

CHAPTER 3.

TASKS FOR STUDYING

CALIFORNIA'S COMMON CORE MATHEMATICS STANDARDS

The Overview Task and all five Study Tasks are detailed in the sections that follow. For each task, we provide a brief description, an explanation of the intended outcomes, and directions for facilitating the task in a group or staff setting. Talking Teaching Network schools complete these tasks collaboratively, in some cases as an entire staff and in others during regular meetings of groups of teachers, e.g., grade level teams and departments. Directions are written with these kinds of group or staff sessions in mind and are intended for teachers and administrators who facilitate the sessions. All directions are drawn from the pilot work completed with these tasks at Network school over the past year. All worksheets and handouts referenced in the sections below can be found in the Appendix to this Study Guide. The tasks to be described are as follows:

- Overview Task: Why Is This Happening? The Rationale Behind the Common Core Initiative
- Study Task #1: Browsing the New 2010 Common Core Mathematics Standards
- Study Task #2: Interpreting Common Core Standards for Mathematical Practice
- Study Task #3: Analyzing the Common Core Math Content Standards by Type
- Study Task #4: Analyzing the CC Math Content Standards within Domains and across Grade Levels
- Study Task #5: Coding Common Core Math Content Standards for Implications

Overview Task: Why is this Happening? The Rationale Behind the Common Core (Chapter 2 Jigsaw)

3.0.1. Overview Study Task: Brief Description of the Overview Study Task and its Development

The overview and context of the Common Core State Standards Initiative is an important story for teachers and others to know. In our work over the past twenty plus years, it has been important to provide teachers with detailed explanations and rationales for why they were being asked to make changes or integrate new initiatives. As we began to work directly with teachers in the study of the Common Core Standards it was of paramount importance to first establish the Common Core Standards as an important reform initiative that would have lasting effects for years to come. It was also critical to establish the Common Core in a historical context. The Common Core is not revolutionary, but rather evolutionary. It is the next logical step in the history of standards based reform in the United States. Once told, this story places the study of the new standards in its proper context: the Common Core is not some newly conceived idea, but rather the next best effort to establish world-class standards, informed by and built upon earlier efforts to do the same. Simply diving into the study of the standards themselves would ignore much of what is important for teachers and others in schools to know about the Common Core Standards Initiative. Teachers consistently report the value of knowing the history and context of standards-based reform efforts in the United States, the perspective that story lent to the Common Core initiative, and why it is happening.

3.0.2. Overview Study Task: Intended Outcomes/Understandings of the Overview Study Task

After studying Chapter 2, teachers should have a clear understanding of the history of the standards based reform movement in the United States, the evidence that spurred the National Governors Association (NGA) to act and initiate the development of the Common Core State Standards in the form of states self-reported proficiency levels and their NAEP achievement levels, and how, specifically, the NGA responded to this evidence and drew together a representative group to develop the new Common Core Standards. As a

result, most teachers and administrators view the study of the Common Core in a slightly different light: this is, indeed, the major reform initiative for the foreseeable future and is built upon the prior major reform initiative – NCLB and development of State Standards. The Common Core isn't new, it's "next". It is the next link in the chain that connects over twenty years of efforts to define what students in the United States should know, and be able to do in Mathematics and English Language Arts.

3.0.3. Overview Study Task: Directions for Engaging in the Overview Study Task in Grade Level Teams

- Form Study Groups. Chapter 2 is divided into three sections, therefore teachers should be divided into study groups of three in order to jigsaw the chapter.
- Explain the Purpose of the Overview Task. It is important to provide the context and rationale for the why this is happening. Teachers will appreciate the opportunity to have time to study and learn about the larger issues surrounding the Common Core and why the Common Core makes sense at this point in time. In introducing the Overview Task, you might tell teachers something like:

Too often teachers aren't provided with the rationale for why they are being asked to do certain things. With each major initiative, teachers are required to do something new and/or different. It makes sense that if teachers are being asked to make a change that they are also provided with the sound reasoning why the change is happening. Today we will complete the Overview Task that will provide information about the history of standards-based reform in the U.S., the evidence that demonstrated the limitations of No Child Left Behind and the current state standards, and the response to this evidence in the form of the Common Core State Standards Initiative. Hopefully this will provide the rationale for why the Common Core is important and worth taking the time to study and implement well.

- Assign the Sections of Chapter 2 within Study Groups. Have each group of three teachers divide the three sections of Chapter 2 among themselves (The History, The Evidence, and The Response) so that all sections of the Chapter have one person who will read and study just that section and then be prepared to teach their section to the others in the group.
- Read and Study the Sections of Chapter 2. Allow teachers time to individually read and highlight their assigned section of Chapter 2. They should identify the most important points made in the sections they are responsible for reading so that they can explain the section to the others in their group.
- Discuss each Section of Chapter 2 within Study Groups. Allow study groups time to share what they have read and studied in their sections. Have them share within each study group starting with section 2.1 The History, then 2.2 The Evidence, and then 2.3 The Response. They should focus specifically on what they highlighted as the most important points for the section they read and studied. This will allow each member of each study group to hear the most important points of each section of Chapter 2 in a reasonable amount of time and to piece together the rationale for why the Common Core is happening.
- Share Observations of Chapter 2 Across the Whole Group. Allow teachers to share their observations of Chapter 2. Start with those from each study group that read section 2.1. Prompt teachers to share what they thought was most important and/or interesting in section 2.1. As a result of their reading, studying and discussing they should be prepared to share the most important points that explain section 2.1 to the entire group. Discuss each subsequent section the same way in order until each of the three sections of Chapter 2 have been discussed by the whole group.
- Close Down the Session. Close the session by explaining that the review of Chapter 2 is important in creating the proper context for studying and transitioning to the Common Core. Teachers should have a

firm grasp on the answer to the question, “Why is this happening?” Finally, share that all subsequent study sessions will focus on the actual standards—reading, studying and interpreting them, and that the next study session will focus on browsing the entirety of the Study Guide in order to understand the approach to studying the Common Core as well as browsing the standards.

Study Task 1: Browsing the Study Guide and Standards

3.1.1. Brief Description of Study Task #1 and its Development

The Common Core Math Standards are longer, more complex, and have a different organization than California’s current math standards. They provide more in depth explanations and illustrations of math concepts and require the proper context for teachers to really dig in and study them and not become overwhelmed by the sheer volume of words they contain. To this end, we found it helpful to simply start the study process by browsing the standards and the Study Guide. This approach provided teachers with a first exposure to the new math standards that was non-threatening and positioned teachers well to complete subsequent study tasks.

The tasks for studying the Common Core Math Standards were developed working directly with teachers. As such, we received direct and immediate feedback on the value of any given task. The overview of the Study Guide and it’s contents (the first portion of Study Task #1) proved useful in providing teachers with a schema for the totality of their work in studying and beginning to transition to the Common Core Math Standards. The Browsing of the Math Standards (the second portion of Study Task #1) provided teachers with an opportunity to gain an initial familiarity with the new standards without undue pressure to master or produce anything other than preliminary thoughts and observations of the Common Core Standards for their grade level or course. Teachers responded positively to the opportunity to first browse the standards in this fashion.

3.1.2. Intended Outcomes/Understandings of the Study Task #1

As a result of the browsing tasks, teachers should gain a general familiarity with the standards and form general impressions about the nature of the standards themselves. After the browse task many teachers recognized the Standards for Mathematical Practice as new and useful in describing the “habits of mind” that students should develop while doing math. Pilot teachers also noted that the Math Content Standards tended to be more descriptive than the 1997 Math Standards and that the additional verbiage was often attempting to explain math content more extensively and precisely. K-8 teachers also noticed a greater focus at their respective grade levels, registering familiar things moved to higher grades allowing them more time to master the fewer things that the Common Core focuses on at each grade level. Traditional path high school pilot teachers tended to notice the opposite: more standards in Algebra I, Geometry and Algebra II. Each of these impressions and the many more that were made were helpful in sizing up what the Common Core Math Standards are - and are not - separate from the various interpretations and characterizations circulating on the internet and in the popular press. The browsing of the Common Core Math Standards is critical as it allows teachers to form their own first impressions based on their own review and study of the standard themselves.

While browsing the Common Core Standards is a low intensity first exposure to the Common Core Math Standards, it is a structured activity and there are some “points of interest” that all teachers should note as they first study the standards. These points of interest are outlined in section 3.1.3 of this chapter and provide direction for facilitating the browsing of the math standards productively.

3.1.3. Directions for Engaging in Study Task #1 in Grade Level Teams

Note: Although we found a direct comparison of the 1997 Math Standards to the Common Core Math Standards to be impractical, having the 1997 Standards on hand for teachers to reference should they choose to is helpful.

- Form Study Groups. It is best to keep the browsing study groups small – 2 to 3 teachers together at the most. There is no need to form grade or course alike groups; teachers can select their partner(s). It may be advantageous to make cross grade/course groups for this study task as some subsequent study tasks will require teachers to work in grade/course alike groups.
- Distribute the Study Task #1 Worksheet. Distribute to each teacher the Study Task #1 Worksheet (available in the Study Guide Appendix) and tell them that they will use this as a resource to record their observations of the Study Guide and as well as the standards as they browse them.
- Overview the Math Study Guide. Walk teachers through the table of contents of the Study Guide and provide brief descriptions of its contents. This is just a broad overview so teachers know what the Study Guide contains:

Chapter 1: This chapter provides an explanation of the purpose of the Study Guide and how it was developed.

Chapter 2: This chapter provides an overview and context for the Common Core State Standards and the history of standards based reform in the United States. This chapter should be familiar as it was the subject of the Overview Task: Jig Saw Study of Context and Promise of the Common Core Standards Initiative.

Chapter 3: This chapter provides directions and information for each of the Study Tasks (Browse the Study Guide and Standards, Interpreting the Standards for Math Practice, Analyzing the Standards by Type, Analyzing the Standards within Domains Across Grades or Domains, and Coding the Standards for Implications).

Chapter 4: This chapter contains the complete California Common Core Math Standards that have been reformatted to make them more readable in smaller amount of space. They appear in the following sections:

- The Standards for Math Practice
- Kindergarten through 8th grade Math Standards
- Higher Math Standards by High School Course
 - Traditional Pathway: Algebra I, Geometry, Algebra II;
 - Integrated Pathway: Mathematics I, Mathematics II, and Mathematics III;
 - Advanced Math: AP Probability and Statistics, Calculus
- Higher Math Standards by Conceptual Category
- Glossary

Chapter 5: This chapter contains a different orientation of the standards. This orientation presents the standards for K-5 and 6-8 by domain and across grade levels. K-5 and 6-8 teachers can view the standards as they progress across the grade levels within each domain. High school teachers can use the math standards organized by Conceptual Category to analyze progressions within categories across courses, both Traditional and Integrated Pathways. We have added at the end of each standard in the Conceptual Category section, designations regarding the courses to which the standard was assigned (e.g., @ Algebra I; Integrated Math I).

- Browse the Study Guide. Allow study groups time to review the contents of the study guide and jot down notes on the worksheet under the first prompt: "Touring the Study Guide and Points of Interest: Observations?" Tell teachers that as they browse the Study Guide, they should pay particular attention to some notable points of interest (and perhaps have these points of interest charted or projected so they can reference them as they browse):
 - Standards for Mathematical Practice.
 - Introduction and Overview for a few grade levels or courses of interest.
 - Higher Math Standards and Conceptual Categories.
 - Glossary
 - Chapter 5 which contains a rearrangement by domain and across grades for K-5 and 6-8
 - Specific grade level or a course of greatest interest.
- Debrief the Browsing of the Study Guide. Allow teachers to share the observations they have recorded on their worksheets as they browsed the Study Guide. Be sure to ask them specifically about the points of interest should their comments and observations be very broad or vague.
- Browse the Standards for a Particular Grade and/or Course. Allow teachers time to study the grade or course that is most relevant to their teaching experience. As they browse, ask them to keep notes and observations on the worksheet under the second prompt: "Browsing Standards for a Particular Grade and/or Course: Observations?" As teachers browse remind them that they can reference their current math standards if and when they feel it would be helpful to do so, but it is not necessary or required.
- Debrief the Browsing Standards for a Particular Grade and/or Course. Ask teachers to share their observations of their browsing of a particular grade or course.
- Close Down the Session and Frame Upcoming Study Sessions. As the session closes, remind teachers of what they have completed in their study of the Common Core: The study of the Overview and Context and the browsing of the Study Guide and Standards. There are three more study tasks to be completed. The next study task will involve reading, studying and interpreting the Standards for Mathematical Practice.

Study Task 2: Interpreting the Standards for Mathematical Practice

3.2.1. Brief Description of Study Task #2 and Its Development

The inclusion of the Standards for Mathematical Practice in the Common Core Math Standards represents an attempt to describe the habits or practices of mind that characterize students who are learning to effectively reason and problem solve mathematically. Study Task 2 was developed in response to these statements and recognizes that they are complex ideas that merit study. The ideas represented in these standards have a long history and importance in the field of mathematics and math education in particular. The Standards for Mathematical Practice are intended to apply to students in Kindergarten through high school with the sophistication of each grade levels content standards supplying the appropriate level of rigor for students to grapple with the application of the Standards for Mathematical Practice.

The Standards for Mathematical Practice are predicated on two separate efforts to describe math proficiencies and expertise. One effort was led by the National Council of Teachers of Mathematics and described process standards for math, which are: problem solving, reasoning and proof, communication, and representation and

connections. The other effort was by the National Research Council and identified a set of mathematical proficiencies. These mathematical proficiencies are: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and reasoning), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worth while, coupled with a belief in diligence and one's own efficacy). Together, these two separate efforts form the foundation for the Common Core's Standards for Mathematical Practice.

The eight Standards for Mathematical Practice 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

Note: A schematic version of these standards appears on the Overview page for each grade level and course.

3.2.2. Intended Outcomes/Understandings of the Study Task #2

After interpreting the Standards for Math Practice teachers will gain familiarity with this unique set of math standards. They will deepen their understanding through their attempts to characterize each of the Standards for Mathematics Practice in their own words as applied to their grade level or course.

3.2.3. Directions for Engaging in Study Task #2 in Grade Level Teams

- Form Study Groups and Assign the SMP's. Study groups should be formed by distributing teachers evenly across the Standards for Mathematical Practice (SMP) so that each of the eight SMPs has a small group of teachers taking responsibility for its reading, studying and interpreting. If the number of teachers is too great to allow for eight small groups, multiple study groups may be formed for some or all of the SMP's in order to accommodate all teachers in a group no larger than three. The study groups should mix teachers across grade level and/or course. As the SMPs are applicable to all grade levels, but not aligned with any particular grade level/course, they lend themselves to cross grade/course study groups. Subsequent study tasks will require teachers to work in grade/course alike configurations and the opportunity to mix teachers across grades/courses can be beneficial in establishing working relationships among staff that rarely have the opportunity to work together. Depending on the number of participating teachers, some study groups may be assigned two SMPs to study and interpret, or there may be more than one study group for each SMP.
- Explain the Purpose of Study Task #2. It is always helpful to provide teachers with purpose for each study task and place it in the context of each of the study tasks they have already completed. For Study Task 2, you might explain:

We've now completed a couple of important tasks in studying the Common Core Math Standards. In Overview Task we studied the context and promise of the Common Core Standards Initiative and why this is happening. In Study Task 1 we browsed the Study Guide and the standards to gain familiarity with the approach we're taking to studying the standards as well as the standards themselves. Today we're going to complete Study Task 2. We'll read, study and interpret the Standards for Mathematical Practice which articulate the habits of mind that characterize students successfully learning and studying mathematics.

- Distribute the Study Task 2 Worksheet. Distribute to each teacher the Study Task 2 Worksheet (located in the Study Guide Appendix) and tell them that they will use this worksheet to keep their notes and ideas about what the SMPs mean as they study and interpret them. The Study Task 2 Worksheet is straight forward containing directions and a short version of each of the SMPs.

Read the directions on the worksheet or explain to teachers that the worksheet contains short versions of each of the eight SMPs and that a full description for each is located in the Study Guide. The goal is to read and discuss their assigned SMP and then attempt to put into their own words the meaning of the assigned SMP.

- Study the Context for the Standards for Mathematical Practice. For context, have individuals read and then discuss the section “Connecting the Standards for Mathematical Practice to the Standards for Mathematical Content” (located at the end of the Standards for Mathematical Practice). This will help teachers better understand the role and importance of the SMPs and how they connect to the Common Core Math Content Standards.
- Read and Highlight the SMPs. Have teachers read and highlight each of the eight SMPs individually (not just their assigned SMP, but each of them). This allows all teachers to at least gain exposure to each of the SMPs even though they will study in depth the one or two assigned to their study group. Teachers should highlight what they identify are the key points for each of the eight SMPs.
- Jigsaw the SMPs Across the Study Groups. Assign each of the SMPs to a study group. Depending on the number of teachers participating, you may have fewer groups studying a couple of the SMPs, or you may have multiple groups studying the same SMP.
- Interpret and Develop Explanations for the SMPs. Study groups discuss their assigned SMP(s) including that which they highlighted during their individual study of the full descriptions of the SMPs. Study groups then draft an explanation of their interpretation of the assigned SMP. Each study group should develop a chart with their explanation of their assigned SMP. Study Groups have latitude with regard how they might explain their interpretations (prose, pictures, etc.), but they should know in advance that they will be expected to share the chart they develop with the other study groups.
- Share and Discuss Explanations of the SMPs. Each study group shares with all other study groups the interpretation/explanation of their assigned SMP. Everyone listens and then provides feedback in an effort to best articulate each SMP, distinguish it from the other seven, and portray it meaningfully. Remind participants that although they might represent different grade levels and/or different course, the Standards for Mathematical Practice apply to all grades and courses and can serve as a common, unifying element of the new Mathematics standards.
- Close Down the Session. Close the session by reminding teachers that they have now completed the overview of the Common Core, they have browsed the Common Core Study Guide and Standards and have now studied and interpreted the Standards for Mathematics Practice. The next study session will be devoted to Study Task three: Analyzing the Common Core Math Content Standards by Type within Grade Level/Course. The emphasis of that study task will be to take stock of the various kinds of standards (factual, procedural, conceptual) that populate each grade level/course set of standards.

Study Task #3: Analyzing the Math Content Standards by Type

3.3.1. Brief Description and Development of Study Task #3.

The 2010 Common Core Math Content Standards include a variety of types of standards: some articulate arithmetic or mathematical facts to be memorized and known, some describe specific procedures to be learned and used, some explain mathematical concepts to be understood, applied and connected to one another, and some standards combine facts, procedures, and/or concepts. For this study task, teachers study their grade level or course standards domain by domain and code each standard into the following categories: Fact, Procedure, Concept, and/or Combination. The goal with this task is not necessarily to arrive at definitive classifications of the standards by category but to study and discuss them in terms of the different teaching and learning they require.

Study Task #3 was developed in conjunction with pilot groups of K-12 teachers who consistently made two major observations while studying the Common Core Math Standards. In contrast to California's prior math standards (1997), the Common Core standards contained (1) more explanation and more examples (more verbiage, in general) and (2) more mathematical terms and language. After an initial read and review, teachers (especially, K-5 teachers) tended to characterize the Common Core Math Standards as "dense," including both the Standards for Mathematical Practice and the Content Standards. However, subsequent reading and discussion, including when we started categorizing standards by type, proved to be more instructive, as teachers penetrated the seeming density of the standards and became more and more comfortable with the mathematical terms and language. Teachers commented that they were accustomed to math standards that primarily articulated what students should know and be able to do, and the Common Core standards devoted noticeably more words to articulating what students should understand. Over time, we developed Study Task #3 to explicitly support among other teachers the same kind of observations made by pilot teachers.

3.3.2. Intended Outcomes/Understandings of Study Task #3.

Assuming teachers are completing study tasks in their prescribed order (first Browse, then interpret Standards for Mathematical Practice, then Analyze Content Standards by Type), Study Task #3 is the first opportunity for teachers to study, in depth, the standards for their grade level or course(s). After completing Task #3, they should possess a general familiarity with the Domains and the particular Strands within each Domain (or Conceptual Category for High School) that are addressed at that grade level or in that course. They should also possess an awareness of the different types of content the standards articulate, including facts, procedures, concepts, and combinations.

As stated above, teachers do not need to arrive at definitive classifications of the standards, but rather an awareness of, and perhaps a respect for, the mathematical content the standards attempt to articulate. In particular, they should arrive at an awareness that some standards attempt to articulate things students should come to understand about mathematics, and that such standards may not readily translate into concrete things students should be able to recite or do. In the best case, teachers complete Study Task #3 with the awareness that some, if not many, standards require additional study and discussion. As one of the pilot teachers commented after completing Task #3:

I don't know that we coded all the standards right, but it was an interesting way to study them. It got me reading much more closely as I tried to determine what each standard was really getting at. (Middle School Pilot Teacher)

3.3.3. Directions for Engaging in Study Task #3 in Grade Level or Course Teams.

- Organize Participants by Grade Level (K-8) or Course (High School). Unlike Study Tasks 2 and 3 (Browse and interpret SMPs), Study Task #3 is a grade- or course-specific task. Teachers will want to analyze standards for the grade or course(s) they teach. As such, the study session should be planned with this organization in mind. All staff might participate in the same session but sit and work in proximity to others at their grade level or to others who teach the same course. Alternatively, Study Task #3 can be conducted individually for each grade level or for teachers of each course, either by design or in conjunction with teachers' regular collaboration time.
- Within Grade Level or Course, Organize Participants into Pairs or Triads. Study Task #3 is best conducted with participants working in pairs. If the grade level or course group has an odd number of teachers, pair up as many individuals as possible and incorporate one triad. Pairs (or pairs and a triad) is more productive than teachers working individually as teachers will want to discuss with one another their views about each standard: Is it a fact, procedure, concept, or combination? However, pairs (or pairs and a triad) tend to work better than larger groups because it is easier for teachers to pace themselves at their desired rate, it allows for partners to examine and discuss the standards more closely (because they can point to and locate items for discussion more easily), it takes a bit less time than doing the task in larger groups, and it also gets more participants directly involved in the discussion of each standard. In larger groups, some individuals might take a more passive role.
- Explain the Purpose of Study Task #3. In facilitating the series of study tasks (1-5, or some portion of the series), it is always helpful to explain the purpose of the task to be completed and locate it in relationship to the other tasks in the series. For example,

Thus far, we have studied and discussed why this is happening (Overview Task), we've browsed the new standards (Study Task 1), we've studied, discussed and interpreted the K-12 Standards for Mathematical Practice (Study Task 2), and in this study session, we'll examine closely and discuss the standards for our own grade level or course in terms of what each standard is really getting at: Is it articulating a fact to be memorized, a procedure to be learned, a concept to be understood and applied, or some combination of those types. The point today is not to categorize all standards precisely but to use the categories (or types) to help us think about each standard and what kind of teaching and learning it requires. Study Task #3 will provide us with sufficient familiarity about our grade or course standards to then move on to Task #4 where we will trace domains of standards across grade levels and Task #5 where we will study our grade or course standards in terms of our current curriculum and teaching (What are we currently covering? What will need refinement, and what will need development?).

- Review Study Task #3 Handout: The Types of Standards. Distribute the Study Task #3 Handout to participants and review and discuss the five coding categories for different types of standards. (The handout is available in the Study Guide Appendix; but it is best to have a duplicated copy available for each participant so they can keep it in front of them while they study and code their standards.) The session facilitator might read the definition for each code aloud and then discuss them with participants, or have participants read silently, discuss with their partner, and then open it up for general discussion. Emphasize to participants that the definitions provided are by no means definitive, and they should not worry about getting the coding of each standard exactly correct. Rather they should work more informally, using the codes to help them study and better determine what each standard is trying to articulate. The definitions that appear on the Study Task #3 Handout are provided below.

Categories for Coding Different Types of Standards

- F Fact.** This standard articulates an arithmetic or mathematical fact that students need to memorize, remember, and use (often times, but not limited to, calculations).
- P Procedure.** This standard articulates an arithmetic or mathematical procedure (or algorithm) that students need to learn how to perform (e.g., a series of steps that when correctly executed produce an anticipated result).
- C Concept.** This standard articulates an arithmetic or mathematical concept that students need to come to understand and be able to apply (e.g., an idea or notion that may be somewhat abstract in form but when understood and applied yields beneficial insights).
- M Mixed.** This standard articulates a combination of an arithmetic/mathematical fact, procedure, and/or concept. There are 2-3 of the types listed above represented in the standard. Note: When coding a standard as mixed, try to highlight or label the portions of the standard that represent different types (e.g., label the procedure and label the concept within the standard). Then code the standard as M but record the types that were identified within the standard: M-F/P, or M-P/C, or M-F/P/C.
- ?? Unsure.** This standard is difficult to interpret in terms of the categories above. Essentially, it is not yet clear the category or categories to which this standard should be assigned.

- Review Study Task #3 Handout: Directions for the Task. The directions that appear on the Study Task #3 Handout are provided below. Direction 1 recommends that participants work one domain at a time (direction 1). This allows the facilitator to pace the larger group and review and clarify issues as needed after each domain. Directions 2 and 3 recommend that participants read and code the standards in the domain first individually, and then discuss. Directions 2 and 3 are designed to insure that each participant has individual think-time prior to discussions. As described in the Note following Direction 4, if pairs prefer to work through each standard together, that is perfectly fine. Allow partners to pursue a process that feels comfortable to them. Direction 4 recommends that pairs try to reach a consensus code for each standard; where consensus is not attainable, pairs should simply record a double code (e.g., F/P).

Task Directions:

- 1) With a partner (or in a triad), work through the Math Content Standards one domain at a time for a particular grade level or course of your choice.
 - 2) For each domain, first read silently the standards that comprise the strand.
 - 3) Individually code each standard according to the categories listed below. Record your individual codes next to the number (or letter) of the standard in the left hand margin.
 - 4) As a pair (or triad), review the standards in the domain and discuss your individual codes. As best you can try to reach consensus on the single code that best characterizes each standard in the domain. Record your group consensus code in the left hand margin next to your individual code. If a pair cannot reach consensus simply record a split code (e.g., F/P) [Note: If pairs would prefer to read, discuss, and code each standard together, that is perfectly fine. Reading and coding individually first is designed to provide individuals with think-time prior to discussions, which may or may not be the preference of the pair.]
 - 5) Repeat the process for the next domain in your grade level standards.
- Session Facilitators Should Move and Assist As Needed While Participants Are Coding. Session facilitators should move about the room, observe and listen in on pairs, and assist as needed. In particular watch for pairs that belabor the task and spend more time discussing definitions of facts, procedures, and concepts rather than the standards themselves. In such cases, remind participants that the major purpose of the

task is studying the standards through the lenses of the different types, not getting every standard coded precisely.

- Review and Clarify Task as Needed Proceeding One Domain at a Time. After participants have had time to code the standards in each domain, the facilitator for the session should check if participants have any questions or wish to share any issues that have arisen or any observations that they have made. The purpose here is to insure that everyone is comfortable with the task and to discuss issues or observations while they are timely for participants.
- Participants Do Not Necessarily Need to Code Standards for All Domains. Depending on time available for this session, participants may not have sufficient time to code standards for all domains in their grade level or course. That is okay. As long as participants have coded a majority of the domains (more than half), the session will provide them with a working familiarity with the different types of standards that comprise their grade level or course.
- Option: Tally and Review Coding Results. Depending on time available for this session, facilitators may want to involve participants in tallying the number of standards coded into the various categories. If the session involves multiple pairs for only a single grade level or course, the tally chart allows for discussion about consistency and differences between pairs; the latter of which is to be expected because the session does not intend to produce precision (see Example 1 below). If the session involves multiple grade levels or courses the tally chart allows for discussion about similarity and differences in the composition of the standards across grades or courses (see Example 2 below).

Example 1 Tally Chart: Multiple Coding Pairs for One Grade Level or Course

	Pairs	Fact	Procedure	Concept	Mixed	??	Total
	1	4	6	5	6	1	22
	2	5	4	6	5	2	22
	3	3	6	6	7	0	22

Example 2 Tally Chart: Multiple Coding Pairs and Multiple Grade Levels or Courses

Grades or Courses	Pairs	Fact	Procedure	Concept	Mixed	??	Total
X	1	4	6	5	6	1	22
	2	5	4	6	5	2	22
	3	3	6	6	7	0	22
Y	1	5	6	5	8	2	26
	2	4	5	5	9	3	26
Z	1	3	6	9	8	2	28
	2	2	8	8	9	1	28

- Conclude with Sharing and Discussion of Observations. Session facilitators should manage time in the session so as to allow at least five minutes to share and discuss participants' observations. The key in closing this session is to help participants register the familiarity gained through the study task...about the domains, about the strands that comprise the domains, and about the various types of standards that comprise the standards for the grade level(s) or course(s) studied.

Study Task 4: Analyzing The CC Math Standards within Domains and Across Grade Levels

3.4.1. Brief Description of Study Task #4 and Its Development

In contrast to the 1997 California Mathematics Standards, the Common Core Mathematics Content Standards are organized under different domains, with new terminology and names. Study Task 4 was developed in an effort to help teachers trace standards across grade levels or courses within these new domains and gauge the learning progressions for standards across grades or courses. To facilitate this study task, Chapter 5 of the Study Guide contains the standards in a different orientation. This orientation of the standards contains the K-5 and 6-8 standards by domain and across grade levels. This allows teachers to engage in an analysis of the learning progressions for standards within each domain. Although Chapter 5 does not contain the same orientation for the high school math standards, high school teachers can use the standards organized by Conceptual Category to analyze progressions within categories across courses, both Traditional and Integrated Pathways. We have added at the end of each standard in the Conceptual Category section, designations regarding the courses to which each standard was assigned (e.g., @ Algebra I; Integrated Math I).

3.4.2. Intended Outcomes/Understandings of the Study Task #4

After completing Study Task 4, teachers should have a working knowledge of the learning progressions of the standards by domains (K-8) or conceptual category (HS). This will help teachers gauge in a yet another way the coherence of the new math standards. Teachers should have working knowledge of the extent to which standards make reasonable progressions from grade level to grade level.

3.4.3. Directions for Engaging in Study Task #4 in Cross-Grade Level Teams

- Provide an Overview of the Study Sessions and the Rationale for Study Task 4. Remind teachers that they have engaged in several Common Core study sessions. They have completed the Overview Study Task that explained the rationale for the Common Core Initiative, Study Task #1 helped them browse the Study Guide and standards, Study Task #3 engaged them in determining the types of standards in the Common Core. Study Task #4 will provide teachers with an opportunity to study the learning progressions for standards across grade levels or courses.
- Form Study Groups and Assign a Domain or Conceptual Category to Each Group. It is best to keep the study groups small. It will be advantageous to form cross grade/course groups for this study task. The point here is to study standards across grade level spans or courses and it will be important to have study groups with representatives from different grade levels or courses in each study group. The session should be organized in jigsaw fashion, with staff divided into domain-specific groups. Each group studies its respective domain and then teaches what they have learned to others.
- Review Chapter 5 and the Standards by Domain Across Grade Levels. This orientation of the standards is what drives the teachers' ability to study the learning progressions across grade levels. Review Chapter 5 and allow teachers to become familiar with how the standards and the way they are organized. Allow teachers to identify where the domains and relevant grade level spans reside within Chapter 5 so they are able to quickly get to work.
- Distribute the Study Task #4 Worksheet. The Study Task 4 Worksheet (available in the Study Guide Appendix) allows teachers to record their observations about the learning progressions across grade levels within a single domain. Teachers will need a worksheet per each domain they study. There are two versions of the worksheet in the Study Guide Appendix – one for K-5, and one for 6-12. The K-5 version

allows teachers to study the progressions within domain across six grade levels (K-5) and the 6-12 version allows teachers to study progressions within domain or conceptual category across grade levels or courses (i.e., across grades 6, 7 and 8, or across, say, Algebra I, Geometry, and Algebra II).

- Groups Review Standards within Their Domain across Grade Levels or Courses. Each group reads, discusses and, as needed, clarifies the meaning of standards within their domain at each successive grade so as to get generally familiar with the progressions from one grade to the next.
- Groups Discuss, Determine, and Chart the Major New Content Introduced at Each Grade Level or Course. Groups determine and chart for their domain that which is introduced at each grade level or course. They record this in the left hand column of the chart. As they find meaningful, they can also record in the right hand column of the chart other observations they make about the standards in their domain for one or more grade levels. Note: The chart should be a replica of the Study Task #4 Worksheet.
- Groups Share Their Charts and Findings. Each group shares their chart and findings, explaining the learning progressions they identified for their respective domain.
- Close down Study Session #4. Close the session by telling teachers that Study Task #4 was another important way to study and understand the new standards. Knowing the learning progressions will be very important in thinking about developing math competence across grade level spans. In addition, remind teachers that Study Task #5--Implications Coding, is the next and final study task. Given the careful study of the standards to this point, teachers should be well positioned to make judgments regarding which standards they are currently covering and which standards they are not.

Study Task 5: Coding the Standards for Implications

3.5.1. Brief Description of Study Task #5 and Its Development

Implications Coding represents a transition from studying the Common Core standards to preparing to implement them. Teachers consider each standard for their specific grade level/course one at a time and determine if the standard is covered (CC) by their current instructional practices and curriculum, needs refinement (NR) of current instructional practices and curriculum, or needs development (ND) of new instructional practices and curriculum (see Study Task 5 Handout in the Appendix for lengthier definitions of each code). Once the Implications Coding task is completed for all relevant grade levels/courses, the results can be aggregated within strands and domains to develop a profile of Common Core implications.

The Implications Coding process and the codes themselves were developed and tested across three different school districts involving teachers, instructional coaches and administrators. Note that the focus of the analysis is on the extent to which each standard is being covered—that is, are teachers attempting to teach the standard and help students meet it? A more discerning question is, Are students meeting the standard? That is a question for subsequent analyses. Here the goal is to determine which of the new Common Core standards teachers are attempting to teach (currently covering), which they are not (needs development), and which standards will require refinements in teaching in order to fully address them. Implemented thoughtfully, the new Common Core ELA standards will require teachers to change their practices. Any new set of standards would require change, and the new Common Core standards, developed specifically to better focus and deepen the teaching and learning of mathematics, will certainly require change. The intent of implication coding is to involve teachers in the process of identifying changes needed. Involving teachers directly in the process of identifying changes needed will—we hypothesize—increase the

likelihood that teachers will engage productively in the process of changing their teaching to help students meet the new Common Core standards.

Implication Coding should be conducted after teachers have completed Study Tasks 1-4. To be done properly, Implications Coding requires that teachers have a good working knowledge of the 2010 Common Core standards, and Study Tasks 1 - 4 should provide that working knowledge. Implication Coding should be completed by teachers who teach the grade level/course to be coded and have a high degree of familiarity with the current standards, instructional practices and curriculum at that grade level or for that course. We recommend forming pairs or triads of teachers within a grade level/course for Implications Coding. Groups of four or more make it more difficult and time-consuming to reach consensus when coding. If there are more than three teachers at a grade level/course, then divide the number of teachers into pairs and/or a combination of pairs and triads. If multiple pairs or triads are coding for one or more grade levels, tally results for all pairs and triads and examine results for similarities and differences. Conduct Implication Coding one domain/conceptual category at a time.

3.5.2. Intended Outcomes/Understandings of the Study Task #5

After completing Implication Coding of the California's 2010 Common Core Math Standards (and also Study Tasks 1-4), teachers should have a high degree of familiarity with the Common Core Standards, and they should have a working knowledge of the new standards currently being covered, those that will need refinement of instruction and curriculum, and those that will need development of new instructional practices and curriculum. In addition, they should also express a willingness to begin working on the refinements and development needed to address the new standards. The completion of implication coding should also frame productive work for the future in terms of specific Common Core Standards that will need to be addressed to a greater (those coded ND) or lesser (those coded NR) extent. Armed with this information, teachers and administrators can begin to scope the work and plan how they will begin to address the issues of curricular and/or instructional development identified during the Implication Coding Study Task.

3.5.3. Directions for Engaging in Study Task #5 in Grade Level Teams

- Form Pairs and Triads by Grade Level. Be sure to have teachers grouped by grade level/course. Within grade levels/course form pairs and/or triads. Try to avoid groups of four or more.
- Review Rationale for Implications Coding. Explain the rationale for implications coding. Explain that the Common Core will require change. Implications coding is the first step in this process as it will frame out the current state of curriculum and instruction: which of these new standards we are addressing, which will need refinement, and which will need development. This information will provide the direction required to begin to make the important decisions regarding how best to use the existing curricular resources and how best to change instruction to help students meet the demands of the Common Core standards.
- Review the Study Task 5 Handout: Explanation of Implications Codes. The Study Task 5 Handout (available in the Appendix) provides definitions of each of the codes to be used during Implication Coding. Read and discuss each code with teachers.
- Identify the First Domain/Conceptual Category to be Coded. For each grade level/course set of standards, be sure that coding pairs/triads have correctly identified the first domain or conceptual category to be coded for implications.

- Distribute and Review Copies of the Study Task 5 Worksheet. Distribute copies of the Study Task 5 Worksheet (K-5, 6-8, and High School versions are in the Appendix) and review directions at the top of the worksheet. “Use one of these worksheets for each domain or conceptual category. The domains and conceptual categories are not consistent across grade levels/courses, so care must be taken to ensure that coding pairs/triads are moving through their standards systematically. List the number of the standard, the code assigned to the standard, and notes that explain why you assigned that particular code to that particular standard. The notes will help us remember our thinking when we return to review the results of Implication Coding subsequently.
- Remind Teachers of the Following:
 - For any standard that is comprised of a numbered item (the standard) and lettered items teachers should code the numbered item as well as each lettered item. They should then develop a single code that best captures the whole standard. For example, if a given standard is accompanied by 3 lettered elements (i.e. 1, 1a, 1b and 1c) and the resulting codes are cc, nr, nr, nr, the single code that best captures those for codes would be “nr”. If the codes were nr, nd, nd, nd, the code that would best apply would be “nd”.
 - There are special exceptions that will require split codes. For example, a standard with lettered items that is coded “nd, nr, nd, nr,” for each letter should be coded “nr/nd” for the standard overall. The split code signifies that there is variation across the lettered items in this standard. Also, a pair or triad of teachers may have a genuine disagreement on which code to apply to a given standard (regardless if the standard has lettered items or is a single statement). In this case all efforts should be made to reach consensus, but when consensus cannot be reached around a single code, a split code should be used.
- Rove and Assist as Needed as Teachers Code. While teachers are coding, rove about the room and assist as needed. If you find pairs or triads bogging down over a particular standard, remind them that it is best to be conservative in their coding. That is, if they are uncertain about whether to code a standard as Currently Covered or Needs Refinement, tell them to split the code (CC/NR) to fully capture their uncertainty, or to simply be more conservative and code the standard as NR. We are looking for implications, and it is better to flag potential needs (even if we are uncertain) than just assume a standard is currently being addressed.
- Complete Implications Coding for Each Successive Domain/Conceptual Category. Repeat the procedure described above for each domain or conceptual category until all domains/conceptual categories have been coded.
- Chart and Gallery Walk Coding Results. When pairs or triads finish coding all standards for their grade level or course, they should post their completed Worksheets for their grade level or course on a chart. If there are more than one coding pair/triad per grade level or course, the charts containing each of their Worksheets for each domain/conceptual category should be posted near one another. Once the grade level/course implication coding charts are completed and posted, all participating teachers can gallery walk the charts, study the work of other coding groups and attempt to characterize the degree and kind of change being indicated by the implication coding efforts. In cases where there are multiple coding groups per grade level/course (e.g. two or more 2nd grade coding groups or two or more Algebra I coding groups), groups within the same grade or course should be allowed time to examine and discuss each others work before studying the implications coding work for other grades/courses. Their discussions may (but do not have to) result changes to their prior codes—resolving differences across pairs.