Session Description
- Participants will examine an overview of the structure of the Common Core standards for high school.
- Participants will examine the critical areas for one or more high school courses from the Pathways document of the Common Core State Standards (CCSS) for Mathematics.

Expected Outcomes
- Participants will deepen their understanding of the structure of the CCSS for Mathematics and at least one suggested pathway course.
- Participants will deepen their understanding that the critical areas suggest a possible grouping of the standards into coherent blocks for each high school course.

Agenda
- Examining the structure of the high school standards document (10 min)
- Examining the Critical Areas (40 minutes)
- Whole group discussion (15 minutes)
- Reflection (10 minutes)

Time
- 75 minutes (~40 minutes per course examined, so additional time would be needed for a teacher to examine all three HS course)

Audience
- Teachers and leaders of students in grades 9–12 (could include 7th and 8th grade teachers and leaders.)

Materials
- Critical Areas PowerPoint
- Critical Areas Handout A
  - HS1
    - Algebra 1
    - Integrated 1
  - HS2
    - Geometry
    - Integrated 2
  - HS 3
    - Algebra 2
    - Integrated 3
  - Accelerated 7th
    - Traditional Accelerated 7th
    - Integrated Accelerated 7th
  - Accelerated 8th
    - 8th Grade Algebra 1
    - 8th Grade Integrated 1

Resources/References
Oregon Common Core State Standards for Mathematics
http://www.ode.state.or.us/search/page/?id=1527
Introduction (10 minutes)

Slide 1
Title slide [Welcome participants. They should be able to work alone as well as in small groups.]

Introduction: This session will look at the organization of the high school Common Core Standards for Mathematics. The conceptual categories will be identified and you will have an opportunity to look at the critical areas for one high school course.

Slide 2
Review the expected outcomes for this session ...
- Participants will deepen their understanding of the structure of the CCSS for Mathematics and at least one suggested pathway course.
- Participants will deepen their understanding that the critical areas suggest a possible grouping of the standards into coherent blocks for each high school course.

Slide 3
Introduce the Common Core State Standards (CCSS) for Mathematics.

Say, “The Common Core State Standards Initiative is a state-led effort coordinated by the National Governors Association Center for Best Practices and the Council of Chief State School Officers. The standards were developed in collaboration with teachers, school administrators, and experts, to provide a clear and consistent framework to prepare our children for college and the workforce.”

“The standards are informed by the highest, most effective models from states across the country and countries around the world and provide teachers and parents with a common understanding of what students are expected to learn. Consistent standards will provide appropriate benchmarks for all students, regardless of where they live.

These standards define the knowledge and skills students should have within their K–12 education careers so that they will graduate high school able to succeed in entry-level, credit-bearing academic college courses and in workforce training programs. The standards:
- Are aligned with college and work expectations;
- Are clear, understandable and consistent;
- Include rigorous content and application of knowledge through high-order skills;
- Build upon strengths and lessons of current state standards;
- Are informed by other top performing countries, so that all students are prepared to succeed in our global economy and society; and
- Are evidence-based.

Question: How is the implementation of the Common Core State Standards different than past standards implementations?

In Oregon, implementation of these standards will be different in three ways:
- Nationally developed with shared resources and assessments coming
- Both ELA and Mathematics will be implemented simultaneously
- Focus on attending to the Instructional Core
Slide 4

“For over a decade, research studies of mathematics education in high-performing countries have pointed to the conclusion that the mathematics curriculum in the United States must become substantially more focused and coherent in order to improve mathematics achievement in this country. To deliver on the promise of common standards, the standards must address the problem of a curriculum that is ‘a mile wide and an inch deep.’ These Standards are a substantial answer to that challenge. It is important to recognize that ‘fewer standards’ are no substitute for focused standards. Achieving ‘fewer standards’ would be easy to do by resorting to broad, general statements. Instead, these Standards aim for clarity and specificity.”

- Focus
- Coherence
- Clarity
- Specificity

What do these words mean? We will begin by examining the structure of the high school standards. By the end of this and subsequent sessions, we will be able to elaborate on the meaning of these words as they relate to high school mathematics.

Slide 5

**Instructional core:**
The core includes three interdependent components: teachers' knowledge and skill, students' engagement in their own learning, and academically challenging content.

We are not just swapping out one set of standards for another. As we increase the rigor of the content, we must focus on using the excellent recent educational research to improve content knowledge and practice and student engagement and ownership of their learning (i.e., NRC: How People Learn; Horizon Research: Elements of Effective Instruction; CCSSO: What is Effective Professional Development).

**Introduce the Instructional Core**

Richard Elmore identifies a number of core principals as we consider implementing the instructional core, but for this introduction we’ll just identify two principles:

**Principle #1:** Increases in student learning occur only as a consequence of improvements in the level of content, teachers’ knowledge and skill, and student engagement. These three components need to be thought of as interdependent rather than isolated and independent of each other.

**Principle #2:** If you change one element of the instructional core, you have to change the other two. We cannot think of implementing the CCSS as just swapping out one set of standards for another. As we increase the rigor of the content, we must focus on using the excellent recent educational research to improve content knowledge and practice and increase student engagement and ownership of their learning (i.e., NRC: How People Learn; Horizon Research: Elements of Effective Instruction; CCSSO: What is Effective Professional Development).

Slide 6

**Organizational Elements:** It is important to remember that the organizational elements that surround the instructional core are critical to the successful implementation of a districtwide improvement strategy.

The instructional core does not occur in isolation of these organizational elements. Any implementation strategy would need to take into consideration how these elements impact successful implementation.
In time, more information on implementation of the CCSS through an instructional core focus will be developed.

*The purpose of this session* is to give an overview of the CCSSM, which is intended to help attend to the Teacher-Content interaction described in the instruction core. Future sessions will help deepen a teacher’s understanding of the new content, as well as help teachers understand the new Student-Content interaction (CCSS Standards for Mathematical Practices) and eventually Teacher-Student interactions.

**Slide 7**
**Show** the “Table of Contents.”

**Highlight** the different sections of the CCSS document:
- **Introduction**
  - Provides a rationale for focus and coherence
  - Describes purpose of standards
  - Illustrates how to read the standards
- **Standards for Mathematical Practice**
  - Outlines eight standards for all students to develop proficiency
- **Standards for Mathematical Content**
  - Organized by grade level from kindergarten through grade 8
  - Organized by conceptual categories at the high school level
- **Glossary**
  - Includes definitions
- **Sample of Works Consulted**

These high school standards are aimed at students who have completed K–8 Common Core Standards and are now in grades 9–11. Notice that they are not listed as separate grades, as are the K–8 standards. The high school standards specify the mathematics that all students should study in order to be college and career ready.
Introduction to the High School Conceptual Categories and Clusters

Slide 8
The high school standards are listed in six conceptual categories. [Highlight a couple of the sentences.]

“Conceptual categories portray a coherent view of high school mathematics; a student’s work with functions, for example, crosses a number of traditional course boundaries, potentially up through and including calculus.”

All of the standards, except for those with a “+,” are expected to be completed by all students by the end of 11th grade. The standards indicated by a “+” are those that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics. These advanced courses would be offered as a fourth year of mathematics. Some of the “+” standards can also be included in a fourth mathematics course, but not all of the standards for these courses are in the CCSS. One of the hallmarks of the Common Core State Standards for Mathematics is the specification of content that all students must study in order to be college and career ready. This “college and career ready line” is a minimum for all students.

Slide 9
Each Common Core Standard falls in one of these conceptual categories. If a standard notation begins with the letter “A,” then it is an algebra standard. Modeling standards are not listed separately. Modeling is best interpreted not as a collection of isolated topics, but in relation to other standards.

Making mathematical models is one of the Standards for Mathematical Practice. It is also a specific modeling category in the HS standards which appear throughout the high school standards indicated by a star symbol (*). Several examples of modeling are provided in the Common Core State Standards document.

Slide 10
Within the conceptual categories, the standards form a progression of increasing complexity. They are the big ideas that connect mathematics across high school. The conceptual categories are further delineated by domains, clusters, and standards.

Slide 11
Each conceptual category contains a set of domains. These domains are the overarching “big ideas” that connect topics across the grades/courses. Within each domain, the mathematical content to be learned is elaborated through clusters and standards.

Slide 12
The standards are organized in clusters. These clusters:
- Indicate WHAT students should know and be able to do
- May appear in multiple grade levels/courses with increasing developmental standards as the grade levels progress
- Reflect both mathematical understandings and skills, which are equally important
We will briefly look at one Conceptual Category. This is a snapshot of the Conceptual Category, Algebra Overview. Remember that this contains the algebra content that a student should learn by the end of 11th grade. This is not the course Algebra I.

There are four domains in the Algebra Conceptual Category: Seeing Structure in Expressions, Arithmetic with Polynomials and Rational Expressions, Creating Equations, and Reasoning with Equations and Inequalities. There are eleven clusters of standards in these domains.

Some domains may have a (*) by it, indicating that all of the standards in this domain are modeling standards. The (*) can be on individual standards, clusters of standards, or on an entire domain. If the (*) is on the domain, or cluster heading, it applies to all standards in that group.

A (+) symbol may also appear for a standard, cluster, or domain. The (+) indicates that the standard or entire cluster/domain as advanced. These standards may, or may not, be included by the end of a three-year sequence of high school courses. All non (+) standards must be addressed by the end of 11th grade or sooner.

Here is a closer look at one algebra domain: “Seeing Structure in Expressions.” An example of how we would refer to a specific standard: A.SSE.3c refers to the conceptual category “Algebra,” the domain, “Seeing Structure in Expressions,” the cluster, “Write expressions in equivalent forms to solve problems,” standard 3, “Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*” Notice that this standard has a (*) beside it, indicating that this standard and all sub-standards (e.g., 3a, 3b, 3c) are modeling standards.

Standard 3c is "Use the properties of exponents to transform expressions for exponential functions." Any content in ITALICS are examples to further clarify the standards, but are not standards themselves. If the italicized content helps, then feel free to use the example; however, if the examples are not helpful, then focus on the non-italicized content which represents the actual standards.

The Modeling conceptual category does not list any specific standards. Rather they are found throughout the other five conceptual categories, as indicated by a star symbol (*).
We will now explore how these standards and conceptual categories might be organized into courses, or grades, at the high school level.

Appendix A: Designing High School Mathematics Courses Based on the Common core State Standards, developed by Achieve (in partnership with the Common core writing team), convened a group of experts, including state mathematics experts, teachers, mathematics faculty from two and four year institutions, mathematics teacher educators, and workforce representatives to develop Model Course Pathways in Mathematics based on the Common Core State Standards.

It should be noted that these courses are models, not mandates. They illustrate possible approaches to organizing the content of the CCSS into coherent and rigorous courses that lead to college and career readiness. States and districts are encouraged to use these pathways and courses as a starting point for developing their own (Appendix A, page 3).

Appendix A is a separate document from the standards and can be found at: http://www.ode.state.or.us/teachlearn/subjects/mathematics/standards/math-appendix-a-model-course-pathways.pdf

[If time, ask participants what coherent and rigorous means to the group. It is not intended to reach consensus at this point.]

[Optional: If more information about Achieve is desired, here is an excerpt from their home page: “Created in 1996 by the nation’s governors and corporate leaders, Achieve is an independent, bipartisan, non-profit education reform organization based in Washington, D.C. that helps states raise academic standards and graduation requirements, improve assessments and strengthen accountability.” For more information see their website: http://www.achieve.org/]

Slide 17
The Model Course Pathways document has four different model pathways: [click for each number to appear on the slide]

1. An approach typically seen in the U.S. (Traditional) that consists of two algebra courses and a geometry course, with some data, probability, and statistics included in each course;
2. An approach typically seen internationally (Integrated) that consists of a sequence of three courses, each of which includes number, algebra, geometry, probability, and statistics;
3. A “compacted” version of the Traditional pathway, where no content is omitted, in which students would complete the content of 7th grade, 8th grade, and High School Algebra I course in grades 7 and 8.
4. A “compacted” version of the Integrated pathway, where no content is omitted, in which students would complete the content of 7th grade, 8th grade, and the Mathematics I course in grades 7 and 8.

Ultimately, all of these pathways are intended to significantly increase the coherence of high school mathematics.
Each course, outlined in the Pathways document is organized around Critical Areas, also called units. In the High School Algebra I course, the “fundamental purpose is to formalize and extend the mathematics that students learned in the middle grades ... The critical areas, called units, deepen and extend understanding of linear and exponential relationships...”

Read a few lines of the description of the Critical Areas and ask participants “What do you notice about this language?”

Critical area 1: By the end of eighth grade, students have learned ... Now students analyze and explain the process of ...
Critical area 2: In earlier grades, students define, evaluate, and compare ... In this unit, students will learn ...
Critical area 3: This unit builds upon students’ prior experiences with data, providing students with more formal means of assessing ...
Critical area 4: In this unit, students build on their knowledge from unit 2, where they...
Critical area 5: ... Students expand their experience with functions ...

[It is clear that Critical Areas 1, 2, and 3 are building on prior knowledge. Teachers in this course should be sure that they have a common understanding of what those standards are at earlier years and build on that knowledge.]

The titles of the critical areas (units) of the High School Algebra I course. Specific standards from all of the Conceptual Categories except Geometry are included in this course outline.

During this session we are going to begin exploring the critical areas recommended for one course. [Handout for each of the courses.] In the handout, you will have an opportunity to respond to the following questions for each critical area (either individually or in your small groups):

- What are the important mathematical ideas for this critical area?
- What types of evidence would convince you that a student understands these ideas?
- What common misconceptions do students have when studying these critical areas? What challenges have you had in teaching these areas?

[Handout for each of the courses.] Think about the answers to these questions by yourself and then discuss in your small groups. [Participants will work in small groups to answer the questions and complete the handout. Allow approximately 30–40 minutes]
Whole Group Discussion

**Discussion: (15 minutes)**

*Facilitate* the whole group discussion. If only one course has been examined, have participants share highlights from their discussion.

**Slide 21**

*Ask* participants to consider the following questions as each group is sharing:
- What are the similarities in the types of evidence that would convince you that a student understands these ideas?
- Are there common themes in student misconceptions and in challenges to teaching?
- Compare the concepts in the critical areas with those that you are currently teaching. In general, how are they similar? How are they different?

Reflection

**Reflection** (5 minutes)

**Slide 22**

*Ask* participants to consider the following questions as each group is sharing:
- How do the critical areas help to bring focus to the standards for the course that you examined today?
- How will you use the critical areas to inform your curriculum and guide your instruction?
- What questions do you still have about the conceptual categories and critical areas?

Adjourn