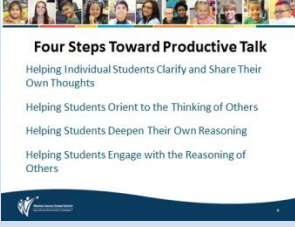
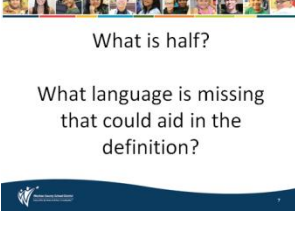
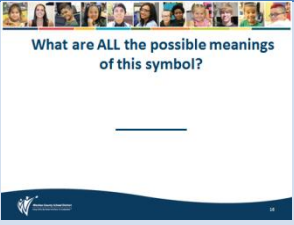
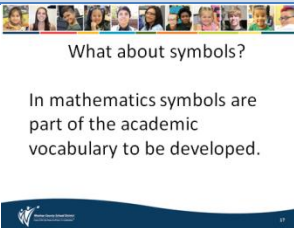
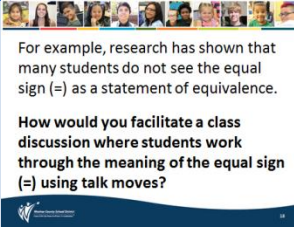
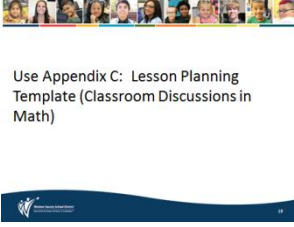
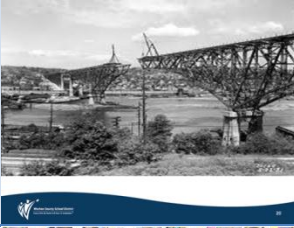
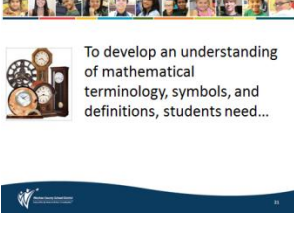
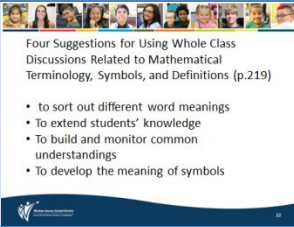
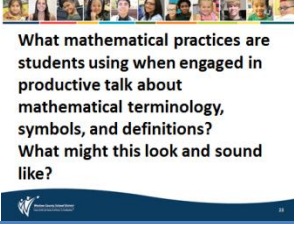


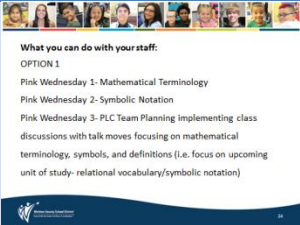

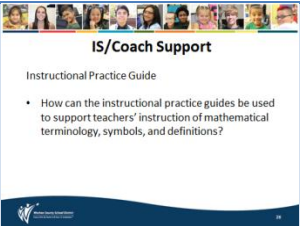
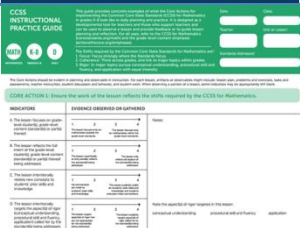

Implementing the Nevada Academic Content Standards

Talking About Mathematical Terminology, Symbols, and Definitions

Slides	Slide Notes	Additional Notes
 <p>Four Steps Toward Productive Talk</p> <ul style="list-style-type: none"> Helping Individual Students Clarify and Share Their Own Thoughts Helping Students Orient to the Thinking of Others Helping Students Deepen Their Own Reasoning Helping Students Engage with the Reasoning of Others 	<p>Background: The purpose of this slide is to connect to prior learning from the Fall/Winter mathematics “pink” Wednesdays.</p> <p>Presentation: Connection to the work that was engaged in the Fall 2013. The four steps provide a structure for analyzing and planning for components of productive classroom discussion.</p> <p>Consider having participants think about the ‘talk moves’ they have been using to support the productive classroom discussion and moving student thinking and reasoning between these four steps.</p>	
 <p>Essential Questions</p> <p>What strategies can we use to enhance our instruction so students learn mathematics with understanding?</p> <p>What does this look and sound like?</p> <p>Objective: How to support implementing classroom discussions that build understanding of mathematical terminology, symbols, and definitions.</p>	<p>Background for Facilitator:</p> <p>There are <i>Three Broad Categories of Math Vocabulary</i>:</p> <p>Category 1: Familiar words that have both mathematical and nonmathematical meanings.</p> <p>Category 2: New words that have specific mathematical meanings.</p> <p>Category 3: Words that must carry their context with them: phrases that express <i>part-whole</i>, <i>comparison</i>, and <i>set-element relationships</i>.</p> <p>Today we are focusing on Category 3.</p>	
 <p>What is half?</p> <p>60 second Stop and Jot.</p> <p>Turn & Talk with your colleagues.</p>	<p>Presentation:</p> <ul style="list-style-type: none"> Have all participants answer the question as a Stop & Jot. After a minute, have individuals Turn & Talk with colleagues. Facilitate a whole group discussion using the talk moves. Collect responses on poster paper. 	
 <p>What is half?</p> <p>What language is missing that could aid in the definition?</p>	<p>Background for Facilitator:</p> <p>Place the slide up after collecting responses on poster paper. Share-out what language could clarify and help draw attention to the context that is necessary when discussing Category 3: Words that must carry their context with them: phrases that express <i>part-whole</i> (this example), <i>comparison</i>, and <i>set-element relationships</i>.</p>	
 <p>How do we learn mathematical terms?</p> <p>Think about it. Jot down two ways to learn mathematical terms.</p> <p>Read p. 217-218 from Classroom Discussions in Math</p> <p>Annotate</p> <p>I- That’s just what I was thinking! P- Really? ✓ - I really need to check this out!</p>	<p>Background for Facilitator:</p> <p>This slide transitions in two parts.</p> <ul style="list-style-type: none"> Part 1 focuses on “How do we learn mathematical terms?” Part 2 focuses on participants connections and clarifications of what they may have noted. <p>Presentation:</p> <p>For Part 1: Have participants jot down two ways to learn mathematical terms. This may be two ways they teach or two ways in which they remember learning.</p> <p>For Part 2: Have participants read pages 217 and 218 sections, “About this Chapter” and “How do we learn mathematical terms?”. Use the annotate strategy to have them engage with the text.</p>	

 <p>Four Steps Toward Productive Talk Helping Individual Students Clarify and Share Their Own Thoughts Helping Students Orient to the Thinking of Others Helping Students Deepen Their Own Reasoning Helping Students Engage with the Reasoning of Others</p>	<p>Background for Facilitator: The “Four Steps Toward Productive Talk” provide a structure for thinking about how students are engaging in the mathematics. Depending on the task they may follow these steps in many different ways and not always in order. Think about the mathematical experience you engaged in at the beginning of this session. Which of the steps did you incorporate during your understanding process? Did you notice that you may have gone back and forth between a few of the steps? Presentation: Have participants quickly re-read.</p>	
 <p>Norms for Viewing Records of Practice</p> <ul style="list-style-type: none"> Assume that there are many things you don't know about students, and the shared history of the teacher and students in the video. Assume good intent and expertise on the part of the teacher. Keep focused on your observations about what student are getting out of the talk and interaction. Keep focused on how the classroom discourse is serving the mathematical goals of the lesson. 	<p>Background of Facilitator: Just a reminder of norms for viewing records of practice. Presentation: A record of practice is a way for us to have a discussion around a common source of information. They are not examples or non-examples, yet just a clip from practice for us to use to discuss the guiding questions.</p>	
 <p>How might a student respond to this question? If half an hour is 30 minutes, is half a dollar equal to 30 cents?</p>	<p>Background for Facilitator: Set-up for the video. This question is posed to students during the video. The purpose is to have participants think about this question prior to watching the video. Presentation: Say, “In the video the teacher had recognized a misconception in previous learning. She now poses a related misconception in the form of a question to the students for further exploration.” Turn & Talk: Anticipate what students may say.</p>	
 <p>As you watch the video clip consider these questions:</p> <ul style="list-style-type: none"> How are the four steps toward productive talk revealed during the small group discussion? How does this establish the purpose and direction for the whole class discussion? 	<p>Presentation: Have teachers read to establish purpose for viewing the record of practice (video).</p>	
 <p>Video 7A: Making Sense of One-Half</p>	<p>Background for Facilitator: This is for your reference only. Presentation: Watch Video.</p>	
 <p>How did the teacher facilitate the learning using productive talk?</p>	<p>Background for Facilitator: The purpose of this slide and this “extending” question (this builds from the guiding questions for watching the video) is to have participants think about the four steps and the structure of instruction. Example: Using small groups before whole group instruction. Presentation: Have participants engage in a Think-Pair-Share & Revoice (Be prepared to restate what your group shared)</p>	
 <p>We have discussed words that must carry their context with them.</p>	<p>Background for Facilitator: The purpose of this slide is to summarize Category 3. Category 3 words contain relational words. These words bring along with them the context needed to understand them. For example:</p> <ul style="list-style-type: none"> Quarter of an hour (15 minutes) Quarter in a game (1st quarter in a football game) Quarter of a dollar (\$0.25) Quarter of a whole (1/4) 	

 <p>What are ALL the possible meanings of this symbol?</p>	<p>Background for Facilitator: This connects to page 242-244: "Suggestion 4: Use Whole-Class Discussion to Develop the Meaning of Symbols"</p> <p>Presentation:</p> <ul style="list-style-type: none"> List all of your ideas on a post-it note. As you share with your group, list all the groups possibilities on a piece of chart paper. 	
 <p>What about symbols?</p> <p>In mathematics symbols are part of the academic vocabulary to be developed.</p>	<p>Presentation: Mathematical vocabulary goes beyond words. Just as the meaning of "half" has multiple meanings, so do many symbols.</p>	
 <p>For example, research has shown that many students do not see the equal sign (=) as a statement of equivalence.</p> <p>How would you facilitate a class discussion where students work through the meaning of the equal sign (=) using talk moves?</p>		
 <p>Use Appendix C: Lesson Planning Template (Classroom Discussions in Math)</p>	<p>Background for Facilitator: This is a <u>Differentiation Option</u>: consider using the Appendix C lesson planning template as an activity during a "pink Wednesday" If you are not using this activity, delete this slide.</p>	
	<p>Presentation: Students often come with preconceived notions of terminology and symbols. There is a need to orchestrate productive discussion that build on students' current understandings while connecting to new or corrected mathematical meanings.</p>	
 <p>To develop an understanding of mathematical terminology, symbols, and definitions, students need...</p>	<p>Background for Facilitator: Connect to page 217-218: How do we learn Mathematical Terms, paragraphs 2 and 3. You may wish to incorporate the gray box on page 219 "Four Suggestions for Using Whole-Class Discussions Related to Mathematical Terminology, Symbols, and Definitions." See the next slide.</p> <p>Presentation: Have participants finish sentence stem. Note: They have a place for this on the note-taker.</p>	
 <p>Four Suggestions for Using Whole Class Discussions Related to Mathematical Terminology, Symbols, and Definitions (p.219)</p> <ul style="list-style-type: none"> to sort out different word meanings To extend students' knowledge To build and monitor common understandings To develop the meaning of symbols 	<p>See notes for slide prior.</p>	
 <p>What mathematical practices are students using when engaged in productive talk about mathematical terminology, symbols, and definitions? What might this look and sound like?</p>	<p>Background for Facilitator: Differentiation Option: Consider using this as a processing piece for teachers to make connections to the math practices. You may wish to incorporate a structure such as having participants underline statements that support the connections.</p>	

 <p>What you can do with your staff: OPTION 1 Pink Wednesday 1- Mathematical Terminology Pink Wednesday 2- Symbolic Notation Pink Wednesday 3- PLC Team Planning implementing class discussions with talk moves focusing on mathematical terminology, symbols, and definitions (i.e. focus on upcoming unit of study- relational vocabulary/symbolic notation)</p>	This slide will be deleted for final posted presentation.	
 <p>What you can do with your staff: OPTION 2 Pink Wednesday 1- Mathematical Terminology and Symbolic Notation Pink Wednesday 2- PLC focusing on feedback and reflection of content OPTION 3 Pink Wednesday 1- Entire lesson and allow for planning time.</p>	This slide will be deleted for final posted presentation.	
 <p>IS/Coach Support Instructional Practice Guide</p> <ul style="list-style-type: none"> How can the instructional practice guides be used to support teachers' instruction of mathematical terminology, symbols, and definitions? 	Background for Facilitator: Differentiation Option: Consider using this as a processing piece for teachers to make connections to the instructional practice guides. You may wish to incorporate a structure such as having participants underline statements that support the connections.	
 <p>CCSS INSTRUCTIONAL PRACTICE GUIDE Mathematical Terminology, Symbols, and Definitions</p>	Delete this slide if you are not using the IPG differentiation option.	
 <p>References: www.nctm.org/ National Council of Teachers of Mathematics (NCTM). Chapin, S., O'Connor, C., Anderson, N. (2013). Classroom Discussions in Math: A Teacher's Guide for using talk moves to support the Common Core and more. Math Solutions. http://www.illustrativemathematics.org/HS/index.html Classroom Talk Page</p>		

Additional Notes:

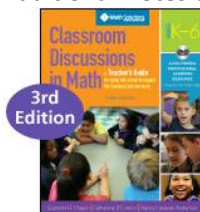
School Level Essential Question:

What strategies can we use to enhance our instruction so students learn mathematics with understanding? What does this look and sound like?

Talk Moves & Strategies

- Turn & Talk
- Think, Pair, Share & Revoice
- Who can add on?
- Revoice/Restate
- Stop & Jot (then revise)

Additional Notes & Support: Chapter 7: Talking About Mathematical Terminology, Symbols, and Definitions.



- Videos to support:
- 7A Making Sense of One-Half (5:54)
 - 7B Using the Words *More* and *Less* (4:43)
 - 7C Connecting Factors and Multiples (5:23)
 - 7D Defining the Word *Volume* (2:07)
 - 7E Talking About Ratios (6:07)
 - 7F How Many Groups? How Many Hearts (2:56)