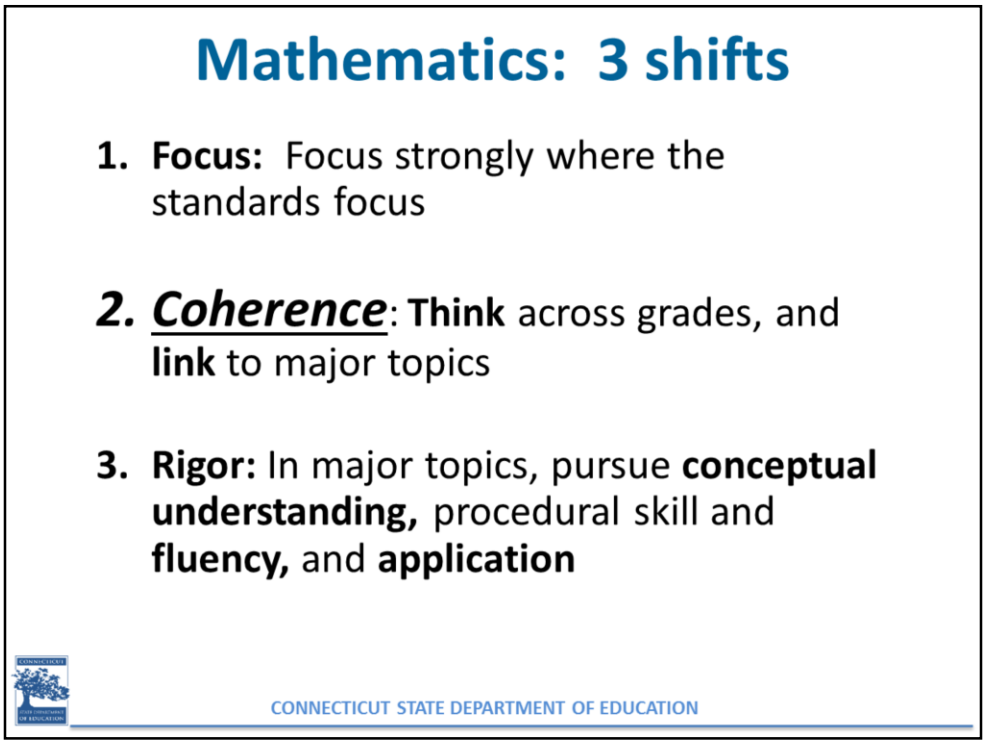
The Mathematics Progressions

Presented by: Jennifer Michalek, CSDE

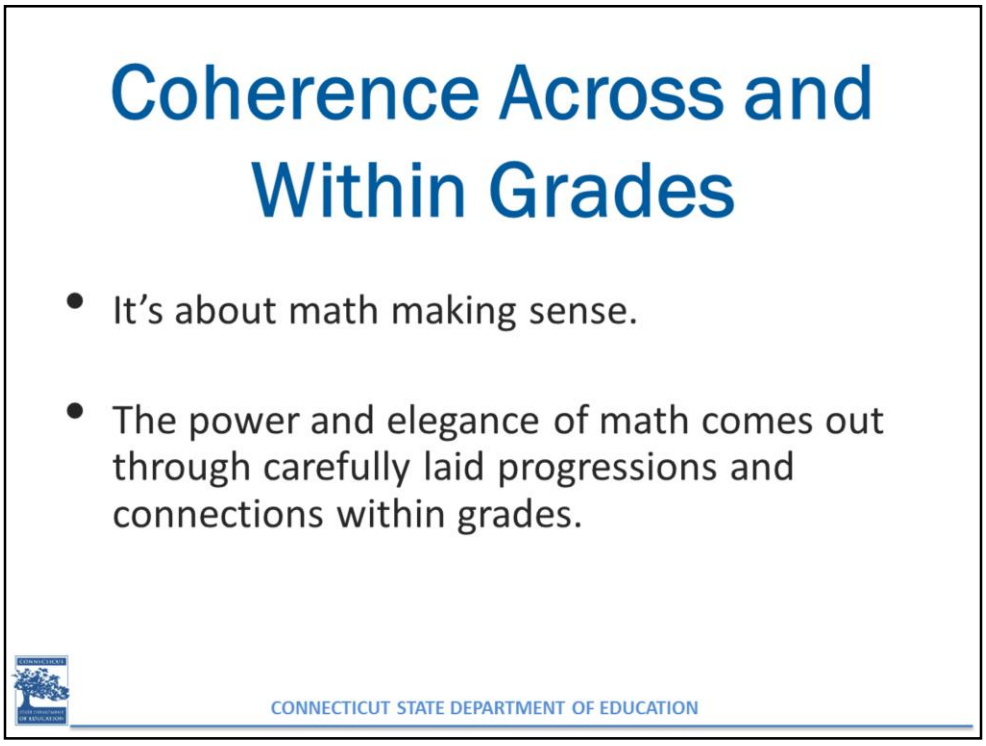


There has been a lot of attention given to the three shifts inherent in the common core math. While all three are important, coherence is the result of the progressions that are contained within the standards. This will be our lens for today's session.

Why Coherence?

- Mathematics is not a list of disconnected topics, tricks, or mnemonics;
- Mathematics is a coherent body of knowledge made up of interconnected concepts.
- The standards are designed around coherent progressions from grade to grade
- Learning is carefully connected across grades so that students can build new understanding onto foundations built in previous years.

2014 Common Core State Standards Initiative



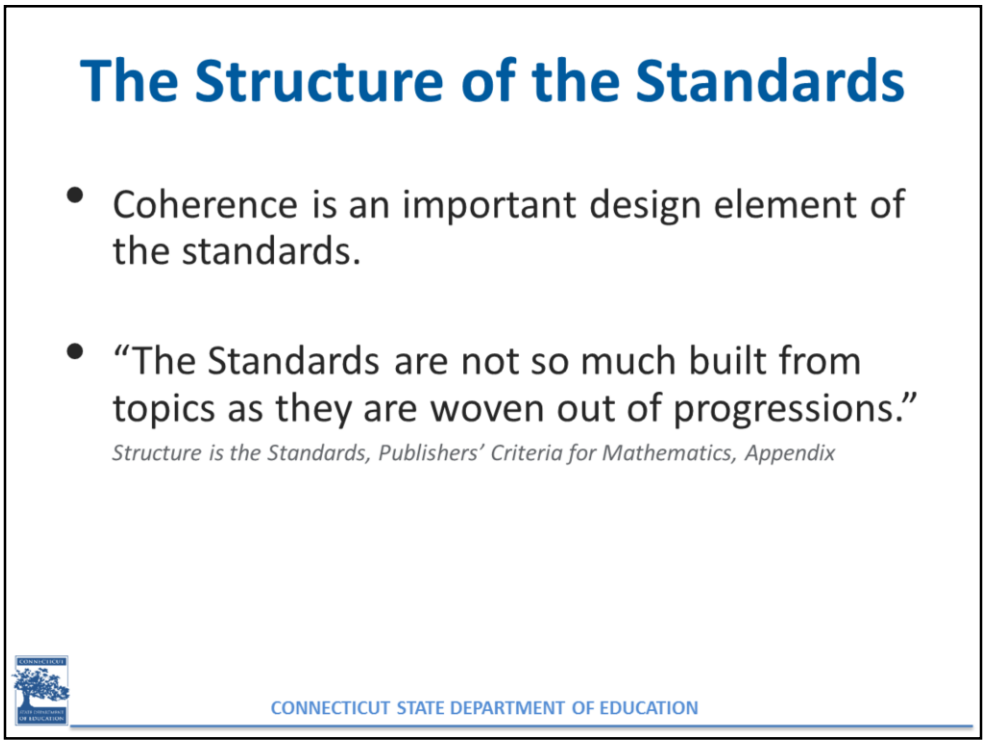
Coherence is about math making sense.

There are two types of coherence found in the math standards. One is the coherence of topics across grades and the other is the coherence within a grade.

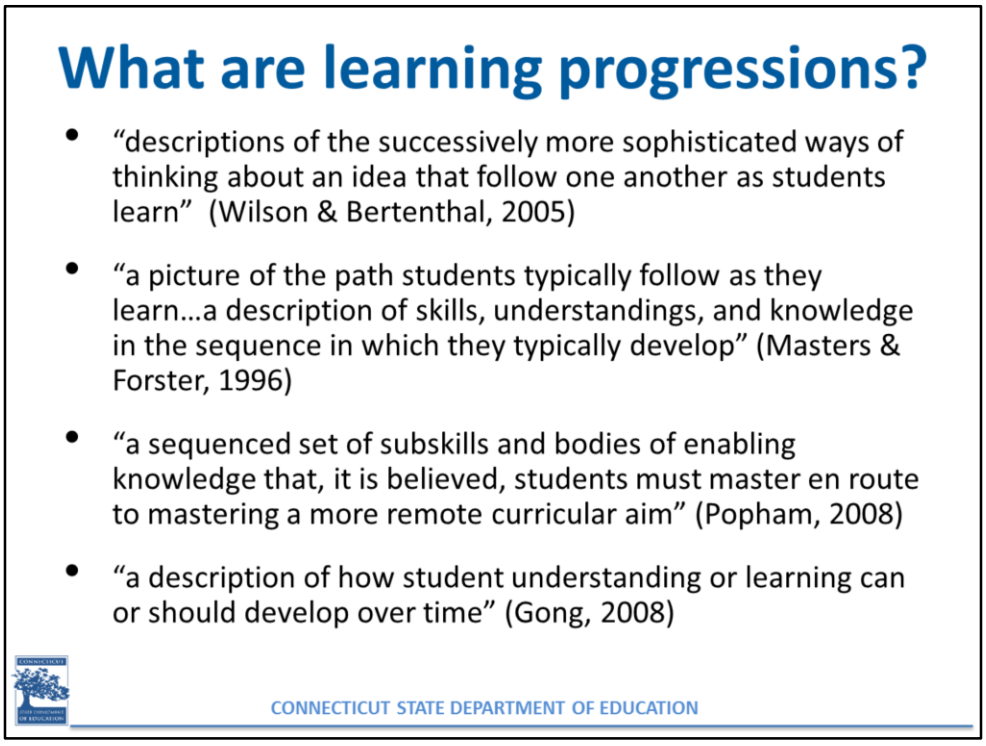
Coherence across grades within the standards is in having students apply learning from a previous grade to learn a new topic.

Coherence within a grade comes from the reinforcement of the major topics by utilizing a supporting topic.

These two types of coherence result from the carefully laid structure of the standards.



In the activity we are going to do later in the presentation, you will see how themes, topics**,** and language build across grades in the CCSSM. There are many meaningful progressions of mathematics in the CCS. Before we get into the standards themselves, we need to understand what is meant by learning progressions.



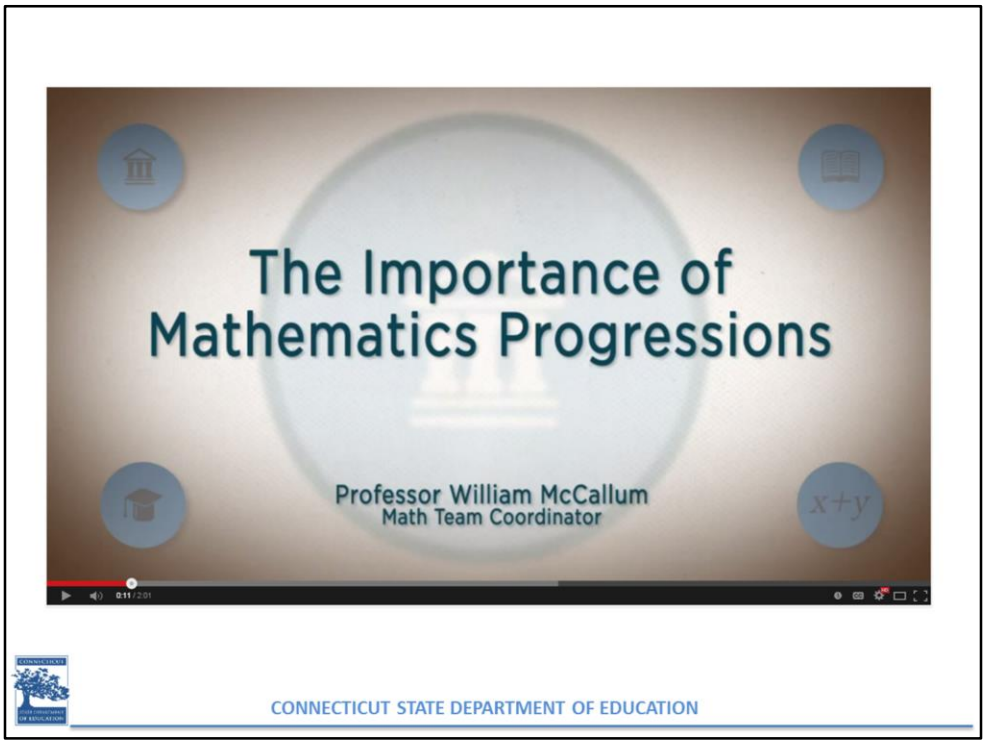
Description of successively more sophisticated ways of thinking about a big idea

Provide a framework for long-term development

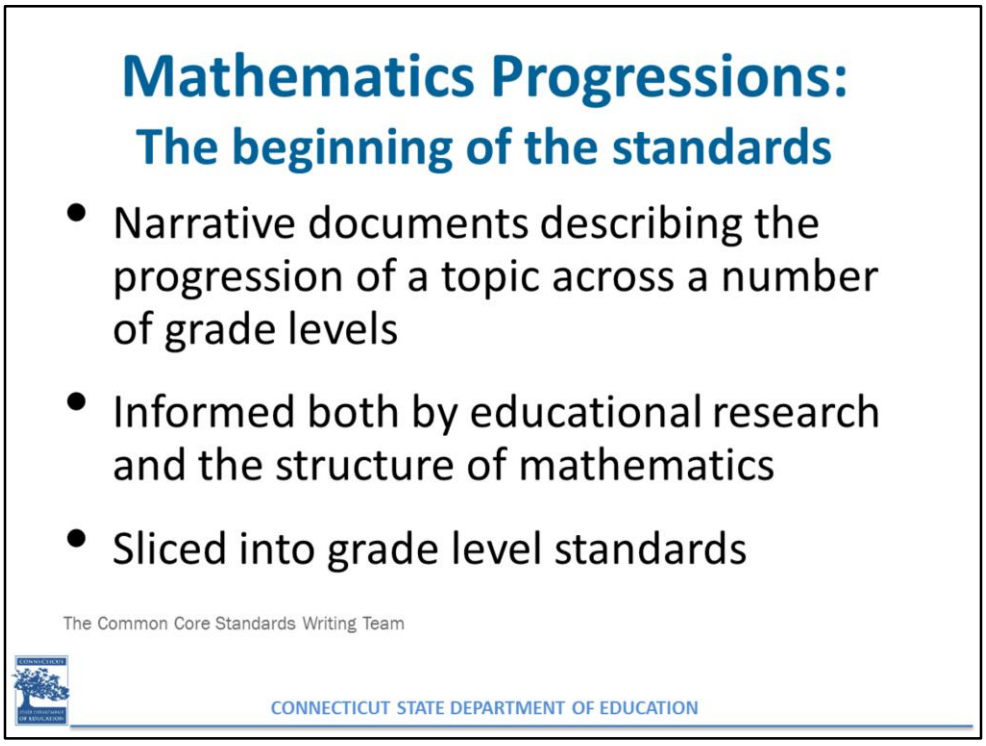
- Describes what it means to move towards more expert understanding in an area
- Gauge increasing competence over time

A sequence of successively more complex ways of thinking about how an idea develops over time

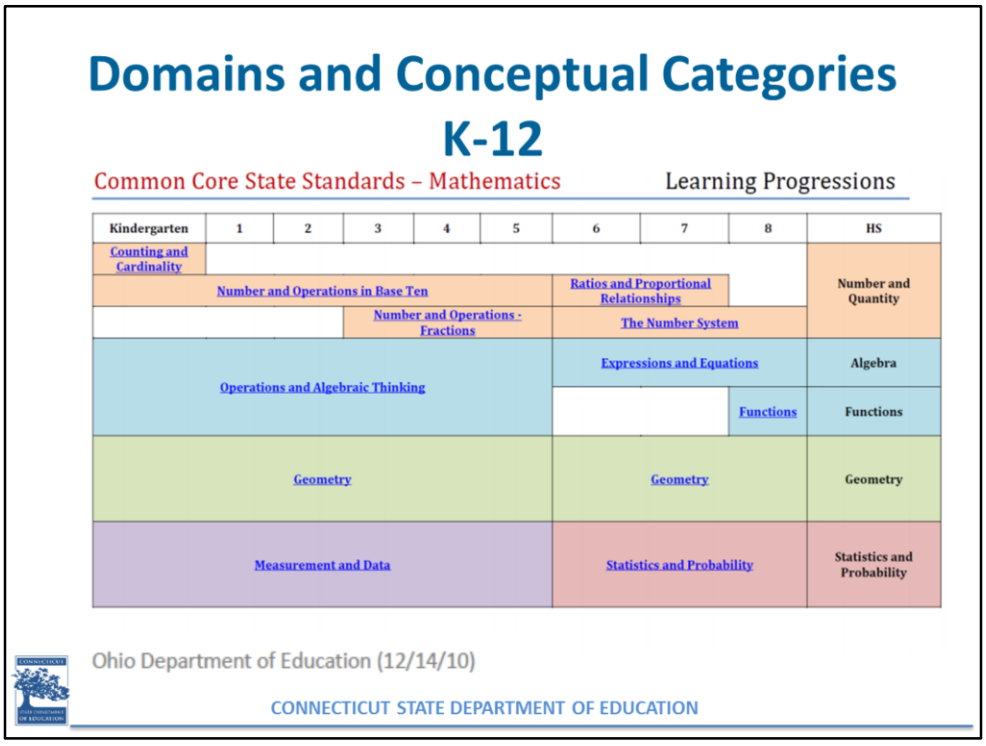
Consider how ideas build upon each other to form more complex practices or ideas



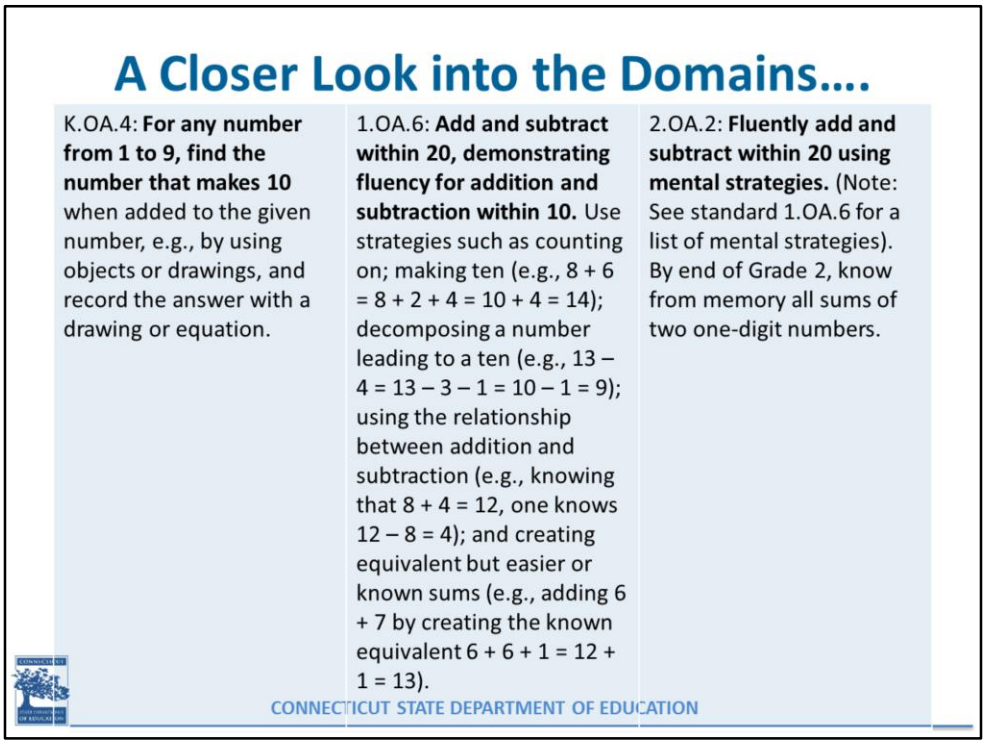
Let's listen to Bill McCallum as he explains progressions specifically around mathematics and the development of the Common Core.
https://www.youtube.com/watch?v=a-P9KQdhE0U



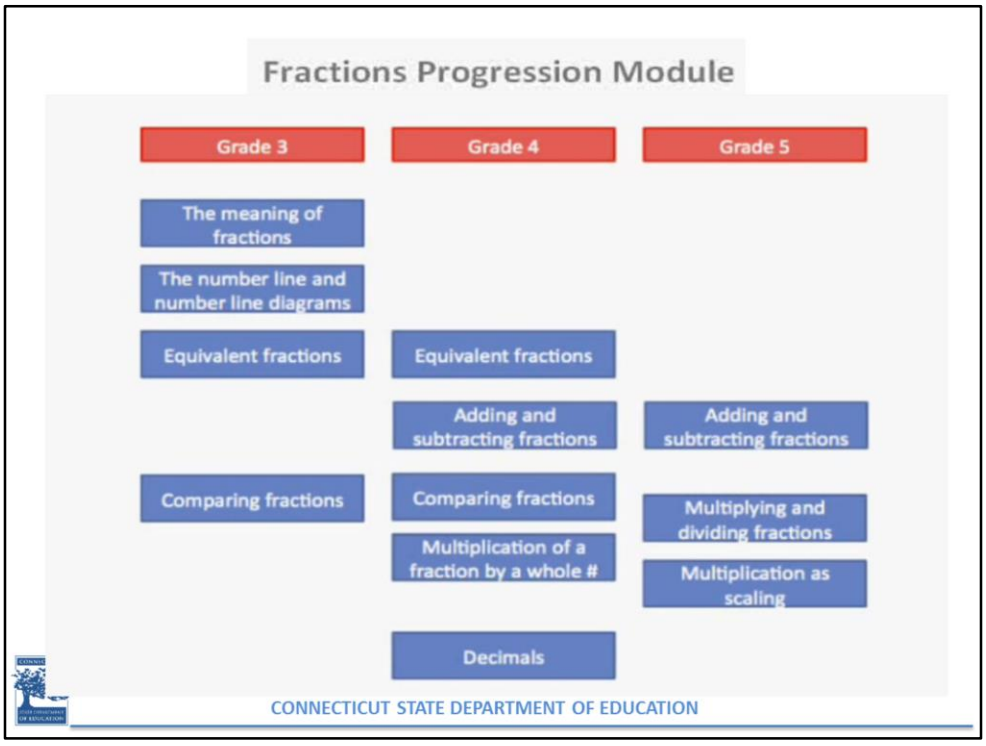
To summary what we just heard Bill explain. Read to the slide.



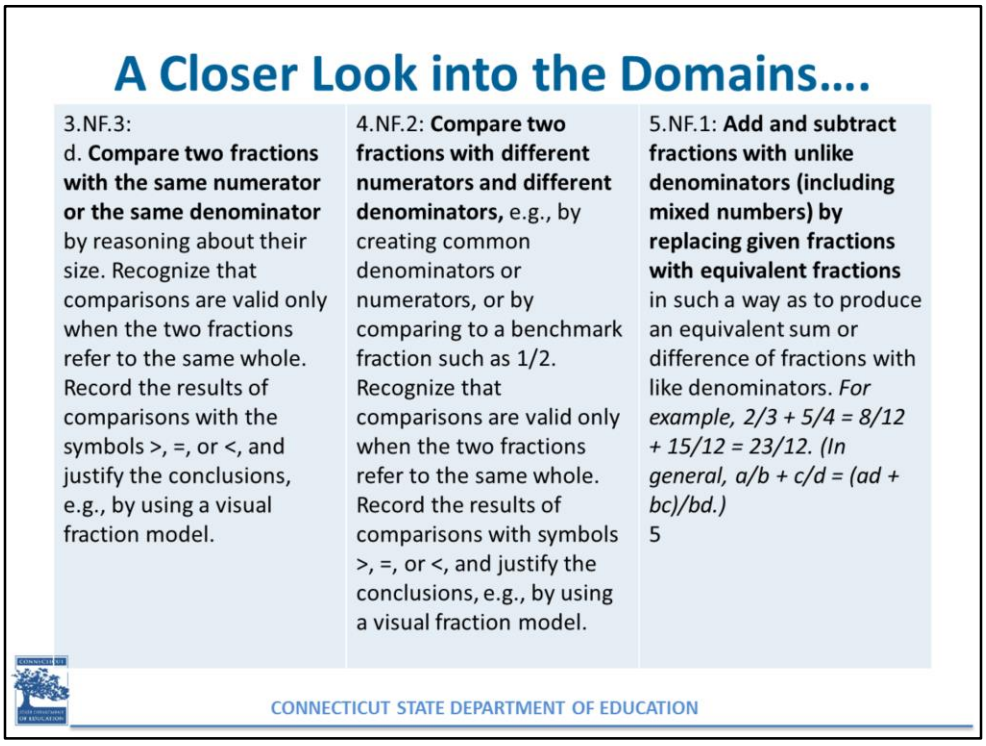
Looking at the standards, this shows a graphic of the progressions of mathematics K-12. Note that in grades K-8 the mathematics is broken down by domain. This does not mean that the progression occurs only within the domain. There are also connections between domains. When students reach high school, the standards are broken down into conceptual categories. As this graphic shows, these conceptual categories tie together all of the domains that eh students learned throughout their K-8 careers.



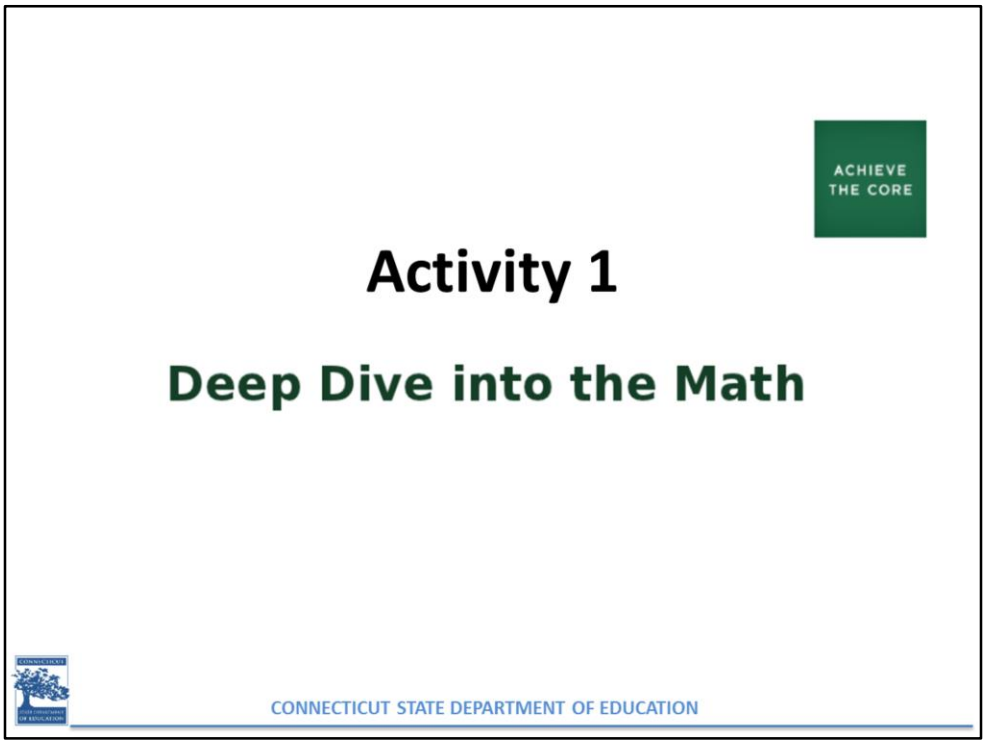
To demonstrate an example of where we see a progression, we can look at the K-2 domain of Operations and Algebraic Thinking. You can see how the mathematics gets more complex as a student moves on. Talk to the bold part of the standard.



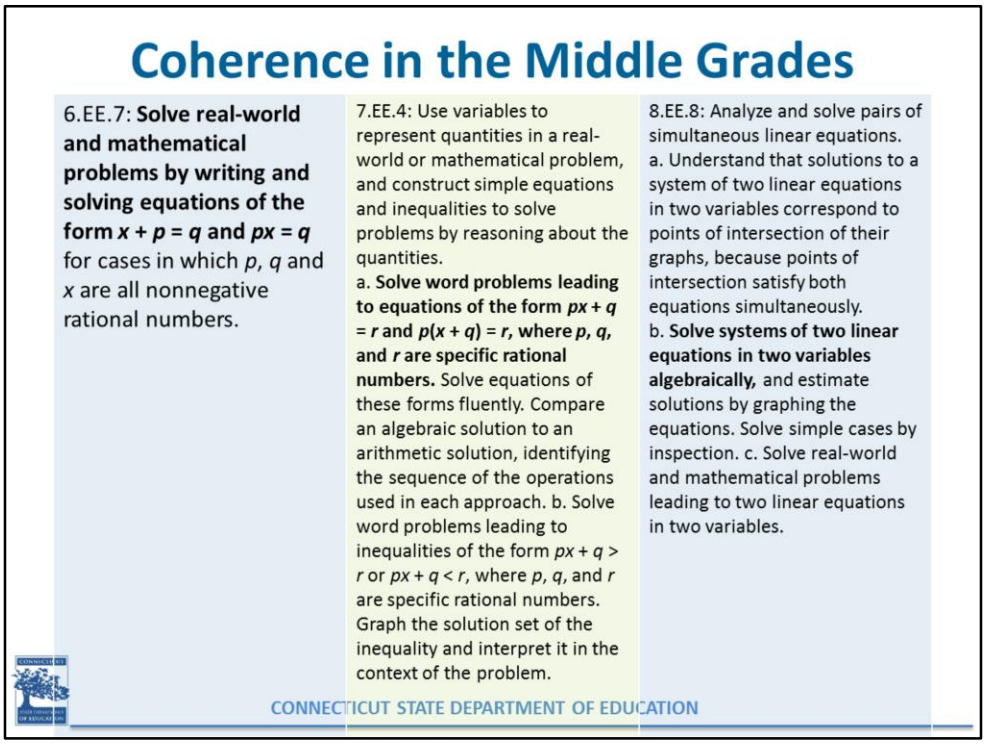
Now that we have a sense of the what we mean by progressions and understand their importance in the CCS math, an important question that needs to be examined is what does this mean for instruction and student learning. To help explain this we are going to look at a brief video clip on fractions. You can see from this graphic how the concept of fractions progresses from third grade to fifth grade. In the video we will see how this progression is used to explain the new concepts.
https://www.youtube.com/watch?v=0ZblmRwktTo



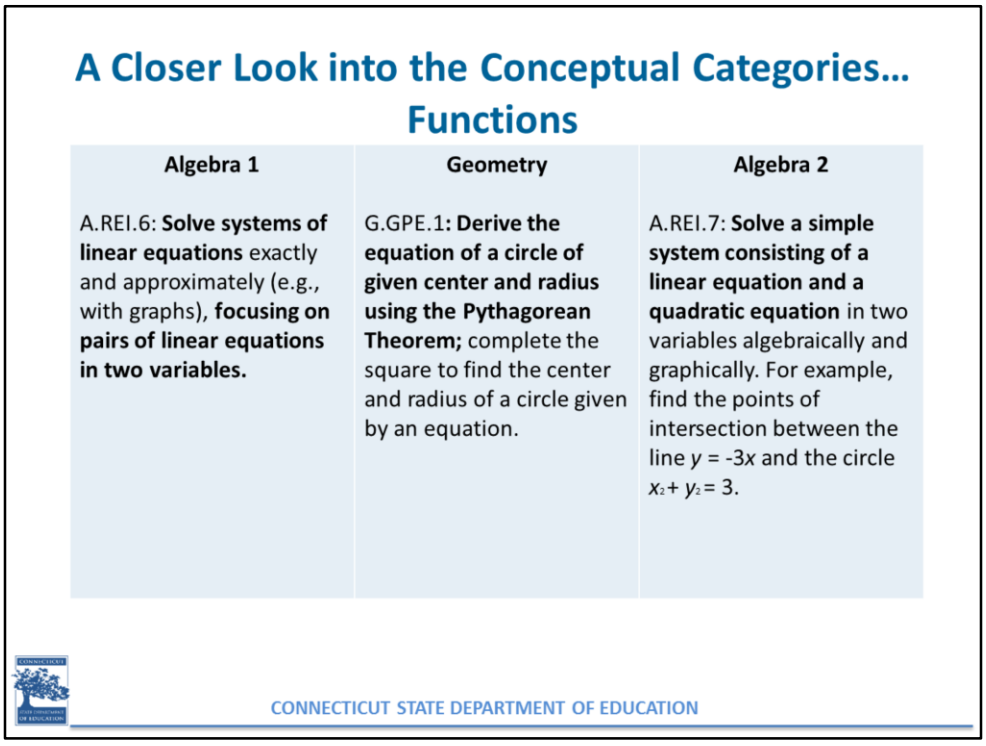
We just saw a video that explains the progressions of fractions. It is important to always bring our instruction back to the standards. This example of standards for fractions from grades 3 to 5 demonstrates how students are taking their prior learning and building upon it as they advance through the grades.



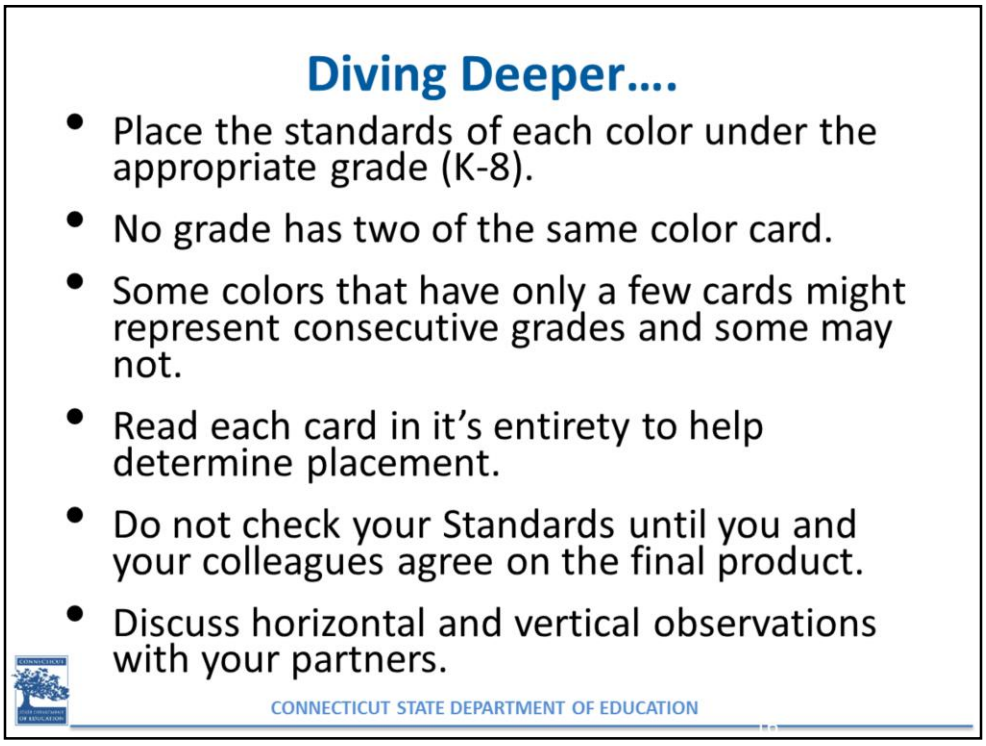
I have done a lot of talking and now I want to give you the opportunity to explore progressions on your own. Let's start with the envelope labeled Activity 1. In it you will find three standards. I would like for you to arrange these standards in a progression and identify what grade level each would be expected.



Let's see how you did. These standards are from the Expressions and Equations domain for grade 6 to 8.



Much of the discussion about progressions is from grades K-8. However, the progressions continue in the standards for high school. In Connecticut, most of the districts use the traditional pathway approach to mathematics. This shows that even in this pathway, there is evidence of a progression and that the progression does not need to be contained to one conceptual category.

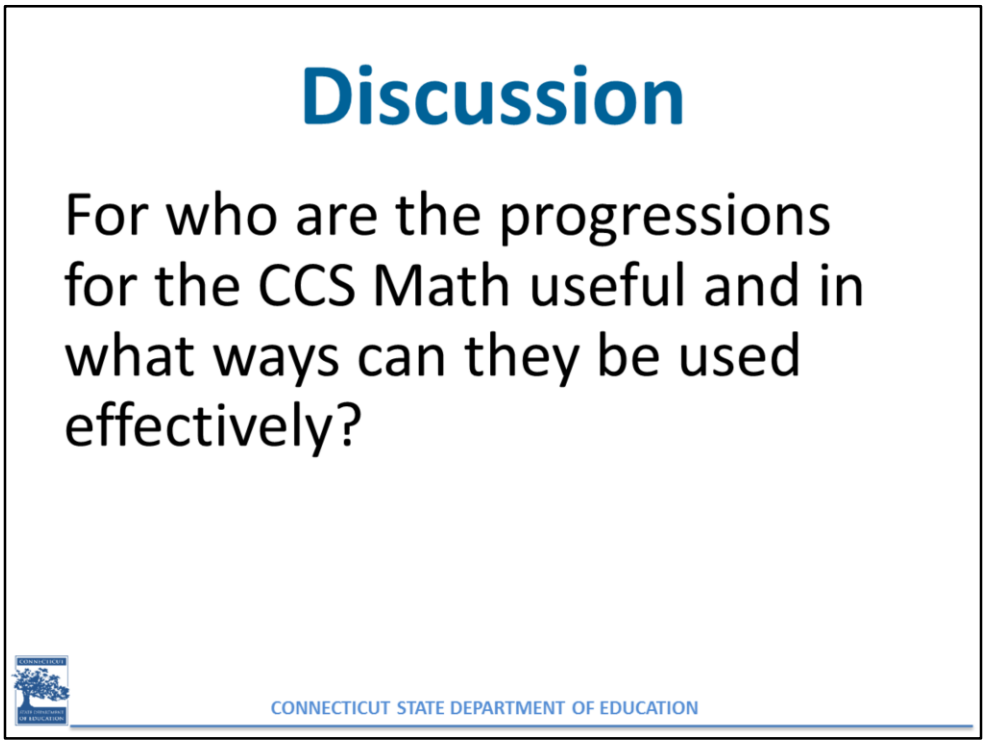


We have seen examples of the progressions throughout the K-2, 3-5, 6-8 and high school grade bands. In order to really understand the power of the progressions and their impact on the mathematics you need to dig into multiple standards across a variety of grades. In this activity you will have the opportunity to do that. In your envelopes you will find several standards that are color coded. Your task is to arrange each color by placing it in the appropriate grade on the poster paper. There is only one color card for each grade and not all grades will have all colors. The colors that have fewer cards may or may not be consecutive grades.

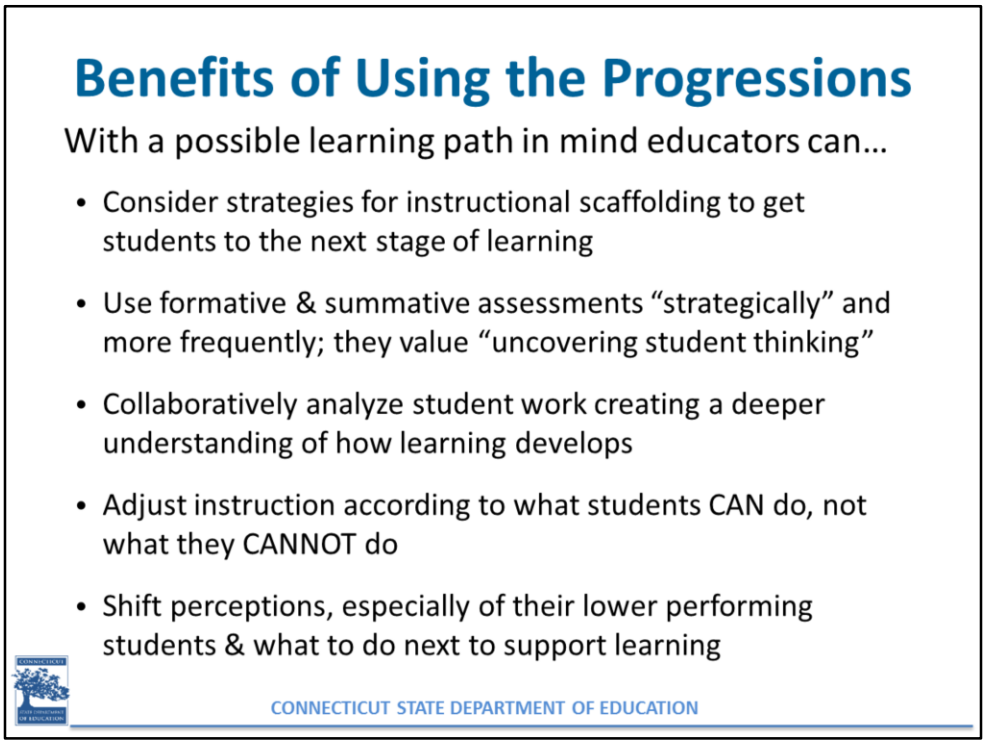
The key is to read the standards on the cards. This isn't an activity to just see if you know the standards for each grade or can reason the order they should go in. Really read the standards. See the coherence of the writing. See how the topics progress from one grade to another. See why it is important for teachers to know the standards for their grade as well as for the grades before and after theirs.

This activity is most beneficial when not using the standards as a guide. We want you to have to mull over these standards and hash out tough decisions with your colleagues. When you are finished and comfortable with your choices, use the Standards to check your work.

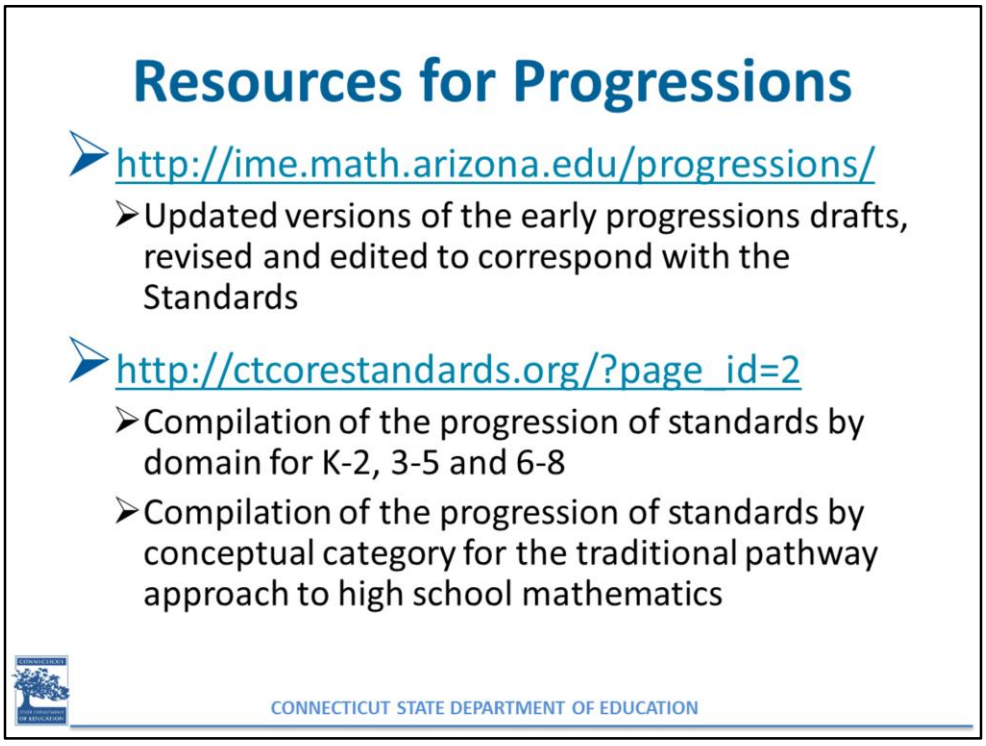
This activity was adapted from Achieve. http://achievethecore.org/page/400/deep-dive-into-the-math-shifts-list-pg



Solicit responses from the participants.



Read to the slide



The progression documents that Bill McCallum discussed at the beginning of the presentation can be found through the University of Arizona website. These documents go into great detail about the progressions for each domain and the conceptual categories. These are rather lengthy so to look at the progression of the standards by grade band in an easier to use format, Dewey Gottlieb from Hawaii compiled the standards by domain for the K-2, 3-5, and 6-8 grade bands. Recently, I compiled the standards by conceptual category for the traditional pathway at the high school level. The standards at each grade level align with the model curriculum for Algebra 1 that is already available and will align to Geometry and Algebra 2 when it is released this summer.