Module 2
Facilitator Guide

Focus on Content Standards

Connecticut Core Standards for Mathematics

Grades K–5

Systems of Professional Learning

Table of Contents

Module Overview

Prerequisite	**None**
Duration	**Full day**
Outcomes	**By the end of the session, participants will have:** • Strengthened working relationships with peer Core Standards Coaches across their region. • Deepened their understanding of the Practice Standards specified in the CCS-Math through sharing of implementation experiences from Module 1. • Examined the implications of the language of the Content Standards for teaching and learning. • Identified CCS-aligned tasks that combine cognitively rigorous content with mathematical practices. • Identified tasks that combine cognitively rigorous content with the Practice Standards. • Analyzed the progression of topics in the Content Standards both within and across grade levels. • Deepened their understanding of the potential of the CCS-Math to change mathematics teaching and learning. • Gained understanding of some of the challenges involved in implementing the CCS-Math. • Explored strategies for supporting teachers as they make changes in their classroom practice. • Made plans for next steps.

Resources Required

- Chart paper, markers, pens, highlighters, nametags, post-it notes
- Participant Guide for each participant
- Domain Cards
- Cardstock (for labeling tables and groups)

Session Preparation

Tables should be arranged so participants can work in groups.

Key Messages

- The Standards for Mathematical Content are not just a new list of topics. They go hand in hand with the Standards for Mathematical Practice.
- When implemented together, the Standards for Mathematical Practice and the Standards for Mathematical Content bring new rigor to the mathematics we teach and that we expect students to learn.
- Teaching the CCS-Math will require fundamental changes in teaching practice.
- The process of changing to a CCS-aligned curriculum is complex because it involves considerable attention not only to the standards, but also to curriculum materials, instruction, assessment, and professional learning. Therefore, full implementation of the CCS-Math will require all professionals in the schools to collaborate over time.

Session at-a-Glance

Introductory Activity (10 minutes)

The facilitator will review project goals and activities, module outcomes, and the agenda for the session. Participants will complete a Pre-Assessment.

Supporting Documents:

- Session Agenda
- Pre-Assessment

PowerPoint Slides:

- 1–5

Section 1: Sharing Implementation Experiences (35 minutes)

Training Objectives:

- To review the foundations of the CCS-Math and the key shifts of focus, coherence, and rigor.
- To share, discuss, and address experiences with and common challenges of supporting teachers in implementing the Standards for Mathematical Practice.

The facilitator will begin by reviewing the key shifts of focus, coherence, and rigor. Then, in groups, participants will share experiences and describe any "aha moments" from attempts to implement the Standards for Mathematical Practice (SMP). Participants will look for themes or choose one or two important successes, challenges, and/or insights to share with the larger group. These will be recorded on chart paper so that common themes and additional strategies can be discussed. Participants can record new ideas on the handout, Moving Forward with the Practices. The facilitator will wrap up Section 1 by explaining that to build upon their knowledge and experience with the SMP, they will begin to connect these to the Standards for Mathematical Content.

Supporting Documents:

- Moving Forward with the Practices

Materials:

- Chart paper, markers

PowerPoint Slides:

- 6–13

Section 2: The Language of the Content Standards (45 minutes)

Training Objectives:

- To define conceptual understanding, procedural skill and fluency, and application of mathematics.
- To understand the differences between conceptual understanding, procedural skill and fluency, and application of mathematics.
- To begin to understand how procedural skills and fluency build upon conceptual understanding.
- To demonstrate how application of mathematics can support students' development of conceptual understanding.

The Language of the Content Standards: In groups, participants will complete the first part of the Who Knows Math exercise, examine short examples of student work, and together will answer questions about what the student knows based on the answers given. After a brief large group discussion, small groups will watch the video *Mathematics Fluency: A Balanced Approach* and develop working definitions of "conceptual understanding," "fluency," and "application" as addressed in the content standards. Groups will then work through short, basic examples on how students can demonstrate conceptual understanding and then discuss current strategies used now to develop procedural skill and fluency. The wrap-up of the section takes place as participants complete the second part of the Who Knows Math exercise and revise their first round of answers given their new understandings.

Supporting Documents:

- Who Knows Math

Materials:

- Chart paper, markers

Video:

- *Mathematics Fluency: A Balanced Approach*
  http://www.youtube.com/watch?v=ZFUAV00bTwA

PowerPoint Slides:

- 14–29

Section 3: The Progression of the Content Standards (80 minutes)

Training Objectives:

- To provide participants with information on and experience with identifying standards that address conceptual understanding, procedural skill and fluency, and application of mathematics.
- To have participants experience how concepts are developed within and across grade levels.
- To provide participants practice with identifying concept progressions.
- To provide participants with an understanding of how standards within a grade level can be grouped, or are "connected" across content domains.
- To provide participants practice with connecting standards.

The definitions of "conceptual understanding," "fluency," and "application" developed in the previous section are used to help participants analyze the content standards in three different ways.

In Exploring the Standards Part 1, participants explore the content standards for one domain, at one grade level, and determine which standards focus on conceptual understanding, procedural skill and fluency, and application of mathematics.

In Exploring the Standards Part 2, participants explore the content standards for one domain across grade levels and record five general observations about the progression of the concepts and two connections to the practice standards.

In Exploring the Standards Part 3, participants explore all of the domains for one grade level to "connect" standards across multiple domains that can be taught together in a lesson or unit.

Participants will then discuss and reflect as a large group on the importance and instructional implications of the progressions and any new insights they now have into the standards.

The activity will conclude with having participants view the video *Gathering Momentum for Algebra* in order to see where the K–5 content progressions impact the larger K–12 learning pathway.

For more information about this activity, please refer to page 10 of this Facilitator Guide.

Supporting Documents:

- Standards for Mathematical Practice (Participants will bring a copy or access online.)
- Exploring the Content Standards Observation Sheet

Materials:

- Chart paper, markers
- Sets of Standard Progression Cards (one set per five table groups)
  Signs made for tables: K, 1, 2, 3, 4, and 5

Video:

- *Gathering Momentum for Algebra*
  http://www.youtube.com/watch?v=ONPADo_Nt14

PowerPoint Slides:

- 30–40

Section 4: Meeting the Expectations of the Content Standards by Teaching with Cognitively Rigorous Tasks (85 minutes)

Training Objectives:

- For participants to understand the definition of a cognitively rigorous task.
- To deepen participants understanding of why incorporating cognitively rigorous tasks into their mathematics instruction is important.
- To examine strategies that can be used to incorporate cognitively rigorous tasks that will benefit all students.

Participants begin by viewing the video *Dan Meyer: Math Class Needs a Makeover*, which is about problem solving. Participants will discuss the video and compare their previous experience with solving *Two Machines, one Job* with Dan Meyer's message in the video.

Participants are then shown how scaffolds can be removed slowly from a problem in order to deepen the level of cognitive rigor. Participants use Hess's Cognitive Rigor Matrix to discuss the problem example.

Participants will brainstorm how cognitively rigorous mathematics tasks can be used to benefit all students and will be presented with four strategies that can be used to differentiate cognitively rigorous tasks for all students, as needed, in order to provide multiple entry points into the mathematics while maintaining the problem's rigor.

Participants will wrap up the activity by making connections back to "conceptual understanding," "fluency," and "application" and how each of these is addressed through cognitively rigorous tasks.

Supporting Documents:

- Hess's Cognitive Rigor Matrix for Mathematics and Science
- Strategies for Differentiating Cognitively Rigorous Tasks
- Resources for Finding Tasks
- Reflect

Materials:

- Chart paper, markers

Video:

- *Dan Meyer: Math Class Needs a Makeover*
  http://www.ted.com/talks/dan_meyer_math_curriculum_makeover.html

PowerPoint Slides:

- 41–59

Section 5: Supporting Change (85 minutes)

Training Objectives:

- To help participants identify elements of lessons that work to develop conceptual understanding, procedural skill and fluency, and application of mathematics.
- To provide participants with instructional strategies for teaching the content standards through problem solving, for helping students to develop procedural skill and fluency, and to provide students with opportunities to apply their mathematical understandings.
- To have participants create a plan for disseminating big ideas from the session with teachers at their school.
- To have participants anticipate specific teacher questions and challenges around implementing lessons that incorporate the Standards for Mathematical Content.

Supporting Documents:

- Video Observation Sheets
- A New Spin on Old Strategies
- Group 1: Math Journals
- Group 2: Mathematical Language
- Group 3: Fluency
- Group 4: Group Work and Decision Making
- Next Steps

Videos:

- *Skip Counting with Counting Collections*
  https://www.teachingchannel.org/videos/skip-counting-with-kindergarteners
- *What Fraction of the Shape is Red*
  https://www.teachingchannel.org/videos/teaching-fractions

Materials:

- Chart paper, markers

PowerPoint Slides:

- 60–63

Closing Activities (15 minutes)

Participants will complete a Post-Assessment and an online Session Evaluation**.**

Supporting Documents:

- Post-Assessment
- Session Evaluation (online)

PowerPoint Slides:

- 64–68

About the Standard Progression Cards

A complete set of the Standard Progression Cards used in Section 3 is 180 cards. Each set consists of five color-coded domains. The chart below indicates the number of cards in each domain by grade level.

Domain	Counting and Cardinality & Operations and Algebraic Thinking	Number and Operations Base Ten	Number and Operations Fractions	Geometry	Measurement and Data	**Grade Level Totals** ⇣
Color	Blue	Red	Green	Purple	Orange	
Kindergarten	15	1	0	6	3	25
1st Grade	8	6	0	3	4	21
2nd Grade	4	9	0	3	10	26
3rd Grade	9	3	9	2	14	37
4th Grade	5	6	14	3	7	35
5th Grade	3	7	12	4	10	36
Domain Totals ----->	44	32	35	21	48	**180**

Several of the cards have asterisks indicating that there was a reference to a footnote in the Content Standards document. These footnotes are provided on the following pages in case a participant inquires about a particular note.

Counting and Cardinality & Operations and Algebraic Thinking

K.CC.C.6

Include groups with up to 10 objects.

K.OA.A.1

Drawings need not show details, but should show the mathematics in the problem.

1.OA.A.1

See Glossary, Table 1.

1.OA.B.3

Students need not use formal terms for these properties.

2.OA.A.1

See Glossary, Table 1.

2.OA.B.2

See standard 1.OA.C.6 for a list of mental strategies.

3.OA.A.3

See Glossary, Table 1.

3.OA.B.5

Students need not use formal terms for these properties.

3.OA.D.8

This standard is limited to problems posed with whole numbers and having whole-number answers. Students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

4.OA.A.2

See Glossary, Table 2.

Number and Operations Base Ten

2.NBT.B.9

Explanations may be supported by drawings or objects.

3.NBT.A.1

A range of algorithms may be used.

4.NBT.A.1

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

Number and Operations Fractions

3.NF.A.1

Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.

4.NF.A.1

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

4.NF.C.5

Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with un-like denominators in general is not a requirement at this grade.

5.NF.B.7

Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.

Geometry

1.G.A.2

Students do not need to learn formal names such as “right rectangular prism”.

2.G.A.1

Sizes are compared directly or visually, not compared by measurement.

Measurement and Data

K.MD.B.3

Limit category counts to be less than or equal to 10.

2.MD.D.10

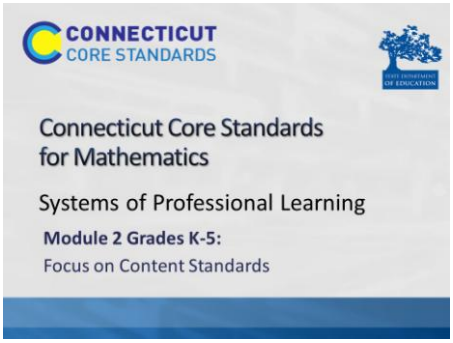
See Glossary, Table 1.

3.MD.A.2

Excludes compound units such as cm3 and finding the geometric volume of a container. Excludes multiplicative comparison problems (problems involving notions of "times as much", see Glossary, Table 2.

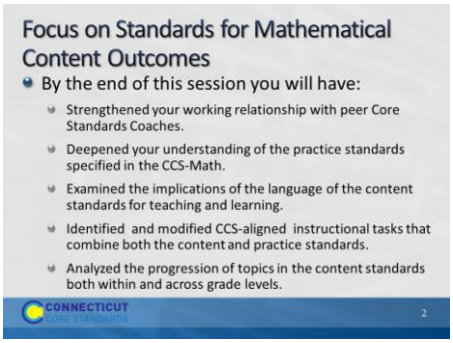
Session Implementation

Introduction



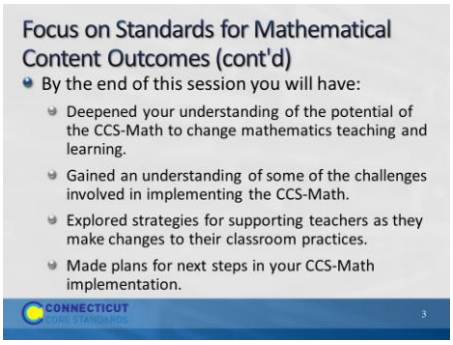
Slide 1

(Slides 1-5, including the pre-assessment, will take about 10 minutes total.)



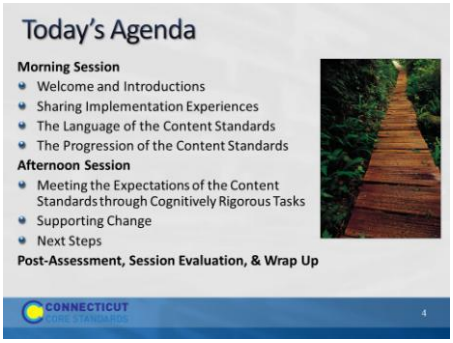
Slide 2

Review the outcomes for the day, sharing what you hope to accomplish throughout the full day session. There are nine outcomes for this session. These are presented to the participants over two slides.



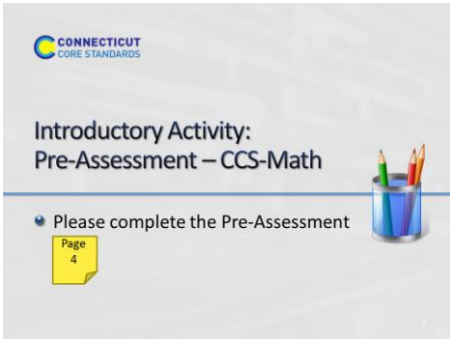
Slide 3

There are nine outcomes for this session. These are presented to the participants over two slides.



Slide 4

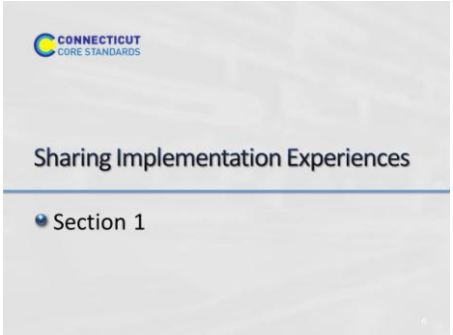
Review the agenda letting participants know that this is the pathway they will travel in order accomplish the nine outcomes discussed earlier. Note that in addition to the break for lunch there will also be shorts breaks throughout the day, but participants should feel free to take a personal break as needed. Emphasize the importance of coming back from lunch and breaks on time to ensure enough time to complete all the work of the day.



Slide 5

This will be a short self-assessment, which will be found in the Participant Guide on **page 4.** It will assess where the coaches are now with understanding the implementing the Practice Standards that were introduced in Module 1, and assess where they are in understanding the Content Standards. The participants will complete the same assessment at the end of the session. **Allow 3-4 minutes to complete.**

Section 1



Slide 6

Sharing Implementation Experiences

Section 1 Time: 35 minutes
Section 1 Training Objectives:

- To review the foundations of the CCS-Math and the key shifts of focus, coherence, and rigor.
- To share, discuss, and address experiences with, and the common challenges of, supporting teachers in implementing the Standards for Mathematical Practice.

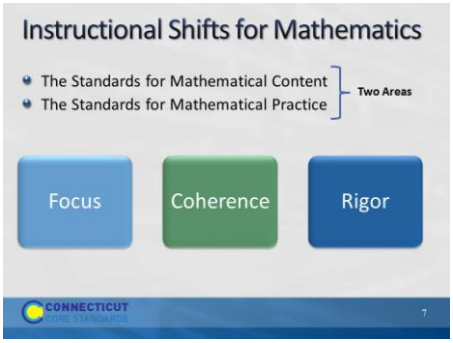
Section 1 Outline:

1. The facilitator will begin by reviewing the key shifts of focus, coherence, and rigor. **(5 minutes)**
2. Then, in groups, participants will share experiences and describe any "aha moments" from attempts to implement the Standards for Mathematical Practice (SMP). Participants will look for themes or choose one or two important successes, challenges, and/or insights to share with the larger group. These will be recorded on chart paper so that common themes and additional strategies can be discussed as a large group. Participants can record new ideas on the handout *Moving Forward with the Practices*. **(30 minutes)**
3. The facilitator will wrap up Section 1 by explaining that to build upon their knowledge and experience with the SMP they will begin to connect the SMP to the Standards for Mathematical Content.

Supporting Documents

Moving Forward with the Practices

Materials
Chart paper, markers



Slide 7

Begin by review key ideas from Module 1 using the next five slides:

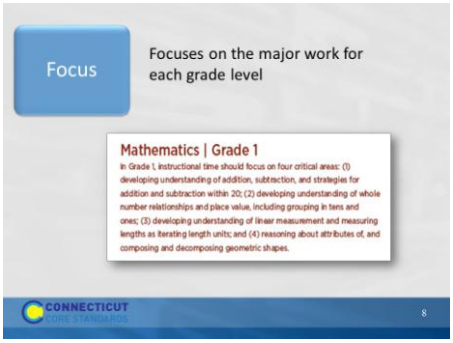
There are two parts to the Common Core Standards for Mathematics, Standards for Mathematical Content and Standards for Mathematical Practice. Together they define what students should understand and be able to do in their study of mathematics in order to be college and career ready.

The Standards for Mathematical **Practice** are often simply called the Practice Standards or the Practices. The Practices include the mathematical habits of mind and mathematical expertise that students should develop such as reasoning, communication, making arguments, and modeling. These were the focus of Module 1, delivered in March.

The Standards for Mathematical **Content** are very specific about concepts, procedures, and skills that are to be learned at each grade level, and contain a defined set of endpoints in the development of each. This will be the focus of this session.

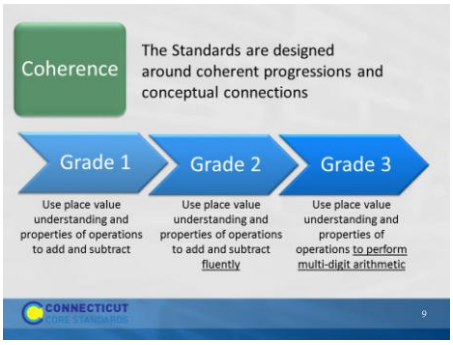
What's New About the CSS-Math?

In order to meet both the Content Standards and the Practice Standards, the writers of the Common Core explicitly based the standards on three very important fundamentals of mathematics that were missing from or were not as explicit in different versions of mathematics standards. Those are: Focus, Coherence, and Rigor.



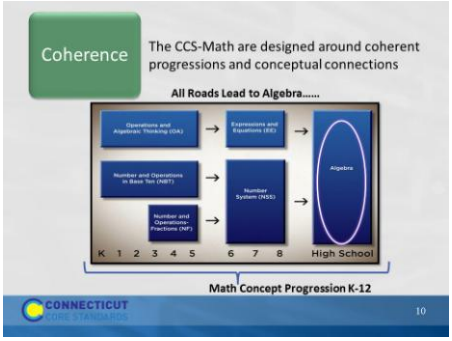
Slide 8

Focus: The writers of the Standards worked very hard to reduce the number of expectations at each grade level. This work was not done arbitrarily. They focused on the different domains of mathematics, such as Operations and Algebraic Thinking, Number and Operations in Base Ten, Geometry, and Measurement and Data, and determined what work was critical for students at each grade level to address in order to develop the concepts in each domain over time. This change allows teachers to shift their instruction to focus on the major work at their grade and to spend more time in each of these critical areas in order for students to develop a deep understanding through investigation, inquiry and problem solving.



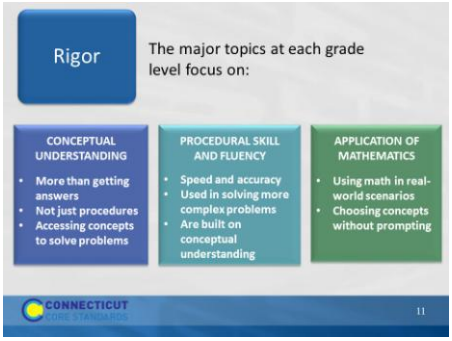
Slide 9

Coherence: Coherence means ensuring that there is a clear sequence of concepts and skills that build on each other across the grades.



Slide 10

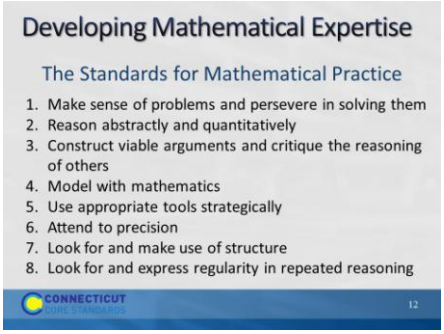
Coherence: The chart on the slide shows one of the progressions in the CCS-Math that builds up to the formal study of upper level Algebra in High School. Note that the Operations and Algebraic Thinking standards in grades K–5 lead up to and are designed to help middle school students work with Expressions and Equations, which will then help students to be successful in high school Algebra. This same progression takes place with the Number and Operations domains. In K–5 the Number and Operations standards are split over two domains, Base Ten and Fractions. This does not mean that the standards within the domains are not connected, but that there is a focus on each. The intent of the coherence and progressions is that students will all be ready for algebra at either the 8th grade or high school level. Section 3 of this module will include an in-depth examination of coherent progressions.



Slide 11

Rigor: Rigor means learning that is based in the deep understanding of ideas AND fluency with computational procedures AND the capacity to use both to solve a variety of real-world and mathematical problems. Section 2 of this module will include an in-depth examination of the three aspects of rigor.

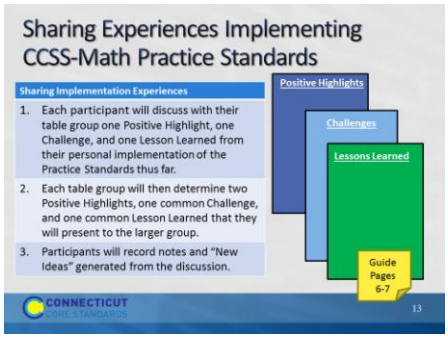
Note: We are not talking about a three-pronged balance of conceptual understanding, procedural skill and fluency, and application of mathematics here. Rather, we are focusing on the expectation that students are able to flexibly work with the mathematics content in each of the three areas. This will become more apparent as participants explore the Content Standards in Section 3.



Slide 12

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the National Council of Teachers of Mathematics process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are 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).

Developing these mathematical expertise is important so that students are better able to solve problems and reason quantitatively both within a classroom and throughout life outside of the classroom.



Slide 13

Now that you have quickly reviewed the key points from Module 1, ask participants to now reflect on the work that they have done back at their school, in their role as a Core Standards Coach, with helping teachers learn more about and implement the CCS-Math. Have each participant discuss with their table group one positive highlight, one challenge, and one lesson learned from their personal implementation of the Practice Standards thus far. Each table group will then determine two positive highlights, one common challenge, and one common lesson learned that they will present to the larger group. They can record notes from their discussion on **page 6** in the Participant Guide.

As table groups present, record the participants' responses on the chart paper titled Positive Highlights,

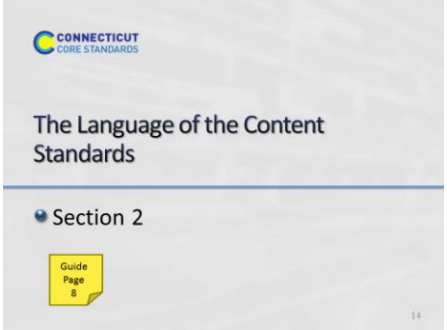
Challenges, and Lessons Learned. After all groups have presented, summarize what has been charted and then ask the large group if anyone has a solution to any of the common challenges. Encourage participants to record "New Ideas" on **page 7** in the Participant Guide.

Wrap up the activity by explaining that the challenges will be revisited periodically throughout the day as the discussion of the Content Standards ensues. **Note**: Be sure that the connections are made when discussing how to teach the Content Standards so that participants understand how implementing the Practice Standards go hand-in-hand with implementing the Content Standards in a rigorous, focused, and coherent lesson.

Transition to the next activity by explaining that participants will now start looking at the connections of the Content and Practice Standards by looking at the language of the Content Standards.

Note: If teachers have not had the time between the previous module and this module to begin their implementation, have them instead focus on things that they have seen and heard back at their school, including positive highlights of where their school is, challenges that they now recognize they may be facing, and any lesson learned in terms of the outcomes of the first module and where they think they need to go next with the implementation.

Section 2



Slide 14

Section 2: The Language of the Content Standards

Section 2 Time: 45 minutes

Section 2 Training Objectives:

- To define conceptual understanding, procedural skill and fluency, and application of mathematics.
- To understand the differences between conceptual understanding, procedural skill and fluency, and application of mathematics.
- To begin to understand how developing conceptual understanding can lead to the development of procedural skill and fluency.
- To demonstrate how application of mathematics can support students' development of conceptual understanding.

Section 2 Outline:

1. In groups, participants will complete the first part of the *Who Knows Math* exercise during which they will

examine short examples of student work and make observations about what the student knows based on the answers given.

2. After a brief large group discussion, small groups will watch the video *Mathematics Fluency: A Balanced Approach* and develop working definitions of "conceptual understanding," "fluency," and "application" as addressed in the content standards.
3. Groups will then work through short, basic examples on how students can demonstrate conceptual understanding, and then discuss current strategies used now to develop procedural skill and fluency. The discussions will continue with how those strategies will benefit from students first developing a conceptual understanding of the mathematics.
4. The wrap-up of the session takes place as participants complete the second part of the *Who Knows Math* exercise in which they revise their first round of answers given their new understandings.

Supporting Documents

Who Knows Math

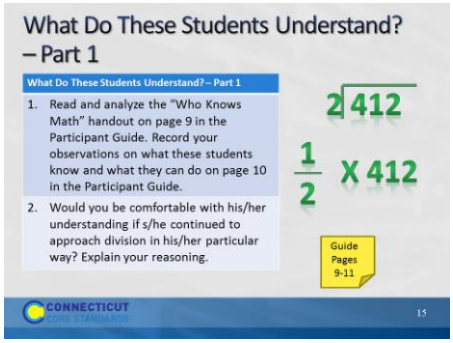
Materials

Chart paper, markers

Individual copy of the mathematics standards that participants bring or access online

Video

Mathematics Fluency: A Balanced Approach

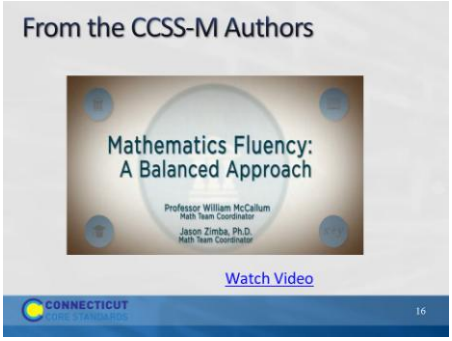


Slide 15

What do these students understand?

- Ask table groups to read and analyze the "Who Knows Math" handout on **pages 9-11** in the Participant Guide. Ask them to think about what each student on the sheet knows and doesn't know. Also have them think about what is unknown about what the students know. Participants can record their observations on the handout. Briefly discuss participants' observations and explain that they will return to this after exploring the language of the content standards in more detail.

Note: If time is an issue at the start of this activity, you may choose to have groups focus on only one student. If you have five groups, assign each group a different student.



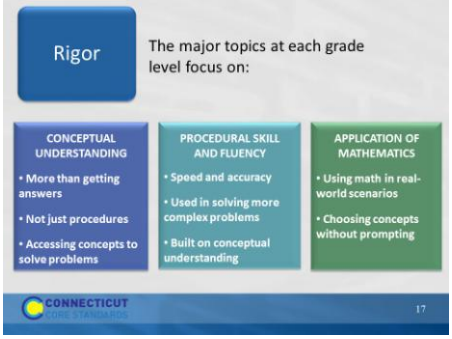
Slide 16

From the Authors

Click on "Watch Video" to play the video *Mathematics Fluency: A Balanced Approach* from here: http://www.youtube.com/watch?v=ZFUAV00bTwA. The video is **1:57** long.

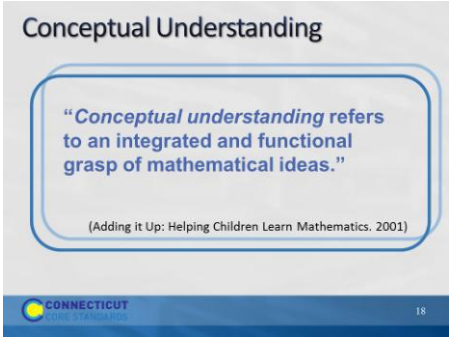
After the video has played, ask participants for their thoughts.

Transition to the next part of this section by explaining to participants that they will now look more closely at conceptual understanding, procedural skills and fluency, and application of mathematics in more depth.



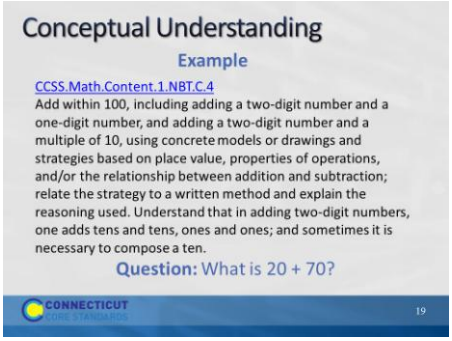
Slide 17

Rigor: Remind participants that one of the big shifts in the content standards is that at all ages, students are to be taught with rigor as defined on the slide. Review the three aspects of rigor: conceptual understanding, procedural skill and fluency, and application of mathematics. Repeat that rigor means learning based in the deep understanding of ideas AND fluency with computational procedures AND the capacity to use both to solve a variety of real-world and mathematical problems. Explain to participants that you will now go over each aspect of rigor in more depth.



Slide 18

- Ask participants to turn to pages 12-13 in the Participant Guide where space is provided for them to take notes on Conceptual Understanding, Procedural Skill and Fluency, and Application of Mathematics.
- Conceptual Understanding
- As participants read the quote on the slide, explain that conceptual understanding can be difficult to define. Ask participants to read the description on **page 12** in the Participant Guide that is an overlap of the National Research Council and NCTM definitions of conceptual understanding:
- "Students demonstrate *conceptual understanding* in mathematics when they provide evidence that they can recognize, label, and generate examples of concepts; use and interrelate models, diagrams, manipulatives, and varied representations of concepts; identify and apply principles; know and apply facts and definitions; compare, contrast, and integrate related concepts and principles; recognize, interpret, and apply the signs, symbols, and terms used to represent concepts. *Conceptual understanding* reflects a student's ability to reason in settings involving the careful application of concept of definitions, relations, or representations of either." (Balka, Hull, & Harbin Miles, n.d.)
- Just as they looked at "I Can" statements with each of the Practices, use the next slides to show examples of student responses that demonstrate conceptual understanding.

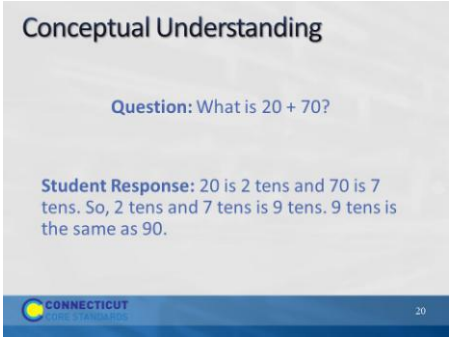


Slide 19

Conceptual Understanding

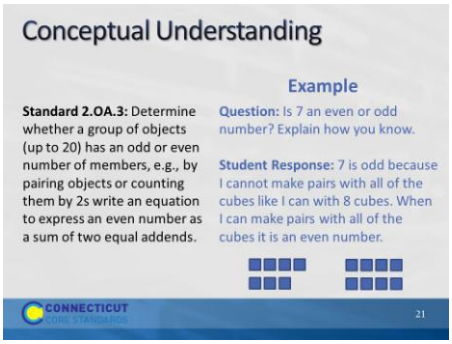
Ask participants to look at the example on the slide and discuss with their group how a student might

demonstrate conceptual understanding if asked the question *What is 20 + 70*. Allow participants to discuss this briefly, 2-3 minutes, and then transition to the next slide.



Slide 20

Ask participants to now consider the student response to the question and have them determine if this student has developed a conceptual understanding. A standard that may be used to support this students response is CCSS.Math.Content.1.NBT.B.2.c
The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

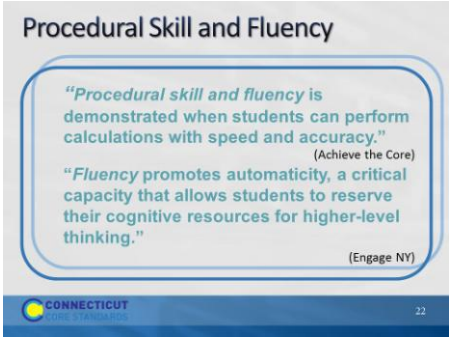


Slide 21

Conceptual Understanding

Go over example on the slide and ask participants how the student's response relates to Standard 2.OA.3. Here we want participants to see that a student is demonstrating a conceptual understanding of determining if a number is even or odd. They may need to see multiple responses of this students' work to make a final determination of this, so ask what else, if anything, might they ask or look for from this student. And, to support the idea that there is no one right way for a student to demonstrate conceptual understanding, what other ways might they expect to see students answer this question.

Transition to the next slide by explaining that, as they have seen, not all standards explicitly focus on conceptual understanding so they will now look at procedural skill and fluency.



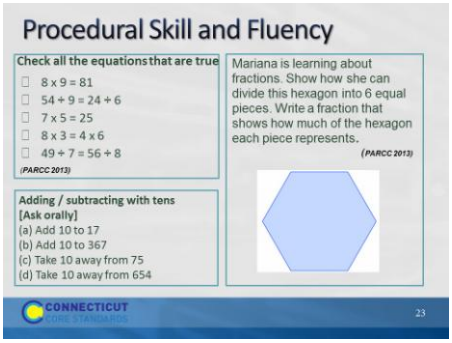
Slide 22

Procedural Skill and Fluency

Focus on the two key points on the slide. Ask participants for their thoughts on Bill McCallum's statements in the video (shown on slide 16) in which he talks about the design of the standards being such that there is a build up to procedural skill and fluency. Ask why they think this is the case. If it does not come out in the conversation, have participants think back to the video of CCSS-Math co-author, Phil Daro's, video that was viewed in Module 1 about teaching students to get answers. Ask participants what connections might be made between Bill McCallum's and Phil Daro's videos.

Then, transition to the next slide by explaining that teaching students procedures and how to use an algorithm or any type of short cut or trick without developing some level of conceptual understanding for why those things work mathematically is akin to teaching answer getting vs. problem solving.

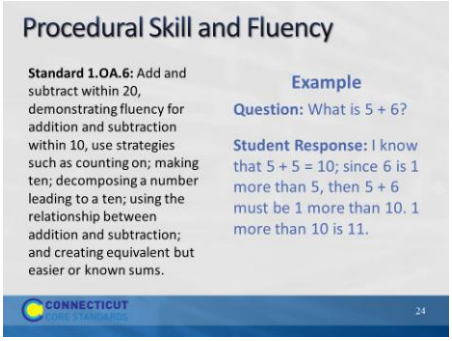
Note: For a deeper look at Phil Daro's discussion on answer getting, review the video of his longer discussion here: http://vimeo.com/79916037



Slide 23

Procedural Skill and Fluency

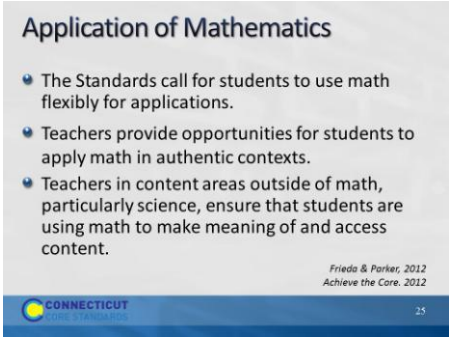
Go over the examples on the slide. Each of these is a variation on the traditional activities that teachers have used to determine if students have developed mathematical fluency. Ask if there is anything more that they would want to see to determine if students' fluency is based in conceptual understanding.



Slide 24

Have participants think about the example on the slide and ask them to explain how the student's response relates to Standard 1.OA.6 and why, at this grade level, they may want students to provide their strategy rather than just the answer.

After the discussion of the standard, transition to the next slide by explaining to participants that some of the standards ask students to apply their mathematical understanding and skills within a given context.



Slide 25

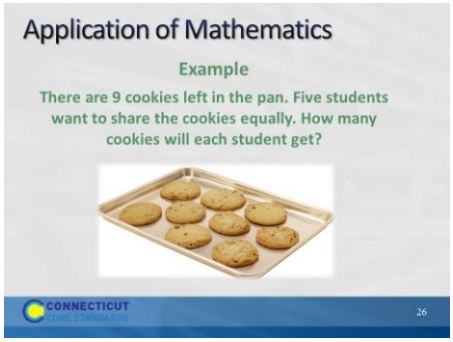
Application of Mathematics

Go through points on the slide. Ask participants how they have had students apply mathematics. Get two or three examples. Ask participants why this is important.

Application of mathematics is important because without this step or expectation students are learning math as a set of rules, procedures, etc. that have no real meaning in the world outside of the classroom. Students need to learn how math works and how it is used. Note here that when the conversation of application of mathematics typically comes up the phrase 'real-world problems' is usually somewhere in the conversation. As teachers think about the types of problems that students will solve in order to apply their mathematical understanding, have them think about problems that would be 'real world' to their students. This means that the problems should be contextually relevant and easily understood by the students at their particular grade level. Also note that, just as we saw with the fluency standard, not all standards focus on application. But, when the standard does point to solving problems through an application of mathematics, we really want to see how students can flexibly use what they know and understand. Finally, ask participants to briefly discuss how they can engage students in

authentic problem-solving scenarios.

Before moving to the next slide that has examples of contextually relevant problems, focus participants on the third bullet on the slide and ask for one or two volunteers to give examples of how the CCS-Math standards can be supported and connected to the standards from other content areas in order for students to see and apply mathematics outside of their typical math lesson time.



Slide 26

Application of Mathematics

Have participants examine the example on the slide and discuss ways that conceptual understanding and procedural skill and fluency can be applied when solving this problem. Then, have participants look at their standards to determine which standard is being addressed in this problem.

Standards addressed by the problem

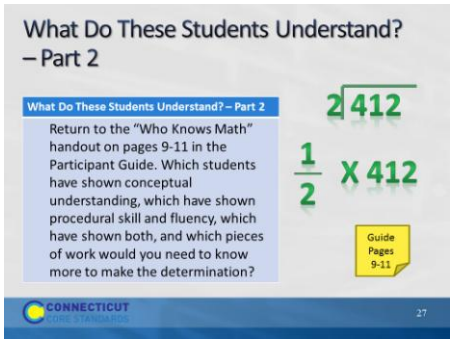
CCSS.Math.Content.5.NF.B.3
Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Example of Participant Response:

Students should see this as a division problem even though the word divide, nor the division symbols are present. Some students may draw 'cookies' and show the division by partitioning the 'cookies'. Students then write 9÷5 = 1 4/5 Students can then be prompted to write 1 4/5 as the fraction 9/5 as this is the number of 1/5 sized pieces that each student will receive of the cookie. And then discuss how their fraction 9/5 relates to the original division problem of 9 ÷ 5. If they wrote this out they would see that 9 ÷ 5 = 9/5. Students could then be prompted to try this out with other division problems and then make a generalization about interpreting fractions as a division of the numerator by the denominator.

Other students may simply perform the calculation of 9÷5 to get the answer of 1 4/5 and be able to explain that each student gets 1 whole cookie and then the remaining four cookies can be divided into 1/5s with each student receiving four of the 1/5 sized pieces. When asked to write their answer in fraction form, not as a mixed number, and make an observation of their answer 9/5 and its meaning within the problem context, they are able to see and explain that 9÷5 = 9/5 and further make a generalization about interpreting fractions as a division of the numerator by the denominator. Depending on where students are with their personal understanding more or less

prompting through questioning may be needed to get at the intended deeper understanding of the generalization.



Slide 27

Have participants look back at the "Who Knows Math" student work and ask them to make assumptions about which students have shown conceptual understanding, which have shown procedural skill and fluency, which have shown both, and which pieces of work they would need to know more about in order to make the determination. Have volunteers share their thinking.

Things to note about each student's piece of work:

Effie: Is able to make the conceptual connections, but does not have a way to get an answer.

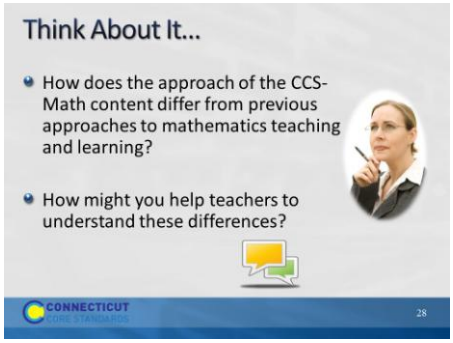
Abie: Produced two correct answers, but lacks the conceptual understanding of the operations and that would allow the connection to be made between division and multiplication of fractions.

Ceedee: Is able to make the conceptual connections, but did not perform the calculations in a way that produced the correct answer. Also, as she performed the calculations she was not paying attention to the precision of her answer and asking herself, 'does my answer make sense?'

Gigi: More information on Gigi's thinking and understanding would be needed to determine if there was conceptual understanding.

Hi: Seems to have an efficient way for finding the answer, but more information is needed to determine what 'it' is.

An important point to bring up here is that we are asking participants to make assumptions only because the student is not present to find out more. However, teachers should try not to make a determination of what students know and understand based on an assumption. They need to probe deeper to really determine where students are with their understanding.

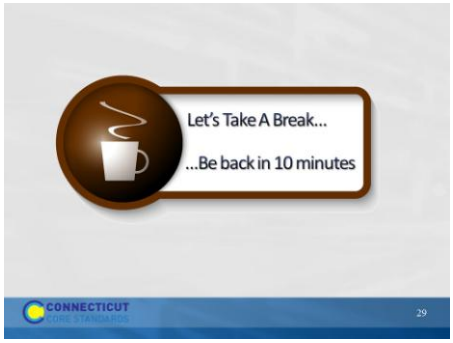


Slide 28

Think About It

Finally, wrap up this section by asking participants to reflect on the questions on the slide. **Allow 5 minutes for discussion**. You can also use this question to transition to the next activity after the break by linking the discussion on the CCS-Math approach to rigor and now looking specifically at the standards to see how conceptual understanding, procedural skill and fluency, and application of mathematics is developed over and within grade levels.

As time permits, ask for volunteers to share their responses to the question.



Slide 29

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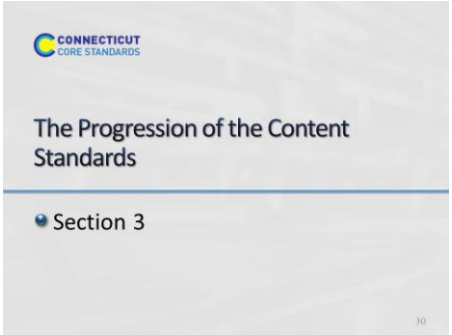
Section 3



Slide 30

Section 3: The Progressions of the Content Standards

Section 3 Time: 80 minutes

Section 3 Training Objectives:

- To provide participants with information on and experience with identifying standards that address conceptual understanding, procedural skill and fluency, and application of mathematics.
- To have participants experience how concepts are developed within and across grade levels.
- To provide participants practice with identifying concept progressions.
- To provide participants with an understanding of how connections between standards across multiple domains can be made to support the deepening of mathematical understanding.

Section 3 Outline:

- The definitions of "conceptual understanding", "fluency", and "application" developed in the previous session are used to help participants analyze the content standards in three different ways. In Exploring the Standards Part 1 participants explore the content standards for one domain, at one grade level, and determine which standards focus on developing conceptual understanding, procedural skill and fluency, and application of mathematics.
- In Exploring the Standards Part 2, participants explore the content standards for one domain across grade levels and record five general observations about the progression of the concepts and two connections to the Practice Standards.
- In Exploring the Standards Part 3, participants explore all of the domains for one grade level to identify connections across domains that can be referenced in a lesson or unit in order to support the deepening of mathematical understanding.
- Participants will then discuss and reflect as a large group on the importance and instructional implications of the progressions and any new insights they now have into the standards.
- The activity will conclude with having participants view the video *Gathering Momentum for Algebra* in order to see where the K-5 content progressions impact the larger K-12 learning pathway.

Supporting Documents:

Standards for Mathematical Practice (participants should have their own copy or access them online)

Exploring the Content Standards Observations Sheet

Materials

Chart paper, markers

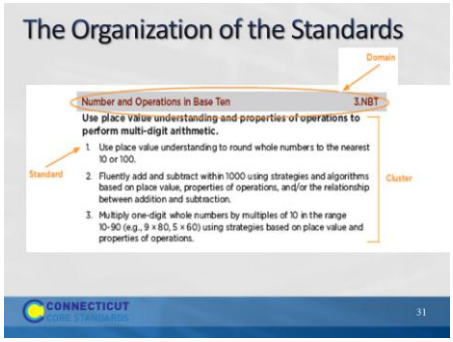
Sets of Standards Progression Cards (one color per domain) (1 full domain color set per table group)

Signs made for tables: K, 1, 2, 3, 4, 5

Video

Gathering Momentum for Algebra

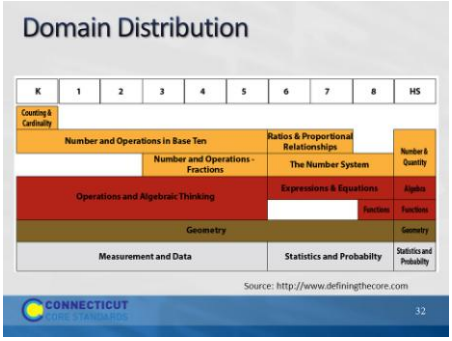
Notes: In this activity you will have full sets of content standards with one standard per card. You begin by giving a table one grade level set that has all of the domains for that grade level and with that set they complete part 1. Then ask participants to give all of a particular domain to one table, so one table will have all of the Number and Operations – Fractions standards, one table will have all of the Geometry standards, etc. With that domain they complete part 2. Then, have participants separate the domain by grade level again and give each table the full grade level set again so that they can complete part 3. While participants should have a full set of print-based standards, having them work with the standards in this card format allows them to physically manipulate the standards and create connects and see the progressions side-by-side rather than having to flip through multiple pages.



Slide 31

The Organization of the Standards

Quickly go through the organization of the Content Standards with the participants. Each grade level is organized by domains and within each domain there are associated groups of standards that make up a cluster. There can be multiple clusters within a domain. Transition to the next slide by explaining that domains span several grade levels.



Slide 32

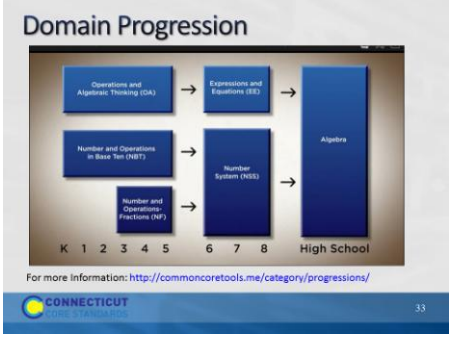
Domain Distribution

Explain that in K-5 there are four domains that span all of the grade levels: Number and Operations in Base Ten, Operations and Algebraic Thinking, Geometry, and Measurement and Data.

Kindergarten has a unique domain of Counting and Cardinality which includes standards that are foundational to both Number and Operations in Base Ten and Operations and Algebraic Thinking.

When students are developmentally ready and have a solid foundation in Number and Operations in Base Ten, Number and Operations – Fractions is layered on beginning in third grade.

Transition to the next slide by reminding participants that the domains were determined based on a very specific and coherent roadmap for learning called a progression.

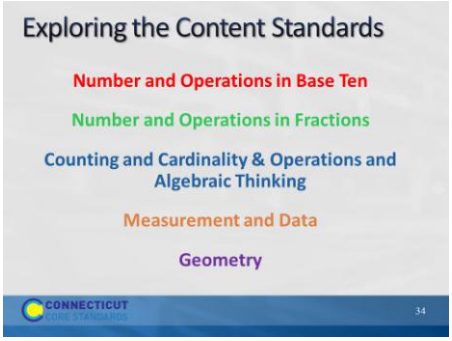


Slide 33

Domain Progression

Remind participants that the domains were written so concepts build on each other grade after grade so that, in this particular progression, there is a clear pathway to high school Algebra. The video at the end of this section is an explanation of the progressions from CCSS-Math Co-Author, Bill McCallum.

More information about specific domain progressions can be found at the Common Core Tools Website: http://commoncoretools.me/category/progressions/. Have participants make a note of this resource.

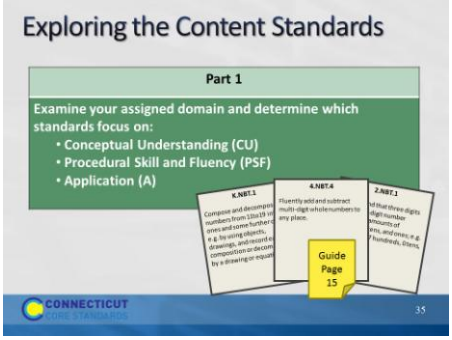


Slide 34

Exploring the Content Standards

Participants will work in grade level alike groups to complete the three parts of Exploring the Standards. Signs for each grade, K-5, should be posted around the room. Assign each table one of the K-5 Content Standard domains and pass out the color coded domain cards to each group.

Note: Participants may choose whichever grade level group they want in order to further explore the standards from that grade, however try to ensure that there is a balanced number of participants in each group.

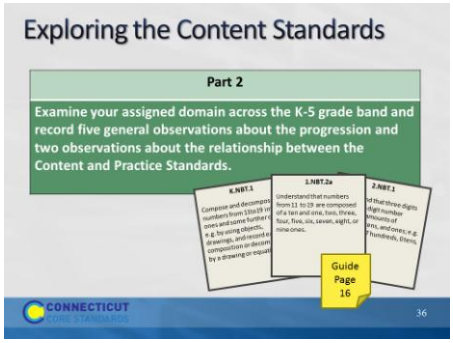


Slide 35

Exploring a Progression

For Part 1 of Exploring the Content Standards ask participants to examine their assigned domain and determine which standards focus on developing Conceptual Understanding, Procedural Skill and Fluency, and Application of Mathematics. Participants should use sticky notes to mark the card with either CU, PSF, or A according to how they sorted the cards. After sorting and marking the cards, have participants answer the following questions on **page 15** in their Participant Guide:

- What are the expectations around conceptual understanding at your grade level?
- What are the fluency expectations at your grade level?
- What are the opportunities for application at your grade level?



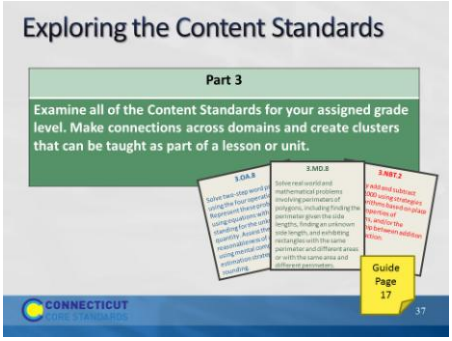
Slide 36

Exploring a Progression

Now, ask participants to examine the Content Standards in their assigned domain across grade levels and, on **page 16** in the Participant Guide, complete the observation worksheet on which they record five general observations about the progression and two observations about how the Practices are integrated into the content. Allow each domain group to share their observations.

The goal here is for participants to see the progression of and how conceptual understanding, procedural skill and fluency, and application of mathematics are developed and addressed across grade levels. Because they are using the cards, participants should be able to line up the grade level domain standards side by side so that the vertical alignment can be seen horizontally across their table allowing for a continuous comparison. Some key points to make sure to bring out in the discussion are that participants should be able to see the build-up to Procedural Skill and Fluency (PSF) and to make the point that some students may develop PSF within a standard during their exploration and development of understanding around the concept. As long as the student understands their procedure and the mathematics behind what they are doing this is fine and should be encouraged. However, if students do not reach this point during a year prior to the year in which PSF is an expectation, the student is not 'behind'. The expectation of PSF provides us with an end goal and not a specific spot on a student learning timeline that PSF should be addressed. In other words, the when of PSF is not the focal point, rather the build up to PSF with or from conceptual understanding should be.

Transition to Part 3 of the activity by explaining to participants that teaching the standards is not just about understanding how the Content Standards progress across a domain, but also about understanding how the standards of different domains work together.



Slide 37

Making Connections

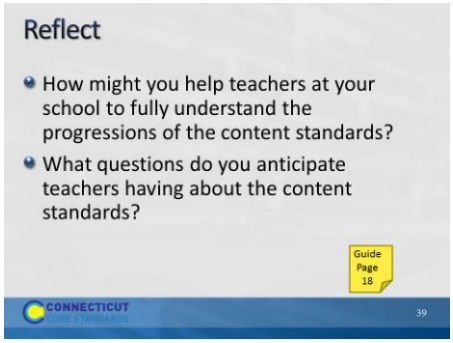
Ask participants to separate their domain cards by grade level. Direct participants to the areas around the room designated for each grade, K-5. They should take the cards for their grade level from the table to the designated area. For each grade, the cards for all five domains will be combined so there is a complete set of Content Standards for each grade level. In larger groups there may be several complete sets so the grade groups can be broken into two or three smaller groups.

Once they have their complete set of standards ask participants to examine all of the Content Standards for their grade level and make connections across the domains that can be referenced as part of a lesson or unit. Allow participants **10 minutes** to create and record the connections and then take **10 minutes** to allow each grade level the opportunity to share one or two of their connections. They can record their thoughts on **page 17** in the Participant Guide.

Slide 38

To being to wrap up this section click on “Watch Video” to play the video Gathering Momentum for Algebra from here: http://www.youtube.com/watch?v=ONPADo_Nt14. The video is **2:08** long.

Use this video to transition to the next slide.



Slide 39

Reflect

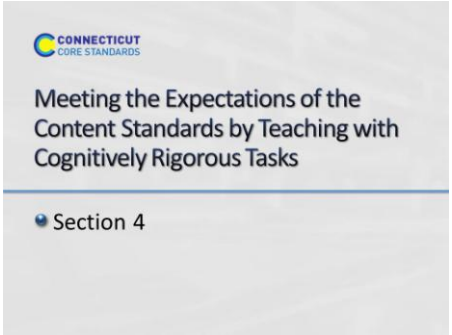
Now that participants have a deeper understanding of the CCSS-Math expectations around conceptual understanding, procedural skill and fluency, and application of mathematics at their grade level, ask them to reflect on the two questions on the slide and record their answers on **page 18** in their Participant Guide. As time permits ask for volunteers to share their responses. Allow **5 minutes**.

Then, set-up the after lunch activities by explaining to participants that they will build off of their understanding of the Content Standards to explore the implications for teaching and learning in the classroom.

Slide 40

Remind participants of the need to be timely. Allow 45 minutes. State time to return.

Section 4



Slide 41

Section 4: Meeting the Expectations of the Content Standards by Teaching with Cognitively Rigorous Tasks

Total Time on Section 4: 85 minutes

Section 4 Training Objectives:

- For participants to understand the definition of a cognitively rigorous task.
- To deepen participants understanding of why incorporating cognitively rigorous tasks into their mathematics instruction is important.
- To examine strategies that can be used to incorporate cognitively rigorous tasks that will benefit all students.

Section 4 Outline:

1. Participants begin by viewing the video Dan Meyer: *Math Class Needs a Makeover* which is about problem solving. Participants will discuss the video and compare their previous experience with solving *Two Machines, One Job* with Dan Meyer's message in the video.
2. Participants are then shown how scaffolds can be removed slowly from a problem in order to deepen the level of cognitive rigor. Participants use Hess's Cognitive Rigor Matrix to discuss the problem example.
3. Participants will brainstorm how cognitively rigorous mathematics tasks can be used to benefit all students and will be presented with four strategies that can be used to differentiate cognitively rigorous tasks for all students, as needed, in order to provide multiple entry points into the mathematics while maintaining the problem's rigor.
4. Participants will wrap up the activity by making connections back to "conceptual understanding," "fluency," and "application" and how each of these is addressed through cognitively rigorous tasks.

Supporting Documents

Hess's Cognitive Rigor Matrix for Mathematics and Science

Strategies for Differentiating Cognitively Rigorous Tasks notes page

Resources for Finding Tasks

Reflect worksheet

Materials

Chart paper, markers

Video

Dan Meyer: Math Class Needs a Makeover

Background Resources

- Use the following to gain a deeper understanding of Bloom's Taxonomy, Depth of Knowledge, and Hess' Cognitive Rigor Matrix that will be used during this section.
- Bloom's Taxonomy: http://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
- Depth of Knowledge: http://schools.nyc.gov/NR/rdonlyres/2711181C-2108-40C4-A7F8-76F243C9B910/0/DOKFourContentAreas.pdf
- Karen Hess & Cognitive Rigor Matrix: http://vimeo.com/20998609 and http://www.sde.idaho.gov/site/common/webinars/Cognitive%20Rigor%20Matrix%20Article_Hess,%20Carlock,%20Jones,%20and%20Walkup.pdf

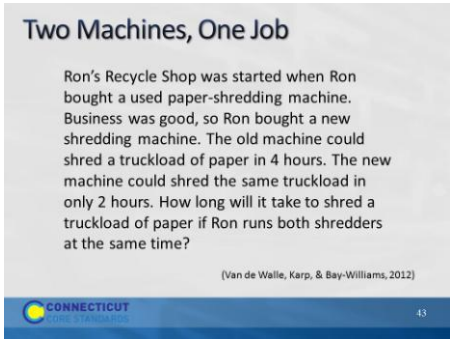
Slide 42

Math Class Needs a Makeover

Begin the activity by explaining to participants that they are going to watch a video in which math expert Dan Meyer discusses the types of problems that students should be doing in math class. Further set up the video by explaining that the examples given in the video are from a secondary classroom. Ask participants to not focus so much on the task itself but the message that is being delivered as it will be the topic of the discussion that will follow.

Click on "Watch Video" to play the video *Math Class Needs a Makeover* from here: http://www.ted.com/talks/dan_meyer_math_curriculum_makeover.html. The video is **11:39** long.

After viewing, debrief the video with participants by first asking for their thoughts on Dan Meyer's message. After two or three volunteers share, explain to participants that one of the keys to using the types of problems that Dan Meyer talks about is taking a math problem and removing part, if not all, of the scaffolding that is in place within the problem itself and moving the scaffolding into the process of teaching. Transition to the next slide by having participants think back to their experience in Module 1 when they solved the *Two Machines, One Job* problem.

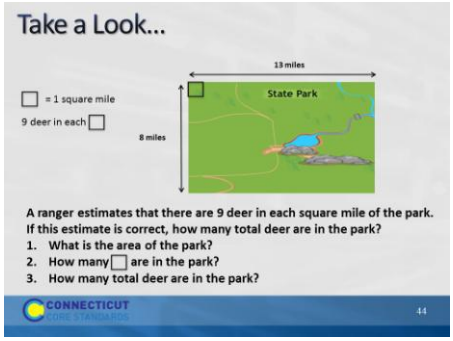


Slide 43

Ask participants to look and determine what, if any, scaffolds are in place within the problem itself. When thinking about scaffolds in this context they should look for anything in the problem that is given, but that students could actually figure out for themselves. This should be a short discussion because all of the scaffolding took place within the teaching during the task through suggestions to draw pictures when someone was stuck, through asking and answering questions to help an individual participant move forward, etc. Scaffolding took place in the moment and was individualized to each persons' needs. Allow participants to briefly discuss the differences in their experience with solving a problem with scaffolds built in to the teaching rather than having scaffolds built into the problem.

Now, have participants turn to Hess' Cognitive Rigor Matrix for Math and Science on **page 21** in their Participant Guide. Go over how to read the matrix; revised Bloom's Taxonomy are on left hand side going down and Webb's Depth of Knowledge levels go across the page. In their groups have participants determine where, for them, the *Two Machines, One Job* problem falls on the matrix. As time permits, ask groups to share their determination and what evidence, in the problem and the implementation of the problem, they used to make this judgment.

Transition to the next slide by explaining to participants that they will now look at a K-5 problem.



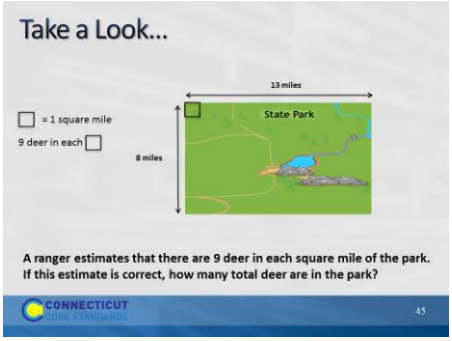
Slide 44

Have participants look at the problem on the slide and determine its placement on the Cognitive Rigor Matrix and have groups share their response.

Note: This is a 4th grade PARCC sample assessment task that has been modified to provide extensive scaffolding. At the end of this activity, participants will view the actual assessment task without the scaffolds in place. Due to the added scaffolding, this problem would fall somewhere around the Apply/DOK Level 1 range because students

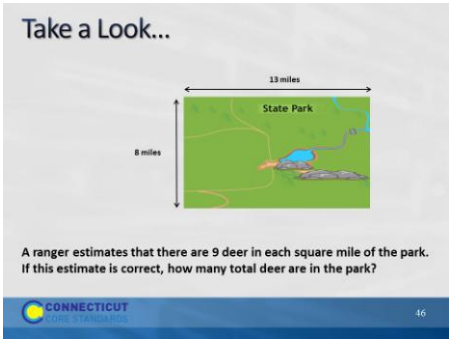
are asked to follow a given set of steps and only need to apply the formula for area and complete the multiplication to answer the problem.

After participants have shared their response and an agreement is made on the matrix placement, transition to the next slide by asking how the problem might change if some or all of the scaffolding is removed.



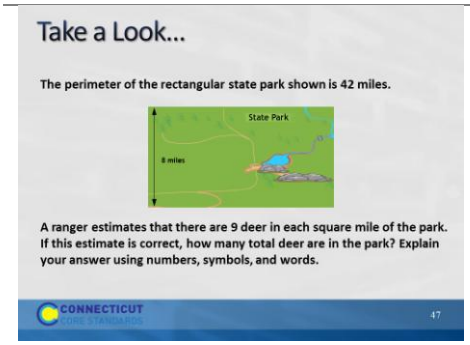
Slide 45

Have participants determine if removing the scaffold (the steps to follow) changes the problems placement on the matrix. Some participants may say that the placement has not change, however an argument can be made here that the problem is still in the Apply range but has moved to DOK 2 because students need to make the determination of having to calculate the area vs. being specifically asked to find the area in the previous version. As there are elements of both DOK 1 and DOK 2 present in the problem, a definitive level may not be agreed upon, however that is okay because the two are very closely related. As long as participants are not way off on their placement determination go ahead and move to the next slide where more of the scaffolding has been removed.



Slide 46

Have participants repeat the process of determining the problem's placement on the matrix. But note, as more of the scaffolding falls away, where the problem actually falls is beginning to become more dependent on what students know and how the teacher implements the problem. For example, if students do not understand what a 'square mile means', they may need investigate the problem further with the teacher's assistance which may push the problem further into the Analyze range. However if students understands this concept and is easily able to calculate the area and multiply to find the total number of deer, and this would then stay in the Apply range.



Slide 47

Take a Look

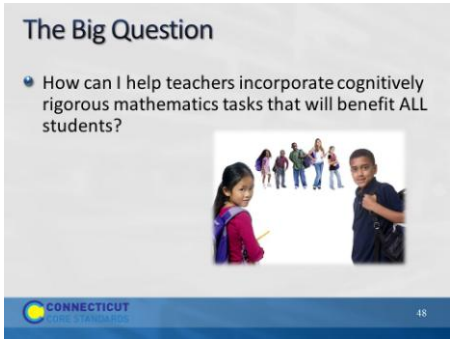
Have participants examine the original task and determine its placement on the matrix. The problem has changed significantly because students have to understand the relationship between perimeter and area and be able to work towards determining the area after they have completed calculations to construct the perimeter. Again, the placement on the matrix will be dependent somewhat on students' understanding and teacher implementation, but if focusing on what the tasks is asking it should be placed somewhere around the Apply/Analyze and DOK 3 range. Again, make sure that participants understand that not every problem is going to fit nicely into one spot on the matrix, but that they should be able to find a general area based on the criteria given.

Provide background on the task and discuss the Content and Practice Standards addressed. Finally, ask participants what challenges they may face when asking teachers to move students towards thinking at this level of mathematics. A key point to bring out in the discussion if it is not brought out by participants is that many teachers may feel that not all students are ready to work tasks such as this. Use the answer to this question to transition to the next slide.

Note: Use the following as the task is debriefed with the participants:

Task Background: This particular task is a 4^{th} grade PARCC Assessment prototype task created by the Charles A. Dana Center at the University of Texas. The following is background information provided by the Dana Center about this specific task: "In the grade 3 CCSSM, students developed their understanding of area and perimeter by solving real-world and mathematical problems involving rectangles with a missing side length. In the grade 4 CCSSM, students now apply this securely held knowledge for the first time to solve multistep problems. This task is innovative because students go much deeper than just demonstrating their ability to solve area and perimeter problems. They reason about the model and the relationship between area and perimeter. Students must move in and out of context as they create a coherent representation of the problem, consider the units involved, and attend to the meaning of quantities."

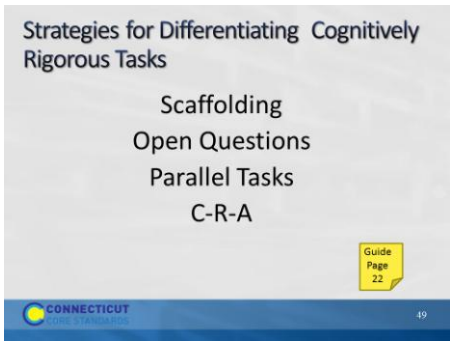
Content Standards covered by the task: 4.OA.3, 4.NBT.5 and build off of 3.MD.7b and 3.MD.8



Slide 48

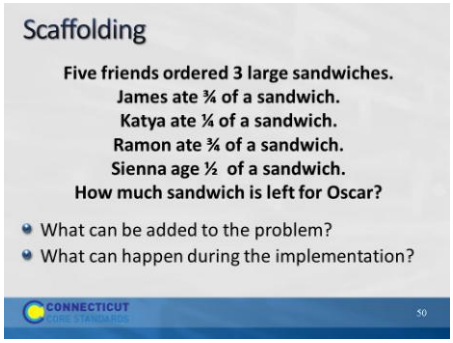
The Big Question

Explain to participants that if students are going to be expected to work cognitively rigorous tasks, such as those Dan Meyer discussed, as they enter middle and high school, we have to prepare them for this in K–5. The question now becomes "How can I help teachers incorporate cognitively rigorous tasks that will benefit all students?" This is the question participants will focus on now. Explain to participants that they will now examine strategies that can be used to provide multiple pathways into the mathematics of cognitively rigorous tasks so that all students can benefit from its use.



Slide 49

This begins the discussion of the four strategies listed on the slide. Explain that one of the key things to keep in mind when differentiating mathematics tasks is that teachers will want to be sure to make modifications or offer choices in tasks that allow students the needed point for entry into the mathematics, but at the same time keeping the level of rigor high. Often mathematics is differentiated by providing 'easier' tasks to students who may not yet be ready for the main task. These 'easier' tasks sometimes lower the level of rigor to the point that the students' receiving that task are never given the opportunity to engage in deeper reasoning about the mathematics. Whenever possible, teachers should maintain the level of rigor, but make modifications in such a way that a solution is still within the students' reach. The five strategies that will be discussed are those that teachers can use to do just that.



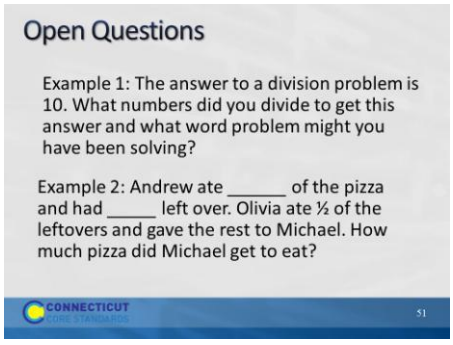
Slide 50

Begin by revisiting scaffolding. Explain to participants that just as we stripped the scaffolding away from the deer problem earlier to increase the level of rigor of the problem, scaffolding can be added back in, as needed, to help students reason about the mathematics. These scaffolds can be added back in through the problem itself or through the implementation (questioning, group work, representations, etc). The key here would be to start with the original or root task and then add the scaffolding as needed by the student, when the student reaches the point of not being able to go any further. Teachers should plan the scaffolds out beforehand so that they are ready to provide them within the lesson.

Have participants discuss scaffolds that can be added to the problem and those that can be added during implementation. Chart participants' responses for later reference.

Problem background:

This is a Grade 4 sample item from Smarter Balanced. Note that while this is a sample assessment item the context used here is using the problem as an instructional task. This task addresses standard 4.NF.3.2a and 2d. Notes from SBAC on this task: "By grade 4 students should understand that each sandwich in this problem represents the same whole, and therefore operations with fractions can be used in solving this problem."



Slide 51

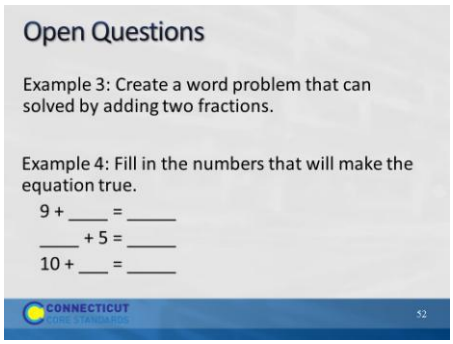
Open Questions

Explain to participants that open questions are questions posed in problem form to students that allow multiple responses and approaches to correctly answer the questions. These types of questions allow all students, no

matter their developmental and readiness level, to participate in small and large group mathematical discussions.

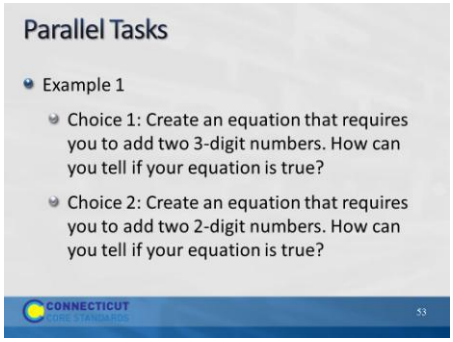
Show Example 1 and ask participants to solve this individually. Then, have participants share their answers and briefly discuss how even though they may have used different numbers and created a different problem everyone was essentially working on the same concept. Have participants determine where on the Cognitive Rigor Matrix this problem might fall.

Repeat this process for the remaining examples on this slide and on the next slide.



Slide 52

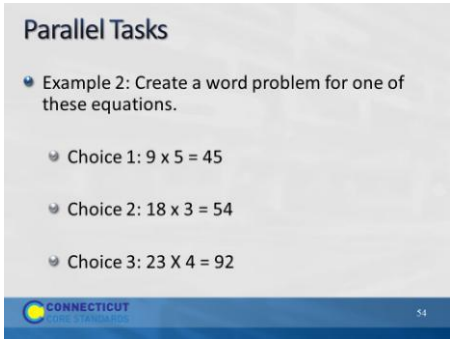
After going over the two examples, ask participants to think for a moment about how they might introduce this strategy to teachers and what example they might use during their introduction. Participants may need to utilize the standards to create an example of an open question if one of the four examples here will not work for a particular grade level, or they may modify one of the examples shown here. After participants complete their notes, move on to the next strategy, parallel tasks.



Slide 53

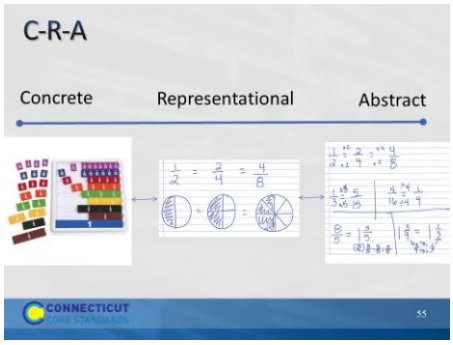
Explain to participants that parallel tasks are sets of tasks that students can choose from that are close enough to address the same standard(s) but different enough to allow for the multiple entry points into the mathematics. Also, just as with open questions, students, no matter which task they have selected, are able to equally engage in mathematical discussions.

Go over Example 1 on the slide and Example 2 on the next slide.



Slide 54

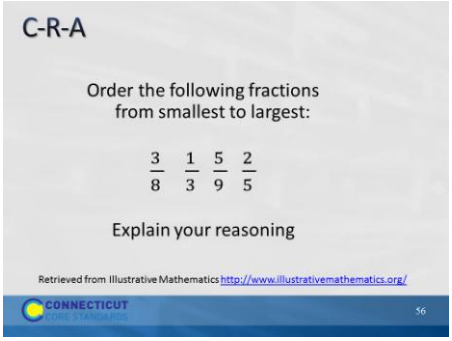
After going over the example, have participants discuss at their table how parallel tasks are related to open questions. Then, have them think about how they might introduce this strategy to teachers and what example they might use during their introduction. Participants may need to utilize the standards to create an example of an open question if one of the four examples here will not work for a particular grade level, or they may modify one of the examples shown here.



Slide 55

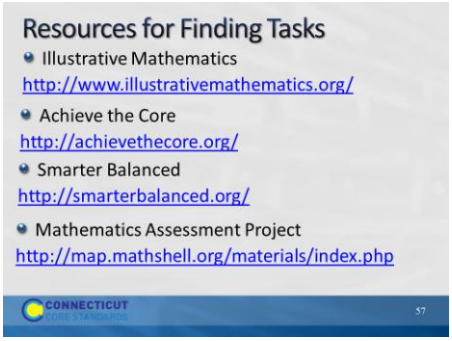
Explain to participants that C-R-A stands for concrete to representational to abstract and is a strategy for differentiation that does not involve changing the problem, but rather, involves changing the models students use to solve the problem. C-R-A can be thought of as a continuum where we want all students to eventually get to the point of using abstract (mathematical symbols) models to represent a problem, but some students may need to step back on the continuum to representational models (drawings) or even to concrete models (some form of manipulative). Teachers should move students along the continuum, both forward and backward, as needed. Again, however, with the end goal of getting to the abstract. Have participants again think about the *Two Machines, One Job* experience from Module 1. How many needed to draw a picture before solving the problem using abstractly? This is the same situation that students may encounter.

For additional information on C-R-A see
http://www.coedu.usf.edu/main/departments/sped/mathvids/strategies/cra/html



Slide 56

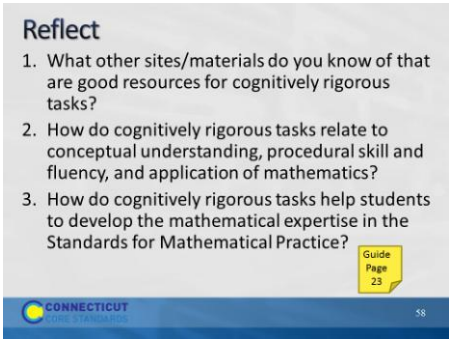
Have participants discuss with their group how they might use C-R-A to help students complete the task on the slide, and determine how they might move a student forward on the continuum based on the student's entry point. Participants can generate their ideas on chart paper and as time permits, present their strategies to the larger group.



Slide 57

Explain to participants that the strategies that they just examined and discussed can be used with tasks from their curricular materials or, if needed, they can find additional tasks online. If time permits and if an internet connection is available, show participants the tasks available at each of the resources on the slide.

Wrap up this section by having participants complete the reflection, either individually or in small groups, on the next slide.

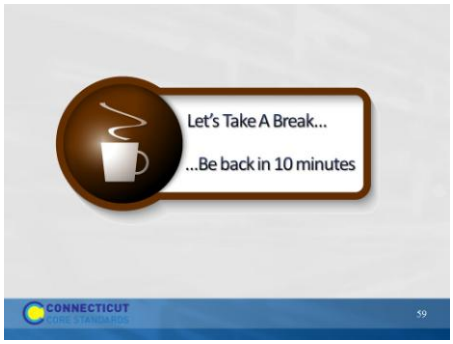


Slide 58	

Reflect

Allow participants to respond to the reflection questions on the slide and in their Participant Guide on **page 23**. As time permits have volunteers share their thinking.

Transition to the next section by telling participants that now that they have looked at strategies for creating multiple entry ways into the mathematics through the problems provided, they will now examine instructional strategies that can be used by teachers to implement tasks. Because participants will be moving from table to table in the next activity, ask participants to put their personal belongings to the side.

 Slide 59	

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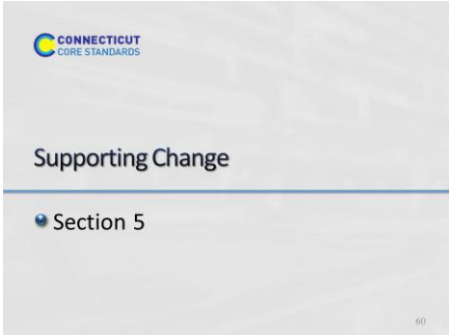
Section 5



Slide 60

Section 5: Supporting Change

Section 5 Time: 85 minutes

Section Training Objectives:

- To help participants identify elements of lessons that work to develop conceptual understanding, procedural skill and fluency, and application of mathematics.
- To provide participants with instructional strategies for teaching the content standards through problem solving, for helping students to develop procedural skill and fluency, and to provide students with opportunities to apply their mathematical understandings.
- To have participants create a plan for disseminating big ideas from the session with teachers at their school
- To have participants anticipate specific teacher questions and challenges around implementing lessons that incorporate the Standards for Mathematical Content

Section 5 Outline:

1. Participants will begin by watching the videos *Skip Counting with Counting Collections* and *What Fraction of the Shape is Red*. During each video, participants will take notes on the corresponding *Video Observation* worksheet. After each video, discuss the strategies that were seen and the evidence provided as a large group and chart strategies to use as a master resource.
2. Participants will then begin to think about areas of instructional practice that will need to be addressed with the teachers with whom they work. Participants will be asked to consider this through the lens of approaching teachers with the idea of rather than learning to teach in a completely new way, working towards enhancing the instructional strategies in place now so that they help students to meet the expectations of the CCS-Math. To experience this, participants will explore ways that current strategies, such as concept cards/maps, journals, group work, decision making and so forth, can be restructured to meet the new expectations. Participants will Jigsaw each of the instructional strategy areas during which they will examine instructional strategies and/or examples, discuss how the examples can be implemented, and generate at least one new idea to share with others.
3. Participants will return to their 'home' group and discuss their strategy and new idea and as a group will wrap-up the activity by working together to make a plan for helping the teachers they work with understand

and implement the key ideas and strategies presented in the module**.**

Section 5 Supporting Documents

- Video Observation Sheets
- A New Spin on Old Strategies
- Group 1: Math Journals
- Group 2: Mathematical Language
- Group 3: Fluency
- Group 4: Group Work and Decision Making
- Next Steps

Section 5 Materials

Chart paper

Markers and tape

Notes: If time is a factor at this point in the day, you may opt to only play one video, giving participants enough time to review each of the strategies in the Jigsaw activity.

Slide 61

Counting Collections: Kindergarten

To begin the activity explain to participants that they will watch two videos; one showing parts of a primary lesson and one showing parts of an intermediate lesson. While watching the videos, participants should makes notes on the Video Observation sheet provided in the Participant Guide on **pages 25-26**. After each video, pause for a short discussion centered around participants' observation notes and chart instructional strategies used and discussed as a large group. The goal of watching the videos is to get participants looking for examples of the important aspects of teaching the Content Standards that have been discussed throughout this session, and to also look at additional teaching strategies that they want to bring back to teachers at their school.

Begin by watching the first video, *Skip Counting with Counting Collections,* that shows part of a Kindergarten lesson. Click on "Watch Video" to play the video from here: https://www.teachingchannel.org/videos/skip-counting-with-kindergarteners. The video is **12 minutes** long.

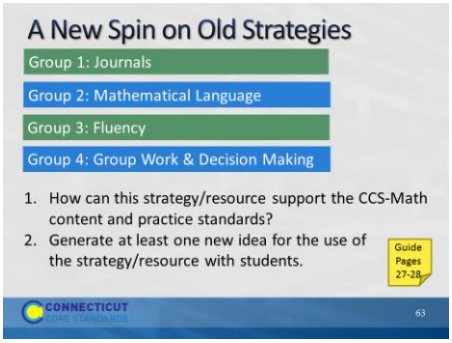
Slide 62

What Fraction of This Shape is Red?

Following the discussion of the Kindergarten lesson, watch the video *What Fraction of This Shape is Red* that takes place in a fifth grade classroom. Click on "Watch Video" to play the video from here: https://www.teachingchannel.org/videos/teaching-fractions. The video is **5 minutes** long. Again discuss and chart the instructional strategies used by the teacher.

(Note: In this video, *What Fraction of this Shape is Red,* the standards being addressed are 3rd grade standards and this lesson is being delivered in a 5th grade classroom setting. So, while the lesson is worth watching because of the strategies being used, participants should be able to point out that it is not grade level appropriate for 5th grade.)

After the discussion on the second video, explain to participants that they will now have an opportunity to explore some additional strategies and resources for teaching the CCS-Math Content Standards.



Slide 63

A New Spin on Old Strategies

Participants will work in small groups to examine four different Math strategies and/or resources. The group that participant sat in to watch the video will become their home group. Have participants number off at each table until everyone has a number representing 1, 2, 3, or 4. Then, participants will move into their Jigsaw groups (1's will become Group 1 and discuss Journals, 2's will become Group 2 and discuss Mathematical Language, etc.). On the notes page in the Participant Guide, each participant should note key points that come out of the discussion and the group should develop at least one new way to implement the strategy being discussed. (Allow 15 minutes

for the Jigsaw discussions)

When time is called, participants will move back to their 'home' group and each person will have 5 minutes to discuss their strategy/resource.

Notes about setting up and managing movement to tables:

- In cases where you are working with a large number of participants, create multiple jigsaw groups (e.g., two to three groups labeled as Group 1, two to three groups labeled as Group 2, etc.) so that there are no more than six participants at any one table at any one time.
- •Make sure that each table is clearly labeled (use the cardstock that has been provided with the supplies to label tables) so that groups are not trying to figure out where they are going as they move.
- •Give participants a 1 minute wrap-up warning at each table so that they can conclude their conversations and prepare to move to the next table.

"Set up" this activity to participants by explaining that they might explore strategies they already know. However, a new spin has been put on each strategy in order to meet the challenges presented by the CCS-Math. Also, explain that at there is space within the Participant Guide on **pages 27-28** on which they can make notes about the important points they want to bring back to their 'home' group and to teachers at their school.

After the 'home' group discussion is complete, debrief the strategies/resources as a large group and highlight and chart some new ideas generated.

Transition to the last part of this section by asking participants how they will now share this information back at their school site and allow participants to make notes on the Next Steps worksheet on **page 39** in the Participant Guide.

Closing Activities

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The goal of the Closing Activites is for participants to determine how they will take the key information back to their peers at their school so that everyone gains a shared understanding.

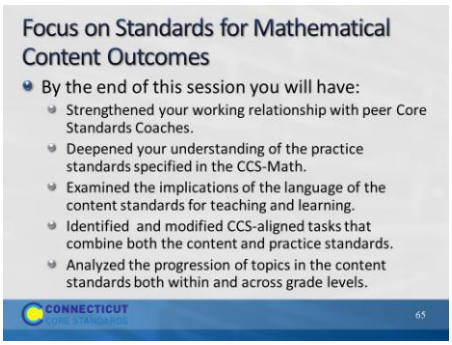
Total Time on Closing Activities: **5 minutes**

Closing Activities at a Glance:

1. Review the Module 2 Outcomes.

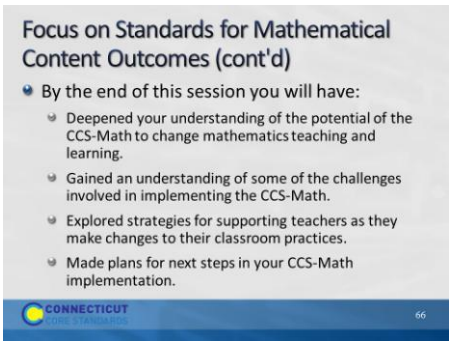
2. Have participants complete the Post-Assessment.

3. Have participants complete the on line Session Evaluation located here: http://surveys.pcgus.com/s3/CT-Math-Module-2-K-5.



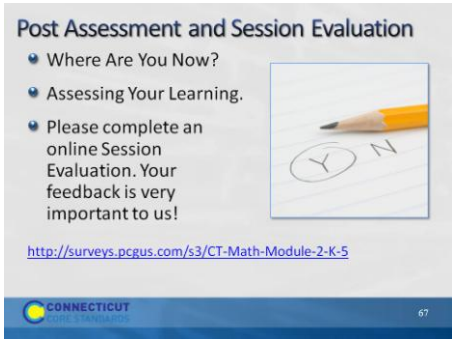
Slide 65

Review the outcomes for the day.



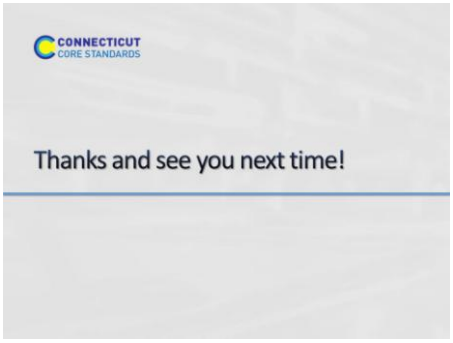
Slide 66

Review the outcomes continued.



Slide 67

This Post-Assessment is the same as the Pre-Assessment they took in the beginning of the session. This assessment is to gauge their learning based on the activities of the full day session. Remind the participants to fill out their online Session Evaluation as well (http://surveys.pcgus.com/s3/CT-Math-Module-2-K-5)



Slide 68

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