the grade 7 focus on data display and interpretation.

Mathematics Content Differences

Standard C Geometry

- Includes content from 1997 standards E. Geometry and F. Measurement (geometric)
- As compared to the old Grade Level Expectations, expectations in measurement (area and volume) have moved to lower grade levels.
- Transformations have been included in grades 6-8 but are no longer explicitly stated for grade span 9-D.
- There is a tighter tie between geometry and number.
- In the 9-D span, periodic trigonometry is no longer required.

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Mathematics Content Differences

Standard D Algebra

- Includes content from 1997 standards G. Patterns, Relations, and Functions and H. Algebra
- In grades 3-8 there is a stronger tie to the Number standard.
- In grades 6-8 there is an increased emphasis on proportionality and graphing of linear relationships.
- In grade span 9-D periodic functions have been removed, there is a separate indicator for logarithms and there is a new indicator for recursion and iteration.

Standard D Algebra includes content from 1997 standards G. Patterns, Relations, and Functions and H. Algebra.

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In grades 6-8 there is an increased emphasis on proportionality and linear relationships.

In grade span 9-D periodic functions have been removed, there is a separate indicator for logarithms and there is a new indicator for recursion and iteration.

Implications for Work in Schools

- There will be a need for curriculum re-alignment, especially in grades 3-8. The tighter specifications for grade level standards means that there is less flexibility for learning progressions within the standards.
- There will be more opportunity to go deeply into concepts rather than skimming over them so materials will need to be found, adapted, or developed to support deeper student learning.
- While working on the standards, especially in grades 3-8, the panel kept March testing in mind. It might help to think of mathematics curriculum in April to March units rather than September to June.

There are many implications for work in schools that arise from these new standards. There will be a need for curriculum re-alignment, especially in grades 3-8. The tighter specifications for grade level standards means that there is less flexibility for learning progressions within the standards.

There will be more opportunity to go deeply into concepts rather than skimming over them so materials will need to be found, adapted or developed to support deeper student learning.

While working on the standards, especially in grades 3-8, the panel kept March testing in mind. It might help to think of mathematics curriculum in April to March units rather than September to June.

Opportunities for Integration

- Measurement, computation, data analysis, formulas, statistics, and mathematical models are useful, especially in the sciences and social sciences and well as in health and physical education.
- In the arts proportion and scale; measurement, and geometric relationships can be useful.
- Number sense and ideas from probability can be used to estimate the magnitude of an issue or the amount of risk involved in addressing problems of interest.

Multiple opportunities exist to develop connections that can mutually support student learning across content areas. Like literacy, numeracy can be implemented across the curriculum.

Measurement, computation, data analysis, formulas, statistics, and mathematical models are useful, especially in the sciences and social sciences as well as in health and physical education.

In the arts, proportion and scale; measurement, and geometric relationships can be useful.

Number sense and ideas from probability can be used to estimate the magnitude of an issue or the amount of risk involved in addressing problems of interest.

Career and Education Development

- Numeracy, Data Analysis and Probability
 - C2 Decision-Making
- Understanding Science, Technology, Engineering and Mathematics (S.T.E.M.) Career Opportunities
 - B3 Education and Career Information
 - C4 Societal Needs and Changes that Influence Workplace Success

Career and Education Development will usually be developed in the contexts of other courses rather than as a separate course. Knowledge and skills from numeracy, data analysis, and probability support decision making, which is performance indicator C2 in the Career and Education Development standards.

When teaching mathematics, it is important to supply the answer to “when we will ever use this?” This supports Career and Education Development Performance indicators B3 Education and Career Information and C4 Societal Needs and Changes that Influence Workplace Success.

Cross Content Connections

- http://www.maine.gov/education/lres/pei/cross_content.pdf

You can access more detailed descriptions of Cross Content Connections that were developed by groups of Maine teachers at the web address provided on this slide.

Mathematics Content Resources

- Standards already cited (slides 7-9)
- Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report
<http://www.amstat.org/education/gaise/>
- Achieve K-12 Mathematics Benchmarks and related tasks <http://www.achieve.org/node/966>
- College Board Standards for College Success™ Mathematics and Statistics
www.collegeboard.com/prod_downloads/about/association/academic/mathematics-statistics_cbscs.pdf

The Maine Learning Results do not stand alone as an instructional resource. Shown here are web addresses for additional standards documents that can be used to support the Maine Mathematics Learning Results.

Mathematics Content Resources

- Adding it Up (NRC, 2002)
http://www.nap.edu/catalog.php?record_id=9822
- Report of the National Math Panel (2008)
www.ed.gov/MathPanel/
- <http://www.maine.gov/education/lres/math/>

Two other national reports may prove valuable for your use.

The report Adding it Up (NRC, 2002) has a K-8 focus and is a consensus document representing common understandings about content, curriculum, instruction and assessment from “both sides of the Math Wars”

The National Math Panel’s final report, issued on March 13, 2008, contains 45 findings and recommendations on numerous topics including instructional practices, materials, professional development, and assessments.

More resources are posted on the Mathematics Learning Results page, <http://www.maine.gov/education/lres/math/>.

Timeline 2007 - 2009

- **June 2007** – Maine Department of Education Regulation 131 adopted by the Legislature and signed by the Governor.
- **October 2007** – Maine Department of Education Regulation 132 approved by the State Board of Education. Revised Maine Learning Results: *Parameters for Essential Instruction* effective as of October 22, 2007.
- **Spring 2009** – MEA and MHSA are aligned to the 2007 Maine Learning Results

Maine Department of Education Regulation 131 was adopted in June of 2007 (slide in 1) and Maine Department of Education Regulation 132 was adopted in October of 2007 (slide in 2) Schools can and should (Slide in 3) begin now to create curriculum and programming to align with and support the Learning Results: Parameters for Essential Instruction. The Maine Educational Assessment and Maine High School Assessments will be aligned to the 2007 Learning Results for spring of 2009 testing.

For More Information Contact . . .

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