**Coherence Facilitator notes**

**Mathematical goal:** Understand relationships between ideas in the Functions conceptual category. Think about them mathematically, and in terms of learning.

**Instructional goals:** Think about how to develop coherence of functions using a task.

**Time:** 75 minutes

**Materials:** Functions conceptual category and 8th grade Functions domain; blank (colored) paper for the definitions and questions; Finding Coherence in Functions (1 per person); Finding Coherence in Functions (Answers) 12; Growing Rectangles Task (1 per group); blank paper for final reflection.

**Grouping**: PLCs

**Reflection**: In what ways has your understand of coherence of the standards changed? What questions do you have?

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| On Pp:   * Deepen our understanding of what is meant by ***coherence of*** the CCSS, looking particularly at the Functions conceptual category. | Introduction (10 minutes):  Describe what we are doing and why we are doing it: We want to explore how the standards address ***coherence:*** to become aware of connections between ideas, to understand how the standards were structured to help students ***develop*** ever increasingly sophisticated and flexible ideas. |
| Pp:  Spend one minute thinking alone about the meaning of coherence in everyday language. How does that meaning relate to how you think about the coherence of the CCSS?  Go around your group, with each person quickly sharing one idea they have about the meaning of coherence in the standards. Listen carefully to others and write new ideas with your own. | Small group discussion to elicit prior knowledge (5 min)  The CCSS were designed to be ***coherent***. Discuss, in small groups, your ideas about what is meant by Coherence. Each person takes one minute to jot down ideas, then each shares an idea; add what your colleagues say to your description if it makes sense to you.  Whole group sharing of ideas and add more to your description. |
| On Pp: From dictionary.com: 1. logically connected; consistent: a coherent argument.  2. [cohering](http://dictionary.reference.com/browse/cohere); sticking together: a coherent mass of sticky candies.  3. having a natural or due agreement of parts; harmonious: a coherent design.  Devise a working definition of coherence of Algebra 1 for your group.  (Algebra 1 is coherent when…) | Prompting recall of prior workshop activity (5 min)  Note that we considered coherence when we created a learning trajectory with the Intersections task. The task required students to use many ideas from Algebra 1. Being able to accurately perform each of the skills of graphing linear and quadratic functions, finding intersections, and finding function rules is NOT enough to solve the problem. Students must have meaningful and coherent ideas about the concepts and procedures in order to solve the problem.  Recall that Kris mentioned in January workshop that the structure of the CCSS does not allow us to check off standards, but that some span the entire algebra experience of students.  This requires us to shift our thinking about how we address standards; we need to unpack the connections and make them an important part of our content.  There are two parts to coherence: apath through the content that emphasizes **natural mathematical connections**, and **how learners might learn it**. |
| **Pp:**  **What do you still want to know about coherence of the CCSS? Take two minutes to quietly and individually brainstorm some questions on the back of your paper.** | (3 minutes)  We are not going to discuss these right now, or collect these.  My questions:  How does coherence relate to cognitive complexity?  How does coherence relate to SMP? |
| Pp:  Focus on coherence with Functions Conceptual Category:  Read the introduction and underline any words or phrases that could indicate coherence.  Discuss these in your group and try to come to a consensus on which ideas should be underlined. | Examining the standards for coherence (10 minutes)  We’re going to think about coherence in the Functions conceptual category in order to both better understand the standards within the Functions CC and to think about coherence in general. Note that having you come to a consensus puts a little pressure on those productive professional norms Kris talked about.  Debrief: Each group give one statement that they had a hard time agreeing whether it pointed to coherence or not? Why was it difficult? |
| Pp:  Examine the Functions standards and lightly cross out any standards that you do not think will be addressed in Algebra 1.  There are four domains: why do you think the authors chose to group standards in these four domains? | Examine the Functions standards and lightly cross out any standards that you do not think will be addressed in Algebra 1 (e.g. composition of functions and trigonometry). However, when teaching for coherence, we must keep these clusters in mind because we will build a foundation for them in Algebra 1.  Recall that the star indicates that this is a Modeling standard. |
| Pp:  “The organization of the first two groups under mathematical practices rather than types of function is an important aspect of the Standards: students should develop ways of thinking that are general and allow them to approach any type of function, work with it, and understand how it behaves, rather than see each function as a completely different animal in the bestiary” (Functions Progressions, 2012, p. 7). | Food for thought |
| Pp:  Work in your groups to look for and describe coherence in the pairs of standards, domains, and clusters. | Handout: Finding Coherence in Functions (20 minutes)  Discussion: How is your definition working for you?  Is there anything you want to add?  What is meant by using ‘prior knowledge’? |
| Pp:  A friend from college, who teaches in another state, sent you this Growing Rectangles task and said a colleague of hers loved using it in her Algebra 1 classes. You decide to bring it to your PLC for discussion on possibly all using it. Which CCSS standards does it address and in what ways could it be used to help students develop a coherent understanding of the content? | Task analysis: Growing Rectangles (10 minutes)  The goal is for them to determine which standards it may address and also see where coherence could be intentionally addressed. |
| Look back at your questions: Are you able to answer them? Do you have new questions?  Reflection:  In what ways has your understand of coherence of the standards changed? What questions do you have? | Closure: look at your questions: Are you able to answer them? (discuss in groups)  Reflection:  In what ways has your understand of coherence of the standards changed? What questions do you have? |