

[Added at the end of Section 1.]

Part 3: The Common Core State Standards of Mathematical Practice

The Common Core State Standards were adopted by the California State Board of Education in August 2010. Like this document, in addition to identifying key content the CCSS contain eight *Standards of Mathematical Practice* that “describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.” These Standards encompass most of the Aspects of Mathematics Instruction and should enable development of the Dispositions of Well-Prepared Students Toward Mathematics discussed here. These eight standards are:

- 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.**

The authors of the CCSS cite as background for their Standards of Practice the NCTM Process Standards: problem solving, reasoning and proof, communication, representation, and connections; and they also cite the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy). Both the NCTM Standards and *Adding It Up*, along with the CCSS, are grounded in research and their development included substantial consultation with K-12 teachers and college mathematics faculty. As such, all are worthy of study and collectively they describe a consensus about the levels of reasoning and engagement necessary for college readiness in mathematics and quantitative literacy necessary for all college-level work. Taken together they should be viewed as an integrated whole where each component should be visible in every unit of instruction.

When preparing mathematics course descriptions for UC/CSU area ‘c’ approval (the Mathematics section of the ‘a-g’ requirements) the Standards of Mathematical Practice must be discussed in the application template *Key Assignments, Instructional Methods and/or Strategies*, and *Assessment* sections. The Approaches to Mathematics discussed in this section provide a way to think about preparing the application. For example, do the assignments expect students to work on problems requiring time and thought that are not solved by merely mimicking examples that have already been seen? Does instruction model mathematical thinking where justification is based upon persuasive arguments? Do the assessments require that students communicate their reasoning? Courses redesigned for Common Core alignment will have to be resubmitted for area ‘c’ approval, and discussion of how the Standards of Mathematical Practice are implemented is an essential ingredient of a successful application.