K-12 Standards in Math and Science - Making Waves or Riding the Wave?

Beth Smith, Mathematics, Grossmont College

Carolyn Holcroft, Biology, Foothill College

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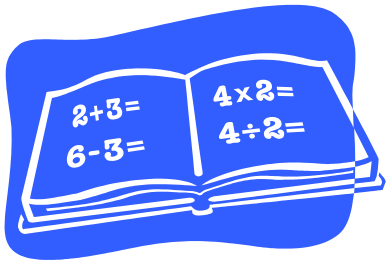
Common Core State Standards

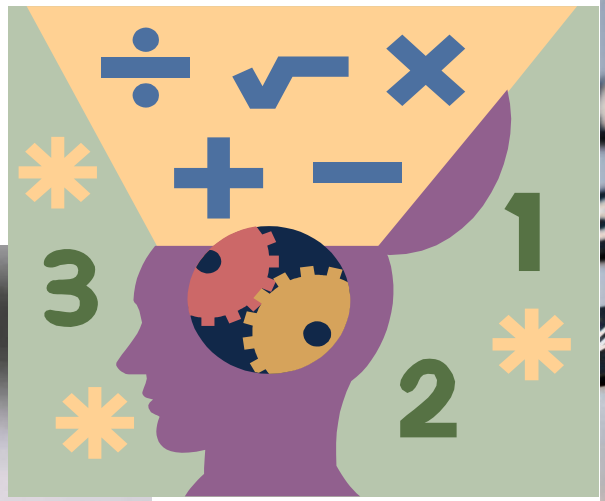
- Not “state” but national standards
- For K-12 in English Language Arts and mathematics
- Adopted by California Legislature in 2010
- California implementation occurring now
- Assessments to begin in 2015
- http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf

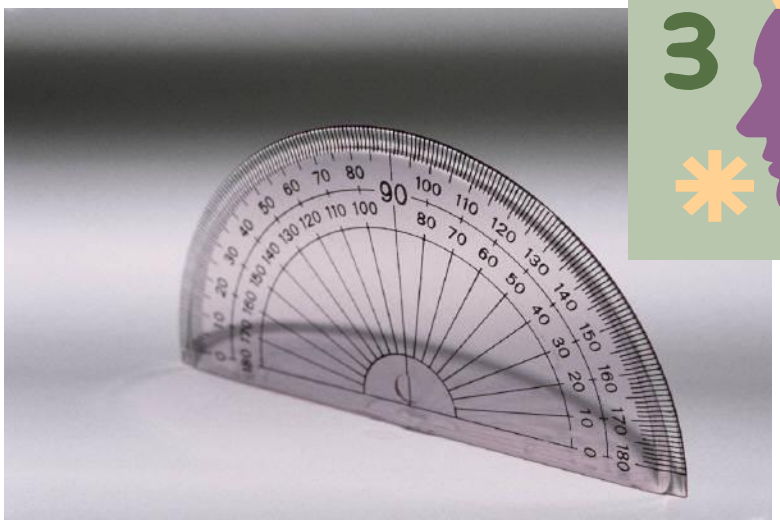
What's New in CCSS?

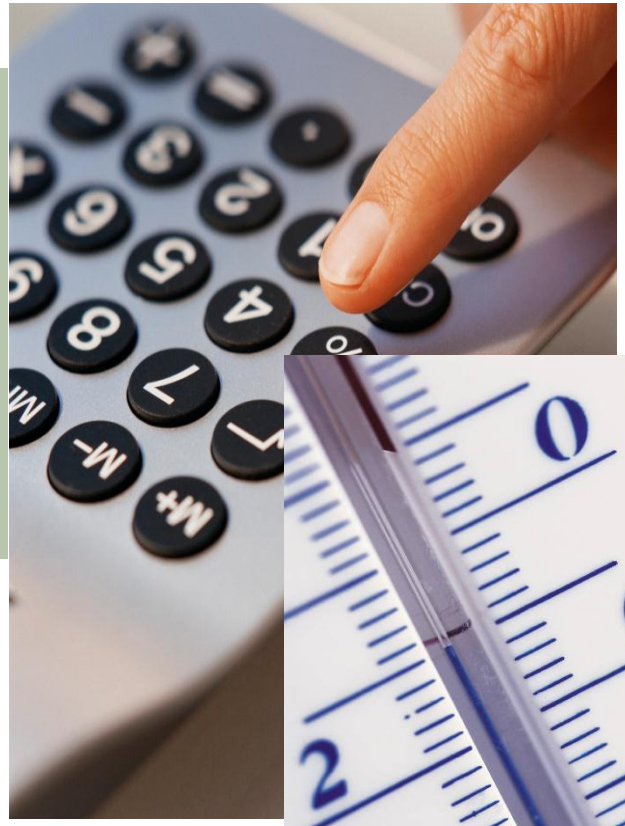
- Integration of topics
- Algebra topics included in middle school
- No spiraling of content
- Computer Adaptive Testing used in assessments

More collaboration, fluency with multimedia and technology, emphasis on problem solving and communication skills









Emphasis on “standards for mathematical practice”

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.**

Smarter Balanced Assessment Consortium

- Two consortia developing assessment systems aligned with CCSS - California is in SBAC
- Higher Ed faculty asked to participate in defining college readiness and determining necessary skill levels for success in college
- http://www.smarterbalanced.org/higher-education/

Definition of College Readiness

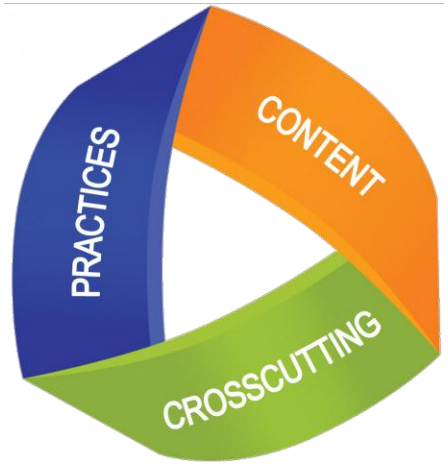
Students who perform at the College Content Ready level in mathematics demonstrate foundational mathematical knowledge and quantitative reasoning skills necessary for introductory courses in a variety of disciplines. They also demonstrate subject-area knowledge and skills associated with readiness for entry-level, transferable, credit-bearing mathematics and statistics courses.

California K-12 Science Standards: Where are we now?

- Currently use *National Science Education Standards* (National Research Council) and *Benchmarks for Science Literacy* (American Association for Advancement of Science)
- These are over 15 years old!
- Time to update, revise!

First step to development of Next Generation Science Standards (NGSS)

1. Identify the science all K-12 students need to know: *Framework for K-12 Science Education* developed by the National Research Council (July 2011)
   - Practices: behaviors that scientists engage in
   - Crosscutting concepts: application across all scientific disciplines (e.g. patterns, diversity, systems and system models, etc.)
   - Disciplinary Core Ideas: physical sciences, life sciences, earth and space sciences, engineering, technology and applications of science



Second step in development of Next Generation Science Standards (NGSS)

2. State-led collaboration to develop the NGSS
   - Included stakeholders in science, science education, higher ed, and industry
   - Just closed public review/comment period of second draft on January 29, 2013
   - Writing team reviewing feedback and revising/refining, final NGSS scheduled for release in March 2013

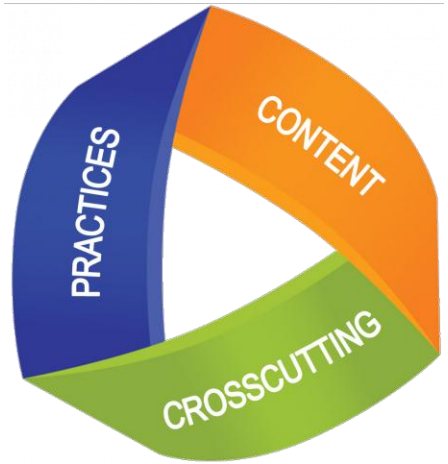
GOAL: College and career-ready students

California adoption and implementation of the NGSS?

- California SB 1200 requires State Superintendent of Public Instruction (Torlakson) to propose new science standards to the SBE by July 2013
  - Must be “based on” NGSS
  - Will be two public hearings prior to submitting his proposal to SBE
- Nov. 30, 2013: SBE adopts, rejects or modifies the recommended science standards
- CA implementation of new science standards begins 2014

How are the NGSS different?

- Meant to reflect real-world interconnections in science (merge behaviors, applications, and facts rather than teach/assess separately)
  - Focus on integration of knowledge and practice
  - Help educators shift pedagogical approach from separate fragments to integrated approach
- Science concepts build coherently across K-12
  - Sustained opportunities to develop understanding and appreciate connections over YEARS instead of weeks/months



How are the NGSS different?

- Focus on deeper understanding and application of content , CORE IDEAS central to disciplines, rather than associated FACTS

Physical sciences

- Matter and interactions
- Motion and stability: forces and interactions
- Energy
- Waves and their applications in technologies for information transfer (stress interplay of science and technology)

Life sciences

- Structures and processes (from molecules to organisms!)
- Ecosystem interactions, energy and dynamics
- Heredity: inheritance and variation
- Biological evolution: unity and diversity

How are the NGSS different?

- Science and engineering (& technology) are integrated in science education across K-12
  - Give core ideas of engineering and technology the same status as other science disciplines
  - Provide ongoing opportunities to deepen understanding by applying science knowledge to solution of practical problems in everyday life

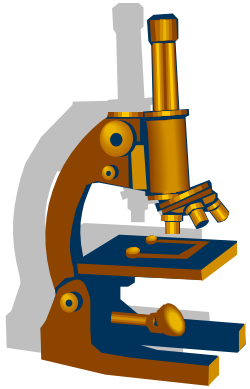
- Science standards coordinate with ELA and Math CCSS
  - E.g. teaching language and math concepts within the context of science

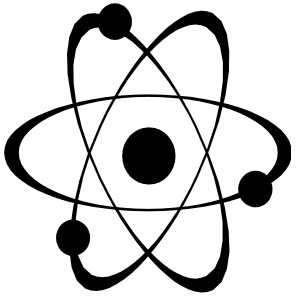
- http://www.nextgenscience.org/sites/ngss/files/Appendix%20A%20-%20Conceptual%20Shifts%20in%20the%20Next%20Generation%20Science%20Standards%20-%20FINAL.pdf

What Does This Mean For CCCs?

ICAS Competency Statements

- Mathematics
- Science





What Does This Mean for Future Students Attending Community Colleges?

What Does This Mean for Our Preparation of Future Teachers?

Will GE Courses and the GE Program Be Affected By This New Approach to Learning Mathematics and Science?

Should we consider changing content, methodology or instructional delivery of science and mathematics courses?

Thanks!