Integrated Mathematics
and
The Common Core State Standards
Common Core State Standards

The standards which specify the mathematics that all students should study in order to be college and career ready.

www.corestandards.org
# Timeline for Common Core Mathematics Implementation

Common Core State Standards Adopted June, 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Standards To Be Taught</th>
<th>Standards To Be Assessed</th>
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</thead>
<tbody>
<tr>
<td>2012 – 2013</td>
<td>CCSS</td>
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</table>
Common Core Attributes

• Focus and coherence

• Balance of concepts and skills

• College and career readiness

• Mathematical practices
Standards for Mathematical Practices

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning
Pathways

1.) **Traditional** (US) – 2 Algebra, Geometry and Data, probability and statistics included in each course

2.) **International** (Integrated) three courses including number, algebra, geometry, probability and statistics each year
Traditional Pathway
• Objectives siloed into separate concepts
• Taught via rules, procedures, and memorization
• Lecture based, teacher directed
• Continuous practice of procedures

International Pathway
• Objectives from algebra, geometry, probability and statistics interwoven throughout
• Real world problems are investigated via lab-type experience
• Teacher serves as facilitator and coach
• Collaborative learning
• Practice with a purpose
National Science Foundation

NCTM Standards-based curricula

» ARISE
» CPMP
» SIMMS
» IMP
FOUNDATIONAL BELIEFS

• Learning is complex, ongoing, and dynamic.

• Curriculum should engage students

• Equity
Integrated Mathematics

CORE FEATURES

• Understanding of mathematics along interwoven strands unified by fundamental themes, common topics, and mathematical habits of mind

• Appropriate use of technology tools

• More mathematics accessible to more students while challenging the most able students

• Multi-dimensional assessment

• Mathematics developed in context with an emphasis on applications and mathematical modeling

• Student-centered investigations that promote active learning through problem solving
Technology Tools

• Graphing calculators are assumed and used as a regular tool

• **CPMP-Tools**
CPMP-Tools is a suite of Algebra, Geometry, Statistics, and Discrete Math software tools designed for and integrated with the Core-Plus Mathematics curriculum.

This material is based upon work supported by the National Science Foundation under Grant No. ESI-0137718. Opinions expressed are those of the authors and do not necessarily reflect the views of the National Science Foundation.

CPMP-Tools © 2006, S. A. Keller, Michigan State University and Core-Plus Mathematics Project, Western Michigan University (www.wmich.edu/cpmp) comes with ABSOLUTELY NO WARRANTY. See the Licensing information in the Help menu.

Suite is built using the following resources:
© 2002, Colt/Cern, dsd.lbl.gov/~hoschek/colt
© 2002, HotEq, www.esr.ruhr-uni-bochum.de/VCLab/software/HotEqn/HotEqn.html
© 2005, JGraph, www.jgraph.com
Differentiating Instruction

- Students experience mathematics using multiple representations
- Assign problems of varying difficulty
- Homework offered in choice of context
- Project choice
- Individualized assistance during instruction
Classroom Implementation

• Launch (full-class discussion)
  – Teacher-led discussion
    • Problem situation
    • Related *think about* questions
    • Context for student work
    • Student interest
    • Student knowledge assessed

• *Teacher is director and moderator.*
Classroom Implementation

• Explore (small-group investigation)
  – Gather data
  – Look for patterns
  – Construct models and meanings
  – Make and verify conjectures
  – Teacher circulates during small group collaboration.
    • Provides guidance and support
    • Clarifies or asks questions
    • Gives hints and provides encouragement
    • Draws all group members fully into the discussion
  • *Teacher is facilitator.*
Classroom Implementation

• Share and Summarize (full-class discussion of Check Point)
  – Teacher-led full class discussion
    • Concepts and methods developed during small group
    • Opportunity to share progress and thinking
    • Leads to a class summary of important ideas or further exploration

• Teacher is moderator.
Classroom Implementation

• Apply (individual task)
  – On Your Own
    • Individual student task to assess initial understanding
• Teacher circulates to assess levels of understanding.
• *Teacher is intellectual coach.*
# Advanced Math Enrollment
(in one NC school)

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## EOC Results

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<th>Geom</th>
<th>Int 3</th>
<th>Alg 2</th>
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## Comparison of Average Algebra I EOC Scores

### “Raw-Scores” 2004-2005

<table>
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<th>Traditional</th>
<th>Integrated</th>
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<tbody>
<tr>
<td>N = 261</td>
<td>N = 266</td>
</tr>
<tr>
<td>Average Scale Score Algebra I = 69.6</td>
<td>Average Scale Score Algebra 1 = 68.7</td>
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<tr>
<td>Low Level IV</td>
<td>Low Level IV</td>
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## Comparison of Average Geometry EOC Scores

“Raw-Scores” 2004-2005

<table>
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<tr>
<th></th>
<th>Traditional</th>
<th>Integrated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>261</td>
<td>266</td>
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<tr>
<td><strong>Average Scale</strong></td>
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<tr>
<td><strong>Score Geometry</strong></td>
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<td>62.0</td>
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<tr>
<td><strong>Mid to High Level III</strong></td>
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<td><strong>Mid-Range Level III</strong></td>
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</table>
Comparison of Average Algebra II EOC Scores
“Raw-Scores” 2004-2005

Traditional
N = 1903

Average Scale
Score Algebra II = 67.8

High Level III

 Integrated
N = 279

Average Scale
Score Algebra II = 67.0

High Level III
National Results

• Integrated students perform as well as or better than comparison students on standardized tests.

• Integrated students demonstrate better conceptual understanding, better problem solving ability, better ability to apply mathematics, better algebraic reasoning, and better performance on statistics and probability.

• On college mathematics placement tests, integrated students performed as well as comparison students on basic and advanced algebra subtests, and performed better on the calculus readiness subtest.

• Integrated students report better attitudes and beliefs about mathematics than comparison students.
This course is so much easier to understand. You can relate these problems to things in your life. I went from very poor grades to a high C this last quarter.

-Tim Ohnemus

Absorbing information and understanding information are two different things. After my high school experiences in two very different methods of teaching mathematics, I have really come to understand this difference. Facts can easily be taught and memorized. However, true understanding of such facts cannot come from memorizing someone else’s words.

-Anonymous
Testimony

Understanding a formula has given me different outlets to solving different types of problems. I have found myself in situations in which I did not remember the formula, and I was able to revert back to the stories in the IM book to help me figure out the formula or the key ideas to solve the problem. When I was in traditional math class and I had forgotten something significant such as a formula, I was left without any outside knowledge to guide me through the problem.

-Anonymous

My most memorable academic experiences in your class were discovering that everything we had been learning (the unit circle, trig, roller coasters) was interconnected and all part of the bigger picture. Before your class, math had never been taught in a way where I could see why what we were learning was important. I’ve also never had a math class that was as fun (yet at the same time as challenging) as yours was.

-Sara
The integrated mathematics curricula has contributed to my growth professionally and personally. My mathematics understanding has increased immensely, and I was personally given the opportunity to address the National Mathematics Panel providing them with ground work, comparisons, successes and failures of teaching traditional curricula and integrated mathematics curricula. Professionally, my experiences with this curricula has raised my level of expertise and mathematical understanding.

- high school math teacher, NC
What does integrated mathematics look like?
What does integrated mathematics feel like?
Areas of Challenge

- Resistant Colleagues
- Inconsistent Administrative Support
- Communication with Parents
- Community Awareness
- Professional Development
- Middle School Implementation
DPI Support

• Information and Awareness Sessions
• Professional Development Opportunities
• Developing Resource Material
  – Toolkit
Contact Information

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Thank You